FS Sound Studio

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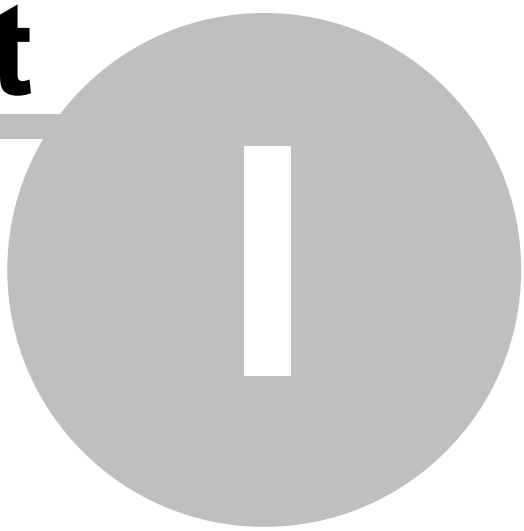


1 Introduction

1.1 Welcome to FS Sound Studio

FS Sound Studio is a full featured sound configuration editor for Microsoft Flight Simulator FSX, Flight Simulator 2004, Flight Simulator FS2002, Combat Flight Simulator2, and CFS3.

1.2 System Requirements

- Windows XP or Vista.
- At least 256 MBytes of physical memory, 512 MBytes or more is strongly recommended.
- Display resolution of at least 1024x768 pixels.
- A DirectX capable Sound card. If your system can run FS2004 or FSX well, you'll probably be OK.

1.3 Manual Conventions

This following is a list of icons and font faces you'll encounter that have special meaning. They will help guide you through the instructions and notes included in the manual.

Buttons and Menu Commands

Buttons and menu commands will be illustrated in Bold, in the color blue, as in the following example:

Tools:Export Panel...

Individual menu picks will be separated by a colon (:).

File Path names

File path names will be italicized and bold as in the following example:

C:\Program Files\Microsoft Games\Flight Simulator

Abbreviations

FS Sound Studio is abbreviated as "FSSS"
Flight Simulator is abbreviated as "FS"
Microsoft Flight Simulator 2000 is abbreviated as "FS2000"
Microsoft Flight Simulator 2002 is abbreviated as "FS2002"
Microsoft Flight Simulator 2004 is abbreviated as "FS2004"
Microsoft Flight Simulator FSX is abbreviated as "FSX"
Microsoft Combat Flight Simulator 3 is abbreviated as "CFS3"
Microsoft Combat Flight Simulator 2 is abbreviated as "CFS2"

Most steps and examples in the manual assume you are using FS2004. The actions are, for the most part, identical if your simulator is CFS2 or CFS3. Where this is not the case, it will be noted.

1.4 Limitations

The Current version of **FS Sound Studio** does not support new keywords added for the FSX release. Support for new keywords will be added over time as free upgrades to customers.

CFS3 does not support multiple panel and sound configurations. You can only edit the single sound configuration provided. There is no concept of more than one Panel per aircraft in CFS3.

FS Sound Studio can read in and convert FS98 format *sound.cfg* files, however the translation is not 1 to 1. For example, the FLAPS sounds are slightly different.

FS Sound Studio is not a wave file editor. A wave file editor is not needed to create a sound configuration, however, to edit wave files, you'll need a standalone external program. **FS Sound Studio** will use this external editor if it's configured in Windows to be the default program to edit *.wav* files.

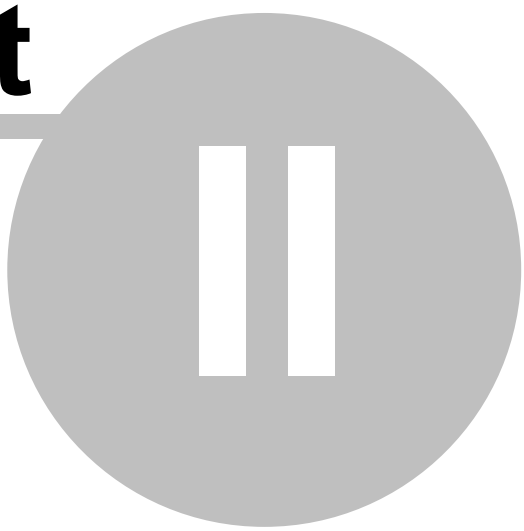
FS Sound Studio using Microsoft DirectX to play sounds. You must have a DirectX capable sound card, with DirectX installed to use it.

Some Examples of Wav file editors:

SoundForge	www.soundforge.com	One of the best, a full featured audio editing solution
CoolEdit	www.cooledit.com	Commercial audio editor
Audacity	audacity.sourceforge.net	An open source free audio editing program

The latest version of DirectX is available from Microsoft at www.microsoft.com/windows/directx.

Part



2 Getting Started

2.1 Installation

FS Sound Studio can be downloaded from www.FSSoundStudio.com. It's a good idea to check this site frequently for the latest version.

FS Sound Studio can be in installed in any directory on your system, however the following directory is recommended (and is the default):

C:\Program Files\FS Sound Studio

Once you have downloaded the ***install.exe*** file, run it and follow the installer directions.

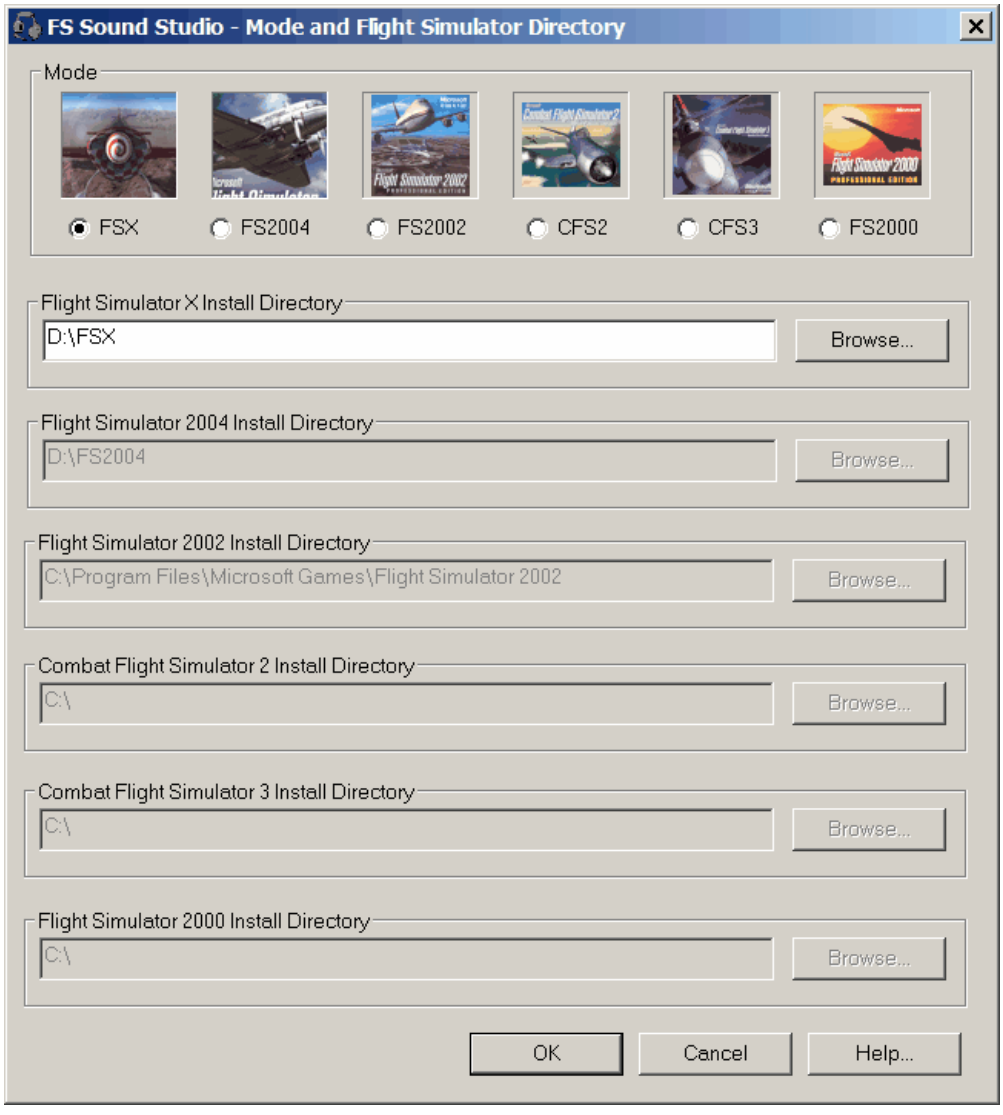
2.2 Running for the first time

Flight Simulator Installation Directories

In order to find the installed Aircraft and Sounds on your system, **FS Sound Studio** needs to know where you've installed your Microsoft Flight Simulator software. The first time **FS Sound Studio** runs, it searches your registry to try to determine this automatically. In most cases this will be successful, however if you wish to edit sounds installed on another system over the network, or **FS Sound Studio** can't find your install directories, you can manually set them.

This dialog will also be run automatically when **FS Sound Studio** detects that it is being run on a computer for the first time.

To set your directories, select **Options:FS Mode and Root Directories...** from the main menu. The following window will appear:



In this example, FSX is installed on ***D:\FSX***.

To change the Install Directory, type in the new path, or use the **Browse...** button to help find your directory. **FS Sound Studio** will store this information in the System Registry and you won't need to enter it again.

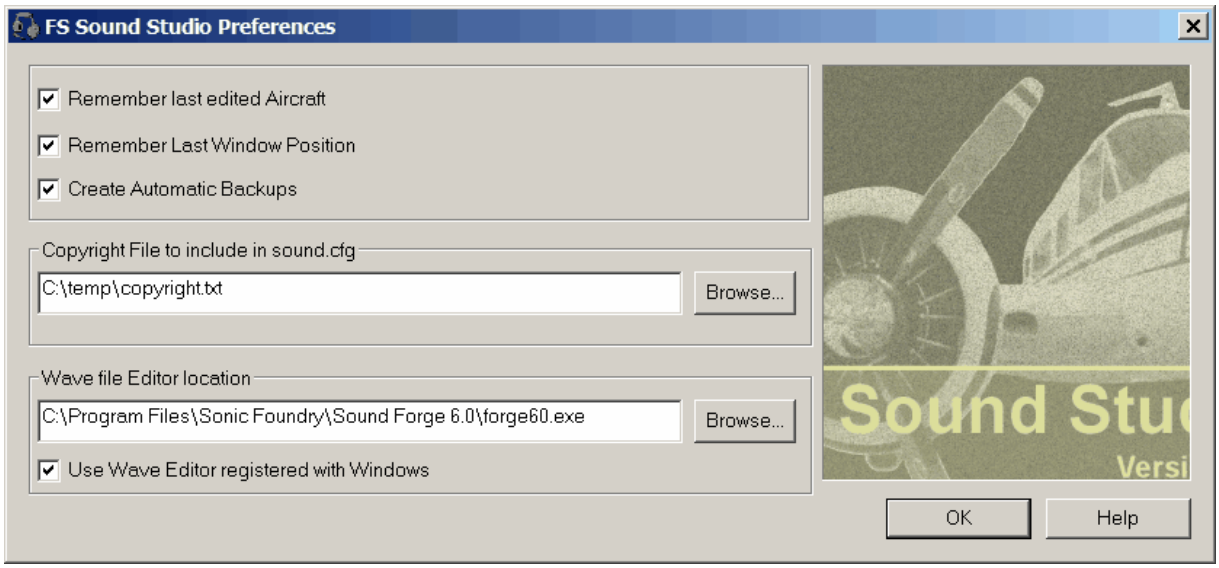
2.3 Mode

FS Sound Studio supports sounds configurations created for FS2000, FS2002, FS2004, FSX, CFS2 and CFS3. However, not all sound options and syntax are valid in all cases. For example FS2002 introduced new syntax and keywords not supported in CFS2. Selecting a "Mode" tells **FS Sound Studio** which Flight Simulator you're working with so it can create the right syntax for the ***sound.cfg*** file.

To specify the mode, Select **Options:FS Mode and Root Directories...** from the main menu. At the top of this window will be a Mode section which will allow you to select the right mode.

2.4 Preferences

- You can tailor how **FS Sound Studio** starts and loads windows with the **Options:Preferences** window:



The options are as follows:

• Remember Last Edited Aircraft

If checked, **FS Sound Studio** will reload the aircraft you were editing when you last exited the program.

• Remember Last Window Position

FS Sound Studio will start in the same position on your graphics display as when you last exited, if this is checked.

• Create Automatic Backups of edited files

If checked (which is recommended), when you save the sound configuration you're editing, a backup copy of the original will be created for you. It will have the form: *sound_backupNNN.cfg*, where the NNN will be replace with a three digit unique number, increasing in value with every save.

• Copyright File to include in sound.cfg

When a valid filename is specified here, **FS Sound Studio** will include it within the output *Sound.cfg* file. Use two slashes, "**//**" at the start of each line in this file to make sure Flight Simulator interprets them as comments -- the file is included with no validation or editing.

This function is useful for inserting a Copyright entry in every aircraft sound configuration you edit. The file can be multiple lines. The validity of the filename is not checked until the output file is written.

- **Wave file Editor location**

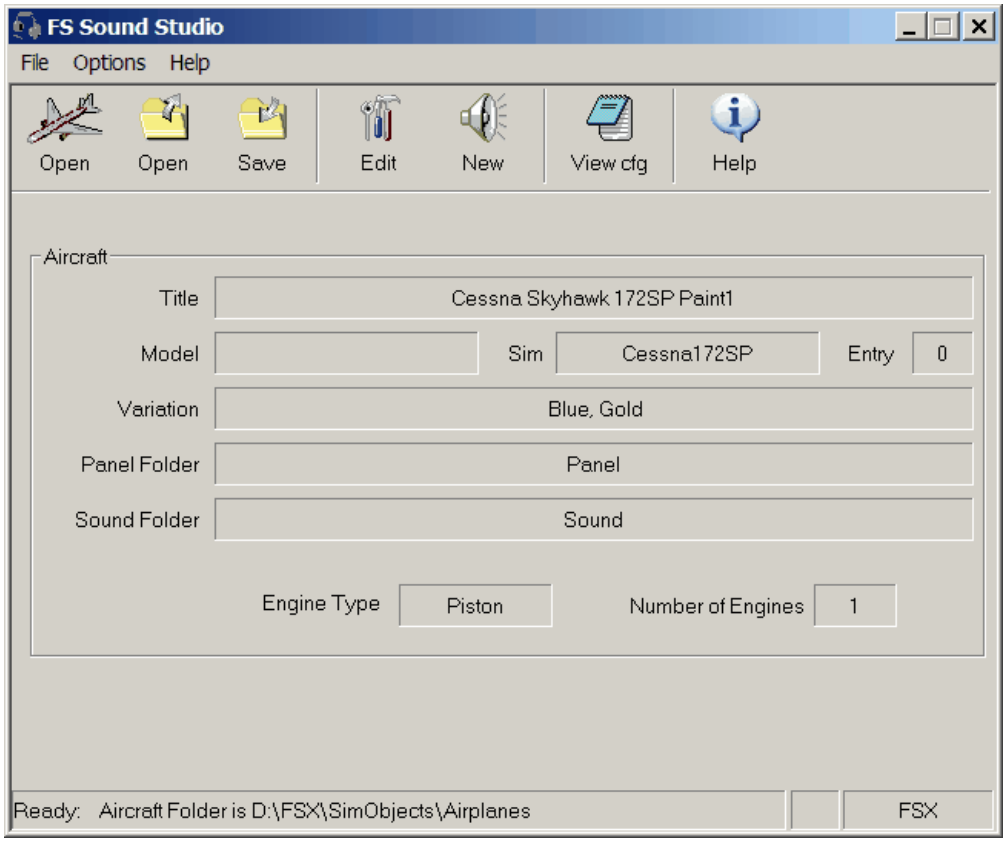
When a valid program name is specified here, and the **Use Wave editor registered with Windows** is left unchecked, **FS Sound Studio** will use the program specified here to edit your wave files when asked to do so in the Properties dialogs.

- **Use Wave editor registered with Windows**

When checked, and FS Sound Studio is asked to edit a wave file in the Properties dialogs, FS Sound Studio will use the program registered in Windows as the file extension *.wav* editor. To modify these associations, use the Windows Explorer, and navigate to the **Tools: Folder Options: File Types** dialog. Note that you need to register a program for the action **Open**.

2.5 The Main Window

The Main **FS Sound Studio** window appears as follows:



From top to bottom, items seen on the Main Window are:

- **Menu Bar**

Contains the standard Windows menus.

- **ToolBar**

The toolbar gives you quick access to the most common FS Sound Studio tools and actions.

- **Mode and Directory Info**

Information about the current Mode of **FS Sound Studio**, and the root location in the file system of the currently selected Flight Simulator

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Aircraft Information

The following informational fields help you identify the Aircraft/Sound configuration to FS2002. In the example below, the Microsoft supplied C172, the **Aircraft Model** is "C172SP Skyhawk" and the **Variation** is "White with blue and gray".

- **Title**

Title information for the currently selected Aircraft is retrieved from the *aircraft.cfg* file. The Title is used by Flight Simulator to uniquely identify and Aircraft/Panel/Sound combination, as when saving Flights.

- **Aircraft Model**

This is the text that shows up in the FS2004 Load Aircraft Dialog in the Aircraft Model field. Extracted from the *aircraft.cfg* file from the **UI_TYPE** entry. This also specifies the MODEL used by the aircraft in FS2004.

- **Aircraft Sim**

This is extracted from the *aircraft.cfg* and specifies the SIM used by the aircraft in FS2004.

- **Entry** number

This is the index of the loaded Panel/Sound configuration in the *aircraft.cfg* file. If you are hand editing the *aircraft.cfg* file, this can be useful information.

- **Variation**

The Variation text describes the Aircraft on one line, and is used to supply more information on the Aircraft while selecting an aircraft to fly. In FS2004, the Variation allows the user to select between

many shared Panels and Sound configurations. Extracted from the *aircraft.cfg* file from the **UI_VARIATION** entry.

- **Panel Folder**

This is where **FS Sound Studio** has determined the currently selected Aircraft's Panel files are located. This information is useful to ensure that the sound configuration you're editing belongs to the appropriate Aircraft and Panel combination.

- **Sound Folder**

This is where **FS Sound Studio** has determined the currently selected Aircraft's local sound files are located. This information is useful to ensure that the sound configuration you're editing is the correct one.

- **Engine Type**

Extracted from the *aircraft.cfg* file, this is the type of engine being modelled, and will determine what types of Sounds and events are valid for the *sound.cfg* file. Example engine types are "piston"and "jet".

- **Number of Engines**

Extracted from the *sound.cfg* file, this is the number of engines for the current configuration. This will determine the Sounds and events displayed in the **FS Sound Studio** editor. Currently, FS2004 supports configurations with 0 to 2 engines. You can have a 4 engine aircraft, but with specific sounds for only 2 engines. This is a limitation of FS2004.

- **Status Line**

Information on the current state and activities of **FS Sound Studio**. Warning and Error messages are also displayed here.

2.6 The ToolBar

The **FS Sound Studio** toolbar appears as follows:

Here's a brief description of what the individual buttons do. The same functions are available through Main Menu picks.

- **Open** a Sound Config based on Aircraft

This will open an sound configuration based on the Aircraft installed in your Flight Simulator. FS Sound Studio will search for *aircraft.cfg* files for valid aircraft. Use it to select the sounds associated with a particular Panel and Aircraft.

- **Open** an existing *sound.cfg* file

For experienced designers only! Use this to open a specific *sound.cfg* file using the normal Windows File Explorer. Useful if you wish to edit a *sound.cfg* file anywhere on your system (not in the normal FS directory structure). *NOTE: Using this option makes it impossible for FS Sound Studio to determine the correct Title and UI Variation and other values extracted from the aircraft.cfg file. Reasonable values will be provided, but they are not guaranteed to be accurate. We recommend you use the previous Open button if at all possible.*

- **Save** the current *sound.cfg* file

The current sounds will be saved to disk, and optionally, a backup file will be created.

- **Edit**

Starts the **FS Sound Studio** Editor, which allows you to manipulate the *sound.cfg* file for the selected Aircraft.

- **New**

Starts the **FS Sound Studio** Add a New Sound Config Wizard. The Wizard allows you to add a new sound configuration for a specific Aircraft/Panel combination. More details can be found in the Tutorial section. *NOTE: CFS3 does not support multiple Panels or Sound configurations. This function will not be available in CFS3.*

- **View .cfg**

Displays the current *sound.cfg* file in Notepad. This allows you to see exactly what your final config file will look like. *NOTE: Any change made in notepad will be discarded.*

- **Help**

Displays the **Help:About** window, showing the revision of **FS Sound Studio** and system information. The most up to date source of Help information can be found at the **FS Sound Studio** website.

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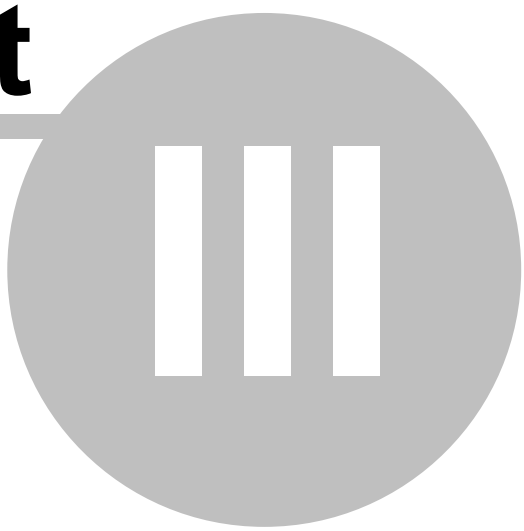


3 Background: How the sound.cfg file Works

3.1 Flight Simulator Sound Background

This chapter will attempt to describe how the *sound.cfg* file is structured. For the official documentation, please refer to the Microsoft SDK. FS2004 or FS2002 will be used in the examples, although the data applies almost equally to other versions of FS.

At its most basic form, Microsoft Flight Simulators use a *sound.cfg* file to associate flight simulation sound ***Events*** with audio wave files on disk. DirectX is used to play the files. The *sound.cfg* file is grouped into Sections such as **SOUND_ENGINE**, with related sound events grouped together.

FS searches for wave files in two directories, the named local Sound folder specified in the *aircraft.cfg* file, and the system Sound folder. FS2002/ and CFS2 allow you to associate a different Sound folder for each Panel (or share the same one). Thus you could have two aircraft with a common Panel but with two different sound configurations. At runtime, you select the one you want in FS by using the **UI Variation** listed in the FS menu.

Sounds have ***Parameters*** which modify how and when they are heard. An example is the **Viewpoint** parameter. This specifies whether the sound being defined is heard inside the cockpit, or in views outside the cockpit, for example the Tower View. Thus we can have different sounds heard for a stall warning: a normal one inside the cockpit; and perhaps a very faint one heard if our view is outside the cockpit.

One of the Parameters that determine when and how a sound is played is the **FLAGS** parameter. Flags associate different sounds with different specific occurrences in FS. For example, FLAGS can be set so that a specific engine sound only occurs when the engine is Damaged, or in CFS3 when Boost is applied to the engine.

Further ***Parameters*** can change the **Volume** and **Rate** of sounds, depending on airspeed or engine RPM. An example is wind sound. The sound can be programmed to more realistically sound louder as the airspeed increases by specifying a initial Volume at a Minimum Speed, and a louder Volume at a Maximum Speed.

More sophisticated ***Parameters*** allow a Volume **Envelope** and Rate **Envelope** to be defined. This allows the mixing of sounds, as a sound can be defined to be heard only over a section of the total RPM range of an engine. This allows the creation of ***Sound Lists***, where multiple wav files are combined to create one sound. They are combined based on their volume Envelopes. This allows better modelling of complex sounds such as Engines.

With all of these parameters, it's usually not necessary to edit the wave file itself. With proper selection of parameters, you can modify to wave file to get your desired sound.

Some sounds use multiple wave files in a different way. For example, the **Crash** sound can have multiple wave files defined. When a crash occurs, FS will randomly pick one of the sounds to play.

FS Sound Studio allows you to see and modify these parameters using a graphical user interface. It also allows you to hear your changes in real time, so you can very quickly produce your desired sound effects.

For more details on sound configurations, please see the Microsoft SDKs.

Sound.cfg file Examples

- **A Simple Example - STALL_WARNING**

A simple example is the stall warning sound. During flight, if the aircraft stalls, the .wav file associated with this event is played for as long as the aircraft is stalled. The config file stall warning event is **STALL_WARNING**. The **viewpoint** is set so the sound is heard only inside the cockpit. The C172 stall sound definition looks like this in the *sound.cfg* file:

```
[STALL_WARNING]
filename=c172_stallhorn
viewpoint=1
```

- **A more complex Example - WIND_SOUND**

The wave file used to represent wind would not sound right if it were to be played at a constant volume and pitch -- the wind noise in the C172 should not sound the same at 50 knots as it does at 120 knots. Also, as the airspeed increases, the pitch of the sound should also increase. This is accomplished by specifying minimum and maximum speeds, volumes and rates for the sound. This is how it looks for the default C172:

```
[WIND_SOUND]
filename=wind3
viewpoint=1
minimum_speed=40.00
maximum_speed=120.00
minimum_volume=6000
maximum_volume=8500
minimum_rate=0.60
maximum_rate=0.90
```

In this case, at airspeeds at or below 40 knots, the sound is played at a volume of 6000 (0 is minimum, 10000 is maximum), and a rate or pitch of 0.60 of the raw file. At airspeeds at or above 120 knots, the sound is played at a volume of 8500, and a rate of 0.90. Between these two airspeeds, the volume and rate are interpolated, and will fall somewhere between the two extremes.

- **Complex Sound Example - the C172 SOUND_ENGINE**

Engine sounds are very complex, and vary dramatically as the RPM and airspeed varies. FS breaks down the total sound into multiple components to allow many wav files to mix together -- this more accurately conveys the sound. The C172 (and all single engine prop planes) can specify up to 6 predefined sound types or events in the SOUND_ENGINE section of the sound.cfg file. The SOUND_ENGINE section of the C172 looks like this:

```
[SOUND_ENGINE]

number_of_engines=1

ENG1_COMBUSTION_START=combstart
ENG1_STARTER=starter
ENG1_SHUTDOWN=shutdown

ENG1_COMBUSTION=COMBUSTION.1.00
ENG1_PROP=PROP.1.00
ENG1_NON_COMBUSTION=NON_COMBUSTION.1.00
```

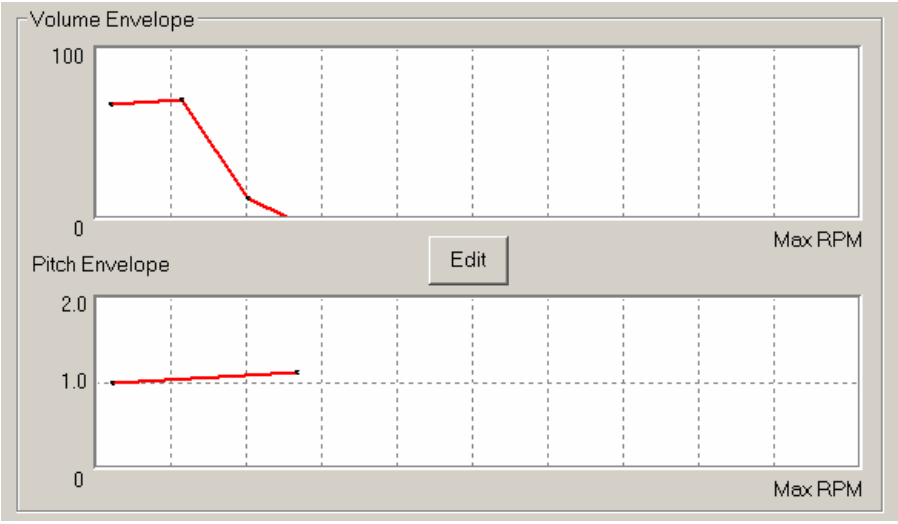
The number_of_engines value is self explanatory. We then have 3 events that have defined sounds, start, shutdown, and combustion start. These sounds are only played at specific times (such as shutdown, of course) and are fairly simple, although they can be defined by a Sound List of multiple wave files. In practice they are normally defined by a Sound List with two items, an external viewpoint sound, and an internal, in-cockpit sound.

Finally we have the most complex section of a *sound.cfg* file -- three Sounds which play all the time the engine is running. Sounds representing the prop, for combustion noises, and for non-combustion, "mechanical" noises. If you're creating your own sound configuration, you may not be able to supply accurate sounds for each, but a satisfactory effect can be had by mixing a sound list of about 4 files for just combustion. Take a look at existing aircraft to see how other designers are dealing with this.

To further our example, let's take a look at the C172 ENG1_COMBUSTION sounds. They're defined by a Sound List named COMBUSTION.1.00. If we take a look at this entry in the sound.cfg file, we see the following:

```
[COMBUSTION.1.00]
filename=c172_rpm1
flags=0
viewpoint=1
rparams=0.023000,0.989000,0.264000,1.110000
vparams=0.021000,65.599998,0.113000,68.000000,0.199000,11.200000,0.255000,0.000000,0.530000,0.
000000,0.530000,0.000000,0.530000,0.000000,0.530000,0.000000
link=COMBUSTION.1.01
```

Note the viewpoint (internal to the cockpit) and filename for the wave file. We also have both a Volume and Rate envelope defined. If we were to plot these out, we'd see the following:



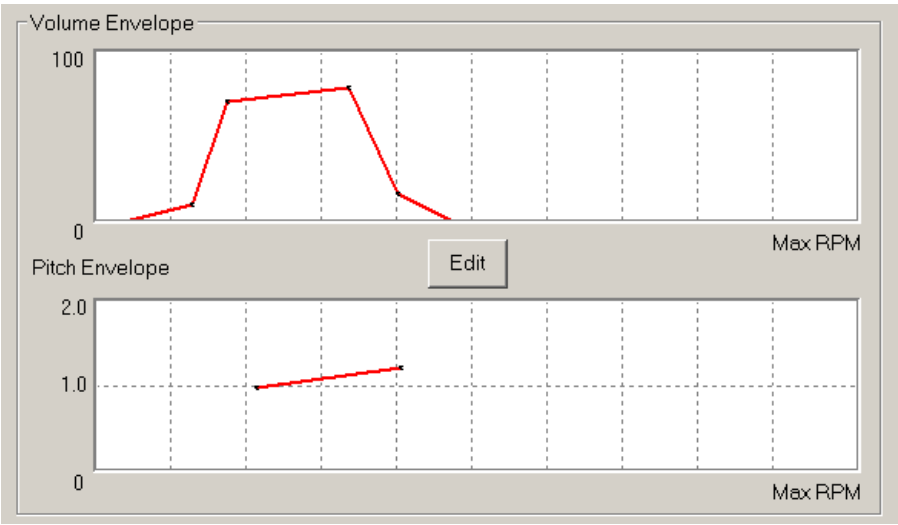
As the RPM of the engine increases the Volume of this wave file is played at about a constant value. At about 11% of the maximum engine RPM, the sound decreases in volume until at about 25% of maximum RPM, it's inaudible. The rate or pitch of the sound increases slightly as the RPM increases.

If this were the only entry in the Sound List, you'd only hear the engine as it was idling, as the throttle was increased, the sound would fade out. However, note the **link** value. This tells FS that this sound list has another entry, COMBUSTION.1.01. Looking at this entry in the sound.cfg, we see the following:

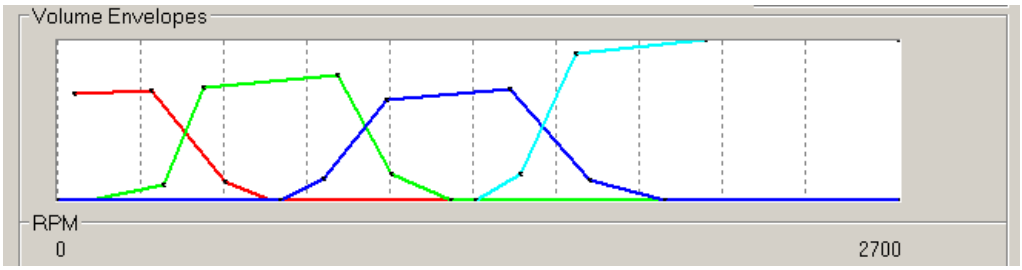
```
[COMBUSTION.1.01]
filename=c172_rpm2
```

flags=0
viewpoint=1
rparams=0.211000,0.977000,0.400000,1.203000
vparams=0.039000,0.000000,0.127000,9.600000,0.174000,69.599998,0.333000,77.599998,0.396000,16.000000,0.468000,0.000000,0.731000,0.000000,0.863000,0.000000
link=COMBUSTION.1.02

And graphing out the rate and volume envelopes we see the following:



As the first sound fades out, the next takes over. And so on for the next **link** entry, until we get (for the C172) four entries in the list. Putting them all together:



Here we see how the four entries in the ENG1_COMBUSTION sound list combine to create the internal Combustion sound for the C172.

Part IV

4 Using FS Sound Studio

4.1 Opening a Panel/Sound Combination

There are three ways to open a Panel and its associated Sounds for editing.

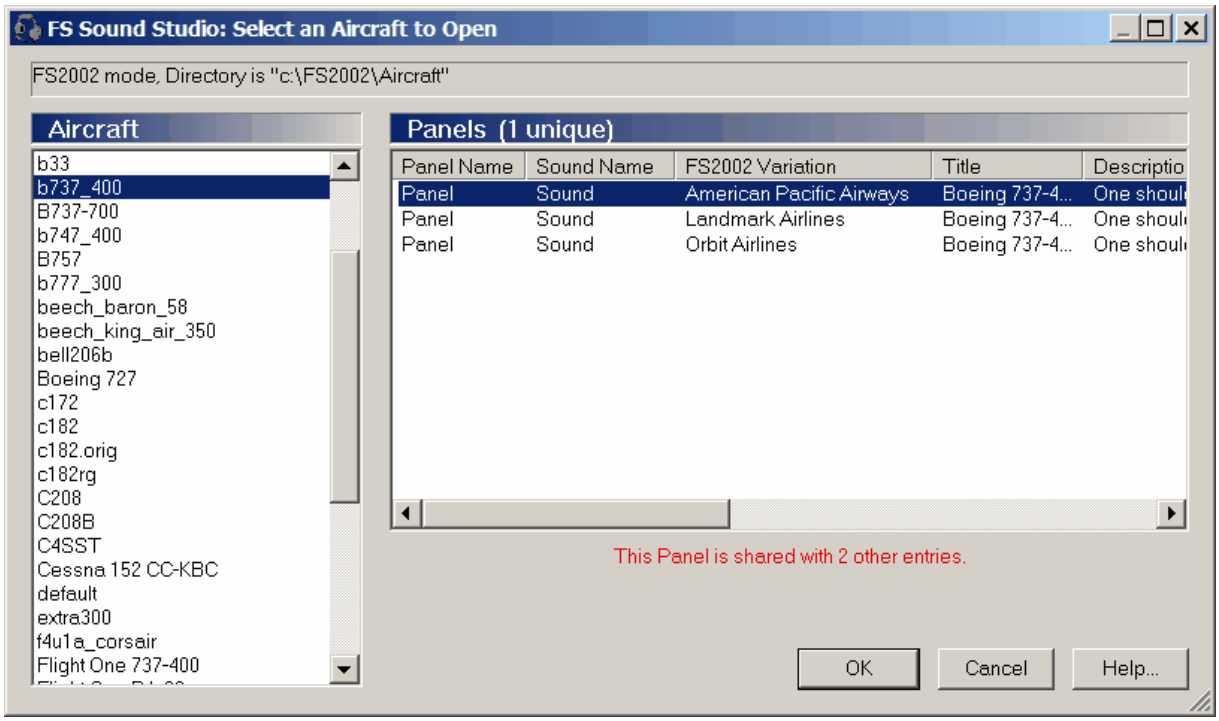
- The first method uses the normal Windows **File:Open** menu pick in FS Sound Studio; just as you would open a file in Notepad, for example. All Sounds configurations are stored in a file name *sound.cfg*, and exist in the following directory:

C:\<FS Install Dir>\Aircraft\<Aircraft Name>\Sound

If you have multiple sound configurations for an Aircraft, there will be multiple Sound directories, eg ***Sound, Sound.stereo, Sound.new*** and so on. Note that CFS3 does not support multiple panels or sounds.

- The second method is to drag a *sound.cfg* file in the Windows Explorer and drop it onto the **FS Sound Studio** Icon.

- The third and last method, and probably the most useful, is to use the **File:Open Sound.cfg by Aircraft** menu pick in FS Sound Studio (or the corresponding Toolbar button). This will bring up the following window:

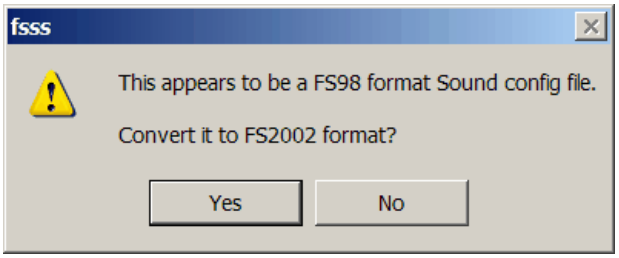


The top box will list the current FS Sound Studio Mode and the directory we are searching for Aircraft in (useful for verifying the directories are set correctly in the preferences dialog). The left **Aircraft** pane shows all installed Aircraft, and the right **Panels** pane will show the Panels installed for each aircraft along with its associated Sound configuration name. Along with the **Panel Name, Sound Name**, the **Variation, Title** and **Description** are listed to help you select the appropriate Panel's sound (these entries are extracted from the Aircraft's *aircraft.cfg* configuration file).

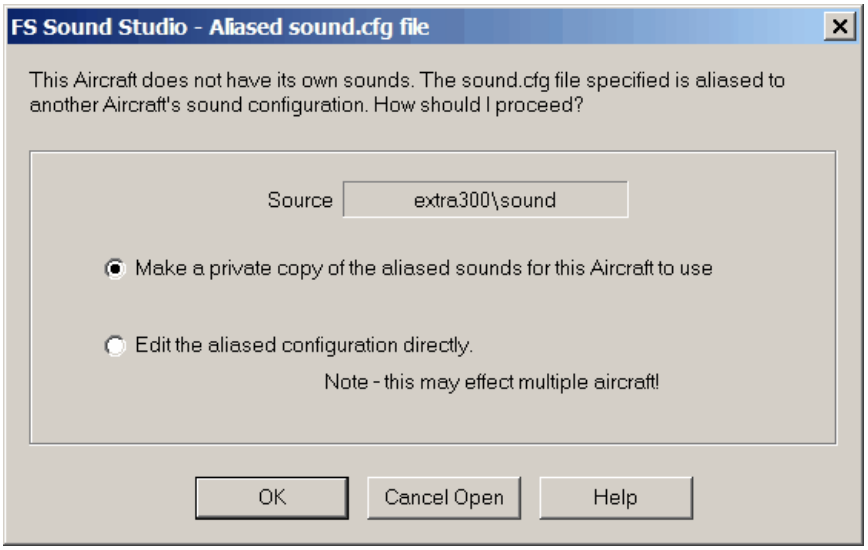
NOTE: In the example above, we see there are three identical Panels named ***Panel***. There is, in fact, only one physical Panel on disk, which is shared by three entries in the *aircraft.cfg* file. They may vary in ATC ID or external texturing, but there is only one Panel. Each also shares the same Sound configuration, named Sound. If you edit this Panel/Sound config, all three Aircraft will fly in Flight Simulator with the modified Panel and Sounds. FS Sound Studio will warn you of this, as is shown in the example above, with the message **This Panel is shared with 2 other entries**. Only Panels or Sounds with different names are unique. If you select a shared Panel, FS Sound Studio will open the first in the list and edit it.

Note: If your aircraft is not installed properly then you won't see any Panels listed. This can happen if there is no *aircraft.cfg* file. You can still edit the Sound if it exists in the default location, which is the subfolder ***Sound*** with a filename of ***sound.cfg***. In this case simply click on **OK**, and FS Sound Studio will look for this default Sounds.

Highlight your selection and click the **OK** button to open. The *sound.cfg* file will be read and the Sound configuration loaded, ready for editing.



FS Sound Studio has the capability to automatically convert pre-FS2000 format *sound.cfg* files to FS2002 and later format. If an FS98 format file is detected, you will be prompted to confirm the file conversion.



If FS Sound Studio detects that the *sound.cfg* file is aliased to another Aircraft, you'll see this dialog.

If FS Sound Studio cannot determine the format of the *sound.cfg* file, you will be prompted to supply this information. Reading in the wrong format will not harm anything, if you don't know which format to specify, you can try both.

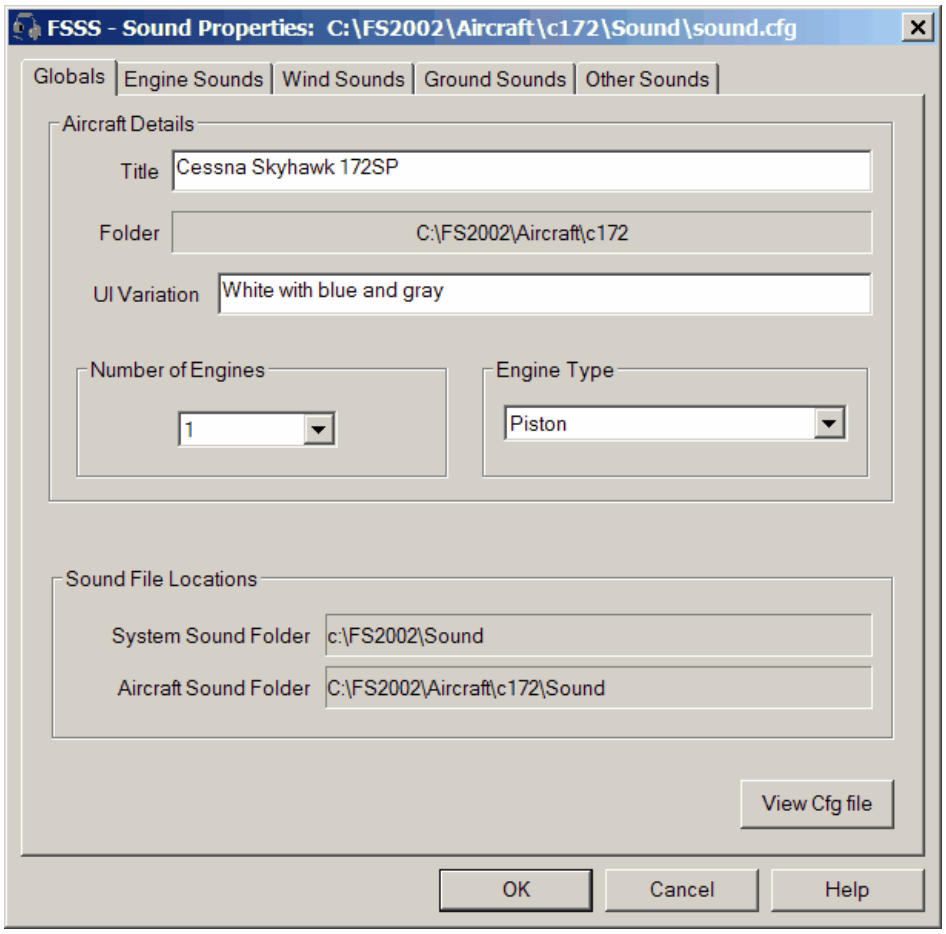
4.2 Using the Editor

The FS Sound Studio Editor allows you to easily change the assignments of sound files to sound events. It also gives you an easy, graphical way to modify the parameters that effect those sounds. Finally, FS Sound Studio allows you to preview sounds in real time while you're making changes, so you can tell exactly how they will sound in Flight Simulator.

After loading an Aircraft and launching the Editor, you'll see the following dialog (All examples are taken from the default Microsoft C172). Each category of sounds has its own property page. Click on the tab for the corresponding sounds.

Globals

The **Global** page gives you general information about the sound configuration.



- **Aircraft Details**
  - **Title**

    The Title is retrieved from the *aircraft.cfg file*. It's used to identify your particular Panel/Sound combination to FS, for example, when saving a flight. You can type in a new Title here, and it will be written to the *aircraft.cfg* file when you Save your sound project.

- **Folder**

  This lists the folder where the *aircraft.cfg* file and the Panel and Sound subdirectories are located. This is useful to ensure you're editing the right Aircraft!

- **UI Variation**

  Extracted from the *aircraft.cfg* file. FS uses the UI Variation to uniquely identify your Panel/Sound combination when loading an Aircraft. You'll see it in the FS Load Aircraft dialog. You can type in a new UI Variation here, and it will be written to the *aircraft.cfg* file when you Save your sound project.

- **Number of Engines**
- **Engine Type**

  The number of engines is defined in the *sound.cfg* file, the engine type in the *aircraft.cfg* file. Together, they determine the Sound Types that FS Sound Studio will display (and FS will play!) For example, if the engine type is **Jet**, then there will be no **ENG1_PROP** sounds in the *sound.cfg* file, or shown in FS Sound Studio as a jet engine has no propeller.

- **Sound File Locations**

  - **System Sound Folder**

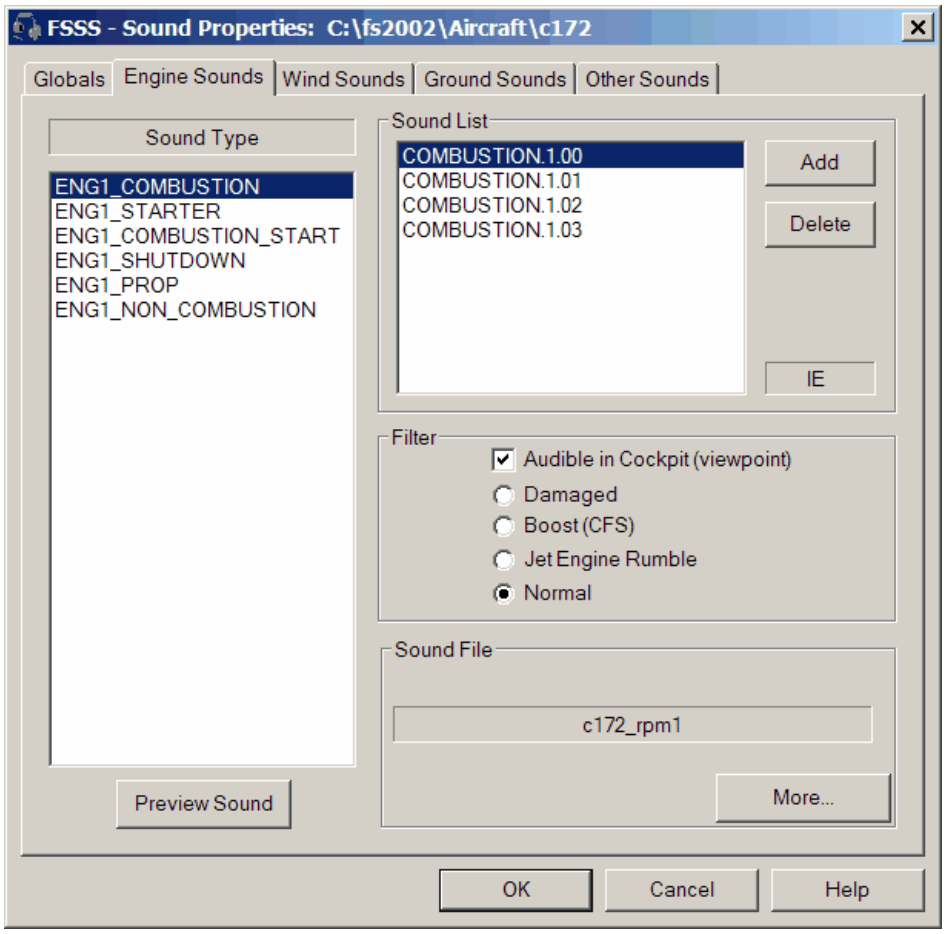
    The location of the sound files shared by all aircraft in the Flight Simulator. A sound configuration may be made up of sounds from a combination of system and local sounds. When searching for a wave file, FS first looks in the local folder, then the system folder.

  - **Aircraft Sound Folder**

    The location of local sound files used by this sound configuration. File name paths are not specified in the *sound.cfg* file. In order to find the file, FS first checks the aircraft's local Sound Folder -- if not found there the System Sound Folder is examined. If still not found, the file will not be played.

Engine Sounds

Engine sounds are the most complex sounds modelled in FS. Multiple Sound Types, such as Prop and Combustion noises, made up of multiple Sound Lists entries, each a wave file with parameters, are mixed together to create the final sounds you hear in FS. FS Sound Studio helps you to organize, modify and preview these sounds.



- **Sound Type**

Engine Sounds are made up of a number of predefined Sound Types which are mixed together to create the final engine sound. The Sound Types change depending on the number of engines and their type; for example, a Prop engined aircraft will not have **JET_WHINE**.

- **Sound List**

FS Sound Studio lists the appropriate Sound Types for the current engine type and number in the Sound Type list box. Selecting one of these will update the Sound List listbox with the Sound List items defined for this Sound Type in the *sound.cfg* file. Selecting an item in the Sound List listbox will update the Sound File box with the wave file name defined for the Sound List item. You can **Delete** the currently selected item, or add a new one with the **Add** button.

A textbox also shows which sounds are defined for this Sound Type. In this example, the legend "**IE**" is shown next to the Sound List. This indicated that both ***I**nternal* and ***E**xternal* sounds are defined. In this example, the internal sounds are listed in the Sound List, because the **Filter** is set to **Audible in Cockpit**. The following abbreviations are used:

I	Internal
E	External

For PROP sounds:

M	Max Prop Pitch

m Min Prop Pitch
R Min Reverse Prop Pitch

For COMBUSTION sounds:

D Damaged
B Boost
J Jet Engine Rumble sound

This is a useful reminder of what sounds are defined and available. FS Sound Studio only shows the filtered sounds to prevent cluttering the display.

- **Filter**

The Sound list items are qualified by the Flag items selected in the Filter. In the example above, the **Audible in Cockpit (viewpoint)** check box is selected. This restricts the list of Sound List items to **ENG1_COMBUSTION** entries that are audible in the cockpit, and do not have the Damaged, Boost or Jet Engine Rumble flag items set.

- **Sound File**

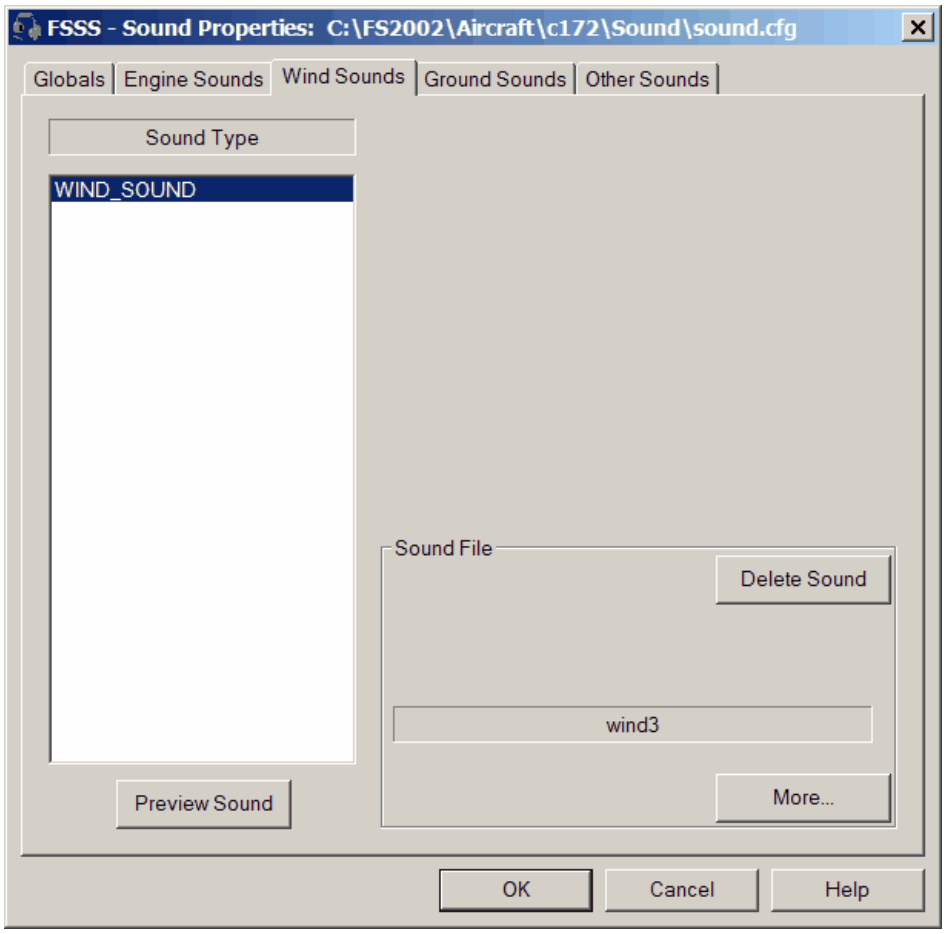
The sound file box shows the wave file defined for the selected Sound List item. This filename is shown without the *.wav* file extension or full path, and must exist in either the System or Aircraft Sound folder as shown on the **Global** page. Clicking the **More...** button will bring up the Properties Dialog detailing the **Parameters** for this Sound List item.

- **Preview**

Clicking on the **Preview** button will start the Sound Previewer.

Wind Sounds

There is only one Wind sound available, which has its own sub section in the *sound.cfg* file.



The Wind Sounds page shows the current Sound File associated with wind sounds in FS.

- **Delete Sound**

Clicking the **Delete Sound** button will remove this sound (but not the wave file).

- **More...**

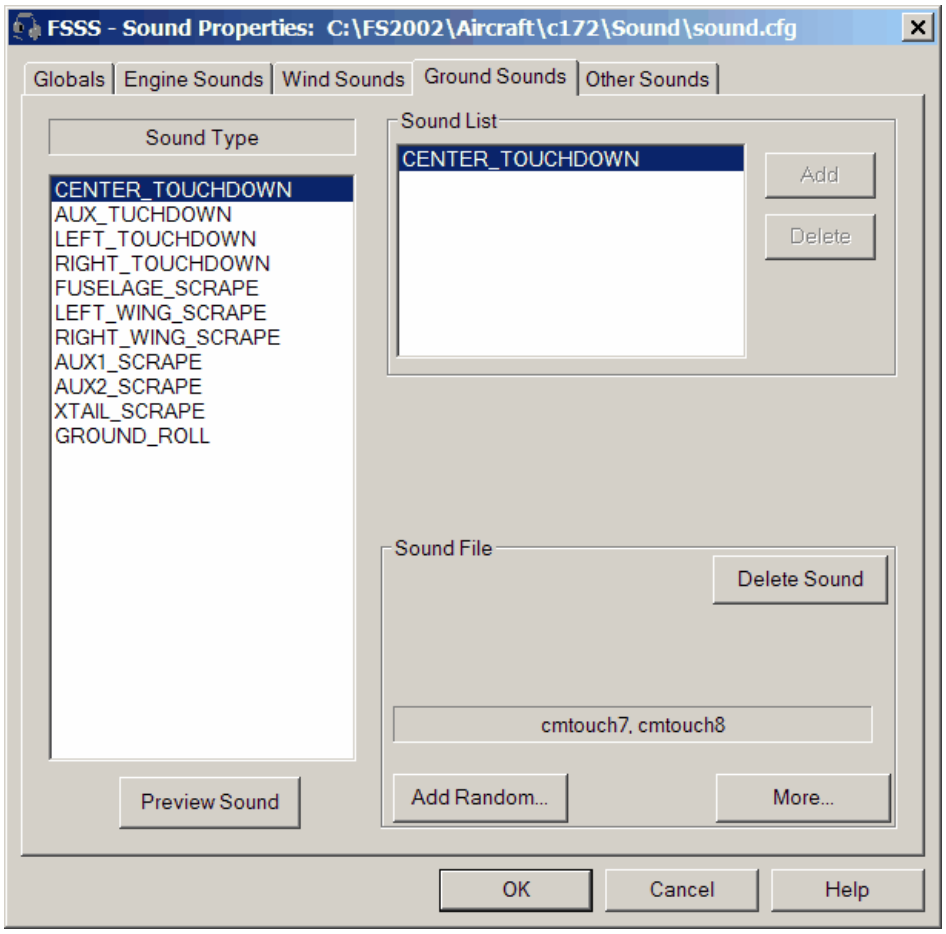
Clicking the **More..** button will display the detailed Properties Dialog for this sound.

- **Preview**

Clicking on the **Preview Sound** button will start the Sound Previewer.

Ground Sounds

Ground sounds include Rolling sounds, Scraping sounds and Touchdown sounds.



- **Sound Type**

Lists the sound events for Ground Sounds in FS. Most are defined by one Sound List entry, although **GROUND_ROLL** can have multiple Sound List entries, each customized for a different ground surface.

- **Sound List**

FS Sound Studio lists the appropriate Sound Types in the Sound Type listbox. Selecting one of these will update the Sound List listbox with the Sound List items defined in the *sound.cfg* file for this Sound Type. Selecting an item in the Sound List listbox will update the Sound File box with the wave file name defined for the Sound List item. You can **Delete** the currently selected item, or add a new one with the **Add** button. The Add and Delete buttons will only be active for Sound Types which support multiple Sound List entries.

- **Sound File**

The sound file box shows the wave file defined for the selected Sound List item. This filename is shown without the *.wav* file extension or full path, and must exist in either the System or Aircraft Sound folder as shown on the **Global** page. Clicking the **More...** button will bring up the Properties Dialog detailing the **Parameters** for this Sound List item.

- **Delete Sound**

Clicking the **Delete Sound** button will remove this sound from the configuration (but not the wave file).

- **Add Random...**

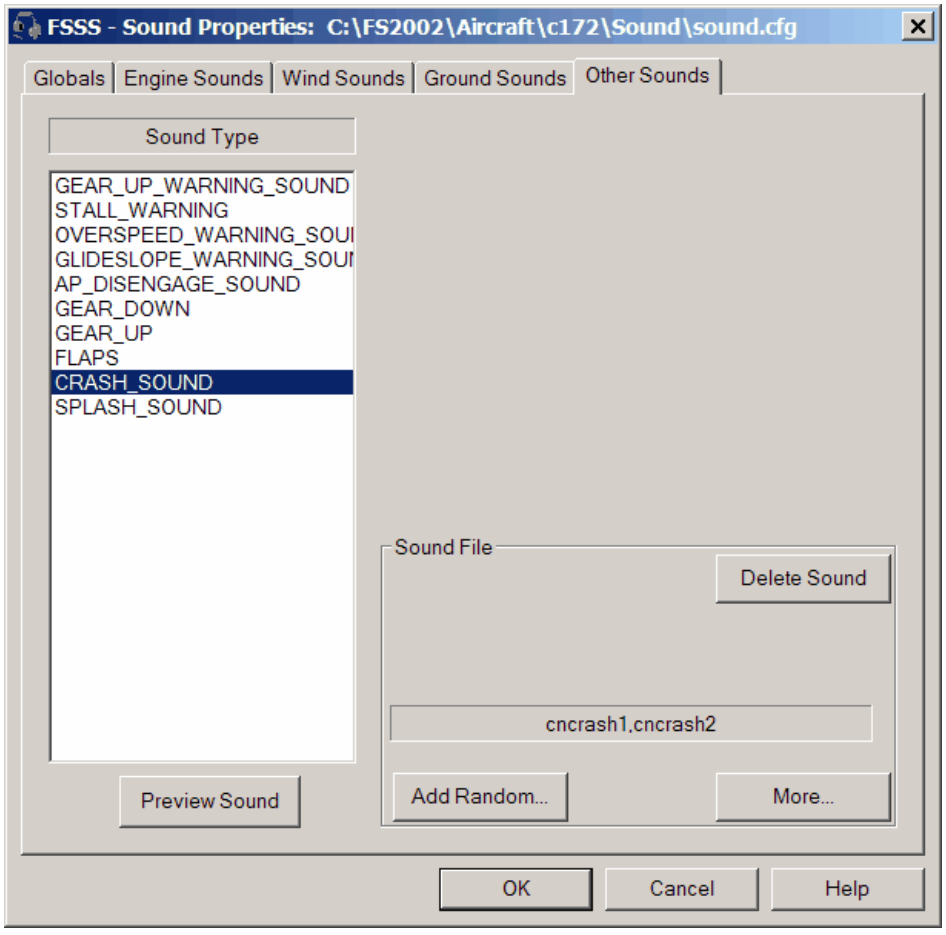
The **CENTER_TOUCHDOWN** entry shown above has two Sound File entries. These represent two wave files on disk. FS will select one or the other randomly when the CENTER_TOUCHDOWN event occurs in the Simulator. To add a another file to this list, click on the **Add Random** button. NOTE that this button is not available for the **GROUND_ROLL** event -- this event uses a Sound List instead. Note also that all wave files defined share the same parameters.

- **Preview**

Clicking on the **Preview** button will start the Sound Previewer to allow you to preview how this Sound Type will sound in FS.

Other Sounds

Other sounds include Gear sounds, Autopilot, Crash and Stall sounds.



- **Sound Type**

Lists the sound events for Other Sounds in FS.

- **Delete Sound**

This will delete this Sound from the sound configuration. The wave file on disk is not affected.

- **Sound File**

The sound file box shows the wave file defined for the selected Sound Type item. This filename is shown without the *.wav* file extension or full path, and must exist in either the System or Aircraft Sound folder as shown on the **Global** page.

- **More...**

Clicking the **More...** button will bring up the Properties Dialog detailing the **Parameters** for this Sound List item.

- **Add Random...**

The **CRASH_SOUND** entry shown above has two Sound File entries. These represent two wave files on disk. FS will select one or the other randomly when the CRASH_SOUND event occurs in the Simulator. To add a another file to this list, click on the **Add Random...** button. NOTE This button is only valid and available for the **CRASH_SOUND** and **SPLASH_SOUND** events. Note also that all wave files defined share the same parameters.

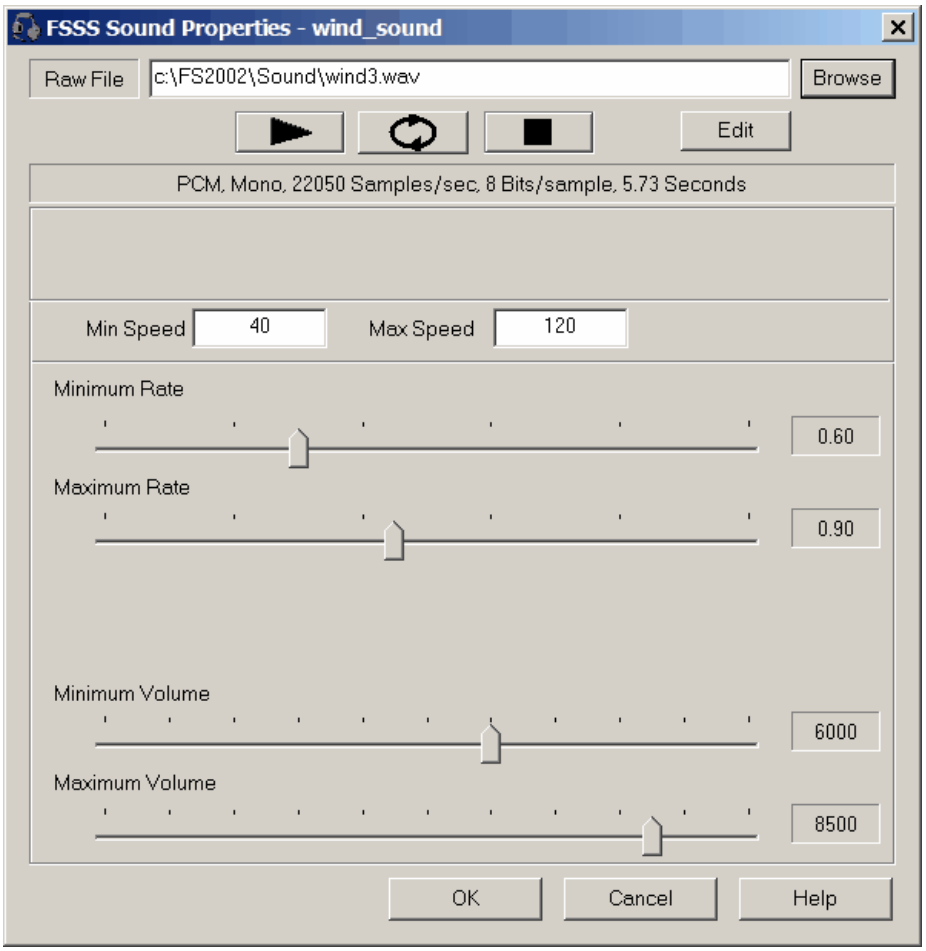
- **Preview**

Clicking on the **Preview** button will start the Sound Previewer.

4.3 The Properties Dialogs

The Properties Dialog allow you to fine tune all aspects of a wave file's sound. This allows you to modify what you hear without needing to edit the wave file on disk. The dialog is normally started from the FS Sound Studio Editor by selecting the **More...** button.

When the Properties Dialog starts, it determines and displays the appropriate valid Parameters based on the Sound Type.



The first example shows the Parameters available for WIND_SOUND.

- **Raw File**

The full path to the sound file is shown in the Raw File box. You can click on the **Browse** button to replace the file shown with a different one. If the wave file you select is not in the Aircraft or System Sound folder, FS Sound Studio will copy it to the proper location.

- **Play, Loop and Stop buttons**

The **PLAY** button allows you to play the raw sound file unmodified. You can also **LOOP** the sound, playing it endlessly in a loop, or **Stop** it. Note that the file is played unmodified. In order to hear the

sound as you would in FS, you need to Preview it.

- **Edit**

Clicking on the **Edit** button allows you to edit the raw audio wave file. FS Sound Studio doesn't have the ability to do this directly, instead it starts whatever program is registered in Windows as the editor for the file extension *.wav*.

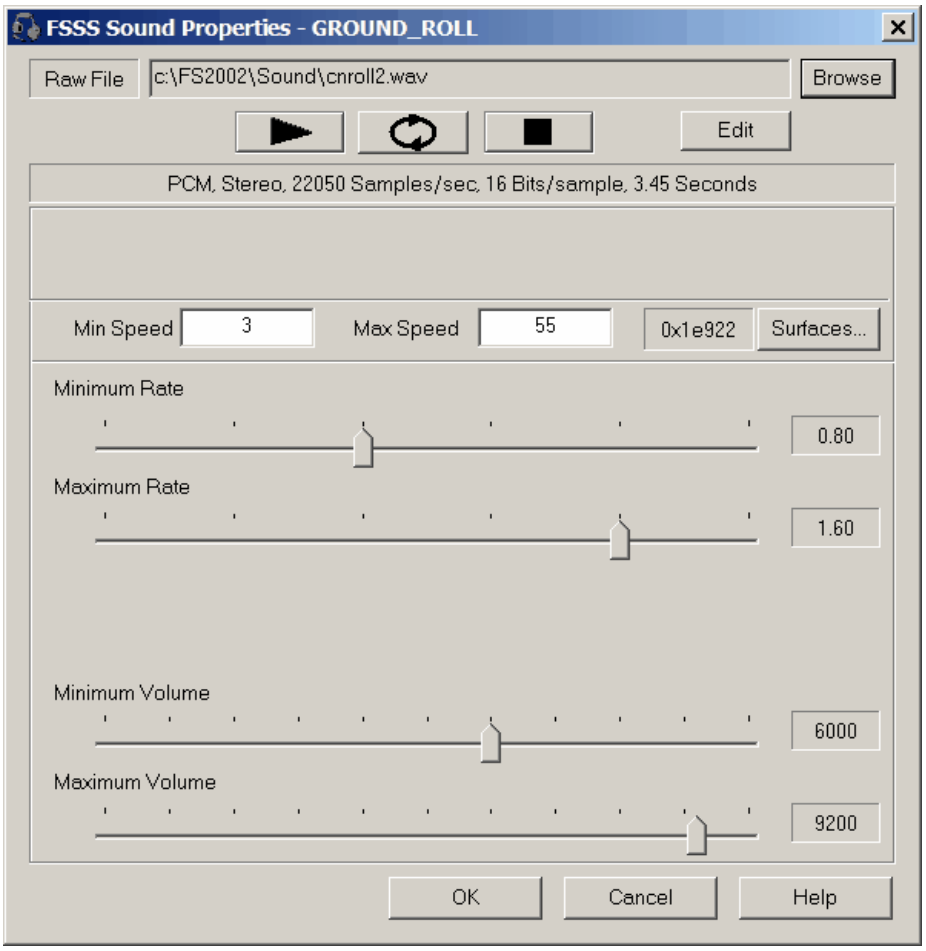
- **File Properties**

The file properties are shown for, in this example, the *wind3.wav* file. Note from the displayed path that this file is found in the System's Sound folder (as opposed to the Aircraft's local Sound folder). The file is Mono, standard Windows Pulse Code Modulation, 22.5KHz sample rate at 8 bits per sample, and lasts for 5.73 seconds.

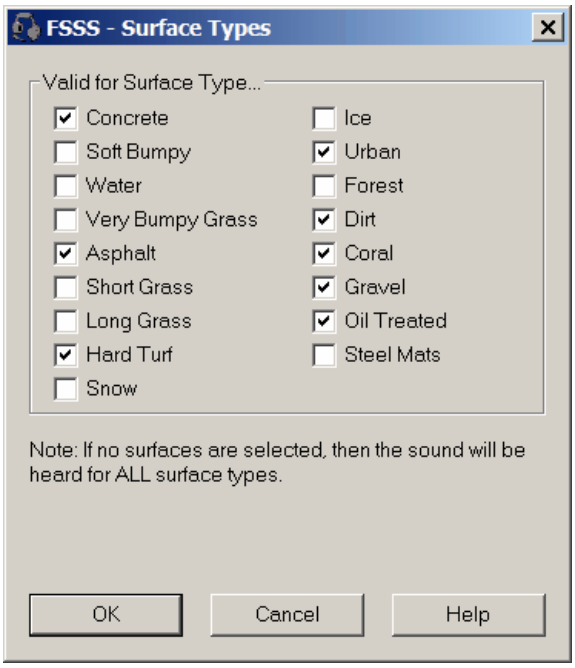
- **Parameters**

When the file is played in FS, the file is modified by six parameters - **Minimum Speed, Maximum Speed, Minimum Rate, Maximum Rate, Minimum Volume** and **Maximum Volume**. You can use the sliders to change these values, or type in new values in the text boxes. For a description of what these parameters represent, and how they effect the sound, see the Background section.

The second example is the Parameters of the GROUND_ROLL sound of the C172. Of interest in this example is the **Surfaces...** button.



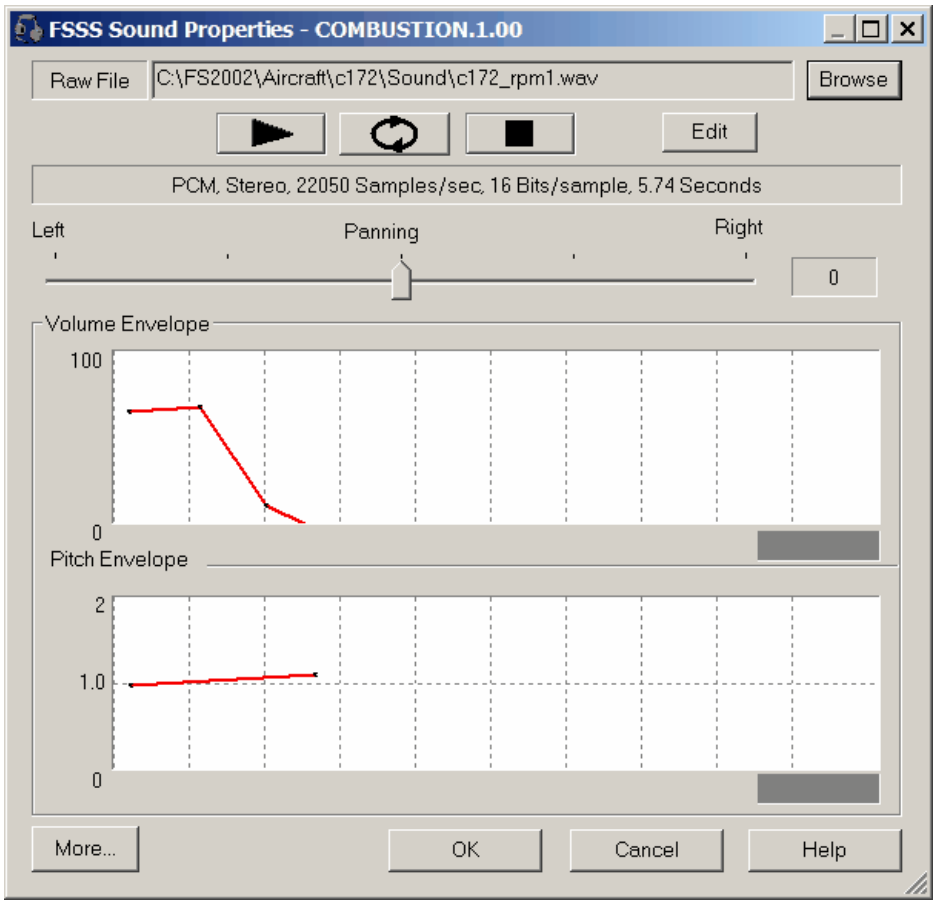
Clicking on the **Surfaces...** button brings up the following dialog:



FS allows you to specify different **GROUND_ROLL** sounds for different surfaces. For example, you probably wouldn't want the C172 making the same sound rolling on **Concrete** as it would on **Short Grass**. FS allows you to specify a different sound for each surface type, or multiple surfaces per sound. In the above example, the selected sound will be played when the aircraft is rolling on **Concrete**, but not on **Snow**. The hexadecimal equivalent of the Surface Type flags is shown on the dialog next to the Surfaces button.

NOTE: If you don't specify any surfaces for a particular Sound, then that sound will be used for all surfaces.

Our third example is more complex. Here we're displaying a Engine Sound List entry, **COMBUSTION1.00**. This sound has a Volume and Pitch envelope. It also can be assigned somewhere between the right or left channel of the audio output with the Panning control. For more information on Sound Types and Sound Lists, see the Background section.



The Raw File, Play buttons and Properties for this sound are as explained above.

- **Panning**

FS allows you to send a sound to the right or left channel of a two channel stereo sound field, or anywhere in between. The *sound.cfg* file panning value ranges from 0 (full left) to 10000 (full right).

- **Volume Envelope**
- **Pitch Envelope**

Multiple mixed sounds are normally needed to create a realistic engine sound. The Volume and Pitch envelopes for each sound allow you to mix sounds by creating an envelope or function which is used to determine the Pitch and Volume of a sound at any given engine RPM value. In the example above, the **COMBUSTION.1.00** sound list entry, which plays the wave file *c172_rpm1.wav*, is only heard at lower RPM values. At higher RPMs, other files take over. This allows the sound designer to play different sound files for different ranges of RPM. The pitch of the sound can also be varied based on RPM. A raw wave file plays at a fixed pitch, but FS allows the sound designer to increase the pitch of the sound as the engine RPM increases for more realism.

The Envelope can be edited by moving the mouse over one of the segment end points, left clicking and then dragging to a new location.

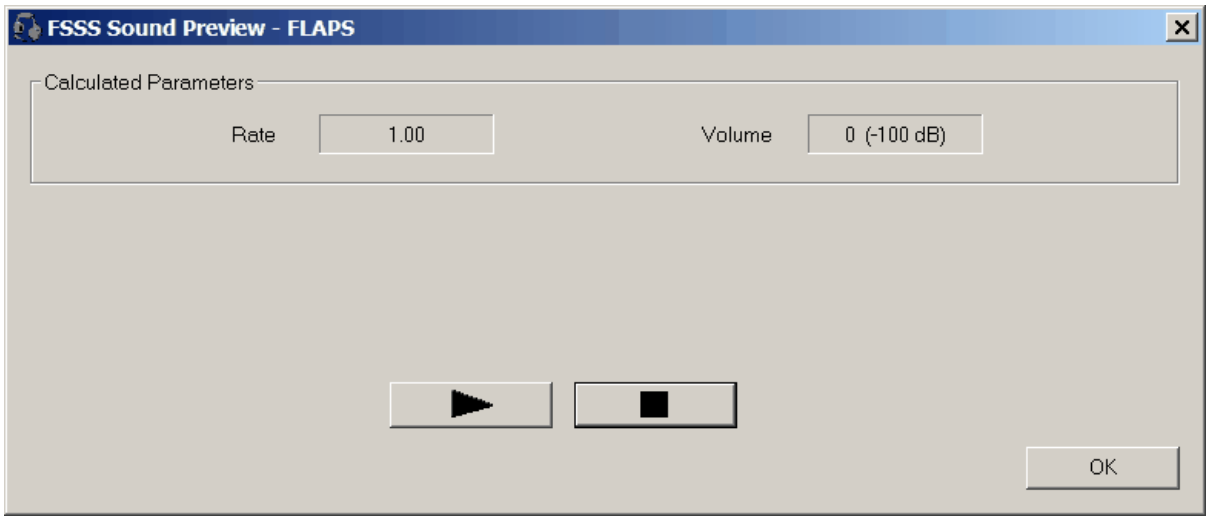
- **More**

Clicking on the **More** button starts the Envelope Editor, which allows you to perform additional editing.

4.4 Sound Previewing

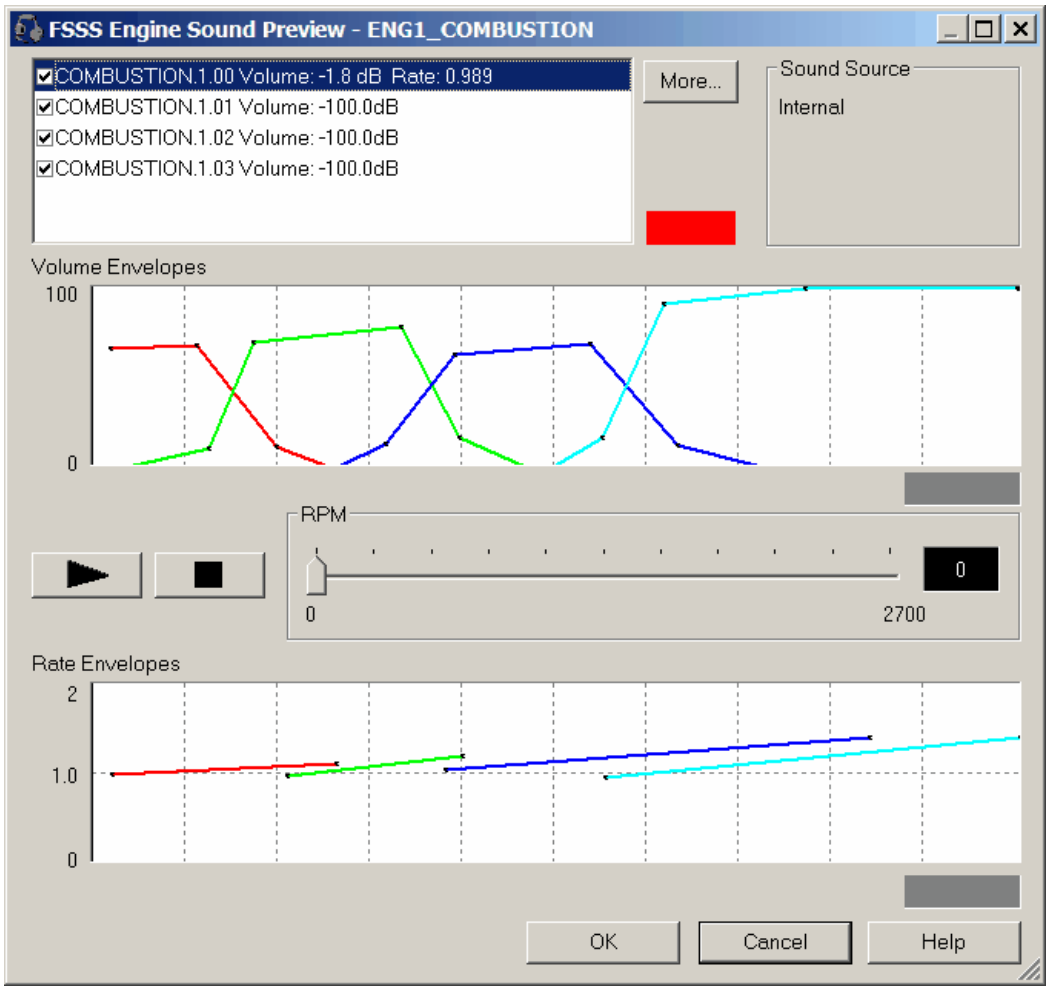
A unique and powerful feature of FS Sound Studio is the ability to preview a sound. This allows you to edit and modify your sound configuration and immediately hear how it will sound in FS.

Depending on which Sound Type you're previewing, you will see slightly different result when you click on the **Preview** button in the Sound Editor.



Simple sounds such as FLAPS, which normally don't have any parameters affecting how they are played, are previewed by simply playing the sound. Pressing the **Play** and **Stop** buttons play or stop the sound.

Complex sounds, such as Engine sounds, which include panning, rate and volume envelopes, are more involved:



- **Sound List Entries**

In this example, we're previewing the **ENG1_COMBUSTION** sounds of the Microsoft FS2002 C172. This sound is made up of 4 sound list entries, **COMBUSTION.1.00** through **COMBUSTION.1.03,** which are mixed together based on their parameters. As shown in the Sound Source box, these are for internal sounds (there are four additional entries used for external sounds).

Each sound list entry has a check box next to it. If you un-check the box, then the entry will not be heard in the final preview mix. Appended to the sound list name are its current Volume and Rate value. FS Sound Studio calculates these values, and plays the sound at the calculated value as you move the RPM slider.

- **More**

If you've selected one of the Sound List entries, the **More..** button becomes active. Clicking on the button starts the Envelope editor, which allows you to edit the selected envelope while listening to the results in real time. This is one of the most powerful features of FS Sound Studio.

- **Sound Source**

This indicator shows which flags and modes the displayed Sound List represents. In this example, we are listening to the Internal sounds (viewpoint) for this aircraft. For example, you can (and usually do) have a different set of ENG1_COMBUSTION sounds for external views in the Flight Simulator.

- **Volume Envelopes**
- **Rate Envelopes**

The Volume and Rate Envelopes provide a graphical display of the volume and rate information. The horizontal RPM values corresponds with the RPM slider, allowing you to instantly see which Sound List entries contribute to the final sound mix at a given RPM setting. Each envelope in the sound list is displayed in a different color.

The Envelope can be edited by moving the mouse over one of the segment end points, left clicking and then dragging to a new location. For more detailed editing of a single envelope, or if you prefer to enter X and Y values textually, click on the **More** button to start the Envelope editor.

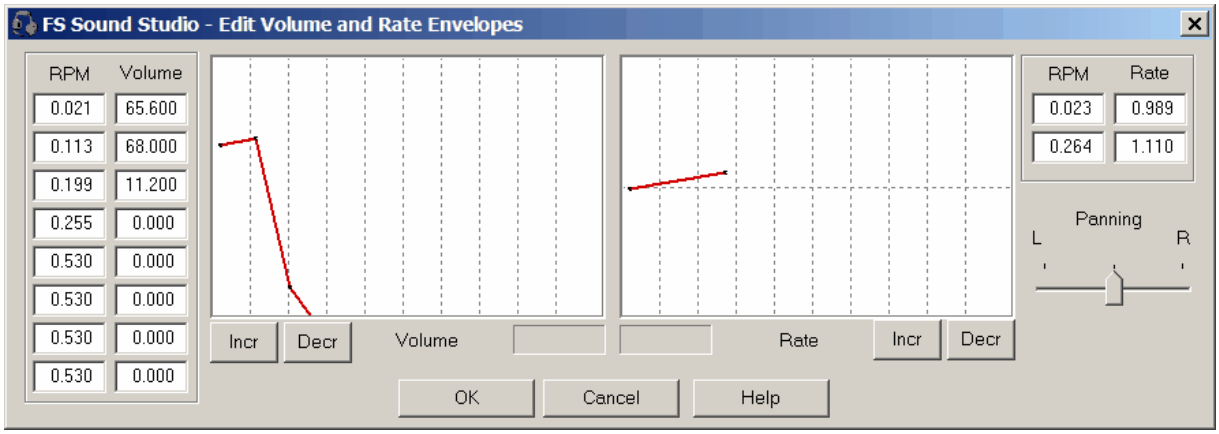
- **RPM Slider**

The RPM slider allows you select the engine RPM at which you'll like to hear your sounds. As you vary the RPM, FS Sound Studio calculates how the 4 sound list entries contribute to the final sound, and plays them. You hear what you would if you were running FS. If you select one of the Sound List entries and click on the **Edit...** button, you can also edit the sound envelope while you listen to it in real time.

4.5 Envelope Editor

One of the most complex tasks in creating a sound configuration is the creating and editing of Volume and Rate Envelopes. FS Sound Studio simplifies the process by allowing you the edit envelopes graphically using the mouse. For more precise input, you can enter the values textually and see the resulting envelope immediately.

The most powerful feature of FS Sound Studio is the ability to graphically edit envelopes while simultaneously Previewing the sound. You can immediately hear the results of your edits, allowing you to very quickly fine tune your sounds.



- **RPM / Volume Text boxes and Graph**

The table lists the current values of the envelope, in numerical form. The Volume envelope has 8 pairs of RPM/Volume values. The RPM value ranges from 0.0 to 1.0, which represents a ratio of the current to the Maximum RPM of the engine. The Maximum RPM value is specified in the *aircraft.cfg* file. The Volume values range from 0 (inaudible) to 100.0 (max).

As you modify the text box values, the corresponding graph will be immediately updated so you can see your changes in real-time.

The graph shows the data in graphical format. To adjust, just position the mouse over an existing point (the cursor will change to a cross shape) and drag the point to its new position. The data in numerical form will also be updated as the mouse moves.

- **Incr / Decr buttons**

The **Incr** and **Decr** buttons apply a constant factor to the existing envelope, increasing or decreasing the values by 10% for quick changes.

- **RPM / Rate Text boxes and Graph**

These operate identically to the Volume table and graph. However, the Rate envelope has only 2 pairs of values. The RPM values range from 0.0 to 1.0, which represents a ratio of the current to Maximum RPM of the engine. The Maximum RPM values is specified in the *aircraft.cfg* file. The Rate represents a Pitch ratio, with 1.0 instructing FS to play the wave file at normal pitch. Higher values represent higher pitch, for example, a value of 2.0 means the file will be played twice as fast.

- **Panning**

Engine Sounds in FS can be assigned to the right channel, left channel or somewhere in between. The **Panning slider** allows you to move the sound around in the stereo sound stage while simultaneously hearing the results in Preview mode.

As the mouse is moved with the Graphical areas, the X and Y positions of the mouse are displayed in the bottom boxes. In the case of the Volume position, the X value is displayed as the RPM of the mouse, to aid you in accurately positioning points.

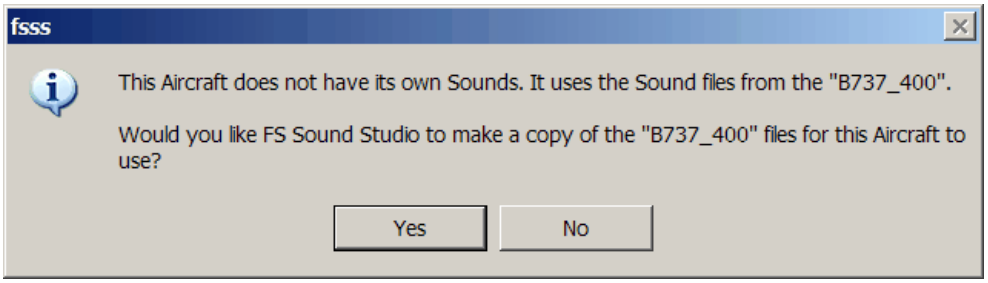
4.6 Editing an Aircraft with Alliased Sounds

Some Aircraft, particularly freeware and third party Aircraft, don't have their own Sound configurations. Instead, they borrow another aircraft's sound configuration by a method called ***Aliasing***. The *sound.cfg* file for these aircraft point to another's. The file may look something like this:

```
[fltsim]
alias=B737_400\sound
```

This is the default Boeing 747 *sound.cfg* in FS2004. It tells the simulator that this aircraft will be using the sound configuration of the B737. *Note that when you're flying the 747 in FS2004, you're hearing the 737 sounds. If you use FS Sound Studio to edit the 737 sounds, you'll hear those changes in the 747!*

If you try to edit an aliased Aircraft, you'll see the following message:

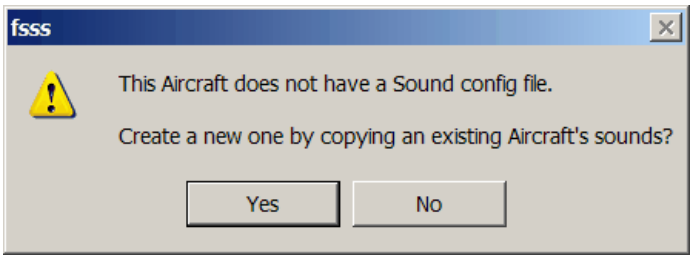


If you click on **Yes**, then FS Sound Studio will copy the 737 wave and configuration files to the 747 folders, and remove the alias. If you click on **No** you'll be unable to edit without loading the original source Aircraft.

4.7 Editing an Aircraft with No Sounds

Some Aircraft, particularly freeware and third party Aircraft, don't have a Sound configuration. The *sound.cfg* file or Sound folder may be missing or not supplied.

If you try to edit an Aircraft with no *sound.cfg* file, you'll see the following message:



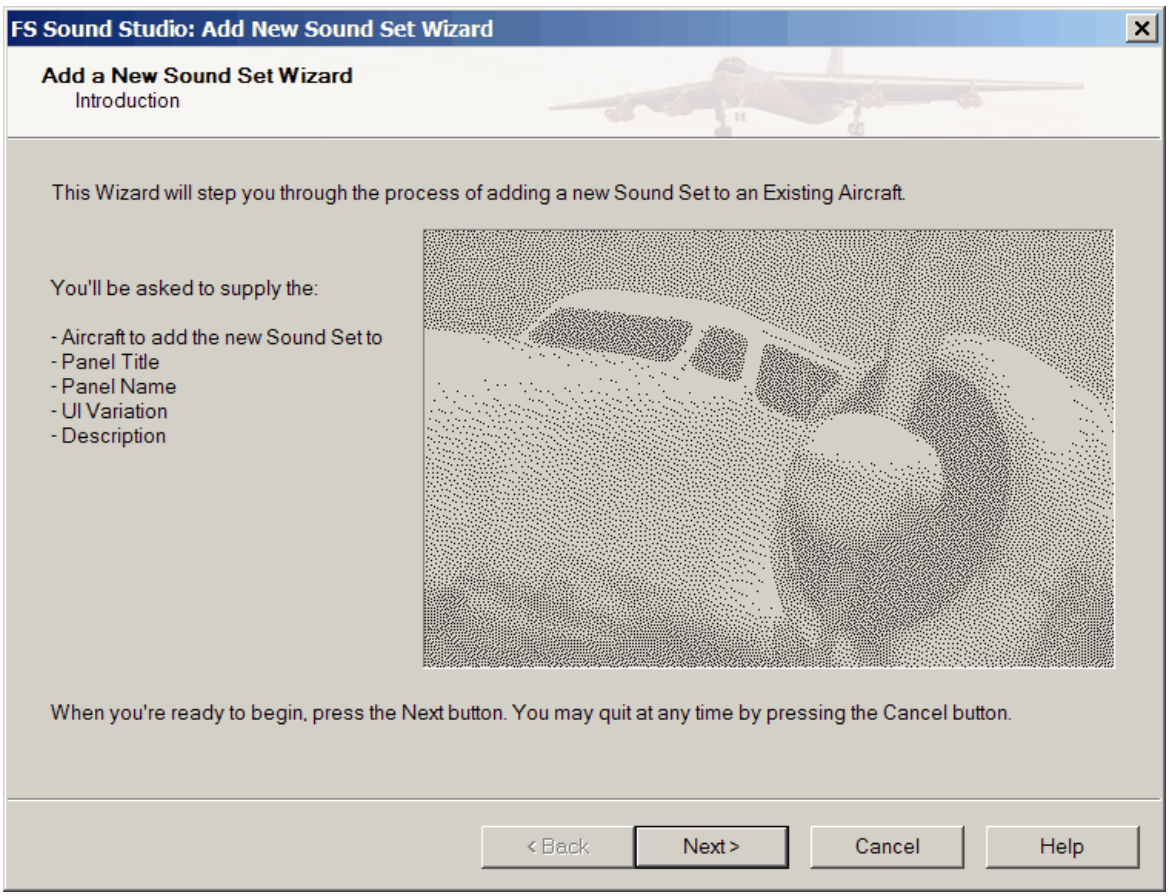
If you click on **Yes**, then FS Sound Studio will start the Add a New Sound Set Wizard. If you click on **No** you'll be unable to edit this aircraft.

4.8 The Add New Sound Wizard

The **Add New Sound Wizard** allows you to add a new Panel/Sound combination to FS. It will guide you step by step through the process of selecting a target Aircraft to add the new Sound Configuration to, (the currently loaded Aircraft is the default), allowing you to enter a new Title, Description and UI Variation to uniquely identify the Panel/Sound combination when selecting an Aircraft to fly in FS.

The Wizard creates a new, empty *sound.cfg* file which can then be edited in FS Sound Studio. Or, by specifying the type and number of engines to the Wizard, the Wizard can select an existing FS standard Microsoft Aircraft and copy its sounds to your new Sound Configuration. This allows you to get started with a new Sound config very quickly.

For example, the FS2002 Beechcraft Baron 58 has one Panel named **Panel**, and one sound configuration named **Sound**. Using the Wizard you can create a new sound configuration, named. for example, **Sound.mysounds**, and populate it with the existing Baron sounds. You can then select this Panel/Sound combo in FS2002 in addition to the original, Microsoft supplied Panel. You then will have two Aircraft listed in FS2002, sharing the same Panel, each with their own private sounds.

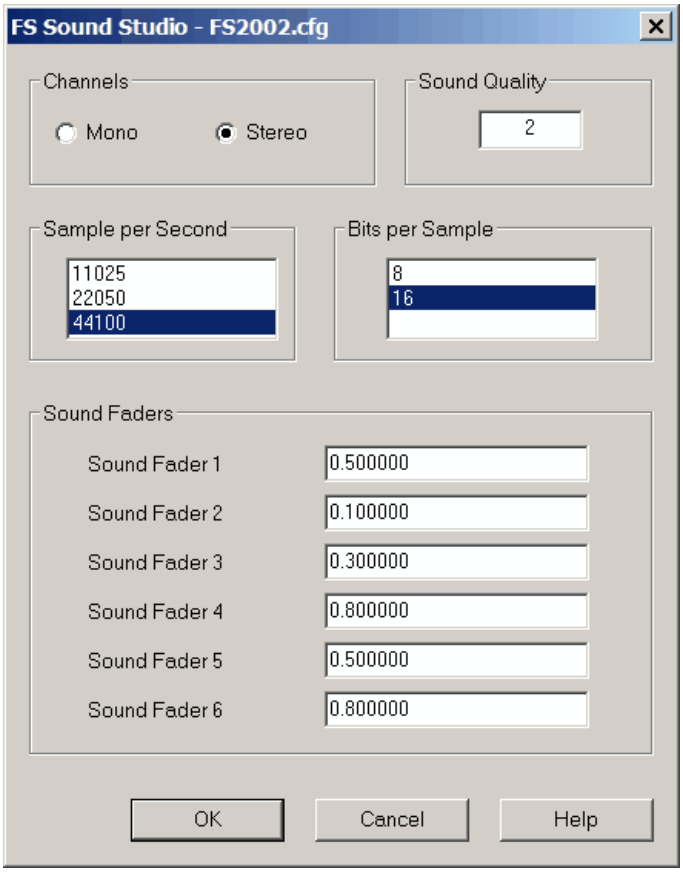


For a step by step description of using the Wizard, see the Tutorial.

NOTE: CFS3 does not support multiple sound configurations per panel, and the Wizard will not be available in CFS3 mode.

4.9 Editing the Config file

Flight Simulator uses a configuration file to control various parameters of the output sound, including the sample rate, sample size and number of channels. FS Sound Studio allows you to easily view and change these values. Start this editor with the **Options:FS2002 Config file** menu pick. You'll see the following dialog:



This dialog will only appear if you have set your Mode to FS2002 or later.

Please refer to the appropriate Microsoft SDK for the exact meaning of these various options.

Part V

5 Tutorials

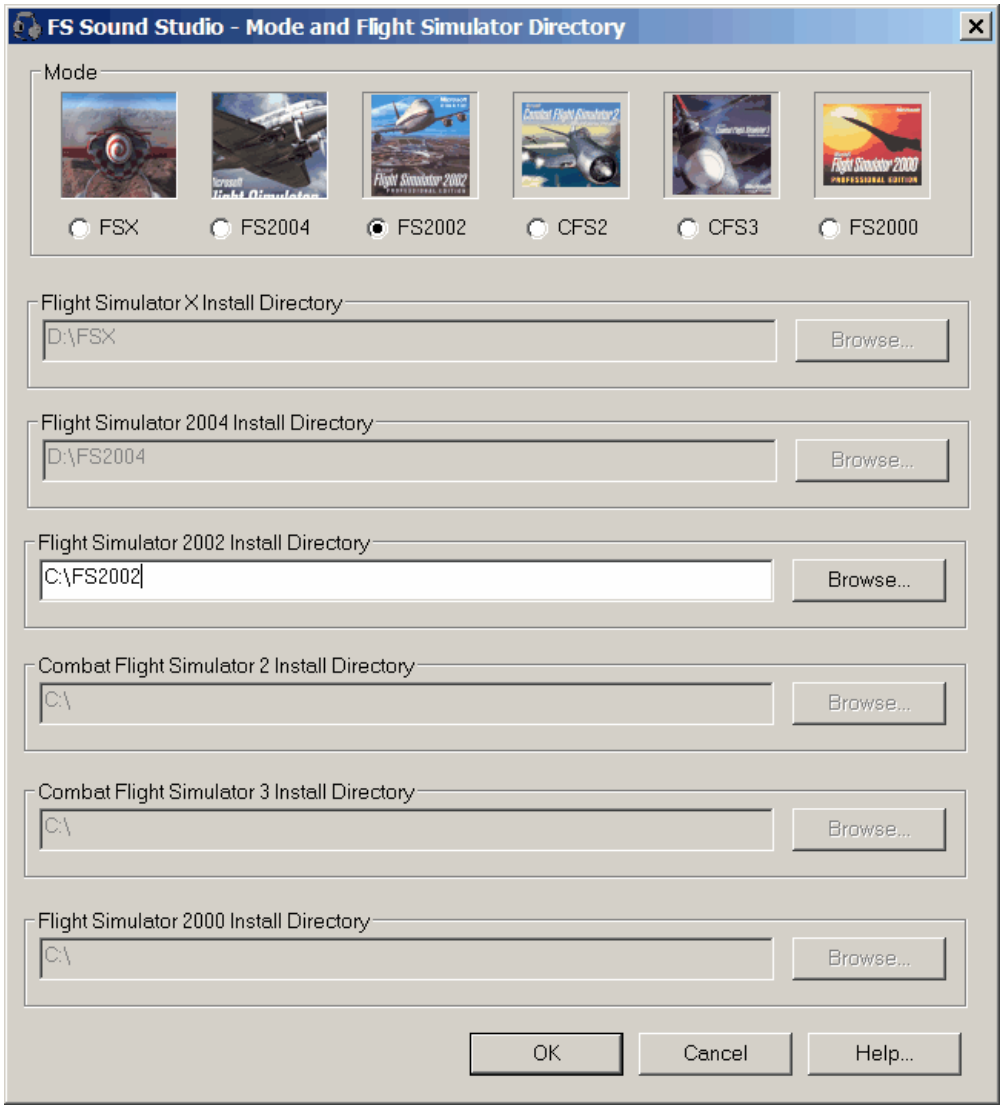
5.1 Editing your first Sound File

As a basic example of editing a Sound Configuration, let's open and modify the default FS2002 **C172** Panel. We'll change the default **Stall_Warning** sound to the one used by the FS2002 Beechcraft **Baron 58**.

5.1.1 Step 1. Setup Directories

Before starting, you must ensure that FS Sound Studio knows where your copy of Flight Simulator is located. This is because the location of all Aircraft and Sounds are relative to this installation directory. FS Sound Studio will also ensure that you only use Sound files that are available when Flight Simulator is run, so you can not create a configuration which will not load properly.

The first time you ran the program after installation, you were presented with a dialog to enter this data. You can also call this up at any time with the **Options: FS Install Dir and Mode...** menu pick:

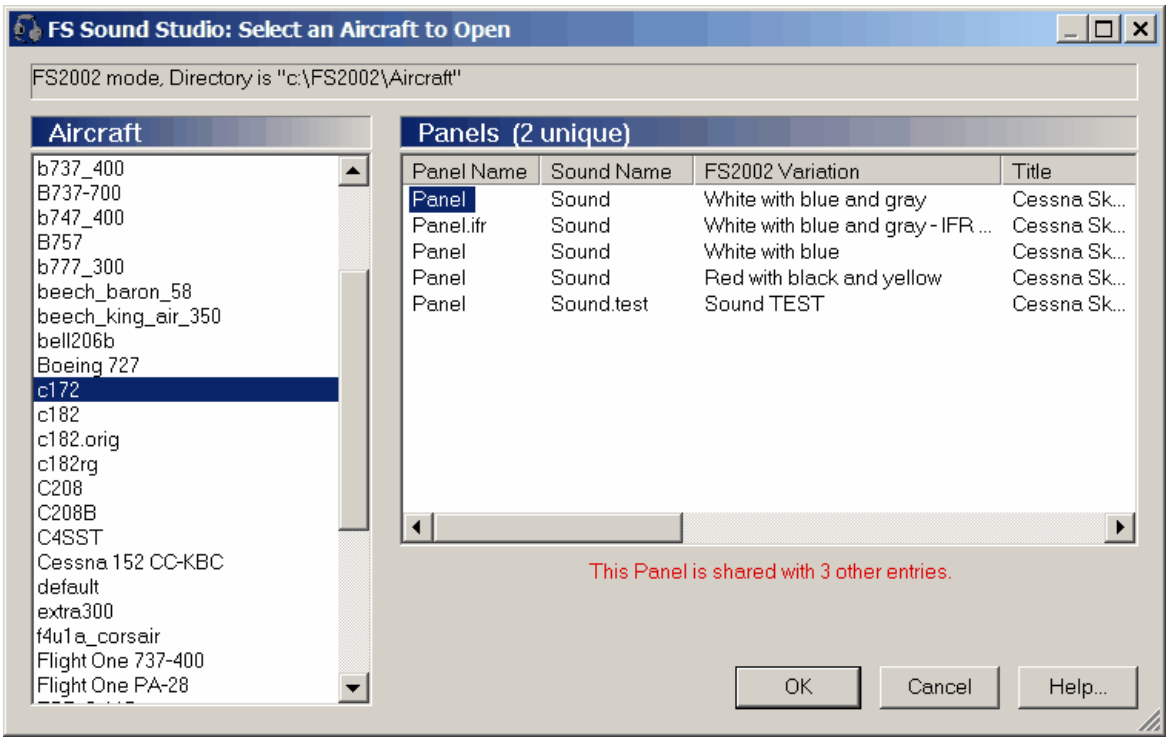


On our example system, we've installed FS2002 in ***C:\FS2002***. This is the root directory of the Flight Simulator 2002 install, where the ***fs2002.exe*** file resides. (The default directory is ***C:\Program Files\Microsoft Games\Flight Simulator 2002***.)

If the current value is not correct, select the **FS2002** check box and enter the proper directory either by simply typing it in, or click the **Browse..** button to bring up a file browser. Click **OK** when the entry is correct.

5.1.2 Step 2. Select a Panel/Sound combination

At the FS Sound Studio Main window, select the **File: Open Sound.cfg by Aircraft** menu pick. You'll see a dialog like this:



The installed **Aircraft** are presented in the left hand list. Selecting an Aircraft by clicking with the mouse results in a list of **Panels and Sounds** displayed for the Aircraft. At the top, you can see the current mode, and the directory in which FS Sound Studio is searching for valid Aircraft. This directory is relative to the one we specified in Step 1, and an example of why Step 1 is so important. If you don't see any Aircraft in this dialog, you probably need to revisit Step 1.

To help us determine which Panel/Sound combination is which, FS Sound Studio also displays the **Title** and **UI Variation** for the plane. (This is extracted from the *aircraft.cfg* file). You'll see the UI Variation in FS2002 when you're selecting Aircraft to fly in FS2002. *Note that CFS3 does not support UI Variations for its aircraft.*

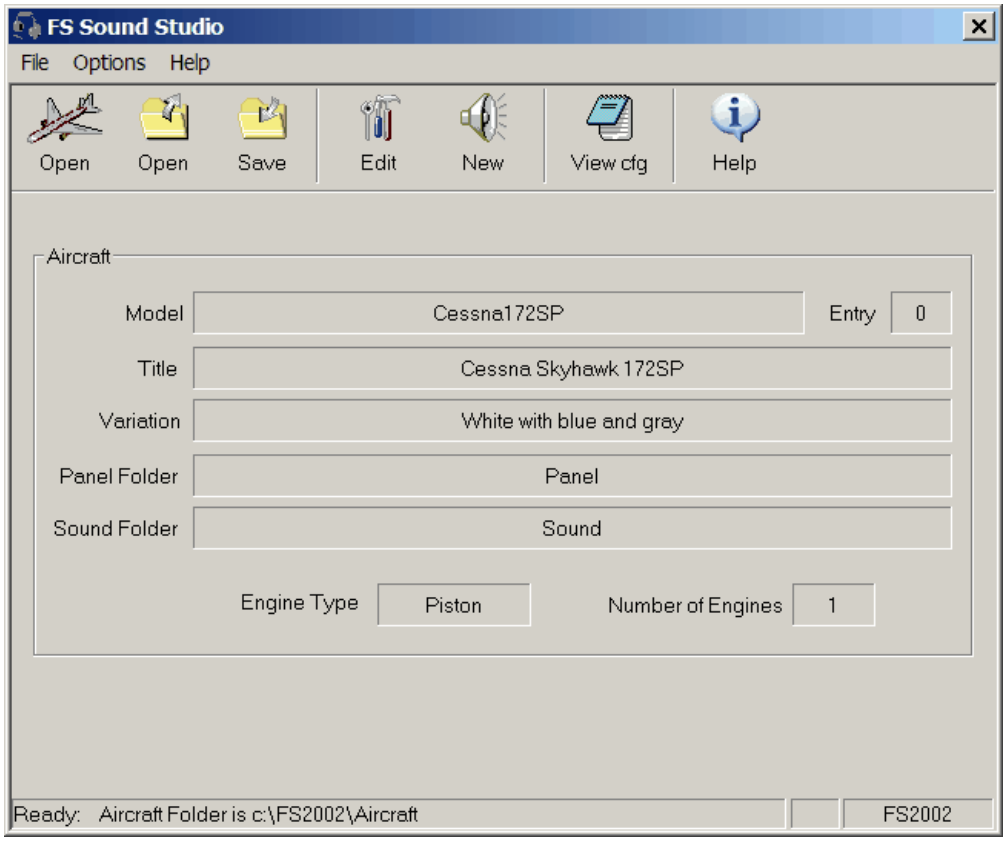
Note that there are multiple Panels listed with the names **Panel** and **Sound**. In reality, they are all the same Panel, but differ slightly in things like ATC ID and external appearance. Sharing Panels and Sounds is a feature of Flight Simulator, but be aware that editing one will result in all of these Aircraft seeing the edits. *Note that CFS3 does not share Panels or Sounds.*

We'd like to edit the default C172 Panel, not the IFR Panel, so select ***C172*** on the left, and ***Panel*** on the right. Note that the changes we will make will effect all of the C172 Aircraft that share the same

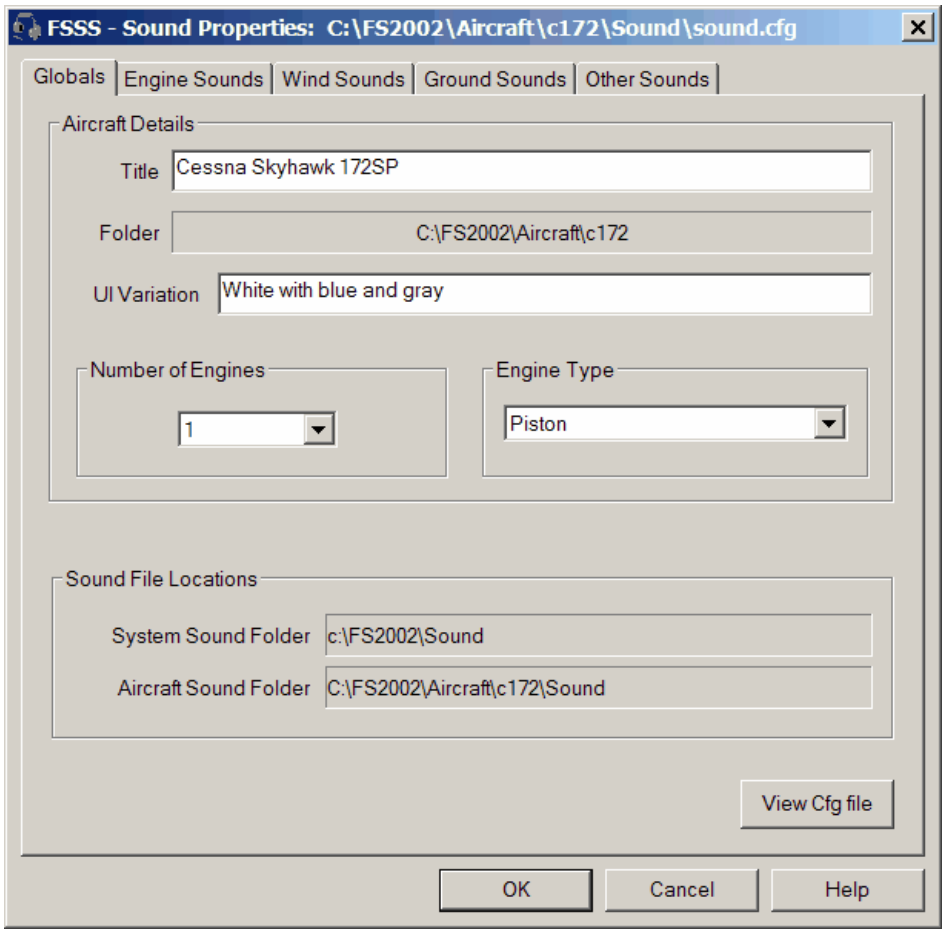
sound configuration named **Sound** of which there are 4. Click **OK**.

5.1.3 Step 3. Start the Editor

We've now specified an Aircraft, a Panel, and a Sound config. The Status line should update as FS Sound Studio reads in the *sound.cfg* file. When complete, the status line will report "Ready". To begin editing, click on the **Edit** toolbar button, or select the **File:Edit** menu pick. The Editor will start and display the Sound Configuration in a tabbed interface.

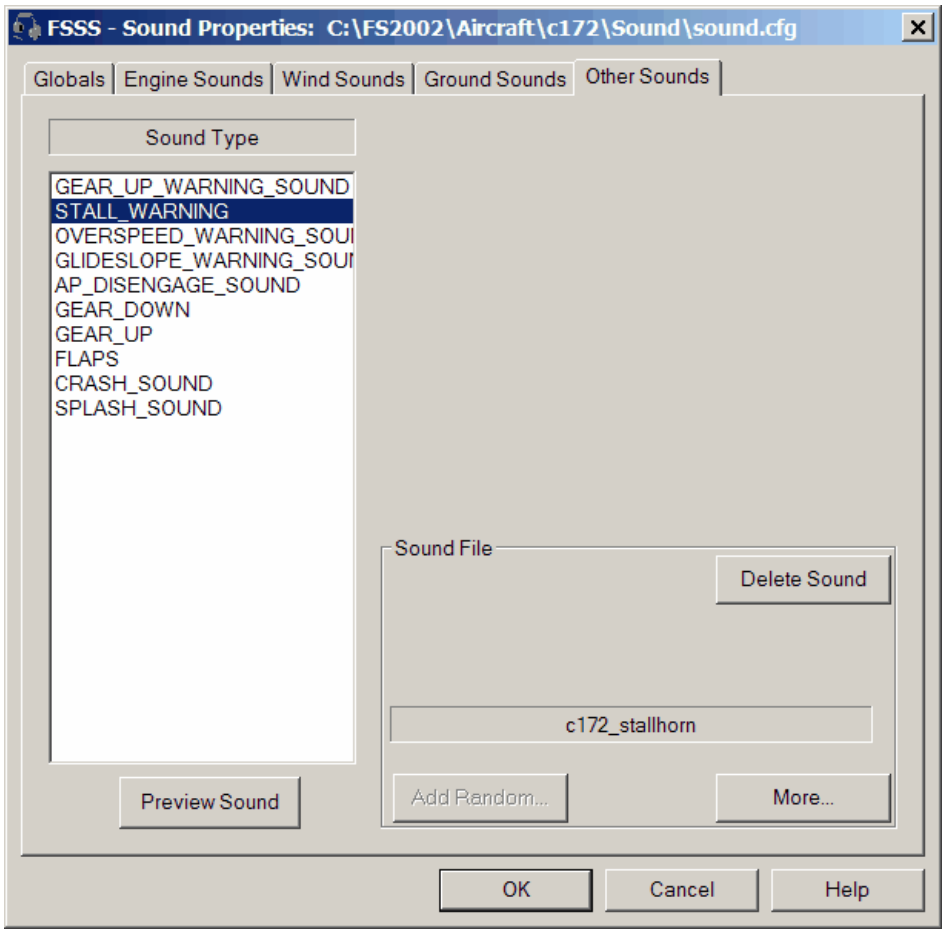


The **Global** properties of this Sound Configuration are displayed. We can double check to see we're editing the correct Aircraft/Panel/Sound combination, and that the Engine type and number have been correctly read. Note the Aircraft Sound Folder. This is the location in which FS2002 will search for *wave* files. If a wave file is not found in this directory, the System Sound Folder will be searched. If a file is not found in either location, then FS2002 will not find it and it won't be heard!



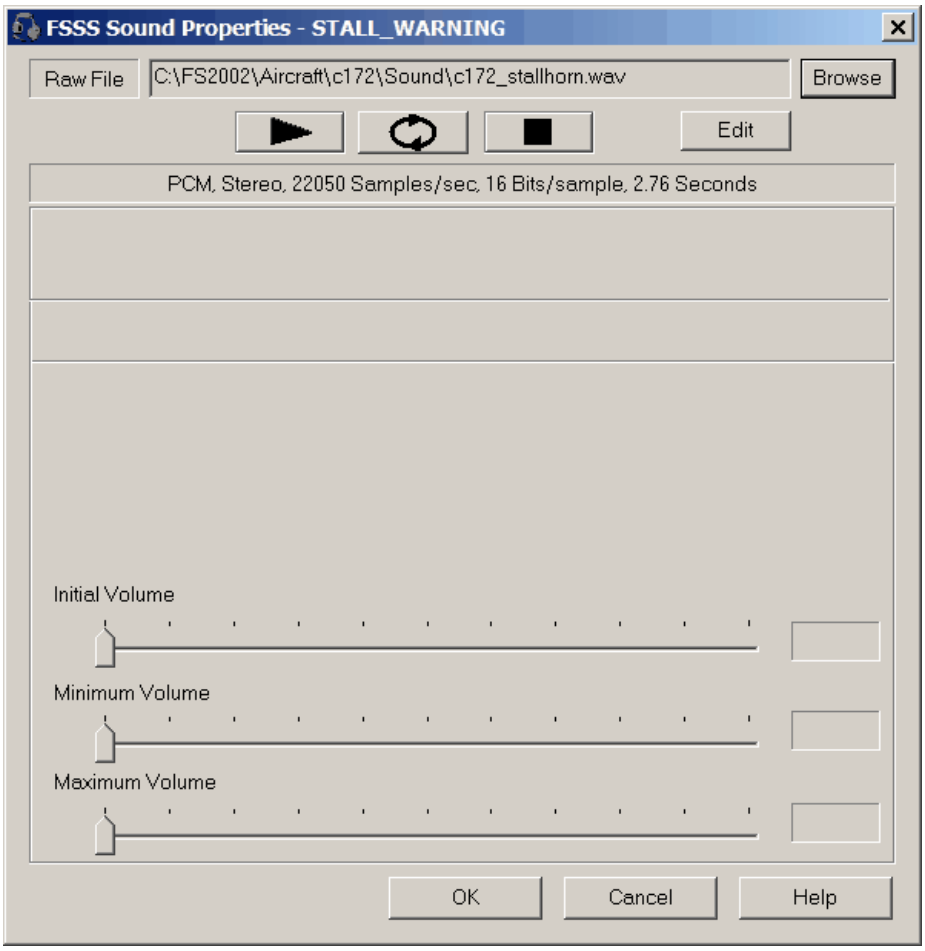
5.1.4 Step 4. Find and Explore the STALL_WARNING sound

The Stall Warning sound is grouped by Microsoft into the Other Sounds category, as **STALL_WARNING**. Select the Other Sounds tab to display these sounds:



FS Sound Studio displays the individual Sound Events listed under Other Sounds. When you select **STALL_WARNING**, the sound file which is played for the event is should be listed in the Sound File box. In this case, the wave file is *c172_stallhorn* (The extension *.wav* is assumed for all sound files, and never shows up in the *sound.cfg* file.) This is the file we will change in the next step.

Depending on the category and type of Sound, there are optional properties associated with a sound file. Click on the More... button to see the properties associated with sounds in the Other Sounds category:



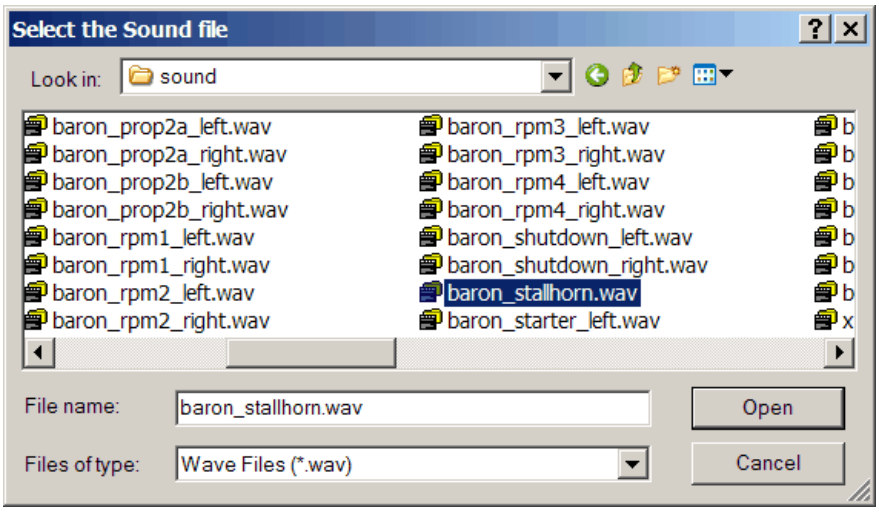
The full path to the sound file is shown in the Raw File box. The file properties are also shown. In this case, the *c172_stallhorn.wav* file is found in the Aircraft's Sound folder (as opposed to the System Sound folder) and the file is Stereo standard Pulse Code Modulation, 22.5KHz sample rate at 16 bits per sample, and lasts for 2.76 seconds.

The **PLAY** button allows you to play the raw sound file unmodified. You can also **LOOP** the sound and play it indefinitely. Note that the file is played unmodified. We'll see how to Preview the sound as it will actually be heard in FS2002 later.

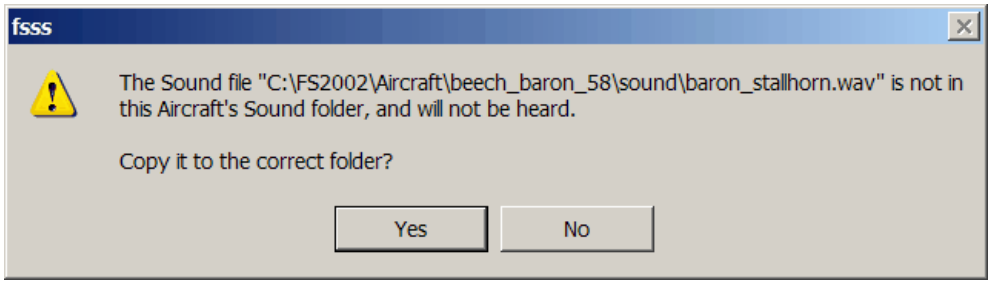
When the file is played in FS2002 in response to a STALL_WARNING event, the file is modified by three parameters - Initial Volume, Minimum Volume and Maximum Volume. How these three interact with the a stall is not documented by Microsoft, but FS Sound Studio allows you to experiment with these values! For the C172, there are no values set for these, thus the text boxes to the right of the sliders are left blank by FS Sound Studio.

5.1.5 Step 5. Change the sound file

In this step, we're going to change the wave file used for the C172 stall warning to the one used by the Beechcraft Baron. We can use FS Sound Studio to determine the file used by the Baron by selecting the Baron and repeating our steps above, but to save time note the file used by the Baron is *baron_stallhorn.wav*. To change the sound file, either type in the full path to the file in the Raw File box, or use the **Browse** button to select it graphically. The path to the Baron in this example is *C:\FS2002\Aircraft\beech_baron_58\Sound*, and you can find *baron_stallhorn.wav* there.



When you select this file, you'll see the following dialog box:



FS Sound Studio has determined that the Baron file needs to be copied to the C172's local Sound folder in order for FS2002 to find it. Click **Yes** to perform the copy.

Click **OK** to exit the FSSS Sound Properties - STALL_WARNING dialog, click **OK** again to exit the Sound Properties: C:\FS2002\Aircraft\C172\Sound\sound.cfg dialog, and finally click on the **Save** button on the Main dialog (or **File:Save** menu pick) to save your *sound.cfg* file. The next time you load the C172 in FS2002, you'll hear a new stall warning sound.

Note that FS2002 caches the sound configuration when it loads an aircraft. If you're running FS2002 and wish to change a loaded aircraft's sounds, you must load a different aircraft, the reload the original to force FS2002 to reload the config files.

5.2 Sound Previewing and the Envelope Editor

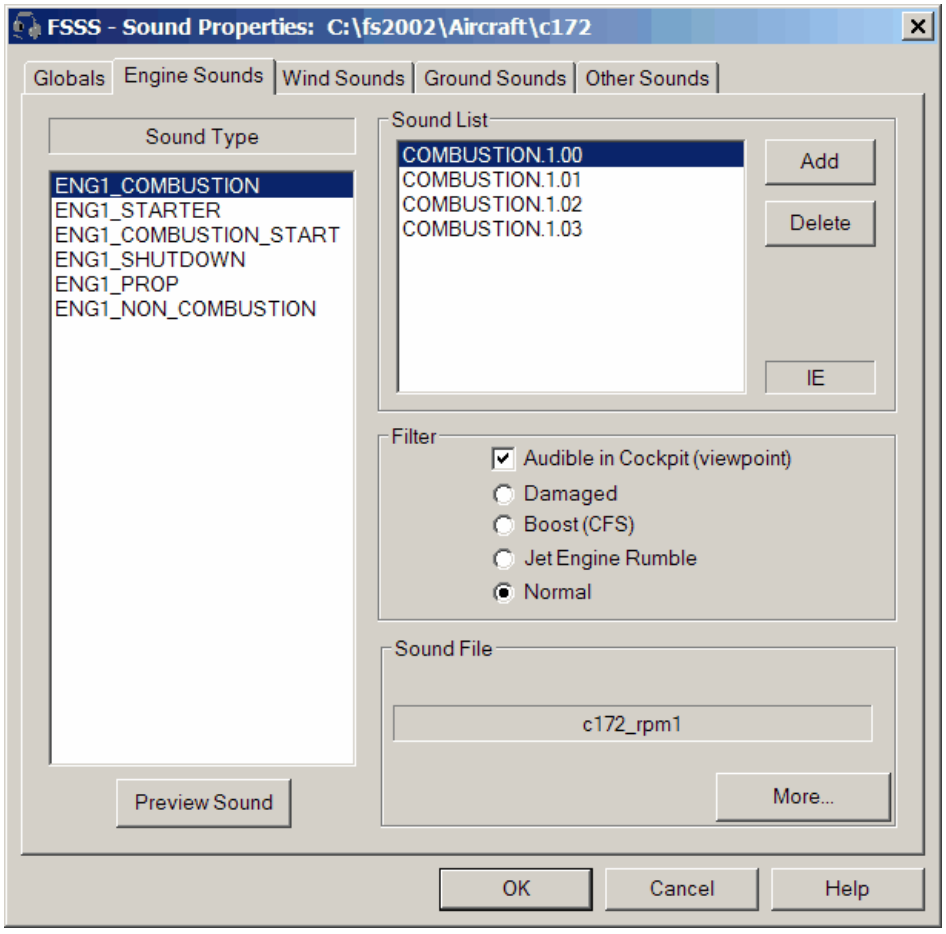
One of the most powerful features of FS Sound Studio is the Envelope Editor. It allows you to graphically modify both Volume and Rate Envelopes of Engine sounds, while listening to your changes in real time. This Tutorial will describe how it is used.

5.2.1 Step 1. Load the FS2002 C172

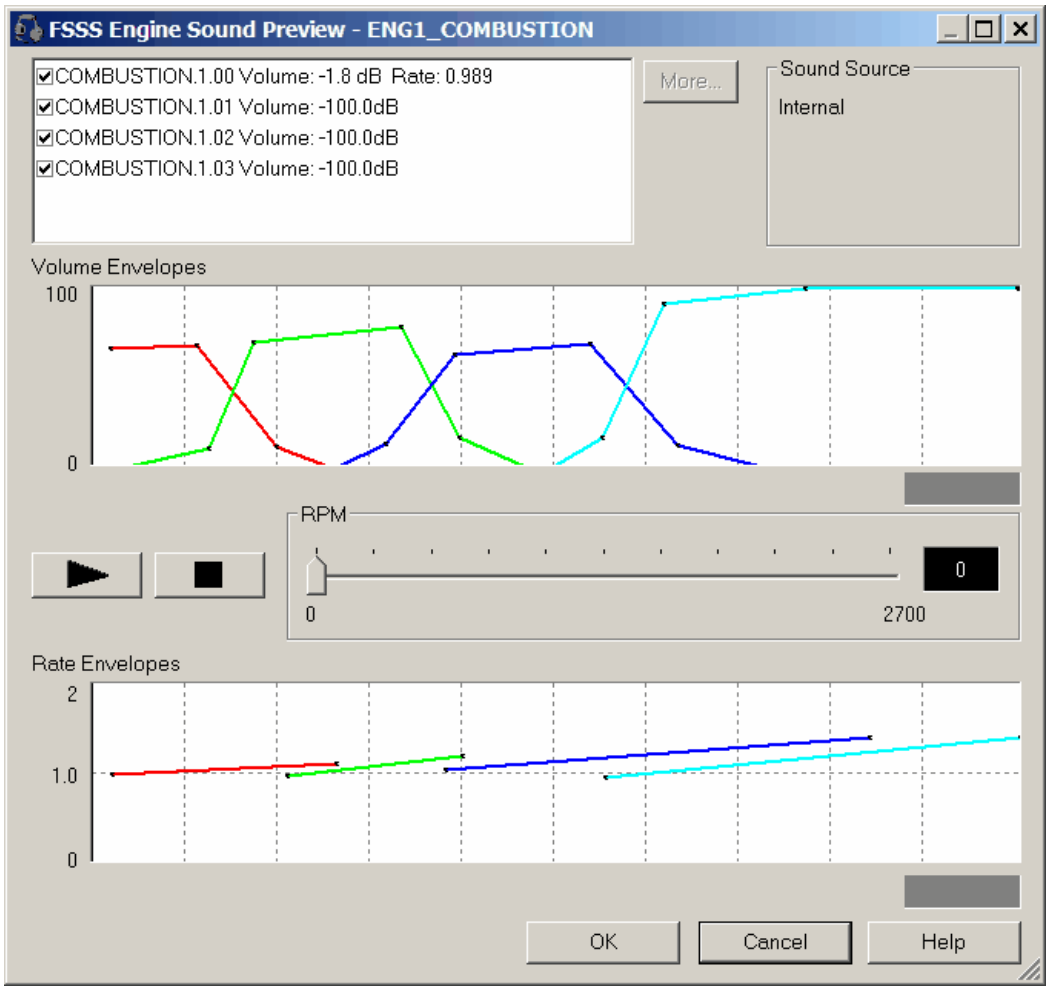
Load the FS2002 Cessna 172 by following Steps 1 to 3 in the preview Tutorial - Editing your First Sound File.

5.2.2 Step 2. Preview the ENG1_COMBUSTION sounds

Click on the **Engine Sounds** tab. You'll see the following dialog.



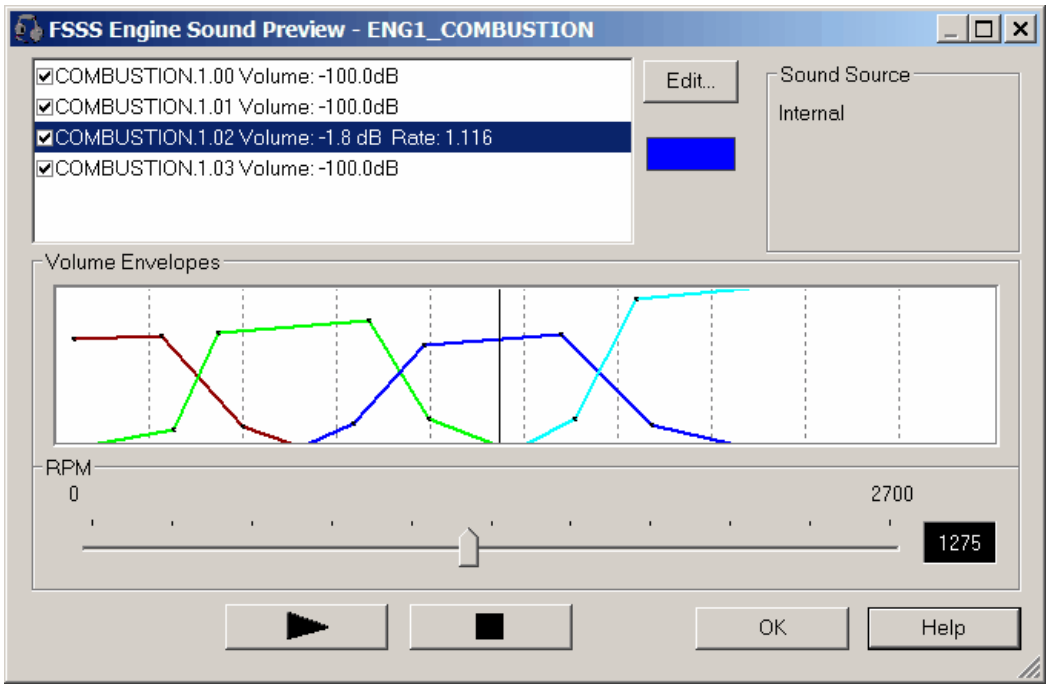
The Sound Type **ENG1_COMBUSTION** is made up of 4 sound files mixed together. Each one is described by a Sound List entry. Click on the **Preview Sound** button, or double click on **ENG1_COMBUSTION** in the Sound Type list box to begin the Preview dialog. More technical info on Sound Types and Sound Lists can be found in the Sound Background section.



The Preview dialog shows us the 4 Sound List entries. Along with their names is the FS Sound Studio calculated Volume and Rate information for the current simulated RPM. The Volume Envelope graph displays the 4 Sound List's Volume envelopes, each in a different color. The Rate Envelope shows the corresponding Rate envelopes. The Sound Source box tells us a bit more about these sounds. In this example, we'll be listening to Internal sounds - sounds heard in the cockpit. (There are a number of Flag entries which can be set to associate the sounds with specific Engine events. Please see the Microsoft SDK for detailed information.)

Listening to the Mix

Press the **PLAY** button to hear the ENG1_COMBUSTION sound as you would in FS2002. Move the **RPM** slider to vary the simulated aircraft RPM. Note the change in sound. As the RPM slider moves, FS Sound Studio updates the Sound List entries to show each one's Volume and Rate for any given RPM. Click on the COMBUSTION.1.02 entry in the list box. The Line Color box under the **Edit...** button shows the color used in the graph for this particular entry.



Simulated Engine RPM

Move the RPM slider so that the simulated RPM is approximately 1275 RPM, as in the screenshot above. The cursor line displays the current simulated RPM exactly in the Volume envelopes. In this case, we can see that almost all of the sound being produced is a result of the COMBUSTION.1.02 sound. All the other entries have a calculated Volume of -100db, the minimum.

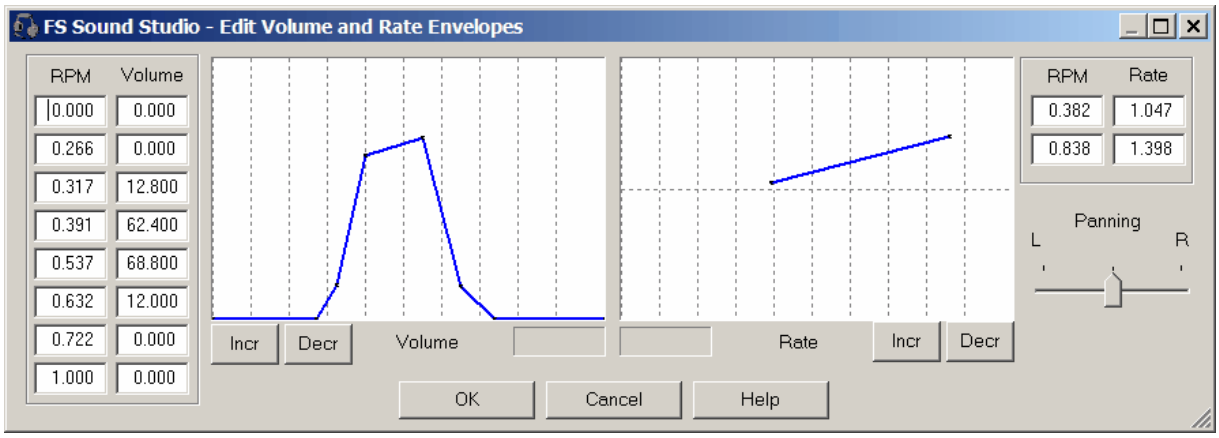
Turning Individual Sounds on or off

Click on the checkbox at the left edge of COMBUSTION.1.02. With the checkmark removed, FS Sound Studio will remove the entry from the preview mix. Move the RPM slider to hear the contribution made by the missing entry. When Finished, click on the checkbox to restore the sound. Adjust the RPM Value back to 1275RPM. Note that these checkboxes do not affect how the sounds are heard in FS2002.

5.2.3 Step 3. Edit the COMBUSTION.1.02 sound

In Step 2 we explored the contribution that COUMBUSTION.1.02 made to the overall sound mix. Lets modify the Volume and Rate envelopes to see how we can change the way it sounds.

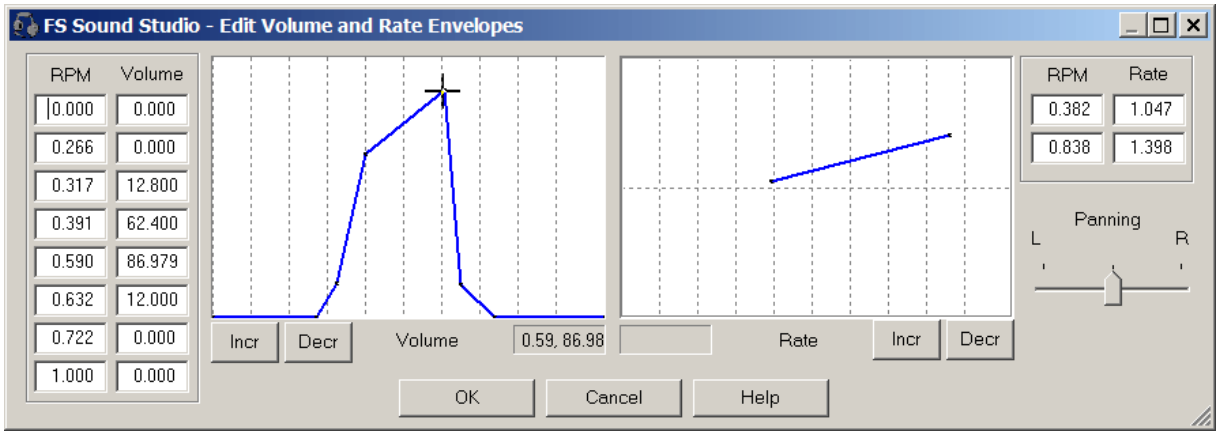
You may edit the waveforms directly in the previous dialog by using the mouse to drag the line segments. To edit a single waveform in more detail, select COMBUSTION.1.20 in the list box and click on the **Edit...** button, or double click on the entry. This will start the Envelope Editor. Note: This dialog can be resized to make it bigger.



The Volume and Rate envelopes are shown both graphically and in a numerical table format. Note that the Sound Preview window continues to function while the Envelope Editor is active, and any changes made in the Envelope Editor are immediately reflected in the Sound Preview Window.

Editing the Volume Envelope

Make sure you're still listening to the Preview sound, if not press the **PLAY** button in the Preview dialog. In the Envelope editor,move the mouse over the Volume graph, somewhere near the middle of the envelope. As the mouse hovers over a graph point, the cursor will change to a cross shape. Press and hold down the left mouse button, and drag the point to a new position.



As the mouse moves, the envelope is redrawn with its new shape, and the Table is updated with the new values. At the bottom right corner of the graph, the current mouse position is tracked. The Sound Preview is also updated with the new envelope shape. While dragging points to reshape the envelope, note the changes in the preview sound.

Editing the Rate Envelope

The procedure used to edit the Volume envelope can also be used with the Rate envelope. It has only two values, so grab one end or the other to reshape the sound, and note the difference made to the sound in the Sound Preview.

Panning

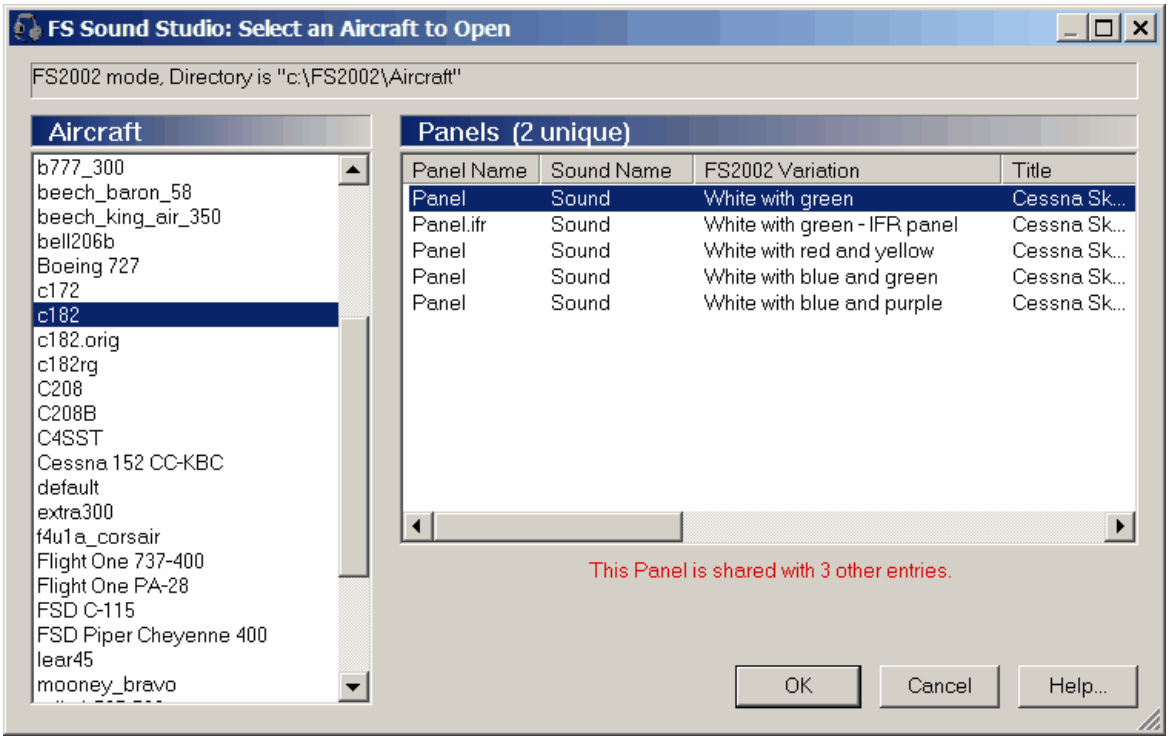
Move the Panning slider left or right to change the apparent sound position. This is useful if you have a multi-engine aircraft -- you can place the sound's apparent origin to be from the left or right side of your sound system.

5.3 Using the Add New Sounds Wizard

The Add New Sounds Wizard allows you to quickly add a new Sound configuration to an existing Aircraft. For our example, well use the Wizard to modify the default Cessna C182. We'll add a new Panel/Sound combination using a copy of the current C182 sounds.

5.3.1 Step 1. Load an Aircraft

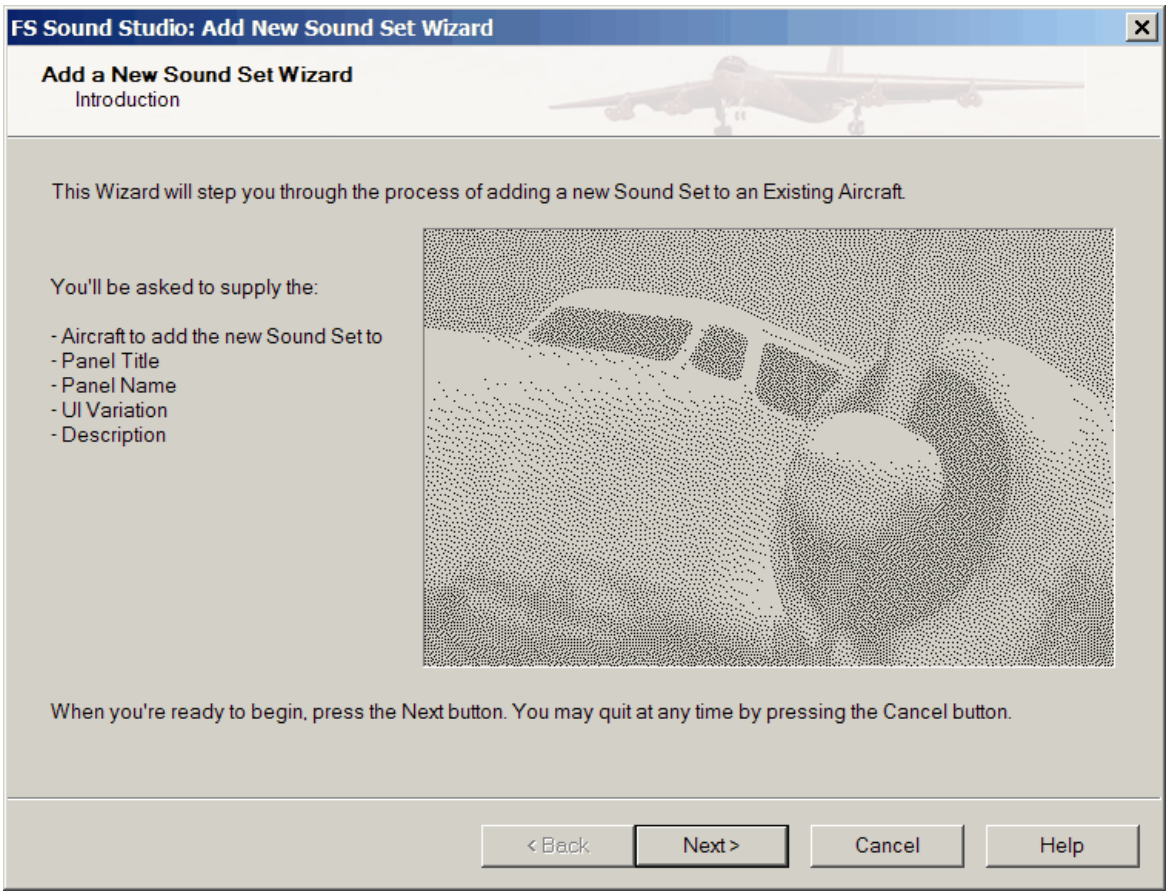
Begin by starting FS Sound Studio. Use the **File:Open Sound.cfg by Aircraft** menu pick (or toolbar button) to load the **C182**.



As shown above, the C182 has 5 Panel/Sound combinations -- we'll add a 5th. Select the default, first Panel/Sound combination in the list and click on **OK**.

5.3.2 Step 2. Start the Wizard

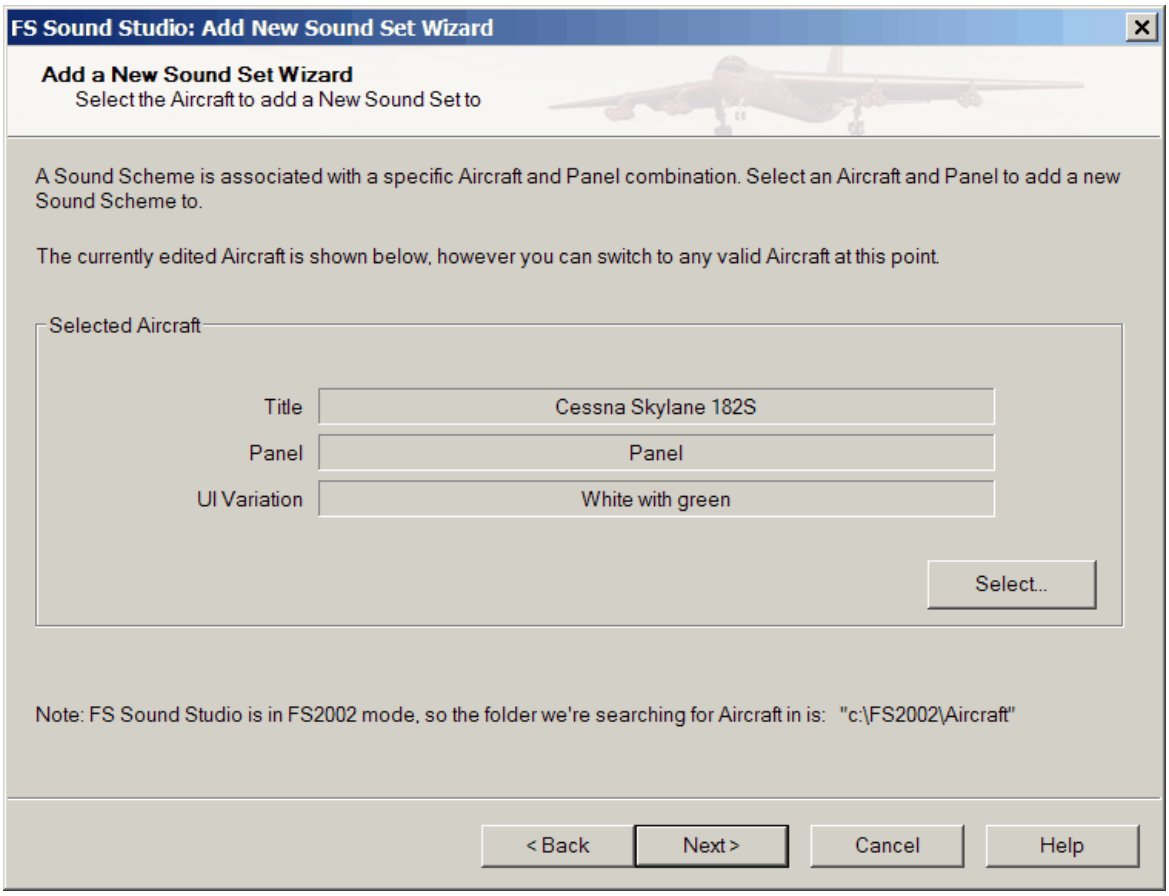
Use the **File: Create a New Sound Config Wizard** menu pick (or toolbar button) to start the Wizard.



The introductory screen is displayed, describing the steps we'll take. Click on **Next** when you're ready to continue.

5.3.3 Step 3. Select the Target Aircraft

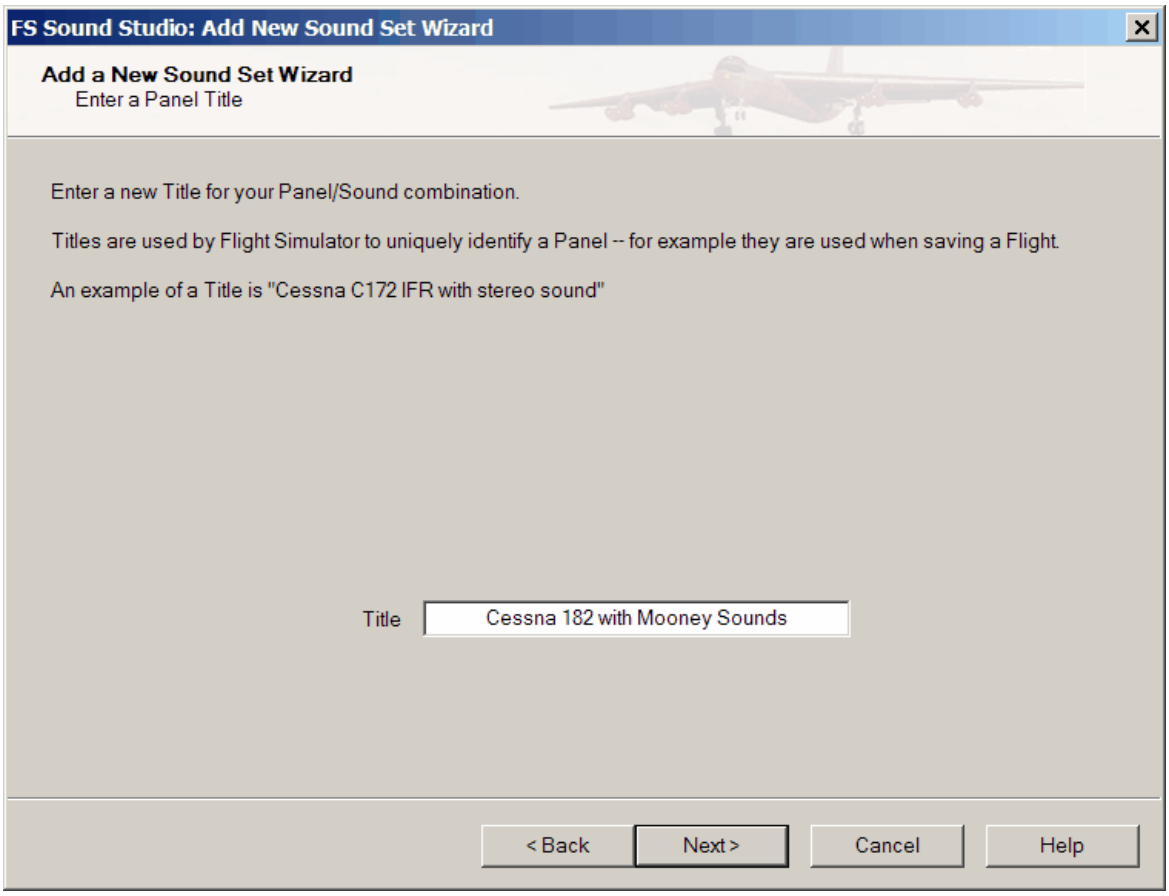
Because we started by loading the C182, the target aircraft in this step of the Wizard is already set correctly. If we wanted to, at this stage we could also select a different Aircraft or Panel to be our target for the new sound configuration by clicking the **Select** button.



Verify the Selected Aircraft is correct and click on the **Next** button.

5.3.4 Step 4. Enter a Title

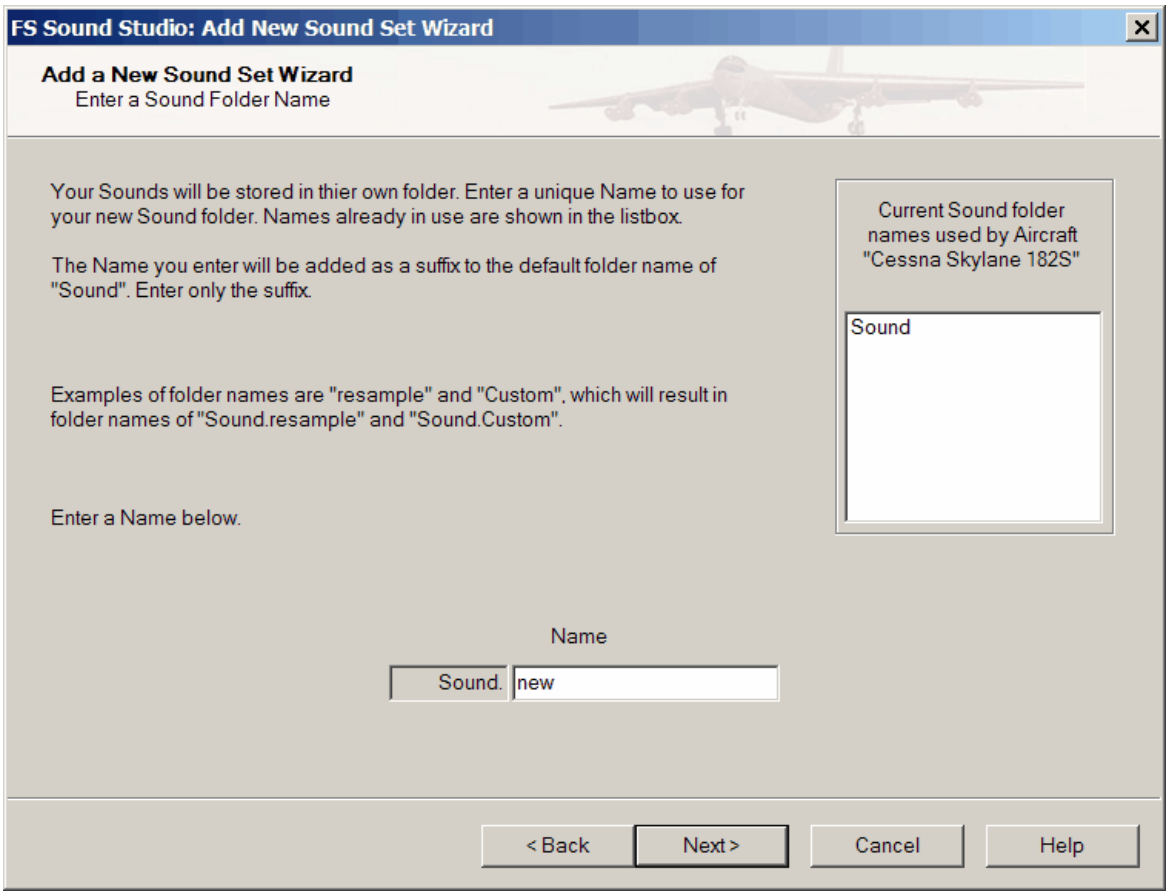
The Title is stored in the *aircraft.cfg* file and is used to identify our new Panel/Sound combination.



Enter a Title which will help identify this Aircraft, then click on **Next**.

5.3.5 Step 5. Enter the new Sound Folder Name

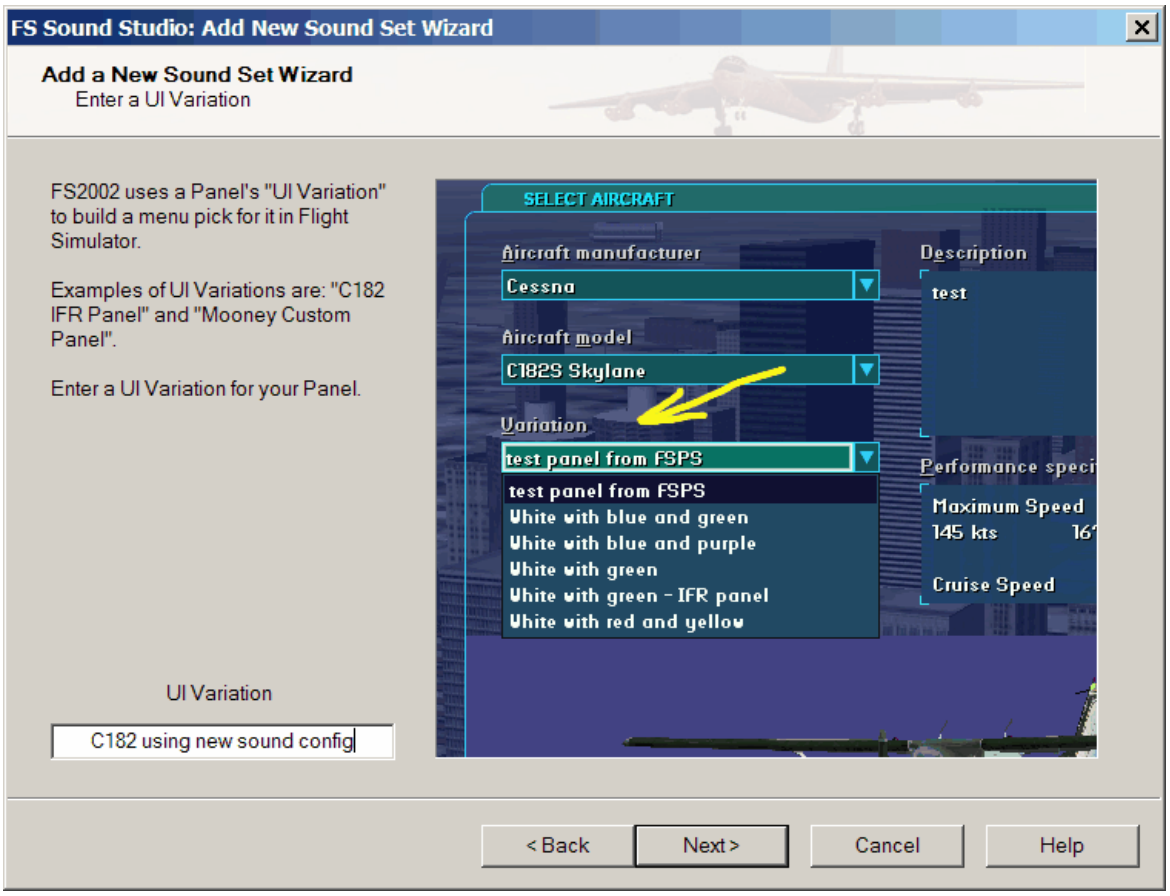
The new *sound.cfg* file and the associated wave files need to be stored in their own folder. This is where the new sounds will be copied to.



The Sound folder must start with *SOUND*, what we specify is a file extension. In this example, using *new* as the extension will help to identify the sounds. Enter the new name and click on **Next**.

5.3.6 Step 6. Enter a new UI Variation

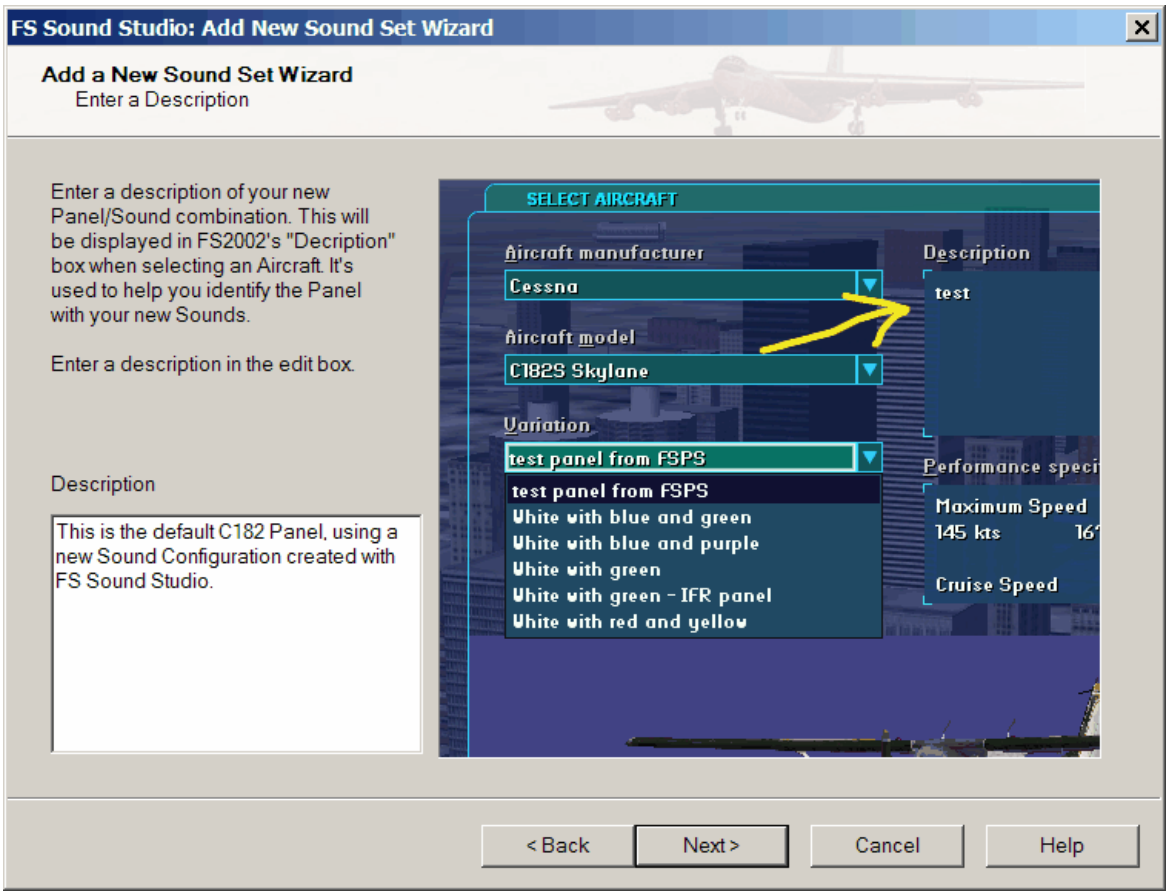
When you load an aircraft in FS2002, you specify the Manufacturer (Cessna in the case), Model (C182 Skylane) and the Variation. The Variation is how we uniquely identify this Panel/Sound combination in FS2002.



Enter a short descriptive phrase to help identify this Aircraft. Click on **Next** when finished.

5.3.7 Step 7. Enter a Description

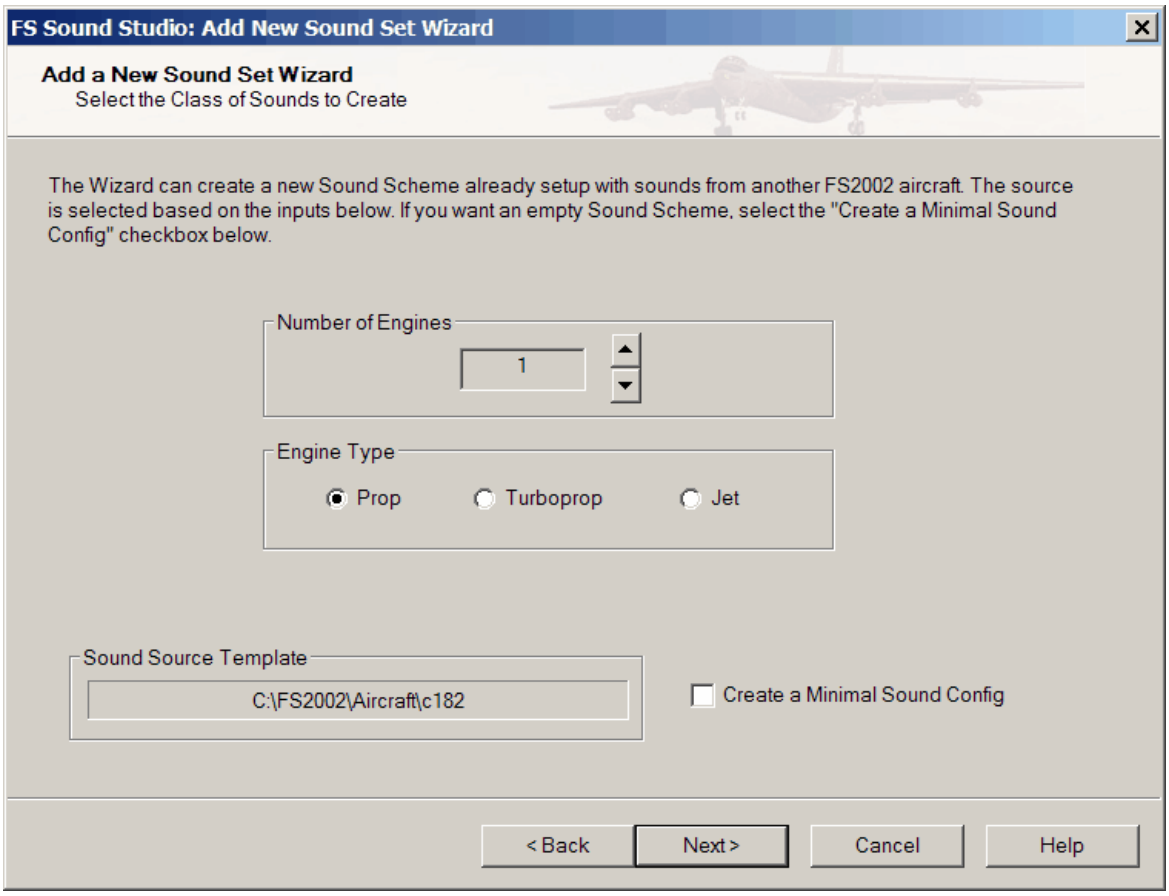
This step is optional. When loading an Aircraft in FS2002, a description is displayed for each Variation. This can further help to identify your Aircraft.



Enter a description and click on **Next**. You may also leave the **Description** field blank.

5.3.8 Step 8. Specify the Engine type and number

At this point the Wizard has determined that we want to create a Sound configuration with a single engine Prop aircraft. The Source Sound Template shows us that we'll be using the default C182 sounds as a base, if we choose.

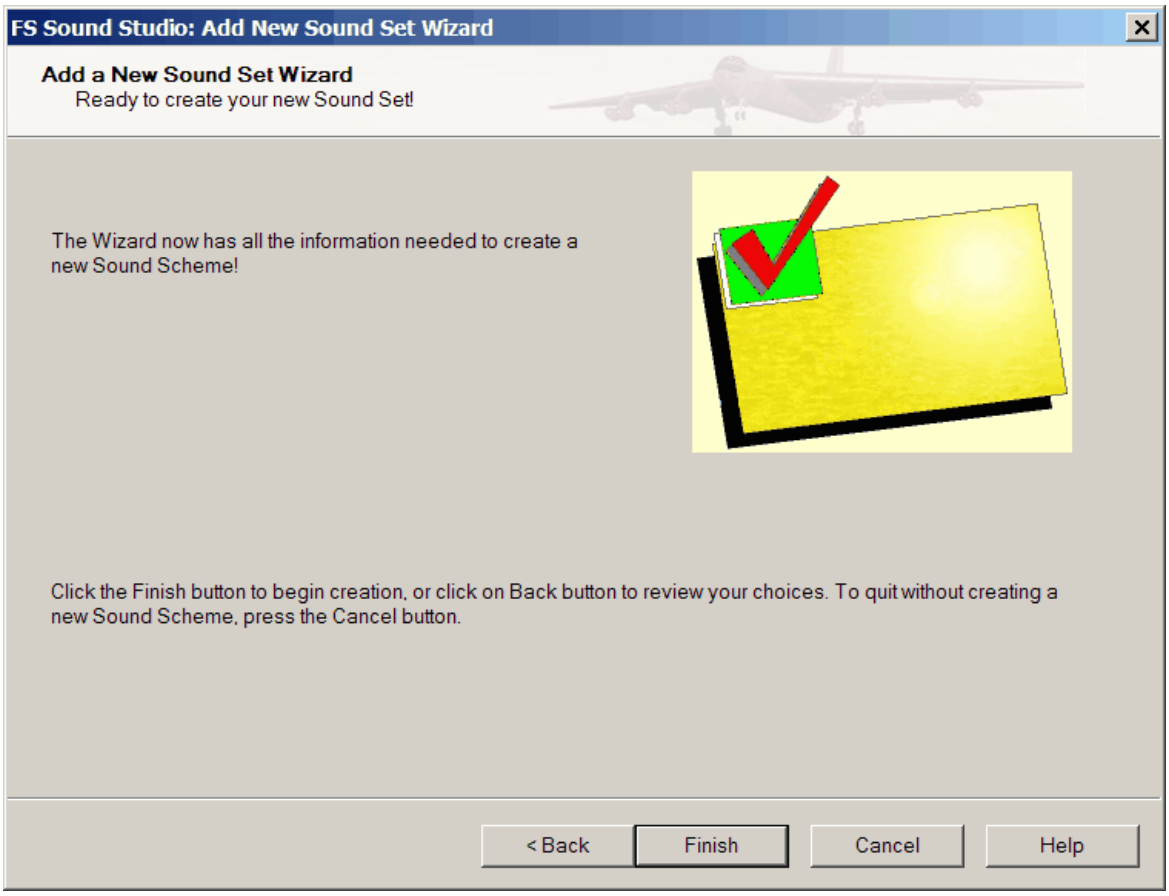


If we only wanted to create the directory structure and aircraft.cfg entries for a new configuration, we could click on the Create a Minimal sound config button. If we did, no actual wave files would be copied, and the *sound.cfg* file would only have a minimal set of entries.

You can experiment by changing the Number of Engines and Engine Type values, watching the Source Sound Template change values. For example, changing the Engine Type to **Turboprop** would change the Source Sound Template to ***Caravan*** (not really useful for a Prop engine!).

5.3.9 Step 9. Create the new Configuration!

At this point the Wizard has collected all the data it needs.



Click on **Finish**, and the Wizard will create a new folder named *Sound.new*, populating it with the full set of wave files from the default Sound Configuration. It will also update the *aircraft.cfg* file for this Aircraft, so we have a new Aircraft to fly in FS2002!

5.4 Creating a New Sound Config from Scratch

This Tutorial will guide you through the first steps in creating a new Sound Configuration from scratch. To start you off, we've provided some sound files to play with, available at the FS Sound Studio web site at: http://www.fssoundstudio.com/zips/examplesounds.zip. Download this file and unzip it into a convenient directory. These will provide us with the original sounds we'll use to create a new configuration. Note that these are not intended to portray real C172 sounds - they're only provided for use with this tutorial.

We'll start with a minimal sound config file for the default Cessna 172, and go through the process of creating the sounds needed for some of the in-cockpit Wind and Engine sounds.

5.4.1 Step 1 Download the Demo Sounds

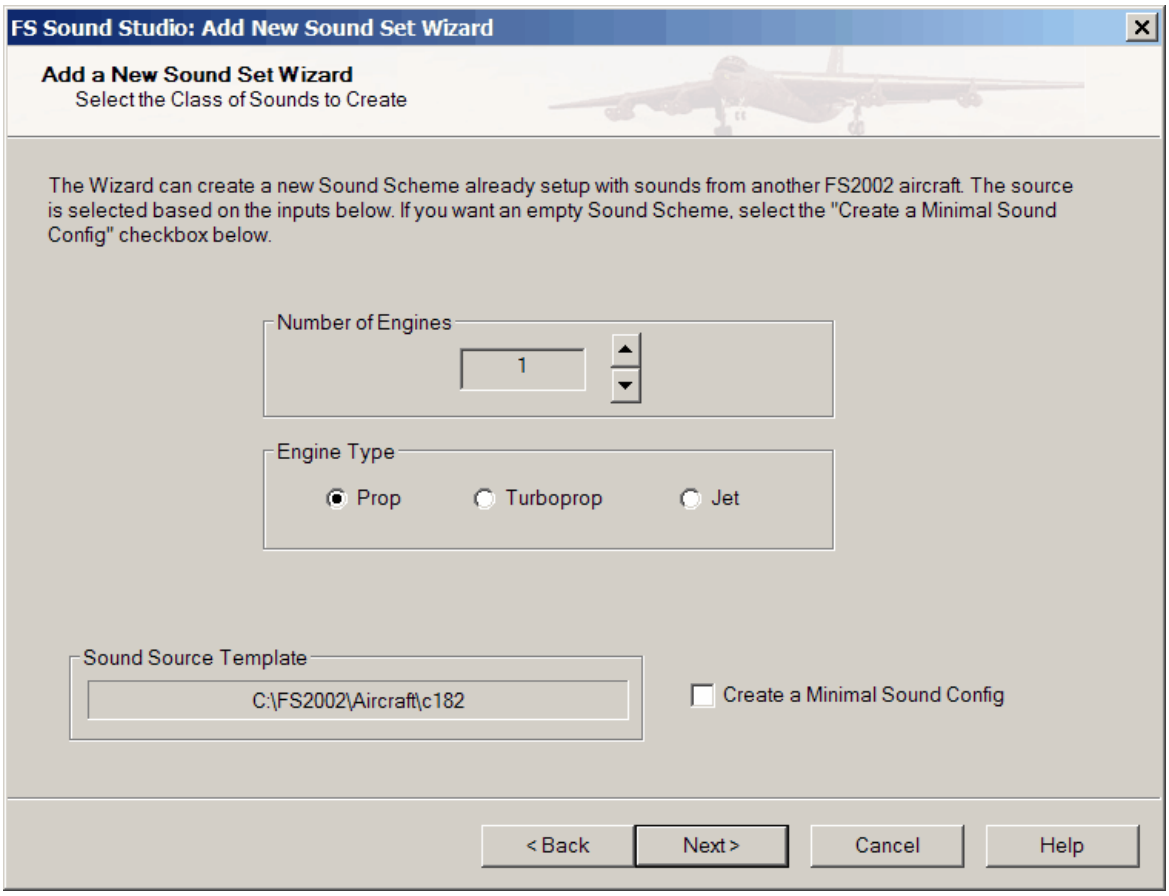
Download the demo files available at the FS Sound Studio web site: http://www.fssoundstudio.com/zips/examplesounds.zip. Unzip to any convenient folder on your system. You should see the following files:

35.wav
50.wav
60.wav
idle.wav
keystart.wav
max.wav
shutdown.wav
startup.wav
wind.wav

We'll use these wave files as the basis for our new Sound Configuration.

5.4.2 Step 2 Create a new Minimal Sound Config

Verify your mode is FS2002. Follow the steps described in the Using the Add New Sounds Wizard tutorial. However, in Step 8, select the **Create a Minimal Sound Config** checkbox.

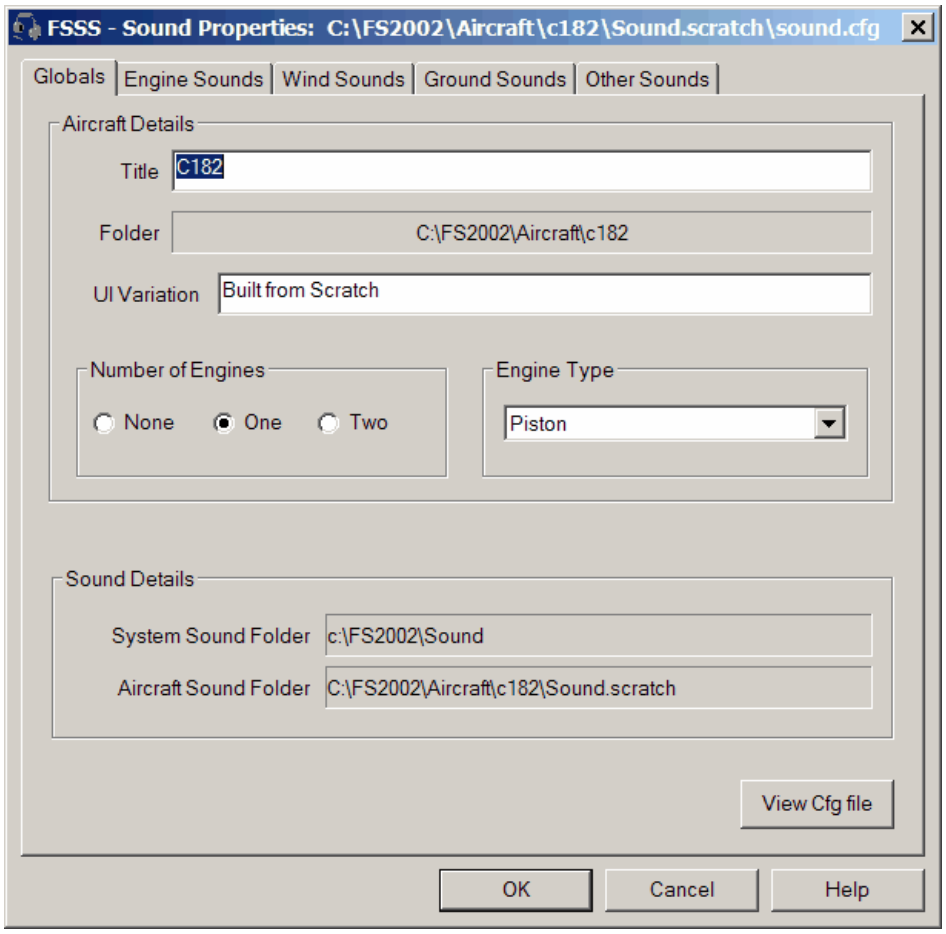


Selecting this option will create a *sound.cfg* file with only the minimal entries necessary -- with no defined sounds. If you were to fly this aircraft, you would hear only a very few default FS2002 supplied sounds such as stall warning. Note that Microsoft does not document what default sounds are available.

5.4.3 Step 3 Add the Wind Sound

At the main program window, load the Plane/Sound combination just created. It will be listed in the Open Aircraft dialog with the **Title** you supplied in the Add New Sounds Wizard, Step 4, the **Sound Name** you supplied in Step 5, and the **UI Variation** entered in Step 6.

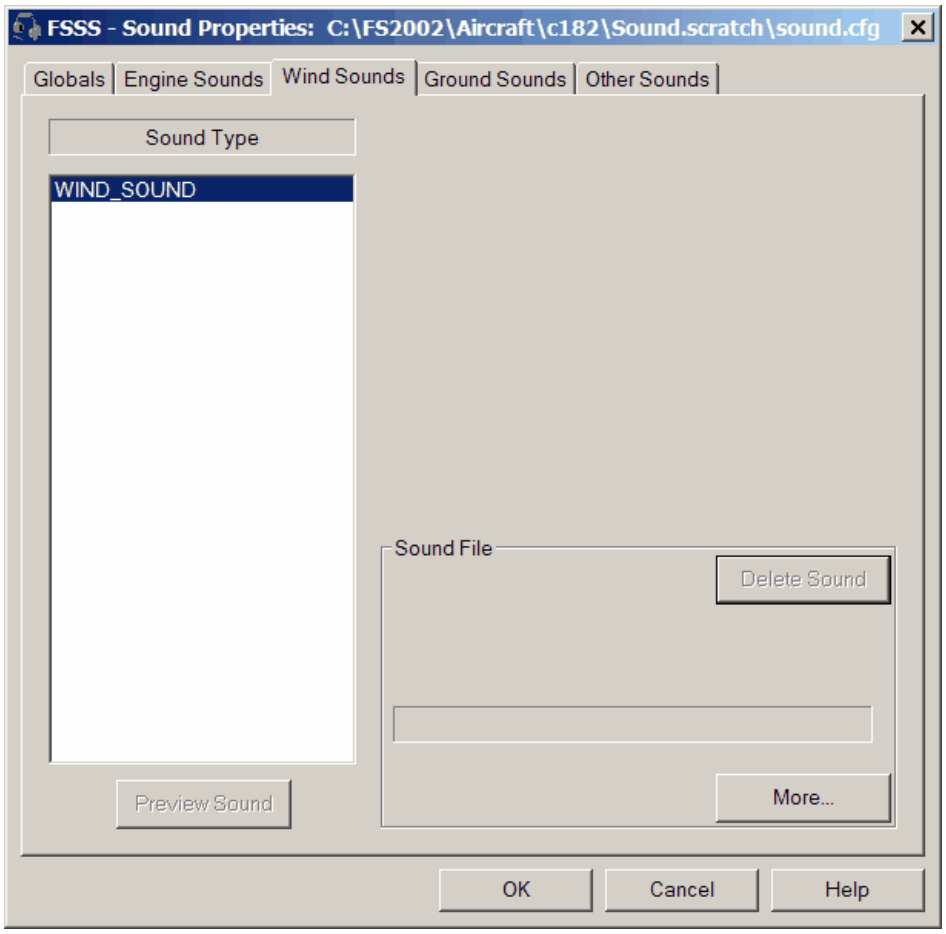
Once the Aircraft is loaded, select the **File: Edit** menu pick (or the corresponding Toolbar button).



In our example, we've set the **Title** to *C182,* the **UI Variation** to *Built from Scratch*, and the **Sound Name** to *Sound.scratch*. FS Sound Studio has set the Number and Type of engines for us to 1 and Piston. Note under **Sound Details** that our files will be stored in the *C:\FS2002\Aircraft\c182\Sound.scratch* folder on disk.

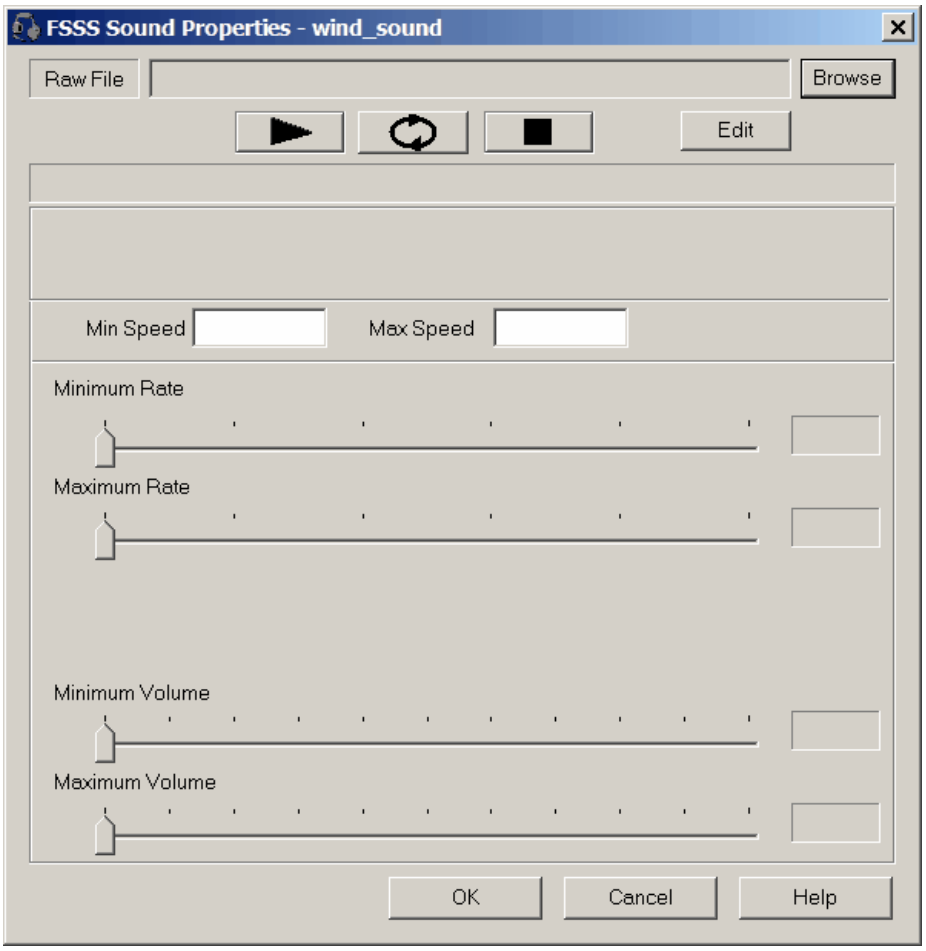
Step 3.1 Open the Wind Editor

We'll start be setting up **WIND_SOUND**. Click on the Wind Sounds tab to bring up the editor for wind related sound.

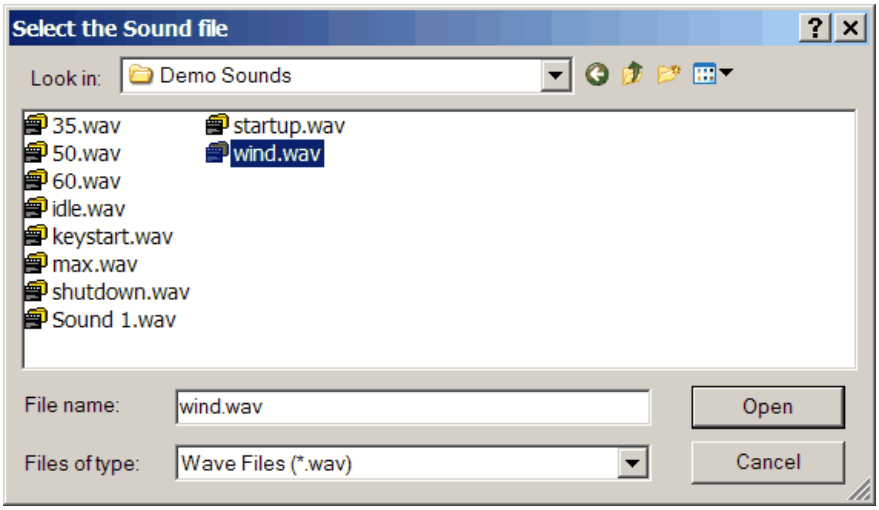


The **Sound File** entry is blank, as there is no file defined. Let's create one now. Click on the **More...** button to bring up this sound's properties.

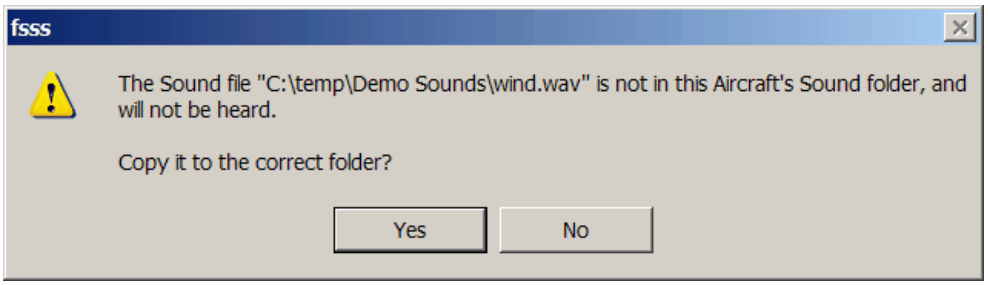
Step 3.2 Setup our new Wind Sound.



Again, there is no entry for the **Raw File** which will be played for this sound. Click on the **Browse** button, navigate to the folder in which you unzipped the demo files, and locate the *wind.wav* file.



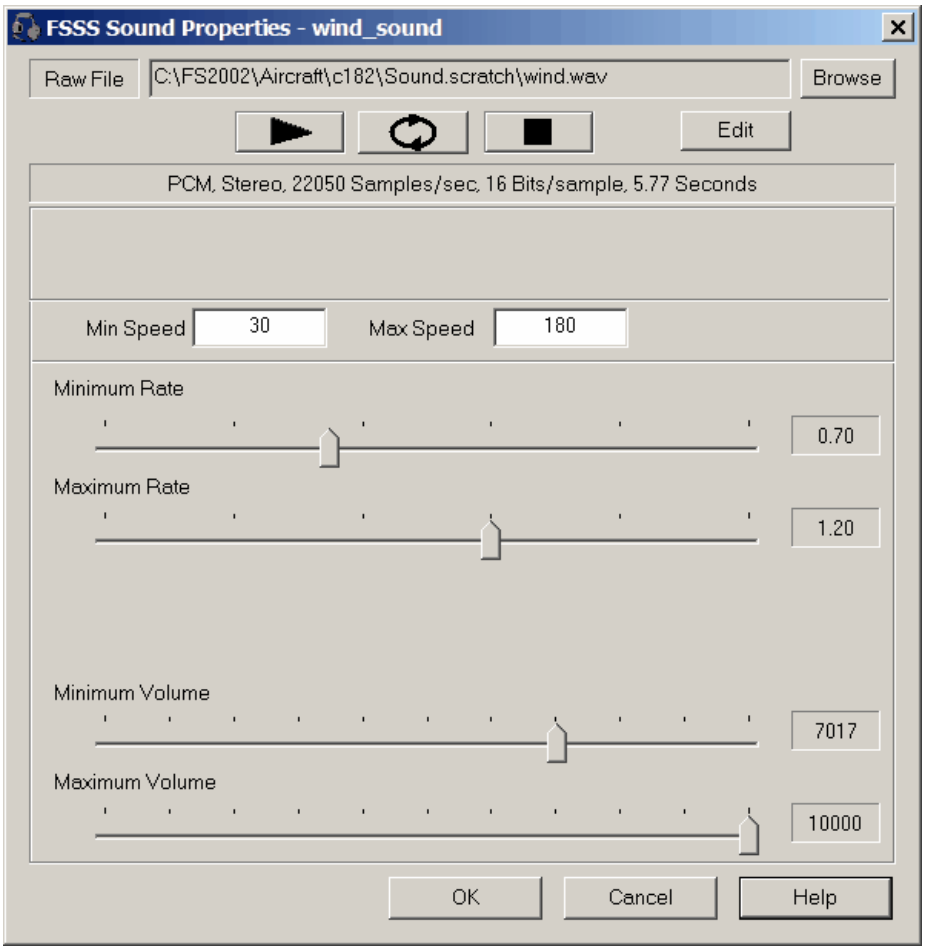
When you click on the **Open** button, FS Sound Studio will check the Path of this file. If it's not in the *Sound.scratch* folder, you'll see the following message:



Click on **Yes** and FS Sound Studio will copy the wave file to the proper location.

We've now set the **Raw File** for this sound. If you were to Preview this sound, it would sound the same at all airspeeds in FS2002 - not very realistic. We'll use the Speed, Rate and Volume Parameters to fix this. In the Sound Properties - wind_sound dialog, set the **Min Speed** to 30 (knots), the **Max Speed** to 180 (redline for this Aircraft). Set the **Minimum Rate** to 0.70, the **Maximum Rate** to 1.20, the **Minimum Volume** to approx 7000, and the **Maximum Volume** to 10000 (max).

These are just initial guesses. We'll use the Preview capabilities of FS Sound Studio to fine tune them.

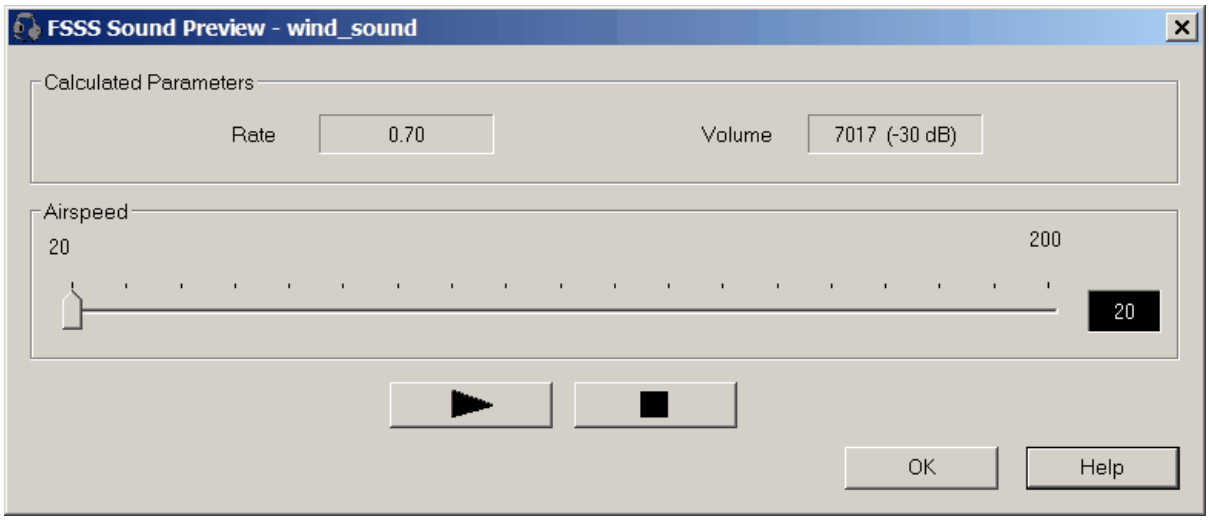


Your dialog should now look like this. Click **OK** to save your changes.

Step 3.2 Setup our new Wind Sound.

We've now associated the *wind.wav* file with wind sound in FS2002. We can now use the Preview capabilities of FS Sound Studio to determine what it will sound like in FS2002, and fine tune it for maximum realism.

We should now be back to the Editor's Wind page, as shown in Step 3.1 Click on the **Preview Sound** button.



The Sound Preview dialog allows us to play the sound, and hear it as modified by the Parameters we set in the last step. This allows us to hear the Sound as it would be played in FS2002. Click on the VCR style **Play** button.

Unless your computers's volume control is set very high, you probably won't hear anything. Slide the **Airspeed** slider control through its range and you should now hear the sound grow louder with increasing simulated **Airspeed**. Note that the sound increases in Pitch as well as Volume. FS Sound Studio shows the calculated Rate and Volume for the Simulated Airspeed, so you can see what the actual values will be for any specific speed.

If you're not satisfied with the sound, you can go back to the Properties dialog, and modify the Speed, Rate and Volume values, and then resimulate. This is a fast and easy way to get the exact effect you're looking for. If you don't like the basic sound of the *wind.wav* file, feel free to explore the wave files provided by FS2002, or other Aircraft's files to select a different sound. FS Sound Studio will ensure the file ends up in the proper folder, and will preview it for you so you can hear it as it will sound in FS2002.

When you're happy with the final result, click on the **OK** button.

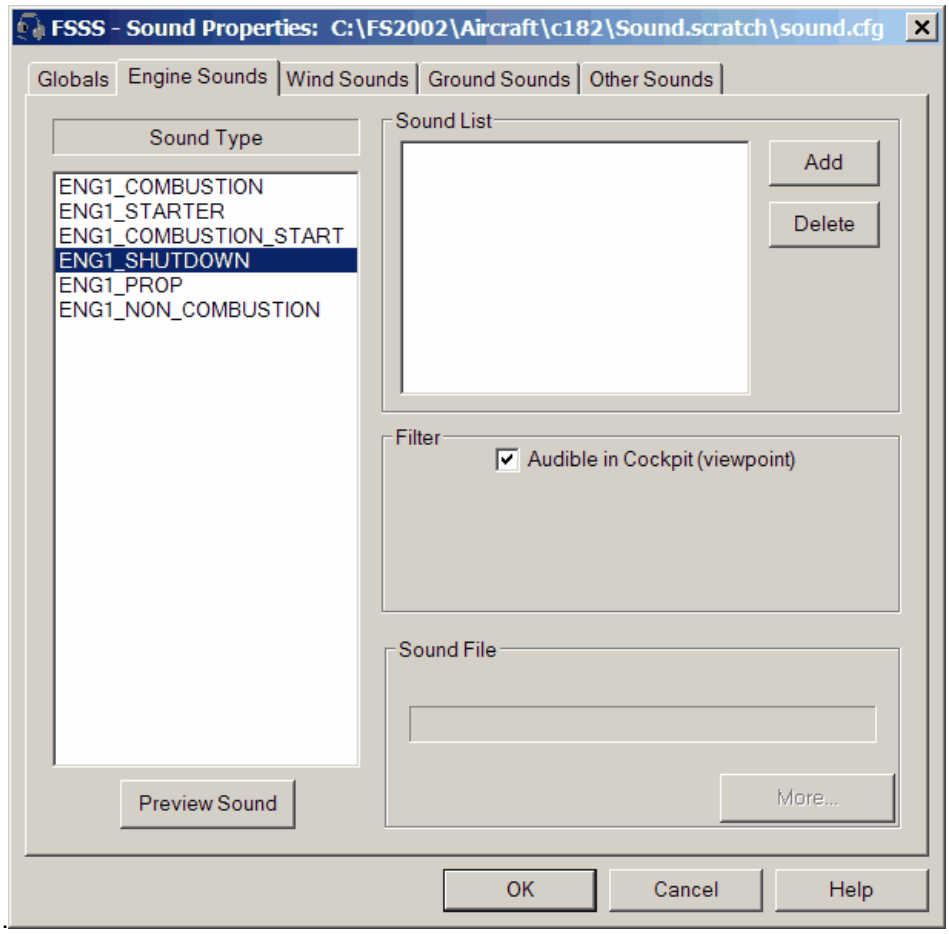
5.4.4 Step 4. Create the Engine Sounds

Our new C182 Sound Configuration has a WIND_SOUND entry, and the default FS2002 sounds. In this step, we'll add the sounds necessary to hear the engine in the cockpit, complete with Startup and Shutdown sounds.

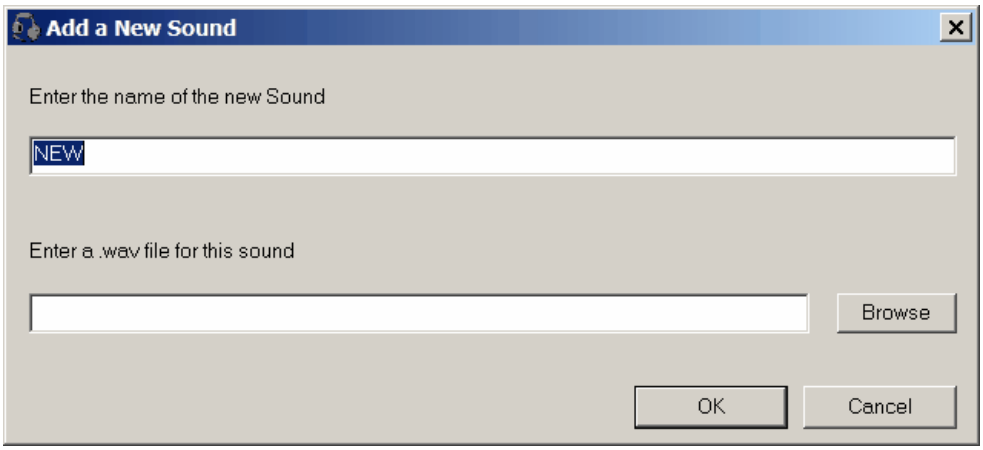
Step 4.1 Setup the Shutdown Sound - Open the *Engine Sounds* Editor

The Shutdown sound is fairly straightforward, one wave file which represents the sound of the engine during shutdown. For a single engine aircraft, the sound is **ENG1_SHUTDOWN**. In the case of the C182, this will be played by FS2002 when the magnetos are switched to off or the Mixture is set to Idle-Cutoff and the RPM drops to about 200.

Click on the **Engine Sounds** tab in the Editor. In the **Sound Type** listbox, click on the **ENG1_SHUTDOWN** sound.



As shown above, there should be no entries in the **Sound List** listbox. We'll now add a Sound List entry. Note that the **Audible in Cockpit** checkbox is set, which indicates we're adding an Internal (audible in Cockpit) entry. Click on the **Add** button.

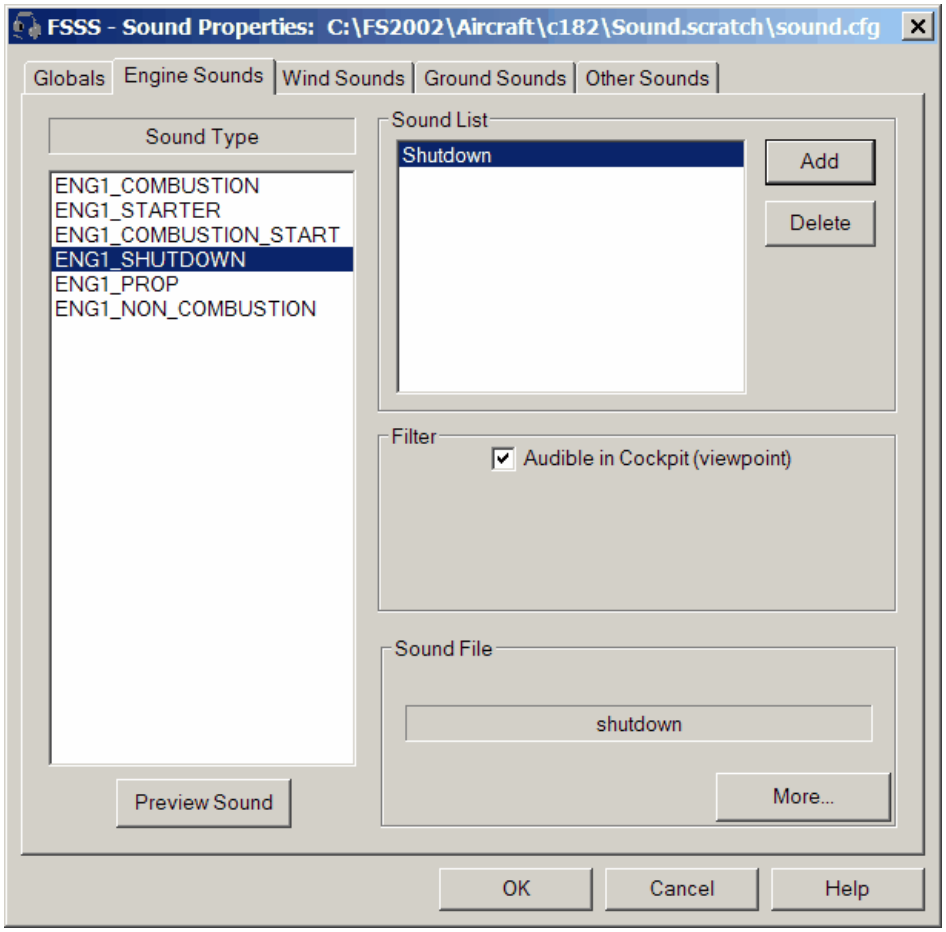


Unlike the simpler sounds where we just specified a filename, the Engine sounds use Sound Lists, which are one or more sound files mixed together to generate the final sound. Each sound list entry has a wave file plus associated Parameters. See the Background section for more details on how a

sound.cfg file works. For the **ENG1_SHUTDOWN** sound, we'd probably have 2 Sound List entries, an internal (in the cockpit) and an external sound. In our example, we're only creating internal sounds.

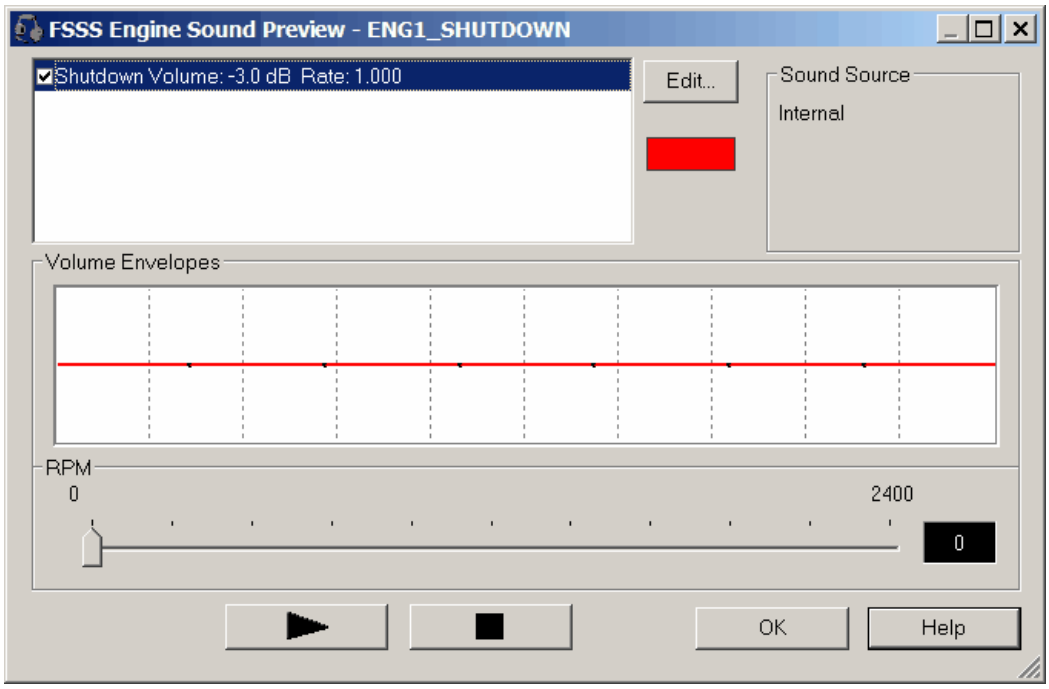
Type in a new name for the Sound. We'll use **Shutdown** in our example.

We'll now select a wave file to use. Click on the **Browse** button, and navigate to the folder containing the files downloaded in Step1. Click on **Open** in the File Explorer to select the file, then **OK** in the dialog which ask if we want to copy the file to the correct folder. You should now see the following. Note the *shutdown* in the Sound File box.



We now have a Sound List entry for **ENG1_SHUTDOWN** named **Shutdown**, and we've associated the file *shutdown.wav* with it. The **Filter** shows that this is an internal sound (audible in the cockpit). Because this is a simple sound, we don't need to set any Parameters in the Properties dialog (accessed with the **More.**. button). The FS2002 documentation appears to state that all Engine Sounds have associated Rate and Volume envelopes, but in practice it appears FS2002 will play this sound unmodified.

We can, however, Preview this sound to hear how it will sound in FS2002. Click on the **Preview Sound** button.



The **Volume** envelope is shown, however you can ignore it. Also, moving the **RPM** slider won't make any difference, since this sound is not affected by the RPM (remember, this is an example of a simple sound!) Click on the **Play** button, and you'll hear the Shutdown sound in an endless loop. *Note: This is the same sound you'd hear in the Properties dialog, if you played the Raw File, since there are no Parameters modifying it.*

Step 4.2 Setup the Startup Sounds

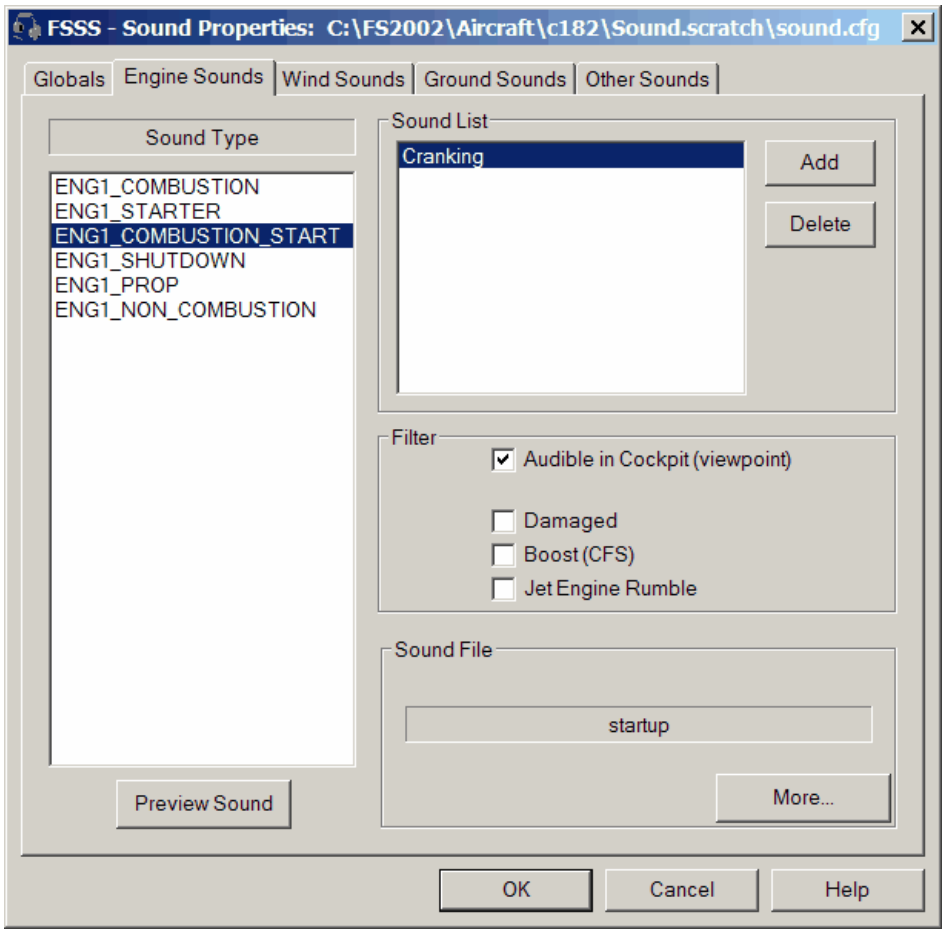
The startup sounds in FS2002 for a piston engined aircraft has two parts -- a starter sound, **ENG1_STARTER**, and a combustion start sound **ENG1_COMBUSTION_START**.

The ENG1_STARTER sound represents the "cranking" sound of the engine, as well as the sounds of the magneto switch being turned in the cockpit (if this is an internal sound, after all). Although undocumented, it appears that this sound is only played for a second or two, and then the ENG1_COMBUSTION_START sound is played. You may need to experiment with the sound file length to account for this and get the two to merge properly.

ENG1_COMBUSTION_START is the sound of the engine coming to life before it settles down to its idle RPM. It's played after FS2002 plays the ENG1_STARTER sound.

In the demo files you downloaded in Step 1, the file *keystart.wav* will be used for the ENG1_STARTER. Use *startup.wav* for the ENG1_COMBUSTION sound. Follow the procedure in Step 4.1 to associate these files to the respective **Sound Types**. You can use any name (but try to pick something informative) for the **Sound List** entries -- in this example we've used **Keystart** for the ENG1_STARTER Sound List entry, and **Cranking** for the ENG1_COMBUSTION_START Sound List entry.

Note that when you add the ENG1_COMBUSTION_START entry, you're presented with a couple of extra entries in the **Filter** for this sound.



Flags have different functions when associated with different sounds. These additional flags allow you to fine tune when the sounds are heard in the simulator. For example, you can have multiple ENG1_COMBUSTION_START sounds, one for a "normal" **Audible in cockpit** start, one when the engine is **Damaged**, etc. Some of the flags don't appear to make sense in all cases, for example, the **Jet Engine Rumble** flag for a Piston engine! FS2002 probably just ignores it in this case.

As in the ENG1_SHUTDOWN sound, you don't need to set any further parameters for these sounds. Previewing them is equivalent to playing the raw audio file. You can also click on the **Preview Sound** button to hear them at this time.

Step 4.2 Setup the ENG1_COMBUSTION Sounds

Setting up the actual combustion sounds of an engine is the most complex part of programming a new Sound Configuration. The simplest solution to this is to create a single Sound List entry, using a single wave file, with Volume and Rate envelopes that increate with RPM. However, this would not create a very convincing sound.

The normal practice is to divide the RPM range into subsections, with a Sound List entry for each. Most Microsoft supplied aircraft divide the RPM range into 4 sections. The Volume envelope is then used to ensure the sound is only audible over a section of the RPM range. The Rate envelope is used to increase the apparent pitch of the sound as the RPM increases. The number of sounds playable at once may be limited on your system by the type of sound card you have, it would be impractical, for

example, to use 50 wav files to represent the Engine sounds. Microsoft does not document how many can be used a one time.

Without FS Sound Studio, you would be forced to use a text editor to enter all of these values into the *sound.cfg* file. Checking the result would require you to start FS2002, load the aircraft, and fly it. Making changes require re-editing, re-loading the Aircraft, and re-flying. While you're trying to fine tune the sound, you're also hearing all the other sounds, such as wind noise. FS Sound Studio allows you to hear your edits in real time -- as you tug on a Volume or Rate envelope, you instantly hear the change.

For this example, we'll use 5 of the files downloaded in Step 1 to represent the range of 0 RPM to the maximum RPM. We'll divide them as follows:

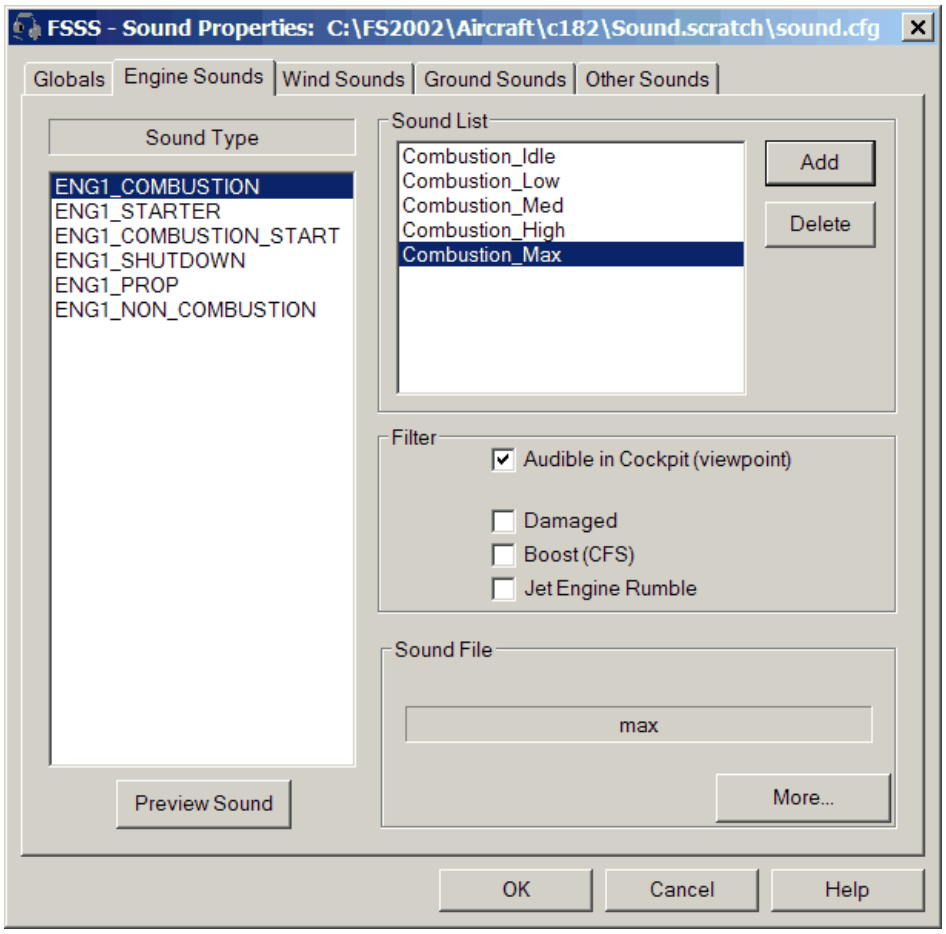
idle.wav	0 - 1000 RPM
35.wav	1000 - 1700 RPM
50.wav	1700 - 2000 RPM
60.wav	2000 - 2300 RPM
max.wav	2300 - 2400 RPM

These ranges are a bit arbitrary, and we'll fine tune this in the Envelope Editor.

By now you should be familiar with creating Sound List Entries. Navigate to the **Engine Sounds** page in the Editor, and select the **ENG1_COMBUSTION** **Sound Type**.
Ensure the Filter is set to only **Audible in Cockpit**. Continue by adding 5 new **Sound List** entries using the following wave files:

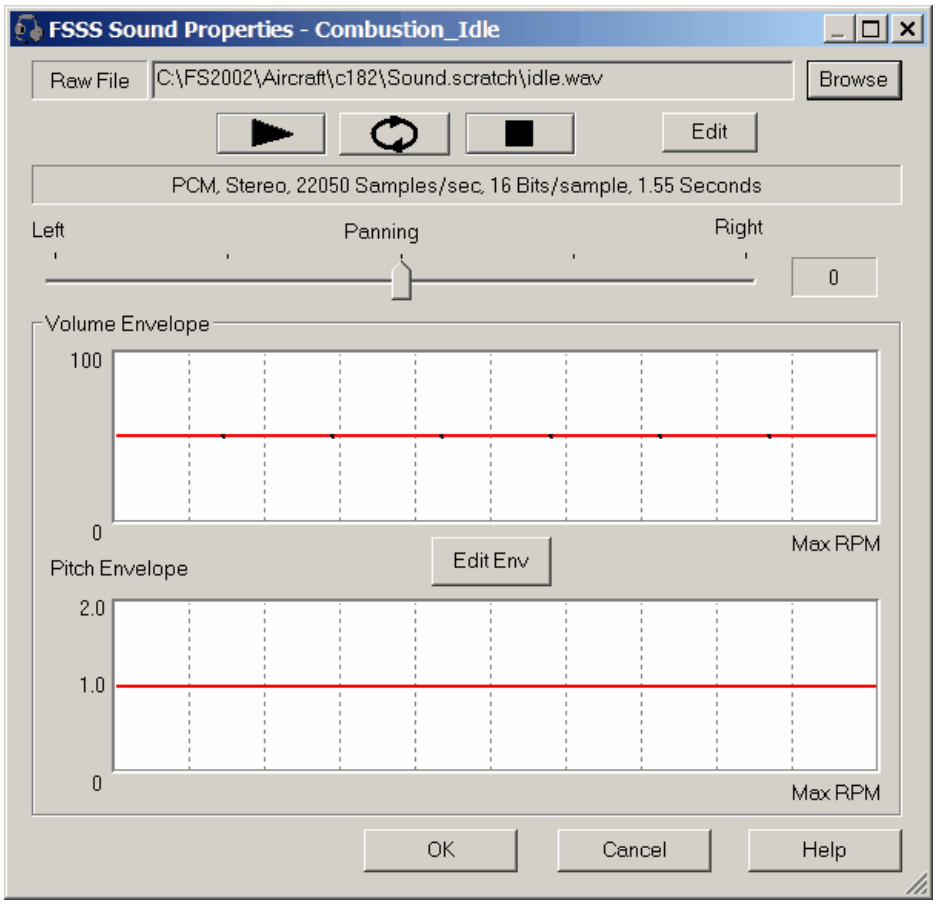
Combustion_Idle - idle.wav
Combustion_Low - 35.wav
Combustion_Med - 50.wav
Combustion_High - 60.wav
Combustion_Max - max.wav

Your **Engine Sounds** page should now look something like this:



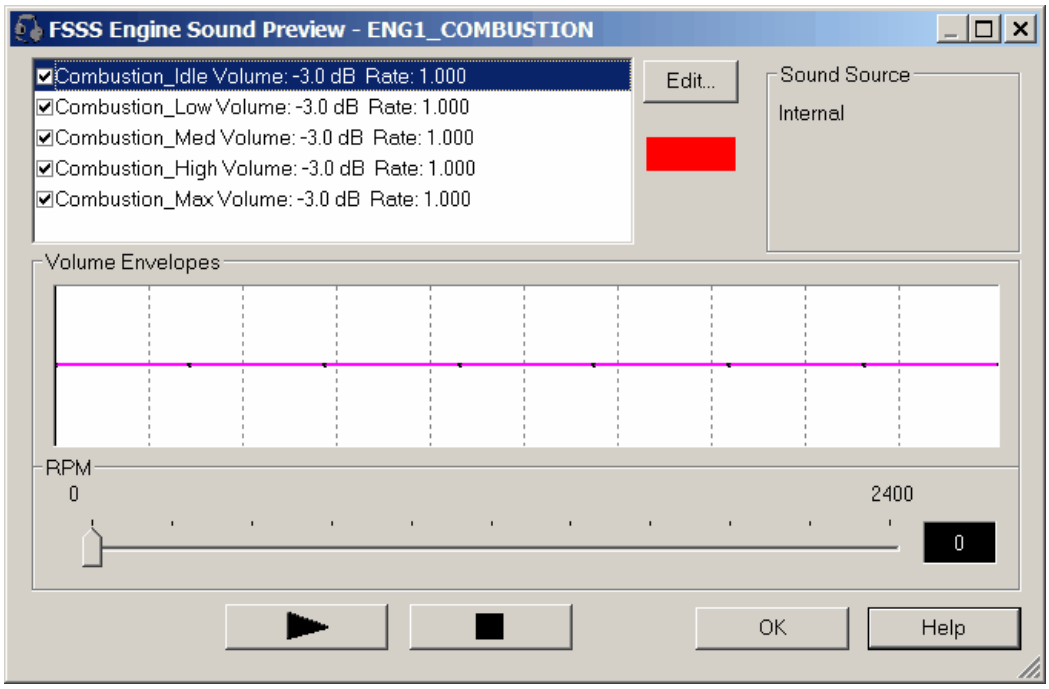
If you try to Preview the **ENG1_COMBUSTION** sound now, you'll hear all of the wave files played at once. They would not vary in Volume or Pitch as you changed the simulated RPM. The reason for this is that as the new **Sound List** entries were added, they were given the same default Volume and Rate envelope. We'll fix that next.

We have two options at this point. We can select each of the entries in the Sound List in Turn, and click on the **More...** button. This will bring up the Properties page.

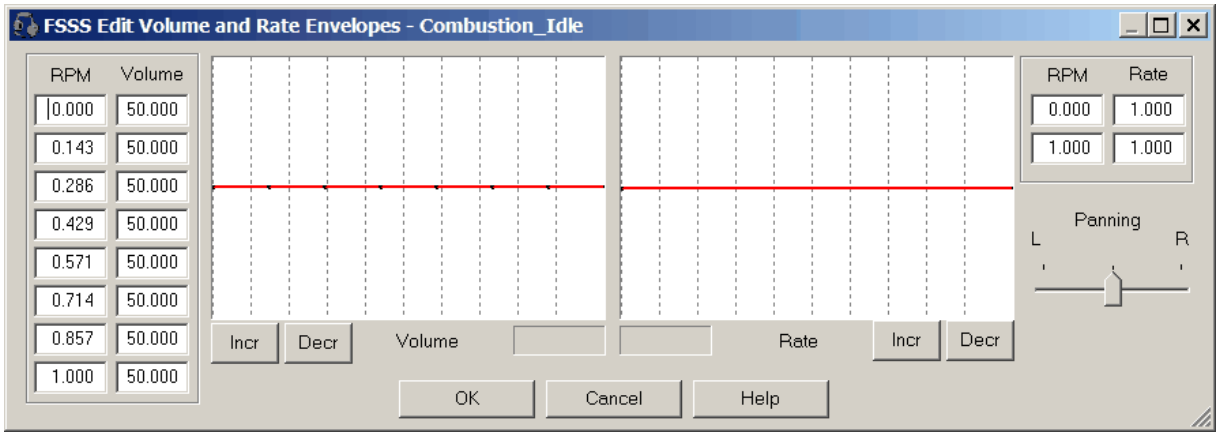


Here we can see the default Volume and Pitch Envelopes. Also note that Panning is set such that this sound emanates from both sides of the stereo sound field equally. To modify the Envelopes, you could click on the **Edit Env**elope button.

In our example, there are 5 sets of envelopes to edit, so a faster way to do this is to click on the **Preview** button in the Engine Sounds editor page.



We can see our 5 sounds, with their default Volume envelopes. Lets start with the Combustion_Idle sound. Select it with the mouse and click on Edit.. (or double click on it) and this will start the Envelope Editor.

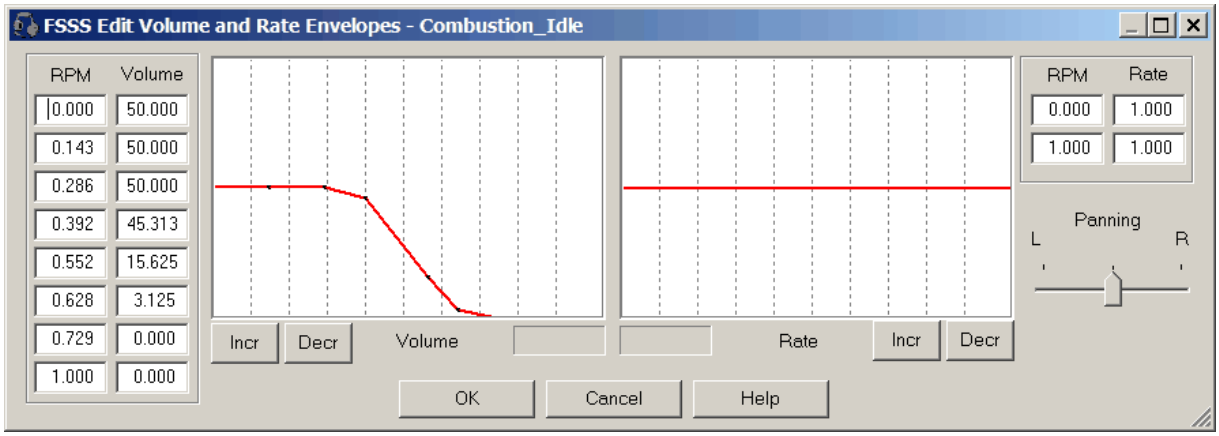


Note that both the Envelope Editor and the Preview dialog are now both active -- as you make changes in the Envelope, they will be immediately reflected in the Preview dialog's **Volume Envelopes** graph. More important, your changes will instantly be reflected in the preview sound you're hearing.

Remember that we wanted to limit the contribution of the *idle.wav* file to the range of 0 to 1000 RPM. We can do this by modifying the Volume envelope. The RPM values are shown as a percentage of maximum, 1.0 being max RPM. In the case of the C182, as we see from the Preview dialog, this is 2400 RPM. The Volume values range from 0 to 100, 0 being silence (100 dB attenuation) and 100 being full volume (0 dB attenuation).

You can modify the envelope by typing your new values into the RPM and Volume tables. A faster way is to use your mouse to drag the envelope points to your desired position. Begin by noting that 1000 RPM represents 1000/2400 or about 0.42 of Max RPM. Thus on our graph we would want to have little

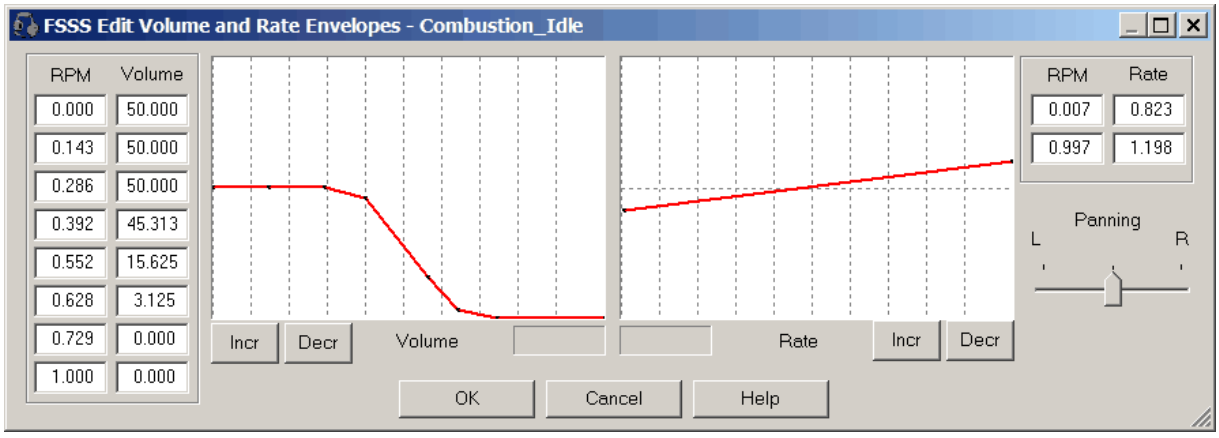
output (or a small Volume value) above this RPM. It's harder to describe than to accomplish. Grab your mouse and have a go. You should end up with something like this.



Note the change in the Volume Envelope shown in the Sound Preview dialog. Let's now listen to the Combustion_Idle entry by itself. Each entry in the list has an associated checkbox to its left. This checkbox determines whether this entry will contribute to the final preview sound (no effect on the final FS2002 sound!). We can selectively turn entries on and off to easily determine their individual impacts to the final mix.

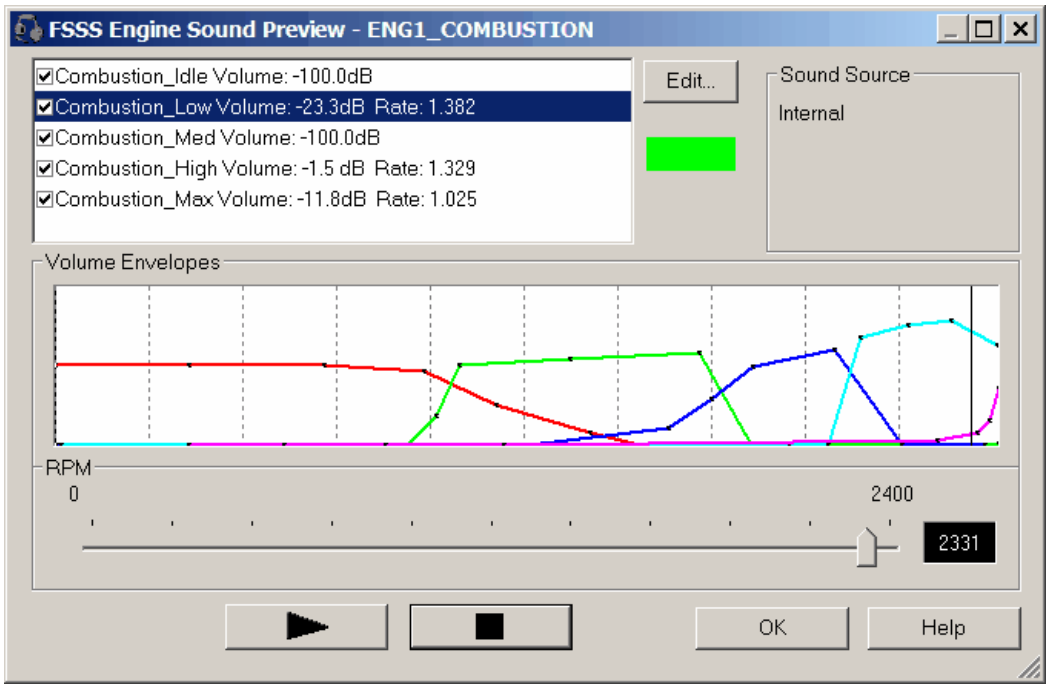
Un-check each of the entries except the first, **Combustion_Idle**. Now click on the VCR style **Play** button. Experiment with the **RPM** slider position. You should hear the sound at normal volume until the RPM reaches about 1000 RPM, where is should decrease.

We would also expect the pitch of the sound to increase as the RPM increases. We can accomplish this by modifying the Rate envelope. Again, we can either use the mouse of enter values directly into the table. For our example, which previewing the sound, tug on the ends of the Rate envelope with your mouse, then preview to hear the results.



It's usually best not to have too much rate change, if you do, the sound starts to become unnatural.

It's up to you to now repeat this process with the remaining 4 sounds. When finished, your Sound Preview dialog should look something like this:



These values resulted from a few minutes of experimentation. There's no "right" solution, it's whatever sounds best to you. Note that the Rate envelopes are not shown, although they have all been modified such that the pitch of the sounds increase slightly with RPM. That's the power of FS Sound Studio -- it allows you to easily manipulate your sound file parameters to create the sounds you desire.

Just for reference, here's how the *sound.cfg* file produced by FS Sound Studio now looks -- imagine typing in all these values by hand (and getting them all right)!

```
// This Sound.cfg file created by FS Sound Studio - http://www.fssoundstudio.com

[FLTSIM]
product_code=FSIM

//EngineSounds_____________________________________________________________

[SOUND_ENGINE]
number_of_engines=1
ENG1_COMBUSTION=Combustion_Idle
ENG1_STARTER=Keystart
ENG1_COMBUSTION_START=Cranking
ENG1_SHUTDOWN=Shutdown

[Combustion_Idle]
filename=idle
flags=0
viewpoint=1
rparams=0.007000,0.823000,0.997000,1.198000
vparams=0.000000,50.000000,0.143000,50.000000,0.286000,50.000000,0.392000,45.313000,0.469000,2
4.479000,0.568000,7.292000,0.620000,0.000000,1.000000,0.000000
link=Combustion_Low

[Combustion_Low]
filename=35
flags=0
```

viewpoint=1
rparams=0.007000,0.750000,0.993000,1.396000
vparams=0.247000,0.000000,0.373000,0.000000,0.405000,17.708000,0.429000,50.000000,0.547000,53.125000,0.683000,57.292000,0.738000,0.000000,1.000000,0.521000
link=Combustion_Med

[Combustion_Med]
filename=50
flags=0
viewpoint=1
rparams=0.007000,0.854000,1.000000,1.302000
vparams=0.003000,0.000000,0.503000,0.000000,0.651000,10.417000,0.697000,28.646000,0.740000,48.958000,0.827000,58.854000,0.898000,0.000000,0.986000,0.000000
link=Combustion_High

[Combustion_High]
filename=60
flags=0
viewpoint=1
rparams=0.003000,0.813000,1.000000,1.344000
vparams=0.007000,0.000000,0.628000,0.000000,0.780000,0.000000,0.820000,0.000000,0.854000,67.188004,0.904000,75.000000,0.950000,77.083000,0.999000,62.500000
link=Combustion_Max

[Combustion_Max]
filename=max
flags=0
viewpoint=1
rparams=0.007000,0.823000,1.000000,1.031000
vparams=0.142000,0.000000,0.243000,0.000000,0.351000,0.000000,0.476000,0.000000,0.936000,2.604000,0.978000,7.292000,0.991000,14.583000,1.000000,34.896000

[Keystart]
filename=keystart
flags=0
viewpoint=1
rparams=0.000000,1.000000,1.000000,1.000000
vparams=0.000000,50.000000,0.142857,50.000000,0.285714,50.000000,0.428571,50.000000,0.571429,50.000000,0.714286,50.000000,0.857143,50.000000,1.000000,50.000000

[Cranking]
filename=startup
flags=0
viewpoint=1
rparams=0.000000,1.000000,1.000000,1.000000
vparams=0.000000,50.000000,0.142857,50.000000,0.285714,50.000000,0.428571,50.000000,0.571429,50.000000,0.714286,50.000000,0.857143,50.000000,1.000000,50.000000

[Shutdown]
filename=shutdown
flags=0
viewpoint=1
rparams=0.000000,1.000000,1.000000,1.000000
vparams=0.000000,50.000000,0.142857,50.000000,0.285714,50.000000,0.428571,50.000000,0.571429,50.000000,0.714286,50.000000,0.857143,50.000000,1.000000,50.000000

//WindSounds_____

[WIND_SOUND]
filename=wind
viewpoint=1
minimum_speed=30.00
maximum_speed=180.00
minimum_volume=7017
maximum_volume=10000

```
minimum_rate=0.70
maximum_rate=1.20

//GroundSounds_____________________________________________________________

//OtherSounds_____________________________________________________________

[STALL_WARNING]
filename=wind
viewpoint=1
```

5.4.5 Step 5. Fly your new sounds

You've now created a new flyable C182. Let's give it a spin in FS2002.

Before we start, make sure you click **OK** in the Engine Editor page, then **Save** in the main application page. Now start FS2002.

In the Aircraft manufacturer box, select Cessna, in the Aircraft model box, select C182S Skylane. In the Variation box, select the UI Variation that you supplied back in Step 2.

When the Panel loads, it should look no different than normal. But, notice the new Engine sounds. Shutdown the engine - note your new shutdown sound. Likewise, start the engine, and note the keystart and startup wave files. Play with the throttle, and enjoy your new engine sounds. WARNING - *Note that FS2002 appears to have some limitation in the number of Panel/Sound configurations defined in the aircraft.cfg file. If you don't hear your new sounds, and you have many (5 or more) entries, this may be the cause. You may need to move the new entry in the aircraft.cfg file using notepad. Hopefully Microsoft produces a patch for this in the future.*

It's this easy to edit a sound configuration in FS Sound Studio.

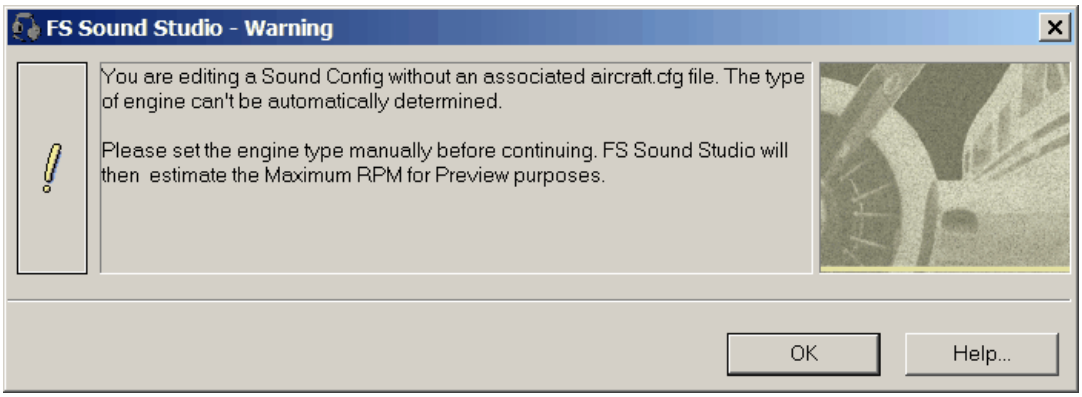
Part VI

6 Troubleshooting

6.1 Error and Warning Messages

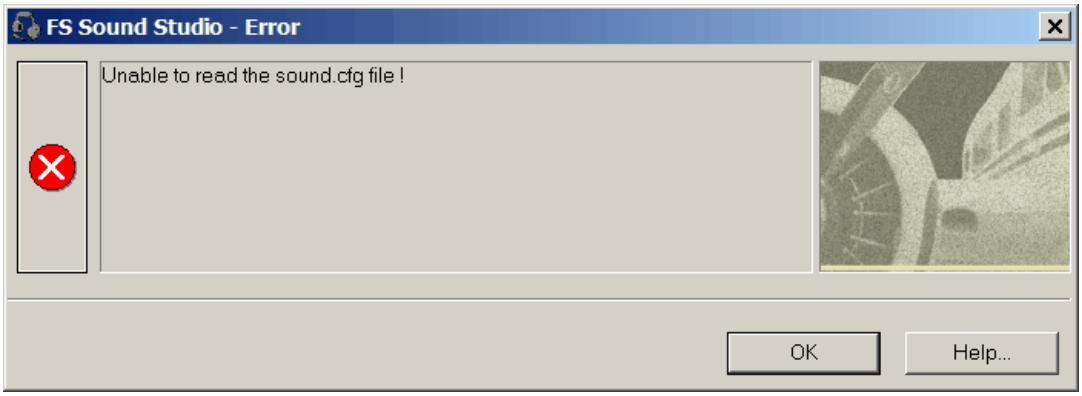
The following are some of the dialogs **FS Sound Studio** will display when it discovers problems.

- **The Aircraft does not have an *Aircraft.cfg* file**



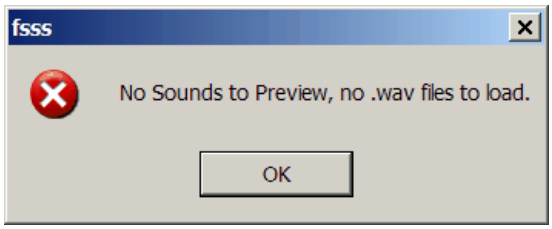
You are attempting to open an aircraft which doesn't have an *aircraft.cfg* file. Essential information is stored in the missing file, such as the engine type and the engine parameters. The Aircraft probably has not been installed correctly, or the FS Sound Studio mode is not correct. FS Sound Studio can continue, but will estimate the value of Max RPM depending on the engine type, which you will need to set manually.

- **Unable to Read the sound.cfg file**



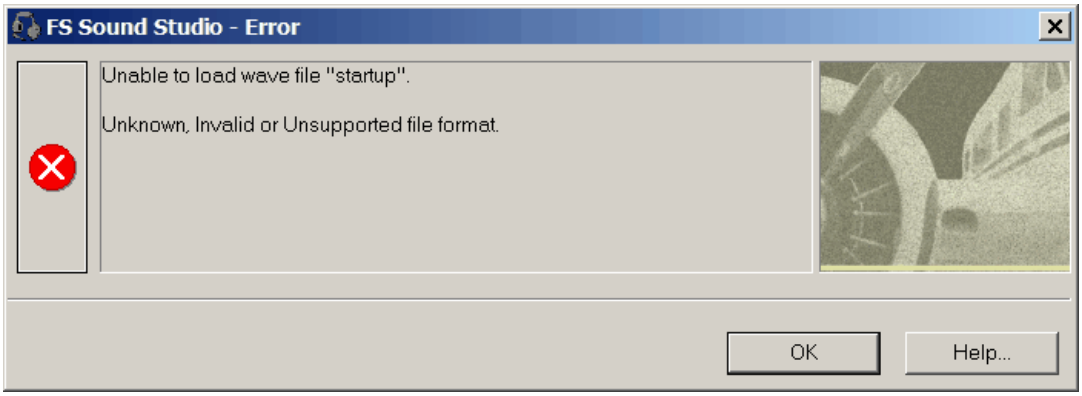
This message is normally seen when a *sound.cfg* file is missing or corrupt.

- **No Sounds to Preview**



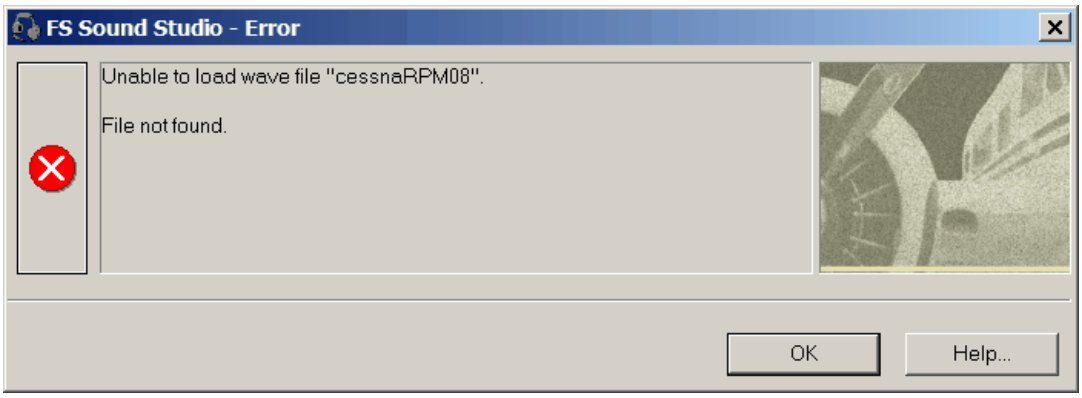
If FS Sound Studio determines there is no wave file associated with a sound, or can't load the wave file, it displays this message.

- **Unable to Load wave file - Unknown, Invalid or Unsupported type**



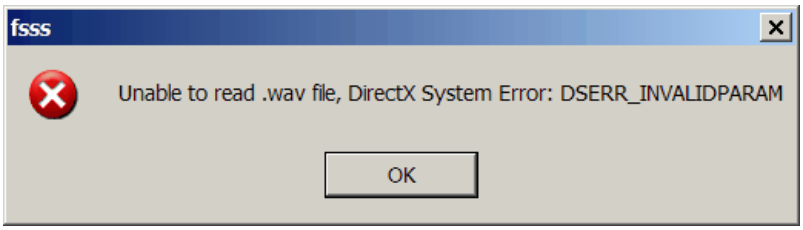
This message is displayed when the wave file specified can't be loaded. The sound file format may be an unsupported type, or the file may be corrupt.

- **Unable to Load wave file - File not found**



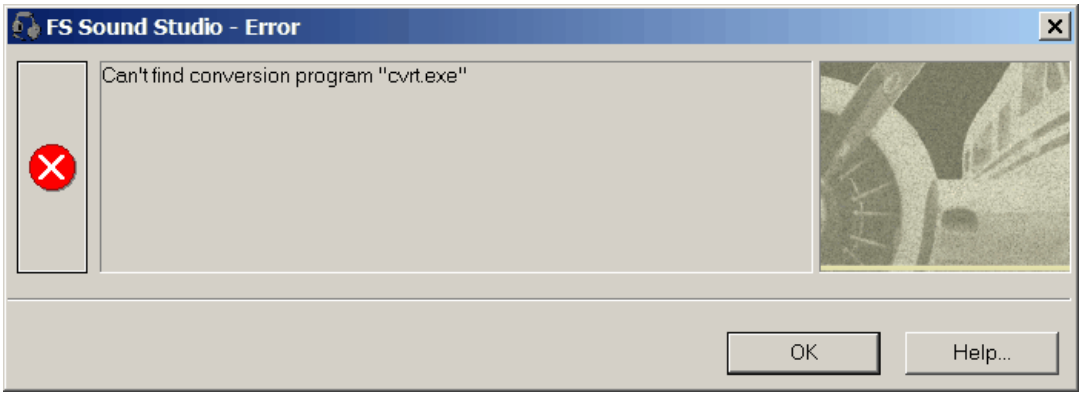
The wave file specified can't be located on your disk. Note that wave files specified must exist either in the FS Sound folder or the Aircraft Sound folder, or they won't be found.

- **Unable to read .wav file - DirectX System Error**



The wave file you attempted to load is not compatible with DirectX. It may be corrupt or not a supported file format.

- **Can't find conversion program "cvrt.exe"**



FS Sound Studio uses a companion program named *cvrt.ext* (installed during the main FS Sound Studio installation) to convert certain types of compressed audio files. If for some reason this file is deleted, you will see this message. The solution is to reinstall FS Sound Studio.

6.2 Common Problems

• No Sounds are heard when you select a Panel

You may have too many Panel/Sound combinations defined in your *aircraft.cfg* file. Although an undocumented FS limitation (bug?), it appears that the correct sound configuration (or Panel!) is not read if there are more than about 4 different aircraft entries. Sometimes...! Try editing one of the first four entries in the list. You can also try exiting and restarting FS.

• Changes I make in FS Sound Studio aren't heard in FS

FS does very aggressive caching of files to improve performance. If you make a change while FS is running, it's likely it won't reload the changed file. Try loading a totally different aircraft, then reload the one you're editing. If this doesn't work, you'll have to exit FS and start it over.

You might also experience a file locking problem. When FS opens a *sound.cfg* file, it opens it exclusively for its own use. You won't be able to edit the configuration until FS exits or loads another Aircraft.

In general, you need to be careful when both FS and FS Sound Studio are running at the same time.

• FS2002 crashes when I make a change...

The flight sim community has been creating their own Panels for many years. The existence of tools such as FS Panel Studio has made this an easy process. Unfortunately, no such tool has existed for editing sound configurations. As a result, the sound subsystem of FS has not been rigorously "tested" by its users. There have been times while testing FS Sound Studio that we have observed unexplainable FS crashes. Until Microsoft releases patches for these problems, about all you can do is restart FS!

If you create a *sound.cfg* file which is unreadable to FS, email it, with a problem report, to support@fssoundstudio.com.

If you've turned on the automatic backup option (strongly recommended), then you'll be able to retrieve you last working *sound.cfg* file, and restart your editing from there.

• FS Sound Studio won't start

If you autoload your last edited file in **FS Sound Studio** (Load last Aircraft at startup option), and because of errors or problems in the *sound.cfg* file **FS Sound Studio** aborts, then you must force **FS Sound Studio** to start with a different aircraft.

You can drag a *sound.cfg* file onto the **FS Sound Studio** desktop icon, or use the "**Open:With**" menu pick if you right click with the mouse on a *sound.cfg* file in Windows Explorer. Once you get things working again, please report your problem.

Registry problems can cause **FS Sound Studio** to not start. In some reported cases, registry entries have been mangled by system crashes. **FS Sound Studio** has logic which tries to determine if the entries are valid, and rebuilds them if they're not. Uninstalling and reinstalling will clear and rebuild all entries.

• Missing Dll Errors

FS Sound Studio may require support files which may not be present on your computer. They're included on your installation file if needed, and should be properly placed on your computer when you

install. If you receive "Missing DLL" errors when you try to start, please reload the **FS Sound Studio** software.

• FS Sound Studio crashed when I...

If you come across an operation or action which causes **FS Sound Studio** to crash or behave erratically, please report the problem.

• Sound Problems

These types of problems are rare but ***almost always due to the sound card device drivers***. Try downloading the latest drivers from your card or motherboard vendor.

Clicks and pops during heard during preview while modifying the simulated RPM or Airspeed, are usually due to less capable sound cards or older versions of Windows.

6.3 How to Report a Problem

Please send an email with as much information as possible, including the build number obtained from the **Help:About** dialog, to support@FSSoundStudio.com.

If the problem is related to a specific ***sound.cfg*** file, attach it to your email and send it along. Don't hesitate to include any problematic .***wav*** files as well -- in order to fix a problem we need to be able to reproduce it!

• Screen Dump info

If **FS Sound Studio** crashed, then capture the screen dump, and in particular the stack dump and email the data. It is not obvious, but you can select the text on the system dialog that shows the error and paste it into a text editor, such as Notepad. Select the text with your mouse and use Ctrl-C to copy the text to the clipboard. Use Ctrl-V to paste it into your text. Make sure you indicate what **FS Sound Studio** was doing when it crashed. Here is a sample stack dump:

FS Sound Studio caused an invalid page fault in module KERNEL32.DLL at 0123:aff75411.

Registers:
EAX=00000001 CS=014f EIP=aff79111 EFLGS=00010202
EBX=00caec90 SS=0157 ESP=01c7fca8 EBP=00000000
ECX=00000000 DS=0157 ESI=00000078 FS=129f
EDX=bccbf9e0 ES=0157 EDI=00000078 GS=0000
Bytes at CS:EIP:
83 ff 04 74 10 6a 00 6a 00 6a ff 68 05 00 0a c0
Stack dump:
00000200 004c7550 00000078 00b9fc80 00b22c80 00000000 00baec90 004982d1 00b93c80 00b93c80 00aca0a0
00000001 00baec90 00420a33 00b93c80 00000000

• Dr Watson info

Also, if you're familiar with the use of the **Dr Watson** tool from Microsoft, this can capture the state of a crashed program and generate a detailed failure report. Please email the report to the above address. More info on using Dr Watson can be found at Microsoft Product Support, Knowledge Base article 275481.

6.4 Suggestions

Suggestions for new features or improvements in **FS Sound Studio** are always welcome. Please send an email with as much information as possible to support@FSSoundStudio.com. Suggestions are often acted on, have resulted in many changes and are very much appreciated.

Part VII

7 References

7.1 Microsoft SDKs

Microsoft SDKs are the main reference for Sound and Panel design. Download them here:

The Microsoft SDKs can be found at

http://www.microsoft.com/downloads/details.aspx?familyid=91bece08-63bd-4a12-92b2-520b2f2b4c15&displaylang=en

http://zone.msn.com/flightsim/FS02DevDeskSDK00.asp

or from

http://fsinsider.com/downloads/fs2004_downloads_sdk.htm

7.2 Useful Links

General information on how to edit and create *sound.cfg* files can be found in many places. A good starting place is FlightSim.com's How To series at http://www.flightsim.com/cgi/kds?$=main/m-howto.htm

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A few good Flight Simulator related sites are:

• AVSIM	www.avsim.com	One of the more popular flight simulation sites
• Flightsim	www.flightsim.com	A popular flight simulation site
• FSPlanet	www.fsplanet.com	Interesting source for freeware panels and aircraft
• AVWEB	www.avweb.com	A good site devoted to real world flying

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Audio wave file editing software

• SoundForge	www.soundforge.com	Full Featured audio editing editing
• CoolEdit	www.syntrillium.com	30 day demo copy available
• Audacity	audacity.sourceforge.net	Free Open Source, doesn't yet support ADPCM

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