



The World's Ultimate RC Sound Systems

ShockWave® 3 PC SW 5.1.2

ShockWave 3 PC Windows Application

Software Manual

Date: November 27, 2021

© Model Sounds™ Inc.

If you are reading this on a computer or mobile device using a PDF document reader, please switch on the Bookmarks Viewing Pane. This will enable you to see the many bookmarks through this document which will make finding and navigating to the information you need much easier.

How you switch on the Bookmarks Viewing Pane will depend on the particular PDF viewing application you are using.



TABLE OF CONTENTS

CHAPTER 1 – THE BASICS AND GETTING STARTED	6
What Is ShockWave 3 PC?	6
Installing ShockWave 3 PC on your Windows Computer	7
The ShockWave 3 module and Its microSD Card	7
BEFORE YOU LAUNCH SHOCKWAVE 3 PC APPLICATION	8
Connecting your ShockWave 3 Module To The PC	8
ShockWave 3 PC File Formats.....	9
ShockWave 3 PC 3 PC Can Read Either .sfx7 or .sfx8 Sound Files	9
How to Open .sfx8 Sound Set Files	9
File Structure On The ShockWave 3 microSD Card	9
CHAPTER 2 – THE MAIN WINDOW	11
The Menu Bar	12
The Tool Bar.....	12
SFX8 Sound Set File Paths.....	12
Elapsed Time Indicator	12
Volume And Balance Controls	13
Voltage Indicators.....	13
SFX8 Sound Set File Controls	13
Playing a Sound Clip.....	14
Set Loop Point Function.....	14
Setting the Engine Start-Up Loop Points	14
The Save Settings Button.....	15
Tool Tips/Balloon Help.....	15
Status Bar.....	15
CHAPTER 3 – WORKING WITH REGULAR (NON-ENGINE) SOUNDS	16
Sound Clip Context Menu For Regular Sounds	18
Adding and Removing Sound Clips	18
Adding Sound Clips	19
Moving Sound Clips.....	19
Transferring Sound Clips	20
Copying Sound Clips.....	21
Set Looping Options.....	21
Setting the Audio Channel	22
Adjusting the Volume of Sound Clips.....	23
Adjusting the Speed of Sound Clips	24

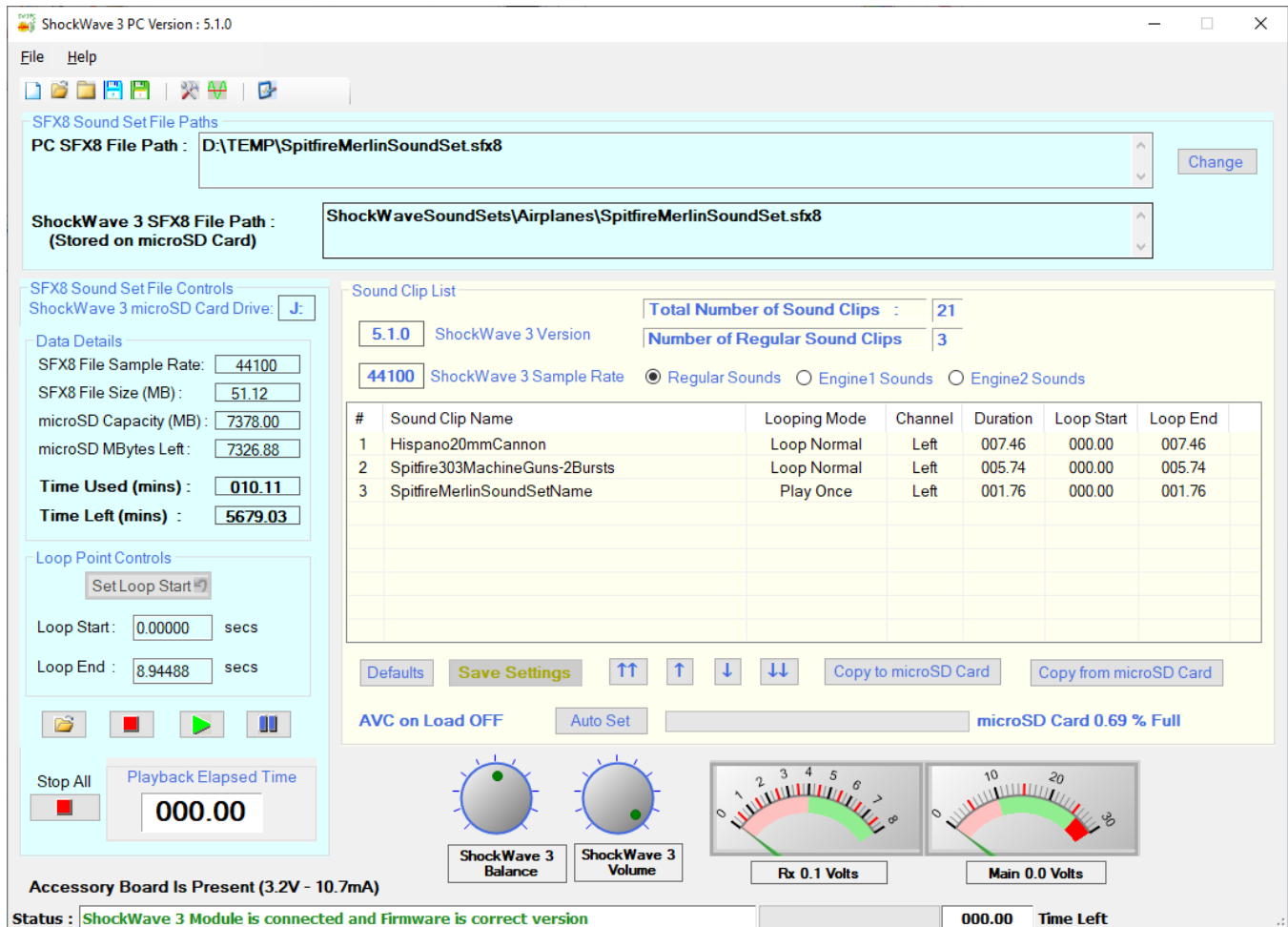
Editing Sound Clips with Audacity	25
Saving Sound Clips	25
CHAPTER 4 – WORKING WITH ENGINE SOUNDS.....	26
Using the Throttle Ranges Feature	30
Using The Auto Set Button	31
Rules for Setting Throttle Range Values	31
Guidelines for using Throttle Ranges Feature	32
Using Afterburner Engine Sounds	33
CHAPTER 5 – GENERATING INCREASING SPEEDS FOR ENGINE SOUNDS	34
Generating Engine Speed Steps.....	35
Deleting Existing Steps.....	36
Startup/Shutdown Throttle Range Upper Limit Defaults.....	36
Using Auto Ramp-Up/Ramp-Down.....	36
Using Auto Cross-Fade.....	37
Using “Engine Speed Change Uses Frequency Multiplication”	37
CHAPTER 6 – HOW TO CONFIGURE YOUR SHOCKWAVE 3 MODULE.....	38
Hardware Tab	39
Throttle and Engine Sound Modes	39
SOUND1/SOUND2/SOUND3 Input Modes	41
Explaining Latched and Momentary Action	42
How to Select Regular (Non-Engine) Sounds.....	42
Low Battery Voltage Alarms.....	44
Miscellaneous settings.....	44
Where Are Hardware Settings Stored?.....	45
BasicHardwareSettings.txt file default contents	46
Switched Outputs Tab	47
Switch Mode Drop Down List.....	48
Associated Sound Clip Drop Down List	49
Active High/Active Low Output Mode	49
Proportional Smoker Fan With Engine1/2 Mode	50
DopplerFX Tab	51
Doppler Shift Calculator	51
DopplerFX Event Announcements	52
DopplerFXSettings.txt File Default Contents	52

CHAPTER 7 – SPECIAL PROVISIONS USING THE SECOND ENGINE SOUND	53
Proportional Tank/Boat Gun Turret Turning Sounds.....	53
Special Provisions For Model Helicopters.....	54
Additional Helicopter Rotor Wash Sounds Using The Second Engine Sound.....	54
CHAPTER 8 – SETTING YOUR PROGRAM PREFERENCES	55
CHAPTER 9 – COPYING .SFX8 FILES TO/FROM THE PC AND THE MICROSD CARD.....	56
CHAPTER 10 - MISCELLANEOUS	57
Installing and Using Audacity.....	57
Software License.....	57
Minimum System Requirements	58
Commercial Sound Clip Libraries.....	58
Index	59

CHAPTER 1 – THE BASICS AND GETTING STARTED

WHAT IS SHOCKWAVE 3 PC?

Figure 1: ShockWave 3 PC Main Window



ShockWave 3 PC is a Windows program that interfaces with a **ShockWave 3** Module via a micro-USB 2.0 full speed (12MBits/s) interface. The micro-USB cable is identical to many mobile device USB cables so it is very likely that you already have a suitable cable. If necessary, one can be purchased from us. The **ShockWave 3 PC** application allows the user to build and edit **.sfx8** composite sound files **on the PC** that can be copied to the **ShockWave 3** module. It also allows the **.sfx8** file stored in the module's microSD Card to be copied to the PC where it may be edited and re- copied back to the module.

All configuration operations that can be performed on the **ShockWave 3** with its microSD inside can be performed with the card inserted into the SD card adapter or USB card reader, with the exception of monitoring the Throttle and Sound Select inputs in the Control panel. The saving and copying of **.sfx8** files will occur much faster using the microSD Card in the SD card reader or USB card reader.

Individual sounds cannot be removed or added without saving the complete file which is a composite of all the sound clips, together with configuration data. This is done in order to maintain the data integrity of the complete set of sounds and their configuration.

ShockWave 3 PC interfaces to the **Audacity** sound file editor for editing at the waveform level.

A URL link to the **Audacity** installer website is included in the **Other Applications** folder on the microSD card.

Once **Audacity** has been downloaded and installed in its default location, you can select one or more sound clips in the Sound Clip List and edit them directly using **Audacity**.

INSTALLING SHOCKWAVE 3 PC ON YOUR WINDOWS COMPUTER

Follow these steps to install **ShockWave 3 PC** on your PC :

1. Purchase our **ShockWave 3 PC** software application from our web site.
After payment is received by Model Sounds Inc. they will send you an email with a manually created customized link from where you can download the installer file. This is a manual process, so please be patient.
2. Once downloaded from our web server, save the downloaded **ShockWave3PC5.1.0Setup.zip** file in a safe location that you remember. This is a ZIP file, so open it to retrieve the actual **ShockWave3PC5.1.0Setup.exe** installer file that is inside the ZIP file.
3. Launch the **ShockWave3PC5.1.0Setup.exe** installer file by double-clicking on it.
4. Follow the steps and answer the prompts as the installer program proceeds.

THE SHOCKWAVE 3 MODULE AND ITS MICROSD CARD

The **ShockWave 3** module uses a removable microSD Card to store its digitized sounds, as well as various configuration and hardware settings. Thus it is very easy to add or change the sounds on a **ShockWave 3** module by simply plugging in a different microSD Card containing the new files.

The microSD Card connector on the **ShockWave 3** module is a push-push type. You push the card in to insert it and push it again to remove it. When inserting the microSD Card, make sure it is pushed fully home so that the latching mechanism prevents it from accidentally being removed.

To remove the card, push it in again and it will spring out so that it can be removed fully. **It is recommended to put a piece of adhesive tape over the microSD Card and its connector to prevent accidentally removal of the card.**

When the **ShockWave 3** module has its microSD Card inserted and it is connected to a Windows PC through its USB port, it will appear as a “USB Mass Storage Device”, i.e. a new removable “external drive” will appear in Windows Explorer. The name of this “drive”, or its disk label, is always **SHOCKWAVE3**. **DO NOT re-label the ShockWave 3 microSD Card as any other name.**

BEFORE YOU LAUNCH SHOCKWAVE 3 PC APPLICATION

Before launching the ShockWave 3 PC Application, PLEASE REMOVE THE microSD CARD FROM THE SOUND MODULE and insert it into the provided USB microSD Card reader. Insert the USB card reader into an available USB port on your computer. This will also power up the ShockWave 3 module.

Launch the **ShockWave 3 PC** application **AFTER** the microSD Card has been plugged into your PC. The **ShockWave 3 PC** application will search all “disk” drives for the first one that has the label **SHOCKWAVE3**. You must have **ONLY ONE** drive with the label **SHOCKWAVE3**.

CONNECTING YOUR SHOCKWAVE 3 MODULE TO THE PC

1. Remove the microSD card from the sound module and insert it into the USB card reader, as detailed above.
2. Connect a micro-B USB cable between the module and your PC. The micro-B USB connector on the **ShockWave 3** module is the same type as used on many mobile devices, so you probably already have a suitable cable. The red LED on the sound module will flash rapidly and continuously indicating the microSD card is missing. This is perfectly normal and correct at this stage.

The blue LED will also flash about once per second. This shows that the Windows operating system is sending USB queries to the sound module as it is querying the status of the module about once per second.

The **ShockWave 3** module is USB powered while connected to the PC.

3. The **ShockWave 3** module does not require any custom USB drivers – the USB drivers it uses are already built into the Windows operating system. When the **ShockWave 3** is plugged in to the computer for the first time, Windows will automatically load the required drivers.

SHOCKWAVE 3 PC FILE FORMATS

ShockWave 3 PC supports adding individual sound clips as either **.WAV** or **.MP3** files.

WAV files are uncompressed audio format files and are higher quality than MP3 files, although they take up more space. However, with the microSD card supplied with the **ShockWave 3**, storage space is no longer an issue. When adding a **.WAV** or **.MP3** file to **ShockWave 3 PC** it has to be of the required format for the module, so **ShockWave 3 PC** will automatically convert the file to the required format – i.e. 16-bit signed samples, monophonic, sample rate 44100 samples/second. The composite sound file that is saved to the module is a **.sfx8** file type.

SHOCKWAVE 3 PC CAN READ EITHER .SFX7 OR .SFX8 SOUND FILES

The older ShockWave 2 sound module used composite sound files with a **.sfx7** file extension. The **ShockWave 3 PC** application can read those files as well as its own **.sfx8** format files. As of the date of this document, the internal format of the **.sfx8** is identical to that of the **.sfx7**, but this may change in the future to support new features.

The **ShockWave 3 PC** application will write files only with a **.sfx8** file extension. This is primarily so that you can have **ShockWave 3 PC** and the older SFXPC4.1.3 applications installed simultaneously. Double clicking on a **.sfx8** file will open that file using **ShockWave 3 PC** and double clicking on a **.sfx7** file will open it using the **SFXPC4.1.3** application.

HOW TO OPEN .SFX8 SOUND SET FILES

When you want to make changes to any of the **.sfx8** files stored on the **ShockWave 3** microSD Card using **ShockWave 3 PC**, **DO NOT** edit them directly on the microSD card whether it is inserted into the sound module or inserted into a card reader on your PC.

ALWAYS make a copy of that file and store it locally on your computer and open the copied file using **ShockWave 3 PC**.

FILE STRUCTURE ON THE SHOCKWAVE 3 MICROSD CARD

The files on the **ShockWave 3** microSD Card must be in a certain format and structure. In the microSD Card Root Folder there is the following file:

1. **SELECT_YOUR_SOUNDSET_HERE.txt**. This file can contain two lines as follows:
 - a. Mandatory first line naming the **folder** containing the **.sfx8** file(s) you wish to use.

- b. Optional Second line naming the specific **.sfx8** file in that folder that you want the **ShockWave 3** module to use.

Example:

ShockWaveSoundSets\Airplanes
SpitfireMerlinSoundSet.sfx8

In this example, when powered up, the **ShockWave 3** module will expect there to be a **.sfx8** file named "SpitfireMerlinSoundSet.sfx8" in the ShockWave 3SoundSets\Airplanes folder on the card.

In this way you can have many **.sfx8** sound sets on the microSD Card and they can be changed at will by simply editing the **SELECT_YOUR_SOUNDSET_HERE.txt**. Each time this information is changed the module should be powered down and then powered up again.

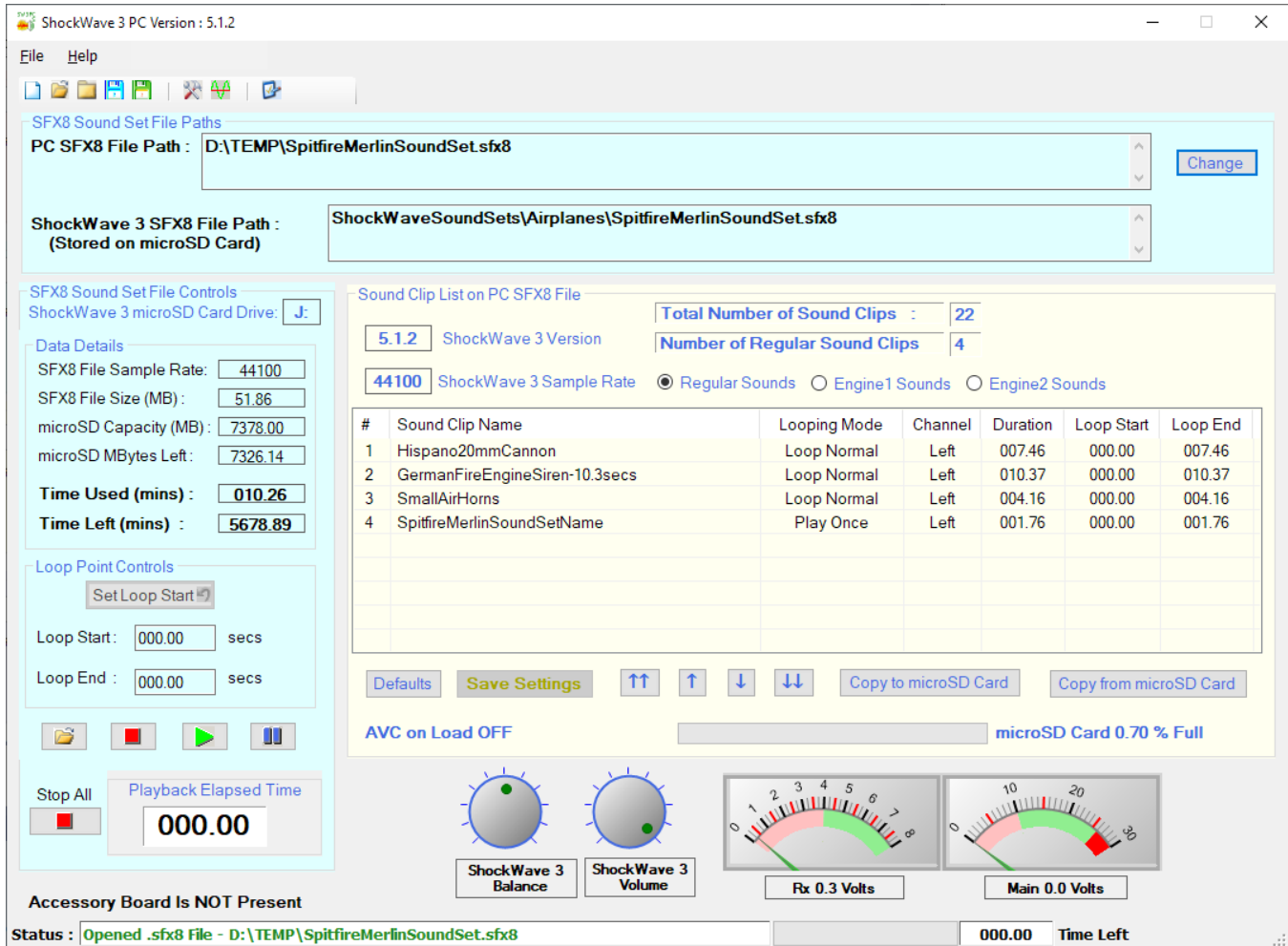
If the second line is blank, then the ShockWave 3 will allow "Scroll Through Mode" to be used using either the on-board push buttons or the remote SOUND1 RC channel to scroll up and down through the available sound set file in the folder identified in the first line.

See the hardware manual - **ShockWave3HWReferenceManual.pdf** document for details on how to use the "Scroll Through Mode".

CHAPTER 2 – THE MAIN WINDOW

Open **ShockWave 3 PC** by double clicking on its icon on the desktop, or in the Start Menu. The main window will appear. The preferred screen resolution is 1920 x 1080 (Full HD). This main form can be as large as 1254 x 706 pixels so it will occupy most of your screen. This window is re-sizable – i.e. it can be stretched to show more information, but cannot be shrunk below a certain minimum size.

Figure 2: ShockWave 3 PC Main Window



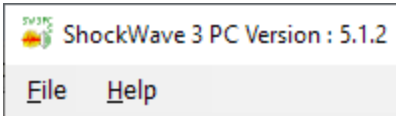
The main window contains:

1. The [Menu Bar](#).
2. The [Tool Bar](#).
3. The [SFX8 Sound Set File Paths](#) near the top. These paths show the Windows locations of the .sfx8 files on the PC and on the microSD card.
4. The [SFX8 Sound Set File Controls](#) on the left side, colour coded Light Cyan – a light blue.
5. The [Sound Clip List](#) to the right, colour coded Ivory.
6. Various meters and indicators.

- The [Status Bar](#) at the bottom.

THE MENU BAR

Figure 3: The Menu Bar



The menu bar contains two menus – File and Help. The File menu contains the usual Open, Save, Save As and Exit commands.

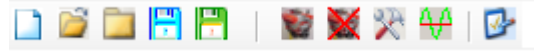
The Help menu gives easy access to the **ShockWave 3** Hardware, Software and DopplerFX reference manuals. These manuals are on-line versions on the Model Sounds Inc. Web site. In this way, they are always kept up to date. The manuals are also on the microSD card in the Manuals-Instructions folder.

THE TOOL BAR

Figure 4: Tool Bar (Regular Sounds)



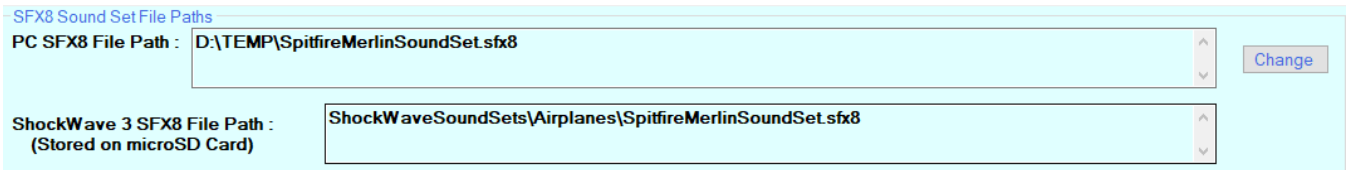
Figure 5: Tool Bar (Engine Sounds)



The Tool Bar includes sets of buttons that have identical behaviour to their respective File Menu Item in the **Menu Bar**. Each button in the Tool Bar has **ToolTips** to inform you of its function.

SFX8 SOUND SET FILE PATHS

Figure 6: SFX8 Sound Set File Paths



These editable fields show the location in the Windows File system of the .sfx8 file that is loaded into the ShockWave 3 PC application and the location of the .sfx8 file on the sound module's microSD card.

ELAPSED TIME INDICATOR

Figure 7: Playback Elapsed Time

A **Playback Elapsed Time Indicator** while a Sound Clip is playing on



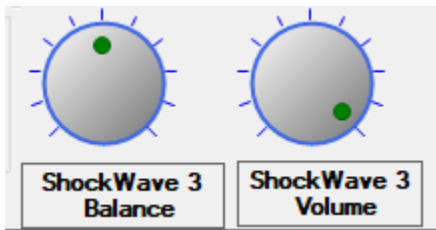
shows the amount of time elapsed the PC.

If the sound clip has reached the end and is looping, this indicates the total time from the start.



VOLUME AND BALANCE CONTROLS

Figure 8: Volume and Balance Controls



These knobs indicate the position of the Volume and Balance controls on the **ShockWave 3** module. These indicators are **read only** – they only display the actual settings on the ShockWave 3 module.

VOLTAGE INDICATORS

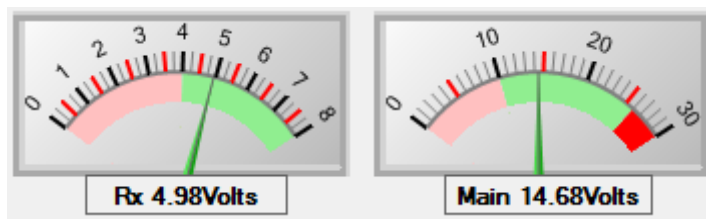


Figure 9: Voltage Indicators

The main form also features two analog/digital voltage meters that give real time voltage readings of the receiver and main battery voltages.

SFX8 SOUND SET FILE CONTROLS

Figure 10: SFX8 Sound Set File Controls

SFX8 Sound Set File Controls
ShockWave 3 microSD Card Drive: **M:**

Data Details

SFX8 File Sample Rate:

SFX8 File Size (MB):

microSD Capacity (MB):

microSD MBytes Left:

Time Used (mins):

Time Left (mins):

Loop Point Controls

Loop Start: secs

Loop End: secs

Playback Elapsed Time

The **SFX8 Sound Set File Controls** show details about the **.sfx8** Download File that has either been opened using the **File->Open** menu item or its **Open Button**, or has been retrieved from the **ShockWave 3** module.

The **SFX8 File Sample Rate** indicates the sample rate of sound clips in the PC **.sfx8** file that is currently open.

The **SFX8 File Size** indicates the size of the PC **.sfx8** file that is currently open.

The **microSD Capacity (MBytes)** field indicates the number of megabytes available for data storage on the microSD Card.

The **Total Size (MBytes)** field indicates the total number of bytes used for all the data, including the configuration.

The **microSD MBytes Left**, **Time Used** and **Time Left** fields are self-explanatory.

PLAYING A SOUND CLIP

Once sound clips have been added to the [Sound Clip List](#) they can be played through the PC loudspeakers using the Play, Stop and Pause buttons.

The **Stop All** button will stop playing all sounds that are currently playing. This is useful if you have been playing several sound clips and have forgotten which ones.



You can also play any sound clip by double clicking on it – if this has been set up in the Preferences dialog. This is the default behaviour.

SET LOOP POINT FUNCTION

ShockWave 3 PC allows you to define a **Loop Point** somewhere during the playback time. The first time the sound clip is played, it will play from start to finish, and then it will start playing from the **Loop Start Point** until the **Loop End Point** and keep doing so as long as that sound clip is switched on.

This **Loop Point** can be set while a sound clip is playing by clicking on the **Set Loop Point Button** when the sound has reached the **Loop Point** you want.

Alternatively, if you want to set the **Loop Point** precisely, you can enter the **Loop Start** and **Loop End Time** to 4 decimal places in the text boxes :

Loop Start : secs
 Loop End : secs

You can optionally choose to have the **Loop Start** and **Loop End** points automatically trimmed or adjusted to the nearest positive going zero crossing point. If this is done, there is a much smoother transition in the sound from the Loop End point to the Loop Start point.

This auto-trim option is set in the [Preferences Form](#), shown later. It defaults to **ON**.

There are two possible values for the Looping type –**Play Once** and **Loop Normal**. [These are explained in detail later.](#)

SETTING THE ENGINE START-UP LOOP POINTS

The Engine Start-Up sound **MUST** have an idle section at its end and its **Loop Start Point** set to the start of this idle sequence. This section of sound is used as the idle sound when the throttle is in the idling position. If you do not set the Loop Start Point this way, the engine sound will loop back to its start, and play the start-up sequence continuously.

The **Throttle Ranges** feature allows the engine sounds to be each assigned a specific range of throttle stick travel based on a percentage of the total throttle stick throw from its off or centre position. This will be explained fully later in [Using the Throttle Ranges Feature](#).

In the Engine 1 and Engine 2 Sound Clip Lists, the Engine Shutdown sound is **ALWAYS** the **first** in the list, and the Engine Start-up sound is **ALWAYS** the **second** Sound Clip in the list. This is because with the **Throttle Ranges** feature, the engine Start-up sound cannot have its range start at 0%, otherwise, the engine sound will start up without any throttle stick movement.

THE SAVE SETTINGS BUTTON

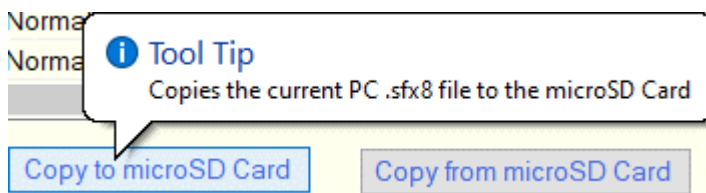


Any time any of the fields (columns) of any sound clip are changed, this button will be enabled and displayed in **BOLD RED** text. If you do not intend to **Copy** the entire **.sfx8** file to the ShockWave 3 module, you must click on this button to save the settings you have just changed. This will store the new settings immediately in the sound module's microSD card.

If you add/remove or move a Sound Clip, then you have to Copy the whole **.sfx8** file to the module's microSD Card.

TOOL TIPS/BALLOON HELP

Figure 11: Tool Tip or Balloon Help



Some of the buttons have Icons on them or short text names. To help you understand the function of the button, you can hover the cursor over the button and a **Tool Tip**, or **Balloon Help** will appear.

This will display a short textual explanation of the button's function.

Tool Tips will only appear if the button is enabled (not greyed out). An example Tool Tip for the **Copy from microSD Card** button is shown above.

STATUS BAR

The **Status Bar** presents messages about the current activity in the application. Play time progress is shown through the **Progress Bar** and the **Time Left to Play** fields.

Figure 12: Main Window Status Bar



The **Time Left Indicator** in the **Status Bar** at the bottom right of the main window shows the amount of time left to play for the currently playing sound clip, and the progress bar indicator gives a visual display of the elapsed time.

CHAPTER 3 – WORKING WITH REGULAR (NON-ENGINE) SOUNDS

Figure 13: The Sound Clip List for Regular Sounds

Sound Clip List on PC SFX8 File

5.1.2 ShockWave 3 Version

44100 ShockWave 3 Sample Rate

☒ Regular Sounds
 ☐ Engine1 Sounds
 ☐ Engine2 Sounds

Total Number of Sound Clips : 22

Number of Regular Sound Clips 4

#	Sound Clip Name	Looping Mode	Channel	Duration	Loop Start	Loop End
1	Hispano20mmCannon	Loop Normal	Left	007.46	000.00	007.46
2	GermanFireEngineSiren-10.3secs	Loop Normal	Left	010.37	000.00	010.37
3	SmallAirHorns	Loop Normal	Left	004.16	000.00	004.16
4	SpitfireMerlinSoundSetName	Play Once	Left	001.76	000.00	001.76

Defaults

Save Settings

↑↑

↑

↓

↓↓

Copy to microSD Card

Copy from microSD Card

AVC on Load OFF

microSD Card 0.70 % Full

- At Top Centre are two fields indicating the total number of sound clips stored in the module and, below it, the number of sound clips in the currently displayed list.
- At Top Left the Release of the firmware in the USB connected **ShockWave 3** module. This release number should match that at the very top of the main window, i.e. **5.1.2**.
- Three radio buttons that select the type of sounds displayed in the Sound Clip List:
 - Regular Sounds** – any sound not appearing in the Engine1 or Engine2 sound clip lists. Generally **Regular Sounds** are used for sounds such as weapons, horns, music, voice etc.
 - Engine1 Sounds** – these are sounds that are controlled by the **THCTL1** Input on the sound module. That input is connected to a Throttle output of the RC radio receiver.
 - Engine2 Sounds** – these are sounds that are controlled by the **THCTL2** Input on the sound module. That input is connected to a second Throttle output of the RC radio receiver.

4. The list of sound clips. Sound clips may be [Added](#), [Moved](#) and [Removed](#) as explained in detail later.

There can be up to sixteen **Regular** sound clips. If you are using one or two on/off channels to select the sounds, all of the sixteen sounds can be selected – see the **ShockWave 3 HW Reference Manual** for details on how to achieve this. If you are using a proportional channel to select these sounds, any four of those sixteen sounds can be selected per proportional channel. Any of the sixteen sound clips can be assigned to the four sound select positions of the proportional transmitter stick, corresponding to the SOUND1/2/3 inputs from the receiver, using the [ShockWave 3 PC Control Panel](#).





The sound clip list for **Regular** sounds has the following fields (columns) :

- d. **#** Sound clip number in the list.
- e. **Name** Name of the sound clip file, without its file extension.
- f. **Loop** Looping mode – **LoopNormal or Play Once**.
Indicates what should happen when the sound clip reaches its end.
[This is explained later.](#)
- g. **Audio** Indicates which output channel the sound should be played on (where supported by **ShockWave 3** hardware).
- h. **Length** Duration of the Sound clip if not looped.
- i. **Loop Start** Loop Start Time – Indicates at what time in the sound clip (from its start) Looping will start if Loop is set to LoopNormal.
- j. **Loop End** Loop End Time – Indicates at what time in the sound clip (from its start) Looping will end if Loop is set to LoopNormal.

5. A set of buttons and indicators as follows :

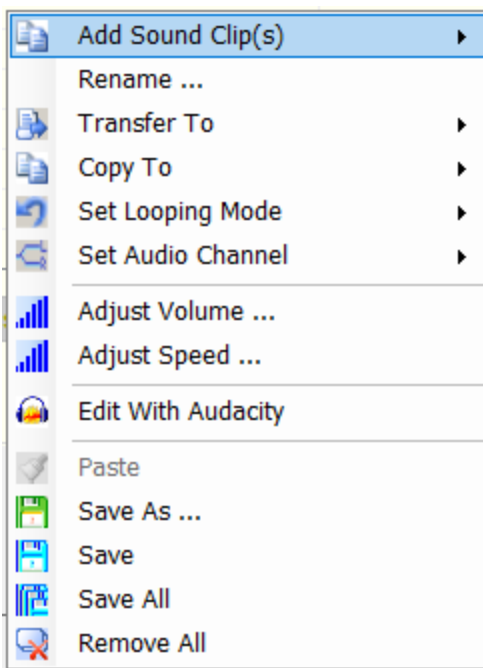


- k. **Defaults** Sets the various fields in the entire list to meaningful default values. Useful if you make many changes and mess things up.
- l. **Save Settings** Whenever any of the changeable fields are altered, this button will show in **Red Text**. **Clicking this button will save the new settings to the microSD card .sfx8 file without having to download the whole file.**

- m. **Navigation** Four Buttons     can be used to move a selected sound clip up or down in the list, or to the Top or Bottom of the list. You can also drag and drop a sound clip in the list to move it up or down.
- n. **Copy to microSD Card** Saves the entire PC **.sfx8** file to disk and copies that file to the **.sfx8** file on the microSD Card.
- o. **Copy from microSD Card** Copies the contents of the **.sfx8** file on the microSD Card to the PC **.sfx8** file and displays the results in the sound clip lists.
- p. **Percent Full Bar** Bar indicating percentage level of storage memory used if the PC **.sfx8** file were to be saved to the **ShockWave 3** microSD Card.
6. A Context Sensitive (right click, or pop-up) menu will appear if you right click anywhere inside the list of sounds. One or more sound clips should be selected first and will be highlighted in blue. The appearance of the right click menu will change, depending on which list is displayed and whether there are sounds in the list.

Sound Clip Context Menu For Regular Sounds

Figure 14: Sound Clip List Context (Right Click) Menu



Adding and Removing Sound Clips

The composite **.sfx8** file contains **ALL** the sounds to be stored in the sound module. **Individual sounds cannot be removed or added without saving the complete file which is a composite of all the sound clips, together with configuration data.**

This is done in order to maintain the data integrity of the complete set of sounds and their configuration data.

If you want to change any of the sounds, you should copy the **.sfx8** composite sound file that is on the microSD Card to your hard drive, and open it from there.

Alternatively, you can **Copy** the sounds from the module to your PC by clicking the **Copy from microSD Card** button.

Before adding any new sound clips make sure you have the correct radio button selected to add them to the correct sound clip list (**Regular, Engine1 or Engine2**).

If you add them to the wrong list you can select them and then [Transfer](#) them to another list.

Adding Sound Clips

You can add Sound Clips to the Sound Clip List in several ways:

1. By using the **Add Sound Clip(s)** context menu, as above. The sound clips are loaded and, if necessary, converted to the correct format for ShockWave 3.
2. By **Dragging and Dropping** one or more **.WAV/.MP3** files from Windows File Explorer or your desktop to the Sound Clip List.
3. By **Copy and Pasting** one or more **.WAV/.MP3** files from Windows Explorer or your desktop to the Sound Clip List. If there is nothing in the Paste Buffer the Paste menu item is greyed out.
4. By **Dragging and Dropping** or **Copy and Pasting** a **.sfx8** composite file that already contains sound clips that have been previously loaded using **ShockWave 3 PC**.

Any of these methods will result in the **.WAV/.MP3** file being converted, if necessary, to the internal file format for the sound module and have it added to the list.



You can optionally choose to have the sound clip start and end points automatically trimmed to the nearest positive going zero crossing point with a mild slope. This makes the looping behaviour at the end of the sound clip sound smoother. This is done in the [Preferences Form](#), shown later. It defaults to **ON**.

Each list has its maximum number of sound clips and the application will not allow you to add a sound clip if that list is full or if the total number of bytes for all sound clips would exceed that available in the **microSD** Card.

Moving Sound Clips

Once sound clips have been added, they may be re-ordered by simply dragging them with the left mouse button to the desired location in the list. Whilst dragging, the cursor will change to the name of the file in reverse highlight i.e. white text in a blue background as in the next figure :

Figure 15 Dragging within the Sound Clip List

#	Name	Loop	Audio	Length		
1	Maschinengewehr 08 Machine Gun	Loop	Auto	003.93	000.00	003.93
2	MorseCodeMessage1	Loop	Auto	023.54	000.00	023.54
3	CrewTalkPreFlightChecks	Loop	Auto	012.51	000.00	012.51
4	TwoToneTugBoat	Loop	Auto	011.85	000.00	011.85
5	Browning0.5calM2MG4	Loop	Auto	006.15	000.00	006.15

Once at the desired location, release the left mouse button. The cursor will resume its normal appearance.

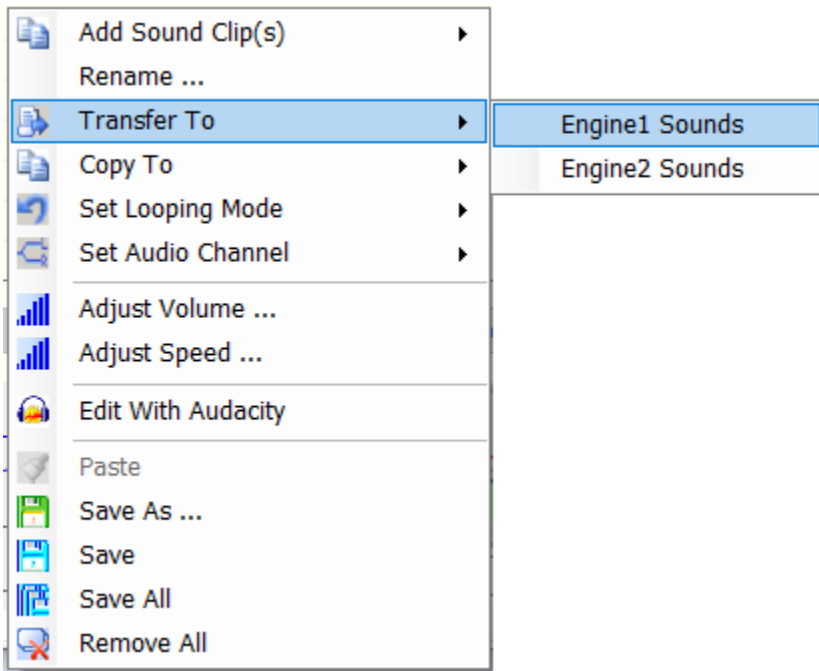
You can also use the up and down buttons



to move a sound clip up and down in the list, or to the top or bottom of the list.

Transferring Sound Clips

Figure 16: Transferring Sound Clips to another List

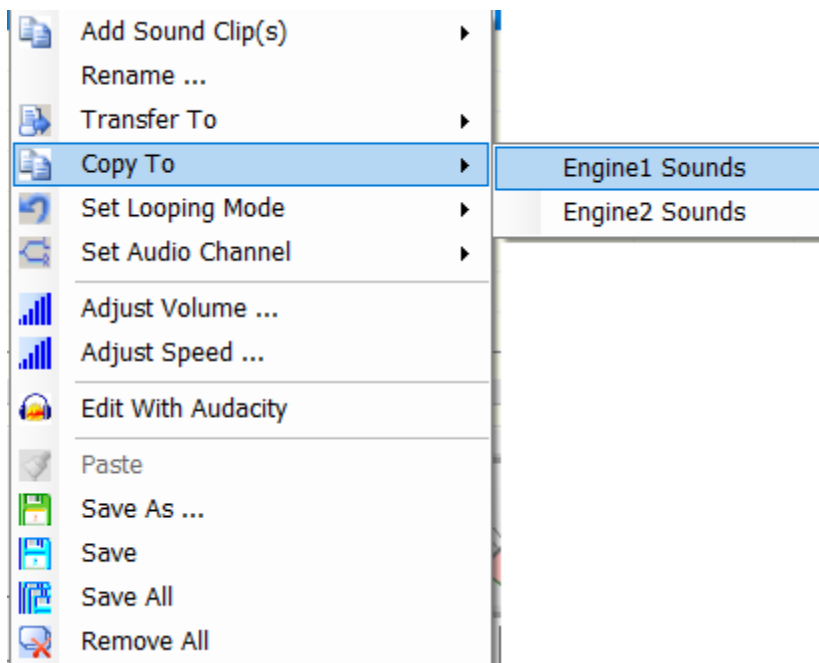


You may sometimes add a sound clip(s) to the wrong list. Rather than delete and re-add them to the correct list, you can simply transfer any selected sound clips in a list to another list.



Copying Sound Clips

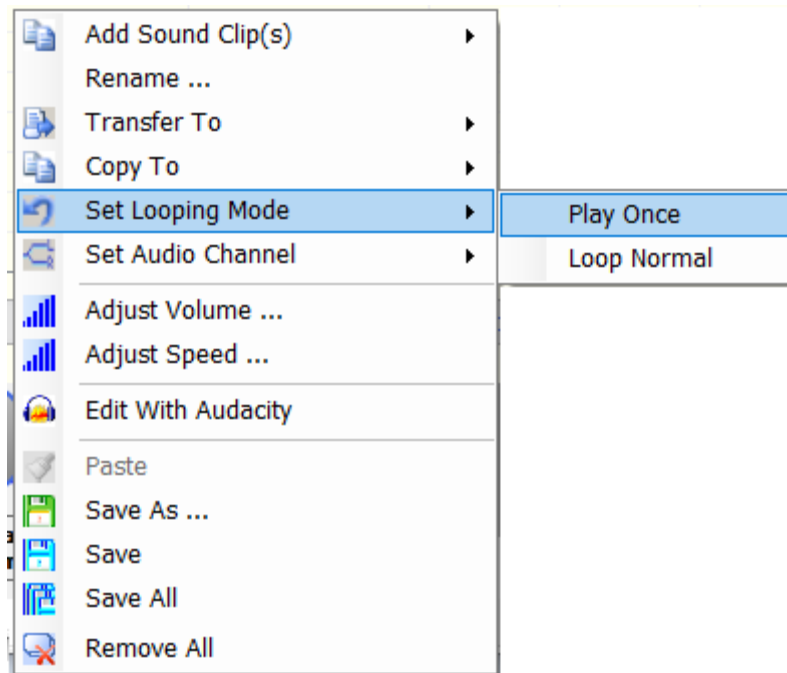
Figure 17: Copying Sound Clips to another List



Similarly, if you want to have the same sound clip(s) in more than one list, for example an engine start-up and shutdown sound, you can copy existing sound clips to another list as in this figure.

Set Looping Options

Figure 18: Setting looping Options



When any sound clip reaches its end it will, by default, loop back and begin playing at its **Loop Start Point**.

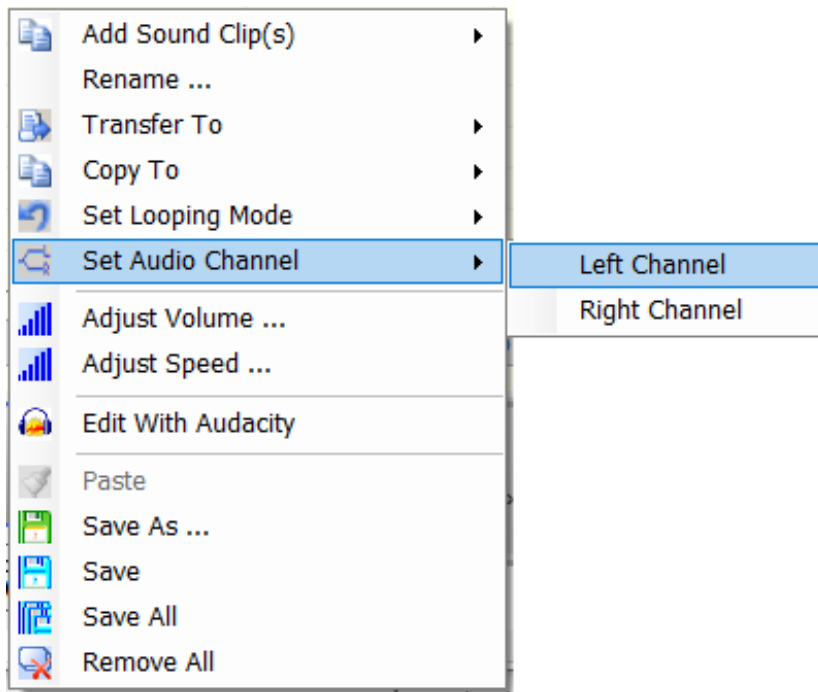
There are two possible Looping options.

1. **Play Once** – when the sound clip reaches its end, it will stop playing.
2. **Loop Normal** – when the sound clip reaches its end, it will continuously loop back to its Loop Start Point.



Setting the Audio Channel

Figure 19: Setting the Left/Right Audio Playback Channel



This allows any sound to be assigned to the left or right or both output channels.

The defaults are as follows:

1. **Regular Sounds – Left Channel**
2. **Engine1 Sounds – Right Channel**
3. **Engine2 Sounds – Left Channel**

The ShockWave 3 module behaves as above internally, but the left and right outputs are then mixed down to a single monophonic output in the loudspeaker amplifier.

The left and right channels are mixed internally using **subtraction** in the differential inputs of the single channel audio power amplifier. They are not additive.

This is of no consequence for unrelated sounds such as an engine sound and a weapons firing sound, but if you attempt to use identical sounds on both left and right channels and play them simultaneously they will subtract and null each other out, not add, in the on-board amplifier.

The ability to have a single sound played on both left and right channels is **ONLY applicable** when you are using an external two channel audio power amplifier instead of the internal one. In that case both the left and right line-audio output signals are in phase, not in anti-phase.



Adjusting the Volume of Sound Clips

Figure 20: Manual Volume Adjust Form

If you want to adjust the volume of some sounds relative to others, you can use the **Adjust Volume ...** menu item.

The sound clip you wish to change the volume of should be selected and then click the **Adjust Volume ...** menu item. The **Manual Volume Adjust** form will appear.

This form displays the maximum positive and negative peaks of the selected sound clip.

In the **Volume Increase (Ratio)** text field you can type in the new desired volume change as a multiplier of the current volume.

Use a value greater than 1.0 to increase the volume, or less than 1.0 to reduce the volume. If you check the Allow Clipping box, you can exceed the maximum 1.0 value if you really want to increase the volume, but this will lead to clipping and therefore increased distortion. **Use this with caution!**

Then click the **Adjust Volume** button. The selected sound clip will now have its new volume level in the list. If you want this to be reflected in the download file on disk you have to click the **Save** Button.

If you have several sound clips that you wish to change the volume of, you can leave this form open. Then when you select any other sound clip, that sound clip will appear in the **Manual Volume Adjust** form and you can proceed as above.

If you want to automatically adjust the volume of the sound to its maximum (1.0) you can click the **Auto Max** button. This button is disabled if the sound clip is already at its maximum volume.

You can also configure **ShockWave 3 PC** to automatically adjust the volume to the maximum whenever a sound clip is loaded into the list – see [Preferences Form](#).



Adjusting the Speed of Sound Clips

Figure 21: Adjust Speed of Sound Clip Form

Speed Adjust Form

Sound Clip Name(s)

Spitfire303MachineGuns-2Bursts

Speed Control

Use +ve values to Increase Speed Speed Change %

Use -ve values to Decrease Speed 0 %

Adjust Speed

This form may be used to adjust the speed up or down of any sound clip in any of the sound clip lists.

To increase the speed, enter a positive number in the Speed Change % field.

To lower the speed, enter a negative number in the Speed Change % field.



Editing Sound Clips with Audacity

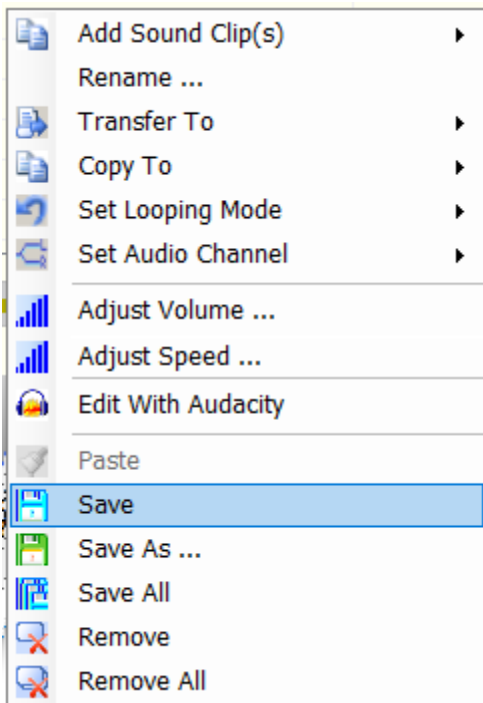
Audacity is an easy to use waveform level audio editing program and is completely free. A link to its main web page is included on the **ShockWave 3** microSD Card in the **Other Applications** folder.

If you choose to install Audacity, you can select a sound clip in the list and open it in Audacity. You can then perform sound editing at the waveform or sample level and create many special effects.

In Audacity you then need to “**Export as WAV ...**” your changes to disk to the same folder location and file name that they were opened from (i.e. the folder that contains the **.sfx8** file). When the Audacity application is closed, the changed sound clip will replace the original in the sound clip list.

Saving Sound Clips

Figure 22: Saving Sound Clips to Your PC SSD or Hard Drive



You can save individual sound clips in the list to your file system using the **Save** and **Save As** context (right click) menu items.

Save will save the currently selected Sound Clips in the list to the **same folder as the currently open PC .sfx8 File**.

Save As may be used to save **ONE** selected file with a different name to any location in your file system. **Save All** may be used to save all of the Sound Clips in the list to the current PC **.sfx8** file folder.

CHAPTER 4 – WORKING WITH ENGINE SOUNDS

Figure 23: Main Form for Engine Sounds – Normal View

ShockWave 3 PC Version : 5.1.2

File Help

SFX8 Sound Set File Paths

PC SFX8 File Path : D:\TEMP\SpitfireMerlinSoundSet.sfx8 Change

ShockWave 3 SFX8 File Path : ShockWaveSoundSets\Airplanes\SpitfireMerlinSoundSet.sfx8

SFX8 Sound Set File Controls

ShockWave 3 microSD Card Drive: J:

Data Details

SFX8 File Sample Rate: 44100

SFX8 File Size (MB): 51.86

microSD Capacity (MB): 7378.00

microSD MBytes Left: 7326.14

Time Used (mins): 010.26

Time Left (mins): 5678.89

Loop Point Controls

Set Loop Start

Loop Start: 000.00 secs

Loop End: 000.00 secs

Stop All Playback Elapsed Time 000.00

Accessory Board Is NOT Present

Status: Opened .sfx8 File - D:\TEMP\SpitfireMerlinSoundSet.sfx8

Sound Clip List on PC SFX8 File

5.1.2 ShockWave 3 Version Total Number of Sound Clips : 22

44100 ShockWave 3 Sample Rate Number of Engine1 Sound Clips 18

☐ Regular Sounds ☒ Engine1 Sounds ☐ Engine2 Sounds

#	Sound Clip Name	Type	Looping Mode	Channel	Duration	Loop Start	Loop End
0	SpitfireMerlinShutdown2	ShutDn	Play Once	Right	008.94	000.00	008.94
1	MerlinEngineStartAndIdle	StartUp	Loop Normal	Right	064.52	016.00	064.52
2	MerlinEngineStep1	NrmStep	Loop Normal	Right	046.21	000.00	046.21
3	MerlinEngineStep2	NrmStep	Loop Normal	Right	043.71	000.00	043.71
4	MerlinEngineStep3	NrmStep	Loop Normal	Right	041.83	000.00	041.83
5	MerlinEngineStep4	NrmStep	Loop Normal	Right	039.77	000.00	039.77
6	MerlinEngineStep5	NrmStep	Loop Normal	Right	037.61	000.00	037.61
7	MerlinEngineStep6	NrmStep	Loop Normal	Right	035.67	000.00	035.67
8	MerlinEngineStep7	NrmStep	Loop Normal	Right	033.93	000.00	033.93

Defaults Save Settings ↑↑ ↑ ↓ ↓↓ Copy to microSD Card Copy from microSD Card

Show Throttle Ranges microSD Card 0.70 % Full

ShockWave 3 Balance ShockWave 3 Volume Rx 0.3 Volts Main 0.0 Volts

The Engine1 Sounds List displays those sounds that are controlled by the **THTTL1** input of the **ShockWave 3 module**. The Engine2 Sounds List displays those sounds that are controlled by the **THTTL2** input of the **ShockWave 3 module**. These can number up to 18 which would normally comprise one engine shutdown sound, one engine start-up/idle sound, and four to sixteen steps of increasing engine pitch to full speed.

These lists are similar to the [Sound Clip List for Regular Sounds](#) with differences as follows:

- There is an additional field (column) in the list – **Type**. This is an **Engine Sound Type** which can one of several values :
 - NrmStep** Normal Step means the sound clip is one of the steps of increasing or decreasing speed linked to the Throttle Position.
 - StartUp** Start Up means the sound clip is the first one played when starting up the engine sound. The exact method of starting up the engine sound will differ, depending on how the **ShockWave 3** hardware is setup.

- c. **ShutDn** Shut Down means the sound clip is played when shutting down the engine sound and always has its Loop Mode set to Play Once.
The exact method of shutting down the engine sound will depend on how the **ShockWave 3** hardware is setup.
 - d. **Afterburner** Afterburner has special significance to the LED switched outputs which can be configured to light up an afterburner light set in exact synchronism with the afterburner sound.
2. An additional **Show Throttle Ranges** button appears instead of the **AVC on Load ON/OFF** value. This button toggles the main form view between **Normal View**, as in the previous figure, and **Throttle Ranges** view as in the next figure:

Figure 24: Main Form for Engine Sounds – Throttle Ranges View

ShockWave 3 PC Version : 5.1.2

File Help

SFX8 Sound Set File Paths

PC SFX8 File Path : D:\TEMP\SpitfireMerlinSoundSet.sfx8 Change

ShockWave 3 SFX8 File Path : ShockWaveSoundSets\Airplanes\SpitfireMerlinSoundSet.sfx8

Throttle Range

Lower Limit Upper Limit

Forward Forward

Reverse Reverse

Forwards/Reverse % of Max. Forwards/Reverse % of Max.

94.8 100.0

☒ Fwd/Rev ☐ Fwd ☐ Rev

☒ Incr/Decr ☐ Incr ☐ Decr

Throttle Range Defaults

Sound Clip List on PC SFX8 File

5.1.2 ShockWave 3 Version Total Number of Sound Clips : 22

44100 ShockWave 3 Sample Rate Number of Engine1 Sound Clips 18

☐ Regular Sounds ☒ Engine1 Sounds ☐ Engine2 Sounds

#	Sound Clip Name	Type	Throttle	Fwd/Rev	Lower %	Upper %	Duration
0	SpitfireMerlinShutdown2	ShutDn	Decr	Fwd/Rev	0.00	5.00	008.94
1	MerlinEngineStartAndIdle	StartUp	Inc/Dec	Fwd/Rev	5.10	15.00	064.52
2	MerlinEngineStep1	NrmStep	Inc/Dec	Fwd/Rev	15.10	20.30	046.21
3	MerlinEngineStep2	NrmStep	Inc/Dec	Fwd/Rev	20.40	25.60	043.71
4	MerlinEngineStep3	NrmStep	Inc/Dec	Fwd/Rev	25.70	30.90	041.83
5	MerlinEngineStep4	NrmStep	Inc/Dec	Fwd/Rev	31.00	36.20	039.77
6	MerlinEngineStep5	NrmStep	Inc/Dec	Fwd/Rev	36.30	41.60	037.61
7	MerlinEngineStep6	NrmStep	Inc/Dec	Fwd/Rev	41.70	46.90	035.67
8	MerlinEngineStep7	NrmStep	Inc/Dec	Fwd/Rev	47.00	52.20	033.93

Defaults Save Settings ↑↑ ↑ ↓ ↓↓ Copy to microSD Card Copy from microSD Card

Show Normal View Auto Set microSD Card 0.70 % Full

ShockWave 3 Balance ShockWave 3 Volume

Rx 0.3 Volts Main 0.0 Volts

Accessory Board Is NOT Present

Status : Opened .sfx8 File - D:\TEMP\SpitfireMerlinSoundSet.sfx8 000.00 Time Left

In this view the entire **SFX8 Sound Set File Controls** section has been replaced by a new **Throttle Range** section. This view is where you can set each engine sound's throttle range Lower % and Upper % limits.

You can also set whether the sound clip should be played when the Throttle is in Forwards or Reverse, or both, and also whether the Throttle is Increasing, Decreasing, or both.

3. In this view, the fields displayed in the list have changed and are now as follows:
Continued over ...

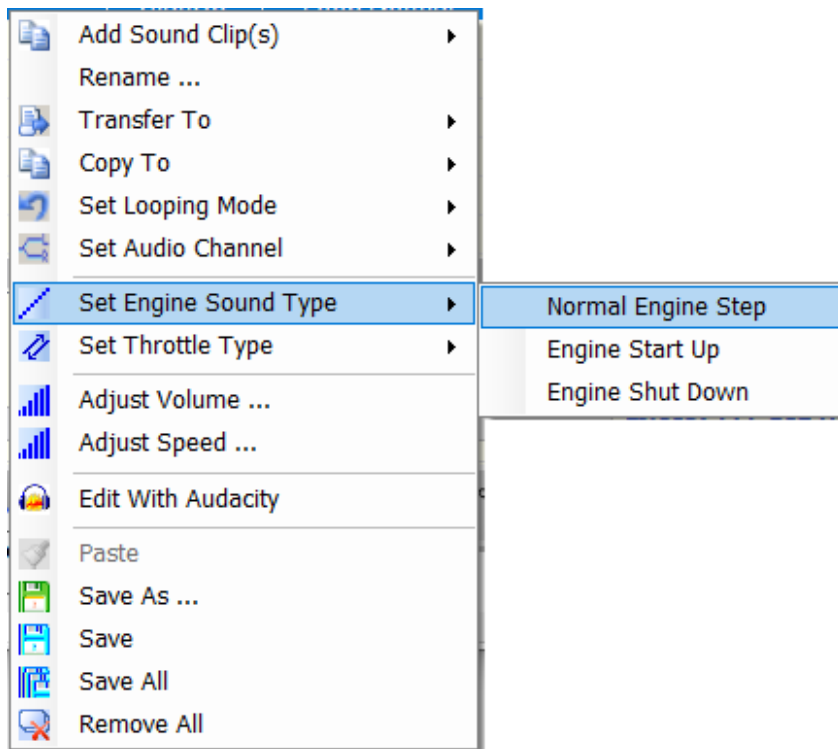
The sound clip list for Engine1 or Engine2 sounds has the following fields (columns) :

- q. **#** Sound clip number in the list.
- r. **Sound Clip Name** Name of the sound clip.
Name
- s. **Type** Engine Sound Type, set its function, as above.
- t. **Throttle** Throttle Type sets whether the sound is played when the Throttle is Increasing, Decreasing, or Both.
- u. **Fwd/Rev** Fwd/ Rev Mode sets whether the sound is played **ONLY** when the Throttle is in Forwards, in Reverse, or Both.
- v. **Lower %** Lower % is the lower limit of throttle position (as a percentage of its full throw) for which the sound clip will be played.
- w. **Upper %** Upper % is the upper limit of throttle position (as a percentage of its full throw) for which the sound clip will be played.

How to use the **Throttle Ranges** feature is explained in detail later.

4. The Context menu (right click, or pop-up) has additional items as on the next page:

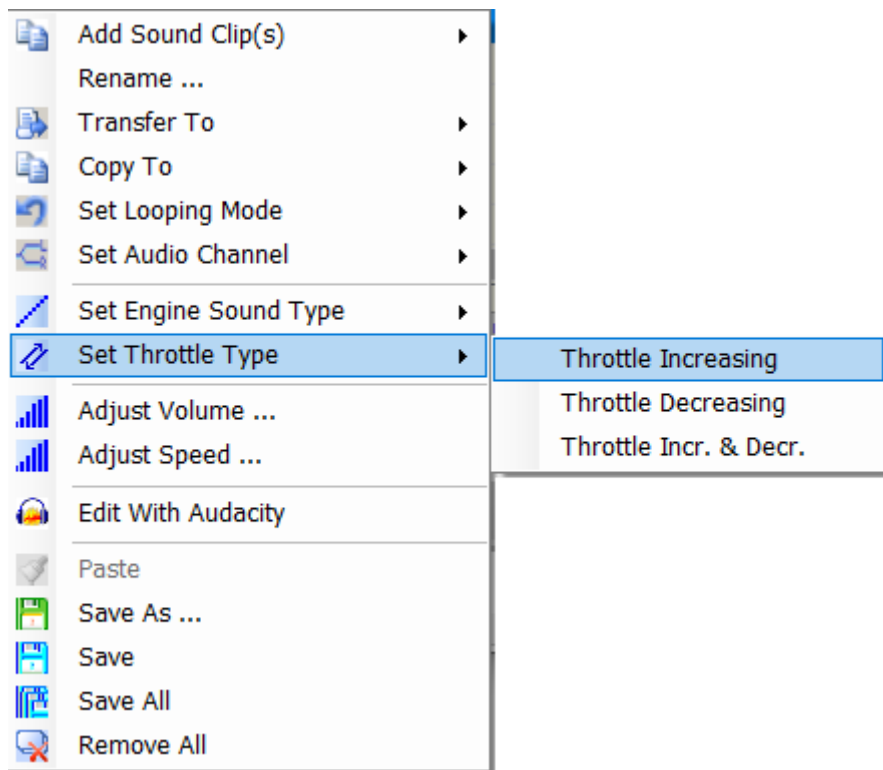
Figure 25: Set Sound Type Menu



This menu item allows you to set the type of the sound in the engine list. The terms are self-explanatory.

For the engine sound clip list there must be ONE sound clip marked as “Engine Start-up” and ONE sound clip marked as “Engine Shut Down”.

Figure 26: Set Throttle Type Menu

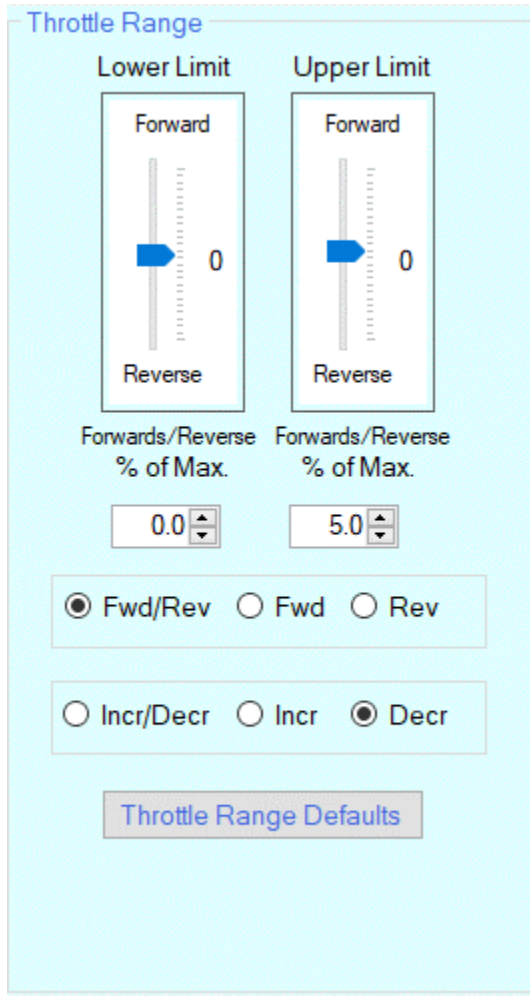


This menu item allows you to set if the sound clip is played only when the throttle is Increasing, Decreasing, or Both.

The other menu items have the same functionality as for the Regular sound clip list

USING THE THROTTLE RANGES FEATURE

Figure 27: Throttle Range Controls



Throttle Range

Lower Limit **Upper Limit**

Forward Forward

Reverse Reverse

Forwards/Reverse % of Max. Forwards/Reverse % of Max.

0.0 5.0

☒ Fwd/Rev ☐ Fwd ☐ Rev

☐ Incr/Decr ☐ Incr ☒ Decr

Throttle Range Defaults

In the Throttle Ranges View, the entire [SFX8 Sound Set Files Controls](#) section has been replaced by a **Throttle Range Controls** section.

For any **ONE** selected sound clip, this set of controls displays values for **Lower %** and **Upper % Throttle Range**, The **Forward/Reverse Type** and the **Increasing/Decreasing Throttle Type**.

As you select different sound clips, the value in these controls will change to reflect the current settings of that sound clip.

The **Lower Limit** and **Upper Limit** throttle position indicators are read only i.e. they display the value but cannot be used to change the value. They are intended to give a graphical visualization of the Throttle position Ranges.

There are two numeric Up/Down boxes which are used to set the actual value for the lower and upper limits. As these boxes are changed the Throttle Bars will change position, as will the values displayed in the actual sound clip list for the selected sound clip.

You can use the two sets of radio buttons to set the **Forward/Reverse** Type and the **Increasing/Decreasing** Throttle Types.

There is a Throttle Range Defaults button which is used to reset everything to the normal operating values if you get the values messed up. This button will also reset the order of the Special engine sounds such as Start-Up, Shutdown etc. This button will assign a throttle range to each sound clip based on the total number of sound clips divided into 100%. This will give a linear progression from one sound clip step to the next.

However, once the defaults have been set, you now have the option to change the throttle range for any or all of the sound clips.

USING THE AUTO SET BUTTON

Setting the upper and lower throttle range limits for all the engine sound clips is a tedious process and can be error prone. To assist with this, there is an **Auto Set** button to automate some of this work.

You can set the throttle range lower and upper limits for the Engine Shutdown and Startup sounds only since these are the most important ones to get proper synchronization of those sounds with the motor rotation. Once those are set manually using the form fields described above, you can click the **Auto Set** button to automatically set the correct values for the remaining engine steps above the startup and idle sound. The remaining % of throttle travel between the Engine startup upper limit and 100% is divided linearly between the remaining steps to set their own upper and lower limits.

The exception is when there is an Afterburner sound clip in the engine sound clip list. That sound clip will be adjusted to have a lower limit of 75% and an upper limit of 100%. The remaining sounds from, and including, the startup and idle sound will be fitted into the remaining total available throttle range.

RULES FOR SETTING THROTTLE RANGE VALUES

In order to achieve smooth operation over the whole range of Throttle travel there are some basic ground rules which must be observed:

1. **NO TWO THROTTLE RANGES CAN OVERLAP** - I.E. For any given **Lower Limit %**, the **Upper Limit %** of that sound clip cannot be higher than the **Lower Limit%** for **ANY OTHER** sound clip in the list. Similarly, for any given Upper Limit %, the Lower Limit % of that sound clip cannot be lower than the Upper Limit % for ANY OTHER sound clip in the list.

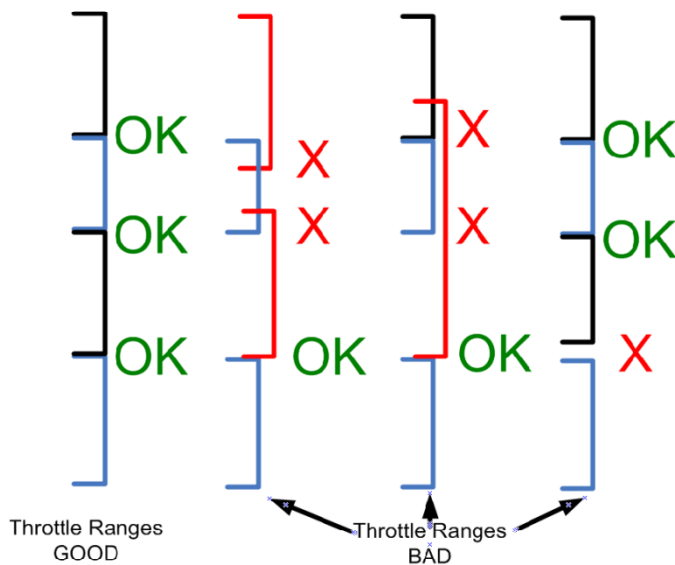
This is because if throttle ranges overlap and the throttle should be in the overlapped region, the firmware cannot know which of the two ranges is intended and the matching sound clip is therefore unresolvable.

2. Throttle Ranges must be contiguous with no gaps. A gap would not cause a blip in the sound, but the throttle would have to be moved by an unusually large amount in order for the next sound step to start playing. The smallest increment between one step's Upper Limit and the next steps Lower limit is 0.1%.
3. Do NOT set the Lower Limit % of the engine Start-up sound to 0% or less than about 5%, otherwise the engine sound will start up with no throttle movement as soon as you switch the module on.

These rules are best illustrated (overleaf) ...



Figure 28: Overlapping and Non-Overlapping Throttle Ranges



Throttle Ranges can overlap if the overlapping sounds have different **Throttle Types** or **Fwd/Rev Types**. This is because when the ShockWave 3 module is first powered up, the initialization code sorts the available sound clips into four separate sub-lists:

1. Forward and Increasing.
2. Forwards and Decreasing.
3. Reverse and Increasing.
4. Reverse and Decreasing.

The non-overlapping rule applies to all sounds in any given sub-list.

GUIDELINES FOR USING THROTTLE RANGES FEATURE

The easiest way to ensure success with this complex feature is as follows:

1. Start with an empty Engine Sound List.
2. Add the Engine Start-Up sound with its idle loop at the end. It will automatically have its **Sound Type** set as **StartUp**, its **Fwd/Rev Type** set as Both and its **Throttle Type** set as Increasing And Decreasing.
3. Use the [Engine Sound Control](#) Form (explained later) to generate 16 steps of increasing speed.
4. Add a shutdown sound and mark it with Engine Sound Type of **ShutDn**.
5. Click the **Show Throttle Ranges** Button to display the Throttle Ranges View. Click the **Throttle Range Defaults** button. This will set the Throttle Ranges of all the sound clips in compliance with the above rules.
6. Now you can remove or add sounds, and re-adjust the throttle ranges, as long as the above rules are complied with.

USING AFTERBURNER ENGINE SOUNDS

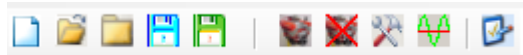
In the Engine1 or Engine2 Sound Clip Lists, when you add a sound clip file that has the word “Afterburner” (not case sensitive) in its file name, it will be added to the end of the engine sound clips and will have its Engine Sound Type automatically set to Afterburner. It will, by default, have its lower throttle range set to 75% and its upper throttle range set to 100%.

CHAPTER 5 – GENERATING INCREASING SPEEDS FOR ENGINE SOUNDS

The **Engine Sound Control Form** is used for controlling and/or generating Engine sounds for the proportional Engine Sound feature of a **ShockWave 3** module.

When the Engine Sound Clip Lists are showing, the tool bar changes to add two additional buttons :

Figure 29: Tool Bar when Engine Sound Clip Lists are Showing




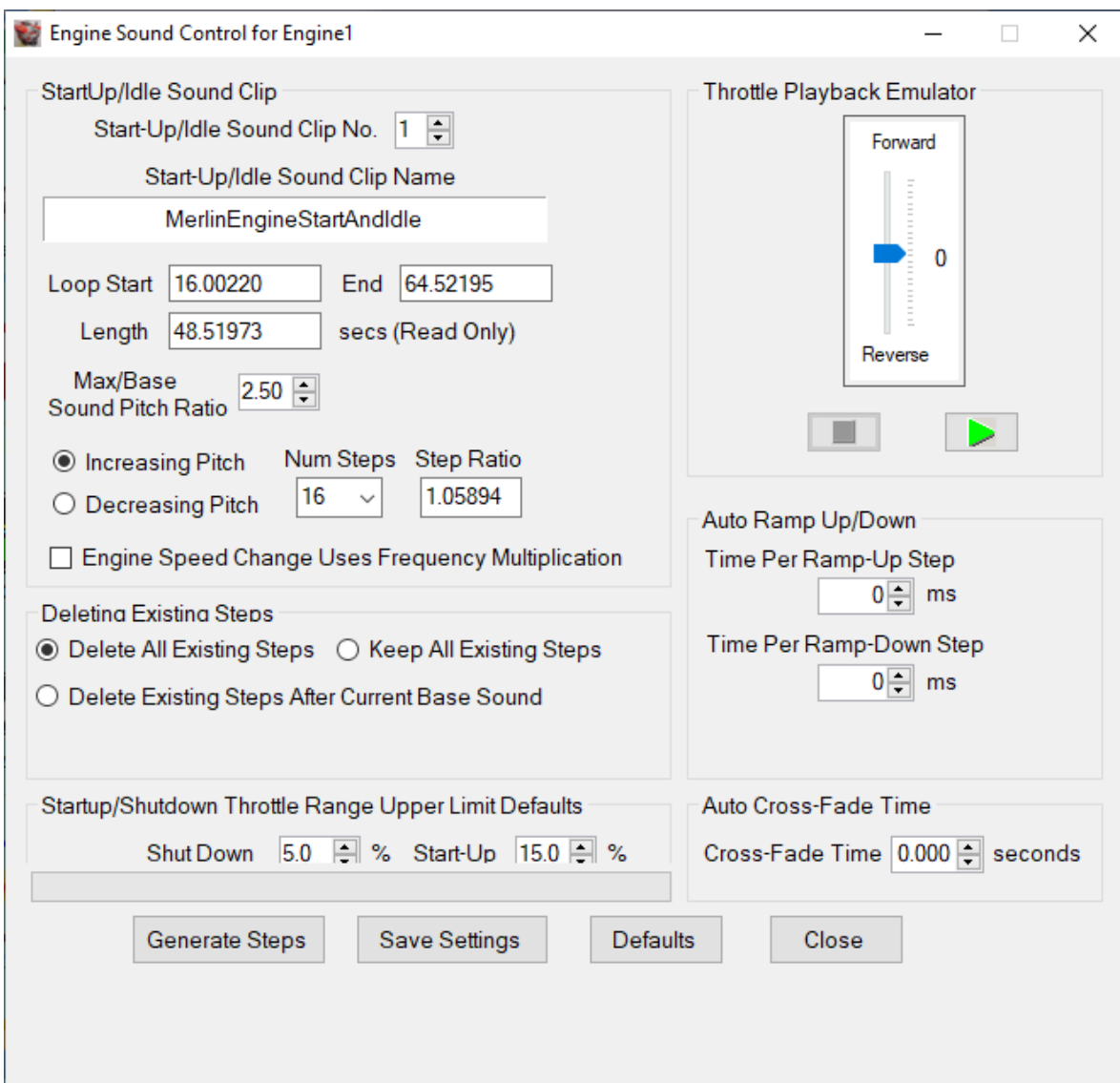
To launch the Engine Sound Control, click on the Engine button - 
The Engine Sound Control Form is shown here :

Figure 30: Engine Sound Control Form



Engine Sound Control for Engine1

StartUp/Idle Sound Clip
Start-Up/Idle Sound Clip No.
Start-Up/Idle Sound Clip Name

Loop Start End
Length secs (Read Only)
Max/Base Sound Pitch Ratio
☒ Increasing Pitch Num Steps Step Ratio
☐ Decreasing Pitch
☐ Engine Speed Change Uses Frequency Multiplication

Delete Existing Steps
☒ Delete All Existing Steps ☐ Keep All Existing Steps
☐ Delete Existing Steps After Current Base Sound

Startup/Shutdown Throttle Range Upper Limit Defaults
Shut Down % Start-Up %

Throttle Playback Emulator
Forward
Reverse

Auto Ramp Up/Down
Time Per Ramp-Up Step ms
Time Per Ramp-Down Step ms

Auto Cross-Fade Time
Cross-Fade Time seconds

The sounds for Engine1 and Engine2 can be set up completely independently of each other. The Engine Sound Control Form will switch its context and contents automatically depending on which of Engine1 or Engine2 Sound clip lists are displayed in the main form.

The **ShockWave 3** module Engine Sound feature works by changing to steps of increasing pitch that follow the throttle control by matching the throttle position with the sound step that has a matching **Throttle Range**. The number of steps can be selected from 4, 8 or 16.

The sounds can be captured from a real engine and edited into short sound clips of 10-20 seconds each. You can also create them artificially from a base engine sound using a sound editor program such as Audacity.

GENERATING ENGINE SPEED STEPS

The **ShockWave 3 PC Engine Sound Control** automates this process. The steps are as follows :

1. Add at least two sound clips to the Engine1 or Engine2 sound clip List. This first sound clip should be a shutdown sound and the second should have a start-up sequence followed by an idle sequence of 10 seconds or more. Set the shutdown **Sound Type** of **Engine Shut Down**, and the start-up sound to **Sound Type** of **Engine Start Up**. Be sure to set its Loop Start Point so that it loops into an idle sound.
2. Once you have a base (lowest pitch) Engine sound loaded in the Engine1 or Engine2 Sound Clip List, you can launch the **Engine Sound Control Form**. The **Engine Sound Control** feature works best on base engine sounds that are repetitive and rhythmic and that have a loop point for the idle portion set to 10 seconds or more before its end – the longer the idle loop the better.
3. You can select the **Maximum/Base Sound Pitch Ratio** of the highest speed to the base sound speed with the numeric up/down control. The Loop duration is read only and is determined by the Length and Loop Position of the base sound. The Loop Point must have been previously set very carefully to give a smooth transition from the end of the sound clip to its Loop Start Point, otherwise the steps generated will have a blip in the sound as it transitions from end to start.
4. When you click the **Generate Button**, additional sounds are created, each one having a speed of the previous one multiplied by the **Nth** root of the ratio selected, where **N** is the number of steps selected. The new sound clips will be displayed in the respective Engine1 or Engine2 Sound Clip List. The sound clips generated automatically can then be used as any other sound clip.

The **Throttle Playback Emulator** emulates the behaviour of the throttle on the module by playing the engine steps present in the Engine Sound Clip List.

The default behaviour is to generate steps of **increasing** pitch e.g. from an idling engine sound upwards. However, sometimes you can obtain better engine sound realism if you use an engine sound that is at cruising speed as the base sound and generate steps of **decreasing** pitch to get an idling sound. You can click the **Decreasing Pitch Steps** radio button to select this behaviour.

You can always use the **Save** and **Save As** pop-up menu items in the **Engine 1** or **Engine 2 Sound Clip Lists** to save any or all of the generated steps. You could then remove all the engine sounds, load one particular sound into the list and use it as the base sound for another pass at generating steps up or down.

DELETING EXISTING STEPS

You can now control how any existing engine steps are deleted before new ones are added. There are three options:

1. **Delete All Existing Steps**

This deletes all sound clips except the ones that are marked **StartUp** or **ShutDn**.

2. **Keep All Existing Steps**

This keeps all existing sound clips.

3. **Delete Existing Steps After Current Base Sound**

The Base Sound from which the steps are generated can now be any sound in the list – it no longer has to be the first one. This option allows some steps to be generated from one base sound, perhaps some of them deleted manually, then a new base sound chosen and a new set of steps generated from it.

STARTUP/SHUTDOWN THROTTLE RANGE UPPER LIMIT DEFAULTS

The “Startup/ShutDown Throttle Range Upper Limit Defaults” box allows you to set the default throttle range upper limits for the start-up and shutdown sounds when you generate the steps.

USING AUTO RAMP-UP/RAMP-DOWN

If the engine sound is that of a large diesel or steam engine, these engines cannot change their speed very quickly due to the mass and inertia of their moving parts. Therefore, if the throttle stick is moved quickly, the engine sound should not increase in a step fashion to the final value. The Auto-Ramp Up and Ramp Down feature allows the steps of increasing engine sound speed to be gradually switched in and ramped up or down. The value in the ramp-up/down fields is in milliseconds and is the time between each engine speed step kicking in. If you do not want this feature, just make these values 0.

USING AUTO CROSS-FADE

Auto Crossfade can be used to smooth out the transitions between one engine step and the next. This will help sometimes with some sound clips if there are clicks or pops during those transitions. This feature will gradually fade out the existing speed step while simultaneously fading in the next speed step, thus affecting a cross-fade between them. The fade-out/fade-in time is set using the Cross-Fade Time numeric up/down box.

USING "ENGINE SPEED CHANGE USES FREQUENCY MULTIPLICATION"

With some engine sounds, some clicks and/or pops may be heard between engine speed steps. If this is unacceptable, then an alternative approach can be used which does not use steps at all. In this case, if that checkbox is checked, when the throttle stick is moved, it will cause the playback of the idle loop to increase and decrease in speed. Therefore, there is no changing of engine steps at all.

However, because the speed change affects the playback speed of the entire system, this can only be used if there are **NO OTHER** sounds playing, e.g. weapons fire, horns, etc. as the speed change will affect those sounds as well.

This feature is very rarely needed, so do not try it unless absolutely needed.

This feature is disabled in the ShockWave 3 module if it has a DopplerFX accessory board connected as this speed increase technique is needed to make the DopplerFX feature work.

CHAPTER 6 – HOW TO CONFIGURE YOUR SHOCKWAVE 3 MODULE


The **ShockWave 3 Control Panel** can be launched by clicking on the **Control Panel** button – 

Figure 31: ShockWave 3 Control Panel

ShockWave 3 Control Panel for J:\ShockWaveSoundSets\Helicopters\AirwolfBell222WithEngineHowl\SoundSet.sfx8 Sound Set File

Hardware | Switched Outputs | DopplerFX

THRTL1/SOUND4 Input Mode

☒ Proportional RC ☐ Analog Idle Off Delay (s)

☐ Switched RC 1xN ☐ Switched RC 1x1

☐ Logic Level 1xN ☐ Logic Level 1x1 ☐ -ve

☐ 3-Pos RC Switch 1x2 ☐ 3-Pos RC Switch 1xN

Engine1 Sound Mode

☒ Auto With Throttle ☐ Force Forwards Only

☐ Switched As Sound Clip #

Basic Hardware Settings

Low Battery Voltage Alarms

Rx Battery Low Voltage Limit Volts

Num Times To Play Alarm Sound

Main Battery Low Voltage Limit Volts

Num Times To Play Alarm Sound

Clear Battery Alarms

Startup Delay (s)

Remote Configuration Mode Timeout (s)

☐ Single Sound Mode

☒ Auto Throttle Setup ☐ Manual Throttle Setup

Engine1 Volume Change With Throttle (dB)

Engine2 Volume Change With Throttle (dB)

Data in this box are stored in the BasicHardwareSettings.txt file on the microSD card.

THRTL2/SOUND5 Input Mode

☒ Proportional RC ☐ Analog Idle Off Delay (s)

☐ Switched RC 1xN ☐ Switched RC 1x1

☐ Logic Level 1xN ☐ Logic Level 1x1 ☐ -ve

☐ 3-Pos RC Switch 1x2 ☐ 3-Pos RC Switch 1xN

Engine2 Sound Mode

☒ Auto With Throttle ☐ Force Forwards Only

☐ Switched As Sound Clip #

SOUND1 Input Mode

☐ Proportional RC ☐ RC Remote Volume Timeout (ms)

☒ Switched RC 1xN ☐ Switched RC 1x1 # Offset

☐ Logic Level 1xN ☐ Logic Level 1x1 ☐ -ve

☐ 3-Pos RC Switch 1x2 ☐ 3-Pos RC Switch 1xN

Proportional RC Position/Sound Clip Assignment

Half Fwd Sound # Full Fwd Sound #

Half Back Sound # Full Back Sound #

Which is Fwd and Back (or Left and Right) depends on your transmitter servo settings

SOUND2 Input Mode

☐ Proportional RC ☐ Wired Rem. Volume Timeout (ms)

☒ Switched RC 1xN ☐ Switched RC 1x1 # Offset

☐ Logic Level 1xN ☐ Logic Level 1x1 ☐ -ve

☐ 3-Pos RC Switch 1x2 ☐ 3-Pos RC Switch 1xN

Proportional RC Position/Sound Clip Assignment

Half Fwd Sound # Full Fwd Sound #

Half Back Sound # Full Back Sound #

Which is Fwd and Back (or Left and Right) depends on your transmitter servo settings

SOUND3 Input Mode

☐ Proportional RC ☒ DopplerFX Timeout (ms)

☐ Switched RC 1xN ☐ Switched RC 1x1 # Offset

☐ Logic Level 1xN ☐ Logic Level 1x1 ☐ -ve

☐ 3-Pos RC Switch 1x2 ☐ 3-Pos RC Switch 1xN

Proportional RC Position/Sound Clip Assignment

Half Fwd Sound # Full Fwd Sound #

Half Back Sound # Full Back Sound #

Which is Fwd and Back (or Left and Right) depends on your transmitter servo settings

Miscellaneous

☐ Engine Speed Change Uses Frequency Multiplication

Save Settings in .sfx8 Files and BasicHardwareSettings.txt on the microSD Card.

Defaults Retrieve Settings

Default Values Displayed

This Form can only be launched if the **ShockWave 3** module is connected and powered up. You will receive a warning message box if it is not.

This Form has been split over three tabs – **Hardware**, **Switched Outputs**, and **DopplerFX**.



HARDWARE TAB

Figure 32: Hardware Tab

ShockWave 3 Control Panel for J:\ShockWaveSoundSets\Helicopters\AirwolfBell222WithEngineHowlSoundSet.sfx8 Sound Set File

Hardware Switched Outputs DopplerFX

THTTL1/SOUND4 Input Mode

☒ Proportional RC ☐ Analog Idle Off Delay (s)

☐ Switched RC 1xN ☐ Switched RC 1x1 0

☐ Logic Level 1xN ☐ Logic Level 1x1 -ve

☐ 3-Pos RC Switch 1x2 ☐ 3-Pos RC Switch 1xN

Engine1 Sound Mode

☒ Auto With Throttle ☐ Force Forwards Only

☐ Switched As Sound Clip # 0

THTTL2/SOUND5 Input Mode

☒ Proportional RC ☐ Analog Idle Off Delay (s)

☐ Switched RC 1xN ☐ Switched RC 1x1 0

☐ Logic Level 1xN ☐ Logic Level 1x1 -ve

☐ 3-Pos RC Switch 1x2 ☐ 3-Pos RC Switch 1xN

Engine2 Sound Mode

☒ Auto With Throttle ☐ Force Forwards Only

☐ Switched As Sound Clip # 0

SOUND1 Input Mode

☐ Proportional RC ☐ RC Remote Volume Timeout (ms) 1000

☒ Switched RC 1xN ☐ Switched RC 1x1 # Offset 0

☐ Logic Level 1xN ☐ Logic Level 1x1 -ve

☐ 3-Pos RC Switch 1x2 ☐ 3-Pos RC Switch 1xN

Proportional RC Position/Sound Clip Assignment

Half Fwd Sound # 1 Full Fwd Sound # 2

Half Back Sound # 3 Full Back Sound # 4

Which is Fwd and Back (or Left and Right) depends on your transmitter servo settings

SOUND2 Input Mode

☐ Proportional RC ☐ Wired Rem. Volume Timeout (ms) 1000

☒ Switched RC 1xN ☐ Switched RC 1x1 # Offset 2

☐ Logic Level 1xN ☐ Logic Level 1x1 -ve

☐ 3-Pos RC Switch 1x2 ☐ 3-Pos RC Switch 1xN

Proportional RC Position/Sound Clip Assignment

Half Fwd Sound # 5 Full Fwd Sound # 6

Half Back Sound # 7 Full Back Sound # 8

Which is Fwd and Back (or Left and Right) depends on your transmitter servo settings

SOUND3 Input Mode

☐ Proportional RC ☒ DopplerFX Timeout (ms) 1000

☐ Switched RC 1xN ☐ Switched RC 1x1 # Offset 4

☐ Logic Level 1xN ☐ Logic Level 1x1 -ve

☐ 3-Pos RC Switch 1x2 ☐ 3-Pos RC Switch 1xN

Proportional RC Position/Sound Clip Assignment

Half Fwd Sound # 9 Full Fwd Sound # 10

Half Back Sound # 11 Full Back Sound # 12

Which is Fwd and Back (or Left and Right) depends on your transmitter servo settings

Basic Hardware Settings

Low Battery Voltage Alarms

Rx Battery Low Voltage Limit 4.0 Volts

Num Times To Play Alarm Sound 1

Main Battery Low Voltage Limit 4.5 Volts

Num Times To Play Alarm Sound 1

Clear Battery Alarms

Startup Delay (s) 6

Remote Configuration Mode Timeout (s) 10

☐ Single Sound Mode

☒ Auto Throttle Setup ☐ Manual Throttle Setup

Engine1 Volume Change With Throttle (dB) 0.0

Engine2 Volume Change With Throttle (dB) 0.0

Data in this box are stored in the BasicHardwareSettings.txt file on the microSD card.

Miscellaneous

☐ Engine Speed Change Uses Frequency Multiplication

Save Settings in .sfx8 Files and BasicHardwareSettings.txt on the microSD Card.

Defaults Retrieve Settings

Throttle and Engine Sound Modes

THTTL1/THTTL2 Input Modes allows you to set the type of input the module expects for the THTTL1/2 inputs. When their respective **RC** radio buttons are selected, the module expects that input to be a standard RC 1-2ms wide pulse.

Engine1 and **Engine2 Sound Modes** default to **Auto Start With Throttle**. This means that the Engine sound will switch on and off automatically with the transmitter throttle stick. If this behaviour is not desirable, the **Engine1** sound can be configured to switch on and off with the **SOUND1/2/3** inputs. In this case the **SOUND1/2/3 Input Mode** should be either **Switched RC 1xN** or **Switched RC 1x1**. Similarly for the **Engine2** sound.

If the **Logic Level 1xN** or **Logic Level 1x1** radio buttons are pressed, that input expects a switch connected to the **receiver +VE voltage** or a **logic voltage swing between 0V and +12V**. The Logic Sense can also be set to either +ve (default) or –ve. This is useful for various RC and non-RC static display applications.

The **THHTL1** input can also be used as a fourth **SOUND4** Select input if it is not needed for an engine sound and the **THHTL2** input can also be used as a fifth **SOUND5** Select input if it is not needed for an engine sound. The **Switched RC 1xN**, **Switched RC 1x1**, and **Logic Level 1xN** and **Logic Level 1x1** buttons will cause the layout of this section to change to be similar to the **SOUND1/2/3** input sections. In this way you can get a fourth or fifth control input for non-engine sounds.

If the **“Idle Off Delay (s)”** field is set to any non-zero value, when the throttle stick is brought back to its neutral position (or off position for model airplanes) the engine sound will idle for the set time delay and then the engine shutdown sound will play.

The **Force Forwards Only** checkbox is used to force the respective Engine sound to act as though it were a forwards only control, even if it is a centre spring loaded control. This means that when the throttle stick is returned to its centre position the engine shutdown sound will play once and then stop instead of the idle sound looping indefinitely. This is useful when that “Engine” sound is actually a gun turret rotation sound.



SOUND1/SOUND2/SOUND3 Input Modes

SOUND1/2/3 Inputs have several possible modes for selecting the Regular (non-engine) sounds.

1. **Switched RC 1xN.** This is selected when you want to use **ONE** on/off transmitter channel to switch **N** regular sounds. In this case a Timeout (in milliseconds) is used to set the time that must elapse to trigger the sounds. The smaller this value, the lower the latency, but the faster the switch must be changed. The default value of 1000ms (1 second) works well in most cases.
2. **Switched RC 1x1.** This is selected when you want to use an on/off transmitter channel to switch just one sound. When the Tx switch is moved from its OFF position to its ON (opposite) position, the sound will play. When it is returned to its OFF position the sound will stop. Which sound is played by that switch is determined by the Offset # field I.E. if the Offset is 0 then Sound Clip 1 will play. If the Offset is 4, then Sound Clip 5 will play.
3. **Logic Level 1xN and Logic Level 1x1.** This is selected when you want to use a logic level or mechanical switch input, such as might be used in static displays. The **Logic Level 1xN** behaves identically to the **Switched RC 1xN** mode except that a logic level is used instead of an RC pulse to trigger the sound(s).
The **Logic Level 1x1** behaves identically to the **Switched RC 1x1** mode except that a logic level input is used instead of an RC pulse to trigger the sound(s).
4. **Proportional RC.** This is selected when you want to use a spare fully proportional channel. This works by using the half forward/back and full forward/back (or left/right) positions of the proportional control to select four of the regular sounds. Which is forward/back or left/right depends on your transmitter servo settings and can usually be reversed on the transmitter.
5. **RC Remote Vol.** This acts as a remote volume control controlled by a rotary knob or slider on your radio transmitter. Minimum volume is when the RC input is 1000 microseconds wide, maximum volume is when the RC input is 2000 microseconds wide.
6. **3-Pos RC Switch 1 x 2.** This refers to a 3 position RC switch where the centre position is used as an OFF Position and the upper or lower positions can be used to switch two different sounds on and off.
7. **3-Pos RC Switch 1 x N.** This refers to a 3 position RC switch where, similar to the above **Switched RC 1xN** mode using a 2-position switch, one switch position does the sound selection, and the opposite switch position will stop playing all previously selected regular (non-engine)

sound clips.

8. **Wired Remote Volume.** This allows a locally attached potentiometer to control the volume. The potentiometer must be wired to provide a variable voltage from 0 to +3.3 Volts, where 0 volts is zero volume and +3.3 Volts is maximum volume.
9. **DopplerFX Control.** This is available on the SOUND3 input only. It is for a 3-position switch with specific functions relating to the DopplerFX feature. The exact meaning of this switch is explained in the separate DopplerFX manual.

The SOUND1/SOUND2/SOUND3 inputs behave almost identically. The main difference is that the Offset # for SOUND2/3 defaults to 4 instead of 0, as for SOUND1. This Offset # is added to the number of toggles when selecting the sounds in **Switched RC 1xN** or **Logic Level 1xN** modes. So for SOUND2/3, if the switch is toggled once, sound clip #5 will play instead of sound clip 1. This is useful for triggering the higher numbered sounds with a lower number of switch toggles.

Remember if you run out of control inputs for SOUND1/2/3, you can use the THTTL1 input as a fourth SOUND input or THTTL2 input as a fifth SOUND input if they are not required for engine sounds.

Explaining Latched and Momentary Action

Latched action means that once a sound has been triggered, it will stay on after the trigger action has been removed. Then, when the trigger action is next performed, the sound will switch off. This is useful for long playing sound clips such as sonar pings, music, songs or anthems.

Momentary action means that the sound plays only for as long as the trigger action is held. Once the trigger action is released, the sound will stop. This is useful for short sounds such as gunfire, horns etc.

If you want to play more than one non-engine sound simultaneously, then the first one must be switched for **Latched** operation. Then it will remain on while you trigger the second one. The exact mechanism and method for triggering non-engine sounds will differ, depending on which mode has been selected.

How to Select Regular (Non-Engine) Sounds

1. **Switched RC 1xN Mode : One transmitter ON/OFF channel is used to switch N sounds.**
Toggle SOUND1/2/3 input from **OFF** to **ON** and back to **OFF** N times to select sound N. After a timeout of about 1 second (adjustable), Sound N will start playing. This is **Latched** action.



Repeat to switch Sound N Off.



For **Momentary Action** - Toggle SOUND1/2/3 input from **OFF** to **ON** and back to **OFF N-1** times then move to **ON and hold it there** – Sound **N** will play for as long as the switch is in the **ON** position. Release the switch to the **OFF** position to switch that Sound **OFF**.

2. **Logic Level 1xN Mode** : This behaves the same as **Switched RC 1xN Mode** except that a logic level is used instead of an RC pulse.
3. **Proportional RC Mode** : One proportional channel is used to switch four sounds.
 - a. Move Tx stick half-forward (or left/right, as appropriate) for more than 1 second - Sound 1 Turns **ON**;
 - b. Move stick quickly full forward - Sound 2 turns **ON**;
 - c. Move Tx stick half-backwards for more than 1 second - Sound 3 turns **ON**;
 - d. Move stick quickly full backwards - Sound 4 turns **ON**;
 - e. The specific sound clips (1,2,3,4 used as an example above), can be set to any regular sound clip.

Proportional RC Mode can be either **Latched** or **Momentary** action, depending on how long you hold the proportional stick in any of the four positions.

Low Battery Voltage Alarms

This section allows you to set battery low voltage alarms that trigger when the battery voltage for either the receiver or main battery voltage or both fall below set threshold values.

When a low battery alarm is triggered by a low battery voltage, a corresponding System Sounds voice announcement will be played.

You can set the number of times the alarm sound will play when first triggered by the low voltage condition. This allows a possibly annoying alarm sound to be played only a small number of times and then allows you to bring in the model to home quietly. If you set this field to 0, the alarm sound will play indefinitely while the low voltage condition lasts.

Miscellaneous settings

Startup Delay sets the number of seconds that the module waits for the receiver to initialize and start producing valid RC signals. It can be anything from 3 to 20 seconds.

Single Sound Mode is where one sound is playing and another sound is triggered, the second sound replaces the first one. This is sometimes preferable when gunfire is played – the engine sound will stop momentarily so the gun sound can be heard clearer.

Once any settings anywhere in this tab have been changed, click the **Save Settings** button to store these settings in various files on the microSD card.

Where Are Hardware Settings Stored?

Hardware settings are those configurable settings that control how the **ShockWave 3** board behaves.

There are two types of Hardware Settings :

1. Hardware settings that bear some relation to the sounds in the .sfx8 files :
 - a. Input modes for THTTL1, THTTL2, SOUND1, SOUND2 and SOUND3 inputs.
 - b. Idle Off Delay for THTTL1, THTTL2 inputs.
 - c. Offset # and Timeout for SOUND1/SOUND2/SOUND3 inputs.

These settings can be changed only using the ShockWave 3 PC Software application Control Panel->Hardware Tab.

Therefore, the hardware settings travel along with the sounds. If you change the .sfx8 file, then those settings will not be carried forward and have to be reset in the new .sfx8 file.

2. Hardware Settings that are completely independent of the sounds :
 - a. Startup Delay.
 - b. Remote Configuration Mode Timeout.
 - c. Throttle Setup Mode
 - d. Single/Multi Sound Mode.
 - e. Eng1MaxMinSPLRatiodB
 - f. Eng2MaxMinSPLRatiodB
 - g. Low Receiver Battery Voltage Alarm Settings.
 - h. Low Main Battery Voltage Alarm Settings.

These settings are stored in a separate file called BasicHardwareSettings.txt located in the root folder of the microSD card. These settings can be edited within the ShockWave 3 PC Software application Control Panel->Hardware Tab. However, this BasicHardwareSettings.txt file is human readable and can be edited using any simple text editor such as Windows Notepad.

Default content of this file is shown overleaf ...



BasicHardwareSettings.txt file default contents

```
**** BasicHardwareSettings.txt ****  
  
// StartupDelay: can be any integer between 3 and 20 (seconds)  
StartupDelay: 6  
  
// RemoteConfigTimeout: can be any integer between 0 and 20 (seconds)  
// if 0, remote configuration options such as Scroll Through mode are disabled.  
RemoteConfigTimeout: 0  
  
// ThrottleSetupMode: can be one of AUTO or MANUAL (using the Buttons)  
ThrottleSetupMode: AUTO  
  
// SingleSoundMode: can be yes or no, if yes, then only one sound plays at a time,  
// for example, if a gun sound is fired, the engine sound will temporarily stop,  
// then resume when the gun sound stops.  
SingleSoundMode: no  
  
// Eng1/2MaxMinSPLRatioidB: can be up to 20dB and represents the SPL (volume)  
// change between maximum throttle and minimum throttle positions.  
// If you do not want the volume to change with throttle position, set this to 0 (0dB = 1.0 x).  
Eng1MaxMinSPLRatioidB: 0.0  
Eng2MaxMinSPLRatioidB: 0.0  
  
// These low battery voltage limits are in Volts and can be used to trigger a  
// system alarm sound when the battery voltage falls below this limit.  
// The NumTimesAlarm sets the number of times that alarm announcement plays.  
RxBattLowVoltageLimit: 4.0  
RxBattNumTimesAlarm: 1  
  
MainBattLowVoltageLimit: 4.5  
MainBattNumTimesAlarm: 1
```

This format and spelling of the various data fields **MUST** be adhered to for the file to be read correctly. They are case sensitive. A single blank space after the : is also mandatory.

Editing the text in this file avoids having to use the **ShockWave 3 PC Software** application to change these basic settings.



SWITCHED OUTPUTS TAB

Figure 33: Switched Outputs Tab

ShockWave 3 Control Panel for J:\ShockWaveSoundSets\Helicopters\AirwolfBell222WithEngineHowlSoundSet.sfx8 Sound Set File

Hardware Switched Outputs DopplerFX

Switch 1

Mode **Flash Synchronized To Sound Clip**

☐ Output Active High

Associated Sound Clip
Sound 1

Flash Threshold 50 %

Timing From Sound Clip Start

Start Time 0.00 secs Repeat Period 6.00 secs

Stop Time 4.00 secs Timeout 10.0 secs

Switch 2

Mode **Flash Synchronized To Sound Clip**

☐ Output Active High

Associated Sound Clip
Sound 2

Flash Threshold 50 %

Timing From Sound Clip Start

Start Time 0.00 secs Repeat Period 6.00 secs

Stop Time 4.00 secs Timeout 10.0 secs

Switch 3

Mode **Flash Synchronized To Sound Clip**

☐ Output Active High

Associated Sound Clip
Sound 3

Flash Threshold 50 %

Timing From Sound Clip Start

Start Time 0.00 secs Repeat Period 6.00 secs

Stop Time 4.00 secs Timeout 10.0 secs

Switch 4

Mode **Flash Synchronized To Sound Clip**

☐ Output Active High

Associated Sound Clip
Sound 4

Flash Threshold 50 %

Timing From Sound Clip Start

Start Time 0.00 secs Repeat Period 6.00 secs

Stop Time 4.00 secs Timeout 10.0 secs

Save Settings in .sfx8 File Retrieve Settings **Set Standard Defaults** Set AfterBurner Defaults Set Smoker Fan Defaults

Default Values Displayed

The **ShockWave 3** module includes four Switched Outputs for switching LEDs or other low power loads. You can configure any of these outputs to operate in several modes selected by their respective **Switch1-4 Mode** drop down lists.

Overleaf ...



Switch Mode Drop Down List

1. **Flash Synchronized To Sound Clip** – this mode sets the output to flash an LED in synchronization with its selected sound. This mode can be used to flash ultra-bright LEDs in gun muzzles in sync. with gunfire sounds or to flash a Morse code lamp in sync. with a Morse sound clip. You can set the Flash Threshold level to adjust the flash effect. A lower value will cause the LED to be brighter, because it is on for a greater period of time. If it is set too low, the LED may be on for too long, thus detracting from the flashing effect.
2. **Flash Synchronized To Sound Clip-Timed** – is the same as (1) but can be subject to timing constraints as in (4). This is useful for flashing LEDs in exhaust ports at engine Start-up for a few seconds while the engine sound is sputtering.
3. **On/Off With Sound Clip** – this mode sets the output on when its associated sound clip starts and off when the sound clip stops. This includes afterburner sounds.
4. **Timed On/Off With Sound Clip Once** – in this mode you can set the output to switch on at a certain time after the start of a sound clip and switch off and stay off at a certain time after the start of the sound clip. You can set up a Start Time and Stop Time for the LED ON.
5. **Timed On/Off With Sound Clip Repeat** – in this mode you can set the output to switch on at a certain time after the start of a sound clip, switch off at a certain time after the start of the sound clip and then repeat with a specified repeat period. You can set up a Start Time, Stop Time, Repeat Period and End Time for the LED ON.
6. **Timed On/Off With Sound Clip Repeat With Timeout** – in this mode it behaves as in (5) above, but you can set a Timeout after which the switch will turn off.
7. **Proportional Smoker Fan With Engine1/2** – in this mode you can set the output to provide a Pulse Width Modulated (PWM) power drive for a smoker unit fan that increases and decreases with the throttle position for THRTL1/2 inputs. You can also set up a Burst of higher value fan speed at engine start-up to give a "belch" of smoke when the engine sound starts up.

The default Switch Mode settings are:-

Switch1 will flash with Sound Clip 1, Switch2 will flash with Sound Clip 2, Switch3 will flash with Sound Clip 3, Switch4 will flash with Sound Clip 4, and the threshold level is 50% of the maximum. These settings may be changed to any sound clip and any threshold between 0% and 100%.

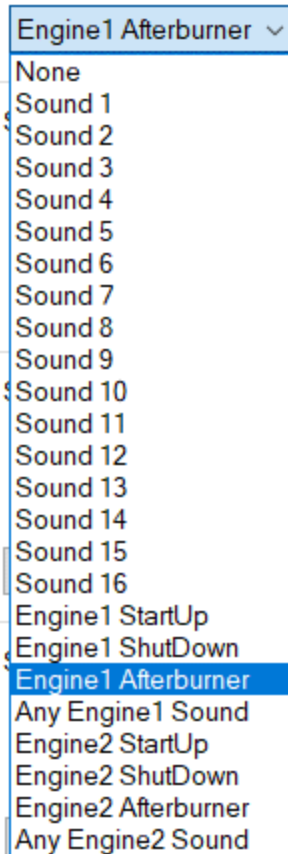


If you want to use these outputs to switch circuits, but not have any sound playing, you can install a **NULL (empty) sound clip** as one of the sounds. A **NULL sound clip** is provided in the Sample Sound Files folder on the microSD Card.

Associated Sound Clip Drop Down List

The Associated Sound Clip indicates which sound clip causes that LED switched output to activate.

The drop-down list looks like this:



The Engine1 Afterburner indicated here is one of many available options for triggering that LED switched output.

Active High/Active Low Output Mode

Each switched output has a check box named “Output Active High”. By default, these checkboxes are unchecked meaning the switched output is Active Low.

“Active Low” means that when the switched output is designated as **ON**, the switched output transistor is conducting causing the output pin voltage to be very close to 0 Volts (i.e. the -VE battery line).

If this checkbox is checked, when the switched output is designated as **ON**, the switched output transistor is not conducting causing the output pin voltage to be close to the battery voltage used to supply whatever load is switched by that output.

This feature is useful if these switched outputs are used to drive logic circuitry or some other processor chip instead of driving LEDS directly.



Proportional Smoker Fan With Engine1/2 Mode

In this mode, the control panel section will change appearance as follows :

Switch 1		Engine Smoker Burst	
Mode	Proportional Smoker Fan With Engine1	Start Time	0.00 secs
<input type="checkbox"/> Output Active High		Fan Burst Level	100.00 %
Fan Idle. Level	10 %	Stop Time	4.00 secs
Fan Max. Level	100 %	Timeout	10.0 secs

The **Fan Idle Level %** is the percentage of full fan speed when the throttle stick is at its idle or off position.

The **Fan Max. Level %** is the percentage of full fan speed when the throttle stick is at its full on position.

The **Fan Burst Level %** is the percentage of full fan speed for the duration of the Engine Startup (Engine1 or Engine2, as appropriate) as indicated by the Start Time and Stop Time fields. If you do not want any Engine Start-up burst of Fan speed, make the Start and Stop Times 0.



DOPPLERFX TAB

Figure 34: DopplerFX Tab

ShockWave 3 Control Panel for J:\ShockWaveSoundSets\Helicopters\AirwolfBell222WithEngineHowlSoundSet.sfx8 Sound Set File

Hardware Switched Outputs **DopplerFX**

DopplerFX Doppler Shift Calculator

Speed Of Sound m/sec km/hr mph ft/sec

Actual Model Speed m/sec km/hr mph ft/sec

Model Speed Multiplier for Doppler Shift Mach

Approaching Freq. Shift Ratio Receding Freq. Shift Ratio

Maximum approaching Frequency Shift Ratio on ShockWave 3 (at 44100 samples/sec) = 2.0
Minimum receding Frequency Shift Ratio on ShockWave 3 = 0.67

Max. Model Speed For 2x Frequency Shift (at 44100 samples/sec) m/sec

The above model speed takes into account the Speed Multiplier factor set in this panel which should correspond to the Speed Multiplier set on the ShockWave 3 sound module.

DopplerFX Settings

Model Speed Multiplier for Doppler Shift Satellite Constellations

These System Sounds will only Play if System Sounds are Enabled on the ShockWave 3 module using Button 1

Play Satellite Fix Acquired/Lost Sounds ☒ Play Obs. Position Set Sound ☒ Play DopplerFX Enabled/Disabled Sounds ☒
Play Satellite Fix Acquired/Lost Once Only ☐ Play Obs. Position Set Once Only ☐ Play DopplerFX Enabled/Disabled Sounds Once Only ☐

Successfully Retrieved DopplerFX Settings

Doppler Shift Calculator

The top part of this window is a Doppler Shift calculator that shows what the approaching and receding Doppler Shift ratio is for various model speeds. This can be informative when experimenting with the **DopplerFX** accessory board.

You can type into any of the Actual Model Speed fields (in different units) to calculate the corresponding Doppler shift when taking into account any model speed multiplier that may be set.



DopplerFX Event Announcements

The ShockWave 3 module can make system sound announcements to notify you of events such as **Satellite Fix Acquired or Lost**, **Observer Position Set** and some others. These system sound announcements can be turned on and off by the user using text entries in a **DopplerFXSettings.txt** file on the microSD card. They can also be changed in the this DopplerFX tab.

This file is mandatory, and if it is not present, the **ShockWave 3** module will create one with default values when it is powered up.

DopplerFXSettings.txt File Default Contents

Important settings for the DopplerFX feature are contained in a DopplerFXSettings.txt text file on the microSD card. This file is mandatory. If it is missing, the ShockWave 3 sound module will create one with default values as below:

```
**** DopplerFXSettings.txt ****
```

```
// SatelliteConstellations: can be one of GPS_ONLY, GPS_PLUS_GLONASS, GPS_PLUS GALILEO,  
GPS_PLUS BEIDOU
```

```
SatelliteConstellations: GPS_ONLY
```

```
// DopplerFXSpeedMultiplier: can be one of 1,3,5,7
```

```
DopplerFXSpeedMultiplier: 7
```

```
// The following can all have values of yes or no.
```

```
// If the OnceOnly settings are yes, that means the sound is played only the first time that event occurs.
```

```
// If the OnceOnly settings are no, that means the sound is played every time that event occurs.
```

```
PlaySatelliteFixAcquiredLostSounds: yes
```

```
PlaySatelliteFixAcquiredLostSoundsOnceOnly: no
```

```
PlayObserverPositionSetSounds: yes
```

```
PlayObserverPositionSetSoundsOnceOnly: no
```

```
PlayDopplerFXEnabledDisabledSounds: yes
```

```
PlayDopplerFXEnabledDisabledSoundsOnceOnly: no
```

The field names are mostly self-explanatory.

Field names must be EXACTLY as shown here and are case sensitive.

Data values can be yes or no and can be upper or lower case.

Comment lines start with //



CHAPTER 7 – SPECIAL PROVISIONS USING THE SECOND ENGINE SOUND

Proportional Tank/Boat Gun Turret Turning Sounds

Most model tanks have gun turrets that can rotate via servo control, or other motorized mechanism, under control of a stick or knob on the RC transmitter. In this case, instead of being an engine sound, the second "throttle" controlled sound can be turret turning sounds. What would normally be the engine 2 startup and idle sound, would be a turret start rotation sound and the engine 2 shutdown sound would be a turret stop rotation sound.

Furthermore, if you set the loop start and loop stop times appropriately so as to exclude the turret start rotation segment, but include the remainder of the first turret sound, you can use the Engine Sound Control to generate 8 steps of increasing turret rotation pitch so that the further you move the turret control stick/knob, the faster the turret rotation sound will be. 8 steps is quite sufficient for this purpose and going higher than this may cause problems.

Also, because the turret turning motor on real tanks does not vary much in speed, the maximum/base ratio for turret turning sounds is usually very low i.e. about 1.25 compared to the normal 2.0 – 3.0 used for proportional engine sounds.

If you want to use the second engine channel in this way you should set it up as a "Force Forwards Only" in the [Control Panel->Hardware Tab](#).

If this channel were a forwards and reverse channel, then when the turret control stick was returned to the centre (off position), the turret turning sound would continue playing as the sound module would think that it is an engine idling sound. By making it a forwards only channel, when the turret control stick is returned to the centre position, the turret stop rotation sound will be played once and then stop.



Special Provisions For Model Helicopters

Helicopters (either real or model ones) do not generally change their engine speed much once they are in flight. Instead, other flight controls determine the speed of the aircraft. Therefore, when used in model helicopters, the engine sound set is usually setup such that the maximum speed to the idle speed ratio is relatively low e.g. 1.5 – 1.75. Also, since turbine helicopters have a very long engine spool-up time to full speed, the engine sounds are usually started up using a spare switch on the transmitter instead of nudging the throttle stick forward a notch or two.

The **ShockWave 3 PC** [Control Panel->Hardware Tab](#) is used to set the Engine1 Sound Mode to “Switched with Sound Clip # 1”. We set this up before we ship the sound module out to a model helicopter customer. Then, a NULL sound clip should be used as regular sound clip # 1. Then the radio channel switch used for the regular sounds would operate as follows :

1. Flip the switch from its **OFF** position to **ON**, and leave it there. The engine start-up sound will begin and will spool-up to idle power and continue looping at idle power. The throttle stick can then be used independently of the engine sound to start the rotors turning at any suitable time during the engine spool-up time.
2. Flip the switch from its **ON** position back to **OFF** again. The engine shutdown sound will play once only, and then stop. Again, the throttle stick can be moved independently to shut down the model’s rotors.

Additional Helicopter Rotor Wash Sounds Using The Second Engine Sound

It is also **potentially** possible to add rotor wash sounds separately as the Engine2 sounds and use the collective radio channel to feed the THTTL2 input. In this way you would get extra rotor wash sound only when the helicopter is taking off, in flight and landing.

However, this depends upon the availability of obtaining a suitable rotor wash sound that is loud enough to mask the underlying engine sound so that the engine sound is not also added as well.

Such suitable rotor wash sound clips are very rarely obtainable so, in practice, this effect is not easily achievable.



CHAPTER 8 – SETTING YOUR PROGRAM PREFERENCES

Figure 35: Preferences Form

Click the **Preferences** button in the main Window Tool Bar.

The **Default Folder for .sfx8 Files** is the folder that **ShockWave 3 PC** opens when you click the Open Button in the Download File Controls

This folder is created for you when **ShockWave 3 PC** first runs. You can use the **Browse** button, or type a new folder name directly into the text field.

The **Load Last .sfx8 File at StartUp** check-box, when checked, will load the download file that was last open in **ShockWave 3 PC** the next time the application is launched.

The **Auto Volume Control on Load** check-box, when checked, will

automatically adjust the amplitude of the sound clip to its maximum level when loading it into the download file.

The **Auto Trim Sound Clip Start and End Points to Zero Crossings** checkbox can be checked to cause any sound clip to have its start and end points automatically trimmed, or cut off to the nearest positive going zero crossing point with a mild slope. This makes the looping behaviour at the end of the sound clip sound much smoother.

Similarly, the **Auto Trim Loop Start and Loop End Points to Zero Crossings** checkbox can be checked to cause the Loop Point start and end to be trimmed or adjusted to the nearest positive going zero crossing point with a mild slope. This makes the looping behaviour at the end loop point sound much smoother. Once your changes have been made, you can click on **OK** to save them and close the form.



CHAPTER 9 – COPYING .SFX8 FILES TO/FROM THE PC AND THE MICROSD CARD

In this application, **Copy to microSD Card** refers to the process of **Copying** the **.sfx8 File**, as composed in the Sound Clip List(s), to the **.sfx8** file on the microSD card. When the content of the Sound Clip List is correct, you can **Copy** the **.sfx8** File to the microSD Card by clicking the **Copy to microSD Card** button below the Sound Clip List.

You can also use the Save button on the Tool Bar or the **File->Save/Save As** menu items to save the current configuration to the currently open **.sfx8** file on your PC. This saves only to the PC Disk, not to the **microSD card**.

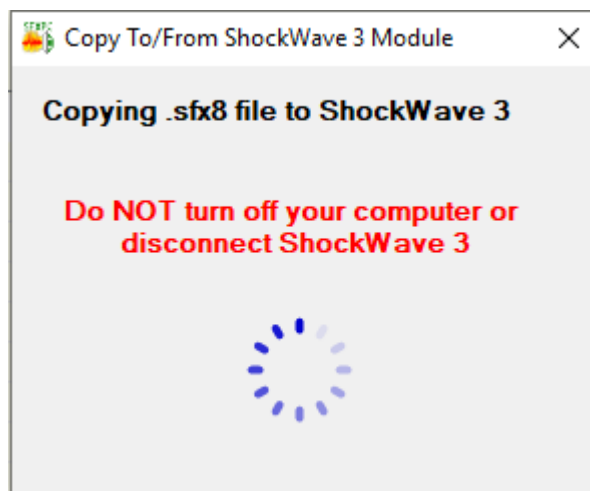
For faster .sfx8 file copy performance you should **ALWAYS** remove the microSD Card from the **ShockWave 3** module and insert it into your computer using the USB microSD Card reader **BEFORE** you power up the ShockWave 3 module or launch **ShockWave 3 PC**.

Copy from microSD Card refers to the process of **Copying** the contents of the **.sfx8** file on the microSD card to the PC.

You can **Copy** the contents of a **ShockWave 3** module's microSD card by clicking the **Copy from microSD Card** Button. These functions check whether there is a **ShockWave 3** module connected before attempting any data transfers. You will be prompted to select or enter a file name that you want to hold the uploaded content. If you choose a file that already exists, you will be asked if you want to overwrite it.

Take care you do not overwrite a .sfx8 file you want to keep, either on the PC or on the ShockWave 3 module's microSD card!

The copying process will be indicated by a Message box as follows:



This Message Box will automatically close when the copying has finished.

CHAPTER 10 - MISCELLANEOUS

INSTALLING AND USING AUDACITY

The Audacity audio editor program is a very good sound editing program and is absolutely free.

It is an Open Source Project and its [web site is here](#). You can download the current release of Audacity from its web site and install it on your PC.

Audacity is not produced by Model Sounds Inc., however, we highly recommend it.

SOFTWARE LICENSE

The original purchaser of the **ShockWave 3 PC** Windows Software has purchased a licence to use the software on any personal computer or computers the purchaser owns.

Files in the downloaded ZIP file may be copied for personal backup purposes only.

The **ShockWave 3 PC** program remains the property of Model Sounds Inc.

Note : This licence does not permit the copying, distribution or resale of the downloaded ZIP file or **ShockWave 3 PC** software or files to any other party.



MINIMUM SYSTEM REQUIREMENTS

Operating System Requirements :

- Microsoft Windows 10/8/7 or later (32 Bit or 64 Bit).
- SXGA (1280 x 1024) minimum graphics controller and monitor.
1920 x 1080 full HD is highly recommended.
- A PDF file viewer such as Adobe Acrobat Reader or Foxit PDF Reader (to view the manuals).
If you do not already have a PDF file viewer, the **ShockWave 3** microSD Card contains links to the Adobe Acrobat reader and to the excellent Foxit PDF reader.

Disk Space Required :

ShockWave 3 PC – 12MB

COMMERCIAL SOUND CLIP LIBRARIES

Below is a list of some commercial sound clip libraries.

Please Note : All Sound Clips are subject to copyright and their respective owners licensing agreements. If you purchase or download any sound clips from anywhere for use in any of our Sound Modules, you alone are responsible for complying with the terms of the respective licensing agreements.

Model Sounds Inc. bears no legal responsibility for any damages sought from our customers by copyrighted works owners.

- [GOOGLE SEARCH ON SOUND EFFECTS LIBRARY](#)
- [AUDIOSPARX](#)
- [THE SOUND EFFECTS LIBRARY](#)
- [SOUND DOGS](#)

Many sounds can also be found on YouTube, but are generally of low quality. Listen for wind noise and background noise such as people talking and/or vehicle or airplane noise.



INDEX

Add Sound Clip(s)	19	Logic Level 1xN and Logic Level 1 x1.....	41
Adding and Removing Sound Clips	18	Looping.....	21
Additional Helicopter Rotor Wash Sounds	54	Low Battery Voltage Alarms	44
Adjusting the Speed of sound Clips	24	Main Form for "Engine" Sounds – Normal View	26
Adjusting the Volume of Sound Clips	23	Main Form for "Engine" Sounds – Throttle Ranges View	27
Audacity	25, 57	Manual Volume Adjust	23
Auto Trim Loop Start and Loop End Points.....	55	Maximum/Base Sound Pitch Ratio	35
Auto Trim SoundClip Start and End Points	55	Momentary	42
Auto Volume Control on Load	55	NormStep Engine Sound Type	26
Auto With Throttle.....	39	NULL sound clip.....	49
BasicHardwareSettings.txt.....	46	Percent Full Bar	18
Before You Launch ShockWave 3 PC Application	8	Play Once	21
Connecting your ShockWave Module.....	8	Playing a Sound Clip and Looping	14
Copy and Pasting.....	19	Proportional Gun Turret Turning Sounds	53
Copy From Module Button	18	Proportional R/C	41, 44
Copy To Module Button.....	18	Proportional Smoker Fan With Engine1/2 Mode	50
Copying Sound Clips.....	21	R/C Remote Volume	41
Decreasing Pitch Steps Button.....	36	Retrieve from Module Button	18, 56
Default Folder for .sfx8 Files	55	Save to Module	56
Delete All Existing Steps.....	36	Saving Sound Clips	25
Delete Existing Steps After Current Base Sound	36	Set Loop Point Function	14
DopplerFX Tab.....	51	Set Looping Options.....	21
Download	56	Set Sound Type Menu	29
Download File Controls.....	11	Set Throttle Type Menu	29
dragging and dropping.....	19	Setting the Audio Channel	22
Elapsed Time Indicator.....	12	SFX8 Sound Set File Controls	13
Engine Sound Control Form	34	ShockWave 3 PC Can Read Either .sfx7 or .sfx8 Sound Files	9
Engine Sound Type.....	26	ShockWave 3 PC File Formats.....	9
Explaining Latched and Momentary Action....	42	ShutDn Engine Sound Type	27
Forward/Reverse Type.....	30	Software License	57
Generate Engine Steps Button.....	35	Sound Clip Libraries.....	58
Hardware Tab.....	39	Sound Clip List	11
How to Open .sfx8 Sound Set Files	9	Sound Clip List Defaults	17
How to Select Regular (Non-Engine) Sounds..	42	Sound Clip List Navigation	18
increasing Pitch Steps Button	36	Sound Clip List Save Settings.....	17
Increasing/Decreasing Throttle Type.....	30	Sound1/SOUND2 Input Modes.....	41
Keep All Existing Steps	36	Special Provisions For Model Helicopters.....	54
Latched.....	42		
Load Last .sfx8 File at Startup	55		



StartUp Engine Sound Type	26	Throttle Range Controls.....	30
Status Bar	12	Throttle Range Defaults	30
Store Settings in Module Button	45	THTTL1/THTTL2 Input Modes	39
Switched Output Tab	47	Transferring Sound Clips	20
Switched R/C 1 x N	41, 44	Upload.....	56
The Menu Bar.....	12	Using the Throttle Ranges Feature	30
The ShockWave 3 Sound Module and Its microSD Card	7	Voltage Indicators	13
The Tool Bar	12	Volume And Balance Controls	13
Throttle and Engine Sound Modes	39	What Is ShockWave 3 PC?.....	6
Throttle Playback Emulator	35	Where Are Hardware Settings Stored?.....	45
		Wired Remote Volume	42