Intelli Sound Creator

0. Contents

1. Requirements

The program „Intelli Sound Creator" creates a new loco sound out of existing sound samples and loads the new sound into an Intelli Sound 4 module (item# 32500) or an Intelli Sound 4 decoder (item# 36520, 36560) using the USB Soundloading adapter (item# 31050). Once the sound has been loaded into the decoder it can tested using the program.

The program needs sound samples files in WAV format with a resolution of 8 bits and a sample rate of 13,021KHz. Every sound which is going to be used with the program must be cut and mixed for the intended purpose. The program „Intelli Sound Creator" is not able to play or edit sound samples. What the program does is to assemble all the sound samples in such a way that they can be all loaded into an Intelli Sound 4 module and can be played by it

Using the program sounds for four different locomotive types could be created:

- Diesel loco
- Electric loco
- Steam loco
- Diesel loco with manual transmission

## 2. Starting the program and creating a new project

After starting the program the main window will be shown:
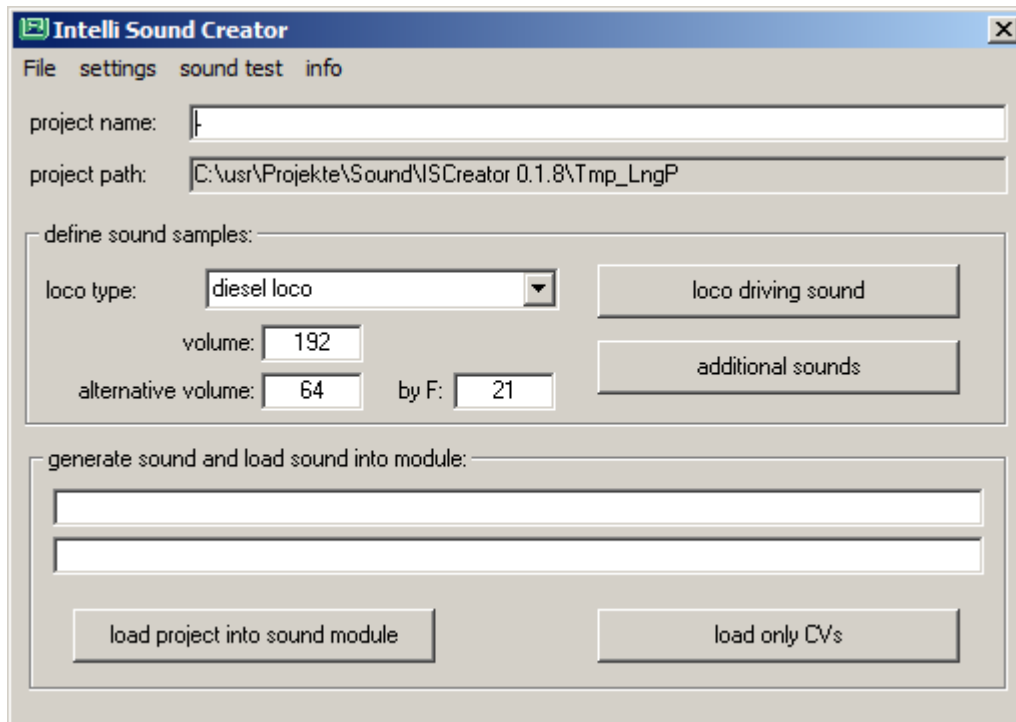
To create a new project all sound sample files must be located in a single directory. From the main menu "File" choose the sub menu "new project". Now use the file select box to choose the directory where all project files will be placed.

Enter the project name and the loco type in the main window.
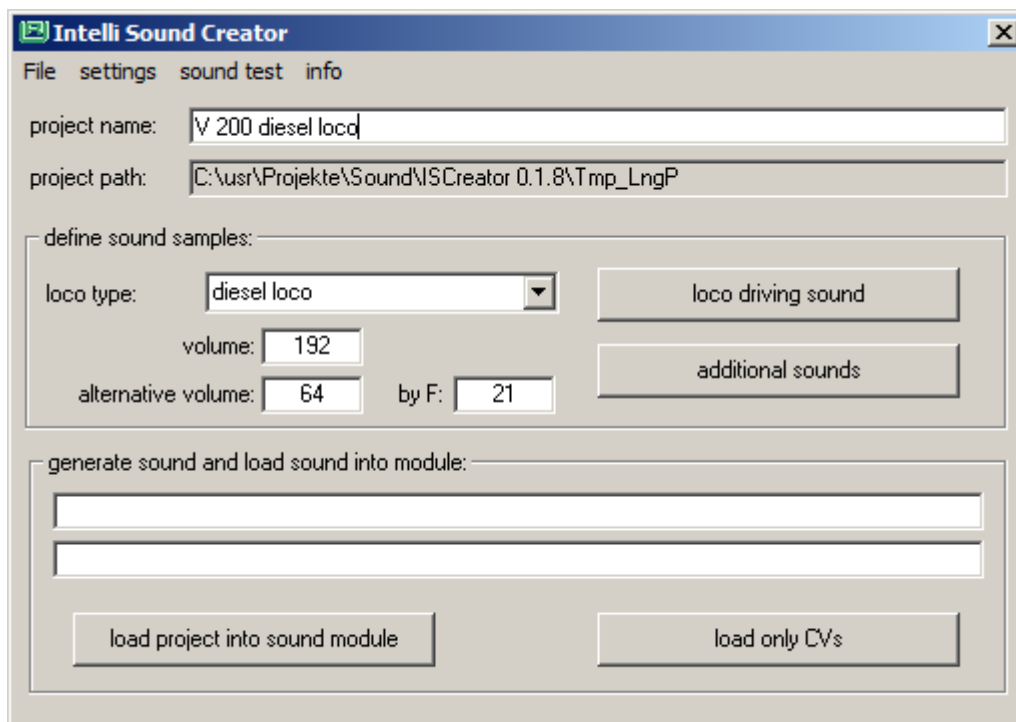
The volume of the whole sound and an alternative volume which could be activated by a function key must be defined in the main window.

Now all necessary sound samples files for the desired loco type can be determined.

3. Locomotive driving sound

3.1 Diesel locomotive

Use the combo box „loco type" in the main window to choose the desired loco type diesel loco and press the button "driving sound". The following window will be shown:

The picture shows the process structure of the diesel loco sound. By clicking on each box in the picture a sound file can be assigned to each sound event. The chosen sound file must be cut and mixed for the particular sound event so that the sound can be played back during the playback process when that particular sound event occurs. The following sound events are part of the playback process:

- **Start engine:** The diesel engine starts up and runs after the starting process with constant rotation speed while the loco is standing.
- **Standing:** The sound of the diesel loco while the loco is standing and the engine runs with constant rotation speed.
- **Stop engine:** The diesel loco is standing, the engine is running and now the engine will be stopped.
- **Start driving:** Out of the standing the diesel loco starts to drive.
- **Driving:** The engine sound of the driving diesel loco with the lowest engine rotation speed . This sound will be played back faster according to the speed step of the digital decoder.

- **Stop:** The sound which occurs when the diesel loco stops driving and the engine changes to the rotation speed of the standing loco.
- **Emergency stop:** like the Stop event, but during an emergency stop.
- **Sound while start driving:** A sound which will be played back every time the loco starts driving. (e.g.: the hiss of compressed air being blown out)
- **Braking – start:** The squeaking of the brakes when the train or the loco decelerates. Here specifically the start of that braking sound is required.
- **Braking-end:** like before but the end of the braking sound.

If one of the above points will be chosen the following window is shown:

The button "erase" erases the file name.

With the button "change" a sound file for this sound event could be chosen out of the project directory. The button "ok" closes the window.

If the desired sound files were chosen all file names are show in the table below the picture:

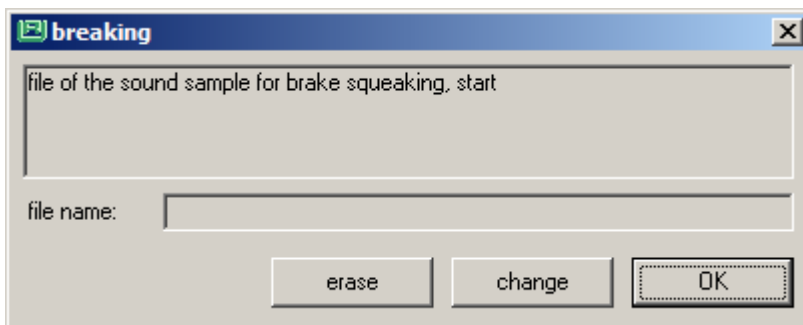| sound	snd	description	File
standing	(blue)	file of the sound sample for engine sound while standing or engine idle	FS0_r8b.wav
start	(green)	file of the sound sample for start driving	FS0-FS1_r8b.wav
driving	(green)	file of the sound sample for engine sound of the electic loco	FS1_r8b.wav
stop	(green)	file of the sound sample which will played when the loco stops	FS1_FS0_r8b.wav
emergency stop	(green)	file of the sound sample for a emergency stop of the diesel loco	FS1_FS0_r8b.wav
start up	(blue)	file of the sound sample for starting the engine	start_r8b.wav
park	(blue)	file of the sound sample for switching off the engine	stop_r8b.wav
starting sound	(red)	file of the sound sample for a sound which should played while the loco starts driving (e.g. starting whistle)	zisch_r8b.wav
breaking	(yellow)	file of the sound sample for brake squeaking, start	
breaking	(yellow)	file of the sound sample for brake squeaking, end	

Afterwards some settings must be specified using the buttons "diesel engine", "load change" and "breaking".

Button "diesel engine":
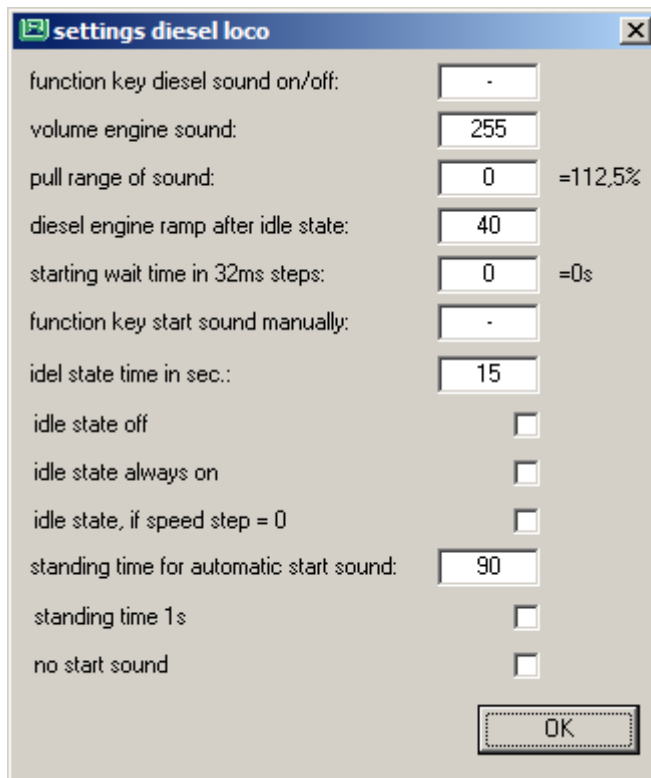
The following settings can be specified using in this window:

- Function key diesel sound on/off: (CV903-931)
  This is the function key which switches the engine sound on and off.
- Volume engine sound: (CV903b)
  The volume of the engine sound can be defined here.
- Pull range of the sound: (sound-parameter)
  The sound sample which is defined for the event "Driving" will be played back more quickly in dependence of the decoder speed. The play back speed gets more quicker if the decoder speed step increases. The specified value determines the maximum speed-up of the sound playback at the highest driving speed. The value for the pull range must be fixed by experiments.
- Diesel engine ramp after idle state: (CV900c)
  Time for the engine runout: the time during which the engine rotation speed runs out from the driving state to the idle state. This value tells the deceleration per speed step in 4ms steps.
- Starting wait time in 32ms steps: (sound-parameter)
  If the loco starts up under control of a digital controller the sound module is able to prohibit the decoder to start up the motor. After the starting wait time is expired the "sound while

starting driving" will be played, the loco begins driving and the sound "start driving" will be played back.

- Function key start sound manually: (CV903-931)
  This is the function which plays back the "sound while starting driving" manually.
- Idle state time in sec.: (CV937)
  If the loco runs on a flat track without changing engine load and without changing speed, the "standing" sound will be played back instead of the "driving" sound. The "standing" sound will be played back only for a certain time, the idle state time, after that the "driving" sound will be played back again.
- Idle state off: (CV937=0)
  The "standing" sound will never be played back while the loco is running.
- Idle state always on: (CV937=255)
  If the sound module switches to the "standing" sound during the loco is running, it never switches back to the "driving" sound without a change of motor load or speed.
- Idle state, if speed step = 0: (CV919a, Bit0)
  If this option is set the sound modul switches to the idle state (sound event: "Standing") when the digital controller send a speed step of zero.
- Standing time for automatic start sound: (CV934a)
  The sound "sound while start driving" will always be played back, after the loco has stand still for the here denoted time. If the stopping time of the loco is shorter, before the loco runs on again, no sound will be played back.
- Standing time 1s: (CV934a=0)
  With this option the standing time is set to 1 second.
- No start sound: (CV934a=255)
  There is no waiting time and the "sound while start driving" will not be played back.

Button „load change":
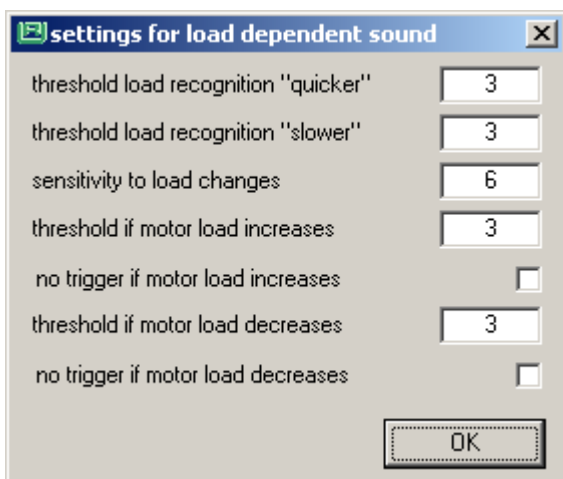
The setting of this windows are:

- Threshold load recognition „quicker": (CV935a)
  This parameter changes the threshold for the recognition of a higher engine load. Above this threshold the sound changes in dependence of the motor load.

- Threshold load recognition „slower": (CV936a)
  This parameter changes the threshold for the recognition of a lower engine load. Below this threshold the sound changes in dependence of the motor load.
- Sensitivity to load changes: (CV937a)
  The sensitivity to load changes can be set using this parameter.
- Threshold if motor load increases: (CV938a)
  Threshold of the motor load, which is sent form the decoder to the sound module, telling from which increase value the sound should switch to a sound with more engine load.
- No trigger if motor load increases: (CV938a=128)
  Do not change the sound if the load of the motor increases.
- Threshold if motor load decreases: (CV938a)
  Threshold of the motor load, which is sent form the decoder to the sound module, telling from which decrease value the sound should switch to a sound with less engine load.
- No trigger if motor load decreases: (CV939a=128)
  Do not change the sound if the load of the motor decreases.

Button "braking":
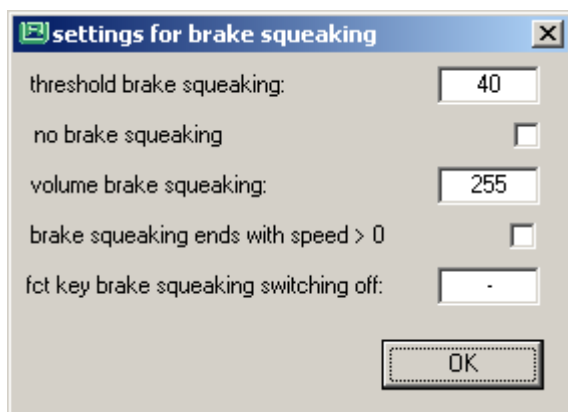
The following settings can be made in this window:

- Threshold brake squeaking: (CV936)
  threshold from which the brake squeaking will be activated.
- No brake squeaking: (CV936=255)
- Volume brake squeaking: (CV937b)
  The volume of the brake squeaking could be changed here.
- brake squeaking ends with speed >0: (CV919a, Bit1)
  The brake squeaking will be switched off if the speed step sent by the digital controller gets greater than zero after it had been zero before. That means that the speed knob was first rotated to zero and later increased again.
- Function key brake squeaking switching off: (CV903-931)
  Here a function key can be defined which switches off the brake squeaking.

3.2 Electric locomotive

Use the combo box „loco type" in the main window to choose the desired loco type electric loco and press the button "driving sound". The following window will be shown:

The picture shows the process structure of the electric loco sound. By clicking on each box in the picture a sound file can be assigned to each sound event. The chosen sound file must be cut and mixed for the particular sound event so that the sound can be played back during the playback process when that particular sound event occurs. The following sound events are part of the playback process:

- **Start engine:** The electric loco will be switched on and stands on the track. The standing sound will be played back.
- **Standing:** The sound of the electric loco while the loco is standing. Only electric supply noise is audible.
- **Stop engine:** The electric loco stands on the track and will be switched off. E.g. the pantograph goes down.
- **Start driving:** Out of the standing the electric loco starts to drive.
- **Driving:** The engine sound of the driving electric loco with the lowest engine rotation speed . This sound will be played back faster according to the speed step of the digital decoder.

- **Stop:** The sound which occurs when the electric loco is stops driving and the engine changes to the stand.
- **Emergency stop:** like the stop event, but during an emergency stop.
- **Sound while start driving:** A sound which will be played back every time the loco starts driving. (e.g.: the hiss of compressed air being blown out)
- **Braking – start:** The squeaking of the brakes when the train or the loco decelerates. Here specifically the start of that braking sound is required.
- **Braking-end:** like before but the end of the braking sound.
- **Switching click up 1:** Switching click of a mechanical switch in an old electric loco. Up switching when the speed should be increased. First version of the clicking noise.
- **Switching click up 2:** Switching click like before, but her second version of the clicking noise.
- **Switching click down 1:** Switching click of a mechanical switch in an old electric loco. Down switching when the speed should be decreased. First version of the clicking noise.
- **Switching click down 2:** Switching click like before, but her second version of the clicking noise.

If one of the above points will be chosen the following window occurs:
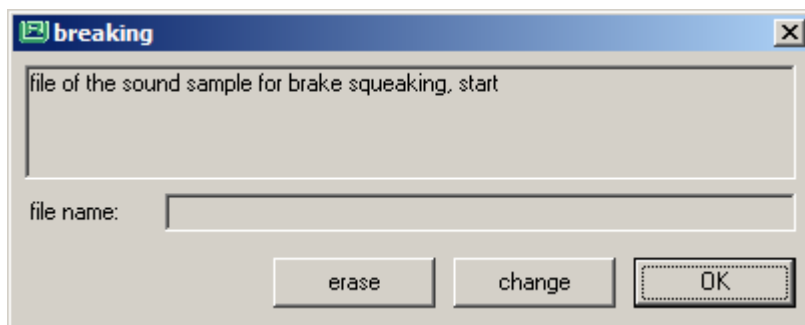
The button "erase" erases the file name.

With the button "change" a sound file for this sound event could be chosen out of the project directory. The button "ok" closes the window.

If the desired sound files were chosen all file names are show in the table below the picture.

Afterwards some settings must be specified using the buttons "electric drive", "load change" and "breaking".

Button "electric drive":
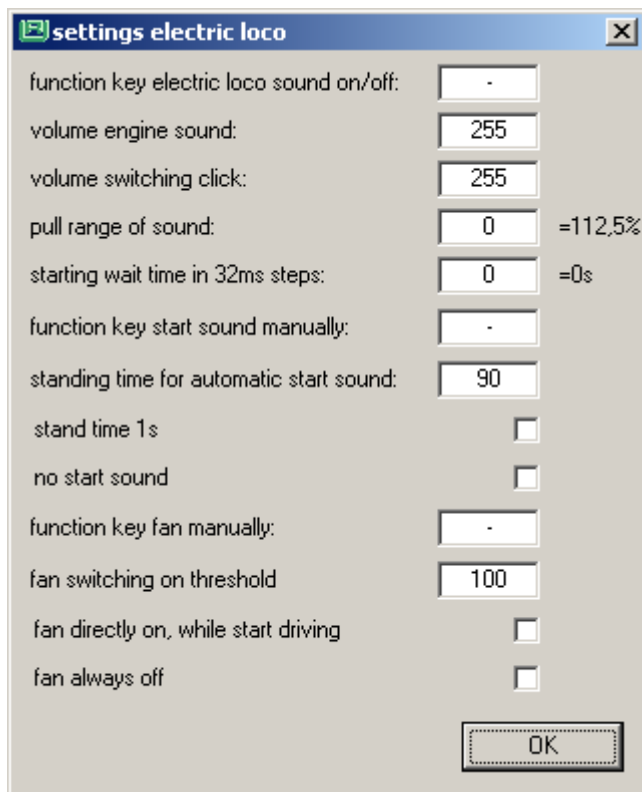
The following settings can be specified using this window:

- Function key electric sound on/off: (CV903-931)
  This is the function key which switches the engine sound on and off.
- Volume engine sound: (CV903b)
  The volume of the engine sound could be defined here.
- Volume switching click: (CV936b)
  The volume of the switching click can be defined here.
- Pull range of the sound: (sound-parameter)
  The sound sample which is defined for the event "Driving" will be played back more quickly in dependence of the decoder speed. The play back speed gets more quicker if the decoder speed step increases. The specified value determines the maximum speed-up of the sound playback at the highest driving speed. The value for the pull range must be fixed by experiments.
- Starting wait time in 32ms steps: (sound-parameter)
  If the loco starts up under control of a digital controller the sound module is able to prohibit the decoder to start up the motor. After the starting wait time is expired the "sound while starting driving" will be played, the loco begins driving and the sound "start driving" will be played back.
- Function key start sound manually: (CV903-931)
  This is the function which plays back the "sound while starting driving" manually.
- Standing time for automatic start sound: (CV934a)
  The sound "sound while start driving" will always be played back, after the loco has stand still

for the here denoted time. If the stopping time of the loco is shorter, before the loco runs on again, no sound will be played back.

- Standing time 1s: (CV934a=0)
  With this option the standing time is set to 1 second.
- No start sound: (CV934a=255)
  There is no waiting time and the "sound while start driving" will not be played back.
- Function key fan manually: (CV903-931)
  This is a function key which plays back the fan sound manually.
- Fan switching on threshold: (CV934)
  This is the threshold for switching on the fan.
- Fan directly on, while start driving: (CV934=0)
  The fan is always on while the loco drives.
- Fan always off: (CV934=255)

Button „change load":   **see diesel loco**

Button „braking":   **see diesel loco**

3.3 Steam locomotive

Use the combo box „loco type" in the main window to choose the desired loco type steam loco and press the button "driving sound". The following window will be shown:

sound	snd	description	File
standing		file of the sound sample for engine sound while standing or engine idle	
start up		file of the sound sample for starting the engine	
park		file of the sound sample for switching off the engine	
starting sound		file of the sound sample for a sound which should played while the loco starts driving (e.g. starting whistle)	
breaking		file of the sound sample for brake squeaking, start	
breaking		file of the sound sample for brake squeaking, end	
load: cylinder 1 a		file of the sound sample for one stream exhaust blow during load state, 1. cylinder version 1	
load: cylinder 1 a		file of the sound sample for one stream exhaust blow during load state, 1. cylinder version 2	
load: cylinder 2 a		file of the sound sample for one stream exhaust blow during load state, 2. cylinder version 1	
load: cylinder 2 b		file of the sound sample for one stream exhaust blow during load state, 2. cylinder version 2	
load to normal: cylinder 1 a		file of the sound sample for one stream exhaust blow during transition from load state to normal state, 1. cylinder version 1	
load to normal: cylinder 1 b		file of the sound sample for one stream exhaust blow during transition from load state to normal state, 1. cylinder version 2	
load to normal: cylinder 2 a		file of the sound sample for one stream exhaust blow during transition from load state to normal state, 2. cylinder version 1	
load to normal: cylinder 2 b		file of the sound sample for one stream exhaust blow during transition from load state to normal state, 2. cylinder version 2	
normal: cylinder 1 a		file of the sound sample for one stream exhaust blow during normale state, 1. cylinder version 1	
normal: cylinder 1 b		file of the sound sample for one stream exhaust blow during normale state, 1. cylinder version 2	
normal: cylinder 2 a		file of the sound sample for one stream exhaust blow during normale state, 2. cylinder version 1	
normal: cylinder 2 b		file of the sound sample for one stream exhaust blow during normale state, 2. cylinder version 2	
normal to idle state: cylinder 1 a		file of the sound sample for one stream exhaust blow during transition from normale state to idle state, 1. cylinder version 1	
normal to idle state: cylinder 1 b		file of the sound sample for one stream exhaust blow during transition from normale state to idle state, 1. cylinder version 2	
normal to idle state: cylinder 2 a		file of the sound sample for one stream exhaust blow during transition from normale state to idle state, 2. cylinder version 1	
normal to idle state: cylinder 2 b		file of the sound sample for one stream exhaust blow during transition from normale state to idle state, 2. cylinder version 2	
ide state: cylinder 1 a		file of the sound sample for one stream exhaust blow during idle state, 1. cylinder version 1	
ide state: cylinder 1 b		file of the sound sample for one stream exhaust blow during idle state, 1. cylinder version 2	
ide state: cylinder 2 a		file of the sound sample for one stream exhaust blow during idle state, 2. cylinder version 1	
ide state: cylinder 2 b		file of the sound sample for one stream exhaust blow during idle state, 2. cylinder version 2	

The picture shows the process structure of the steam loco sound. First of all the number of steam cylinders must be chosen in the lower combo box.

The picture shows the process structure of the steam loco sound. By clicking on each box in the picture a sound file can be assigned to each sound event. The chosen sound file must be cut and mixed for the particular sound event so that the sound can be played back during the playback process when that particular sound event occurs.

Depending on the number of steam cylinder for each driving situation "idle state", "normal" and "load" 3 or 4 sound samples, must be defined. For locos with 3 or 4 steam cylinder for each cylinder a different sound sample will be necessary. If the Locos has 2 steam cylinder for each cylinder 2 different sound are necessary because with only one sample per cylinder the repetition of the sample are listening very synthetic.

The following sound events are part of the playback process:

Steam chuffs:
- **Load:** one sample of one steam chuff per cylinder when the engine runs under load.
- **normal:** one sample of one steam chuff per cylinder when the engine runs in normal mode.
- **Idle:** one sample of one steam chuff per cylinder when the engine runs in idle state (no load, constant speed, steam controller off)
- **Load to normal:** one sample of one steam chuff per cylinder when the engine goes from the load mode to the normal mode.
- **Normal to idle state:** one sample of one steam chuff per cylinder when the engine goes from the normal mode to the idle state.

Parallel sounds:

- **Start engine:** The steam loco starts up and stands afterwards with the standing sound on the track.
- **Standing:** The sound of the steam loco while the loco is standing and the boiling sound is audible.
- **Stop engine:** The steam loco sound will be stopped.
- **Sound while start driving:** A sound which will be played back every time the loco starts driving. (e.g.: a big hissing before the first steam chuff comes up.)
- **Braking – start:** The squeaking of the brakes as the train or the loco decelerates. Here especially the start of the sound.
- **Braking-end:** like before but the end of the braking sound.

If one of the above points will be chosen the following window occurs:
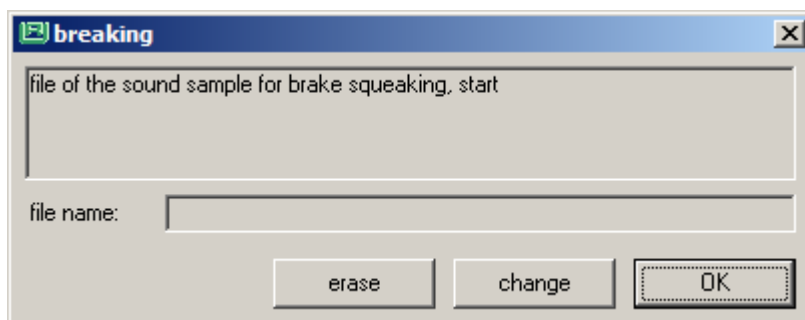
The button "erase" erases the file name.

With the button "change" a sound file for this sound event could be chosen out of the project directory. The button "ok" closes the window.

If the desired sound files were chosen all file names are show in the table below the picture.

Afterwards some settings must be done using the buttons "steam engine", "load change" , "breaking" and "smoke generator"

Button „steam loco":

- Function key steam sound on/off: (CV903-931)
  This is the function key which switches the steam sound on and off.
- Volume steam sound: (CV903b)
  Volume of the steam sound, the sound during the stand of the steam loco where only the boiling is audible.
- Volume steam chuff: (CV900b)
  volume of the steam chuffs

- Time between two steam chuffs at max. speed (not via reed input): (CV938)
  The time between two steam chuffs at max. speed. A value of 0 results in 7,5 chuffs per second and a value of 255 in 13 chuffs per second.
- Time between two steam chuffs at min. speed (not via reed input): (CV939)
  The time between two steam chuffs at min. speed. A value of 1 results in 8 seconds between two chuffs and a value of 255 in 70ms.
- Load time activated by acceleration: (CV927a)
  The time in seconds in which the steam chuffs will be played back under load, if the loco is accelerating.
- Load time activated by increasing load: (CV927a)
  The time in seconds in which the steam chuffs will be played back under load, if the load of the motor increases.
- Exhaust blow only via reed input: (CV935, Bit0)
  The steam chuffs are only triggered by the reed input.
- Exhaust blow auto. And only via reed input: (CV935, Bit1)
  The steam chuffs are triggered by the reed input and via the decoder speed. If no trigger comes from the reed input, the steam chuff are automatically generated according to the decoder speed. If a trigger comes from the reed input, then only the reed input triggers the steam chuffs afterwards.
- Starting wait time in 32ms steps: (sound-parameter)
  If the loco starts up under control of a digital controller the sound module is able to prohibit the decoder to start up the motor. After the starting wait time is expired the "sound while starting driving" will be played, the loco begins driving and the sound "start driving" will be played back.
- Function key start sound manually: (CV903-931)
  This is the function which plays back the "sound while starting driving" manually.
- Idle state time in sec.: (CV937)
  If the loco runs on a flat track without changing engine load and without changing speed, the "standing" sound will be played back instead of the "driving" sound. The "standing" sound will be played back only for a certain time, the idle state time, after that the "driving" sound will be played back again.
- Idle state off: (CV937=0)
  The "standing" sound will never be played back while the loco is running.
- Idle state always on: (CV937=255)
  If the sound module switches to the "standing" sound while the loco is running, it never switches back to the "driving" sound without a change of motor load or speed.
- Idle state, if speed step = 0: (CV919a, Bit0)
  If this option is set the sound modul switches to the idle state (sound event: "standing") when the digital controller send a speed step of zero.
- Standing time for automatic start sound: (CV934a)
  The sound "sound while start driving" will always be played back, after the loco has stand still for the here denoted time. If the stopping time of the loco is shorter, before the loco runs on again, no sound will be played back.
- Standing time 1s: (CV934a=0)
  With this option the standing time is set to 1 second.

- No start sound: (CV934a=255)
  There is no waiting time and the "sound while start driving" will not be played back.

Button „change load":   **see diesel loco**

Button „braking":   **see diesel loco**

Button "smoke generator":

The smoke generator can be connected to output SA1 and it will be controlled by the sound.
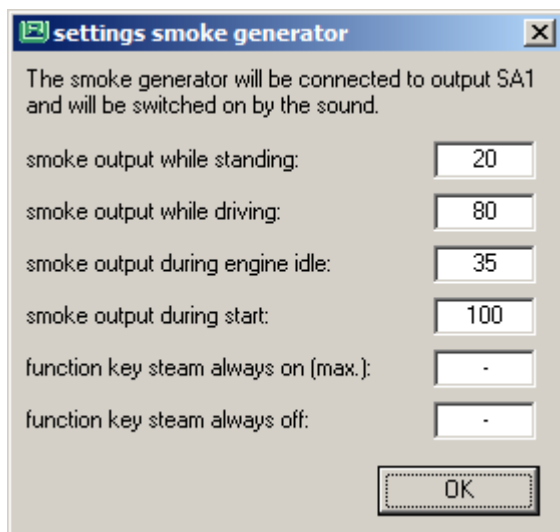
- Smoke output while standing: (CV929a)
  Voltage for the smoke generator while the loco is standing in %.
- Smoke output while driving: (CV930a)
  Voltage for the smoke generator while the loco is driving in %.
- Smoke output during engine idle: (CV931a)
  Voltage for the smoke generator while the loco is idle state in %.
- Smoke output during start: (CV931a)
  Voltage for the smoke generator while the loco is starting in %. During the start waiting time the smoke generator will be warmed up by this voltage.
- Function key steam always on (max.): (CV903-931)
  Using this function key the smoke generator can be switched on all the time.
- Function key steam always off (max.): (CV903-931)
  Using this function key the smoke generator can be switched off all the time.

3.4 Diesel locomotive with manual transmission

Use the combo box „loco type" in the main window to choose the desired loco type diesel loco with manual transmission and press the button "driving sound". The following window will be shown:

sound	snd	description	File
standing		file of the sound sample for engine sound while standing or engine idle	
start up		file of the sound sample for starting the engine	
park		file of the sound sample for switching off the engine	
start		file of the sound sample for start driving in the 1. gear	
driving to idle		file of the sound sample for the transition from the driving state in a certain gear to the idle state	
standing		file of the sound sample for engine sound while standing or engine idle	
idle state after driving		file of the sound sample for the transition from the the idle state to the driving state in a certain gear	
starting sound		file of the sound sample for a sound which should played while the loco starts driving (e.g. starting whistle)	
breaking		file of the sound sample for brake squeaking, start	
breaking		file of the sound sample for brake squeaking, end	
1. gear		file of the sound sample for engine sound in the 1. gear	
1. gear to 2. gear		file of the sound sample for the engine sound including switching from 1. gear to 2. gear	
2. gear to 1. gear		file of the sound sample for the engine sound including switching from 2. gear to 1. gear	
2. gear		file of the sound sample for engine sound in the 2. gear	
2. gear to 3. gear		file of the sound sample for the engine sound including switching from 2. gear to 3. gear	
3. gear to 2. gear		file of the sound sample for the engine sound including switching from 3. gear to 2. gear	
3. gear		file of the sound sample for engine sound in the 3. gear	
stop		file of the sound sample which will played when the loco stops	

settings: diesel loco with 3 gears   diesel engine   load change   breaking   transmission

The picture shows the process structure of the diesel loco sound. By clicking on each box in the picture a sound file can be assigned to each sound event. The chosen sound file must be cut and mixed for the particular sound event so that the sound can be played back during the playback process when that particular sound event occurs. The following sound events are part of the playback process:

- **Start engine:** The diesel engine starts up and runs after the starting process with constant rotation speed while the loco is standing.
- **Standing:** The sound of the diesel loco while the loco is standing and the engine runs with constant rotation speed.
- **Stop engine:** The diesel loco is standing, the engine is running and now the engine will be stopped.
- **Start driving:** Out of the standing the diesel loco starts to drive.
- **Stop:** The sound which occurs when the diesel loco stops driving and the engine changes to the rotation speed of the standing loco.
- **1., 2., 3. etc. gear:** The sound of the diesel engine when driving in this gear.
- **1. To 2.; 2. To 3.; etc.:** The sound of the diesel engine when the gear is shifted up.
- **2. To 1.; 3. To 2.; etc.:** The sound of the diesel engine when the gear is shifted down.
- **Driving to idle state:** The sound of the diesel engine, when the engine runs in any gear and slows down to the idle state.
- **Idle state to driving:** The sound of the diesel engine, when the engine is running in idle state with a constant rotation speed and afterwards speeds up to any gear.
- **Sound while start driving:** A sound which will be played back every time the loco starts driving. (e.g.: the hiss of compressed air being blown out)
- **Braking-start:** The squeaking of the brakes when the train or the loco decelerates. Here specifically the start of that braking sound is required.
- **Braking-end:** like before but the end of the braking sound.

If one of the above points will be chosen the following window occurs:

The button "erase" erases the file name.

With the button "change" a sound file for this sound event could be chosen out of the project directory. The button "ok" closes the window.

If the desired sound files were chosen all file names are show in the table below the picture.

Afterwards some settings must be done using the buttons "diesel engine", "load change" , "breaking" and "transmission".

Button „diesel engine":   see diesel loco

Button „change load":   see diesel loco

Button „braking":   see diesel loco

Button "transmission":

In this window several settings for the transmission could be done:

- Speed step to switch to 2. .. 7. gear: (CV901c bis 906c)
  The speed step when the sound shifts up to the next higher gear.
- Pull range for gear 1. ... 7.: (CV914c bis 920c)
  Pull ranges of the sound in the current gears.
  (The value for the pull range is the maximal play back speed for the sound in current gear. A value of zero set the play back speed to 100% and a value of 255 sets the speed to 200%. This

value must be determined by experiments. By experience this value lies in the range of 120% to 140%.)

- Time ramp in gear 1... 7: (CV927c bis 933c)
Inertia during shifting from one gear to another up or down. The inertia results from the value multiplied by 4ms for every speed step change.

4. The additional sounds

A lot additional sounds which are independent from the loco type can be added to every loco sound. The button "additional sounds" leads to a windows where those sounds can be defined.

Most of the additional sounds consist of three parts, the *beginning*, the *loop* and the *end*. The *start* contains the beginning of the sound until the *loop*, which can be play back by constant repetition. The *end* will be played back, if the sound will be stopped by function key. The transitions between the parts *beginning, loop* and *end* must be played by without any clicks or other disturbance. The repetition of the sample *loop* should also result in a play back without any click or other artifacts that means that the beginning and the end of the sample *loop* must fit together without any click. In addition the sample *loop* should be chosen in that way that the repetition of the sample should not be feel unnatural.

If a sound should only be play back for one time(e.g. a station announcement) the only sample that should be used is the sample *start.*

additional sounds

additional sounds activated by function keys:

name	description	snd#	fct	snd	without engine	during drive	volume	beginning	loop	end
sound 1	file of the sound sample for sound 1	1	-		yes	yes	255			
sound 2	file of the sound sample for sound 2	2	-		yes	yes	255			
sound 3	file of the sound sample for sound 3	4	-		yes	yes	255			
sound 4	file of the sound sample for sound 4	5	-		yes	yes	255			
sound 5	file of the sound sample for sound 5	6	-		yes	yes	255			
sound 6	file of the sound sample for sound 6	11	-		no	no	255			
sound 7	file of the sound sample for sound 7	12	-		no	no	255			
sound 8	file of the sound sample for sound 8	19	-		yes	yes	255			
sound 9	file of the sound sample for sound 9	20	-		yes	yes	255			
sound 10	file of the sound sample for sound 10	21	-		yes	yes	255			

sounds which will be activated by a timer   settings

name	description	snd#	fct	snd	without engine	during drive	volume	beginning	loop	end
timer 1	file of the sound sample for timer 1	13	-		no	no	255			
timer 2	file of the sound sample for timer 2 (fireman)	14	-		no	no	255			
timer 3	file of the sound sample for timer 3	15	-		no	no	255			
timer 4	file of the sound sample for timer 4	17	-		yes	no	255			
timer 5	file of the sound sample for timer 5	18	-		yes	no	255			

special sounds: settings

name	description	snd#	fct	snd	without engine	during drive	volume	beginning	loop	end
fct 'on' - sound	file of the sound sample for switching on a function key	9	-		yes	yes	255		------	------
fct 'off' - sound	file of the sound sample for switching off a function key	9	-		yes	yes	255		------	------
sound during starting drive	file of the sound sample which will be played during start driving	16	-		no	no	255		------	------
direction change f/r	file of the sound sample which will played during change of direction from forward to reverse	-	-		no	no	255		------	------
direction change r/f	file of the sound sample which will played during change of direction from reverse to forward	-	-		no	no	255		------	------
curve squeaking	file of the sound sample for curve squeaking	93	-		yes	yes	255		------	------

In all of the three tables the columns *beginning, loop* and *end* could be clicked by the mouse to define a WAV-file for the current sound event. If clicked the following window occurs:

sound 1 beginning

file of the sound sample for sound 1

file name:

erase   change   OK

The button "erase" erases the file name.

With the button "change" a sound file for this sound event can be chosen out of the project directory. The button "ok" closes the window.

If the column „fct" will be clicked by the mouse the function key which will activate the sound can be defined:
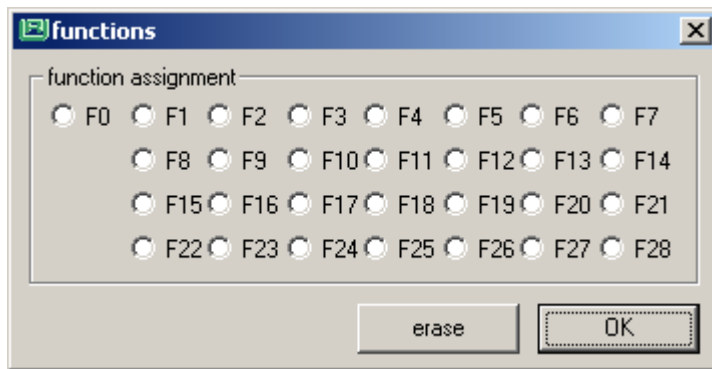
If the column „volume" will be clicked by the mouse the volume of the sound can be defined:
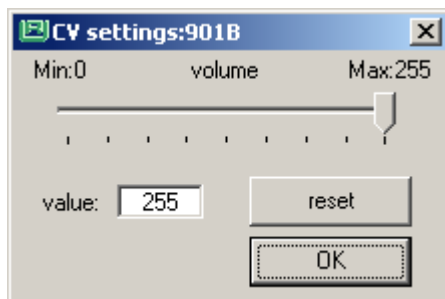
The volume for all sound are defined by the CVs 901b through 938b.

Using the table in the middle of the window, five sounds can be defined which will be activated by timer events. For every timer, three time periods can be defined. When any such time period elapses, the corresponding sound is played back automatically. Additionally the timer sound can also be played back when a function key is pressed.

The timer intervals will be defined via the button "settings" above the timer table. This is how this 'timer events' window looks like:
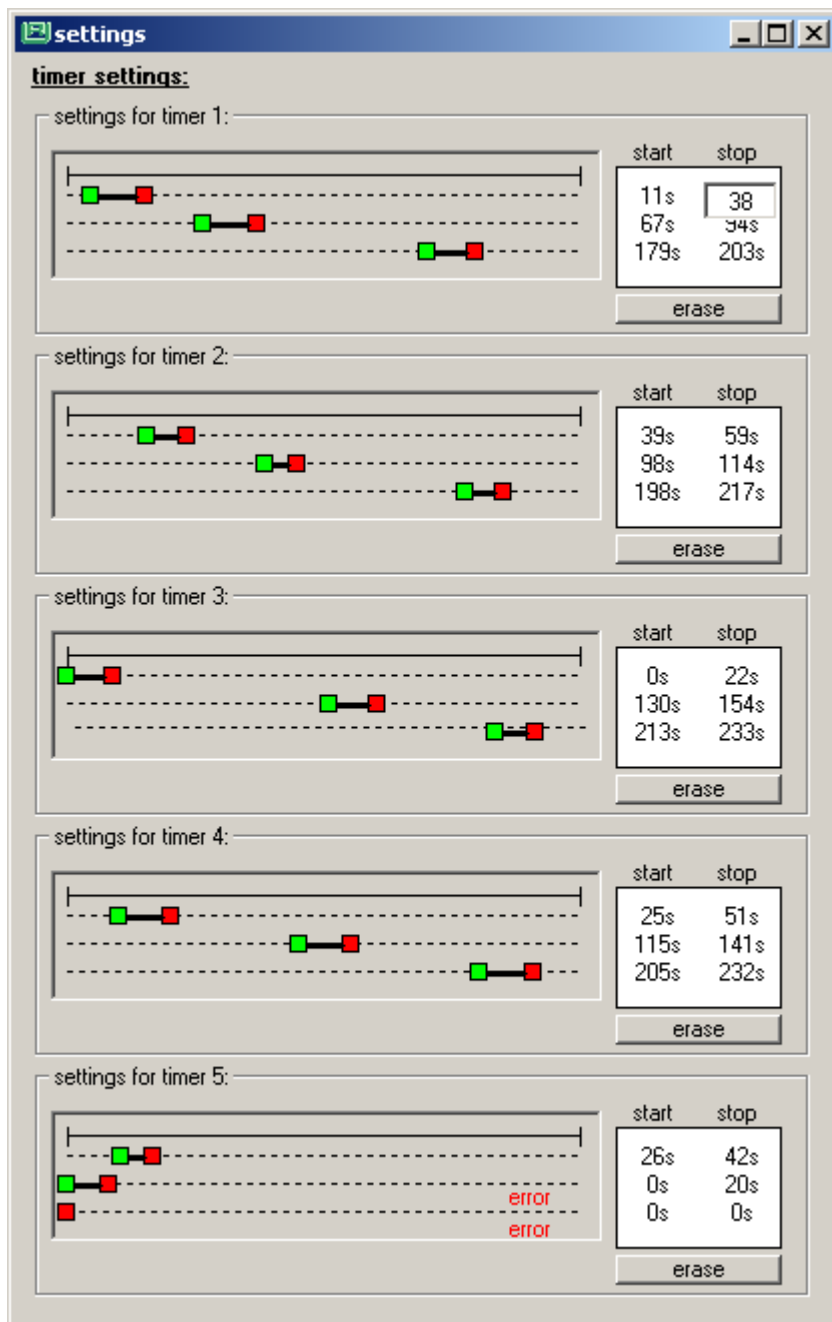
In this window three time intervals for five timers can be defined. Each green starting point and each red ending point can be shifted using the mouse. Alternatively, these times can be set using the keyboard by clicking on the values on the right side of those sliders. The buttons "erase" sets every time interval to zero, so that the sound will not be played back by timer event. A wrong order of the interval results in an error message in the window. When all of the intervals have been defined the window can be closed as usual by clicking on the "x" in the right-upper corner of the window.

In the lower table some special sounds can be defined:

A sound in two parts where part1 will be play back if a function key is pressed and where part2 will be played back when a function key is released. Both paths are loaded in the *beginning* sample. Those sounds can be used e.g. for an electric coupling one sound for closing and the other for releasing the coupling.

One sound which will be played every time the loco starts to drive. A starting whistle could be placed here.

For every change of the driving direction from forward to backward and form backward to forward one single sample could be played back. Both samples have only a beginning sample. The sound event occurs when the engine sound is switched on and the driving direction is changed during the loco is standing.

There is one sound event used for curve squeaking. This sound sample consists of three parts, *beginning, loop* and *end* and is only used for diesel and electric locos. The sound can also be played back by function key.

The button "settings" above the table leads to a window where the settings for the special sound can be made:
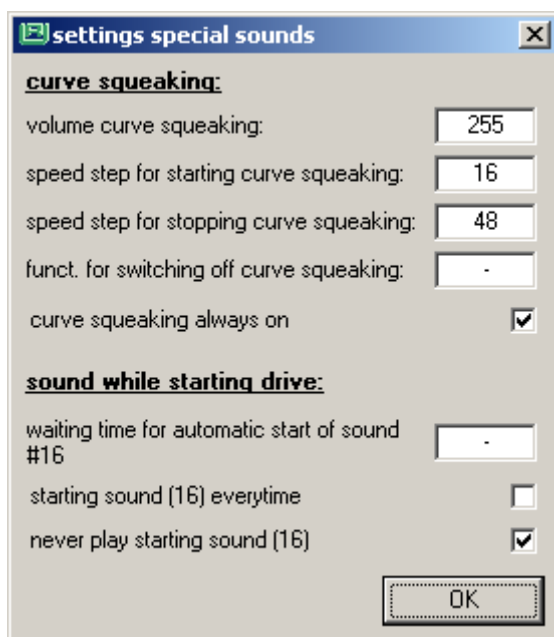
- Volume curve squeaking: (CV933b)
  The volume of the curve squeaking can be defined here.
- Speed step for starting curve squeaking: (CV922a)
  The speed step when the curve squeaking starts.
- Speed step for stopping curve squeaking: (CV923a)
  The speed step when the curve squeaking ends.
- Funct. For switching off curve squeaking: (CV924a)
  With this function key the curve squeaking can be switched off.
- Curve squeaking always on: (CV924a = 31)
  The curve squeaking is always switched on.
- Waiting time for automatic start of sound #16: (CV933a)
  The sound "sound while starting drive" will always played back, after the loco has stand still for the here denoted time. If the stopping time of the loco is shorter, before the loco runs on again, no sound will be played back.
- Starting sound (16) everytime: (CV933a=0)
  The sound will be played back every time the loco starts driving.

- Never play starting sound (16)
  The sound will never be played back.

5. Loading the sound project into the module

To load the sound data into a Intelli Sound 4 Module (item# 32500) or a Intelli Sound 4 Decoder (item# 36520, 36560), a USB Sound Loading Adapter (item# 31050) must be connected to the PC.

Using the menu „settings – comport" the comport number for the Sound Loading Adapter can be entered. The comport number of the adapter can be found in the device manager of the windows operating system.

Connect the sound module or the sound decoder with the SUSI connector of the Sound Loading Adapter.

Pressing the button „Load project into sound module" the sound data will be assembled and will be loaded into the sound module. This takes some time. The progress of the assembling and loading steps will be shown in the lower two lines in the main window of the program.

If the sound had been loaded before and only CV's have been changed it is not necessary to load the whole project. Using the button "load only CV's" only the CV data is loaded into the sound module.

6. Testing Sounds

Using the menu „sound test" the followings window is shown:
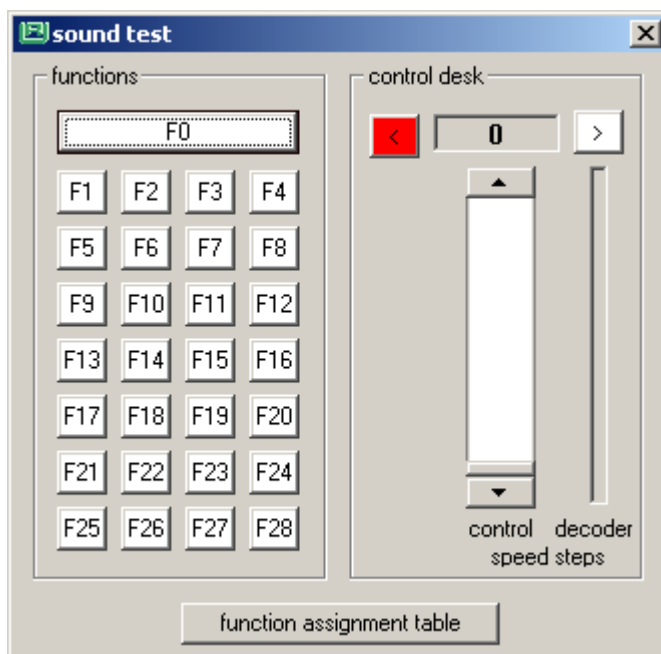
With this window the loco sound in the sound module can be tested. The buttons F0 to F28 activate the particular function. With the control desk speed step and driving direction can be changed.

The button „function assignment table" shows a table with the assignment between function keys and sound files:

Fx	name	beginning	loop	end
0				
1	engine sound on/off			
2	sound 1	KÖF_Horn_r8b.wav		
3	sound 2	Luft-Zisch_r8b.wav		
4	sound while starting drive	PfiffAbfahrt_r8b.wav	------	------
5	sound 3	Kette_r8b.wav		
6				
7				
8				
9	curve squeaking	Bremsen_r8b.wav		
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28	starting sound manual			

7. Hints and tips

7.1 Recording Sounds

7.1.1 Requirements for recording sounds

In order to be able to record sounds, an audio recorder with good sound quality and a good external microphone with wind shield is required. Digital recordings should be made with a sample rate of 44.1KHz and a quantisation of 16Bits. A good video camera could also be used. By using a video recording, it will be easy to identify each sound by the associated locomotive action. Single sounds from whistles, horns or any other auxiliary equipment should be recorded including the beginning (the swinging in, the switching on or the start-up) and the end (the fading, the switching off or the escape).

- Choose a quiet place where you can make the recording:

- without cars passing by
- without people in the recording region
- prevent conversations in the recoding area
- be aware of other noise in the recording area like loud music, machine noise etc.

- The sound you want to record must be clearly audible at the place where your recording microphone is situated.
- Avoid microphone handling noise.

7.1.2 Recording sounds from a diesel loco

The following recorded sounds are necessary:

- The start oft he engine
- The sound of the engine idling (min. length 30 seconds)
- The turning up of the engine at lowest rotation speed.
- The further turning up of the engine to the normal rotation speed when the loco is running (min. length 30 seconds)
- The running down from the normal driving rotation speed to the engine idling.
- Then let the diesel engine speed up again to the normal rotation speed for driving
- and back to the lowest rotation speed (stay here again for 30 seconds)
- then change back to engine idling and after some seconds turn off the engine
- record the horn (may be different horns of that loco) for min. 3-4 seconds (optimal is a duration of 8 to 10 seconds). When recording the horn the engine should be powered off.

Attention: When recording the sounds take a larger distance to the loco to prevent overloading the recording.

If the diesel loco does any other typical sounds like a bell or a heating during standing, try to record this typical sounds without any other disturbing noise. The recording time should also be 20 to 30 seconds.

If the diesel loco uses a diesel-electric transmission try to record the loco sound while the loco is starting on the first several meters and while the loco is stopping on the last several meters. Try to record the sound until nothing is audible any more. Make sure that there is no disturbing noise in the recording area.

7.1.3 Recording sounds from a steam loco

The following recorded sounds are necessary:

- The sound while the loco is standing (the boiling noise, the steam fizzling) for at least 30 seconds.
- Record the following single aggregates without any disturbing noise:
  - Pump: the pump should be recorded for several times (with slow speed while the loco is standing and with higher speed when the air pressure will have increased). Record the pump for several minutes so that every situation will be recorded.

- o Injector: record 30 to 50 seconds. Record the sound of the injector until the burbling water is also recorded.
- o Bell (if the loco has one): recording 10 to 20 seconds is usually enough.
- o Whistle: record a hard short attention whistle and a very long nice whistle of about 10 seconds.

Take care that during the recording of the single sounds other aggregates are switched off. To be sure record everything twice to prevent from any disturbing noise.

7.1.4 Recording sounds from a electric loco

In principle, recordings form an electric loco are taken like those from a steam locos.

The following recorded sounds are necessary:

- the startup of the loco
- the sound in idle mode
- the sound when the loco is switched off
- all aggregates
- the fan
- the air compressor
- etc.
- the driving sound when the loco is driving a short distance for and back.

7.2 Cuting and preparing sound samples

If you cut and mix sound samples out of your recorded sound, take care of the following things:

1. Samples must be cut always at a zero-crossing. If not, then clicks will be audible.
2. If a sample should be used for a loop, the beginning and the end of the sample should fit together without any gap or hop. That means this sample must also be cut at a zero-crossing. At the crossover from the beginning to the end no hop should occur and the gradient of the curve must be equal on both sides of the crossover. If one of those conditions are not fulfilled the crossover point is audible when the sample will be looped. Loop samples may not be too short and the contents must be suitable for a loop, if not the looping sequence will be audible. Audio cutting program are able to play sound samples in a loop. This possibility should be used to cut the right sample out of a sound.
3. If a sound is composed out of three parts (beginning, loop, end) the single parts must fit together without any audible disturbance. Follow the hints in 2.

Every sound file which should be used by the Intelli Sound Creator must be a WAV-file with a sample rate of 13,021Khz and a quantization of 8 bits. To convert WAV-files to this format the program "r8brain" could be used. A copy of this program is included in the setup for the Intelli Sound Creator.

For cutting sound files the free program "Audacity" could be used. (http://audacityteam.org)

7.3 Using the sample rate converter r8brain

If a WAV-file has not the sample rate of 13021Hz it has to be converted to that sample rate. Use the program "r8brain" which is included in the setup of the Intelli Sound Creator to do the conversation.

Load the WAV-File which should be converted (Input WAV file) and enter the destination for the converted file (Output WAV file).

After loading the input WAV-file, the sampling rate of the source file will be shown at the left side below „Resample to r8:". In this example it is 44100Hz. Use the box beside to enter the destination sample rate of 13021Hz. This value will be copied to the box „Set sample r8:" beneath. To create the new WAV-file with the sample rate 13021Hz press the button „Perform r8brain".