Forward AV Studio

Multitrack audio and video editor

User's Guide

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ForwardT Software 3.7.0

SoftLab-NSK, Ltd.

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Our company warrants this product against defects in materials and workmanship for a period of one year from the date of purchase. During the warranty period, products determined by us to be defective in form or function will be repaired or replaced at our option, at no charge. This warranty does not apply if the product has been damaged by accident, abuse, misuse, or as a result of service or modification other than by us.

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Forward AV Studio

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Forward AV Studio

1   Forward AV Studio Overview

Forward AV Studio is designed for video clips scoring, creating audio commercials, and synchronizing voice with music. You can create, save, restore and playback multi-track projects. Forward AV Studio is a non-destructive editor, i.e. it does not change source multimedia files.

Forward AV Studio project may have up to 32 audio tracks, one track with midi sound, and one/two video tracks. Each track can contain an unlimited number of clips. Clip is a reference to a continuous fragment (or the whole content) of audio or/and video data from the source file.

Forward AV Studio playbacks video on any device supported by Video for Windows.

An outstanding feature of the editor is the speed of playback, especially its audio part. Forward AV Studio is able to mix many sound tracks in real time. Forward AV Studio is a powerful and flexible tool for audio mixing. Each track has solo/mute toggles. Master volume and balance can be set for the whole project, each track or each clip. Moreover, volume and balance profile can be set separately for each clip.

You can apply real-time audio effects on clips, tracks and the entire project (mix of all audio tracks).

Forward AV Studio has an intuitive user interface. Operations and features are easily accessible from the toolbar, menus, context-sensitive local menus and keyboard accelerators (hot keys). Forward AV Studio supports up to 999 undo/redo levels.

Forward AV Studio has two main windows: *Project* and *Clip Collection*. The *Project* window contains all data and tools for project editing. The *Clip Collection* window may be considered as a handy storage site for your audio and video files.

2   Project Window
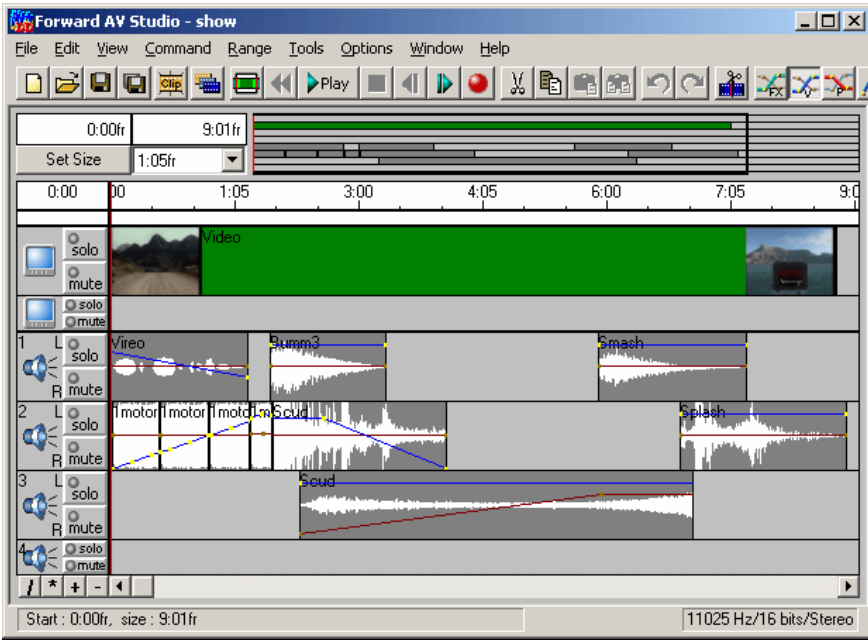
Project window is the main window with the title bar containing the application name, Forward AV Studio, and the path to the project file or Untitled for a newly created project.

The *Toolbar*, accelerator keys and main menu provide access to all commands and options.

By right clicking on different components of the *Project* window you can call a context-sensitive *local menu*. The mouse arrow takes different context-dependent shapes.

The *Working Area* of the *Project* window is used to edit multi-track projects with clips. At the left of each track there is the *Track State* window with one of the three track-type icons (video/audio/midi) and the Solo and Mute buttons to control track inclusion into the playback.

Clips on track, depending of the clip type (*Video*, *Midi* or *Audio*), have various data-specific features but their general functionality and appearance are the same.

All tracks and clips of a project are schematically represented in the *Project Overview* window. *Time Ruler* provides the project time reference for the *Working Area*.

The position of *Current time* is visually represented by two red vertical lines: one in the *Project Overview* window and the other, *current time mark*, across the *Time Ruler* and *Range* windows as well as across the track in the *Working Area*.

At the bottom of the *Project* window there is a status line. By putting the mouse arrow over an object you can view various information about this object. For settings and options call the *Settings* dialog box (press F5). The *Audio Meter (Faders)* window contains the output volume indicator and may have faders and audio effects buttons for tracks.

From the *Project* window clips can be dragged to the *Clip Collection* window, and vice versa. Source media files can also be dragged from the standard *Windows Explorer*.

2.1 Project Overview window

This window displays the reduction of all tracks and clips of a project.

The bold black frame indicates the position of the *Working Area,* a visible part of the project displayed in the window of video/midi/audio tracks. The red vertical line indicates current time.

To move the *Working Area,* place the cursor inside the black frame, where it takes the shape 🖑, press the mouse left button and drag the frame to the left/right.

To change the *Working Area* size, move the left/right edges of the working area putting the cursor over the black frame edge (the cursor will look ⬌ or ⬌), pressing the mouse left button and dragging the edge to the left/right.

To redefine the *Working Area* completely, press the mouse right button at a new position of the first edge, drag it to the left/right and release the button where you want to set the new edge.

The *Set Size* dialog box is used to view and change the *Working Area* bounds.

To change the duration of and the number of audio tracks in the Project you can use the *Set Size* dialog box or *General Settings* (press F5).

A double click in the *Project Overview* window (not in the main window with tracks) starts project playback from a specified position to the end of the *Project*.

2.2   Time Ruler

| 30:08 | 31:05 | 32:02 | 32:09 | 33:06 | 34:03 |
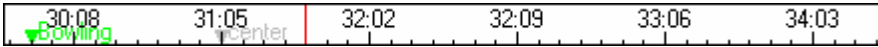
The *Time Ruler* provides the time reference for the project in the *Working Area*. Labels with the project time values are displayed in the current time format with the time step set in the *Scale Step* window.

Each click in this window redefines the position of the current time, which is indicated by the red vertical line or *current time mark*. To start 'scrubbing', or fast preview in the current position while moving it, press the mouse left button, hold it and then move the mouse. A double-click starts playback from a specified position to the end of the *Working Area*.

A right-click in the *Time Ruler* window calls its local menu. Note that the Add Mark command can be dynamically replaced by another command by pressing the mouse right button over the previously set mark.

Play	playback the *Project* from a specified position to the end of the *Working Area*.
Set current time	call the *Set Current Time* dialog box.

The following three commands are analogs of those in the *General Settings* (F5).

Show video	display the current frame on the video player (*Video window*). This command is an analog of Show In/Out frame setting in the *Edit Clip* dialog box.
Play audio	start audio scrubbing while dragging the current time mark.
Auto-scroll rolls	control automatic scrolling of the *working area* while moving the mouse outside the window.

The following two commands duplicate those in the *Alignment Settings* (Time Alignment group).

Align to nearest frame	align the current time mark to the nearest video frame.
Snap to marks	snap the current time position to the placed marks.
Add mark	place the mark at a specified position. This command is also used to call the Mark info menu for a previously placed mark.

2.3   Current Time window

31:09
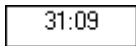
The *Current Time* window on the left of the *Time Ruler* displays the current time value in the current time format.

In the *Project* window, the current time is shown by two red vertical lines: one in the *Project Overview* window and the other, the *current time mark*, across the *Time Ruler*, *Range* window and tracks in the *Working Area*. You can move the current time position by dragging it with the mouse in the *Time Ruler* and *Working Area*.

Set Current Time

Time: 00:00:01:00

OK   Cancel
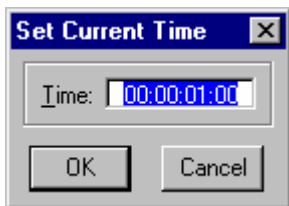
To set the current time manually, double-click in the current time window to call the *Set Current Time* dialog box. This dialog box can also be called by the Set current time command in the *Time Ruler* local menu.

2.4   Range Window

Range is a user-defined time interval to be used in different operations (playback, normalize/statistics, export to the resulting file etc.). The selected interval is displayed as a blue box. The range window and the *Time Ruler* have the same time scale. If the range is set, the *Range Flag* window displays the blue box and *Playback Start* and *Playback Duration* windows display in blue color the start time of the range and its duration. To specify the range and select the time interval for a Project, press the mouse left button when the mouse arrow is on the range window, drag the mouse to the left/right and release it where necessary. If Show video is on, the current video frame from the video track is being displayed during the dragging (see *Time Ruler* local menu or *General Settings*). A shift-click on the range window resets the nearest boundary

of the selected range to a specified position. A double-click sets the full range that covers all clips in the Project except those in the non-active tracks (for switching off tracks by the Mute button see *track selection*). The Include all clips command from the Range menu can also be used for this purpose.

You can move the selected range or its boundaries to the left/right using the mouse. Press and hold the Ctrl key, move the mouse arrow to the selected range or its start/end (the arrow will change its shape), press and hold the mouse left button and drag the mouse to the left/right. When a video range on a video track is being dragged, the first/last frame of the selected range is being displayed. Press the mouse right button to switch between the first and last video frame of the selected range to be displayed when being dragged.

You can set the range boundaries equal to the start/end of any clip by moving the mouse arrow over the clip and pressing the G key on the keyboard. Press Shift+G to expand the range to the start or end of the clip (also, see the section about keyboard accelerators).

To set/view the range boundaries in the current time format, double-click in the *Range Flag* window or click on the Set Size button to call the *Set Size* dialog box.

To clear the range and remove the time interval selection, click at any place in the range window or press and hold the Ctrl key and click on the blue indicator in the *Range Flag* window. This may be useful if you want to clear the range while keeping the current time position.

Right-click on the range window calls a local menu with the same commands as in the Range menu plus the following:

Normalize audio	call the *Normalize Level* dialog box to adjust project master volume to a specified level.
Statistics	mix audio within a range and represent the resulting audio volume as a color picture on range window according to the volume levels and color associations defined in *Audio Meter Settings*. Show *Statistics* of the mixed audio in the selected range.

2.5   Range Flag window

A blue band in this window to the left of the *Range Window* indicates that the range is defined; a blank in this window indicates otherwise.

2. *Project Window*

Set Range

Left: 00:00:30:06
Right: 00:00:34:02
Size: 00:00:03:06

OK   Cancel
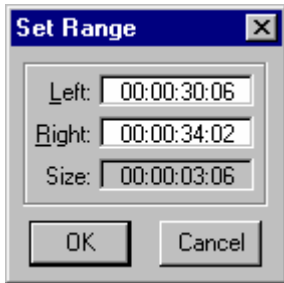
A double-click in the *Range Flag* window calls the *Set Range* dialog box that displays range boundaries values in the current time format.

2.6   Playback Start and Playback Duration

30:06fr   3:06fr

These two windows show the start and duration of playback in the current time format.

If the time range is set in the *Range* window, the range start and duration are shown in blue. Otherwise, the start and size of the *Working Area* are shown in black. Where playback actually starts depends also on the status of Start playback from current time position in *General Settings*.

Double-click in either window to call the *Set Size* dialog box.

2.7   Set Size

Set Size

The Set Size button or double-click in either *Playback Start* or *Playback Duration* windows calls the *Set Size* dialog box, which have three groups of parameters.

Project Limits. In the Size and Audio tracks boxes you can set the duration and number of audio tracks in the *Project*. These settings duplicate the parameters from the Project Limits group in the *General Settings*.

In the Working Area boxes you can set the left and right boundaries and the size of the *Working Area*.

In the Time Range boxes you can set the left and right boundaries and the size of the time range. The same settings are also available in the *Set Range* dialog box.

Set Size

Project Limits
Size: 00:00:48:05   Audio tracks: 4

Working Area
Left: 00:00:30:05
Right: 00:00:35:05
Size: 00:00:05:00

Time Range
Left: 00:00:30:06
Right: 00:00:34:02
Size: 00:00:03:06

OK   Cancel   Help

2.8   Scale Step

0:07fr
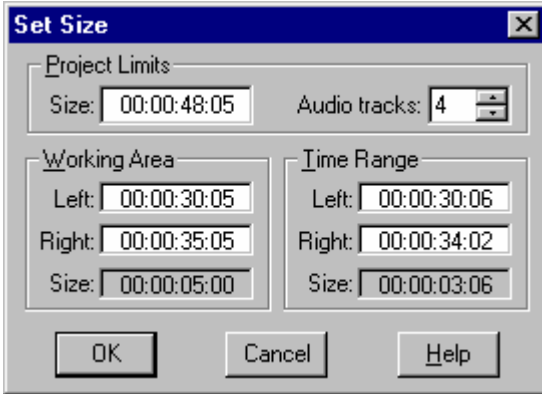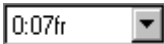
From the list you can select the interval between the ticks in the *Time Ruler* window. Following the setting, the *Working Area* is zoomed to a new size to fit the selected scale.

If the current time position (vertical red line) is within the *Working Area,* it retains its visual position after the execution of any zoom commands; otherwise the center of the *Working Area* does.

3   Project Working Area
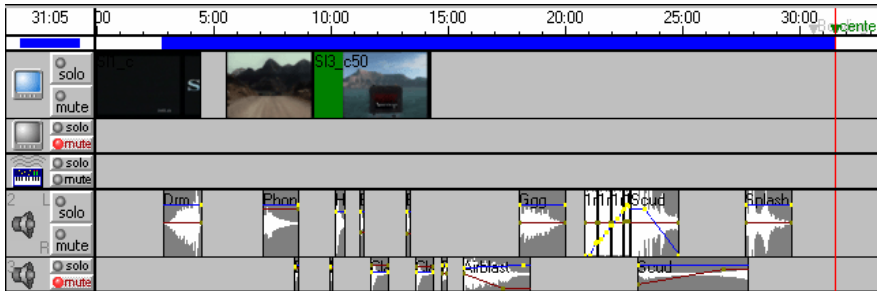
Working Area is part of the *Project window* that is located below the *Range window.* This area represents the project's *Video*, *Midi* and *Audio* tracks with clips within a specified time interval.

On the left of each track there is the *Track State* window with the track type icon (video/audio/midi) and the Solo and Mute buttons. The Show Video tracks, Show MIDI track and Show Audio tracks commands from the View menu are used to define the type of tracks to be shown in the *Working Area* window. The vertical scrollbar in the right part of the area indicates that the project contains too many audio tracks to display all of them separately.

The clip on track in the *Working Area* is represented by a rectangle with the clip name shown in its top left corner. *Video, Midi*, and *Audio* clips also have type-specific features and settings.

To call the local menu right-click on the area not occupied by clips:

Open source file...	call the *Open Clip* dialog box and add a clip with reference to the source file to the project and *Clip Collection*. There is an identical command on the File menu.
Cut. Copy. Paste. Insert.	perform the corresponding operation on the selected clip(s). These are Identical to the commands from the Edit menu.

The *Working Area* size and position can easily be modified or redefined in the *Project Overview* window. The *Set Size* dialog box is used to set the values for the left and right bounds. The position of the *Working Area* relative to the start/end of the project can be changed using the horizontal time scrollbar at the bottom of the *Working Area* window. To the left of the scrollbar there are zoom buttons.

The red vertical line visually represents the current time position.

3.1   Track State
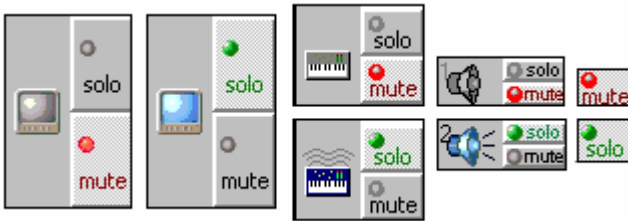
In the *Track State* windows at the left of each track in the *Working Area,* there are Solo and Mute toggle buttons to control the track playback and different icons for each type of track (audio/video/midi). There appear indicators L and R on audio tracks of stereo projects to balance the *Audio clip* profile in stereo projects. If a track is excluded from playback (either because it is muted or other tracks are solo) the track icon becomes gray and faded as shown below:

  - Video track.   - Audio track.   - MIDI track.

A right-click on a track state window region calls the track local menu:

Name	call the *Track Name* dialog box to change the track name.

The following two commands are used to change the positions of tracks of the same type. Note that during playback the first (top) *video track* is of higher priority than the second video track. The number of an *Audio track* is shown in the upper left corner. This is of special convenience when the vertical scrollbar is used instead of a large number of tracks.

Move up	swap the positions of a given track and the upper track.
Move down	swap the positions of a given track and the track below.
Track height	change the height of the track. The desired value of height can be selected from the submenu: Double, Normal, Half or Locked (too small height; clips on the locked track cannot be selected or manipulated with the mouse). You can change the height of any track using the keys 1, 2, 3 and 0 on the keyboard when the mouse arrow is on the corresponding track. To change the height of all audio tracks at once you can use the Audio tracks Height command from the View menu.

Track volume	change the track volume in a special dialog box window or in the *Faders* window if the latter is active. Available only for *Audio* and *Midi* tracks.
Audio effects	allow access to audio effects on the current track. There is a submenu having the following commands:
Add new...	call the *Audio Effects List* dialog box to add new effects or edit effects on a track,
Use	turn on/off the effects,
Delete	remove all effects from the track (with confirmation),
Cut	move the effects to the clipboard,
Copy	copy the effects to the clipboard,
Paste	replace the effects on track with the effects from the clipboard,
Add	add the effects from the clipboard to the current effects on track,
Duplicate track	create a copy of the current track with all clips, the track volume and audio effects, and place a copy to the first vacant track that follows the current track,
Clear track	remove all clips and audio effects from the current audio track, reset the track volume to 0 dB, track balance to center,
Insert track	insert a blank audio track before the current track and move all lower audio tracks down. You can do it also with the 'Ins' key on the keyboard when the mouse cursor is over the track state window.
Delete track	clear the current audio track and move all lower audio tracks up. You can do it also with the 'Del' key on the keyboard when the mouse cursor is over the track state window.
Solo	always include track in playback, same as Solo toggle.
Mute	exclude track from playback, same as Mute toggle.
Enable all tracks	turn off Solo / Mute toggles on all tracks

3.1.1 Track selection (active tracks)

Each track has Solo and Mute buttons on the *Track State* window and may be included in or excluded from playback and export to the resulting multimedia file. For excluded track its type icon is 'grayed'.

- Solo. Track is always included in playback. Tracks not chosen as solo are automatically excluded from playback ('grayed') if solo track(s) is present. If

Exclusive 'Solo' in *Selection Settings* controls is on, solo can be set for only one track and for many tracks otherwise.

![solo/mute icon] - Mute. Track is excluded from playback (track type icon is 'grayed').

![solo/mute icon] - Neither Solo nor Mute. Track included in playback if there is no other solo track(s).

3.1.2 Track Name
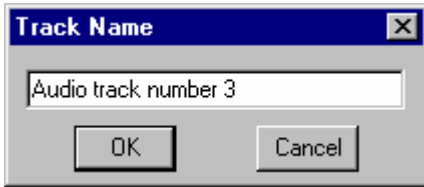
Track name is displayed in the status line at the bottom of the *Project* window while cursor is over the *Track State* window. Predefined names typically consist of a track type and number inherited from the initial enumeration of project tracks of that type. The Name command from the local menu of *Track State* is used to call the *Track Name* dialog box.

3.2 Clip on Track
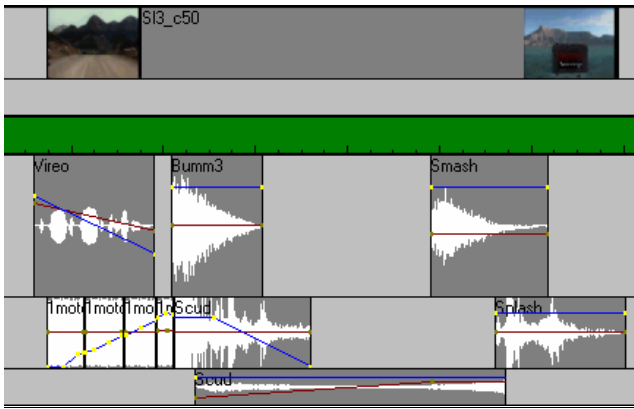
In the *Working Area, Clip* on track is displayed as a rectangle with the clip name in the top left corner. The height of the rectangle is equal to that of the track (see

the *Track State* local menu), the width is determined by the clip duration. The clip background color depends on the status of *Clip Selection*.

To call the local menu right-click on a clip. Some commands are common for all types of clips, other commands are clip-type specific.

Edit	the 'Clip type' editor command is used to call the external media editor to perform common operations with clips and the clipboard (Delete, Cut, Copy, Paste, Insert). The actual name of the command depends on the clip type – Video editor, Audio editor, Midi editor. The *Editor* application can be set in the *Configure external applications* dialog box. The clip source file name is added to the command line of the application at its startup.
Split clip	split the clip into two parts (new clips) at a specified position. This command is similar to the Split command on the Edit menu.
Repeat clip...	call the *Repeat Clip* dialog box.
Select source file in project	
	select all clips from a clip collection referred to the same source file as the current clip.
Range	submenu commands are as follows:
Zoom to clip	zoom the *Working Area* to the current clip.
Set range to clip	set the *Range* boundaries to the start/end of the current clip.
Expand range to clip	expand the start/end of the *Range* to the start/end of the current clip.
Add mark	set *Place mark* at a specified position. If the local menu is called near a previously placed mark (the cursor's shape is ∇^{Mark}), the Add mark command is replaced by the following three commands: Set mark position, Mark info and Remove mark.
Play clip	playback this clip only.
Properties	call the *Clip Properties* dialog box.

Specific features and editing operations are provided for each type of clips and tracks, *Video, Midi*, and *Audio*. The keyboard accelerators can be used to perform some operations with clips.

3.3 Video Tracks and Video Clip

 and in the *Track State* window help identify video tracks. A *Project* can have one or two video tracks. During video playback the first video track is given a priority over the second video track. The second video track may be used for temporary storage of video fragments or as the second variant of a video on the first track switched off with the Mute button.

To display the first and last frames of the clip on track in the *Working Area,* check the Draw first and last frames at clip edges box in the *Video Settings*.

To call the local menu right-click on a clip. Specific commands for video clips are as follows:

Clip In is a key frame   arrange for starting the video clip from a key frame.

Clip In to next key frame   move the In position of the clip forward to the next key frame in the source file.

Clip In to preceding key frame

move the In position of the clip back to the preceding key frame in the source file.

The above-mentioned In position is the place in the source file where the clip starts. See also the Start from Key frame only command in the *Video Settings*.

The application can playback and export video ONLY in the format of the source video files. All clips must have the same width, height, frame rate and CODEC name. Two files with the same width, height and frame rate but with another CODECs can be decompressed with Convert AVI on the Tools menu in the *Clip Collection* window. After starting the *AviEdit* application you should open the first file and look through its info. Then you need to open the second file and set the video's CODEC parameters equal to those of the first file.

3.4   Midi Tracks and Midi Clip

The buttons and in the *Track State* window indicate midi sound tracks.

3. *Project Working Area*

The appearance of all midi clips in the *Working Area* is similar to that of common clips on track. The only difference is that at the clip bottom there are parameters characteristic of midi clips, namely measure, current tempo and source tempo (for example **4/4,120[120]**) at all positions where the source file contains tempo and/or the time signature change command.

To call the local menu, right-click on a midi clip. Specific commands for midi clips are as follows:

Tempo call the *Tempo* dialog box to modify the clip tempo (see below).

Clip volume call the *Volume* dialog box named *Clip* to view/set the master volume of the clip.

The number at the bottom of the *Tempo* dialog box shows tempo at a specified position of the original source file. The number on the top sets a new tempo. The vertical scrollbar can also be used to change the tempo (to the values in the range from 8 to 250 bpm). The tempo of the whole clip will change in the new (on top) to the original (at bottom) tempo ratio.

3.5   Audio Tracks and Audio Clip

The buttons ![icon] and ![icon] in the *Track State* window indicate audio tracks. A *Project* may have up to 32 audio tracks. In the *Track State* windows, at the left of the audio tracks, there appear letters L and R (L = left, R = right) on the top or at the bottom of stereo projects (if Stereo is set in *Audio Settings*). This indicates that the points of the balance profile have been moved respectively on top of the balance (panorama) in the left channel or to the bottom of the balance in the right channel.

The sample rate (ratio) of all audio files in the *Project* must be equal to that of the *Project* (see *Audio Settings*). The audio file first added to the *Project* determines the *Project* ratio. At an attempt to open a file with another ratio, Forward AV Studio will request that the conversion of this audio file be confirmed (please, note that in this case the standard re-sampling system CODEC is used, so the result may be poor). To select the preset standard ratio values, use the list in *Audio Settings,* or set the values manually. If the *Project* ratio is changed, all audio clips will be removed from the *Project* (the user will be asked to confirm the removal of clips from audio tracks).

Audio clips have general features and common clip-on-track appearance in the *Working Area*, but for them some additional features are available: sound waveform picture, volume profile, balance profile (waveform, profiles and profile points are drawn in different colors, which can be selected in *Settings Colors*), clip volume under clip's name (if the volume is not zero). The Edit volume profile or Edit balance profile commands on the Edit menu or *Toolbar* are used to set the profiles available for editing (active). An inactive profile is drawn in dark color.

To call the local menu right-click on a clip. Specific commands for audio clips are as follows:

Clip volume	call the *Volume* and *Balance* dialog boxes with the *Clip* title to view/set general volume and balance values for the current clip (the same can be applied independently to profile).
Clips volume offset	call the *Volume offset* dialog box to change or set the volume for a group of selected clips. This item is available only for selected clip(s).
Profile	call the submenu with the commands for volume/balance profile on the audio clip. The submenu commands include:
Set profile value	call the *Volume/Balance* dialog box with the title *Profile* to set the volume or the balance profile value at a specified position. The profile value can be replaced with a profile key point or the horizontal segment of the profile. When called on a sloping segment of a profile that cannot be changed manually, this command is accompanied by a request to insert a new key point at a specified position.
Add profile point	add a new key point to the profile at a specified position.
Remove profile point	remove from the profile the key point at a specified position.
Delete profile	remove all key points and set a default profile – a constant volume/balance level (confirmation will be requested). Only an active profile can be deleted (see the Edit menu to know how to switch between the volume and balance profiles).
FadeIn	apply (multiply) *FadeIn* profile to the current volume profile from the start of a clip to a specified position.
FadeOut	apply (multiply) *FadeOut* profile to the current volume profile from a specified position to the end of a clip.
Declick	a submenu for setting/removing declicks on/from audio clip (see also *Effects Settings*). FadeIn/FadeOut – set/remove declick at the start/stop edges of the clip. Set both – set declicks on both the start and stop edges of the clip. Clear both – remove declicks from both the start and stop edges of the clip.
Audio effects	a submenu for working with audio effects on the current audio clips:

Add new/Edit – call the *Audio Effects list* dialog box to add/edit audio effects on the clip;

Use – turn on (use)/off (bypass) audio effects on the clip;

Delete – remove all effects from the clip upon confirmation;

Cut – move the effects to the *Clipboard;*

Copy – copy the effects to the *Clipboard;*

Paste – replace the current effects with the effects on the *Clipboard;*

Add – add the effects on the *Clipboard* to the current effects on the clip.

Note that you may paste/delete effects on several selected clips simultaneously (see the Edit menu).

Check overflow   a submenu containing two commands (similar to those in the Command menu):

Normalize – call the *Normalize Level* dialog box to normalize the volume of a single clip (for the entire project use the Normalize command on the Command menu). This command can be executed by using the N button on the keyboard.

Statistics – calculate and display *Sound Statistics* for a single clip (for an entire project use the Statistics command on the Command menu). This command can also be executed by using the C button on the keyboard. Press Shift+C to calculate and display the statistics for the clip without audio effects on track, track volume/balance, master effects and master volume/balance. The two latter commands are executed with regard to the currently selected *Range*.

Most operations with clips can also be performed using the keyboard accelerators.

Note that besides volume and balance profiles each *audio* clip has general volume and balance (Clip volume on the local menu); each audio track and whole projects also have master volume and balance levels. Volume at each point of a clip is the sum (in dB) of the volume profile at this point and all master volumes (project master volume, track master volume and clip master volume). The same is true for the balance.

Attention! The maximum volume amplification is 12 dB (4 times). At the points with maximum amplification, the profile touches the top of the clip rectangle and remains there while other profile key points may move as the master volume changes. Thus the profile is subject to distortions. The mixed signal may have

worse quality than expected. To avoid such situations, please, see that the clip volume profile does not touch the clip's top edge.

3.6   Other elements

3.6.1   Zoom buttons

Four zoom buttons are located in the lower left corner of the *Project* window. To change the *Working Area,* or part of the *Project* with clips on *Video*, *Midi* and *Audio* tracks displayed in the window, press the following buttons.

| *|* | - Zoom to the whole project.

| * | - Zoom to the current time *Range* boundaries.

| + | - Increment zoom factor, preserve the current time position.

| - | - Decrement zoom factor, preserve the current time position.

Note that equivalent commands, Zoom In (+), Zoom Out (–), Zoom to Project (*/*), can be found at the bottom of the View menu, and Zoom in range (*) on the top of the Range menu.

You can zoom the *Working Area* to any clip using an appropriate command from the clip local menu.

The *Working Area* can also be changed in the *Project Overview* window, in the *Set Size* dialog box and by resetting the *Scale Step*.

3.6.2   Time scrollbar

The Time scrollbar is used to shift the *Working Area* by a step displayed in the *Scale Step* window.

3.6.3   Audio tracks scrollbar

At the right of the *Working Area* there appears the vertical scrollbar when the *Project* has too many audio tracks and there is not enough place in the *Project* window to display all of them.

Audio tracks are numbered from the top to the bottom of the *Project* window with the track numbers shown in the upper left corner of the *Track State* windows.

3.7 Toolbar. Project

The first 5 buttons on the *Toolbar* are equivalent to the commands on the File menu.

create a new (empty) project. If there is any open and unsaved project, you will be requested to choose between saving the changes in the current *Project* and *Clip Collection* and canceling the creation of the new project.

open the selected project file.

save the changes in the *Project* and *Clip Collection* to files. If the new project is saved for the first time, you will be requested to give the project file's name. By default the project and clip collection file's extensions will be *.TML and *.PRC, respectively.

save the project to a file under a specified file name. If a new *Clip Collection* is saved for the first time, you will be requested to indicate its file name.

call the *Open Clip* dialog box to insert to the *Project* a clip with reference to the whole source file content. The new clip will also be added to the current clip collection.

switch to the *Clip Collection*. See also the Clip Collection command on the Window menu.

The following 7 buttons on the *Toolbar* are equivalent to the commands on the Command menu.

switch to different playback modes: if the button is pressed, the project is always played to its end. If the button is released (and looks like the button at the top of

this page), only the current *Working Area* is played (when the current time position reaches the right edge of the *Working Area*, the playback stops).

set the current time to *Playback start*.

start playback from the current time. To start playback from a specified position, double-click in the *Working Area* or the *Project Overview* window.

stop playback.

move the *current time* to the previous video frame.

move the *current time* to the next video frame.

call the *Audio Recorder* dialog box. When the recording is completed, you will be requested to give a target file name (press the Save button to insert the recorded file to the *Project* and *Clip Collection*).
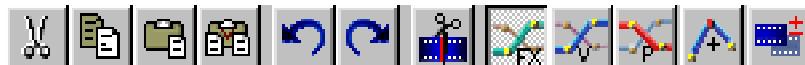
These *Toolbar* buttons are equivalent to the commands on the Edit menu.

clear the *Clipboard* and move the selected clip(s) to the *Clipboard*.

clear the *Clipboard* and copy the selected clip(s) to the *Clipboard*.

add all clips from the *Clipboard* to the *Project* to vacant tracks at the current time.

split all clips in the *Project* at the current time, shift them right, past the *Project*'s current time, and insert into the resulting gap the clip(s) from the *Clipboard*. For

video data the current time and gap width will be aligned to the frame boundaries.

cancel the last operation if possible.

repeat the last cancelled operation if possible.

split the selected clip(s) into two parts at a current time. If clip(s) contain video data, the current time will be first aligned to the frame boundary. New clips retain *Clip Selection* status of the source file and have its volume and balance profiles as well as its audio effects.

enable editing of audio effects profiles of *Audio* clips.

enable editing of the volume profile of *Audio* clips.

enable editing of the balance profile of *Audio* clips (for stereo projects only).

turn on/off the Add profile point mode. This makes it possible to add new points to the volume/balance profile of *Audio* clips.

turn on/off the Multi-selection mode. This makes it possible to make multiple clips selection.

check overflow by making audio mix in the selected range and display the resulting audio volume as a color picture in the *Range* window. The volume is drawn in colors selected in accordance with the color thresholds set in the *Audio meter Settings*. This button is also used to call the *Sound statistics* dialog box. It is equivalent to the Statistics command on the Command menu.

The following 4 buttons are equivalent to the commands on the View menu.

Next mark Group - change the current *Place marks* group number in a cycle. See also **Active group number** in the *Alignment Settings*.

Next selection group - change the current *Clip Selection* group number in a cycle. See also **Active group number** in the *Selection Settings*.

Zoom In, shrink the *Working Area* by an increment zoom factor preserving the current time position.

Zoom Out, expand the *Working Area* by a decrements zoom factor preserving the current time position. See also the *zoom buttons* and the *Project Overview* window.

call the *Settings* dialog box (it can also be called by pressing **F5**). This command is equivalent to the **Settings** command on the **Options** menu.

3.7.1 Status Bar

The status bar is located at the bottom of the *Project* window. It shows information about any object under the mouse arrow (when the mouse arrow is over an object (icons on the toolbar, clips on tracks, etc.), the status bar will display the text information about this object).

The table below summarizes the information that can be displayed in the status bar:

Object under mouse arrow	Information displayed in Status Bar
Icon on the toolbar	Short description of the action that can be performed by pressing this icon
Project overview window	Current limits of the *Project* working area (start and size in the current time format)
Track state window	Track name, track volume (for midi/audio tracks) and balance (for audio tracks only)
Clip on a track	General info: clip name, start of the clip in the *Project*: time, stop of the clip in the *Project*: time, clip duration: time (type – audio/video/midi)

	Clip volume (for midi/audio clips), clip balance (for audio clips only)
	Time is displayed in the current time format.
Left edge of a clip (clip start)	General info, source in: time
	Source in = the clip starts at the beginning of the source file in a clip collection.
Right edge of a clip (clip end)	General info, source out: time, rest: time
	Source out = the clip ends at the beginning of the source file in a clip collection.
	Rest = duration of the rest from the end of a clip to the end of the source file in a clip collection.

The current format of audio output in a project (the format that is used during playback) is displayed at the right of the status bar (the sample rate, bits depth and number of channels, for example, 44100 Hz/16 bits/Stereo). You can also change audio format in *Audio Settings* (press F5 and choose Audio tab). Note that '32 bits' is shown for the extended and floating audio formats.

3.8   Accelerators ('Hot keys') of *Project* window

Action	First accelerator	Second accelerator
Operations with files		
Open a source file		F4
New project	Ctrl+N	Shift+F3
Open a *Project*	Ctrl+O	F3
Copy from the *Project* to the C*lipboard*	Ctrl+Shift+O	Ctrl+F3
Save the *Project*	Ctrl+S	F2
Save the *Project* as	Ctrl+Shift+S	Shift+F2
Export AVI (video+audio)	F11	
Export WAV (audio only)	F12	
Editing		
Undo	Ctrl+Z	Alt+Backspace
Redo	Ctrl+Y	Alt+Shift+Backspace
Delete		Delete

3. Project Working Area

Cut	Ctrl+X	Shift+Delete
Copy	Ctrl+C	Ctrl+Insert
Paste	Ctrl+V	Shift+Insert
Paste under cursor	Shift+P	
Insert	Ctrl+I	Insert
Select all	Ctrl+A	
Select None	Ctrl+D	
Select next clip on track	Tab	
Select previous clip on track	Shift+Tab	
Zoom		
Zoom in	Ctrl+'+'	'+'
Zoom out	Ctrl+'-'	'-'
Zoom to the whole project	Ctrl+'/'	'/'
Zoom in a selected range	Ctrl+'*'	'*'
Zoom to the clip	Z	
Playback/current time position		
Start/Stop playback	Space	Enter
Stop playback	Escape	
Rewind	Home	Ctrl+W W
Playback the entire project mode	Ctrl+P	
Move to next mark	PgDn	
Move to previous mark	PgUp	
Move to previous frame	Left arrow	
Move forward 1 sec	Shift+Right arrow	(with video or not)
Move backward 1 sec	Shift+Left arrow	
Move forward 10 sec	Ctrl+Right arrow	
Move backward 10 sec	Ctrl+Left arrow	
Note: step of cursor moving is customizable in *Scrubbing* settings		
Scroll operations		
Scroll working area to right	Alt+Right arrow	

Scroll working area to left	Alt+Left arrow	
Scroll audio tracks up	Alt+Up arrow	
Scroll audio tracks down	Alt+Down arrow	
Moving of selected clip(s) (with left mouse button pressed)		
Move to upper track	Up arrow	
Move to lower track	Down arrow	
Shift 1 ms to right (audio/midi)	Right arrow	
Shift 10 ms to right (audio/midi)	Shift+Right arrow	
Shift 100 ms to right (audio/midi)	Ctrl+Right arrow	
Shift 1 ms to left (audio/midi)	Left arrow	
Shift 10 ms to left (audio/midi)	Shift+Left arrow	
Shift 100 ms to left (audio/midi)	Ctrl+Left arrow	
Shift 1 frame to right (video)	Right arrow	
Shift 10 frames to right (video)	Shift+Right arrow	
Shift 100 frames to right (video)	Ctrl+Right arrow	
Shift 1 frame to left (video)	Left arrow	
Shift 10 frames to left (video)	Shift+Left arrow	
Shift 100 frames to left (video)	Ctrl+Left arrow	
Clip/profile operations (see also summary)		
Add/Edit audio effects	A	
Use/Bypass audio effects	U	
Set Volume/Balance (or profile value)	V (on an audio clip)	
Set/change Volume of selected clips simultaneously	Shift+V (on an audio clip)	
Separate Video and Audio to two independent clips	V (on a video clip)	
Separate Video and Audio of group of selected clips	Shift+V (on a video clip)	
Split	S	
Add mark/Edit mark info	M	

3. *Project Working Area*

Fade	F	
FadeIn	I	
FadeOut	O	
Add Fade	Shift+F	
Add FadeIn	Shift+I	
Add FadeOut	Shift+O	
Add Crossfade to two clips	R	
Crossfade two clips	Shift+R	
Add/Remove profile point	P	
Delete part of profile	D	
Delete profile	Shift+D	
Move profile points (see **Note**)	Arrow keys	PgUp/PgDn keys
Change clip volume/balance	Arrow keys	PgUp/PgDn keys
Edit clip in external editor	E	
Edit selected clips in editor	Shift+E	
Clip Sound Statistics	C	
Local Clip Statistics	Shift+C	
Normalize Clip volume	N	
Launch external editor	E	
Set range to clip	G	
Expand range to clip	Shift+G	
Zoom to clip	Z	
Track operations		
Add/Edit audio effects	A	
Use/Bypass audio effects	U	
Set Volume/Balance	V	
Half height	1	
Normal height	2	
Double height	3	
Small height (locked)	0	
Other operations		

Activate *Settings* dialog box		F5
Activate *Clip Collection* window		F6
Activate *Faders* window		F7
Activate *DDSound Volume Control* window		F8
Activate *Video* window		F9
Record audio	Ctrl+R	
Exit	Ctrl+Q	

Note: Operations with clips, profiles, tracks are accessible when the mouse arrow is placed respectively over a clip, clip profile, track state window (at the left). The keys for changing tracks height are active when the mouse arrow is placed on any place on a track.

You may also read the section about *Clip Collection* accelerators.

3.9   Clip operations summary

Note: The mouse arrow can change its shape to indicate the editing operation that is possible.

3.9.1   General clip operations

Call clip local menu   click the mouse right button on a clip.

Start playback   double-click on a click to start playback of the *Project* from a specified position to the end of the window (*Working Area*).

Clip insertion   when a clip is dragged from the *Clip Collection* (or a source file is opened on a track) to the *Project*, it is displayed as a black rectangle. The mouse arrow may have one of the following shapes:

⊘ – the clip can not be inserted (for example, its sample rate, frames frequency or frame size are different from those of the *Project*);

✋ – the clip can be inserted to the current place of the black rectangle;

➡ – the clip can be inserted with the right part of the track shifted as a whole to the right. A clip can be inserted to the *Project* by a mouse left button click.

Set clip volume / balance select the Clip Volume command from the local menu or press the V key over a clip.

Split clip	Select the Split command from the local menu or press the S key on the place of split over the clip.
Add / Edit audio effects	select the Audio Effects group from the local menu to add, edit, cut/copy/paste or enable/disable audio effects. You can also press the A key over a clip to add/edit audio effects.
Add mark / Edit mark info	select the Add Mark command from the local menu or press the M key on a desired place to add a new mark to the clip or edit one of the existing clips.
View / Set properties	select the Properties command from the local menu to activate the dialog box with clip properties.
Sound Statistics	select the Check overflow/Statistics... command from the local menu or press the C key on the keyboard when the mouse arrow is over a clip to check overflow/get statistics for a single clip. Press Shift+C if you want to view the statistics for a clip without track volume/audio effects and master volume/audio effects.
Normalize	select the Check overflow / Normalize... command from the local menu or press the N key on the keyboard when the mouse arrow is over a clip to normalize volume of a single clip.

3.9.2 Selection

Select one clip	click on the desired clip.
Select clips	press the mouse left button on a place not occupied by clips and drag the mouse. All clips encompassed with a specified selection box will be selected.
Select / deselect many clips	

press the Shift key or turn on the Multiselection mode
(*Toolbar*, Edit menu). When the mouse arrow has
shape, the following actions revert the selection of
clip(s) (selected to unselected and vice versa):
1) Click on a clip – for this clip;
2) Double-click – for all clips on a track starting from a
specified position. Use the right Shift key to select all
clips before a specified position. Note that on some
keyboards the right and left Shift keys do not differ.
3) Press the Ctrl key instead of Shift and double-click on
a track to select all clips on all tracks after/before a
specified position. Note that on some keyboards the
right and left Ctrl keys do not differ.

4) Press the left mouse button and drag mouse – all clips rounded or touched by specified selection box.

Clear selection   click on area not occupied by clips or select Deselect all command from the Edit menu.

Select next clip on a track

if you have selected any clip on a track, press Tab button to select next clip on the same track, or Shift+Tab to select previous clip.

3.9.3 Moving

Move selected clips – press left mouse button and drag.

Move Left clip edge – press left mouse button and drag clip edge. If clip has video the first frame will be displayed on videoplayer.

Move Right clip edge – press right mouse button and drag clip edge. If clip has video the last frame will be displayed on videoplayer.

Move mark ∇Mark – press left mouse button and drag mark.

3.9.4 Audio volume/balance profile editing

Add key point to audio profile

press Ctrl key or turn on Add profile point mode (*Toolbar*, Edit menu). In this mode cursor has ✚ shape. Each click inside audio clip rectangle adds new key point at specified position. You can also press and hold Ctrl and click on any place of clip to add new profile point or remove existing. P key will add/remove profile point without changing current profile value. You can use this to quickly add 4 points to a horizontal profile and move up/down a segment of profile (add 2 points at the left corner of segment and 2 points at the right one).

Move profile key point ✚– press left mouse button and drag. If you press and hold Alt key before this, the point preserves its profile value. You can also set mouse cursor over a point and use arrow keys and PageUp / PageDown keys on keyboard. Use Shift or Ctrl keys with arrow keys to change step of point moving.

Move horizontal profile segment

⇕ – press left mouse button and drag up or down horizontal segment of profile (between two key points of audio clip profile with equal profile values).

Shift sloping / vertical profile segment

⇔ – click left mouse button and drag to left or to right the sloping/vertical segment of profile (between two key points of audio clip profile with different profile values).

Delete profile point	✚ – call local menu (right-click) and select Profile/Remove profile point or press P over a point.
Clear audio profile	call the local menu (right-click) and select the Profile / Delete profile command or press Shift+D when mouse cursor is over a desired clip. This resets profile to default 0 dB constant (0% for balance profile).
Clear part of profile	press D on a desired place of profile, a part of profile will be deleted. Left part of profile is deleted if you press D closer to left edge of clip, right part otherwise.
FadeIn / FadeOut	move mouse cursor to a point where fade should be applied, and press F key. *FadeIn* is applied if you press F closer to left edge of clip, *FadeOut* otherwise. Use I key to set *FadeIn*, O key for *FadeOut*. Fades replace part of profile.
Add FadeIn / FadeOut	if you press and hold Shift key before pressing F, I, O, fade is only added to profile, and not replaces existing profile.
Crossfade	select two audio clips that cross each other and press R button to crossfade volume between two clips. See also Crossfade command from the Edit menu. Crossfade profile is added to current profile of clips. Press Shift+R to replace current existing profile by crossfade profile.
Set Profile value	select Set profile value command on local menu or press V key when mouse cursor is over profile point ✚ or horizontal fragment of profile ⇕.

4   Main menu

4.1   File menu

This menu is used to save/open *Projects* and to save the result of work to multimedia files (export). Most commands on this menu are also available on the *Toolbar*.

Project files (having .TML filename extension) are normally associated with *Clip Collection* files (with .PRC file name extension). A clip collection can be used with different *Project* files. Save project and Open project commands are used to save/open both the *Project* and associated *Clip Collection*.

New project	create a new (empty) *Project* in the *New Project* dialog box.
Open project	open the *Project* and associated *Clip Collection*.
Append project...	open a project and append it to the end of current project. Its clip collection is added to the current clip collection.
Add source File	call the *Open Clip* dialog box to select the source file and add a clip with reference to the whole source file content. Simultaneously multiple files can be added only to a *Clip Collection*.
Save project	save changes to *Project* and *Clip Collection* files.
Save project As	save the *Project* to a specified project file (in a new location). For a new *Clip Collection* the user will be requested to indicate the clip collection's file name.
Save All	copy the *Project*, *Clip Collection* and all source files to a specified directory. The source files present in the clip collection but not used in the *Project* can be excluded from copying.
Move All	move the *Project*, *Clip Collection* and all source files to a specified directory. All source files are deleted from their original location! Be careful while using this command as you may erroneously delete some source files that are used in other *Projects*. The source files present in the *Clip Collection* but not used in the *Project* can be excluded from moving.
Close	close current project and clip collection and leave all tracks and clip collection empty. You can start working with new project or open any other already existing project after that.

Saving the result of work to an external multimedia file:

Export	mix active tracks of the *Project* in a specified range (or the whole project if no range has been selected) and save the results to a file of the selected format (please note that MIDI files are not included in the mix!):
AVI	write the resulting video and audio data to a specified AVI-file or video file only if no audio is present in the *Project*.
Wave	write the resulting audio data to a specified WAVE-file (standard *Windows* audio format).
Multiwave	write the parts of the resulting audio data to several WAVE-files. By using this command you can prepare audio files for audio CD tracks. For more detail, read the section about exporting multiple files.
Aiff	write the resulting audio data to a specified AIFF-file (Mac audio format).

Any Export command calls the export dialog box.

Note that if the program you use is unregistered, only the first 10 seconds can be saved to the resulting file!

Recent files	call the list of the most recently used *Project* files. From the list you can select any file for opening. The error message appears if a *Project* file is not found in its original location. If the *Project* has been moved to another place, use the Open Project command to open it.
Recent clip folders	call a list of the most recently used folders for opening clips. Select any folder to add a file to the *Project* and *Clip Collection*.
Exit	exit from Forward AV Studio.

4.2   Edit menu

On this menu there are commands for various editing operations. Most commands on this menu are also available on the *Toolbar*.

Undo	cancel the last operation, if possible.
Redo	repeat the last canceled operation, if possible.

Most of the following commands are available only if a group of clips (at least one) is selected (see also clip operations summary):

Delete	remove the selected clips from tracks;
Cut	move the selected clip(s) to the *Clipboard*;
Copy	copy the selected clip(s) to the *Clipboard*;

Copy from file	copy all clips from a specified *Project* file to the *Clipboard*;
Paste	add all clips from the *Clipboard* to the *Project* at the current time position to free tracks;
Insert	split all clips at the current time, shift them to the right and insert in the gap clips from the *Clipboard*. If clips contain video data, the current time and gap width will be aligned to the frame boundaries;
Split	divide the selected clip(s) into two parts at the current time. If clips contain video data, the current time will be aligned to the frame boundary. The new clips will preserve the status of *Clip Selection* original files and have their own copy of volume/balance profiles and audio effects;
Cross fade	available only for the selection of exactly two overlapping audio clips. *FadeOut* is applied to the left clip and *FadeIn* to the right clip in the overlapping region;
Delete profile	delete profile on all selected clips (reset profile to 0 dB) after the confirmation;
Declick	set/remove declicks for the group of selected clips. The submenu commands include: Set FadeIn/FadeOut/Both (set declicks to start/end/both edges of clips), Clear FadeIn/FadeOut/Both (remove declicks from start/end/both edges of clips after the confirmation);
Audio effects	allow to add/delete, switch on/off audio effects on all selected clips. The submenu commands include: Delete (remove audio effects from the clips after the confirmation), Paste (replace effects on the clips with effects from the *Clipboard* after the confirmation), Add (add effects from the *Clipboard* to the effects already present on the clips). Both Paste and Add commands require that effects be copied to the *Clipboard*. Set using/Clear using – switch on/off (bypass) effects on the clips.

Editing modes:

Edit Volume profile	switch to the mode of audio clip volume profile editing;
Edit Balance profile	switch to the mode of audio clip balance profile editing (for stereo projects only);
Edit Effect profile	switch to audio effects profile editing mode of audio clips. See also section about working with audio effects.

Add profile point mode	allow to add new points to volume/balance profile in audio clips;
Multiselection mode	allow multiple clips selection;
Select All	select all the clips of the *Project* (reset other selection groups);
Deselect All	deselect all the clips of the *Project* (reset other selection groups);
Invert selection	select all unselected and deselect all selected clips in the current selection group.

Forward AV Studio Clipboard

Clips in the *Clipboard* preserve their relative time position and track number. Each Cut/Copy command is used to clear previous *Clipboard* contents. The Copy/Add commands in the *Clip Collection* window are used to add clips to the first track only.

Add profile point mode

If the mouse arrow shape is ✚, the Add profile point mode is on (*Toolbar*, Edit menu, or when the Ctrl key is pressed). By clicking in the audio clip rectangle you add a new point to the volume/balance profile at a specified position.

Multiselection mode

If the mouse arrow shape is ⬚, the Multiselection mode is on (*Toolbar*, Edit menu or when the Shift key is pressed). In this mode, the following actions invert the clip selection state (change selected to unselected and vice versa):

1) click on a clip - invert the selection of this clip;

2) double click on a track - invert the selection of all clips on the track from a specified position;

3) press the mouse left button and drag it to invert the selection for all clips touched by or encompassed with a specified selection rectangle.

See also *Clip Selection*.

4.3   View menu

This menu is used to define the appearance of the elements in the *Project* window. Most commands of this menu are also available on the *Toolbar*.

| Next mark Group | change the current *Place marks* group number in a cycle. See also the Active group number command in *Alignment Settings*. |
| Next selection group | change the current *Clip Selection* group number in a cycle. See also the Active group number in *Selection Settings*. |

Show Video tracks	enable the display of video tracks.
Show Midi track	enable the display of midi tracks.
Show Audio tracks	enable the display of audio tracks.
Show audio meter (faders)	
	show the *Audio meter (Faders)* window. Analogous to the Audio meter (Faders) command in the Window menu (or press F7 key).
Show mixer	show the *DDSound Volume Control* window. Analogous to the DDSound Volume Control command in the Window menu (F8 key).
Audio tracks Height	the submenu commands Double, Normal and Half change the height of ALL audio tracks in the *Project* window. See also the *Track State* window.

Using the following 3 commands you can select the current format for time values.

Time in Frames	time as a frame counter.
Time in SMPTE	"Hours: Minutes: Seconds: Frames".
Time in miLliseconds	"Hours: Minutes: Seconds: Milliseconds".

Using the following 3 commands you can change the size of tracks *Working Area*. See also the *zoom buttons* and *Project Overview* window.

Zoom In	increment zoom factor retaining the current time position.
Zoom Out	decrement zoom factor retaining the current time position.
Zoom to Project	expand the working area to fit the entire project.

You can also zoom to any clip using the Zoom to clip command on the clip local menu or pressing the 'Z' key on the keyboard when the mouse arrow is over the clip (see also the section about keyboard accelerators).

4.4   Command menu

This menu provides generic operations to work with *Projects*. Most of these commands are also available on the *Toolbar* or through hot keys on the keyboard.

Play	start playback of the current *Project*.
Stop	stop playback.
Record audio...	open the *Audio Recorder* dialog box. Prior to performing this command the program may request to specify the target file name.
Next frame	move the *current time* to the next frame.
Previous frame	move the *current time* to the previous frame.

Rewind	move the current time to *Playback start* (to the start of either the *Project* or selected range).
Playback entire project	this command is used to switch to different playback modes. When on, this option provides for the *Project* to be played to the end. When off, it provides for only the current *Working Area* to be played (when the current time position runs up to the right edge of the *Working Area*, the playback stops).
Master volume...	set the *Project's* master *Volume* and *Balance*. If the *Audio meter (Faders)* window is opened, it gets activated with the focus being set to the master volume fader.
Master Effect(s)	these commands are used to work with master audio effects, which are applied to the entire project. The submenu commands are as follows: Edit (add or edit audio effects), Use (switch effects on/off), Delete (remove effects), Cut (move effects to the *Clipboard*), Copy (copy effects to the *Clipboard*), Paste (replace effects with effects from the clipboard), Add (add effects from the *Clipboard* to the current effects).
Normalize audio...	call the Normalize Level dialog box after responding to the request to set the maximum level of audio output. This dialog box is used to adjust the *Project's* master volume with audio to be normalized to a selected level.
Normalize audio of selected Clips...	
	changes volume level of all selected clips so that maximal volume level of each clip coincided with a level specified in dialog *Normalize Level*. After a level it is specified, consecutive normalization of a sound is made for each of the selected clips.
Statistics... (Check overflow)	
	mix audio on the active tracks in a selected range and to show the resulting audio volume as a color picture in the *Range* window. The colors in *Audiometer Settings* are used to indicate the volume level thresholds. Following the calculations, *Sound statistics* are displayed and can be analyzed.

4.4.1 Sound Statistics

This dialog box is called with the Statistics (Check overflow) command from the Command menu or the *Range* window local menu. You can also press the C key on the keyboard for calling sound statistics of an audio clip, or Shift+C to view the statistics with no regard for the volume and audio effects of the track or project master volume/audio effects.

Sound Statistics				✕
Total Samples, Time	845 618		19 : 175 ms	
Clipped Samples	0 (0.000%)		0 (0.000%)	
	Left Channel		Right Channel	
Positive Max Level	-1.67	27041.4	-1.67	27041.4
Negative Max Level	-2.28	-25206.6	-2.28	-25206.6
Average Level	-26.64	1526.3	-26.64	1526.3
Average RMS Level	-22.59	2433.1	-22.59	2433.1
	dB	value	dB	value
DC Offset (%, value)	0.000	-0.1	0.000	-0.1
Copy		Close		Help
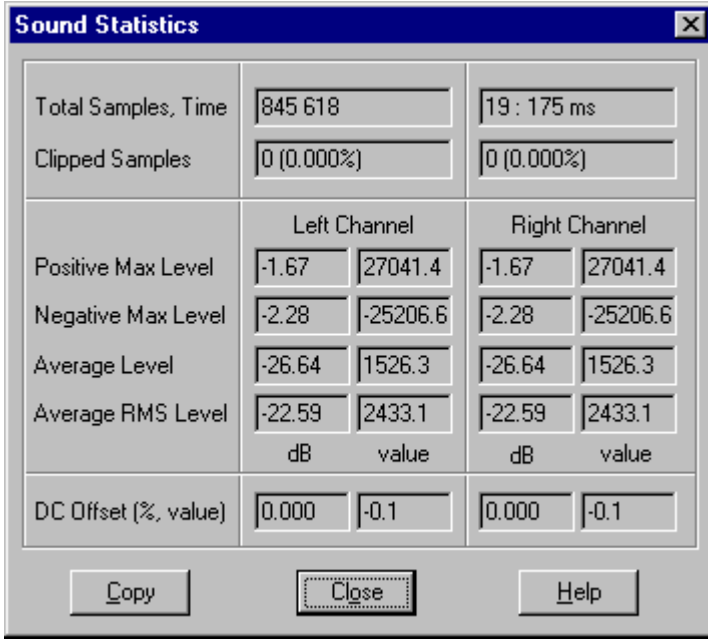
The *Sound Statistics* dialog box displays the following information about sound in each channel:

Total samples, Time – the number of samples and duration of the analyzed audio.

Clipped samples – the number of clipped samples (the sample value over 0 dB).

Note: 0 dB level is assigned to the maximum absolute sample value of 32768. All values below the maximum value are shown in sample and dB values relative to 0 dB level (normally all values are less than 0 dB, otherwise the clipping is elsewhere).

Positive max level – the maximum level of positive samples.

Negative max level – the maximum level of negative samples.

Average level – the average absolute level of all samples.

Average RMS level – the average RMS (root mean square) level. By adding 3 dB to this value you get the RMS power of the sound and, thus, can estimate the average power of the sound.

DC offset – a constant offset of sound (is shown as a sample value and in percent). If not equal to 0%, this value indicates that the maximum positive and negative levels may differ implying that the sound is not centered on the zero sample.

The Copy button is used to copy to the *Clipboard* all data displayed in the dialog box. The data will be saved in a text format and can be pasted to any text editor, saved to file, printed etc.

Note: You can also use sound statistics as an audio "effect" in order to view these statistics during real-time playing.

4.5   Range menu

Range is a time interval set by the user for further use in various operations (playback, export to file etc). The selected interval is displayed as a blue box in the *Range* window.

Zoom in range	set the *Working Area* equal to the selected range. (see also **Zoom buttons**).
Include all clips	set the range so that it covers all clips in the *Project*, except the clips on the switched-off track.
Select between Marks	set the range between marks, including the current time mark.
Clear selection	undo the range selection.

The editing commands below are used to operate on the *clips on track* within a selected range and/or on parts of clips within a range whose bounds intercept them. Each operation can be executed by the following submenu commands – all tracks, active tracks, selected clips, to select for editing all tracks in the *Project*, only tracks included into playback (active) or only selected clips from the current selection group.

Copy	copy the clip(s) and/or parts of the clips from all tracks or active tracks to the *Clipboard*.
Cut	cut the clips (parts of the clips) from all tracks or active tracks to the *Clipboard*, and then shift the right part of each track to the left to fill the gap.
Clear	clear part of the *Project* on all tracks or active tracks.
FadeIn	apply the *FadeIn* profile within a range to *audio clips* on all tracks, or active tracks, or to the selected clips only.
FadeOut	similar to the above for the *FadeOut* profile.

4.6 Tools menu

Each menu item is used to launch an application as set up in the *Configure external applications* dialog box.
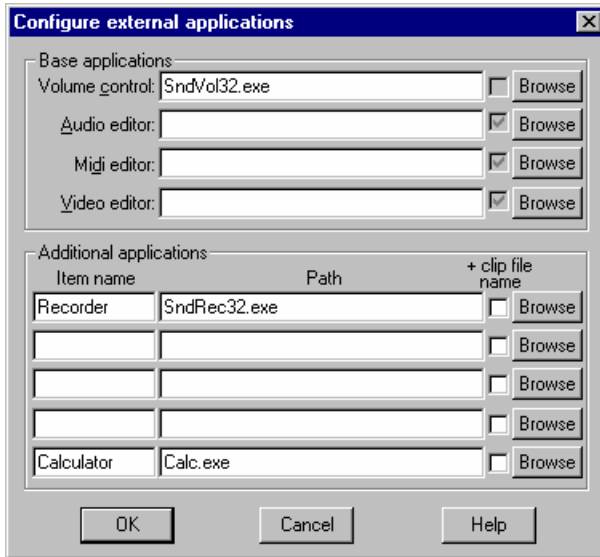
Volume control	launch the *Volume control* application (by default standard "sndvol32.exe", which shall be installed by the user).
Audio editor	launch the *Audio editor* application.
Midi editor	launch the *Midi editor* application.
Video editor	launch the *Video editor* application.

The menu can contain up to 5 commands defined in the *Configure external applications* dialog box. For example, for an image there will appear the following two commands:

Recorder
Calculator

and the command:

| Configure... | call the *Configure external applications* dialog box. |

4.7 Options menu

| Settings... | call the *Project Settings* dialog box. |
| Fade profile... | call the *Fade profile* dialog box. |

Font for Labels...	call the dialog box for setting fonts for labels to be displayed in the *Project* window; in particular the time labels values in the *Time Ruler*, *Current Time* window.
Font for clip Name...	call the dialog box to set fonts for the displayed names of *clips on tracks*.
Save Options	save the program settings. Actually this is not necessary as all settings are saved automatically each time you exit the Forward AV Studio or save the *Project*.

4.8   Window menu

Clip Collection	activate the *Clip Collection* window.
Faders (Audio Meter)	activate the *Audio meter (Faders)* window.
DDSound Volume control	
	activate the window of *DDSound Volume Control* application. This application is used to adjust the settings of audio devices. See also Audio Devices *Settings*.
Video	show the *Video* preview window, if possible.

4.9   Help menu

This menu is almost the same as the menu in the *Project* and *Clip Collection* windows:

Project window description	
	appears in the *Project* window;
Overview	show general characteristics of Forward AV Studio;
Contents	help contents;
Audio Effects	help for audio effects;
DDSound Volume Control	
	help for the *DDSound Volume Control* application.
Using help	standard *Windows Help* (the use and customizing of the help system);
About...	information about Forward AV Studio developers and registration.

5   Settings

This dialog box contains various settings and options for the current *Project*, which are on the following tab panels:

General	*Project* limits, undo and playback options;
Audio	audio settings (playback format and options);
Devices	audio devices selection;
Effects	audio effects settings;
Video	video options (frame rate and playback options);
Troubleshooting	special troubleshooting modes;
Audio meter	volume indicator settings;
Alignment	alignment and snapping to marks options;
Selection	selection options;
Scrubbing	scrubbing options;
Save	save and auto save options;
Colors	colors of user interface elements;
Summary	embedded info fields (text information saved with the *Project* and to output files).

To call this dialog box in the *Project* window, use the Settings command from the Options menu or *Toolbar* (or just press the F5 key when the *Project* window is active).

5.1 **General *Settings***
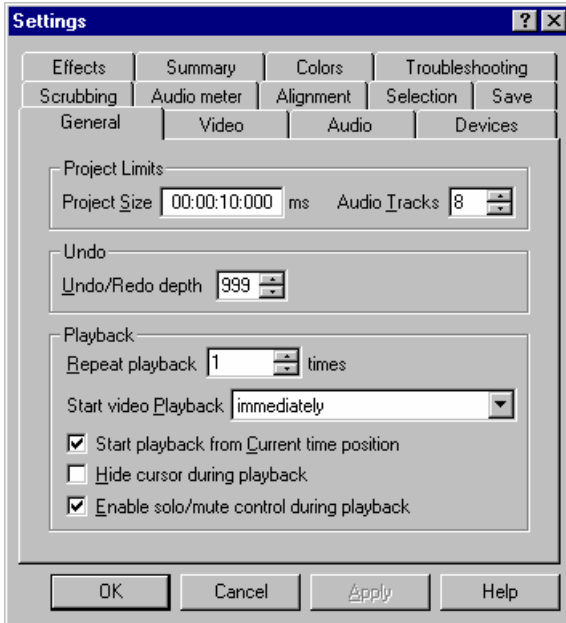
Project limits - set the *Project's* basic parameters.

Project size – set the duration of the entire *Project*.

Audio tracks – set the number of audio tracks in the *Project*.
Undo / Redo depth – set the number of Undo / Redo operations.

Playback - select a playback mode.

Repeat playback - set the number of playback repetitions initiated by the Play command. Note that mouse double-click on the *Project overview* window or on the tracks in the *Project* window starts the playback from a specified position, which then proceeds to the end of the *Project*. In this case there are no repetitions! You can use this option by starting the playback with pressing the Play button on the *Toolbar* or the Space key on the keyboard (see also the section about keyboard accelerators).

Start video playback - set the mode of a video *Project* playback: immediately or on a keyboard event (you have to press the Space key after the Play command).

Start playback from Current time position - turn on the VTR playback mode. If this mode is on, the Play command starts the playback from the current time position, which remains the same after the execution of the Stop command and playback stop. If this mode is off, the program sets the playback start position in the

Playback Start and *Playback Duration* windows. On the execution of the Stop command the current time position reverts to the previous time position that was current before the playback start.

Hide cursor during playback – if checked, the current time mark (vertical line) will not be drawn over the *Project* tracks. Instead, the current time mark will be drawn in the *Time Ruler* and *Range* windows. This option reduces the system load during playback and can increase performance.

Enable solo / mute control during playback – this command is used to dynamically include/exclude audio tracks from mixing during playback. If turned off, this option disables the Solo / Mute buttons during the playback.

5.2   Audio *Settings*
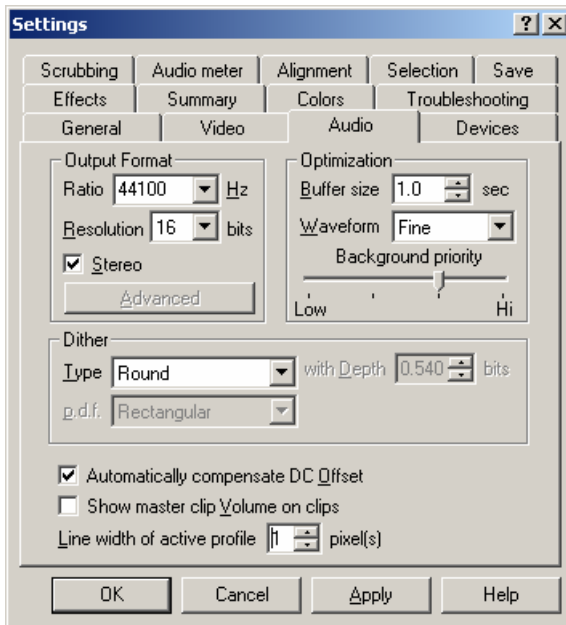
Output Format – this group is used to set the playback audio format for the current *Project*.

Ratio – set audio sample ratio (in Hz or samples per second). All audio clips on tracks must have the same ratio (an audio file first added to an empty *Project* sets it automatically). The ratio values may be selected from the list (standard ratios up to 48 kHz are supported by almost all sound cards). Arbitrary values can be

set manually. If you change the *Project* ratio, all audio clips will be removed from the *Project* (upon confirmation).

Resolution – set audio sample resolution (the number of bits per sample) for the current *Project*. In the professional Forward AV Studio package you can select 20/24 bits per sample. If your soundcard does not support 20/24-bit formats and you want to playback such projects, you can choose the Limit playback to 16 bit option in *Audio Device Settings*.

Stereo – number the *Project's* channels (mono/stereo).

Advanced – call the advanced format selection dialog box to select different 24-bit format modes.

Optimization – this group is used to tune the parameters that can improve the playback performance.

Buffer size – set the premix buffer size in seconds. If the values are small, there may be breaks in the sound during playback. In this case try to set higher value, which may be of no help if your computer is not fast enough to mix and playback many tracks in real time. These parameters also affect the length of the delay between the moment when you manually change the track volume in the *Faders* window and the moment when the real change of the volume occurs.

Waveform – is used to control the quality of waveform pictures displayed on audio clips. For better quality more resources are required, which may result in slower performance of Forward AV Studio in working with complex projects (with many clips on tracks). If you encounter very slow redrawing of audio clips, try to decrease the quality to 'draft' or turn off the waveform pictures.

Background priority – is used to set the priority of background thread for filling the waveform pictures of audio files. When you add any audio file to a *Project* or *Clip Collection*, Forward AV Studio starts filling the waveform background picture for this audio file. Therefore, you need not wait for the picture to be filled and may continue your work. You may set high priority to filling thread and increase its performance, but this may lead to lower performance of the operations with the main project window. There may also result in delays in keyboard- or mouse-triggered actions during the filling of waveform pictures.

Dither - this group is used to set dithering parameters for audio playback.

Type of dithering: truncating, rounding (round and then truncate) or dithering (add noise and then truncate). If 'dither' type is selected, the following two lists are available.

Depth – add the amplitude of noise to the audio signal. The default value 0.54 is good for most applications. Values may be in the range of 0.01 to 2.0 bits.

p.d.f. – the probability distribution function of a generated noise. Possible types are rectangular, triangular and Gaussian (different types result in different sound). Please note that noise generation requires additional calculation time.

Auto-compensate DC-offset – if this option is on, all new audio files added to the *Project* will have an auto-compensated DC-offset. That means that the file will be centered around the zero sample, so you may change the volume of this file without distortions caused by a non-zero DC-offset. You may turn on/off the DC-offset compensation option for any audio file in a Clip Collection (see file audio properties).

Show clip volume on clips – by turning this option on you call the information about the clip volume (shown in parentheses with clip name). Note that clip volume is not shown if it is equal to 0 dB (set by default). Clip volume is shown in the color of the volume profile with the color scheme to be set in *Colors Settings*.

Line width of active profile – on audio clips in pixels (from 1 to 3). Increase it to make active profile better visible.

5.2.1   Advanced audio Format
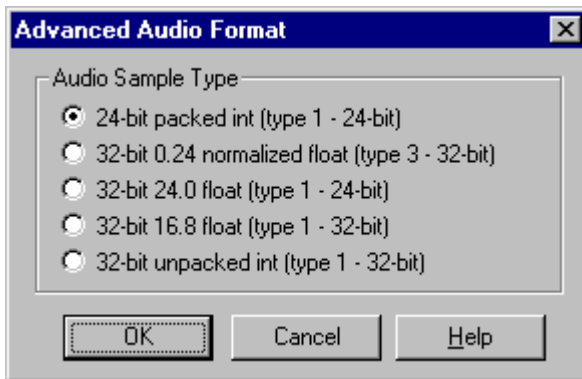
In this dialog box you can select a specific type of 24-bit audio format. The standard format is '24-bit packed int', professional 24-bit soundcards should support such a format for playback/recording. This format is used by default.

Additional 4 formats may be unsupported, so, please, read the documentation for a particular soundcard. In any case, Forward AV Studio can open and save audio files of all types, you can play them on any soundcard in any mode supported by it (e.g. 16-bit).

Please note that all such formats are actually 24-bit only: float formats have 24-bit mantissa (only 24 accuracy bits are significant), and '32-bit unpacked int' format actually uses only 24-bits.

Warning: please, be careful when trying to play audio on your soundcard in non-standard modes for the first time! Depending on soundcards' settings you may get very loud noise that can damage your headphones, speakers and ears!

Please, on your amplifier set the volume at minimum and/or take off the headphones prior to testing your soundcard in 24-bit modes for the first time. The normal volume can be set only after you have tested your soundcard in the mode you are going to use.

Audio formats supported by Forward AV Studio are:

Standard formats:

  8-bit (packed int, type 1)
  16-bit (packed int, type 1)

Extended formats:

  20-bit (packed int, type 1)
  24-bit (packed int, type 1)
  32-bit (unpacked int, type 1)

Float formats (32-bit):

  '24.0' (type 1)
  '16.8' (type 1)
  '0.24' (normalized, type 3)

Forward AV Studio can open/export uncompressed audio files of such formats, and playback/record audio (in formats supported by your soundcard).

5.3   Video *Settings*

Frame rate sets the video frame rate of a *Project*. The video clip first added to a *Project* with empty video tracks resets this value.

Show information about dropped frames. During playback some video frames may be dropped. Check this box to display the information about the dropped frames in the dialog box after playback.

Draw first and last frames at clip Edges turn on drawing first and last frames at left and right edges of each video clip.

Start from Key frame only. Video in AVI-files may also have frames other than key frames. If a video clip starts not from a key frame, during playback in the *Video* window its first frames (up to the next key frame) may be drawn with noise. Such frames will have red borders. Check this switch to prohibit setting the clip left edge (time In) at a non-key frame. In any case, an exported AVI-file will have correct video data.

AVI group.

Playback mode list is used to select the mode of video data decompressing and drawing. Video codec may not support some of the playback modes.

Full screen – decompress and draw frames on an external monitor or full screen by video codec.

Decompress directly to window – decompress and draw frames directly in *Video* window by video codec.

Decompress and then draw – decompress frames by codec and draw them on video player (*Video window*) by Forward AV Studio.

Decompress to SLTM player (FDTM board) – decompress frames by codec and send them for playback on *FDTM (FD300)* board. See 'Playing video on FD300 boards' for more details.

None – do not playback video.

Default – a playback mode for codec is automatically selected by Forward AV Studio starting from **Full screen** mode.

Synchronize to audio - turn on synchronization of video playback to audio playback. In this mode any delay in audio playback causes the same delay in the next video frame.

Never yield hardware device normally should be unchecked. It may be useful in special cases, for example, when Forward AV Studio works together with hardware video CODEC on the air. Check this box to prohibit the release of CODEC when the project window is minimized or an external application is launched by Forward AV Studio.

Zoom list is used to select the scale factor for the *Video* window.

Always on top – keep the *Video* window always on top of other windows.

Minimize to taskbar – this function is used to minimize the *Video* window to the system taskbar. If checked it allows the activation of the *Video* window from the taskbar or via **Alt+Tab**, independently from the Forward AV Studio main project window.

5.4   Troubleshooting *Settings*
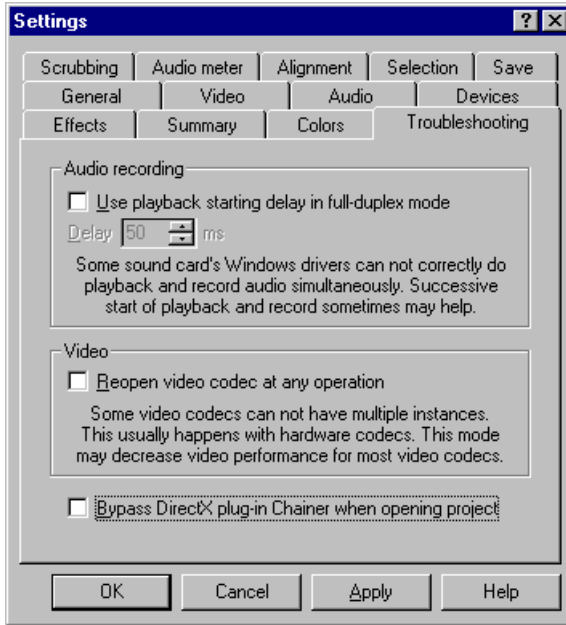
Use playback starting delay in full-duplex mode. Successive start of playback and recording is used when some sound card drivers fail to playback and record audio simultaneously. Delay sets delay duration in milliseconds.

Reopen video codec at any operation. In this mode, video codec is reopened at each access. This allows working correctly with hardware video codecs such as that for microVideo DC20. **Attention!** This mode may decrease video performance for most video codecs.

Bypass DirectX plug-in chainer when opening project – turn on this mode if you encounter program crash during opening project with *DirectX plug-in chainer* (note that crash may be caused by plug-in, not Forward AV Studio itself). You will lose all instances of DirectX plug-ins in opened project, but you will be able to keep all other portion of your work. **Suggestion**: when you add DirectX plug-in, tune its settings and save its state to preset using plug-in's dialog – you will be able to quickly restore state of plug-in in the future by just selecting it from list of saved presets.

5.5   Audio meter Settings
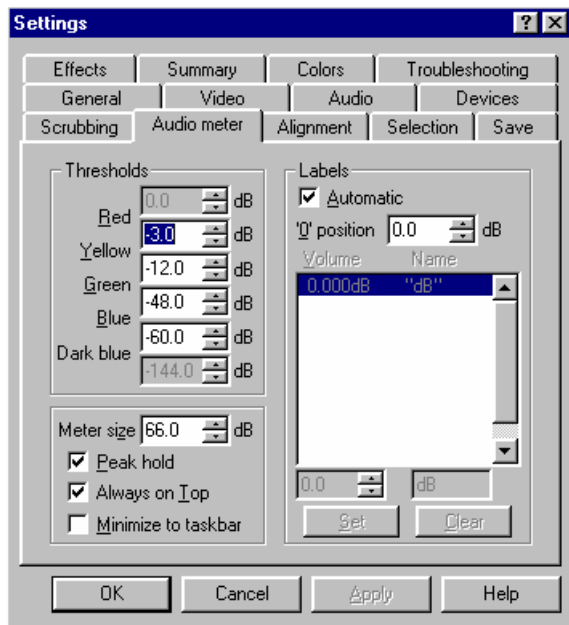
Audio volume color indicator is set in the *Audio Recorder* and *A.Meter (Faders)* dialog boxes. The Statistics (check overflow) command from the *Range* window local menu is also used to set correspondence between the volume level and its color representation.

Thresholds group is used to set correspondence between audio volume level and indicator color. The delimiting values shall be in the range of 0 dB to –144 dB and the intervals may not overlap.

Meter Size is used to set audio volume range represented by the indicator. The top value is always 'absolute' digital 0 dB (in Forward AV Studio, this value corresponds to the maximum absolute sample value of 32768.0).

Peak hold enables the display of the peak mark (a thin color band in the meter). It shows the maximum peak level found during playback/recording. To clear the peak mark just click on the meter or select an appropriate command on the local menu.

Always on Top – keep the audio *A.Meter (Faders)* window always on top above the *Clip Collection* and main *Project* windows.

Minimize to taskbar – this function is used to minimize the *A.Meter (Faders)* window to the system taskbar. If checked it allows the activation of the *A.Meter (Faders)* window from the taskbar or via Alt+Tab, independently from the Forward AV Studio main project window.

Labels group is used to control the volume text labels (shown close to the meter).

Automatic – select some values in dB automatically and display them as text labels with reasonable spaces between them. Or you can set up to 10 pairs of Volume, Name labels manually.

'0' position set the position of label 0 for automatic text labels. Note that zero shift or '0.000' value is used by default.

5.6   Alignment *Settings*
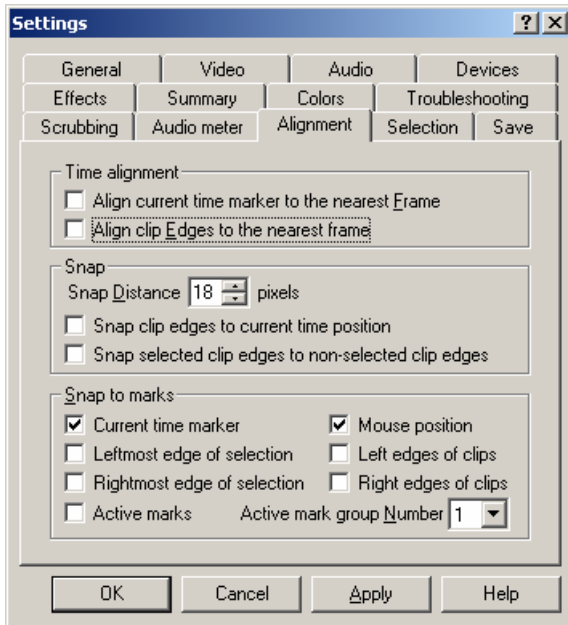
These settings control alignment (snapping) of objects (clips on tracks, clip edges and current time position mark) when you move them with the mouse.

Time alignment group:

Align current time mark to the nearest Frame - turn on the alignment of the current time mark to the nearest video frame.

Align clip Edges to the nearest frame - turn on the alignment of clip edges to the nearest video frame.

Snap group:

Snap Distance – set the maximum distance of snapping objects in pixels. For example, if the Current time marker (see below) option is on, you can drag the current time cursor close to a mark and it just jumps exactly to the mark ('snaps' to it). Snap distance is a maximum distance between objects (in pixels) at which they can snap to each other.

Snap clip edges to current time position – snap the edges of the clip you are moving to the current time cursor. It can be used to align the clip edges to the same time.

Snap selected clip edges to non-selected clip edges – edges of only selected clips will snap to edges of non-selected clips.

Snap to marks group is used to set conditions of snapping objects to place marks during objects moving:

Current time marker enables snapping of the current time position cursor to marks.

Mouse position – snap the mouse cursor position to marks while dragging clips or time position. When the mouse cursor remains within the snap distance, the selected clips are not moved.

Leftmost edge of selection – align the leftmost edge of selected clips to marks.

Left edges of clips – align the left edge of each selected clip to marks.

Rightmost edge of selection – align the rightmost edge of selected clips to marks.

Right edges of clips – align the right edge of each selected clip to marks.

Active marks – by choosing this option can snap marks of an active group to each other.

Active mark group Number – set the number of active group marks (all objects snap only to the marks of an active group).

5.7   Selection *Settings*

Forward AV Studio
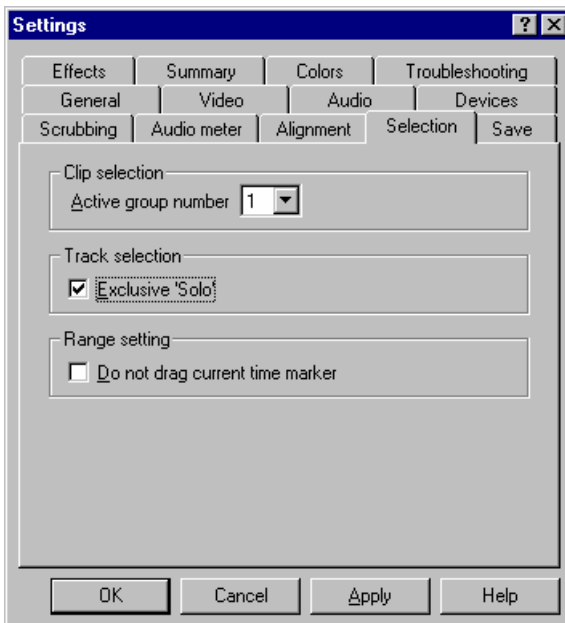
Active group number – set the number of active Clip selection groups. Other groups become inactive.

Exclusive 'Solo'. In this mode, only one track marked, as 'solo' will be included in the playback.

Do not drag current time mark. If this option is unchecked and the time range is set in the *Range* window the current time mark can also be dragged.

5.8   Save Settings
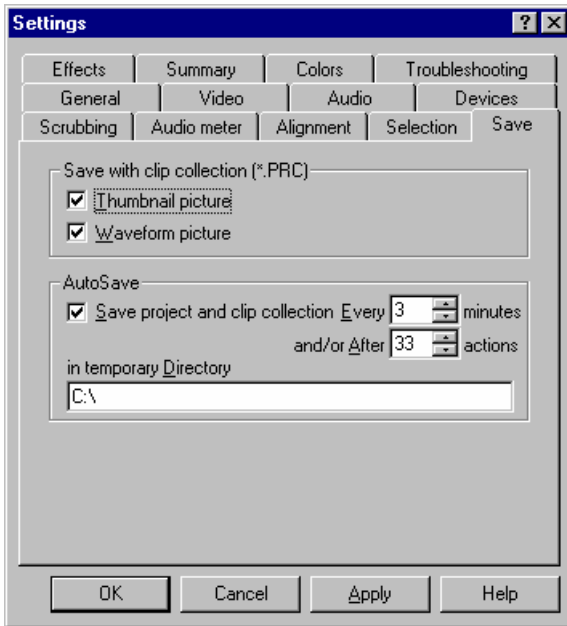
Save with Clip Collection group is used to specify what additional information must be saved with clips in *Clip Collection*.

Thumbnail picture – turn on the function of saving thumbnail picture for each video clip in *Clip Collection*.

Waveform picture – turn on the function of saving waveform picture for each audio clip in *Clip Collection*. Opening clip collection next time requires no recalculation of waveform pictures for audio files.

AutoSave group is used to define the time and place for auto saving of the project and clip collection. If your system or Forward AV Studio crashes, you will be able to restore your work in the state as of the moment of auto saving.

Save project and clip collection every XX minutes/YY actions. Turns on saving the current *Project* and *Clip Collection* at a specified interval (XX minutes) and/or after a specified number of changes (YY actions).

Temporary directory – create a directory for autosaved files with the name *autosave.tml* and *autosave.prc*. Read/Write access to this directory is required (*C:* by default). If Forward AV Studio is run after the program or system crash and Forward AV Studio finds autosaved files in a specified directory, you will be requested to open the autosaved project. After opening the project you will have to save it to a desired place manually.

5.9   Colours *Settings*
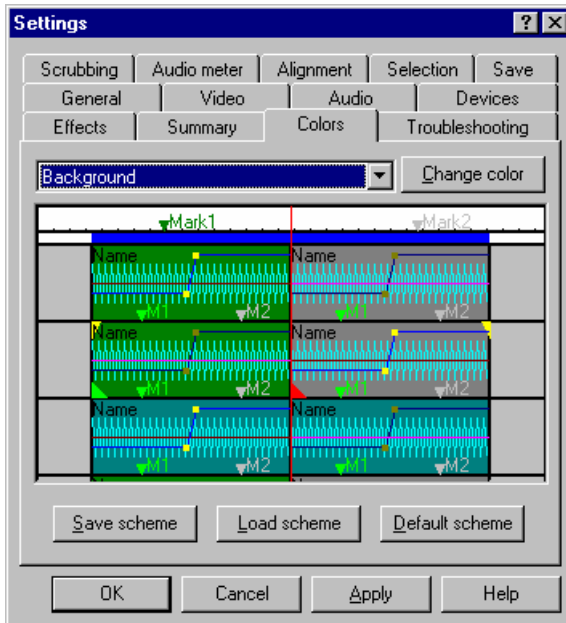
Here you can adjust colors of almost all elements of Forward AV Studio user interface. You can select a desired item by choosing its name in the drop-down list or click on an item in the sample picture. It is possible to keep the mouse button pressed and move the cursor around.

Change color - call the standard color selection dialog box to set color for the selected item. Color settings are reflected in the picture.

Colors combination can be stored in files with default .CLT extension. To save color settings, click Save scheme, then select a directory and file name.

Load Scheme - restore the previously saved colors combination from a file.

Default scheme - reset colors to a predefined color scheme.

When you press the Apply button, all colors changes are applied immediately in Forward AV Studio.

5.10 Summary *Settings*
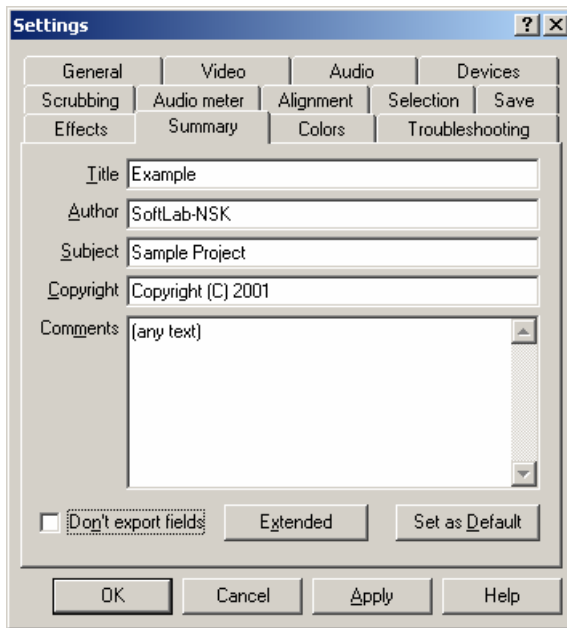
Various information fields can be embedded in the exported audio and video files (File / Export in the *Project* window). Some of these fields are present in this dialog box. Text strings with up to 255 characters can be entered as any field value.

Don't export fields – if unchecked, this function allows including all non-empty fields in the output file. Two additional fields are always saved. One is the name of the software package, 'Forward AV Studio. Multitrack Audio and Video Editor' (with the version you are using). The other field is for the date of output

file creation in the form YYYY-MM-DD; for example, '1998-05-01' for May 1, 1998.

Extended allows viewing and editing ALL available fields in the *Extended Summary* dialog box.

Set as Default allows saving all currently defined fields for later use as the default settings for newly created projects.

5.10.1 Extended Summary dialog box
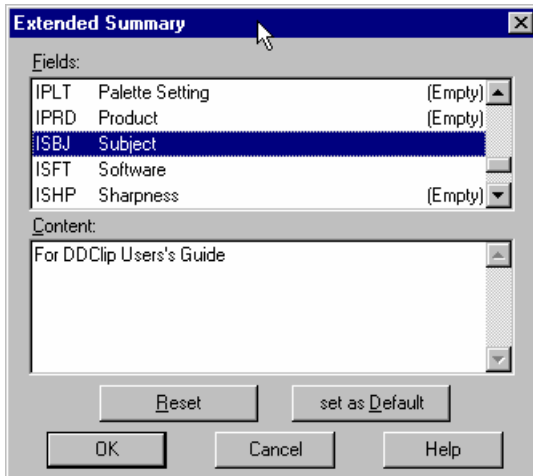
Fields that can be embedded in the exported audio and video data files are available for editing in this dialog box. Some of them appear also in the *Summary Settings*. Each field is represented by its short name and human readable name. A text string of up to 255 characters can be entered as the field value. If the field has no associated text string, it is marked '(Empty)' at the right part of the list box. Empty fields are not saved, see also Don't export fields witch in the *Summary Settings*.

Reset button is used to clear summary info fields. Set as Default button allows saving currently defined fields for later use as default settings for newly created projects.

The dialog box can be called from the Summary panel in the *Settings* dialog box.

5.11 Devices *Settings*
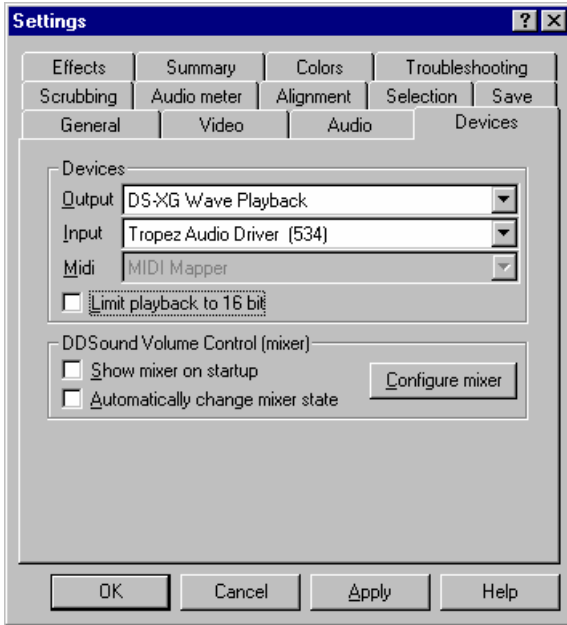
Devices group is used to select audio devices installed on your system for sound playback and recording.

Output – a device for digital audio playback (in WAVE format).

Input – a device for recording digital audio (in WAVE format).

Midi – a device for MIDI music playback. Please, note that Forward AV Studio plays MIDI through system midi-stream that can work on the MIDI mapper only, so no actual MIDI device can be selected for this purpose. You should open the system Control Panel (open Settings / Control Panel from the Windows Start menu), double-click the Multimedia icon and select a desired default MIDI Out device in the MIDI tab.

Click here to see an example of MIDI device selection in Windows-98 control panel ('DS-XG Synthesizer' is selected as default MIDI device. Forward AV Studio will use it to play MIDI).

Limit playback to 16 bits – if you open a project with 20/24-bit audio output format (see *Audio Settings*) but your soundcard can play only 16-bit sound, turn this option on to limit the output quality to 16-bit. If you have a soundcard with 20-24 bit sound capability, you may turn this option off.

DDSound Volume control   (mixer)   is   an   additional   application   of Forward AV Studio. It can be used to adjust your audio device settings: to set volume, to turn on/off audio outputs for playback and select source inputs for recording. This mixer is user-friendlier compared to similar standard system applications (you can run it using the Volume Control command on the Tools menu). With the mixer you can adjust volume in decibels (dB), save the status of any audio device and restore this status in future.

Show mixer on startup – turn this option off if you do not want to see the mixer main window on Forward AV Studio start (still, it will remain active and operational).

Automatically change mixer status – when you start playback/recording in Forward AV Studio, the mixer recalls and activates a saved status of the audio device appropriate for playback/recording.

Configure mixer – activates the mixer's window. You can also use the DDSound Volume Control command from the Window Menu or press F8 key.

You   can   use   DDSound Volume Control   any   time   independently   of Forward AV Studio. Run it by choosing its item on the Forward AV Studio folder in the system Start menu (for example «Start –> Programs –> Forward AV Studio –> DDSound Volume Control»).

5.12 Scrubbing *Settings*
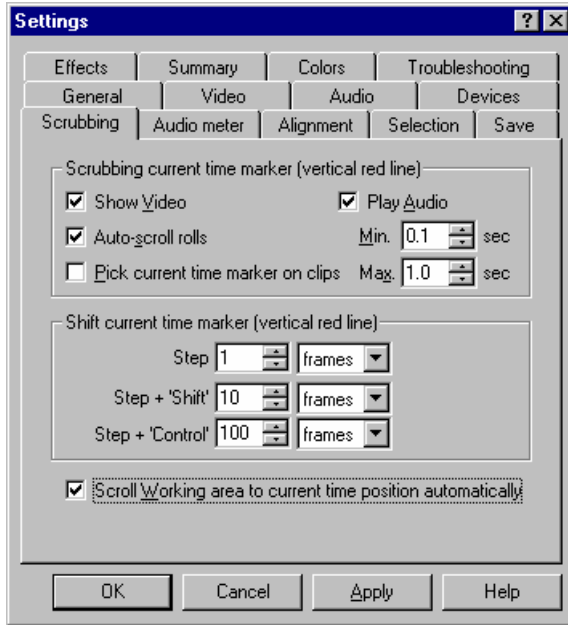
Scrubbing current time marker group parameters allows controlling application behavior when dragging *current time* position mark by left mouse button or setting current time in *Time Ruler*. These switches are duplicated on *Time Ruler* local menu.

Show Video enables showing of current frame on video player.

Play Audio enables audio scrubbing (drag current time position with left mouse button). Sound will be played in small pieces of Min. duration. If current time is changed during this small piece playback, next piece will start from new current time position. If current time does not change piece of audio up to Max. duration will be repeated until you release or move mouse. In other words, Min. value sets the minimal duration of playing; and if mouse is not moved when playback of next piece is started, duration will be Max.

Auto-scroll rolls changes scrolling mode of working area. When *current time* position mark is dragged outside *Project* window, the *Working Area* shifts automatically to follow current position. If this option is turned on, the working area slides smoothly while left mouse button is kept pressed outside window. If it is turned off, the working area shifts at a step when current time mark reaches

the working area edge. It looks like as time position and its associated cursor jumps back in this moment. It may be useful if you do not want autoscrolling of working area.

Pick current time marker on clips – if this option is on, you can drag current time position mark when it is over a clip, but you can't access clip items and move clip when mouse cursor is on time position cursor. If you turn it off, you will be able to move clip in any case, but you can't move current time position until mouse cursor is not on a clip.

Shift current time marker group allows controlling behavior when current time position is moved with Left / Right arrow keys on keyboard. All values can be defined in frames, seconds and milliseconds.

Step – moving with arrow keys

Step + Shift – moving with Shift and arrow keys

Step + Ctrl – moving with Ctrl and arrow keys

Scroll Working area to current time position – if this option is on, current *Working Area* is autoscrolled during playback. It is useful when Playback entire project mode is on (see section about Command menu).

5.13 Effects *Settings*
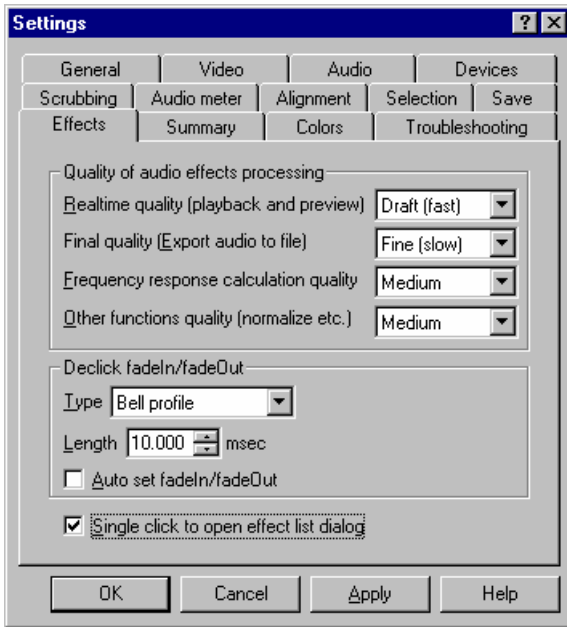
Quality of audio effects processing group is used for setting the quality of sound processing by audio effects in different modes. Poorer quality requires fewer calculations and may be useful if your computer cannot play complex projects with many audio effects in real-time. Please, note that some audio effects do not support this feature and process only top quality sound (see *Audio Effects*).

Real-time quality sets the playback/preview quality (real-time operations).
Final quality sets quality for exporting a project to the resulting file.
Frequency response calculation sets the quality for calculating audio effect frequency and phase response.
Other functions command is used to set the quality for normalize /statistics functions.

There are three possible modes of quality processing: 'draft' (fastest), 'medium', and 'fine' (slowest). Normally, these three modes produce more or less identical sound. 'Draft' quality is recommended for real-time operations (playback) whereas 'fine' quality for exporting a project to the resulting file of the upmost quality. You may set 'other functions' quality to 'draft' to accelerate the

performance of normalize/statistics functions. Note that in this case the calculation of volume levels may produce some minor errors.

Declick FadeIn / FadeOut group is used to define the parameters of declick *FadeIns/FadeOuts* on audio clips.

Type is used to set either linear or bell profile of fade. Bell profile usually produces better sound than linear one, even with a very loud clip breaking out instantly.

Length is used to define the length of declick fades. If you set declick without removing a very loud click at the clip edge, try to increase the length of declick. Possible values lie in the range of 0.01 to 100.0 milliseconds.

Auto set FadeIn/FadeOut – if this option is on and a new audio clip is inserted in a track, both declicks will be set automatically. On the audio clip local menu you can turn on/off the declicks manually. If you want to set/remove declicks for a group of selected clips, use appropriate command on the Edit/Declick menu.

Single click to open effect list – if this option is on, you can open the effect list on a clip, track or entire project by clicking the mouse left button at the triangle mark indicating the presence of audio effects. If this option is off, double-click the triangle to open the list of effects.

6 Saving results of work

6.1 Export File dialog box
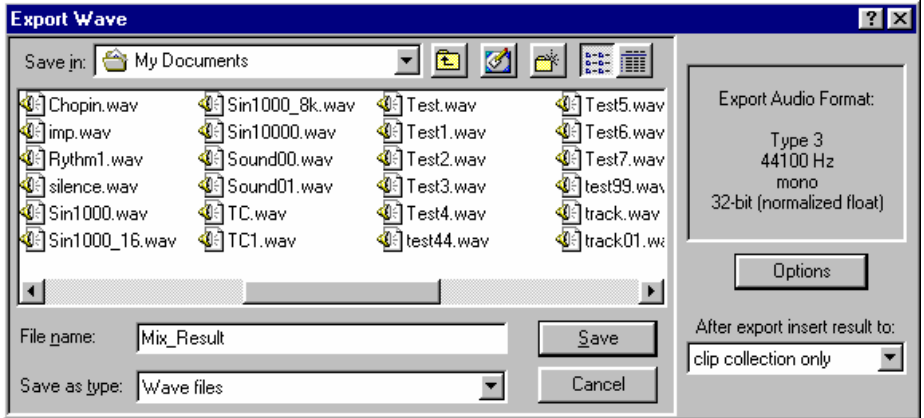
To save the results of work to a multimedia file, call this dialog box by the Export command from the File menu. On the right of this standard system *Save File* dialog box there are a format field and Options button. After the resulting file is exported, it is automatically added to the current clip collection and/or project.

The standard part of the dialog box (at its left) allows selecting the destination path and name of the resulting file. As soon as the name and path are selected, press the Save button to mix all active tracks in a specified range and write them to the resulting file. The file's type (audio/video) and format depend on the command selected from the File / Export menu. *Projects* with video can be saved to AVI-format only (Audio and Video Interleaved, standard Video for Windows format). *Projects* with audio (no video) can be saved to uncompressed WAV (standard Windows audio format), AIFF (Mac-format) or AVI (without video) formats.

Note that unregistered Forward AV Studio saves only the first 10 seconds of the project to an external file! For more detail about registration and lifting this restriction, please, read the section on Forward AV Studio registration.

Audio format of the resulting file is shown in the format field at the right part of the dialog box. To change audio format of the resulting file, press the Options button to call the export audio format dialog box.

You can insert the exported file to a current clip collection and/or project (for example, to immediately check the results in Forward AV Studio). In After export insert result to, select what you need: clip collection only, project and clip collection (insert the file both to the clip collection and to the project's track) or none (just export without inserting the results to Forward AV Studio). This option can be used, for example, to download several audio tracks to a single track. Select these tracks (press the Solo buttons on the tracks you want and then the Mute buttons on the tracks you do not want to include in the mix), then export them to a multimedia file by choosing the option Insert result to project and clip collection. You may also use this option for "ready" tracks that are not to be changed (edited) in the future – you can mix them to a track and clear the mixed tracks to vacate them for another work. This may be useful if minor packages of Forward AV Studio with restricted number of tracks are used for creating complex projects.

6.1.1 *Export Parameters* dialog box
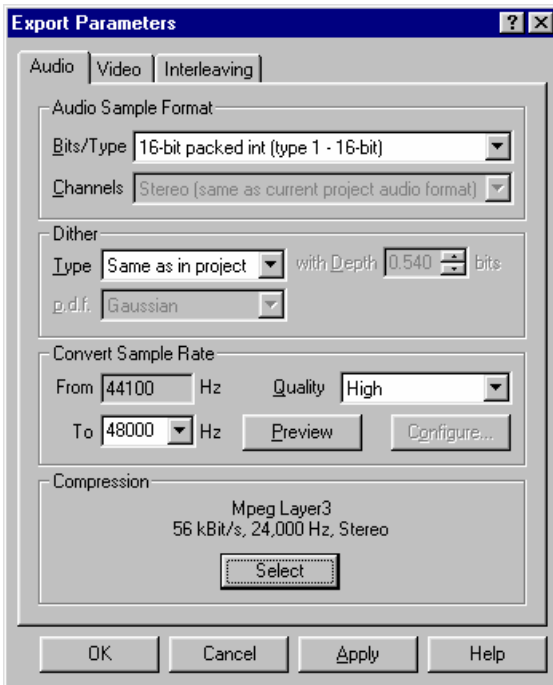
In Audio panel of this dialog box you can specify audio format different from current settings of project when exporting audio to resulting AVI, WAVE of

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AIFF-file. You can also use any audio compression codec installed in your system to save compressed audio to AVI or WAV-file.

Audio sample format is used to set the output format of the resulting file.

Bits/Type is used to set the resolution and type of the resulting audio file. You can select the type from the list (from 8 to 32 bits with different types: 8, 16 and 20/24 bits of integer type only for AIFF files). Please, note that next time the selected format will be used by default! Look at format information in the *Export Audio* dialog box before saving a file to make sure that you have selected the format correctly.

The Channels parameter is used to check that the file is saved with the number of channels set up in the project (mono/stereo). You cannot change the number of channels here. This number can be set in the project's *Audio Settings*.

Dither is used to set dithering parameters while exporting audio to 8/16 bit formats.

The settings Type, Depth and p.d.f. are described in *Project Audio Settings* sections. These parameters are identical to those of the project (upon change the new parameters will be used for project playback).

Convert sample rate is used to save audio with a sample rate different from that of the project. For example, if you have a professional soundcard, you can record, process and mix audio with maximum quality (24 bit/96KHz) and save the results of your work to a WAVE file(s) for audio CD (16 bit/44100 Hz). Forward AV Studio can resample audio to almost any sample rate (from 5000 to 999999 Hz) using very fast and high-quality algorithm.

From shows the original sample rate of the project.

To allows selecting output sample rate as desired. You can select any predefined value from the list or just type the desired value manually. Please, note that if you resample to sample rates lower than the original value, you will lose high-frequency components!

Quality is used to set the quality of resampling. You can select a value from the list or choose «Custom» to set all parameters manually by the Configure button. Higher quality requires more calculations and gives better results, but 'Fast' or 'Default' presets normally give satisfying results too.

Preview button is used to examine the results of resampling in real time and to compare them with the original sound (available only if your soundcard supports playback at a required sample rate). High quality resampling may require a lot of computation, so your computer must be fast enough to mix several audio tracks and resample the results in real time. Please, note that pressing the Preview button may be followed by a short delay (up to a few seconds on slow computers)

before the playback actually starts (delay is shorter when Preview is pressed before starting playback next time).

Configure button is available only if you select the «Custom» option for resampling. It calls the *Resample Audio* dialog box where you can set all resampling parameters manually. It is recommended for advanced users only.

Compression group allows you to compress resulting audio (after resampling if it is selected in previous group) with any audio compression codec (ACM codec) installed in your system. Select button shows standard system audio compression dialog where you can select desired destination format (codec, sample rate, data rate etc.). When you selected desired format, it is shown before Select button. Select 'PCM' format if you want to turn off audio compression.

Important: it is **not** recommended to change sample rate when using standard audio compression dialog, you may get terrible distortions in the resulting sound because of bad quality of standard system resampling codec. You should resample audio using Convert sample rate group first and then select desired audio format using Select button with output sample rate equal to one defined in To field in Convert sample rate group!
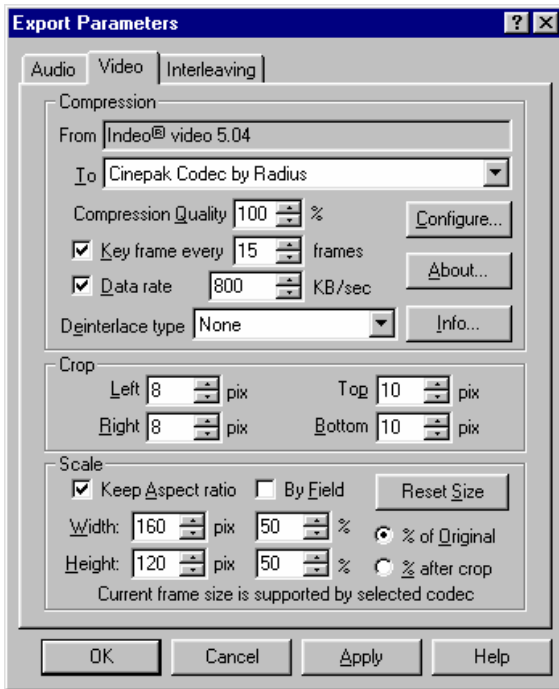
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In Video panel of this dialog box you can specify video format different from current settings of project when exporting video to resulting AVI–file. You can resize video frame and/or recompress video using any Video for Windows-compatible compression codec installed in your system.

Compression group defines output video compression format of resulting file. Click at name of a control to get its description:

Field From shows name of original video codec that was used to compress source video files in your project. Select Don't recompress in the To field if you don't need any video format conversion (recompression, crop and resize).

From the list To you can select desired video codec to recompress your video. You can select any Video for Windows–compatible codec installed in your system. Select Don't recompress in this field if you don't need any video format conversion (direct video stream copy will be performed in this case – it is the fastest way to save AVI–file from your project).

If you select the same codec that was used to compress source video files of your project (its name is shown in the From field), recompressing will be performed anyway! Use it if you want to crop and/or resize video frames before recompressing using the same video codec.

Data rate: desired average data rate of resulting compressing video stream (in kilobytes per second). Reducing data rate reduces resulting file size, but quality of image is typically reduced too. Don't change default value if you don't know what value to use. Not all codecs support this setting; it will be disabled (grayed out) in this case.

The Configure button allows you to call configuration dialog to set some additional video compression parameters of selected video codec.

Parameter Compression Quality defines approximate compression quality in percents (100% gives maximum quality). Reducing quality usually gives reduction in average data rate and resulting file size, but quality of image is reduced too. Don't change default value if you don't know what value to use. *Not all codecs support this setting, it will be disabled (grayed out) in this case.*

The About button shows some information about selected video codec (typically information about codec's manufacturer).

This dialog belongs to the codec itself, not Forward AV Studio! Not all codecs have it; the button will be disabled (grayed out) if codec does not have about dialog.

Parameter Key frame every N frames defines how frequently key frames will be present in resulting file. Key frames allow random positioning through the file during its playback. The more frequently are key frames, the faster will be re-positioning in the file when playing it with playback software (for example

Windows Mediaplayer). Don't change default value if you don't know what value to use.

Not all codecs support setting of key frames not at every frame, this setting will be disabled (grayed out) in this case

The Info button calls dialog *Video Codec Info* with detailed information about selected codec (codec name, path to its driver file, possible format restrictions etc.). Press this button if you can't find video format supported by selected codec, see the info dialog to know more about codec's format restrictions.

The Deinterlace type option allows you to deinterlace video with fields (for example that was captured using video capturing hardware from external video source such as video tape) for better smooth playback on PC screen. Select None if you don't need deinterlacing (for example, you are working with video that was rendered without fields on PC). Select Interpolate lower fields to skip and interpolate lower fields in image (recommended), and Interpolate upper fields to skip and interpolate upper fields. See also By field option in the Scale group.

Select Don't recompress in the To field if you don't need any video format conversion (cropping, resizing and recompression). Direct copying of video stream without recompression will be performed in this case; it is the fastest way to save video from your project to AVI file.

Crop group allows you to crop video frame edges (it can be useful to remove blank or distorted edges of frame in captured video material for example). Set all values to 0 (zero) if you don't need cropping:

Parameter Left shows how many vertical lines should be cropped at the left side of video frame. Set it to 0 (zero) if you don't need cropping at the left of frame.

Parameter Top shows how many horizontal lines should be cropped at the top of video frame. Set it to 0 (zero) if you don't need cropping at the top of frame.

Parameter Right shows how many vertical lines should be cropped at the right side of video frame. Set it to 0 (zero) if you don't need cropping at the right of frame.

Parameter Bottom shows how many horizontal lines should be cropped at the bottom of video frame. Set it to 0 (zero) if you don't need cropping at the bottom of frame.

Scale group allows you to resize video frame (decrease frame size to reduce video data rate and file size). Don't change any settings or press Reset size button if you don't need frame resizing:

Width – resulting width of video frame. You can set it in pixels or percents of original size or size that you get after cropping (select it using % of original or % after crop). Press Reset button to restore original frame size.

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% of original – select this option if you want to set frame size in percents from original size (not size that you get after cropping).

Height – resulting height of video frame. You can set it in pixels or percents of original size or size that you get after cropping (select it using **% of original** or **% after crop**). Press **Reset** button to restore original frame size.

% after crop – select this option if you want to set frame size in percents from size that you get after cropping (not original size).

Keep aspect ratio – turn on this setting if you want to be sure that aspect ration is kept when you change **Width** or **Height**. When one value from frame width and height is changed, the other is changed too to keep frame aspect ratio.

Option **By field** – resizing video frames by fields independently or not. Turn this option on if you are working with video with two fields in video frames. Typically fields are used in video that is used for playback on TV or external TV monitor. If you are working with such video (for example, you captured it from video tape using video capturing hardware board), it is strongly recommended to resize video by fields independently, or you will get field mixing in different video lines and image distortions during video playback.

If you are using video that is created on PC and used for playback on PC display monitor only, turn this option off.

In any case, Forward AV Studio can't recognize itself is your video with fields in frames or not. If you encounter image distortions during playback of video resized with Forward AV Studio, try to turn this option on/off and save your video again.

Press the **Reset size** button if you want to set frame **Width** and **Height** to their original values.

Note: video frame resizing is performed after cropping if both cropping and resizing are selected (the program crops edges of video frame first and resizes it after).

Important: selected video codec can be unable to compress video with selected frame size. String message at the bottom of the dialog shows is current frame size supported by selected codec or not. If current frame size is not supported, you will get an error message when trying to press Apply or Ok buttons. Use Info button to know more about possible codec's format restrictions.

Video Codec Info

Codec info
FOURCC code: cvid
Short name: Cinepak Codec
Description: Cinepak Codec by Radius
Driver filename: C:\WINDOWS\SYSTEM\ICCVID.D

Format restrictions
Width: no known restrictions
Height: no known restrictions

Close   Help
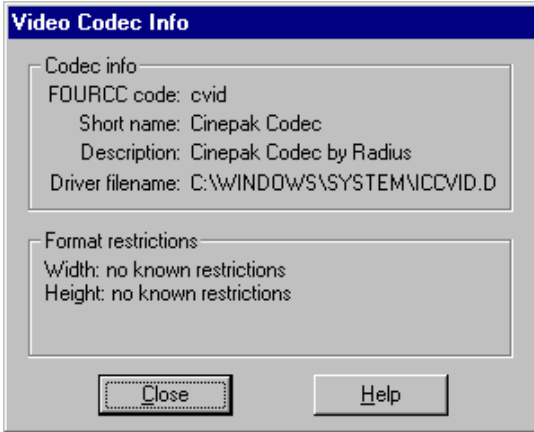
In *Video Codec Info* dialog box you can see detailed information about video codec selected for video compression.

Codec info group contains general information about codec. This information includes:

FOURCC code – four-byte string identifier of the codec.

Short name – string with short name of the codec.Description – string with short description of the codec.Driver filename – full path on disk to the codec's driver file.

Format restrictions field shows some information about possible codec's format restrictions.

Not all codecs support any frame size and/or any pixel color depths for video compression. The programs try to test video codec for compatibility with some different frame formats, and shows if there were any restrictions encountered. If No known restrictions is shown, it seems that selected codec supports most of frequently used frame sizes and/or pixel color depths (typically 24/32 bits).

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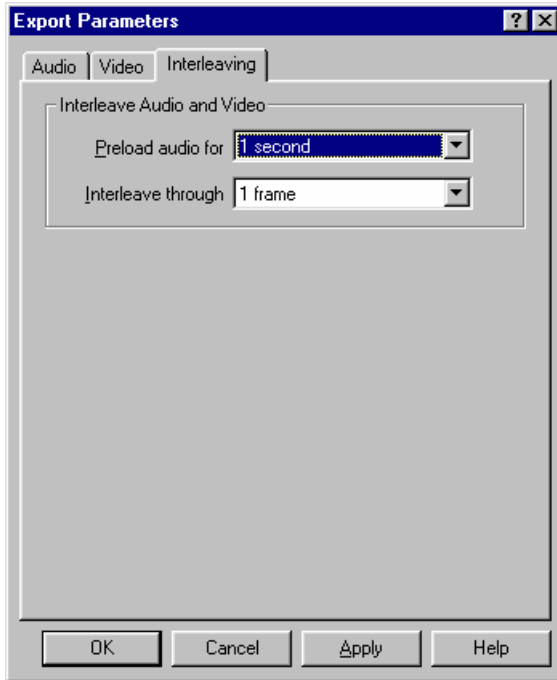
In the Interleaving panel of the *Export Parameters* dialog box you can specify audio and video interleaving parameters for output AVI file. These parameters are:

In the field Preload audio for you can set amount of audio that will be written at the beginning of resulting AVI file. This portion of audio will be preloaded before start of playback; it helps to prevent audio skipping during playback. It is not recommended to set this value too low (less than 0.5 second).Interleave through shows interleaving length of audio and video streams in resulting AVI-file. Try to decrease this value to 1 frame if you encounter problems with playback of saved AVI-file with other software.

Default values are good for most cases. Try to decrease interleaving to 1 frame only if you encounter problems with playback of AVI files with some other software. It is not recommended to set audio preload less than 1 second, change it only if you encounter problems.

6.1.2 *Resample Audio* dialog box
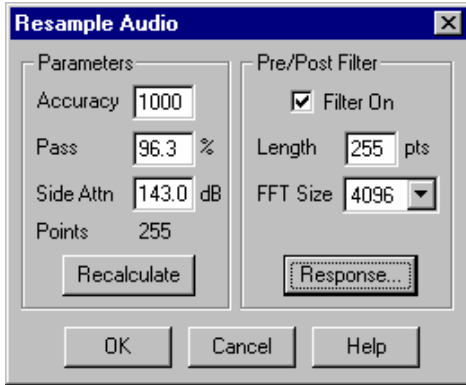
Parameters – set the main parameters denoting the quality of resampling.

Accuracy – set the accuracy of resampling by allocating the amount of memory to be used for the calculation.

Pass and Side Attn - set the parameters of the resampling filter. Side Attn is used to set approximate filter attenuation in the stopband (the greater the attenuation, the better the filter), Pass is used to set approximate relative filter steepness in percent (the relative width of the filter's passband is 100% minus Pass). If you change any of these two values, the filter's parameters shall be recalculated. On slow computers it may require a few seconds, so press the Recalculate button following the setting of these values. The Points parameter shows the length of resampling filter response (the greater the length of response, the better the filter).

Pre/Post Filter - set the parameters of the anti-aliasing filter used before (pre-filter) or after (post-filter) resampling.

Filter On - indicates that the anti-aliasing filter is used with the audio signal being resampled.

If you resample audio to a sample rate lower than the original rate, it is most recommended to use the pre-filter (it removes high-frequency components that shall be absent from the audio with the resulting sample rate), especially if you significantly reduce the sample rate (e.g. from 48 kHz to 8 kHz). In such cases using pre-filter is necessary, otherwise there may arise audible distortions.

If you increase the sample rate, the use of post-filter will suppress high-frequency noise after resampling. This is not necessary if you set high quality of resampling filter (with greater length of response; see above). If you select the

quality of resampling from the list of preset values (in the *Export Audio format* dialog box), use pre/post-filter for best results.

Length – set the length of response of anti-aliasing filter (only odd values are admissible). To see frequency response of the calculated filter, press the Response button.

FFT Size – set the length of the fast Fourier transform to be used in the fast convolution algorithm for pre/post filter. The default value (1024 points) produces the best results in most cases, although other values depending on your processor may accelerate or slower the computation.

Please, note that applying pre/post filter requires additional calculation time and may decrease the performance if you start audio resampling in real time with the Preview button. You may try to turn off the filter and listen to the results of resampling. If you are satisfied with what you hear, the pre-post filter is not necessary.

6.1.3 Pre/Post-filter response
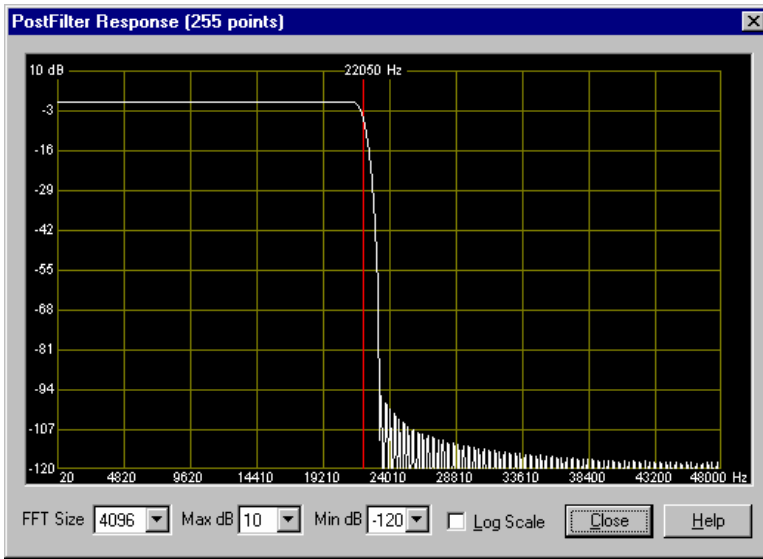
The diagram in this dialog box shows the frequency response of the pre/post lowpass filter used with resampling audio to a new sample rate. Using this diagram you can visually estimate the quality of the pre/post filter applied before

or after resampling. The main requirement to such a filter is to suppress high-frequency components of the audio being filtered (lowpass filter).

The white curve shows the frequency response of a filter. The vertical line shows the edge frequency: you can see that to its left the response is flat (filter does not affect frequency components lower than the edge frequency), and to its right the filter does suppress frequency components. For the pre-filter, the edge frequency is one-half of the resulting sample rate (frequencies higher than this shall be removed from the resulting signal so the filter shall remove them prior to resampling). For the past-filter, the edge frequency is one-half of the original sample rate (high-frequency noise that was nonexistent in the original signal shall be filtered after resampling).

Normally the filter shall suppress only high-frequency components of the signal by 60 dB or more (the greater the length of the filter, the greater the suppression).

FFT Size - set the length of the fast Fourier transform to be used for calculating response. Greater values give more accurate response.

Max dB/Min dB - set the vertical range of the diagram in decibels.

Log Scale is used to switch between the logarithmic and linear horizontal scale of frequency values.

The post-filter on the above diagram suppresses frequencies over 100 dB when applied after audio resampling from 44100 Hz to 96 kHz. Filter length is 255 points.

6.2   Multiple WAV files export

With this command you can write parts of the project (resulting audio only) to separate WAVE-files. You must mark out places in the project where project will be divided into parts to be saved to separate resulting files.

To divide a project into parts and save them to separate files, set the marks on the selected places in the timeline window (*Time Ruler*) where the project (not applicable to clips) must be sliced into parts. Select the mark group Export separator for marks to be used as separators of the project's parts. Press the right mouse button on the mark, select Mark info item on the local menu, then select Export separator in a dropdown list at the right top edge of the mark info dialog box. For example, if you have a project with 1 minute of audio and set the mark at 20 sec on the timeline (don't forget about 'Export separator' flag!), you will have two parts lasting 20 sec and 40 sec, respectively.

If you select the Multiwave export command from the File menu, each part will be saved to a separate file. Type the name of the resulting WAVE-files. The names

of files will be auto-incremented. For example, if you enter 'track' as a file name, you will get files 'track01.wav', 'track02.wav' and so on.

You must select the following format for audio CD: sample rate 44100 Hz, 16-bit format, Stereo. You can create a project with these audio parameters (see *Audio Settings*) or select the output format during file exporting (press the Options button in the *Export* dialog box to select the file name and set the required 16-bit format and 44100 Hz sample rate in the *Export Audio format* dialog box). In any case, you must have a Stereo project.

The duration of the resulting audio files is always adjusted to 1/75th of a second. You can get audio CD with no pauses between tracks (you must have a CD-recorder supporting the "Disk-at-once" mode. For more information, read the documentation or manufacturer's contract). When you get audio files in 44100Hz/16-bit/Stereo format, you can record them to audio CDs using the software supplied with the CD-recorder (read the software documentation to know how to record audio CDs).

Note: the duration of the last part of a project is adjusted to 1/75th of a second!

7   Dialog boxes

7.1   Audio meter (Faders) window
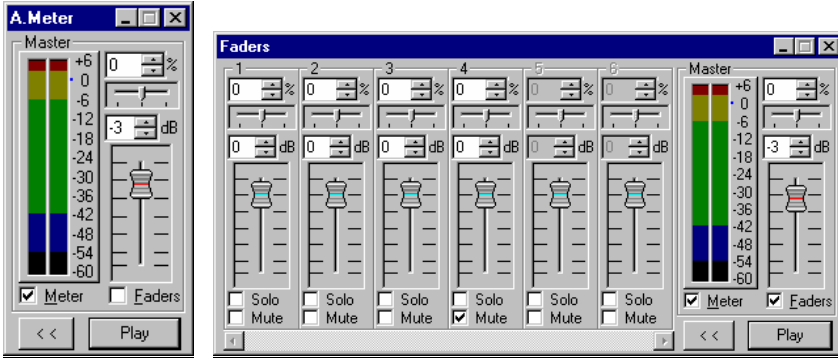
The Faders (Audio meter) command from the *Project* Window menu is used to activate a window that may have either *A.Meter* or *Faders* title, depending on the status of the Faders switch (see below). In this window you can control the tracks and master volume/balance (pan) and audio effects on tracks in a project.

There is always the output volume indicator (audio meter) at the right part of the window. This indicator is divided into 5 intervals. Within each interval the output audio volume is painted in the corresponding color (dark blue, blue, green, yellow and red respectively for the minimal to maximum volume). Thin lines mark the maximum peak volume encountered during the playback (if Peak hold is enabled in the *Audio meter Settings*). These marks are reset at the playback start or by a click on the indicator. To change color intervals delimiting values, the displayed volume level range and level text labels representation, call the *Audio meter Settings* or the local menu (click the mouse right button on the indicator).

Project master volume can be set with the vertical fader shown at the right part of the window or by editing the volume value in the text box above (see also the note about editing numerical values in Forward AV Studio). The horizontal slider and corresponding text box are used to control the project master balance (pan).

Meter – enable monitoring the output audio volume on the indicator.

Faders are used to control the presence of faders (volume controls of tracks) at the left. With this option off, the window contains only the volume indicator and

master fader (the window title is *A.Meter*). With Faders on, the window changes its title to *Faders* and shows the track faders with the Solo / Mute and audio effects buttons.

The << and Play buttons allow rewinding the current time position to start the playback directly from the *Faders* window.

Edit FX buttons allow calling the *Effects List* dialog box to add/edit track/master audio effects.

Use FX – turn on (use)/off (bypass) track/master audio effects.

You can use Edit / Use buttons to control audio effects during project playback.

The *Faders* window shows faders for 6 tracks (track numbers are displayed on the top of the faders). If the current project has less than 6 tracks, the unused faders will be grayed and inaccessible. If the project has more than 6 tracks, the scrollbar at the window's bottom allows selecting for display 6 tracks. You can also use the *Volume* and *Balance* dialog boxes to set volume and/or balance (pan) for a project, track, clip or profile.

It is possible to dynamically change the master and track volume/pan during playback. **Attention!** Changes will always be made with some delay depending on the value of Buffer size in *Audio Settings*.

7.2   **Volume and Balance dialog boxes**
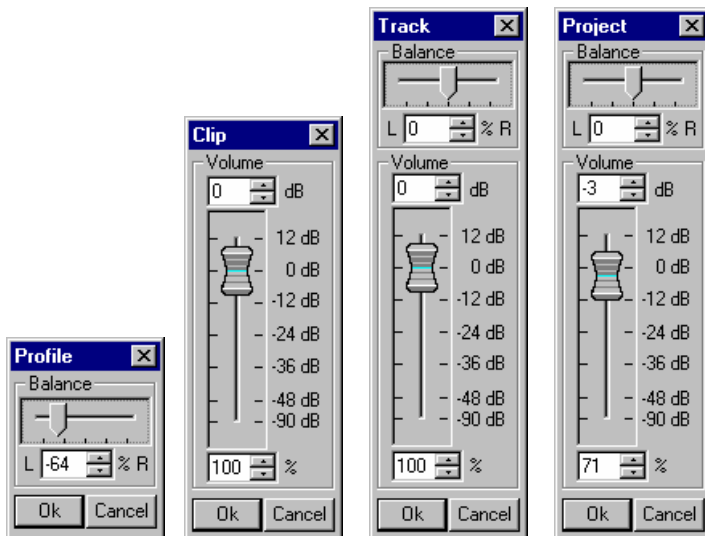
Volume and/or balance dialog boxes may be called from different menus. Depending on the context, the dialog box changes its name and may have either Volume or Balance group, or both.

The dialog box has Profile or Clip names when called with the Set profile value and Clip volume commands on the *Audio clip* local menu.

The dialog box is named Track when called with the Track Volume command on the *Track State* window local menu.

The Master volume command on the Command menu is used to change the master volume and balance for the whole project. In this case the dialog box is named Project.

Note that the master volume and balance for a project and audio tracks can be set in the *AudioMeter(Faders)* window, where it is possible to dynamically change the volume and balance during playback.

Note that volume at each point of a clip with audio is a sum (in dB) of all master volumes (the project master volume, track master volume and clip master volume) and the volume profile value at this point (for an audio clip). The same is true for balance.

The balance value can be set from –100 (Left) to 100 (Right).

The nominal volume value is 0 dB or 100 %.

Attention! The maximum volume amplification is 12 dB (4 times). At points where maximum amplification is reached, the profile touches the top of the clip rectangle and stays there while other profile key points are fluctuating with master volume change. Thus, the profile is distorted and the mixed signal may not fully correspond to your expectations. To avoid this, take care of the clip volume profile - visually it should not touch the top edge of the clip.

7.3   *Open Clip* dialog box
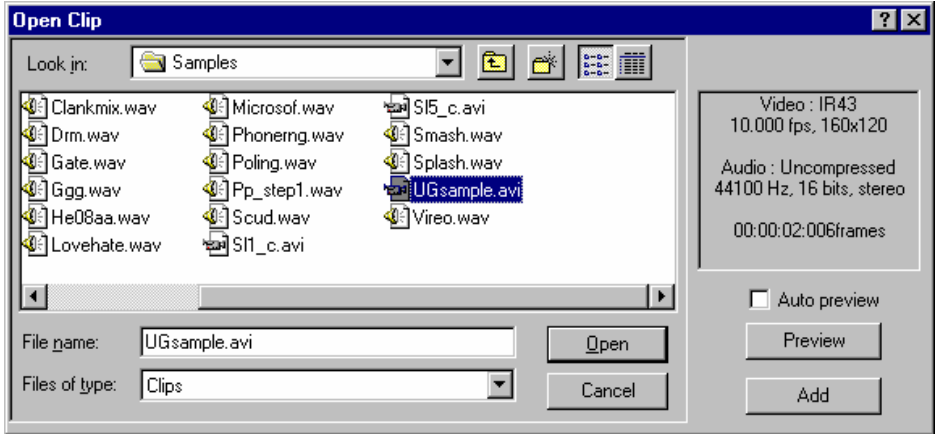
This dialog box allows adding a clip with reference to the whole source file content. If a file is added to the *Project* from the track local menu, the new clip is inserted to both the track and *Clip Collection*.

The *Info* area at the right of the dialog box displays information about the selected source file (audio format of the file etc.). Please note that Forward AV Studio cannot add to a project compressed audio files (such files can be decompressed to new files and then inserted into a project). Files with different sample rate cannot be added to the same project either (such files can be converted to new files with the project's sample rate).

Preview button starts playback of a selected file.

The Auto preview flag enables automatic playback of a selected file.

Add button appears only if the dialog box is called from the *Clip Collection* window. It is used to add a clip with a selected source file to the *Clip Collection* and does not close the dialog box. It is used to add multiple files to a clip collection at once.

You can call this dialog box from the *Project* window dialog box with the Add source File command from the File menu and *Working Area* local menu (press the mouse right button at any place not occupied by clips) and also with the button on the *Toolbar*.

In the *Clip Collection* window, this dialog box can be called with the Add source File command from the File menu and the local menu (on the background), and with the button on the *Toolbar*.

You can add source multimedia files by dragging them from the *Windows Explorer* to the *Project* window (a single file only) or *Clip Collection* (multiple files).

7.4   *New project* **dialog box**
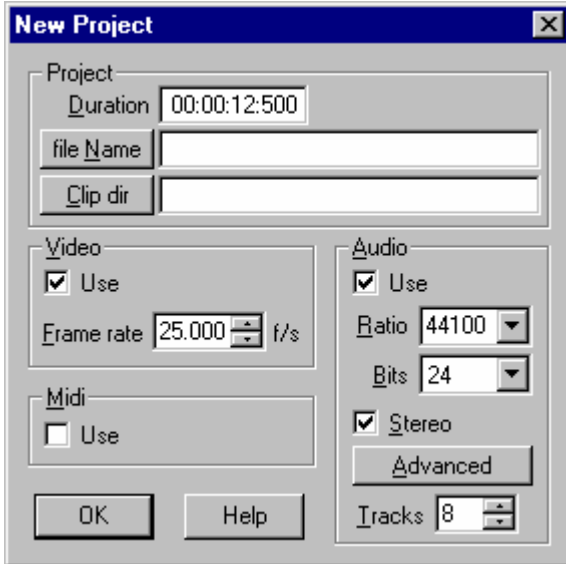
This dialog box is called when you want to create a new project in Forward AV Studio. To create a new project, press the first button on the *Toolbar* in the *Project* window or use the New project command from the File menu.

In this dialog box you should set all main parameters of a new project.

Duration – duration of project in current time format. You can change duration any time later using the Set Size button.

File Name – press this button to set location and name of project file on disk, or type it manually in edit box. If no name is set, it will be 'Untitled', and name of file will be asked when you save project first time (see also File menu). If you type it manually, you must specify full path to a file with drive letter and 'TML' filename extension (for example, 'D:\Projects\project.tml').

Clip dir – press this button to set default location (directory on disk) of source media files for clips. This path will be used by default when you add new clip(s) to a *Project* and *Clip Collection*. The same path will be used by default when you

recorded audio and want to save it to file. This path is not obligatory and can be changed any time when you open/save any media files in Forward AV Studio. If you type path manually, you must specify full path including drive letter (for example 'D:\Clips').

Note: you may need to create a new folder (directory) on disk for a new project and recorded audio clips. You can create a new folder before defining file name for a new project: after pressing File Name *button in the standard Save file dialog box will be shown. Select path on disk where you want to create a new folder, press right mouse button on empty space in the field with folder names, select the* New/Folder *command from menu. New folder will be created in current folder, type desired name and press* Enter. *Now you can double-click at created folder and type filename of new project. Press the* Save *button to close dialog box.*

Video group defines main video parameters of a project.

Use – turn this option on if you want to use video in your project, turn it off otherwise. It means that video tracks will be shown or not in a *Project* window, you can change it later with appropriate command from the View menu.

Frame rate – video frame rate in frames per second. It is set automatically when you add first video file to project using the Add source file command in the local menu of video track (press the right mouse button on empty place of video track), or you can change frame rate later in *Video Settings*.

Audio group defines main audio parameters of a project.

Use – turn this option on if you want to use audio in your project, turn it off otherwise. It means that audio tracks will be shown or not in the *Project* window, you can change it later with appropriate command from the View menu.

Ratio, Bits and Stereo and Advanced button define audio format of a project, see *Audio Settings*. When you add first audio file to a project using the Add source file command from the local menu of audio track, sample rate (Ratio) is set automatically equal to sample rate from the first file (all audio files used in a project must have the same sample rate). However, output bits and number of channels should be set manually.

Tracks define number of audio tracks in the *Project* window; you can change it later with the Set Size button or in *Audio Settings*.

Midi group: turn on/off Use option if you want to use MIDI or not in a new project. It means that midi track will be shown or not in the *Project* window, you can change it later with appropriate command from the View menu.

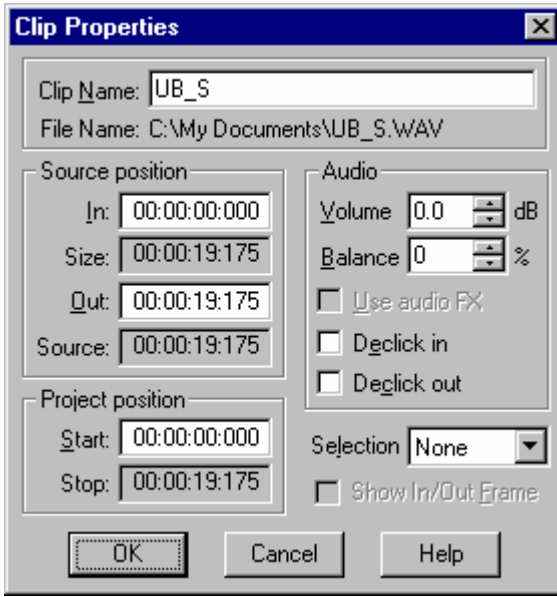You can use mouse to edit numerical values.

7.5   Clip Properties dialog box

This dialog box can be opened in the *Working Area* by the Properties command of the clip on track local menu. Another dialog box, *Clip Properties*, can be called in the *Clip Collection*.

In the Clip Name field, an arbitrary set of symbols can be assigned to a clip. By default, the source file's name is assigned. Clips with different parameters may have the same name. A clip is not uniquely defined by the Clip Name.

File Name shows the path to the source file.

Source position field groups the values of the following parameters:

In, Out – start and end of a clip relative the start of the source file.

Size – clip duration, the difference between the end and start (Out and In).

Source – duration of the whole source file.

Start and Stop – start and stop clip positions in a project.

Audio group is available only in the properties of *Audio Clip*.

Volume – clip volume.

Balance – clip balance.

Use audio FX – turn on/off (bypass) audio effects on a clip (if available).

Declick in / out – turn on/off the suppressor of clicks on the clip edges. The declick function can be set automatically on any clip added to the project (see *Effects Settings*).

Show In/Out frame is identical to Show video in the *General Settings* and *Time Ruler* local menu. When activated this option outputs the corresponding frame on the monitor or video player (*Video* window) when you change the In or Out fields. Available only for *Video clip*.

7.6 *Repeat Clip* dialog box
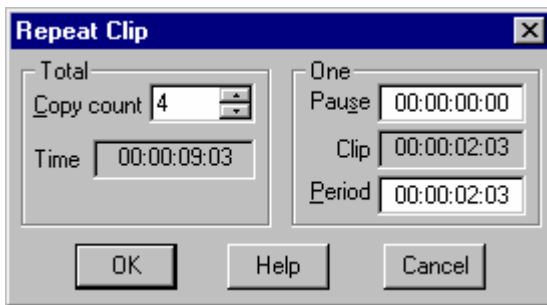
This dialog box is used to create additional copies of any clip on track in the *Working Area* and can be called by the Repeat clip command from the clip local menu. Each created copy is an independent clip, and the initially copied clips are almost identical (except their positions in the project). Each copy inherits the general clip parameters, such as clip duration, position in the source file, *place marks*, as well as properties specific for the clip's type, such as volume and balance profiles and audio effects for *Audio* clip.

Values of time position or time interval are presented in the current time format.

Copy count is used to set the number of new copies. For example, with the counter value set at 4 you will get 5 identical clips.

Time shows the value of time interval occupied by newly created repeated units – 'period' multiplied by the number of copies.

Pause sets the duration of a pause inserted before each new copy.

Clip shows the duration of a clip.

Period sets the total duration of 'pause + clip' to be repeated.

Maximum values of all parameters depend on the vacant space after the clip and are interdependent. Note after editing the field it is recommended to switch to

another field by using the mouse or the Tab button to check the actual field value prior to pressing the OK button. For example, the value of Period may not be set larger if there is not enough space for the set number of additional copies.

Note that if time is measured in frames or SMPTE, the displayed time interval value is rounded to the start time of the nearest frame. This may be a bit misleading. To make sure everything is consistent, for a current format choose Time in milliseconds. The dialog box for the sample image is called for a project with the frame rate of 10 frames per second. It is easy to see that the time interval value is '00:00:09:02'.

7.7   Normalize audio
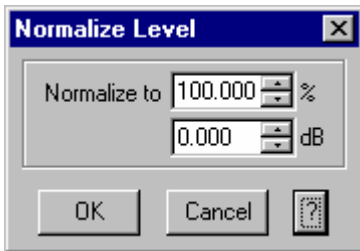
Normalize Level dialog box requests the maximum output audio level and adjusts the project master volume to the required level (in percents or decibels). If you select the Normalize command from the audio clip local menu, the same operation will be executed to adjust the clip volume.

The program mixes audio in selected range and finds maximum volume. Project or clip master volume is adjusted to match resulting maximum volume of audio to specified level.

If the project volume is normalized, this operation does not change the volume/balance profile, master volume of clips or tracks, instead it changes the project master volume. If the audio clip volume is normalized, the clip master volume is changed.

The Normalize audio command is available from the Command menu, *Range* window or audio clip local menus (to normalize an audio clip volume level, you may also press the N key on the keyboard when the mouse arrow is over this audio clip).

Attention! The maximum volume amplification is 12 dB (4 times). Thus, the program cannot normalize a file with the maximum level less than 25%. Second, if the resulting amplification for a clip sample exceeds 12 dB, the mixed signal may fail to meet the expectations. To avoid adverse effect on the clip quality,

watch the audio clip volume profile carefully – it should not touch the top edge of the clip.

7.8 *Audio Recorder* **dialog box**
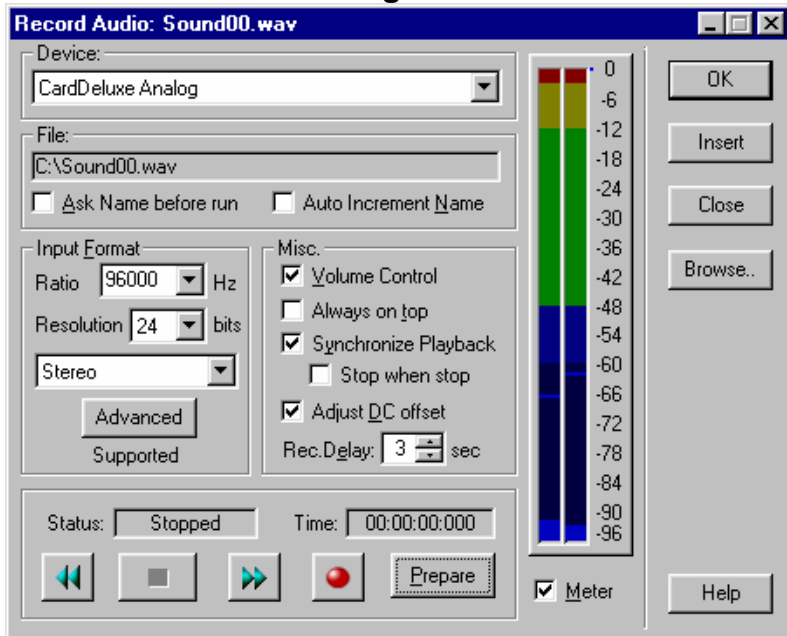
Using this dialog box you can record an audio clip and insert it in the current project. To call the recording dialog box, use the Command menu, the *Toolbar* button or press Ctrl+R on the keyboard (see also the section about keyboard accelerators).

The Device field defines an audio device for recording. Prior to recording, please, make sure that your selection of the input source (line/microphone/CD input etc.) and cable connections are correct.

Before opening this dialog box, Forward AV Studio may request the target file name (after you input the file name press the Save button to continue) if the Ask name before run option is on.

The current name of the recorded file is shown in the File group. You may select another name using the Browse button (select or type the desired name and press the Save button to continue).

Ask name before run – if this option is on, Forward AV Studio requests the target file name for the recorded audio prior to opening the recording dialog box.

Otherwise, the file name will be requested only when you have recorded the file and pressed the OK or Insert button. Auto increment name – use this option to record several fragments. After you have defined the name of the first file (for example, 'Sound00.wav'), the names of all fragments that follow will be incremented automatically ("Sound01.wav", 'Sound02.wav' etc.) when you press the Insert button to add the recorded fragment to the project without closing the audio recording dialog box.

Input format group defines audio format for recording. Ratio – audio sample rate, Resolution – audio sample resolution.

You can select the number of channels from the dropdown list: Mono (one channel), Stereo (two channels), Left / Right (one channel will be recorded from the left or right channel of the selected audio device).

Advanced button is available only for 24-bit resolution, it is used to call the advanced format selection dialog box.

Note that your soundcard must support the selected format for recording.

V.Control – if this option is on, Forward AV Studio displays the window of the *DDSound Volume Control* application to adjust the settings of the audio device selected for recording.

Always on top option is used to keep the recorder window on top, over the project and clip collections windows.

Synchronize playback option is used to turn on the playback of the current project during recording. This allows simultaneous playback of the current project and audio recording (during consecutive recording of many musical instruments). A project or its part will be played as specified in the *General Settings.*

If option Stop when stop is on, recording is automatically stopped when playback of project is finished (current time position reaches end of project). If this option is off, recording is continued until you press Stop button (even if playback of project is finished). **Note:** This setting is available only if Synchronize playback mode is on.

Note that your soundcard must support the full-duplex mode (simultaneous playback and recording in the selected format).

DC Adjust – turns on/off the real time compensation of DC-offset during recording. You may also use automatic DC-offset compensation during playback.

Rec.Delay sets the delay between a click on the Record button and the actual start of recording.

Status shows the current state of the recorder. Time shows the current time position in the recorded file.

7. Dialog boxes

The Rewind and Fast Forward buttons are used to rewind to the beginning or forward to the end of the recorded file. The end of the resulting file will be at the end of the fragment recorded the latest.

The Stop button stops recording. To record the next fragment, press the Prepare / Record buttons again. Use the Rewind button to repeat the recording of a file from the beginning.

The Record button is used to start recording (not instantly if the Prepare button has been previously pressed).

The Prepare button initiates preparations for the process of recording. It is used to start recording almost instantly as soon as the Record button is pressed. The preparation is of primary importance if the recording is in the full-duplex mode (when the Synchronize playback option is on).

Note: The 'Record' and 'Prepare' buttons may be disabled if your soundcard cannot record audio in the current audio format. Check that you have selected an appropriate format and that 'Supported' is shown in the 'Input format' field.

Meter – if this option is on, the input audio volume level is displayed on the indicator. This indicator is similar to that used in the *Audio meter (Faders)* dialog box; its parameters can be set in the *Audio meter Settings*.

The OK button closes the dialog box and inserts the recorded file to a project and clip collection. In the Synchronize playback mode the file will be inserted at the current time position (on the first empty track) or should be placed manually with the mouse.

The Insert button inserts the recorded file to a project and clip collection without closing the dialog box so you can record a great number of takes of the desired fragment and listen to the recorded fragment without closing the recording dialog box.

Note: the recorded clip is inserted to the first empty track. You may need to move the clip to another track without changing the clip's starting time. To do this, press the mouse left button on the clip, hold it and press the up/down arrow key on the keyboard. Release the mouse button when the clip is moved to a desired track. If you have recorded many takes, you may include not all of them in the playback. Use the "Mute" buttons on the track state window to exclude the unnecessary tracks from the playback. Use Always on top to ensure that the recording dialog box is not hidden on pressing the Mute / Solo buttons in the Project window.

The Close button closes the dialog box and deletes the recorded file.

7.9   Configure external applications dialog box
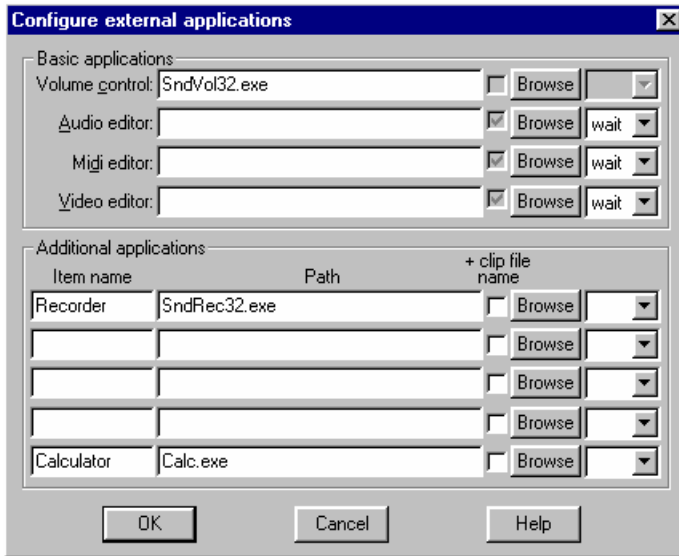
This dialog box is used to set the correspondence between the commands on the Tools menu and external applications (external editors, calculator etc.).

Basic applications group defines external applications associated with the first 4 commands on the Tools menu.

Additional applications group defines additional applications, which are optional. If any text label in the Item name column is non-empty, it appears as a command in the Tools menu.

Path contains the complete path to the files of external application.

+clip filename – if this option is on, the clip source file name is added to the command line of an application.

Browse button allows manual selection of an application executive file in the standard *Open File* dialog box.

Wait / lock switch is used to change Forward AV Studio operation when an external editor for source file editing is opened (with the Edit / Editor command on the clip local menu). If wait is selected, Forward AV Studio gets locked until the file has been edited and saved and the external editor has been closed. Note that if the same editor is launched regularly, it may open the file you want to edit using an opened external editor. In this case Forward AV Studio is immediately

reactivated and the file is reopened so you cannot save it in the external editor. In this case, use lock instead of wait.

If lock is selected, Forward AV Studio will show the warning message and get locked until the OK button in the message box is pressed. Do not press OK until you have finished editing and saved the file in the external editor! After the editing has been finished, press OK to return to Forward AV Studio and reopen the edited file.

You may also launch editing of the multiple source files in the external editor in lock mode simultaneously. Select desired clips and select corresponding item in the Tools menu (or press Shift+E when desired clips are selected). Forward AV Studio will launch the external application for each selected source file. Many audio editors detect that an instance of editor is already running and open all files in only one running instance. It is recommended that you should keep the external editor always running before launching of editing of multiple files in it. There may be some problems (especially on slow computers) if the external editor was not already running before launching of editing of multiple files in it (multiple instances of the editor instead of one may be launched or some files may be skipped).

If the empty field is selected, the external application will be launched immediately without closing/opening a file and locking Forward AV Studio. For example, this may be useful for calling the Calculator.

This dialog box is called by the Configure command from the Tools menu.

7.10 *Fade Profile* dialog box
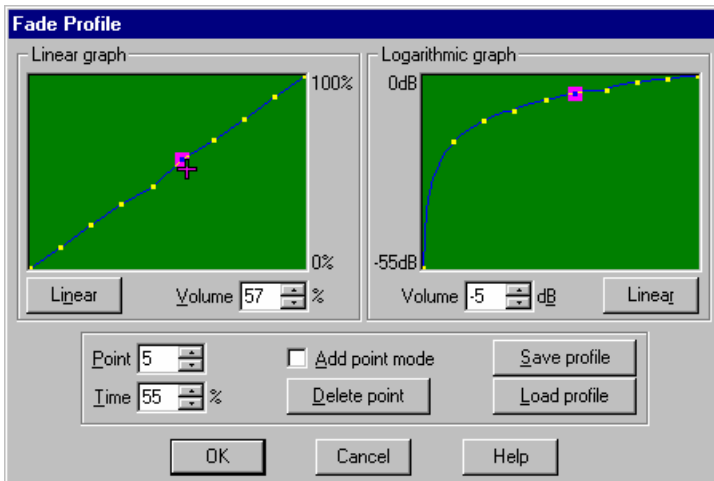
The Options / Fade profile command from the *Project* window is used to call this dialog box.

This dialog box specifies the shape of *FadeIn* profile. *FadeOut* profile is similar to *FadeIn* profile except that it is reversed in time. The profile is shown in both linear and logarithmic scales. Between any adjacent points the profile is interpolated linearly (in logarithmic scale it looks like a bend). Any selected key point is encircled by a pink square.

Linear buttons are used to place points equidistantly in a relevant scale.

Volume allows the volume of a selected point to be set in a relevant scale.

Point shows the number of a selected point number.

Time allows setting the time position of a selected point.

Add point mode allows adding key points to a profile. Each click in the profile window adds a new key point.

Delete point deletes a selected point from the profile.

Save profile saves the current profile into a file. By default the file has .FPR extension.

Load profile loads the saved profile from a file.

When the cursor approaches the key point, it changes its shape to a cross-like figure. Click once to select the key point. The selected key point can be dragged with the mouse. The key point cannot be placed before and below the preceding point or after and above the following one. The first and last points cannot be moved.

The FadeIn and FadeOut commands multiply current volume profile of clip(s) by fade profile. Profile scales to the specified time interval; interval definition depends on from where command is issued.

The FadeIn command from the *Audio clip* local menu applies (multiplies) fade profile to clip volume from start of the clip to point, where local menu was called with the right mouse button; the FadeOut command applies fade profile from specified point to the end of clip.

If commands are issued from the Range menu, profile is applied to range interval.

The Edit / CrossFade command is available only if exactly 2 overlapping clips are selected, and is equivalent to FadeOut in first clip and FadeIn in second in overlapped interval.

7.11 Time marks
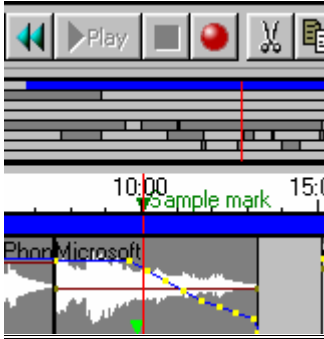
Time marks can be used to align and synchronize clips and to mark clips and *Time Ruler* with text labels. Various objects can be attracted (snapped) to the marks: the current time position, clip edges and marks on clips being dragged. The types of object, snapping distance and other alignment parameters can be defined in *Alignment Settings*.

The mark can be set in the *Time Ruler* or in a clip on track. In the *Time Ruler* the mark has a fixed, 'absolute' time position in the project. The mark on a *clip* has a fixed time position from the beginning of the source file and is moved together with the clip. Clip resizing does not affect the positions of marks on a clip.

When the mouse cursor is close to a mark, it changes its shape to ∇^{Mark}; now the mark can be dragged and moved with the mouse left button. When the mark is dragged in the *Time Ruler*, the *current time* position also changes.

The *Time Ruler* and clip on track local menus have the following commands:

Add mark   sets the time mark at a specified point.

When the local menu is called on an existing mark (the mouse cursor's shape turns into ∇^{Mark}) and the Add mark command is replaced with the following commands:

Set mark position...   calls the dialog box to set the position of a time mark;
Mark info...   allows setting the mark name and text information and changing the number of group the mark belongs to, in the *Mark Info* dialog box;
Remove mark   removes the mark.

Marks can be arranged in groups (up to 9 groups). Only one group can be active. Using the Next mark group button on the *Toolbar* or View menu you can make the groups become active in a cycle. The number of the active group can also be set in the *Alignment Settings*.

The mark of an active group is displayed as a solid green and the mark of an inactive group as a solid gray triangle.

How all this works. By default any mark attracts the *current time position*. Suppose that you set a time mark on the *Time Ruler*. If the *current time position* is dragged and the distance between it and the mark becomes less than the preset snap distance, the *current time position* jumps to the position of the mark. As long as the distance between the cursor and time mark remains less than the snap distance, the *current time position* is kept at the position of the mark. The alignment of all other objects can be done in a similar way: the clip edges, mouse cursor (the point on a clip where the mouse button is pressed for dragging) and marks on clips. In the *Alignment Settings,* you can define the objects to be snapped to marks.

7.12 Mark info dialog box
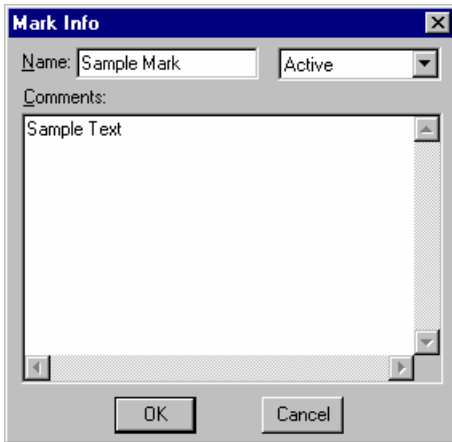
In the *Mark Info* dialog box, you can set the text label (name) of a mark, input text information (comments, remarks etc) and select the group that the mark belongs to (in the list at the topmost right edge of the dialog box). The text label is shown together with the mark symbol (triangle), text information is shown when the mouse cursor has been moved and held on a mark for about one second.

On the *Time Ruler* (not on clips), two special types of marks can be placed.

Export separator	use this type to mark the places where the project is to be divided into parts for their exporting into a few WAV-files.

Stop playback   when you start playback and the current time position reaches a mark of this type, the playback is terminated. Note that if you start playback with a double-click on the *Project Overview* window or on tracks in the *Project* window, or if you start the preview in the audio effects list, the playback would start from a specified position to the end of the project with all Stop playback marks being ignored! To use such marks, you should start playback with the Play button on the *Toolbar* or from the keyboard with the Space key (see also the section about keyboard accelerators).

Marks of these two types have their own colors different from other marks. Other colors can be set for these marks in *Colors Settings*.

7.13 Clip selection

Each clip on track is displayed as a rectangle with the clip name in its upper left corner. The rectangle height is equal to that of the track. The rectangle width is determined by clip duration and current zoom factor. Clip background color depends on whether the clip is selected or not.

One or many clips may be selected, see Selection in *Clip operations summary*. Clips of the current selection group are displayed in dark green. Clips of other groups are displayed in dark blue. Unselected clips are displayed in dark gray color.

Up to 9 clip selection groups may be defined. It is possible to change the number of the current selection group in the *Selection Settings*. The Next selection group command on the *Toolbar* or View menu is used to make the group become active in a cycle.

Delete, Move, Cut, Copy and some other operations (see the Edit menu, *Clip operations summary*) work with all clips of the current selection group.

7.14 Time Format

Forward AV Studio can show time values in the following formats:

Time in Frames

The time is measured in frames. The current Frame rate (see *Video Settings*) is used to convert the time into frames. For example, at the frame rate of 25 fps one second of time will be displayed as '25′' or '25fr'.

Time in SMPTE

SMPTE format – 'Hours : Minutes : Seconds : Frames'

One second time label will be displayed as '00:00:01:00' or '00:00:01:00fr'.

Time in milliSeconds

This is the following format: 'Hours : Minutes : Seconds : Milliseconds'.

For example, one second time label will be displayed as '00:00:01:000' or '00:00:01:000ms'.

To set the current time presentation format, call the *Clip Collection* window from the View menu on the *Toolbar*, and from the View menu in the *Project* window.

7.15 Numbers editing

Almost in all dialog boxes, you can use the mouse to edit numeric fields.

Place the cursor over a desired digit, press and hold the mouse right button (the digit will be selected). Hold the button while dragging the mouse up/down to increment/decrement the digit value.

You may also use up/down arrows (at a step of 1) and PageUp / PageDown keys (at a step of 10) on the keyboard to increment/decrement numeric values of integers. The values of fractional numbers (such as decibels in the *Clip Volume* window) can be edited by up/down or page up/down keys for adding/subtracting 0.1 and 1.0, respectively.

7.16 Clips volume offset dialog box

In this dialog box you can change or set the volume of a group of selected clips at once. This dialog box can be called with the Clip(s) Volume Offset command from the local menu on any selected clip or by pressing Shift+V (see the section about keyboard accelerator).

When Offset is selected, you can type any offset of the volume to increase or decrease the volume of all selected clips at once. For example, if you have selected two clips with the volume of –1dB and 2dB set the volume offset at 3 dB and you will get the clips with the volumes of 2 dB and 5 dB, respectively. When Set is selected, you can set the volume equal for all selected clips.

8   Clip Collection
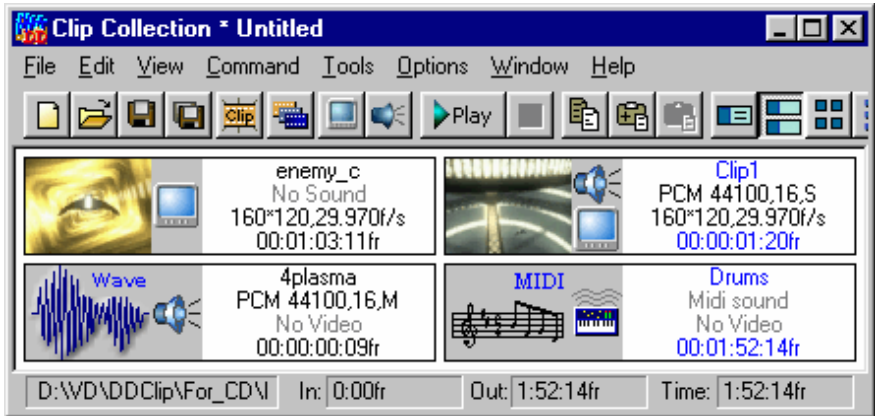
Clip Collection may be considered as a handy storage of multimedia data, which can be used in projects. It contains the list of source multimedia files with additional information, for example, pictures of audio waveforms (it is used to open a project almost instantly without re-scanning the audio files) and preview images for video clips.

By default a clip collection can be saved to a file with *.PRC file name extension. By opening a project you automatically open the associated collection file. While working on a project you can also open and save other clip collections.

There are different ways to add source files to a collection: you can drag files from the *Windows Explorer* window by using the Add source file command from the File menu or you can open you from the local menu (by clicking the mouse right button over the collection's background and then choosing the Add source file command). Another way is to double-click in the *Clip Collection* window (the last three commands open the *Open Clip* dialog box where you can add many files at once). When a source file is opened in Forward AV Studio, a new clip with reference to the whole file content is added to the *Clip Collection*. To change the position of the *Clip Info* window, drag it with the mouse left button or use the Up/Down / Left / Right keys with the Shift key pressed (select the clip by clicking on it before doing this).

Each clip in the *Clip Collection* window is represented by the *Clip Info* window. Clips can be dragged from the *Clip Collection* to the *Project* window – move the black box to a desired place and release the mouse button to place the clip on

track (if you decide not to add a clip to the project, do not release the mouse button but drag the clip back to the collection). In the collection you can keep not only source files, but also some clips with the edge position and duration different from those of the source file (copy the clip from the track to the clipboard and paste it to the collection).

Right click on the collection background to call the local menu with the following commands:

Add source File	call the *Open Clip* dialog box to add clip(s) with reference to the whole source file(s) content.
Paste	add all clips from the *Clipboard* to the *Clip Collection*.

The following 4 commands are used to customize the appearance of the *Clip Info* windows:

Full Info	show maximum information about clips.
Basic Info	show basic information about clips.
Large Icons	show clips as large icons.
Small Icons	show clips as small icons.

In the *Clip Collection* window there are accelerator keys, the *Toolbar* and the following menus: File, Edit, View, Command, Tools, Options, Window, Help.

8.1 Clip Info window

Each clip in the *Clip Collection* window is represented by its *Clip Info* window. There are four variants of its representation:

Full Info is the most informative window. It displays the clip name, source file path, audio parameters (sample rate, bits per sample or audio format type, stereo/mono or No sound), video parameters (width*height, frame rate in frames per second or No Video), time In and time Out (the beginning and end position in the source file), duration. A thumbnail picture is drawn at the left.
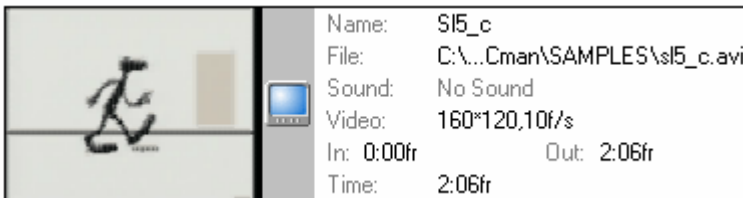
8. Clip Collection
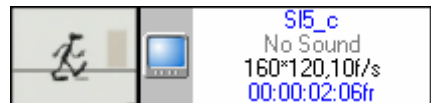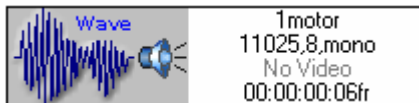
Basic Info window is more compact. It provides the same information as **Full Info,** except the source file path, time **In** and time **Out**.
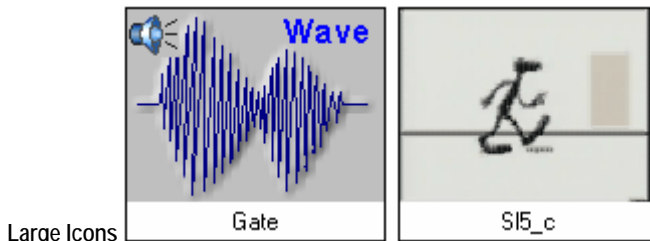
Large Icons

and **Small Icons** that contain only the clip name and have different sizes.

Note that if a clip from the *Clip Collection* is not used in the current project, its information is drawn in blue.

The current presentation of the *Clip Info* windows can be selected on the *Toolbar,* in the local menu (a right-click over the background) or in the **View** menu. Thumbnail picture (frame) for a Video clip can be selected on the **Thumbnail** panel of the *Clip Properties* dialog box. Audio and Midi clips have predefined pictures.

The type(s) of multimedia data in a clip are shown by the following icons:

 , - video. , - audio. , - Midi-sound.
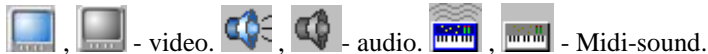
If an icon is grayed, the clip parameters are different from those of the project. Clip parameters can be adjusted in the **Tools** menu.

A clip may contain both *audio* and *video* data. If so, *both icons* are displayed. To disable audio or video in a clip (for example, in the opened source file there are

both video and audio, but you want to use video only), use Use Video or Use Audio in the *Clip Properties* dialog box. If audio or video is disabled, the corresponding icon becomes red-crossed:

, , or .

Local menu of the *Clip Info* window

A right-click on the *Clip Info* window calls the local menu with the following commands:

Play	playback this clip;
Change project video parameters	
	reset video parameters of a project (such as frame rate and video frame size) so that they match those of the current clip;
Change project audio parameters	
	reset audio parameters of a project (such as audio sample rate) so that they match those of the current clip.

These two commands are available only if the project's tracks are empty.

Launch Video editor	
Launch Audio editor	
Launch Midi editor	the items of the Launch 'data type' editor commands appear if the clip has multimedia data of the corresponding type(s). The *Editor* path can be set in the *Configure external applications* dialog box. The *Editor* application is launched by adding the clip's source file name to the application's command line;
Select source file in project	
	the same command as in local menu of clip on track. Selects all clips in project that correspond to the same source file as current clip corresponds to.
Purge	remove all clips that are not used in the current project from the clip collection;
Copy	clear the *Clipboard* and add the selected clip to the *Clipboard* (the clip is placed on the first track);
Add	add this clip to the *Clipboard* (clips are added consecutively on the first track);
Paste	paste all clips from the *Clipboard* to the *Clip Collection*;
Delete	remove the current clip from the *Clip Collection*.
Properties	call the *Clip Properties* dialog box.

8.2   File menu

New collection	create a new (empty) *Clip Collection*.

Open collection...	open the selected *Clip Collection* file.
Add source File...	add a clip with the whole source file content.
Add from collection...	add all clips from selected clip collection file to the current collection.
Save collection	save changes to the current clip collection file.
Save collection As...	save changes to a new clip collection file.
Close	close the current clip collection file. A clip collection file's name has extension *.PRC.
Recent collection files	here there is a list of the most recently used clip collection files (with *.prc filename extension). You can select any of the recent collection files to open it by its name in the list. If a collection file does not exist in its original location there appears an error message. If a clip collection has been moved to another place, open it with the Open Project command.
Recent clip folders	here there is a list of the most recently used folders to be used for opening the clips. Select any of the folders to add a source file to the clip collection. You can select and add many files at once.

The commands from this menu are also available on the *Toolbar*.

8.3   Edit menu

Change project video parameters	
	redefine project's video parameters such as frame rate and video frame size.
Change project audio parameters	
	redefine project's audio parameters such as sampling rate.
Video editor	
Audio editor	
Midi editor	the 'data type' editor command(s) appears if a clip contains multimedia data of the corresponding type(s). The *Editor* path may be set in the *Configure external applications* dialog box. To launch the *Editor* application, add the clip source file name to its command line.
Add all Files from project	
	add all files that are used in current project to clip collection. It may be useful if you have a project without clip collection or if you have lost clip collection file.

Purge	remove clips that are not used in the current project from the current clip collection.
Copy	clear the *Clipboard* and add the selected clip to the *Clipboard* (the clip is placed on the first track).
Add	add the current clip to the *Clipboard* (the clips are added consecutively on the first track).
Paste	paste all clips from the *Clipboard* to the *Clip Collection*.
Delete	remove the current clip from the *Clip Collection*.
Properties...	call the *Clip Properties* dialog box.

8.4   View menu

The first 4 commands are used to customize the appearance of the *Clip Info* windows:

Full info	maximum information about clips;
Basic info	basic information about clips;
Large icons	clips as large icons;
Small icons	clips as small icons.

The following 3 commands are used to sort clips in the *Clip Collection* window:

Auto Sort	sort clips in a collection each time a new clip is added;
Sort by Type	sort clips in a collection by type in the following order: *Video&Audio* clips, *Video* clips, *Audio* clips, *Midi* clips;
Sort by Name	sort clips in a collection by clip name.

The following 3 commands are used to select current time format:

Time in Frames	display time as a frame counter. One second 25 or 25fr for the video frame rate of 25 fps.
Time in SMPTE	'Hours : Minutes : Seconds : Frames'. One second 00:00:01:00 or 00:00:01:00fr;
Time in MilliSeconds	'Hours: Minutes : Seconds : Milliseconds'. One second 00:00:01:000 or 00:00:01:000ms

The buttons on *Toolbar* duplicate the above commands.

8.5   Command menu

Move selected clip to the project

add the selected clip to a project. You can just drag clips to the *Project* window using the mouse.

Move Unused clips to the project

add to the project all clips that are in a clip collection but not used in the project.

Move All clips to the project

add all clips from a clip collection to the project.

Select source File in project

	this command is analogous to the command in the local menu of clip on track. Select all clips corresponding to the source file of the selected current clip.
Play	start playback of a selected clip.
Stop	stop playback of the clip.

8.6   Tools menu

Convert WAVE	convert the source audio file into a WAVE-file with different parameters.
Convert AVI	launch the *AviEdit* application to convert a source AVI-file into another AVI-file with different parameters. In *AviEdit*, select the Save Options... command from the File menu, choose video or audio stream and press the Options... button, etc.
Convert MScamcorderAVI	
	prior to using this command, consider a possibility to update the corresponding CODEC, see URLs below. This update allows you to use the standard Convert AVI command. Otherwise use Convert MScamcorderAVI. Choose a source file, and then define an output AVI-file. The source AVI-file will be played on the screen and grabbed into the output AVI. Wait until the end of conversion, do not open or minimize the windows, do not move the mouse etc.

8.7   Options menu

Font...	set a font for clip information display.
Color...	set a color for clip name's presentation in the Small Icons *Clip Info* windows.
Skip Video	don't use video from all source files while adding new clips to a project from the *Clip Collection*.
Skip Audio	don't use audio from all source files while adding new clips to a project from the *Clip Collection*.
Save Options	save the program settings.

Forward AV Studio automatically saves the current program settings on exit. These settings will be used the next time you run Forward AV Studio. On Forward AV Studio abnormal termination, the program settings will not be saved. The Save Options command from the Options menu in the *Project* window and Options menu in the *Clip Collection* are used to save the program setting at any time.

8.8   Window menu

Project	activate the *Project* window.
Faders (Audio Meter)	activate the *Faders* window.
DDSound Volume Control	
	activate the *DDSound Volume Control* window (see also *Devices Settings*).
Video	show the *Video preview* window if possible.

8.9   *Clip Properties* dialog box

This dialog box can be called in the *Clip Collection* by the Properties command on the local menu of the *Clip Info* window or Edit menu. The following tab panels present various clip parameters:

General	clip name, source file name, size, etc;
Video, Audio, Midi	multimedia data specific info. Use Video and Use Audio switches;
Thumbnail	video frame for a thumbnail picture;
Summary	information fields embedded into the source media file.

8.9.1   Clip Properties. General
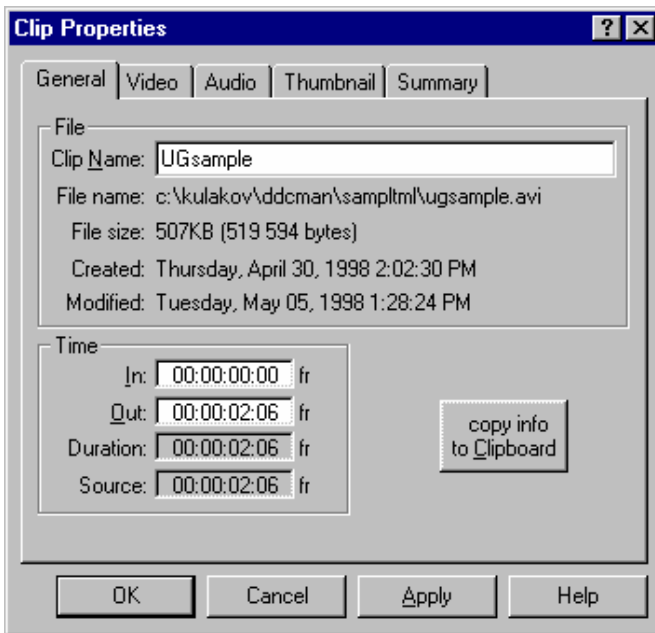
Clip Name is an arbitrary label associated with the clip. The name of the source file is assigned by default. Clips with different parameters may have the same name. A clip is not uniquely identified by its name.

File Name shows the path to the source file. File Size shows the size of the source file in bytes and kilobytes (KB), 1 KB=1024 bytes.

Created and Modified show the dates of the source file creation and modification.

The group of Time group contains the following information:

In, Out – start and end of a clip in the source file.

Duration – clip duration, the effective difference between Out and In.

All values are displayed in the current time format and depend on the current value of video Frame rate on the Video tab panel.

Copy info to the clipboard button is used to copy all clip-related information to the *Clipboard* in text format. You can paste it into any text editor, save to a file, print etc.

8.9.2 Clip Properties. Video
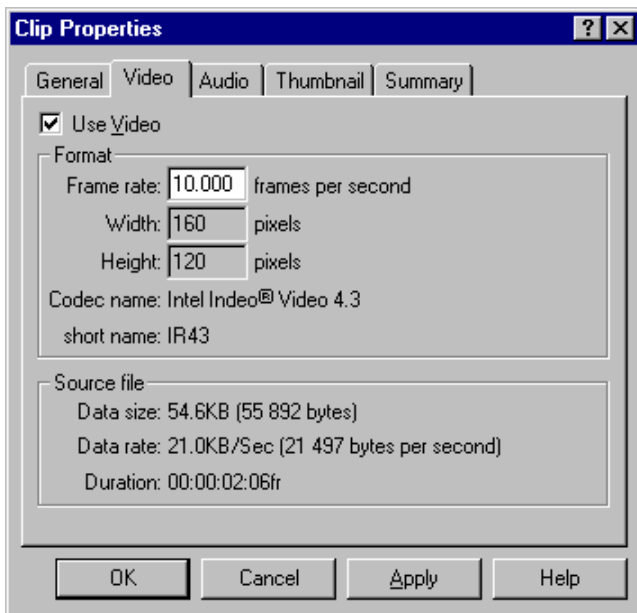
This panel appears if the clip's source file contains video data. If unchecked Use Video disables the use of video data from the source file. This makes sense when the source file contains both video and audio.

Frame rate is measured in frames per second. It determines the duration of playback for video. The frame rate of the source file is displayed in the info area at the right of the *Open Clip* dialog box. The frame rate can be changed provided in the current project there are no clips referred to video data of the source file.

Width and Height present geometrical parameters of the video frame.

Codec name and short name provide two variants of video CODEC name.

Data size shows the size of video data in the source file.
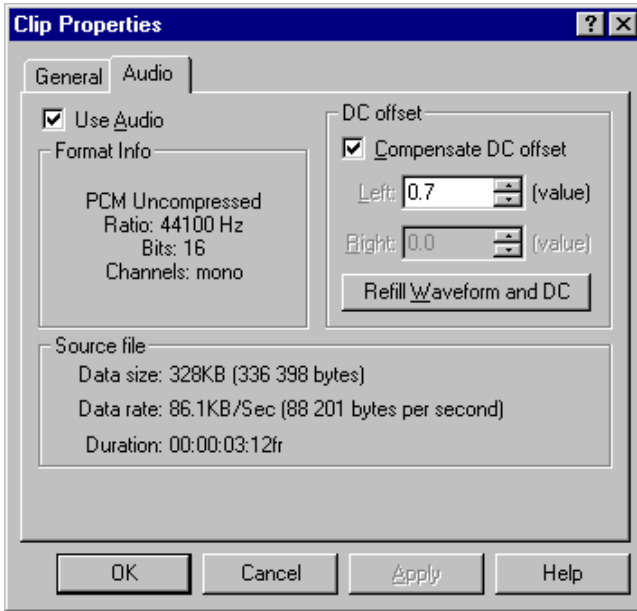
Data rate shows the averaged video data stream.

Duration shows the duration of video data of the source file in the current time format.

NOTE, that the current frame rate is used to calculate Data rate and Duration, see above, as well as the values in the In, Out, Duration fields on the General panel. No change in the frame rate can affect the duration of audio playback. If both Use Video and Use Audio are enabled and the current frame rate value is greater or lower than that of the source file, audio data inserted into the project will be truncated or padded with zeros, respectively. It may be convenient for duplicating clips when only Use Video is enabled for one copy and only Use Audio for the other.

8.9.3 Clip Properties. Audio

This panel appears if the clip's source file contains audio data.

Use Audio – turning this option off disables the use of audio data from the source file. This makes sense when the source file contains both video and audio.

The Ratio parameter shows the sample rate of audio in the source file.

The Bits parameter shows the number of bits per sample (audio format).

Channels show mono / stereo for one or two channels, respectively.

Data size shows the size of audio data in the source file.

Data rate shows the averaged audio data stream.

Duration shows the duration of the playback of audio from the source file in the current time format.

Compensate DC offset is used to compensate DC-offset of the audio in the source file automatically. See also *Audio Settings*. Note that this requires additional computations and may slow down the performance during playback.

Left / Right – show DC-offset in each audio channel in sample values (maximum value of 32576). If it is equal to 0, no DC-compensation is needed. You can adjust it manually (however, it is unnecessary in most cases).

Refill waveform and DC – press this button to re-read audio from the source file, refill its waveform picture, recalculate DC offset and show it in Left / Right.
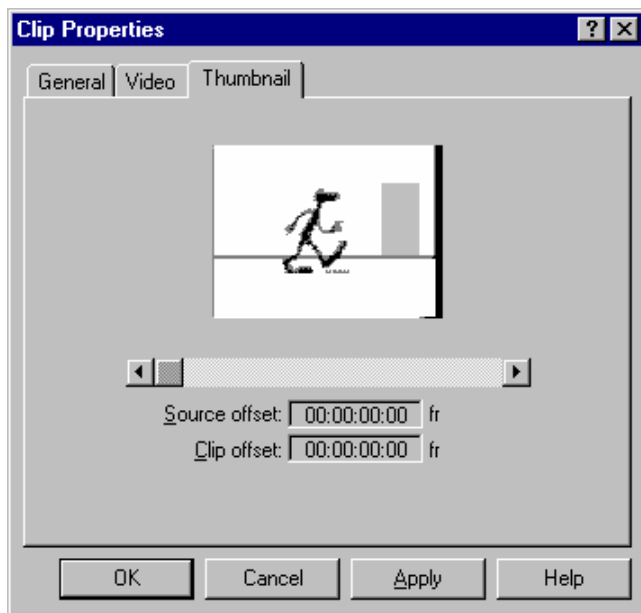
8.9.4   Clip Properties. Midi
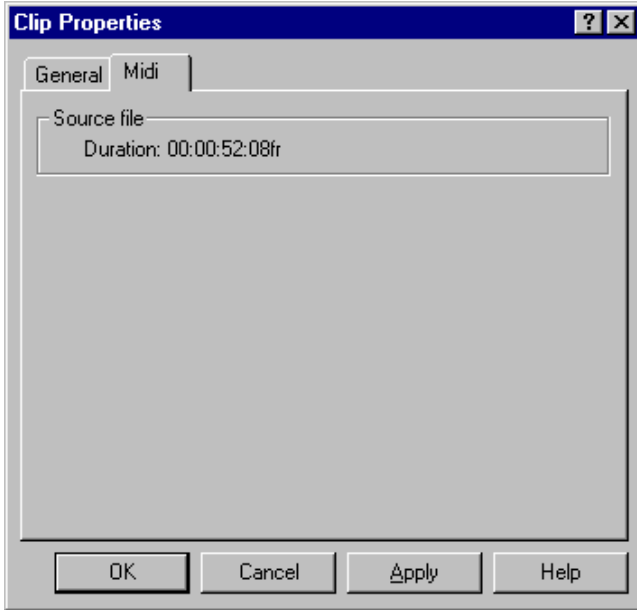
This panel appears for midi clips only.

The Duration parameter shows the duration of playback of the source midi-file in the current time format.

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8.9.5 Clip Properties. Thumbnail

This panel appears if the clip source file contains video data. The slide bar allows selecting the video frame that will be displayed on the clip in the *Clip Collection* window.
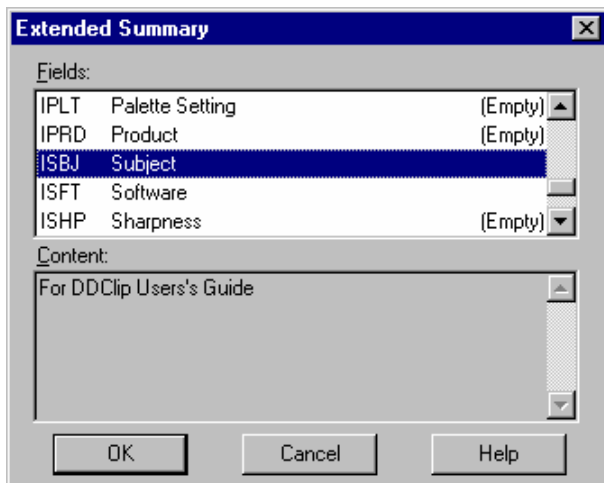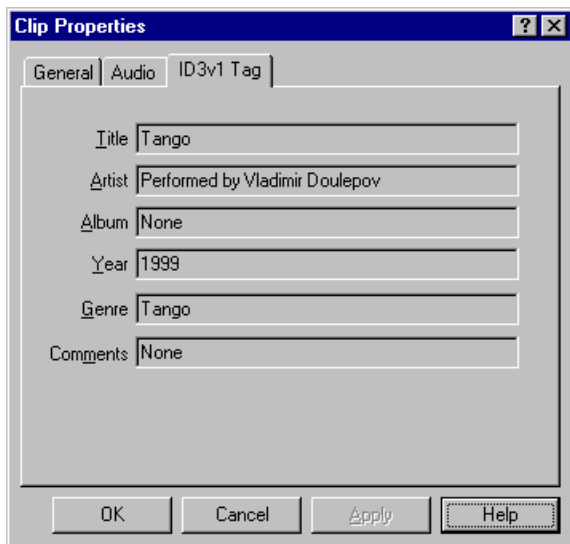
8.9.6 Clip Properties. Summary

A clip of the source file may have various embedded information fields. Some of these fields are presented on this tab panel. See also the section *Summary Settings*.

Use the Extended button on the Summary tab panel of the *Clip Properties* dialog box to call the *Extended Summary* dialog box.

8.10 *Clip Properties*. **ID3-tag Summary**

Audio clip compressed in mp3-format can contain summary stored in ID3-tag header. Its fields describe song title, artist, album name and year of release, musical genre and some text comments.

8.11 Toolbar. Clip Collection

The first 5 buttons on the *Toolbar* duplicate the commands on the File menu.

create a new (empty) clip collection. Confirmation requested for saving changes to the current *Clip Collection* or canceling the creation of a new collection;

open the selected clip collection file;

save changes to the current clip collection file. For the newly created collection, a file name is requested. By default, clip collection file has *.PRC extension;

save changes to a new clip collection file;

call the *Open Clip* dialog box to add a new clip to the current clip collection;

switch to the *Project* window. See also Project on the Window menu;

when the button is pressed and grayed, video will be skipped when you drag clips from clip collection to *Project* window. Use this button to use audio only from clips with video and audio;

when the button is pressed and grayed, audio will be skipped when you drag clips from clip collection to *Project* window. Use this button to use video only from clips with video;

playback the selected clip. See also Play on the clip local menu;

stop the playback. See also Stop on the clip local menu;

Clipboard commands are also available on the Edit and clip local menus. Note that from the *Clipboard* clips of the *Clip Collection* will be inserted on the first track of appropriate type in the *Project*;

clear the *Clipboard* and add the clip to the *Clipboard* (the clip is placed on the first track);

add this clip to the *Clipboard* (clips are added consecutively on the first track);

paste all clips from the *Clipboard* into the *Clip Collection*.

Buttons in this part of the *Toolbar* duplicate the commands on the View menu.

First 4 buttons in this part control appearance of *Clip Info* windows:

(Full Info)   maximum information about clips;

(Basic Info)   basic information about clips;

(Large Icons)   clips as large icons;

(Small Icons)   clips as small icons.

The following 3 buttons are used to control the order of clips in the *Clip Collection* window:

sort the clips in the collection upon addition of a new clip;

sort the clips in the collection by type in the following order: *Video and Audio* clips, *Video* clips, *Audio* clips, *Midi* clips;

sort the clips in the collection by clip name.

The following 3 buttons allow selecting current format for time values:

Time in Frames, time as frame counter. One second 25 or 25fr for video frame rate 25 fps;

Time in SMPTE, Hours : Minutes : Seconds : Frames'. One second 00:00:01:00 or 00:00:01:00fr

Time in milliSeconds,
"Hours : Minutes : Seconds : Milliseconds". One second 00:00:01:00 or 00:00:01:00fr

8.12 Clip Collection Accelerators ('Hot keys')

Action	First accelerator	Second accelerator
File operations		
Open source file(s)	Insert	F4
New clip collection	Ctrl+N	Shift+F3
Open clip collection	Ctrl+O	F3
Add from clip collection(s)	Ctrl+Shift+O	Ctrl+F3
Save clip collection	Ctrl+S	F2
Save clip collection as	Ctrl+Shift+S	Shift+F2
Edit operations		
Delete		Delete
Add to clipboard	Ctrl+Shift+C	Ctrl+Shift+Insert
Copy to clipboard	Ctrl+C	Ctrl+Insert
Paste from clipboard	Ctrl+V	Shift+Insert
Remove unused clips		Shift+Delete
Arrange operations		
Move current clip up	Shift+Up arrow	
Move current clip down	Shift+Down arrow	
Move current clip to right	Shift+Right arrow	
Move current clip to left	Shift+Left arrow	

8. Clip Collection

Select operations		
Select upper clip	Up arrow	
Select lower clip	Down arrow	
Select right clip	Right arrow	
Select left clip	Left arrow	
Other operations		
Playback clip	Enter	Space
Stop clip playback	Enter	Space Esc
Show *Project* window		F6
Show *Faders* window		F7
Show *DDSound Volume control* window		F8
Show *Video* window		F9
Exit	Ctrl+Q	

9   Playing video on *FD300* boards

If there are some *FD300* boards correctly installed in the system, you can perform video playback on any of these boards from *Forward AV Studio* (version 3.51 or higher). Open Options dialog (press F5), select Video tab and select the following Playback mode from the drop-down list: Decompress to SLTM player (FDTM board).

If there is no such choice in the list, be sure that:

- software and drivers for *FD300* boards of the latest version are properly installed;

- the boards are functioning properly (in the system Device Manager);

- the *FDConfig* application can be launched successfully and it does not show any error messages;

- you are using the latest version (3.51 or higher) of *Forward AV Studio*.

Typically proper installation of the latest version of *FD300* software and *Forward AV Studio* should resolve the problem.

When you select Decompress to SLTM player (FDTM board) playback mode, the Properties button appears. Pressing this buttons shows dialog that allows you to select desired *FD300* board and tune its settings for video playback.

This dialog contains three tabs:

- General – general parameters;

- Format – board and video format selection;

- Output – settings of video-output of selected board.

You should tune parameters in these tabs before playing video.

9.1   General – general parameters

This page contains general video playback parameters.

Video Playback Status   this field contains currently selected *FD300* board index (you can select desired board in the Format property page) and current status of playback, for example: Playback on the board #0 is Enabled. Status string can include: Enabled – playback on current board is enabled; Disabled – registration of current board does not allow playback of video, please select other board or obtain a valid registration key for it; Locked – some other process is already performing playback on current board, select other board or stop playback in other process; Blocked –

some other process (usually *OnAir*) used all scenes for video playback on current board, select other board or close other process.

Automatically save / restore boards settings

turn this option on if you want settings of all *FD300* boards (such as video standard, video size, etc. – all parameters in the Format and Output property pages) to be saved and restored next time.

Upper field first

by default this setting is off, it means that interlaced video will be shown with lower field first. It is normal for DV and MPEG2-compressed video. Some other video formats assume inverted fields order (for example, *Forward*), turn this option on in this case to make upper field first.

Try to turn this option on/off if you encounter image flickering (broken moving etc.) on external TV monitor, possible reason can be that video fields order is inverted. Don't turn this option on for deinterlaced (progressive-scan) video material. You may also try to use option Automatically detect fields order by compression type. The right fields order will be detected automatically by video compression type.

Autodetect fields order by compression type

this option is turned on by default – it means that fields order will be detected automatically by video compression type. If you encounter incorrect fields order (the image is flickering on external TV monitor), turn this option off and try to change fields order manually with the previous Upper field first option.

Show video on board as

select what video mixer input will be used to show video being played: Foreground – foreground, or artist (set by default); Background – background (will be hidden if there is a non-transparent video in the foreground); Alpha – alpha channel (only alpha channel of video will be shown, or luminosity component of the image will be used as alpha channel if there is no alpha channel in the video); Title – title (will be shown over any other video).

Important: if you want to play video with alpha channel, use only Title mode, because in other modes only video without alpha channel (Foreground and Background

modes) or only alpha channel (Alpha mode) will be shown!

The video might not be shown if it is hidden by other non-transparent video in some mixer input. Turn on the next option if you want to be sure that video is shown on the board output.

Force show video and hide other mixer inputs

turn on this option if you want to be sure that video is shown on the board output. Video on all other mixer inputs will be turned off in this case.

The Video Format Information group includes the following:

Input / output format   this field shows two types (FOURCC codes) of formats: the first one is format of source (compressed) video, and second one is output format on the *FD300* board (can be Y16/Y16A – without/with alpha channel).

Important: registration of selected *FD300* board must allow video playback on it! Be sure that the status string is ending with Enabled before working.

There should be no other applications (like *OnAir*) that perform video playback on the same *FD300* board (status string can be ending with Locked or Blocked). Close such applications or select other *FD300* board for video playback in the Format page.

9.2   Format – board and video format selection

This page allows you to select desired *FD300* board for playback, select video format and image size on selected board.

Board index – index of currently selected *FD300* board.

TV Standard – output TV-standard, can be PAL or NTSC.

Image size – output image size, can be half or full resolution.

Width – current width of output image in pixels.

Height – current height of output image in pixels.

Width and height depend on the selected TV standard and image size.

Important: some values can be restricted by the registration of selected *FD300* board or by running application, and you will not be able to select some values of some settings in this case.

9.3   Output – settings of video-output of selected board

This page allows you to adjust parameters of video output of selected (in the Format tab) *FD300* board: video output path, output analog signal type, and genlock settings.

Video output switching   output bus mode of *FD300* board. It can be one of: Internal –> analog encoder – analog output only; Internal –> analog encoder + digital bus – both analog and digital outputs; Digital bus –> analog encoder – get video data from digital input of *FD300* board and transport it to its analog output.

Important: if you don't have digital video source connected to *FD300* board, use only first mode!

Analog video encoder type

the type of output analog video signal. If you want to have composite signal in the output, select YUV+CVBS type.

Important: please read the Breakout box section in the *VS2000* user's guide for more details about signal types and video output connections.

Genlock Internal Video Output   group allows you to select mode of video synchronization (genlock):

Source   selected synchronization (genlock) source. It can be one of: Master – genlock by internal clock source of *FD300* board; Line 1 – genlock by video signal from the input line 1; Line 2 – genlock by video signal from the input line 2.

X offset   horizontal synchronization offset. Default value is 550.

Y offset   vertical synchronization offset. Default value is 2.

SC Phase   synchronization delay of color splash phase. Can be used for synchronization of composite signals, default is 0. It is not recommended to change this setting unless necessary.

Changing of X and Y-offset allows you to obtain accurate synchronization to genlock source signal.

Important: some values can be restricted by the registration of selected *FD300* board or by running application, and you will not be able to select some values of some settings in this case.

10 Audio effects

10.1 Working with audio effects

Audio effects are special modules included with *Forward AV Studio* for real time processing of sound (without using any temporary files and without changing the source files). The types of processing are different: equalizers (control volume balance between different frequency components of sound), digital filters (suppress various frequency components to get various effects), delays (to get effects like echo) and some others (even not processing sound at all, but getting some information about sound being processed). You can also use any external Direct-X plug-insprovided by third-party manufacturers.

Audio effects can be applied to audio clips, tracks and whole projects (a mix of all audio tracks).

Effects are grouped in lists that can have almost unlimited chains of effects. All effects can process audio in real time (you must have a computer fast enough to mix many tracks with audio effects applied in real time; however, any effect can be applied even on slow computers during the export of a project to the resulting file) without changing the source file and using temporary files. You can change any processing parameter during playback of an audio clip, a track or the whole project and hear the results almost instantly. For some audio effects you can change the quality of processing (see *Effects Settings*), which allows increasing Forward AV Studio performance during playing in real-time.

Effects can be applied and edited using the local menus of audio clips and tracks or the Edit and Command menus. You can cut/copy single effects and effects chain to the *Clipboard*, paste and save/load them using the *Effects List* dialog box.

Any effect or chain of effects can be turned on (used)/off (bypassed) without their removing or re-adding. If you have added an effect to a clip or track, it will be shown as a small triangle in the bottom left corner of the clip/ track state window (the triangle for master effects is shown on the current time window). The triangle is green if the effect is on, and red otherwise (these colors may be changes in the *Colors Settings*). You can access the effects list by clicking or double clicking on the triangle (you may change it in *Effects Settings*), or pressing A key on the keyboard when the mouse cursor is on the clip or track (see also the section about keyboard accelerator).

You can add/paste effects from the *Clipboard* to many selected clips simultaneously: copy the desired effects to the *Clipboard*, select a group of clips and use the Audio effects submenu of the Edit menu. Use the same menu if you want to remove or turn on/off effects on many clips.

10. *Audio effects*

You can control the parameters of audio effects in real time in different ways: by using the Preview button in the *Effects List* dialog box or by starting playback of the project and calling the effects list of any track or the whole project (master effects), by using A key on the track or through the *Faders* window. This latter way allows you to control the parameters of audio effects during playback on different tracks and master effects simultaneously.

All these features provide very effective and flexible work during audio mixing and processing by Forward AV Studio.

All audio effects process audio during real-time playback without any changes of source audio files and without use of temporary files. You can change any parameter of processing during playback of audio clip, track or project and hear the result almost instantly. You can change quality of processing for some audio effects; it allows you to increase performance of Forward AV Studio during real-time playback (read description of particular effects to know if they support different processing qualities or not).

You must have computer fast enough to mix many tracks with audio effects applied in real-time. However, any effects can be applied even on slow computers when exporting project to a resulting audio file (when saving it using Export *command in the* File *menu).*

Audio effects can be applied to audio clips, tracks and entire project (mix of all audio tracks). Audio effects are organized as effects lists that can include almost unlimited chains of effects. Sound is being processed in correspondence with order of effects in chain.

Presence of audio effects is shown as small triangle on the bottom left corner of clip, track state window or current time window (for master audio effects). If triangle is green, effects are on (active), if it is red, effects are off (bypass).
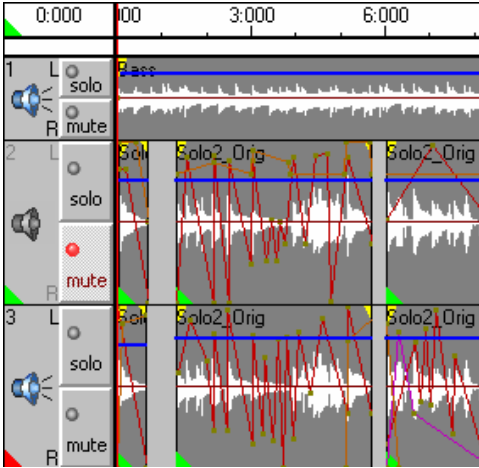
Colors of triangles can be changed in *Colors Settings*. Click or double-click on triangle opens audio effects list dialog (depending of *Audio effects Settings*).

You can use various ways to add or edit lists of audio effects:

To add or edit audio effects on a clip or an audio track via local menu, press right mouse button when mouse cursor is over an audio clip or track state window (at the left of an audio track). Press right mouse button on current time window to add or edit master audio effects for processing of entire mix of all audio tracks (you can do it from Command menu too). Find Audio effects item in a local menu, its submenu contains the following commands:

Add / Edit	calls audio effects list dialog to add or edit effects list
Use	turns effects list on/off (bypass)
Delete	removes effects list
Cut	removes effects list to clipboard
Copy	copies effects list to clipboard (you can also copy effects via drag-n-drop: see editing operations for details)
Paste	inserts or adds effects previously put to clipboard with one of previous two commands. If some effects were already present in current effects list, you will be asked what to do: replace current effects with ones of clipboard, or add effects from clipboard to the end of current effects list.

You can also use keyboard shortcuts to access audio effects list (see also section about other accelerators).

10. *Audio effects*

Tip: if you want to turn on/off, delete or paste audio effects on many clips simultaneously, select desired clips and use Edit/Audio effects menu commands.

Additional local menu is called by pressing right mouse button when mouse cursor is over a triangle indicating present of audio effects. You can also call it by pressing Shift+A when mouse cursor is over an audio clip, track state window or current time window (for master effects).
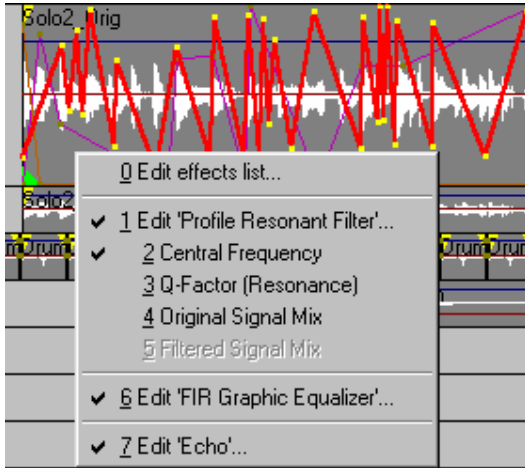
This menu allows you to quickly access desired audio effect or activate desired effect profile by selecting it from menu. If there were no audio effects when you want to activate additional local menu, audio effects list is opened to add new effects.

You can use keys on keyboard to perform audio effects editing operations. Move mouse cursor over an audio clip, track state window or current time window and press the following keys to:

A	open effects list to add or edit audio effects
Shift+A	call additional local menu for quick access to audio effect or effect profile
U	turn audio effects on/off

If audio effects are already present on clip, track, or entire project, move mouse cursor over triangle (that indicates presence of audio effects) and press the following key to:

Del	remove effects

Note: you can open effects list and turn effects on/off on tracks and entire project during playback (you can do it from Faders window too).

You can use *Faders* window to call audio effects lists for tracks and entire project (master effects) using Edit FX buttons. Use FX checkboxes allow you to turn on/off effects on desired tracks or master effects. All these operations can be performed during real-time playback.

You can tune settings of audio effects on different tracks and project independently and hear the result in the mix of all tracks during playback.

Using Audio effects submenu of Edit main menu, you can delete, paste/add and turn/on off audio effects on many selected clips simultaneously. For more details please read section about Edit menu.

Use Master effects submenu of Command main menu to add or edit master audio effects (for processing of mix of all audio tracks). For more details please read section about Command menu.

You can edit master audio effects using local menu of Current time window or using keyboard shortcuts on it.

For quick access to particular effects or effect profiles, you can use additional local menu. It can be called by pressing right mouse button when mouse cursor is over triangle indicating presence of audio effects.

10.1.1 Audio effects editing operations summary

Applying effects. Effects can be applied and edited through corresponding local menus of audio clips and tracks, through Edit and Command menus and *Faders* window. You can cut/copy single effects and effects chains to clipboard, paste and save/load them using *Effects List* dialog box.

Accessing effects. You can access effects list by clicking or double-clicking at triangle indicating presence of audio effects (you may change it in *Audio Effects Settings*), or by pressing A key on keyboard when mouse cursor is over an audio clip or track state window. Pressing Shift+A activates additional local menu for quick access to particular effect or effect profile.

Copying effects. Effects can be copied via drag-and-drop: move mouse cursor on triangle (that shows presence of audio effects), press and hold left mouse button (mouse cursor will change its shape), move mouse cursor to any clip, track state window (to copy effects to audio track) or current time window (to copy effects to master effects), and release mouse button. If there already were some audio effects on object that you want to copy effects to, you can replace them or add effects to the end of already existing effects list (you will be asked a question about it).

Turning effects on/off. Any effect or chain of effects can be turned on (used)/off (bypass) without removing and re-adding them. Effects can be turned on/off with U key and deleted with Del key on keyboard.

You can add/paste effects from clipboard to many selected clips simultaneously: copy desired effects to clipboard select a group of clips and use Audio effects submenu of Edit menu. Use the same menu if you want to remove or turn on/off effects on many clips.

Tuning effects. You may control parameters of audio effects in real-time playing by various ways: use Preview button in *Effects List* dialog, or you can start playback of project and call effect list of any track or entire project (master effects) using A key on tracks or through *Faders* window. This way allows you to control parameters of audio effects during playback on different tracks and master effects simultaneously and independently.

All these features provide very effective and flexible work when mixing and processing audio with Forward AV Studio.

10.1.2 Audio effects with profiles

Some audio effects that are included with Forward AV Studio allow you to define 'scenario' (profile) of change of their parameters in time. It means that you can not only set static values of effect's parameters, but you can also draw profiles on audio clips that denote how parameter(s) should be changed in time. Profiles of audio effects are edited with the same manner as when editing volume/panorama profiles, with mouse and keyboard shortcuts.

Name of each audio effect that supports profiles always start with Profile (see also description of particular effects to know what ones support profiles for their parameters). Such effects can be applied on audio clips only. All profiles of one audio effect are shown on clip simultaneously, but only one active profile can be edited. You can increase line thickness of line of active profile up to 3 pixels to make it better visible using *Audio* settings. To switch between profiles, use additional local menu on audio clips or audio effects list dialog.

Note that you must switch to audio effects profiles editing mode if you want to edit profiles of audio effects (use the icon on the toolbar). When you select active profile from audio effects list dialog or press Edit button in the dialog box of audio effect to edit desired profile, this mode is turned on automatically.

You can perform the following operations with profiles of audio effects:

1. Edit with mouse and keyboard shortcuts with the same manner as when editing volume/balance profiles on audio clips.

2. Switch between profiles. Select desired profile to make it active for editing – you can do it with additional local menu on audio clips, audio effects list dialog or Edit buttons in dialogs of audio effects.

3. Turn profiles on/off. If profile is turned on, static value of parameter is used instead of profile, and you can set the value manually in effect's dialog. You can turn profiles on/off in audio effects list dialog or in dialogs of audio effects.

Important: smooth change of parameters of audio effects with profiles requires significant amount of calculations during playback. Your computer must be powerful enough to use audio effects with profiles. If you encounter breaks in sound during playback, try to increase audio buffer size in Audio settings or select faster modes of processing for real-time playback in Audio effects settings (press F5).

10.2 Audio Effects List dialog box

This dialog box allows creating and modifying a sequence (chain) of audio effects to process audio clips, tracks or whole projects depending on where you add or edit audio effects (the title of this dialog box is 'Clip effects list', 'Track effects list' or 'Master effects list', respectively). The sound will be processed in the order the same with the order of effects on the list, from the top of the list to its bottom.

10. *Audio effects*
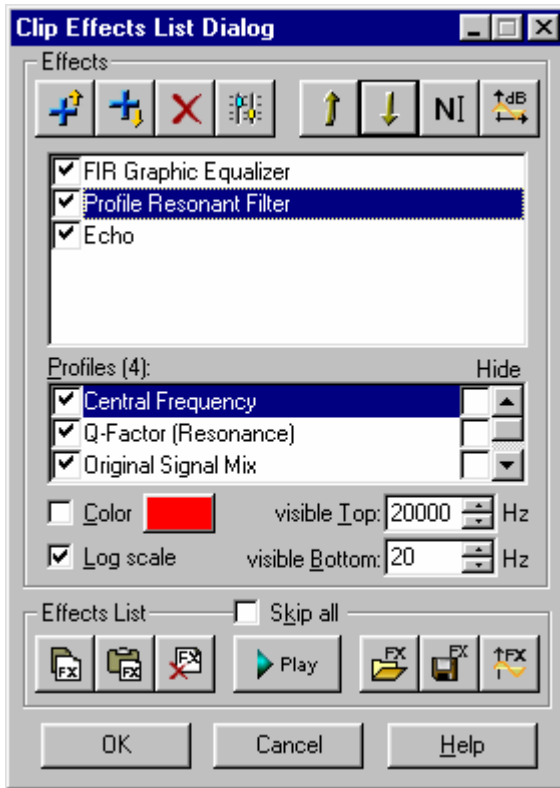
All buttons have tool tips, so you can see short text function descriptions of all buttons. Just move the mouse cursor and hold it above any button with an image.

Effects group is for working with one effect. You can add/remove or locally rename an effect, edit its parameters, view frequency and phase response of the selected effect (available only in *ForwardAVStudio Pro*). You can change the order of effects in the chain, copy/paste effects to/from the Clipboard, turn on/off any audio effect using checkboxes at the left of its names in the list (when the box is checked, the effect is on) or in the effect dialog box using the Bypass checkbox (when Bypass is checked, the effect is off and does not process sound).

Add Above   select an effect from the list of available effects and add it above the currently selected effect in the list.

Add Below   select an effect from the list of available effects and add it below the currently selected effect in the list.

Note: you can get the message 'No audio effects are installed on your system'. You may see it if you have both Windows 95/98 and Windows NT on your computer and have installed Forward AV Studio Pro under one system and run it under the other. You should install ForwardAVStudio Pro under both systems.

Remove   remove a selected effect from the list.

Edit   run the setup dialog box to set the parameters of the current effect. You can also double-click on the name of the effect to run its setup dialog box.

Move Up   move the currently selected effect one step up in the list.

Move Down   move the currently selected effect one step down in the list.

Name   type a new name of the effect to rename it. You can restore the original name of the effect in the local menu.

Frequency Response   show the frequency and phase response of the currently selected effect.

You can also use the Ins and Del keys on the keyboard to add/delete audio effects. Click on a desired effect in the list to delete it with the Del key or add another effect after the selected one with the Ins key

Names of profiles (parameters of current audio effect that can be changed in time with profile) are shown in the list in Profiles group (if number of profiles is greater than 3, it is shown in brackets). Each profile can be turned on/off using checkboxes at the left of profile name. When checkbox is on, profile is used, and off otherwise (it means that a static value of this parameter instead of profile is used; this value can be set in effect's dialog), and profile is not shown on clip in this case (you can hide a profile without turning it off using Hide checkbox at the right of profile's name).

If you double-click at profile name, effects list will be closed, current profile will be set as active and you will be able to edit this profile on clip immediately.

If checkbox Colors is turned off, current predefined color of profile is shown on this button, and you cannot change it here (you can define five standard colors of effect profiles in *Colors Settings*). If you want to set custom color of profile, turn on checkbox, press button and select desired color in standard system color selection dialog.

If checkbox Log Scale is enabled (not grayed), current selected profile allows to use logarithmic vertical scale when editing it graphically on clip. This is useful for editing profiles of parameters like frequency of a digital filter, because of features of human's perception of musical tone pitch. Linear change of frequency in octaves is more natural than in Hz, and linear scale in octaves (logarithmic in Hz) is more comfortable in use.

If current profile allows it, turn on this checkbox to switch to logarithmic scale of current parameter (usually it is turned on by default for such profiles).

Visible Top / visible Bottom values define visible vertical range of current profile when editing it on clip (current range is shown on clip at its right). It does not mean that values of parameter in all points on profile are limited by these two values, it only means that range between these two values will be shown on clip, and points outside this range are kept without any change. Use it for fine editing of profile in desired range.

Note: you can edit values in edit boxes using right mouse button.

Effects List group is used to work with the entire list. You can save, load and clear the list, run real-time preview to hear how the chain of effects affects the processed sound or view the frequency and phase response of the entire chain of effects. You can copy/paste effects to/from the *Clipboard* (use the local menu to copy a single effect). You can turn on/off the entire list of effects using the Skip All checkbox (when it is checked, the effects do not process the sound).

Copy		copy the entire effects list to the *Clipboard*.
Paste		paste effect(s) from the *Clipboard* after the currently selected effect in the list.
Clear list		clear the entire list (remove all effects from the list). You will be requested to confirm the cleaning.
Preview		run real time preview. This button starts the playback of the current part of the project (audio clip, track or entire project) processed with the current effects chain. During playback you can press button or double-click on the name of any effect to run its dialog box where you can change any parameter of sound processing. All changes will take effect almost immediately, so you can control the processing of sound during playback.

Playback is repeated until you press ![Stop] (the same) button.

Note: Preview in real time is performed without breaking the sound only if your computer is capable of processing sound with the current chain of effects in real time. You have to have a sufficiently fast central processor. To increase the performance of some effects, you may also select a faster processing for real-time preview in the Effects Settings.

![FX Load icon] Load restore the effects chain (saved earlier) from an external file.

![FX Save icon] Save save the current effects chain with all the settings to an external file.

![↑FX icon] Frequency Response of List
show the frequency and phase response of the entire chain of effects.

10.2.1 Local menu

Local menu is called by pressing the mouse right button on any effect in the list. There are the following commands in this menu:

Edit   same as ![icon] button.

Bypass   turn on/off the current effect. When Bypass is checked, the effect is off (you can use Bypass checkbox in the effect dialog box). You can use the checkbox at the left of effect's name. If it is checked, the effect is on (bypass is off).

Change name   same as ![NI] button.
Restore name   restore the original name of the effect.
Show frequency response

same as ![↑dB] button.
Copy this effect only   copy the currently selected effect to the *Clipboard*.
Paste effect(s)   paste the effect(s) from the *Clipboard* and insert it after the current effect.

Delete   same as ![X] button.

10.3 Select Audio Effect dialog box
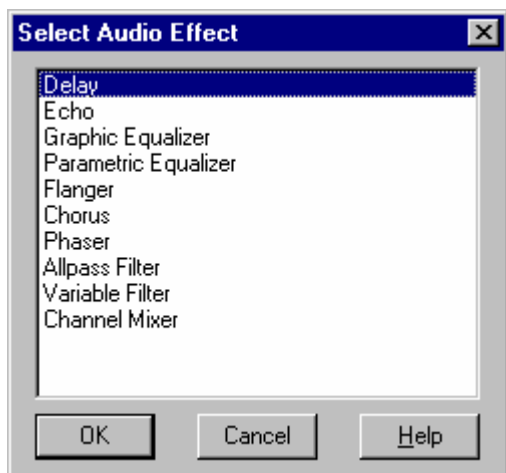
In this dialog box, there is a list of audio effects for Forward AV Studio installed on your system. You can choose any effect by double clicking on its title or by pressing the OK button.

Audio effects with profiles can be used on audio clips only, so when you want to add an effect on a track or entire project, effects with profiles will not be shown in the list of available effects.

Note: when you run this dialog box the first time, Forward AV Studio searches for any installed effects. This may take some time. The next time no searching will be needed.

You can get the message 'Can't create audio effect'. In this case, you should reinstall Forward AV Studio or get a newer Forward AV Studio version.

10.4 Frequency and phase response dialog box
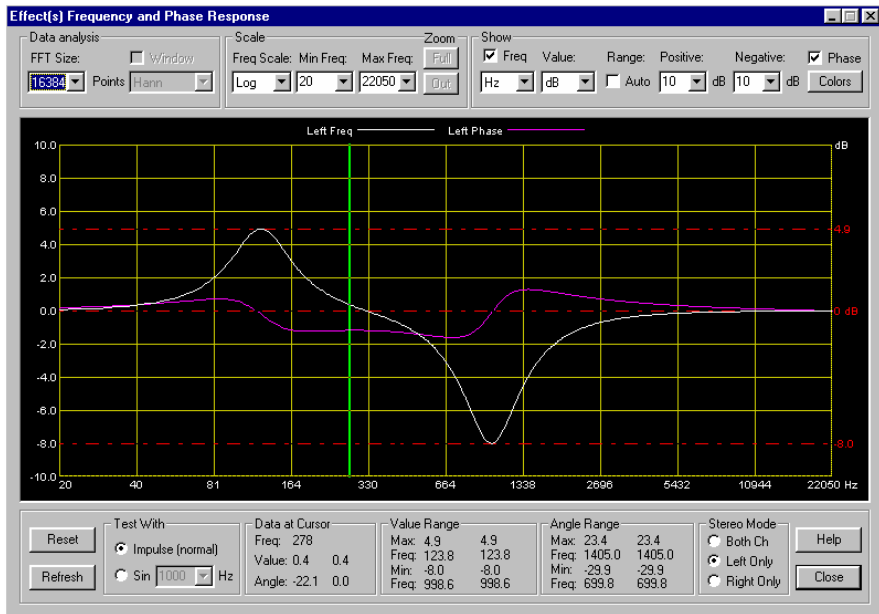
The diagram in this dialog box allows carrying out visual analysis of the frequency and phase response of any audio effect or chain of effects (effects list). In other words, you can see how audio effects affect the processed sound at any frequency. In stereo mode, the response can be shown for both channels or separately for the left/right channel. You can also use a sinusoidal test signal to analyze frequency shifts and harmonics made by the effects.

Data group defines the main parameters of data analysis.

FFT Size (128 up to 64K) – a number of points in the fast Fourier transform. Select greater values to obtain more accurate response. In this case the calculation will take longer.

Window – defines which of the window functions (or none) is applied to frequency response. This setting is available only for sinusoidal test signal (when Sin instead of Impulse is selected in the Test with group).

Scale group defines the horizontal scale type and frequency range.

Freq Scale (Log/Linear) – logarithmic/linear frequency scale. Logarithmic scale is useful for the analysis of such effects as graphic equalizer, where the center frequencies of filters differ from each other in octaves (relatively). Linear scale is

useful for such effects as delay, where the frequency notch points are equidistant with respect to their frequencies.

Min Freq (Hz) – minimal frequency of a shown range. You can select any predefined value from the list or just input any desired value. The minimal frequency must be less than Max Freq and greater than zero for the logarithmic scale.

Max Freq (Hz) – maximum frequency of a shown range. You can select any predefined value from the list or just input any desired value. The Maximum frequency must be greater than Min Freq and less than on half of the sample rate.

Note: you can use Zoom function to magnify any frequency range to fit the entire diagram. To do this, press and hold the mouse left button on the first point of the desired range, then drag the lens mouse cursor to the second point and release the mouse button. Click the mouse right button on the diagram or press the Out button to return to the previous frequency range. Press the Full button to return to the full frequency range immediately.

Show group defines the response(s) to be shown and the type and range of the shown values.

Freq – show/don't show frequency response.

Hz/Norm – show the frequency at the cursor in Hz or normalized to the sampling frequency form in Data at cursor group. On the diagram the frequency is always shown in Hz.

Value (dB/Dec) – show the frequency response in decibels or decimal form.

Range: Auto – use/don't use automatic vertical range zoom if the frequency response is shown in decibels. Range is automatic only for the decimal form.

Positive – positive range in decibels if Auto Range is off. You can select any predefined value from the list or just type it.

Negative – negative range in decibels if Auto Range is off. You can select any predefined value from the list or just type it.

Phase – show/don't show phase response. Phase response is not shown if the testing signal is sinusoidal (when Sin instead of Impulse is selected in the Test with group).

Note: At least frequency or phase response must be shown or you can show both. If you use a sinusoidal testing signal, the frequency response is shown obligatorily. If frequency response is shown in decibels, the dotted horizontal red lines show the minimal, maximum and 0 dB levels. To see the minimal and maximum levels of phase response, turn off the frequency response option.

Colors button shows the color selection dialog box for frequency and phase response.

Refresh button updates the diagram. You can see the evolution of response in time for the effects that change its characteristics in time (such as flanger or variable filter etc.).

Reset button sets all effects to its initial state and updates response.

Note: you do not need to press these two buttons when you change any effect parameter settings to reflect changes in response. When you change the list of effects or any parameter, response is updated automatically.

Test with group denotes which form of signal is generated for analysis.

Impulse – generates a single impulse that is normal for frequency and phase response.

Sin (Hz) – generates sinusoidal wave to show how effects affect to signal of a specified frequency. You can see additional harmonics and appreciate distortions of the sound being processed. You can select any predefined value from the list or just type it. Frequency must be greater than zero and less than one-half of the sample rate. It is useful to set Auto Range or show frequency response in decimal form in this mode. You can use the window functions in this mode if you turn on the Window checkbox in Data group and select a desired function from the dropdown list.

Note: when you type any value manually, you can update the diagram by clicking on it with the mouse left button or by waiting for about half of a second for the diagram to be updated automatically.

The following three groups show the corresponding data in two columns in the stereo mode: the first column shows data in the left and the second in the right channels. In the mono mode, only the first column is active.

Data below cursor group shows the values below the cursor when it is on the diagram as a vertical line.

Freq – the current frequency below the cursor. You can show it in Hz or normalized to the sampling frequency form with the use of the Hz/Norm combo box.

Value – the current value of frequency response below the cursor.

Angle – the current value of phase response (phase shift) below the cursor.

Value Range group shows the minimum and maximum of frequency response.

Max Value at... – the maximum of frequency response for a specified frequency.

Min Value at... – the minimum of frequency response for a specified frequency.

You can visualize these values in decibels or decimal form using the dB/Dec combo box.

Angle Range group shows the minimum and maximum of phase response.

Max Value at... – the maximum of phase response for a specified frequency.

Min Value at... – the minimum of phase response for a specified frequency.

Stereo Mode group is active only for stereo sound and allows selecting a channel of response to be shown.

Both Ch flag is used to display the response of both channels.

Left Only flag is used to display the response of the left channel.

Right Only flag is used to display the response of the right channel.

Note: In stereo mode the frequency response is shown for the effects list that is applied to a stereo clip or when the project is stereo and the list of effects is applied on a track or the project. At the top of the diagram you can see which responses are shown in which colors.

Note: when you press the Close button, all parameters of this dialog box will be stored according to program settings.

10.4.1 Response Colors dialog box
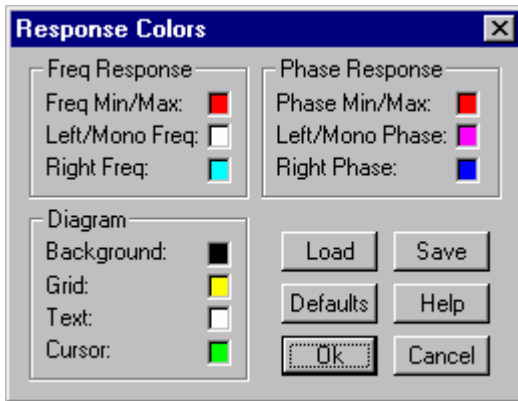
This dialog box allows changing the colors of all elements of the frequency and phase response diagram.

You can click on any color square to select the corresponding color from a standard system color selection dialog box.

Freq Response group is used to set the colors of frequency response elements.

Freq Min/Max – the color of the dash-dotted line indicating the minimum and maximum levels of frequency response.

Left/Mono Freq – the color of frequency response for the left channel in stereo mode or for a mono sound.

Right Freq – the color of frequency response for the right channel in stereo mode.

Phase Response group is used to denote the colors of phase response elements.

Phase Min/Max – the color of the dash-dotted line indicating the minimum and maximum levels of phase response.

Left/Mono Phase – the color of phase response for the left channel in stereo mode or for a mono sound.

Right Phase – the color of phase response for the right channel in stereo mode.

Diagram group is used to denote colors of other diagram elements.

Background – background color.

Grid – grid color.

Text – text color.

Cursor – vertical line (diagram cursor) color.

Load button is used to load a color scheme from a file.

Save button is used to save the current color scheme to a file.

Defaults – restore all diagram colors to default settings. You are asked to confirm this command.

Note: when you change any color or load/save/restore a color scheme the diagram immediately changes its colors so you can see the results. Press OK *to keep current colors or* Cancel *to restore the previous color scheme (you can also restore previous colors after pressing the* Defaults *button).*

10.5 Audio effects warning
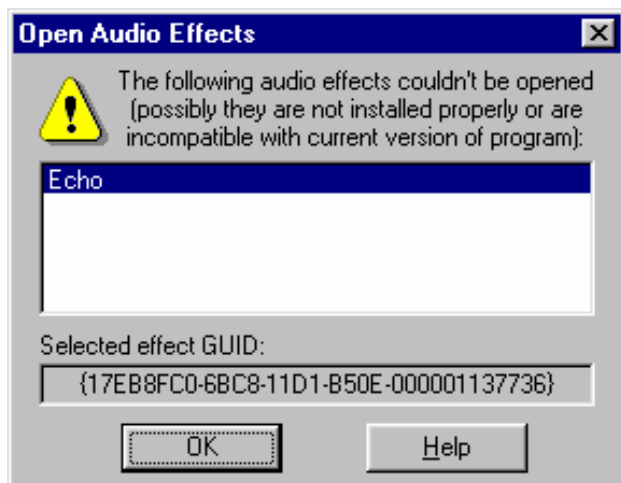
This dialog may appear when you open a project with audio effects, and the program can't open some of them. It can be caused by some reasons:

1.Some modules of audio effects were removed from your disk by mistake.

2.The program was installed under one system (for example, Windows 98) and you launched it when working under other one (for example, Windows 2000). You **must** install the program under all systems if you want to work with it under all of them!

3.You are trying to open a project created with later version of the program with audio effects that are compatible only with newer version of the program. Note that most audio effects included with version 3.5 or later all **incompatible** with version 3.0x!

*In any case, you **must** reinstall the program with needed version to have audio effects working properly. For example, if you worked with version 3.5 or later and then you want to return to version 3.0x for some reasons, you must uninstall program with version 3.5 and reinstall version 3.0x.*

Selected effect GUID field shows unique identifier of effect selected in the list of effects that couldn't be opened.

10.6 Audio Effects

Equalization/filtering effects:

Graphic Equalizer

Variable Filter

Parametric Equalizer

Allpass Filter

FIR Graphic Equalizer

Delay/echo effects:

Delay

Chorus

Echo

Phaser

Flanger

Sound analysing effects:

Sound Statistics

Spectum Analyzer

Other effects:

Channel Mixer

DirectX plug-in Chainer

Advanced Pan

Effects with profiles:

Advanced Pan

Parametric Filter

Allpass Filter

Resonant Filter

Bandpass Filter

Shelf Filter

Delay

For more detail, please, read the section about audio effects operation in Forward AV Studio.

10.7 Equalization/filtering effects

10.7.1 Graphic equalizer
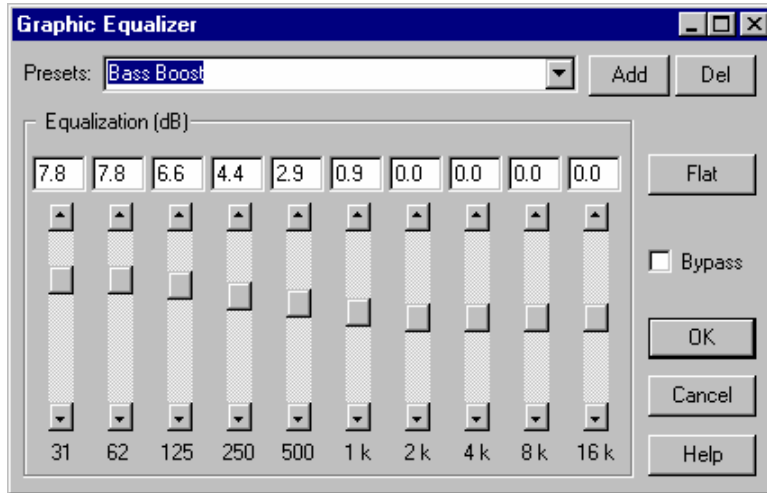
Graphic equalizer is a set of digital filters enabling you to control (equalize) the amplification of sound in 10 frequency bands.

Equalizer is commonly used to improve the balance between different frequency components of sound. It is almost impossible to get a clear sound without equalizing the sound of the recorded voice and 'live' instruments.

The first filter is a so-called 'low-shelf' filter, for which you can set amplification at 0 Hz. The last filter is a so-called 'high-shelf' filter, for which you can set amplification at one-half of the sampling frequency.

The middle filters are the peaking ones, for which you can set amplification of the center frequency of the corresponding frequency band.

In a given equalizer all band frequencies are fixed, which makes it even more convenient to use. The medium band frequencies differ by an octave. If you want to equalize the sound more flexibly, use a parametric equalizer rather than the graphic one.

Equalization group is used to denote the amplification in each frequency band in decibels (from -20 dB to 20 dB).

Note: high amplifications (above 6 dB) may cause distortions and audible phase shifting in the processed sound.

Flat button is used to reset all amplifications to zero (for sound not to be processed).

Graphic equalizer supports the bypass function and presets (see also the note about presets storing).

10.7.2 Parametric equalizer
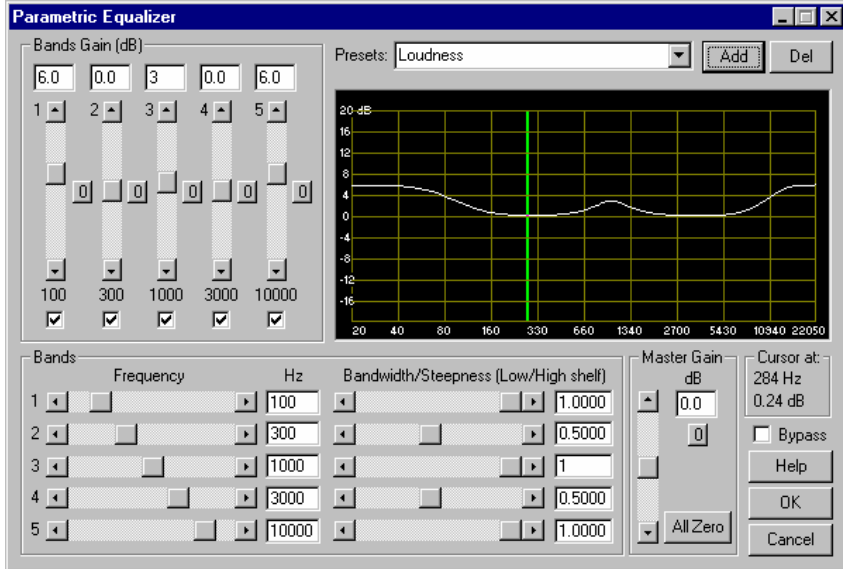
Parametric equalizer is a set of 5 digital filters that allow you to control (equalize) the amplification of sound in 5 frequency bands. It is more flexible than graphic equalizer so you can set not only the amplification but also the central frequency and relative width (in octaves) of each frequency band. You can see how the equalizer amplifies a signal at all frequencies in the diagram.

The first filter is a 'low-shelf' filter, so you can set the amplification at 0 Hz and the cut-off frequency, i.e. the width of the low-frequency band. The last filter is a 'high-shelf' filter, so you can set the amplification at one-half of the sampling frequency and the cut-off frequency, i.e. the width of the high-frequency band. You can also set the 'steepness' of these two filters (change it and see the results in the diagram).

Middle filters are peaking. You can set the band center frequency (instead of the cut-off frequency for high/low-shelf filters) and the relative width of the band in octaves (instead of the steepness for high/low-shelf filters) and the amplification of the center frequency.

Bands Gain group is used to denote amplification for each filter in decibels (from -20 dB to 20 dB) for the frequency shown at the bottom of the scrollbar (for high/low-shelf filters this value is the cut-off frequency). Use check boxes to turn on/off filters in real time playing to compare the sound processed with/without corresponding filters. Use buttons to reset the amplification of a filter to zero (for no filter).

Note: great amplifications (over 6 dB) may cause distortions and audible phase shifting of the processed sound.

Bands group is used to denote the parameters of filters.

Frequency – center or cut-off frequency of a filter. This value is shown also at the bottom of the corresponding filter gain. Frequency must be greater than zero and less than one-half of the sampling frequency of the sound is being processed.

Bandwidth – the relative width of a frequency band (in octaves) or steepness for high/low-shelf filters. Use this setting to change the relative range of frequencies within which the filter affects the sound.

Note: for high/low-shelf filters, normal steepness would be 1.0 (if you set it greater than 1.0, the filters will have additional gain/notch peaks around the cut-off frequencies)

Master gain – output amplification of the resulting sound. Use button to reset master amplification to zero.

The All zero button resets all amplifications (filters and master) to zero.

The diagram in this dialog box shows real frequency response of the parametric equalizer with current settings. It is updated to reflect any changes in filter parameters. The white curve shows the amplification at all frequencies from 20Hz to one-half of the sampling frequency of the sound being processed.

Cursor at... shows amplification at the frequency corresponding to the position of the mouse cursor on the diagram (shown as a vertical green line).

Parametric equalizer supports bypass function and presets (see also the note about presets storing).

10.7.3 Allpass filter
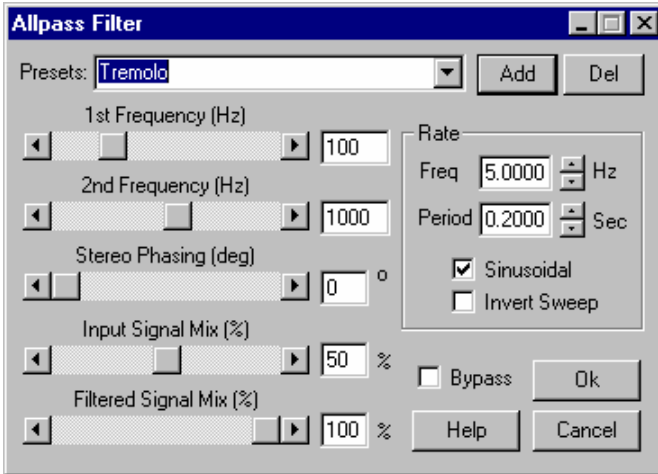
Allpass filter is a special filter that affects only the phase of the sound being processed. If you mix it with the original sound, you get the volume weakening effect at certain frequencies. This effect is similar to that produced by phaser, but the sound has a slightly different timbre.

This effect may be used for processing the guitar or sound effects like noise (or any other).

1st Frequency (Hz) - the first frequency of allpass filter.

2nd Frequency (Hz) - the second frequency of allpass filter.

Filter's central frequency of phase shifting varies between these two values. These frequencies must be greater than zero and less than one-half of the sampling frequency of the sound is being processed.

Note: the frequency varies logarithmically to match the peculiarities of human perceptions of sound (i.e. the frequency variation is linear in octaves).

Stereo Phasing (in degrees) denotes the phase difference of the frequency variation in the left and right channels (only for stereo sound). For example, if you set it to 180 degrees and the reading for the frequency in the left channel starts from the minimal value (1st Frequency), in the right channel the reading for the frequency will start from the maximum value (2nd Frequency).

Input signal mix – amplification (from 0% to 100%) of the input (not processed) sound. Set it to 0% if you want to hear only phased sound but do not want to hear any variations in volume.

Filtered signal mix – amplification (from 0% to 100%) of the processed sound. If you set it to 0%, the filter will have no effect.

Rate group denotes the rate of filter frequency variation (frequency sweep).

Freq – frequency of filter frequency variation in Hz.

**Period** (in seconds) denotes the period of filter frequency variation.

Note: when you change one of these values, the other also changes because **Freq** *= 1/*Period*. So you cannot set it to 0. Setting* **Period** *too small could result in considerable sound distortions.*

Sinusoidal – sets the type of frequency sweep to sinusoidal or linear (such a delay sweep is shown on the diagram for flanger). Sinusoidal sweep produces a smoother sound.

Invert sweep – sets the pattern of frequency variation in time, from 1st **Frequency** to 2nd **Frequency** or vice versa.

Allpass Filter supports bypass function and presets (see also the note about presets storing). For this filter you can also set the quality of processing.

10.7.4 Variable filter
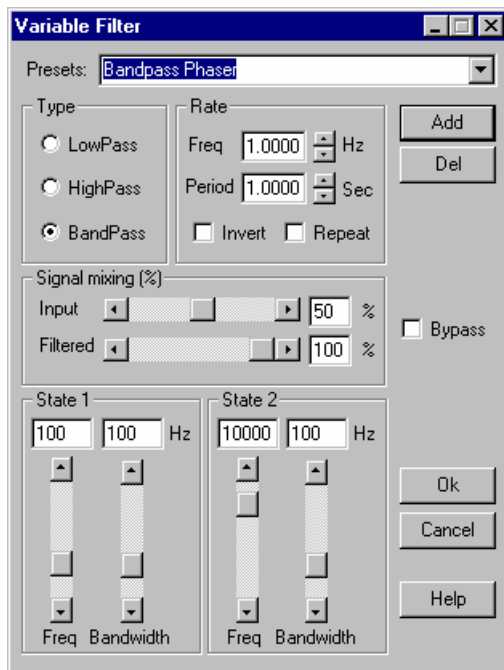
Variable filter is a digital filter for which you can set two states (frequencies) and a period. The filter's parameters vary between these two states within a specified period of time.

This effect allows obtaining different types of modulation. By modifying different filter parameters you can give various effects.

Type group is used to denote the type of filter to be used.

LowPass – lowpass filter, HighPass – highpass filter, BandPass – bandpass filter.

Note: the type of the filter can be set only for both states; otherwise this setting has no sense.

Rate group is used to denote the rate of filter frequency variation (frequency sweep).

Freq – frequency of filter frequency variation in Hz.

Period (in seconds) denotes the period of filter frequency variation.

Note: when you change one of these values, the other also changes because Freq *= 1/*Period. *So you cannot set it to 0. Setting* Period *too small could result in considerable sound distortions.*

Repeat – if is off, the frequency changes from the first state to the second, then backwards (see the diagram):
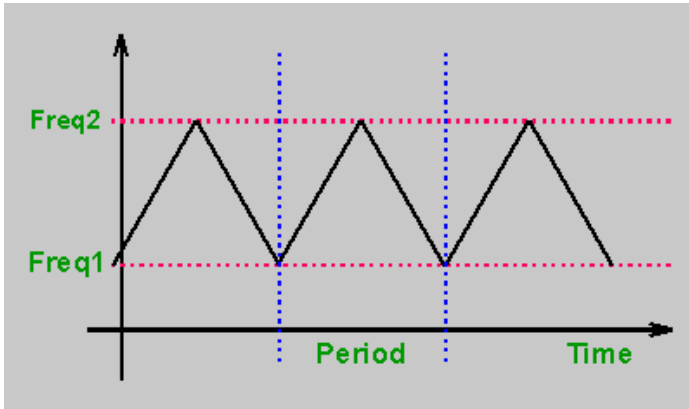
Or from the first to the second, then jumps back to the first etc. (see the diagram):

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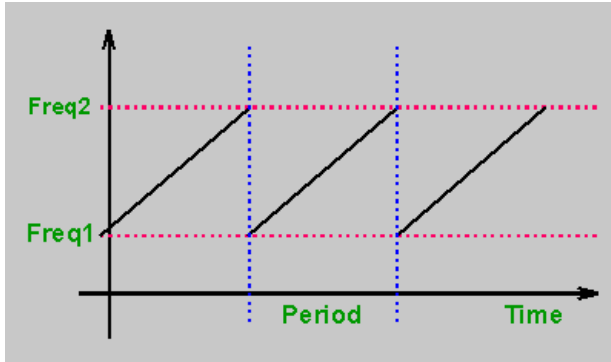
Invert – set the order of frequency change from State 1 to State 2 or vice versa.

You may get various modulation effects by applying these two settings.

Signal mixing group is used to control the mixing of the original and filtered sounds.

Input – amplification (from 0% to 100%) of the original (unprocessed) sound.

Filtered – amplification (from 0% to 100%) of the filtered signal.

By combining amplifications of the input and filtered sound you can get a variety of effects.

The State 1 group denotes frequencies for the first state of the filter.

The State 2 group denotes frequencies for the second state of the filter.

Freq (Hz) – cut-off (for lowpass and highpass filters) or center (for bandpass filter) frequency. It must be greater than zero and less than one-half of the sampling frequency of the sound is being processed.

Note: the frequency is changed logarithmically to match the peculiarities of human perceptions of sound (i.e. the frequency change is linear in octaves).

Bandwidth (Hz) – the width of frequency band (for bandpass filter only). It must be greater than zero and less than one-half of the sampling frequency of the sound is being processed.

Note: the digital filter cannot 'delete' components of a sound with the frequencies outside the filter frequency band. It can only suppress them by a certain number of decibels. So you cannot get a lowpass filter that completely "removes" the components of high frequencies in the processed sound. The farther the frequency of a sound from the cut-off frequency in the stop-band, the more suppressed the sound.

Veriable filter supports bypass function and presets (see also the note about presets storing). For this filter you can also set the quality of processing.

10.7.5 FIR Graphic Equalizer
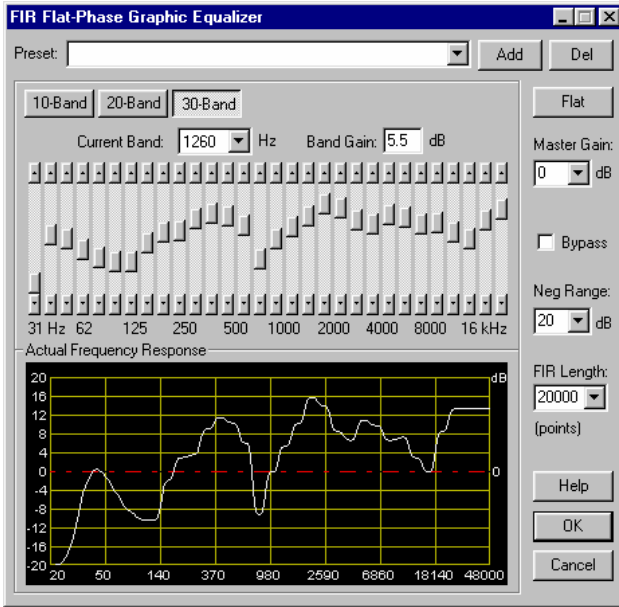
This effect is used for the same purpose as **Graphic Equalizer** (controlling of balance of volume between frequency components of sound), but it provides much better quality of processing (almost the highest possible).

Phase response of FIR Equalizer is absolutely flat, so it does not distort phase of sound being processed at all. However, it requires more processing power.

This type of equalizer is based on the use of FIR filter with symmetric finite-length impulse response (symmetric impulse response provides absolutely flat phase response). Length of filter's impulse response is in points. Select a desired value from the list or type it manually (possible values are from 100 to 32000 points).

1000…100-point filter length is enough for controlling volume of high frequency components (1…5 kHz or more), and 10000…20000 points are required if you want to control volume balance in low frequencies (100 Hz or less) or if you want to significantly suppress sound volume in a band (by 40…100 dB).

Flat phase response guarantees the highest-quality processing with clearest sound. Independent of gain value in any frequency band volume of sound will be just

changed as you want and without any phase distortions (that are encountered when using Graphic and Parametric equalizers).

You can control length of filter's impulse response – the greater it is, the more accurate actual frequency response of the filter is, but more calculations (and processor power) are required for processing. Fast convolution algorithm is used for FIR filtering, so the equalizer can be used even on slow computers with default length of filter's impulse response (1000 points). With such length you will be able to accurately control balance of volume in frequency range from about 1 kHz up to a half of sample rate of the sound being processed. Increase length of filter's response (use FIR Length control) to get more accurate frequency response in low frequencies (below 1 kHz), but you will need more processor power for calculations.

The other advantage of this equalizer is that if you set the same gain in two neighbor bands, you will get one flat band in actual frequency response. This feature and absolutely flat phase response are impossible to get in analog equipment and ordinary Graphic and Parametric equalizers that are based on the use of IIR filters (with infinite-length impulse response).

You can select between three types of equalizer: 10, 20 or 30-band (depending on how accurately you want to control balance of volume between frequency components). For 10-band equalizer you can use edit boxes above scrollbars to type desired gain in any band manually. For 20 and 30-band equalizers you should select a band first by clicking at band's scrollbar or by selecting desired band from Current band drop-down list, and then you can type desired gain value in Band gain edit box for selected band.

Maximal gain value is 20 dB, default minimal value is –20 dB. You can change minimal gain using Neg range control (select desired value from drop-down list or type it manually), maximal possible negative range is –100 dB. Note that if you really want to suppress sound volume in a band by 40 … 100 dB (especially in low-frequency bands), you may need to increase FIR length significantly.

Neg range defines negative range of gain values. Default value is 20 dB, so you can suppress sound volume in a frequency band by 20 dB. If you want to suppress more, increase this value. It will also increase negative range of all scrollbars.

Gain controls define only desired band gains. Actual frequency response of the equalizer is shown on the diagram below gain controls. If it differs significantly from desired response in low frequencies, try to increase FIR Length (length of filter's impulse response), but it will require more processing power.

Press Flat button if you want to reset equalizer to flat frequency response (is does not process sound in this case).

FIR Graphic equalizer supports bypass function and presets.

10.8 Delay/echo effects

10.8.1 Delay

This effect allows you to delay the sound for some time to obtain an echo-like sound effect.

This effect is commonly used for processing the recorded voice or for pseudo stereo effects (for example, for rhythm guitar).

Left group is used for delaying the sound in the left channel or for a mono sound.

Right group is used for delaying the sound in the right channel solely for stereo sound.

The following settings in both groups are used to control the delays in both channels independently.

Delay – the value delay in milliseconds.

Input signal mix – amplification of input (not delayed) sound in percent (from 0% to 100%). You can set it to 0% to obtain only the delayed sound at output.

Delayed signal mix - amplification of the delayed sound in percent (from 0% to 100%). Use this setting to control the volume of the delayed sound (echo).

Lock L/R flag is used to lock the controls of the left and right channels so that you can simultaneously change the delay and mixing in both channels using only the controls of one channel.

Ping-pong flag is used to mix the input sound with the delayed one from another channel (for stereo sound only). This is the so-called "ping-pong" or "bouncing" echo.

Note: As the delayed sound in this mode is from another channel, the time of delay is also borrowed from the settings of another channel. For example, if you set a 500 ms delay for the left channel and a 400 ms delay for the right channel in the "ping-pong" mode, the first sound reflections will appear in 400 ms or later in the left channel (with the sound from the right channel) and in 500 ms or later in the right channel (with the sound from the left channel).

Feedback is the volume of the resulting sound (mixed from the input and delayed sounds) in percent (from 0% to 100%) that is returned to the input of the delay channel to get sound repeated reflections effects.

Warning: Use this setting with care! Values greater than 50% may cause overloading of the delay line!

Both the bypass and presets functions are supported by delay effects (see also the note about presets storing).

10.8.2 Echo
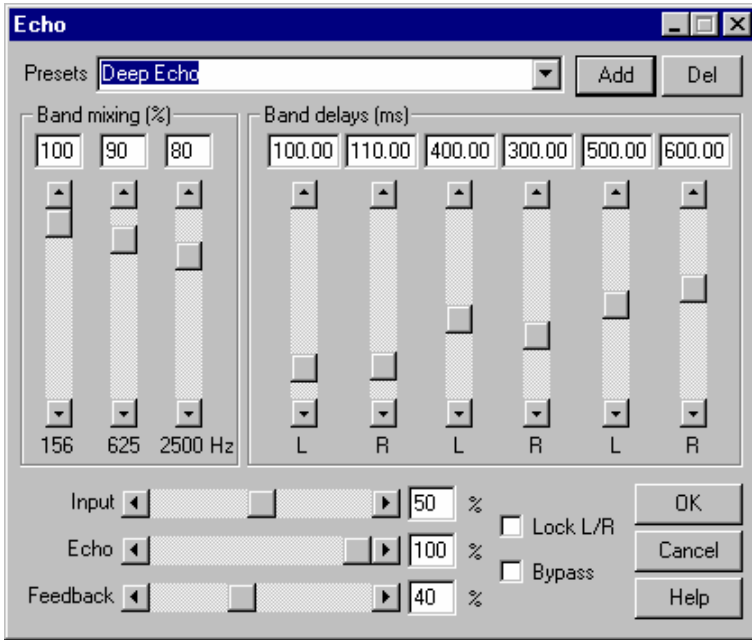
Echo is an improved (still more complex) modification of delay. There are 3 bandpass filters for 3 delay lines for each channel. You can set different delay times for each frequency band to get complex reflections of the sound. All these settings are made separately for each channel to get stereo effects.

This effect may significantly improve the perception of the recorded voice or instrumental solo (guitar, saxophone etc).

Band mixing group is used to set the amplification in percent (from 0% to 100%) for each frequency band. You can control the volume of each filtered echo in the output.

Band delays group is used to set the time of delay for each frequency band in both channels (**L** - left, **R** - right) independently.

Lock L / R flag is used to lock the controls of the left and right channels so that you can simultaneously change the delay and mixing in both channels using only the control of one channel.

Input --the amplification of the input (not delayed) sound in percent (from 0% to 100%). You can set it to 0% to obtain only the delayed sound in the output.

Echo – the amplification of mixed delayed sounds in percent (from 0% to 100%). Use this setting to control the volume of echo.

Feedback – the value of the resulting sound (mixed from the input and delayed sounds) in percent (from 0% to 100%) that is returned to the input of the delay line to get sound repeated reflections effects.

Warning: Use this setting with care! Values greater than 50% may cause the overloading of the delay line!

10.8.3 Flanger
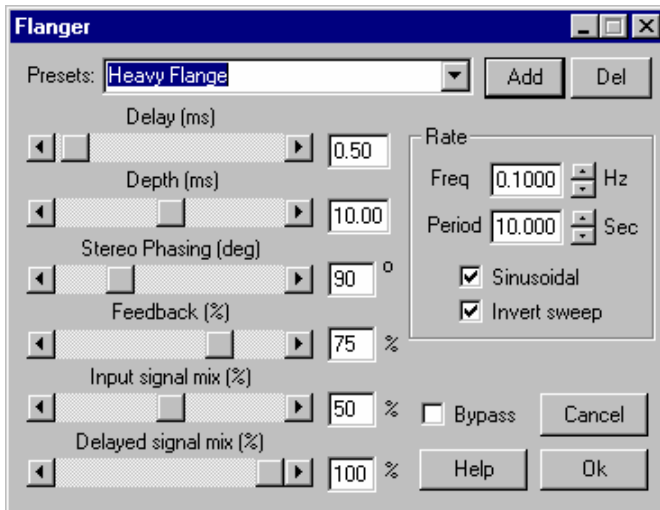
Flanger is a guitar effect of 'floating' sound. Really flanger is a delay with the time of delay varying periodically. The diagram describes this process.

Linear delay change of flanger in time
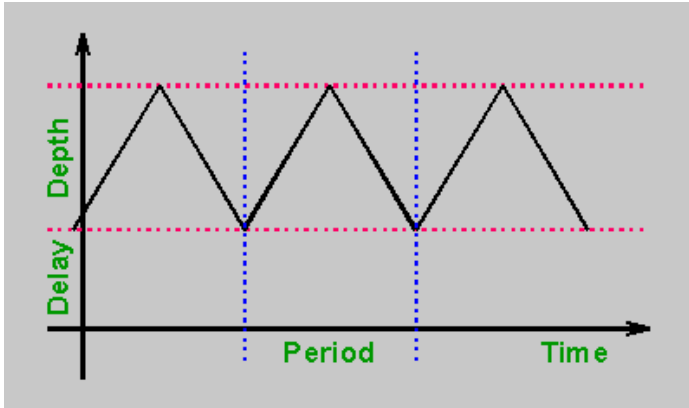
This effect is widely used for processing electric guitar sound.

Delay (in milliseconds) denotes the minimal delay within the range of its variation (see the diagram).

Depth (in milliseconds) denotes the value of delay variation. The time of delay varies from Delay to Delay+Depth (see the diagram).

Delay and Depth are the main parameters with strong impact on the sound being processed.

Stereo Phasing (in degrees) denotes the phase difference in the change of delay in the left and right channels (only for stereo sound). For example, if you set it to 180 degrees and the reading of the delay time in the left channel starts from the minimal value (Delay), the reading for the delay time in the right channel will start from the maximum value (Delay+Depth).

Feedback – the value of the resulting sound (mixed from the input and delayed sounds) in percent that is returned to the input to get "harder" sound. Setting it too high (more than 50%) could result in distortions (more than 50%).

Input signal mix – amplification (from 0% to 100%) of the input (not delayed) sound. Set it to 0% if you want to hear only the delayed (modulated) sound.

Delayed signal mix – amplification (from 0% to 100%) of the delayed sound. If you set it to 0%, the flanger will produce no effect.

Rate group denotes the rate of delay time variations (delay sweep).

Freq – frequency of delay variation in Hz.

Period (in seconds) denotes the period of delay time variation (see the diagram).

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Note: when you change one of these values, the other also changes because Freq *= 1/*Period. *So you cannot set it to 0. If you set* Period *too small, this could result in considerable sound distortions.*

Sinusoidal – sets the type of delay variation as sinusoidal or linear (such as on the diagram). Sinusoidal sweep produces a smoother sound.

Invert sweep – sets the pattern of delay variation in time, from Delay to Delay+Depth or vice versa.

Flanger supports bypass function and presets (see also the note about presets storing). For this effect you can also set the quality of processing.

10.8.4 Chorus
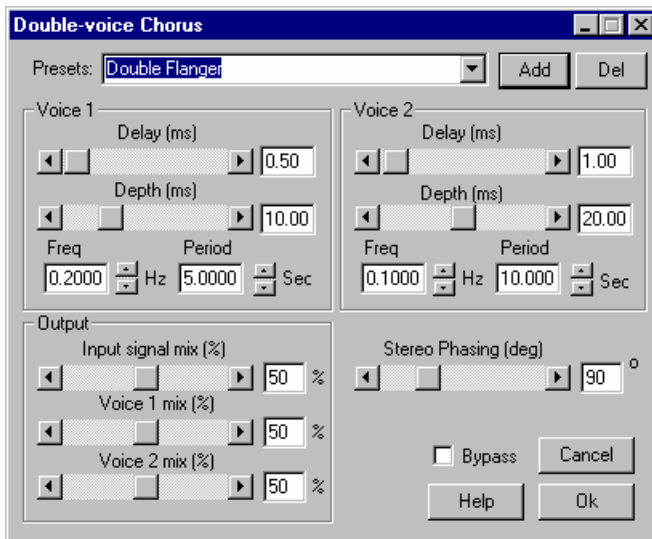
Chorus is a modification of flanger with many delayed signals added to the input to make the effect of 'many voices'. This version of chorus has two 'voices' for which you can independently set the delay time and period.

This effect is used to get richer sound when processing voice and solo instruments (for example, the acoustic guitar or piano).

Voice 1 group sets the parameters of the first varying delay (first 'Voice').

Voice 2 group sets parameters of the second varying delay (second 'Voice').

The following parameters are present in each Voice group and have an effect similar to flanger.

Delay (in milliseconds) – minimal delay time, Depth (in milliseconds) – value of delay variation.

Note: these values may be set greater than in Flanger to get deeper effects.

Freq – frequency of delay variation in Hz.

Period (in seconds) denotes the period of delay time variation.
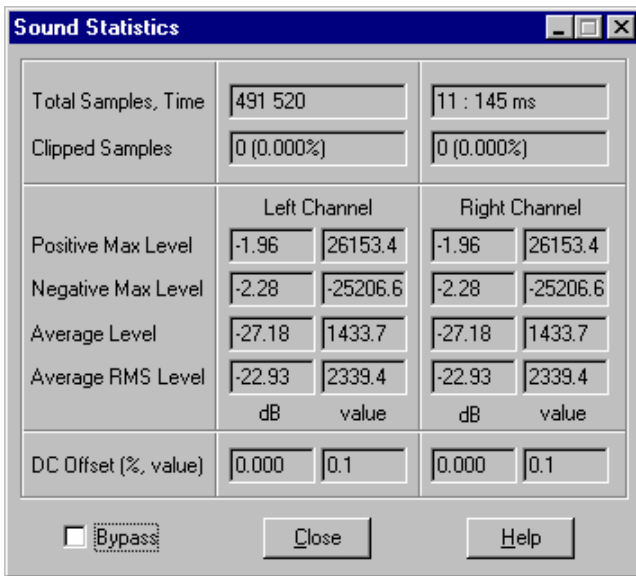
Note: when you change one of these values, the other changes too because Freq = 1/Period. So you cannot set it to 0. If you set Period too small, this could result in considerable sound distortions.

Note: only sinusoidal delay variation is used in chorus to get a smoother sound.

Output group is used to set the parameters of sound mixing in the chorus output.

Input signal mix – amplification (from 0% to 100%) of the input (not delayed) sound. Set it to 0% if you want to hear only the delayed (modulated) sound.

Voice 1 mix – amplification (from 0% to 100%) of the first delayed sound ('voice').

Voice 2 mix – amplification (from 0% to 100%) of the second delayed sound ('voice').

Stereo Phasing (in degrees) denotes the phase difference in delay variation in the left and right channels (only for stereo sound). For example, if you set it to 180 degrees and the reading of the delay time in the left channel starts from the minimal value (Delay), then in the right channel the reading of the delay time will start from the maximum value (Delay+Depth).

Note: this setting affects both – 'voices'.

Chorus supports bypass function and presets (see also the note about presets storing). For this effect you can also set the quality of processing.

10.8.5 Phaser
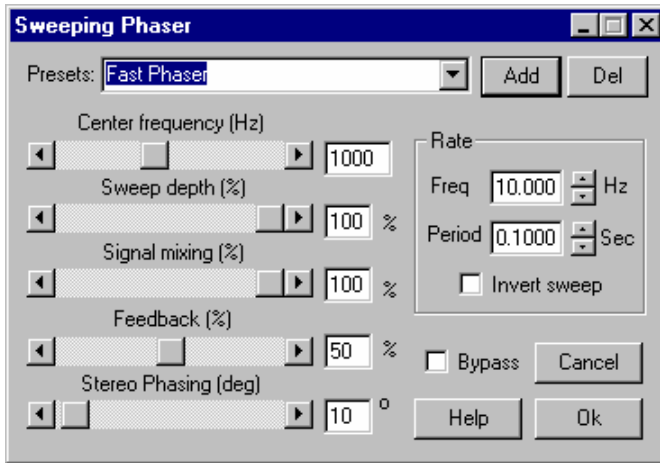
Phaser is a modification of flanger but has a very short time of delay so you can hear the phase shifts in the sound being processed. You can set the central frequency so that the input and delayed sounds give the maximum weakening of the volume.

This effect may be used for processing, say, the guitar or sound effects like noise (or any other). Center frequency (Hz) – the central frequency of phaser.

Sweep depth – the range (from 0% to 100%) of delay variation. By setting it to 0%, you get a constant phase-shifter and to 100% gives, the maximum delay variation.

Signal mixing – amplification (from 0% to 100%) of the delayed sound. If you set it to 0, the phaser produces to effect. Setting signal mixing to 100% produces the deepest effect.

Feedback – value of the resulting sound (mixed from the input and delayed sounds) in percent that is returned to the input to get a more expressive effect.

Stereo Phasing (in degrees) denotes the phase difference in delay variation in the left and right channels (only for stereo sound). For example, if you set it to 180 degrees and the reading for the delay time in the left channel starts from the minimal value (Delay), in the right channel the reading of the delay time will start from the maximum value (Delay+Depth).

Rate group denotes the rate of delay time variation (delay sweep).

Freq – frequency of delay variation in Hz.

Period (in seconds) denotes the period of delay time variation.

Note: when you change one of these values, the other also changes because Freq *= 1/* Period*. So you cannot set it to 0. Setting* Period *too small could result in considerable sound distortions.*

Invert sweep – sets the pattern of delay variation in time, from the minimal to the maximum value or vice versa.

Phaser supports bypass function and presets (see also the note about presets storing). For this effect you can also set the quality of processing.

10.9 Sound analysing effects

10.9.1 Sound Statistics

Sound Statistics				_ □ ×
Total Samples, Time	491 520		11 : 145 ms	
Clipped Samples	0 (0.000%)		0 (0.000%)	
	Left Channel		**Right Channel**	
Positive Max Level	-1.96	26153.4	-1.96	26153.4
Negative Max Level	-2.28	-25206.6	-2.28	-25206.6
Average Level	-27.18	1433.7	-27.18	1433.7
Average RMS Level	-22.93	2339.4	-22.93	2339.4
	dB	value	dB	value
DC Offset (%, value)	0.000	0.1	0.000	0.1
☐ Bypass		Close		Help

This 'effect' does not process the sound. It is used to calculate and show the following information about the sound being processed:

Total samples, Time – number of samples and duration of analyzed audio.
Clipped samples – number of clipped samples (that have the sample value more than 0 dB).

Note: 0 dB level is assigned to the maximum absolute sample value 32768. All values below are shown in sample and dB values relative to 0 dB level (normally all values should be lower than 0 dB or you may have clipping elsewhere).

Positive max level – maximum level of positive samples, Negative max level – maximum level of negative samples.

Average level – average absolute value of all samples.

Average RMS level – average RMS (root mean square) level. If you add 3 dB to this value you will get the RMS power of the sound.

DC offset – constant offset of a sound (is shown in sample value and percent). If it different from 0%, the maximum positive and negative levels may be different as the sound is not centered around zero sample.

Copy button is used to copy all data in the dialog box to the clipboard in text format, so you can paste it in any text editor, save to file, print etc.

This effect also allows viewing sound statistics in real time (during playback).

10.9.2 Spectrum Analyzer
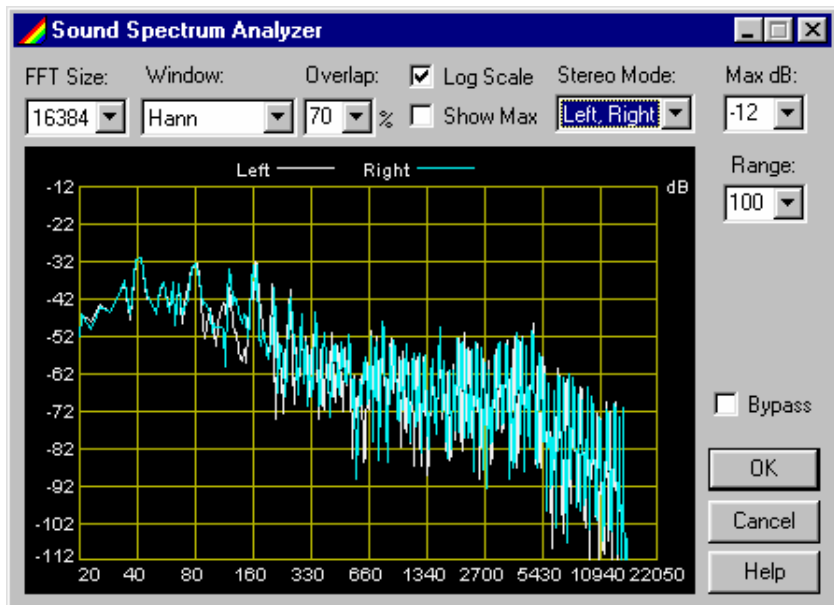
Spectrum Analyzer shows spectrum of signal being analyzed. You can see approximate level of different frequency components of sound on the diagram during playback (when dialog window of spectrum analyzer is closed, analysis is

turned off). Maximum levels are not shown (Show max is turned off) in the dialog box above.

Spectrum analyzer is widely used for estimating power balance between different frequency components, detecting distortion harmonics and undesirable frequency components.

1.Colors of appropriate spectrum graphs are shown at the top of the diagram.

2.You can resize dialog to see more detailed diagram, but performance may drop and you may get breaks in sound during playback.

3.The 0 dB level corresponds to maximal level of sound without overload, and all spectrum values are calculated and shown correspondingly to this level.

4.Audio buffer size in *Audio* settings is the main value that denotes how frequently the diagram is updated. Set this value smaller to get shorter data blocks and more frequent update of the diagram, but it may cause breaks in sound during playback.

5.Some audio effects (for example FIR Equalizer and some DirectX plug-ins) can process audio using very large data blocks; it also affects frequency of diagram update (the larger data blocks are, the less frequently diagram is updated). Click at name of a control to get its description:

Number of points in the Fast Fourier Transform used for spectrum analysis. The more is the length of FFT, the more accurate frequency estimation is, but it requires more CPU power for calculations, and the diagram is updated less frequently. If you want the diagram to be updated more frequently with larger FFT size, increase value of Overlap, but it will require more CPU load (for example, 50% overlapping requires 2 times, and 99% overlapping about 100 times more CPU power for calculations than no overlapping!), so use it with care!

Note: audio buffer size in *Audio* settings is the main value that denotes how frequently the diagram is updated. Set this value smaller to get shorter data blocks and more frequent update of the diagram, but it may cause breaks in sound during playback.

Turn option Show max on to see maximal levels calculated during playback. Look at the sample image to see the difference between modes when Show max is turned on and off. Maximum levels are not shown (Show max is turned on) in the dialog box below.

Forward AV Studio
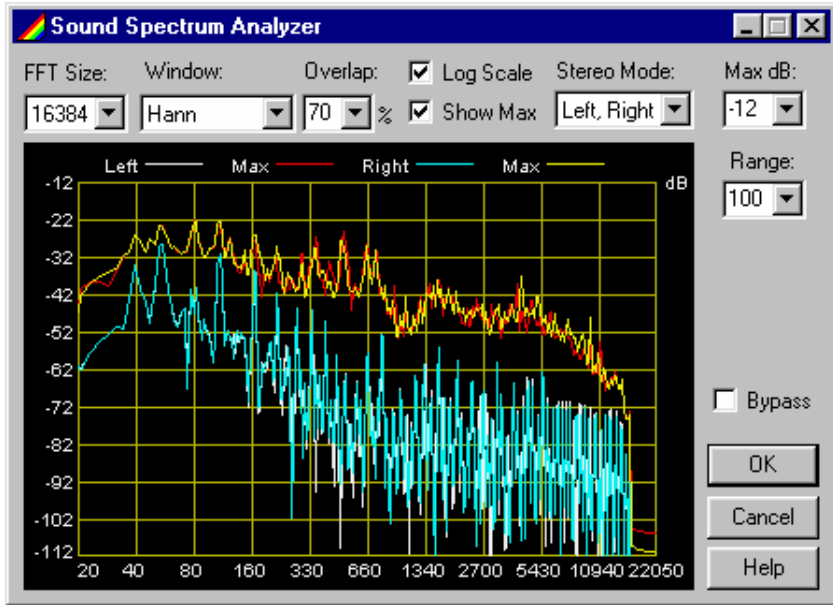
Note: you can see colors of spectrum and maximal level graphs looking at the top of the diagram.

Window. Type of windowing function that is applied to signal data block before performing FFT. Rectangular window means that no windowing function is applied, but it is highly recommended to use any other function (Kaiser window is used by default) to get spectrum image more believable. Actually it means that prominent frequency components will be visible better.

Turn option Log scale on to get logarithmic (linear in octaves) frequency scale (horizontal) on the diagram (frequency scale is linear otherwise).

Stereo mode denotes order of drawing of spectrum graphs for left and right channels (for stereo sound only). Use it to get spectrum graph of desired channel better visible or to see spectrum of mono mix.

Available modes are:

Left, Right – draw spectrum graph of left channel first, then right channel;

Right, Left – draw right, then left;

Left only – draw spectrum graph of left channel only;

Right only – draw spectrum graph of right channel only;

Mono mix – mix left and right channels (calculate average between them) and then draw spectrum of the result.

Overlap. Overlapping of data blocks being analyzed in percents (0% means no overlapping, it is used by default). Increase this value to get the diagram updated more frequently with greater FFT size values (and better frequency estimation). Note that is will require more CPU power (for example, 50% overlapping requires 2 times, and 99% overlapping about 100 times more CPU power for calculations than no overlapping!), so use it with care!

Parameter Max dB defines top spectrum value shown on the diagram. For most cases spectrum values are less than maximal level (0 dB) by some dB, so there is no sense to see greater values. For example, set it to –12 dB if you do not want to see spectrum values greater than –12 dB.

Set appropriate values of Max dB and Range to see desired spectrum value range more detailed.

Parameter Range defines vertical range (in decibels) of the diagram. Set appropriate values of Max dB and Range to see desired spectrum value range more detailed.

Use bypass function to turn off spectrum analysis. When dialog window of spectrum analyzer is closed, analysis is turned off too.

10.10 Other effects

10.10.1   Channel mixer

Channel mixer allows mixing and inverting stereo channels as well as redirecting the resulting sound to any channel (left, right or both).

You can get a 'pseudo stereo' effect by just inverting the sound in one channel (for example, in the right channel only).

Left Channel Mix group denotes the sources of the resulting sound in the left channel.

Right Channel Mix group denotes the sources of the resulting sound in the right channel.

The setting described below refer to both groups:

Left Source – amplification (from 0% to 100%) of the left channel. If you set it to 0%, the channel will not be mixed to the resulting channel.

Right Source - amplification (from 0% to 100%) of the right channel. If you set it to 0%, the channel will not be mixed to the resulting channel.

Invert – invert the sound in the channel. In the resulting channel, you can get the difference between the channels (for example, if in the left channel the Left source is set to 100% and the Right source to 100%, after inverting the left channel, in the resulting left channel you get the difference between the right and the left channels).

Channel mixer supports bypass function and presets (see also the note about presets storing).

10.10.2   DirectX Plug-in Chainer
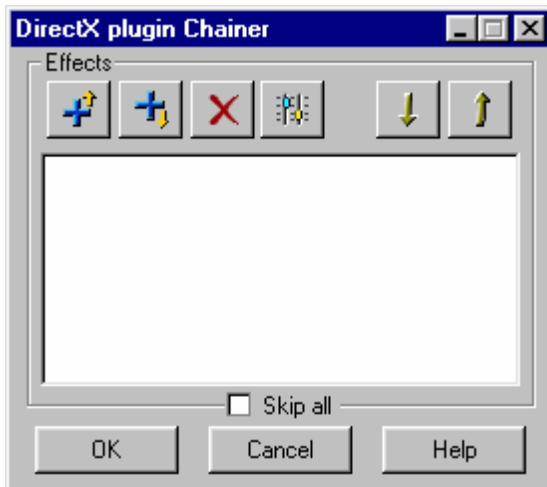
Important! Read section about supported plug-ins before working!

DirectX plug-in chainer allows inserting chain of DirectX audio plug-ins (DirectShow audio filters) to audio effect list. Please note that only plug-ins that get and process audio data in 32-bit float format are allowed to use (plug-ins that get audio data in 16-bit integer format are not supported).

Use buttons at the top of the dialog box to manipulate plug-ins chain. You can add/remove plug-ins, edit its parameters, change order of plug-ins in chain, turn on/off any audio plug-in using checkboxes at the left of its names in a list (when checkbox is checked plug-in is on).

Add Above – select audio plug-in from a list of available plug-ins and add it above current selected plug-in in list.

Add Below – select audio plug-in from a list of available plug-ins and add it below current selected plug-in in list.

Note: you can get message 'Can not use plug-in'. Possible reason is that plug-in does not support current audio format (some plug-ins process only mono or only stereo audio data). Plug-ins that does not work with 32-bit float format are not supported and cannot be inserted to chain (some plug-ins work with 16-bit data). Plug-ins that work with mono data only can be used on mono audio clips or in mono projects only.

Remove – remove selected plug-in from a list.

Edit – run property the dialog box of current plug-in to change its parameters. You can also double-click at a name of plug-in to run its setup dialog box.

Move Up – move current selected plug-in up to one step in list.

Move Down button – move current selected plug-in down to one step in a list.

Use Skip All checkbox to turn on/off entire chain of plug-ins (when it is checked plug-ins don't process sound). Please note that only entire a list can be turned on/off during real time preview/playback, one plug-in can be turned on/off (bypassed) only when playback is stopped.

When you insert any plug-in in a chain, dialog box with plug-in's property page(s) is shown (you can recall it any time later using ▒ button to edit/change

plug-in's parameters). List named Presets at the top of the dialog box allows to select any preset with plug-in's saved states.

Use the Save As button to save current state of plug-in to your own preset. You will be asked a name of preset, type it and press OK to save preset. When you selected any preset from a list and want to change any parameters in it, use the Save button to save current state to preset with the same name. Please note that typically plug-ins have some factory presets (built-in with plug-in), you can not overwrite (change) nor delete them from a list of presets.

Note: presets are saved to the directory on hard disk where you installed Forward AV Studio (for example, C:\Program Files\Forward AV Studio). You must have write access to this directory if you want to save your own presets (such rights may be restricted under Windows NT/2000).

Press the OK button to keep current state of plug-in and close its dialog box, or Cancel if you want to cancel changes that you made. The Apply button is the same as OK, but it doesn't close plug-in's dialog box and keeps current state. It means that this state will be restored if you change any plug-in's parameters and press Cancel after it.

Use the Help button to read help information about current plug-in provided by plug-in's manufacturer. Help file must be included and properly installed with plug-in.

10.10.3   DirectX Plug-ins List dialog box
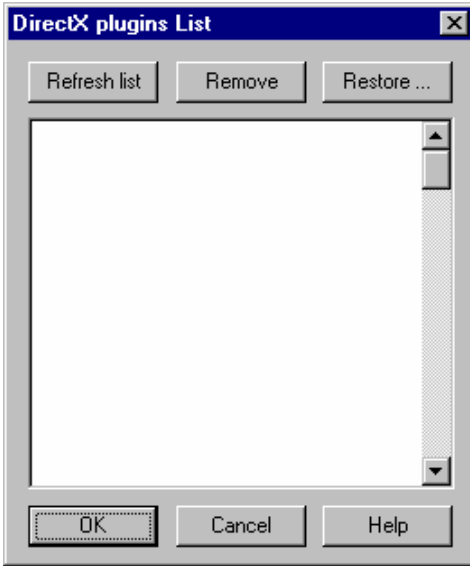
This dialog box shows a list of available DirectX audio plug-ins installed on your system and not included in the list of removed plug-ins (see below). Select title of desired plug-in and press OK to insert it to current plug-ins chain (note that you can't insert plug-in during playback).

Please note that some plug-ins shown in the list may not be allowed to be used. Only plug-ins that get and process audio data in 32-bit float audio format are supported (plug-ins that get data in 16-bit integer audio format are not allowed to use). Some plug-ins can not be inserted because process only mono or only stereo audio data, such plug-ins can be used on audio clips and in the projects with corresponding number of channels only (mono or stereo). You can remove plug-in from a list answering 'Yes' if you get message box 'Can not use plug-in'.

When you run this dialog box first time, **DirectX plug-in Chainer** searches for installed plug-ins, it can take some time. Next time searching is no longer needed. If you installed new plug-ins, you will need to press the Refresh List button to refresh a list of installed plug-ins. If you do not want to see some plug-ins in the list, select one of them and press the Remove button. It does not mean that plug-in is physically removed (uninstalled) from your system; it will be only excluded from a list of available plug-ins.

Removed plug-ins can be shown again if you restore them with the Restore button. It calls plug-ins restoring dialog box where you can restore desired plug-ins to be shown them in the list and allowed to be used.

10.10.4   Supported/unsupported DirectX Plug-ins

Important: you must have *Microsoft DirectShow Media* runtime installed on your system to work with DirectX plug-ins (DirectShow filters).

Forward AV Studio allows you to use any DirectX plug-ins, except ones that get and process audio data in 16-bit format (only 32-bit plug-ins are supported). Most modern plug-ins are 32-bit compatible and are fully compatible with Forward AV Studio.

Some plug-ins can work with only mono or only stereo audio. Such plug-ins can be used only on audio clips and in projects with appropriate number of audio channels (mono/stereo). For example, some Cakewalk plug-ins without Stereo in their name works with mono audio only, and some Waves plug-ins work only with stereo audio.

Most plug-ins work well with Forward AV Studio, but there is a possibility that some of them can cause program crash and loss of unsaved data in some rare situations. Please check all plug-ins before using them in serious work (try to insert them to simple test project and playback it with use of plug-in, check also that project can be saved and opened again). If you encounter crash during opening of a project, you can disable loading of DirectX plug-ins to restore your work – see Troubleshooting *Settings* for details. If you encounter that some plug-ins cause problems and you do not want to use them, you can remove such plug-ins from list of available plug-ins with Remove button (see description of plug-in selection dialog for more details).

We have tested many plug-ins for compatibility with Forward AV Studio, here is a list of some most popular supported plug-in packages:

> SonicFoundry plug-ins
>
> Cakewalk plug-ins (some work with mono audio only)
>
> DSP/FX plug-ins
>
> Hyperprism-DX plug-ins
>
> Waves plug-ins (some work with stereo audio only)
>
> TC Native plug-ins
>
> Timeworks plug-ins
>
> Steinberg plug-ins
>
> and others.

Plug-ins that can not be used because they support only 16-bit audio data:

CANAM (QUARTZ) plug-ins

There may be other plug-ins that are supported or not supported by Forward AV Studio. If you have problems with some plug-ins, contact us and write what plug-ins you are trying to use (please include WEB-address of plug-ins' manufacturer's Internet site if possible) and what is the problem.

10.10.5   Installing DirectShow runtime

In order to use DirectX plug-ins, you must have *Microsoft DirectShow runtime* (formerly called ActiveMovie) installed in your system. Latest versions of Windows (Windows 98 and Windows 2000) already have it installed, but it may be absent in the old versions of Windows 95 and Windows NT (however, DirectShow may be installed with latest version of Microsoft Internet Explorer or Windows Mediaplayer).

If you have problems and are not sure that have *DirectShow* in your system, download and install latest version of *Microsoft DirectShow runtime* via Microsoft DirectX page:

http://www.microsoft.com/DirectX

Follow to 'DirectX downloads' section and find 'DirectX Media'. Read instructions on the page about how to download and install it to your computer.

10.10.6   Restoring removed plug-ins

This dialog box shows titles of removed DirectX plug-ins that are not shown in the plug-ins list. Some of them may be marked as 'dangerous' to avoid them from being shown in the list even after installing other plug-ins and refreshing list of them. Some plug-ins are currently not supported by plug-ins chainer for some technical reasons and may cause program crash or hang-up. It is highly recommended to mark them as 'dangerous' and don't try to use them. Note that there are many plug-in packages in the market that may satisfy most of audio processing needs, and most of them are supported by Forward AV Studio's plug-in chainer.

All removed plug-ins (note that they are not really uninstalled from system, they are only excluded from list) can be restored back to be shown in the list (for example if some plug-ins were removed by mistake). Select plug-ins that you want to restore (click checkbox at left of desired plug-in's title in the list) and press the OK button. List of plug-ins will be rescanned, and all plug-ins that you have selected will be shown in the list again.

Use the Set as dangerous button to mark any removed plug-in as 'dangerous' (that can cause program crash, hang-up etc.). Titles of plug-ins that are marked as 'dangerous' are shown in red color. When you try to select them for restoring by clicking checkboxes at the left of its titles, warning message is shown.

The Restore all button allows to select (turn on checkboxes) all removed plug-ins to restore them with the OK button. Note that plug-ins that are marked as 'dangerous' are not selected with this button; if you want to restore them for some reasons, you must select them manually.

The OK button closes this dialog box and starts rescanning of the plug-ins list. All restored plug-ins will be shown in the list.

The Cancel button closes this dialog box and doesn't restore any plug-ins.

10.10.7   Advanced Pan
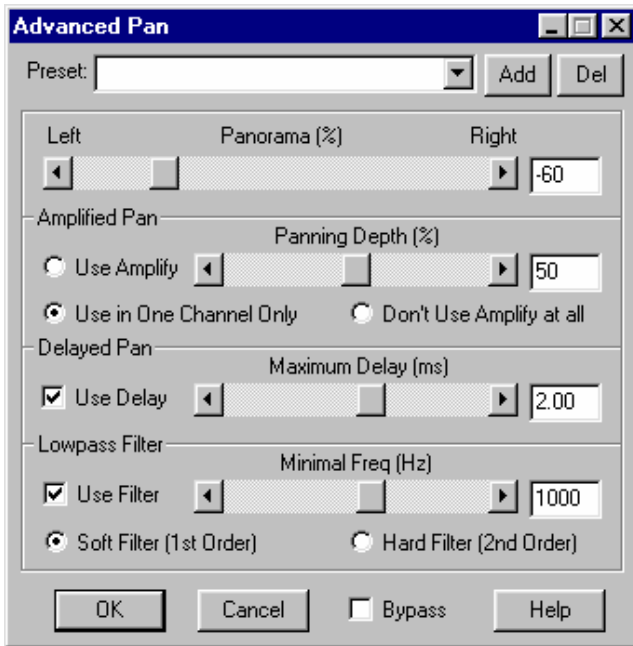
This effect allows you to change stereo balance (panorama) of a clip, track or entire project. It can perform panning not only by just changing volume of sound in left/right channels. You can also use delay and low filter (with slow or fast decay of its frequency response for panning.

Use this effect to get more natural and audible panning effects.

First feature of advanced pan is keeping of perceived volume of sound, so when you change panorama value, sum power of sound in both channels is kept constant. But its more important feature is possibility of use of delay and lowpass filter for panning.

As known from psychoacoustics, human's brain perceives direction of sound source not only by perceived volume in left and right ears, but also by delay and difference of frequency components between ears. Advanced pan allows using this knowledge to get more natural, deep and audible panning.

So, when you change panning value (that is you "move" perceived source of sound to the left or right), one channel can be delayed and/or filtered with lowpass filter (for example, if you move panorama to the left, right channel can

be delayed and/or filtered; the more panorama is moved, the more delayed and filtered right channel is).

You can turn off use of amplification in one or both channels if you want panning to be performed with use of delaying and/or filtering only. Filtering can be performed with use of soft or hard filter (with slow or fast decay of filters' frequency response).

Click at name of control to get its description:

Panorama. Panning value in percents: –100% moves balance to the left, 100% moves balance to the right, 0% keeps it without change.

Amplified pan group defines amplification parameters used for panning:

Panning depth parameter defines how deeply amplification is used to perform panning. 100% gives full depth, so when you set panorama to –100% for example, volume of left channel will be maximal, and zero in right channel (if Use amplify is on). If you set it to 0%, it will turn off amplification at all. Setting it to values less than 100% will give slight panning, so volume in channels will be changed less significantly that if you set full depth.

Use amplify mode turns on usage of amplification in both channels, so when you change panning value, volume of both channels will be affected. For example, when you set panorama to –100%, volume of left channel will be maximal, and zero in right channel in this mode.

Use in one channel only mode turns on usage of amplification in one channel only. For example, when you set panorama to –100%, volume of left channel will be maximal, and volume in right channel won't be changed.

This mode is useful when using delay and/or filter for panning. When you use filter, it suppresses high-frequency components of sound, and it may be enough to decrease power of sound with filter only.

Don't use amplify at all mode turns off usage of amplification for panning. Use this more if you want to perform panning using delay and/or filter only.

Delayed pan group defines delay parameters used for panning:

Maximal delay parameter defines maximal panning delay. If Use delay is on, and you set panorama value to –100% for example, right channel will be delayed to time amount equal to Maximal delay value. The greater is panorama value (the farther it is from center), the more delayed one of channels is.

Note: it is not recommended to set this value too high (more than 1-2 ms), but setting greater values can give interesting and deep stereo effects.

Turn on Use delay mode to use delay for panning. It gives more deep and natural panning effects.

The greater is panorama value (the farther from center), the more delayed one of channels is.

Lowpass filter group defines filtering parameters used for panning:

Minimal freq parameter defines minimal cut-off frequency of lowpass filter used for panning. If Use filter is on, and you set panorama value to – 100% for example, right channel will be filtered by lowpass filter with cut-off frequency equal to Minimal freq value. The greater is panorama value (the farther it is from center), the more filtered one of channels is (the less is filter's cut-off frequency).

Turn on Use filter mode to use lowpass filter for panning. The greater is panorama value (the farther it is from center), the more filtered one of channels is (the less is filter's cut-off frequency).

You can select kind of filter using Soft filter and Hard filter modes.

In Soft filter mode soft 1st-order lowpass filter is used for panning if Use filter is on. Frequency response decay of such filter is slow, so high frequencies are suppressed less than when using Hard filter.

In Hard filter mode soft 2nd-order lowpass filter is used for panning if Use filter is on. Frequency response decay of such filter is rather fast, so high frequencies are suppressed greater than when using Soft filter.

Note: if you want to use panorama profile with advanced delayed/filtered panning on audio clips, use Profile Advanced Pan effect instead of this one.

Advanced pan supports bypass function and presets.

Forward AV Studio

10.11 Effects with profiles

10.11.1   Profile Advanced Pan
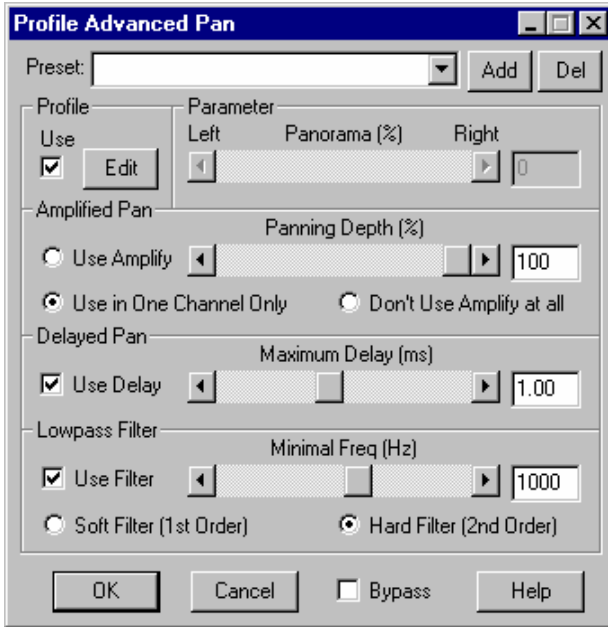
This audio effect allows you to change stereo balance (panorama) of a clip. It can perform panning not only by just changing volume of sound in left/right channels. You can also use delay and lowpass filter (with slow or fast decay of its frequency response for panning.

Use this effect to get more natural and audible panning effects.
This audio effect supports profiles for its parameters: Cut-off Frequency, Steepness and Gain at cut-off frequency. Edit buttons and Use switches. Some audio effects that are included with Forward AV Studio allow you to define 'scenario' (profile) of change of their parameters in time (name of such effects always start with Profile). It means that you can not only set static values of effect's parameters, but you can also draw profiles on audio clips that denote how parameters should be changed in time. Profiles of audio effects are edited with the same manner as when editing volume/panorama profiles, with mouse and keyboard shortcuts.
Note: effects with profiles can be applied on audio clips only.
Use Edit button at the left of parameter's controls (scrollbar and edit box) to make its profile active and edit it on audio clip where this audio effect is placed.

If you turn off Use switch, profile will be turned off, and you will be able to set constant value of parameter manually with scrollbar or edit box:

Profile of effect's parameter is turned on; manual setting of value of parameter with scrollbar and edit box is disabled.

Profile of effect's parameter is turned off; manual setting of value of parameter with scrollbar and edit box is enabled.

Tip: profiles of audio effects can be turned on/off and selected for editing from audio effects list dialog. See also section about working with audio effects in Forward AV Studio. Click at name of control to get its description:

Panorama. Panning value in percents: –100% moves balance to the left, 100% moves balance to the right, 0% keeps it without change.

Amplified pan group defines amplification parameters used for panning:

Panning depth parameter defines how deeply amplification is used to perform panning. 100% gives full depth, so when you set panorama to –100% for example, volume of left channel will be maximal, and zero in right channel (if Use amplify is on). If you set it to 0%, it will turn off amplification at all. Setting it to values less than 100% will give slight panning, so volume in channels will be changed less significantly that if you set full depth.

Use amplify mode turns on usage of amplification in both channels, so when you change panning value, volume of both channels will be affected. For example, when you set panorama to –100%, volume of left channel will be maximal, and zero in right channel in this mode.

Use in one channel only mode turns on usage of amplification in one channel only. For example, when you set panorama to – 100%, volume of left channel will be maximal, and volume in right channel won't be changed.

This mode is useful when using delay and/or filter for panning. When you use filter, it suppresses high-frequency components of sound, and it may be enough to decrease power of sound with filter only.

Don't use amplify at all mode turns off usage of amplification for panning. Use this more if you want to perform panning using delay and/or filter only.

Delayed pan group defines delay parameters used for panning:

Maximal delay parameter defines maximal panning delay. If Use delay is on, and you set panorama value to –100% for example, right channel will be delayed to time amount equal to Maximal delay value. The greater is panorama value (the farther it is from center), the more delayed one of channels is.

Note: it is not recommended to set this value too high (more than 1-2 ms), but setting greater values can give interesting and deep stereo effects.

Turn on Use delay mode to use delay for panning. It gives more deep and natural panning effects.

The greater is panorama value (the farther from center), the more delayed one of channels is.

Lowpass filter group defines filtering parameters used for panning:

Minimal freq parameter defines minimal cut-off frequency of lowpass filter used for panning. If Use filter is on, and you set panorama value to –100% for example, right channel will be filtered by lowpass filter with cut-off frequency equal to Minimal freq value. The greater is panorama value (the farther it is from center), the more filtered one of channels is (the less is filter's cut-off frequency).

Turn on Use filter mode to use lowpass filter for panning. The greater is panorama value (the farther it is from center), the more filtered one of channels is (the less is filter's cut-off frequency).

You can select kind of filter using Soft filter and Hard filter modes.

In Soft filter mode soft 1st-order lowpass filter is used for panning if Use filter is on. Frequency response decay of such filter is slow, so high frequencies are suppressed less than when using Hard filter.

In Hard filter mode soft 2nd-order lowpass filter is used for panning if Use filter is on. Frequency response decay of such filter is rather fast, so high frequencies are suppressed greater than when using Soft filter.

Note: if you want to use panorama profile with advanced delayed/filtered panning on audio tracks or entire project, use Advanced Pan effect instead of this one.

Profile advanced pan supports bypass function and presets. You can also set quality of processing for this effect.

10.11.2 Profile Allpass Filter
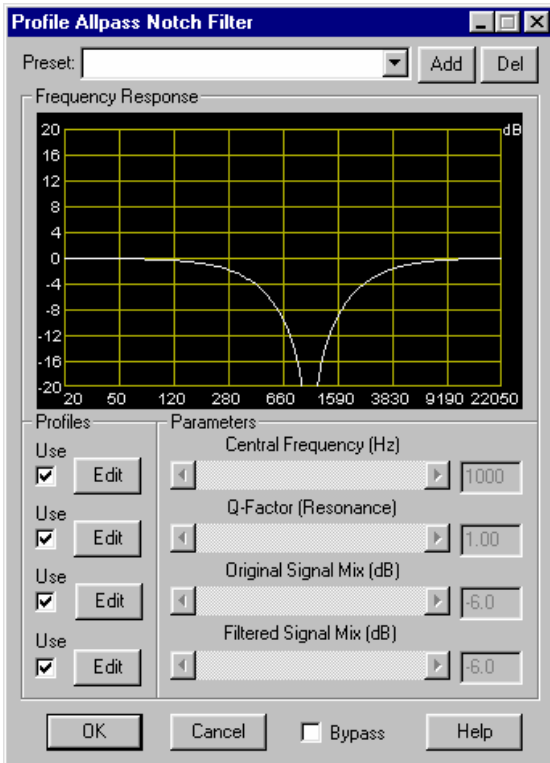
Allpass filter affects only phase of sound being processed. If you mix it with original sound, you will get weakening of volume at some frequencies. It gives sound like phaser but with slightly other timbre. This modification of effect allows you to define and edit change of filter's parameters with profiles on audio clip.

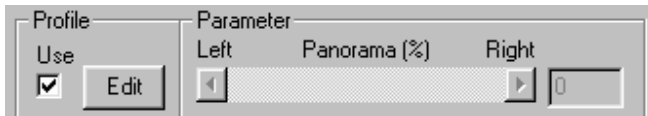*Allpass filter can be used for processing guitar or sound effects like noise (or any other).*

This audio effect supports profiles for its parameters: Cut-off Frequency, Steepness and Gain at cut-off frequency. Edit buttons and Use switches. Some audio effects that are included with Forward AV Studio allow you to define 'scenario' (profile) of change of their parameters in time (name of such effects always start with Profile). It means that you can not only set static values of effect's parameters, but you can also draw profiles on audio clips that denote how parameters should be changed in time. Profiles of audio effects are edited with
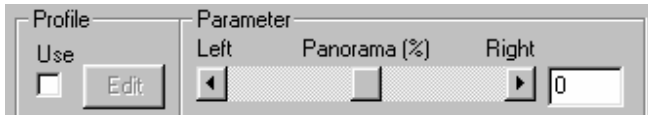
the same manner as when editing volume/panorama profiles, with mouse and keyboard shortcuts.

Note: effects with profiles can be applied on audio clips only.

Use Edit button at the left of parameter's controls (scrollbar and edit box) to make its profile active and edit it on audio clip where this audio effect is placed. If you turn off Use switch, profile will be turned off, and you will be able to set constant value of parameter manually with scrollbar or edit box:

Profile of effect's parameter is turned on; manual setting of value of parameter with scrollbar and edit box is disabled.

Profile of effect's parameter is turned off; manual setting of value of parameter with scrollbar and edit box is enabled.

Tip: profiles of audio effects can be turned on/off and selected for editing from audio effects list dialog. See also section about working with audio effects in Forward AV Studio. Central frequency of the filter is being changed with profile in logarithmical scale in correspondence with features of human's perceptions of sound (frequency change is linear in octaves).

Click at the name of control to get its description:

Central frequency of allpass filter. This frequency must be greater than zero and less than a half of sampling frequency of sound being processed.

Q-factor (resonance) parameter defines bandwidth of filter's band.

Original signal mix. Amplification of original (not processed) signal in the output of filter (in dB).

Filtered signal mix. Amplification of filtered (processed) signal in the output of filter (in dB).

Note: current frequency response of the filter is shown on the diagram. It is being updated when you change values of parameters manually or during real-time playback when you press Play button in effects list dialog. You can also use frequency and phase response dialog to analyze effects more deeply.

10.11.3 Profile Bandpass Filter
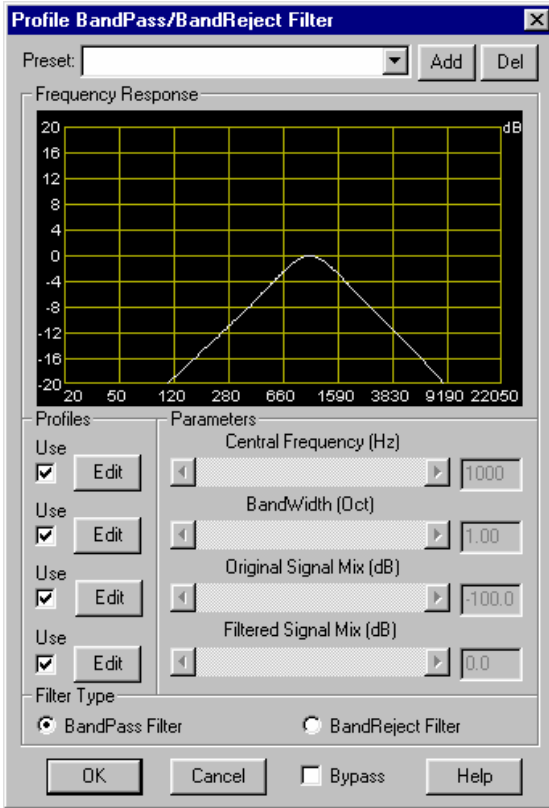
This audio effect allows you to filter sound with bandpass or bandreject filter. Bandpass filter suppresses sound volume of frequency components outside passband, bandreject filter suppresses components inside reject band.

Bandpass filter can be used for processing voice to get 'telephone' sound.

This audio effect supports profiles for its parameters: Cut-off Frequency, Steepness and Gain at cut-off frequency. Edit buttons and Use switches. Some audio effects that are included with Forward AV Studio allow you to define 'scenario' (profile) of change of their parameters in time (name of such effects always start with Profile). It means that you can not only set static values of effect's parameters, but you can also draw profiles on audio clips that denote how parameters should be changed in time. Profiles of audio effects are edited with
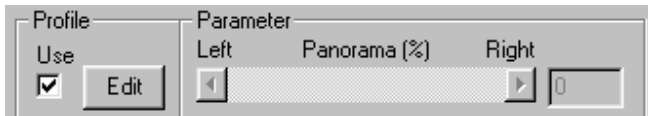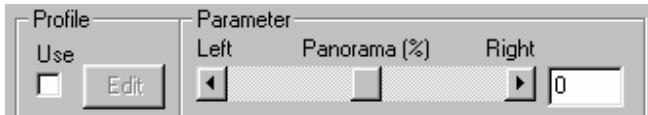
the same manner as when editing volume/panorama profiles, with mouse and keyboard shortcuts.

Note: effects with profiles can be applied on audio clips only.

Use Edit button at the left of parameter's controls (scrollbar and edit box) to make its profile active and edit it on audio clip where this audio effect is placed. If you turn off Use switch, profile will be turned off, and you will be able to set constant value of parameter manually with scrollbar or edit box:

Profile of effect's parameter is turned on; manual setting of value of parameter with scrollbar and edit box is disabled.

Profile of effect's parameter is turned off; manual setting of value of parameter with scrollbar and edit box is enabled.

Tip: profiles of audio effects can be turned on/off and selected for editing from audio effects list dialog. See also section about working with audio effects in Forward AV Studio. Central frequency of the filter is being changed with profile in logarithmical scale in correspondence with features of human's perceptions of sound (frequency change is linear in octaves).

Click at the name of control to get its description:

Central frequency of filter's band. This frequency must be greater than zero and less than a half of sampling frequency of sound being processed.

Bandwidth – relative width of filter's band (in octaves).Original signal mix. Amplification of original (not processed) signal in the output of filter (in dB).

Filtered signal mix. Amplification of filtered (processed) signal in the output of filter (in dB).

Bandpass filter. Selects bandpass type of filter: frequency components of sound outside passband are suppressed.Bandreject filter. Selects bandreject type of filter: frequency components of sound inside stopband are suppressed.

Note: current frequency response of the filter is shown on the diagram. It is being updated when you change values of parameters manually or during real-

time playback when you press Play button in effects list dialog. You can also use frequency and phase response dialog to analyze effects more deeply.

10.11.4 Profile Delay
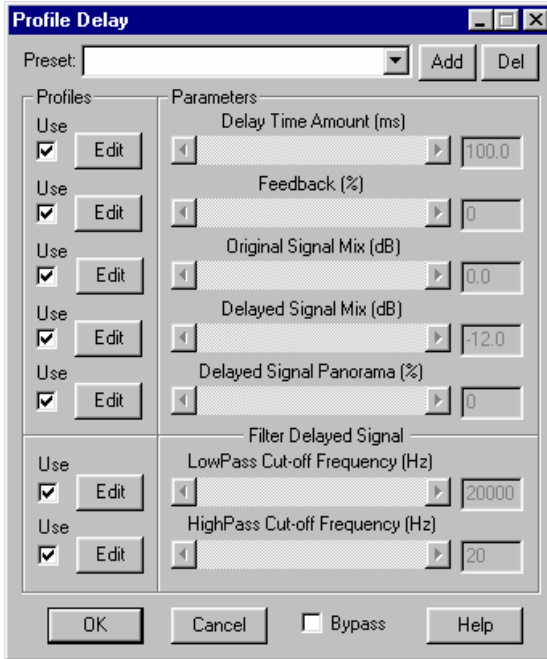
This effect allows you to delay sound for some amount of time to obtain sound effects like simple echo. When delay amount is about 100 ms or more, it gives effect of reflections of sound (like echo), and when delay is some milliseconds, it gives effect of phase-shift (you can get pseudo-stereo effect – just delay sound in one channel by some milliseconds). This modification of delay allows you to define and edit change of filter's parameters with profiles.

Delay is widely used for processing recorded voice or to get pseudo stereo effects (for the rhythm-guitar for example).

This audio effect supports profiles for its parameters: Cut-off Frequency, Steepness and Gain at cut-off frequency. Edit buttons and Use switches. Some audio effects that are included with Forward AV Studio allow you to define 'scenario' (profile) of change of their parameters in time (name of such effects always start with Profile). It means that you can not only set static values of effect's parameters, but you can also draw profiles on audio clips that denote how parameters should be changed in time. Profiles of audio effects are edited with

the same manner as when editing volume/panorama profiles, with mouse and keyboard shortcuts.

Note: effects with profiles can be applied on audio clips only.

Use Edit button at the left of parameter's controls (scrollbar and edit box) to make its profile active and edit it on audio clip where this audio effect is placed. If you turn off Use switch, profile will be turned off, and you will be able to set constant value of parameter manually with scrollbar or edit box:

Profile of effect's parameter is turned on; manual setting of value of parameter with scrollbar and edit box is disabled.

Profile of effect's parameter is turned off; manual setting of value of parameter with scrollbar and edit box is enabled.

Tip: profiles of audio effects can be turned on/off and selected for editing from audio effects list dialog. See also section about working with audio effects in Forward AV Studio. Click at the name of control to get its description:

Delay – the value delay in milliseconds.

Input signal mix – amplification of input (not delayed) sound in percent (from 0% to 100%). You can set it to 0% to obtain only the delayed sound at output.

Delayed signal mix – amplification of the delayed sound in percent (from 0% to 100%). Use this setting to control the volume of the delayed sound (echo).

Feedback is the volume of the resulting sound (mixed from the input and delayed sounds) in percent (from 0% to 100%) that is returned to the input of the delay channel to get sound repeated reflections effects.

Delayed signal panorama – panorama of delayed signal (in percents). You can move delayed signal to left/right in stereo image using this parameter. – 100% moves signal to the left, 100% – to the right.

This parameter is active only in a stereo project.

Lowpass cut-off frequency. Cut-off frequency of lowpass filter on delayed signal (in Hz). This parameter allows you to filter delayed signal with lowpass filter and

remove high-frequency components. Dynamic change of these parameters gives interesting effects. This frequency must be greater than zero and less than a half of sampling frequency of sound being processed.

Highpass cut-off frequency. Cut-off frequency of highpass filter on delayed signal (in Hz). This parameter allows you to filter delayed signal with highpass filter and remove low-frequency components. Dynamic change of these parameters gives interesting effects. This frequency must be greater than zero and less than a half of sampling frequency of sound being processed.

Cut-off frequency of filters is being changed with profile in logarithmical scale in correspondence with features of human's perceptions of sound (frequency change is linear in octaves).

10.11.5   Profile Parametric Filter
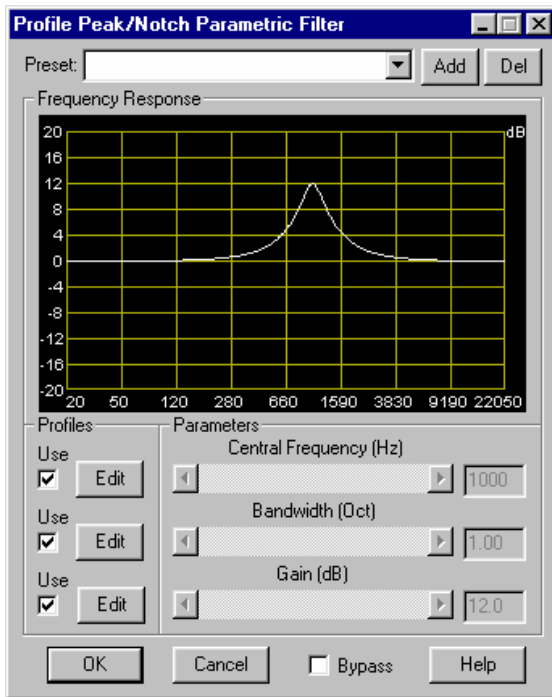
This audio effect uses the same filter as middle filters of Parametric Equalizer: you can peak or notch volume in some frequency band with it. This modification of parametric filter allows you to define and edit change of filter's parameters with profiles.

Parametric filter can be used for processing guitar solo for example to get some kind of 'wah-wah' pedal effects. You can also use Profile Resonant Filter for the same kind of effects.
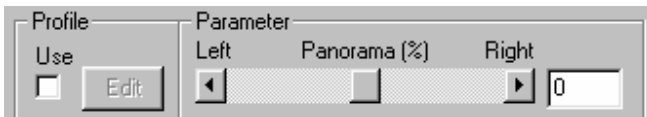
This audio effect supports profiles for its parameters: Cut-off Frequency, Steepness and Gain at cut-off frequency. Edit buttons and Use switches. Some audio effects that are included with Forward AV Studio allow you to define 'scenario' (profile) of change of their parameters in time (name of such effects always start with Profile). It means that you can not only set static values of effect's parameters, but you can also draw profiles on audio clips that denote how parameters should be changed in time. Profiles of audio effects are edited with the same manner as when editing volume/panorama profiles, with mouse and keyboard shortcuts.

Note: effects with profiles can be applied on audio clips only.

Use Edit button at the left of parameter's controls (scrollbar and edit box) to make its profile active and edit it on audio clip where this audio effect is placed. If you turn off Use switch, profile will be turned off, and you will be able to set constant value of parameter manually with scrollbar or edit box:

Profile of effect's parameter is turned on; manual setting of value of parameter with scrollbar and edit box is disabled.

Profile of effect's parameter is turned off; manual setting of value of parameter with scrollbar and edit box is enabled.

Tip: profiles of audio effects can be turned on/off and selected for editing from audio effects list dialog. See also section about working with audio effects in Forward AV Studio. Central frequency of the filter is being changed with profile in logarithmical scale in correspondence with features of human's perceptions of sound (frequency change is linear in octaves).

Click at the name of control to get its description:

Central frequency of filter's band (in Hz). Dynamic change of this parameter with profile gives interesting effects like 'wah-wah' pedal. This frequency must be

greater than zero and less than a half of sampling frequency of sound being processed.

Bandwidth – relative width of filter's band (in octaves).Gain at central frequency (in dB). You can both peak (gain > 0 dB) and notch (gain < 0 dB) sound at central frequency of filter's band.

Note: current frequency response of the filter is shown on the diagram. It is being updated when you change values of parameters manually or during real-time playback when you press Play button in effects list dialog. You can also use frequency and phase response dialog to analyze effects more deeply.

10.11.6   Profile Resonant Filter
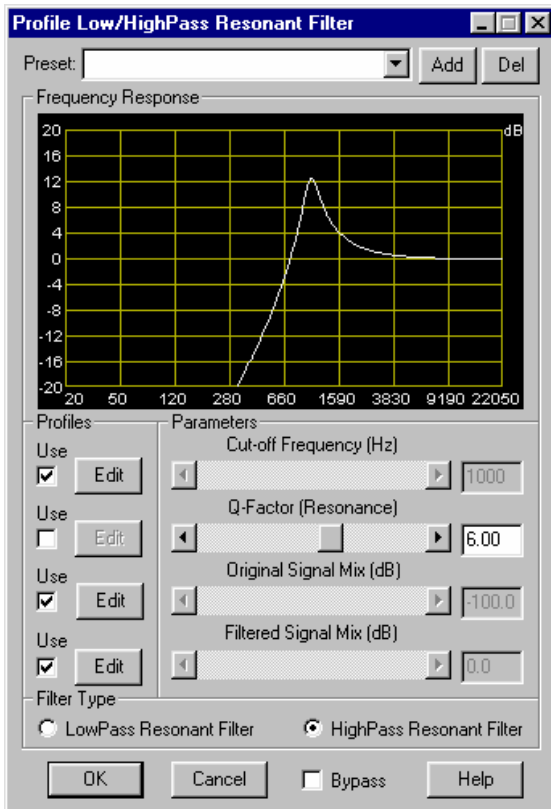
This audio effect allows you to filter sound with lowpass or highpass filter. You can also use resonance to peak gain at filter's cut-off frequency.

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Resonant filter is widely used for processing guitar solo to get 'wah-wah' pedal effects. You can also use Profile Parametric Filter for the same kind of effects.
This audio effect supports profiles for its parameters: Cut-off Frequency, Steepness and Gain at cut-off frequency. Edit buttons and Use switches. Some audio effects that are included with Forward AV Studio allow you to define 'scenario' (profile) of change of their parameters in time (name of such effects always start with Profile). It means that you can not only set static values of effect's parameters, but you can also draw profiles on audio clips that denote how parameters should be changed in time. Profiles of audio effects are edited with the same manner as when editing volume/panorama profiles, with mouse and keyboard shortcuts.
Note: effects with profiles can be applied on audio clips only.
Use Edit button at the left of parameter's controls (scrollbar and edit box) to make its profile active and edit it on audio clip where this audio effect is placed. If you turn off Use switch, profile will be turned off, and you will be able to set constant value of parameter manually with scrollbar or edit box:

Profile of effect's parameter is turned on; manual setting of value of parameter with scrollbar and edit box is disabled.

Profile of effect's parameter is turned off; manual setting of value of parameter with scrollbar and edit box is enabled.

Tip: profiles of audio effects can be turned on/off and selected for editing from audio effects list dialog. See also section about working with audio effects in Forward AV Studio. Cut-off frequency of the filter is being changed with profile in logarithmical scale in correspondence with features of human's perceptions of sound (frequency change is linear in octaves).

Click at the name of control to get its description:

Cut-off frequency of filter's low or high-frequency band (in Hz). Filter suppresses volume of sound outside its passband, and resonance defines peak at this

frequency. This frequency must be greater than zero and less than a half of sampling frequency of sound being processed.

Q-factor (resonance) parameter defines peak in filter's frequency response at cut-off frequency.Original signal mix – amplification of original (not processed) signal in the output of filter (in dB).

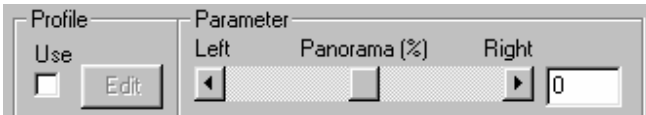Filtered signal mix – amplification of filtered (processed) signal in the output of filter (in dB).

Lowpass resonant filter. Selects lowpass type of filter: high-frequency components of sound are suppressed.

Highpass resonant filter. Selects highpass type of filter: low-frequency components of sound are suppressed.

Note: current frequency response of the filter is shown on the diagram. It is being updated when you change values of parameters manually or during real-time playback when you press Play button in effects list dialog. You can also use frequency and phase response dialog to analyze effects more deeply.

10.11.7　Profile Shelf Filter
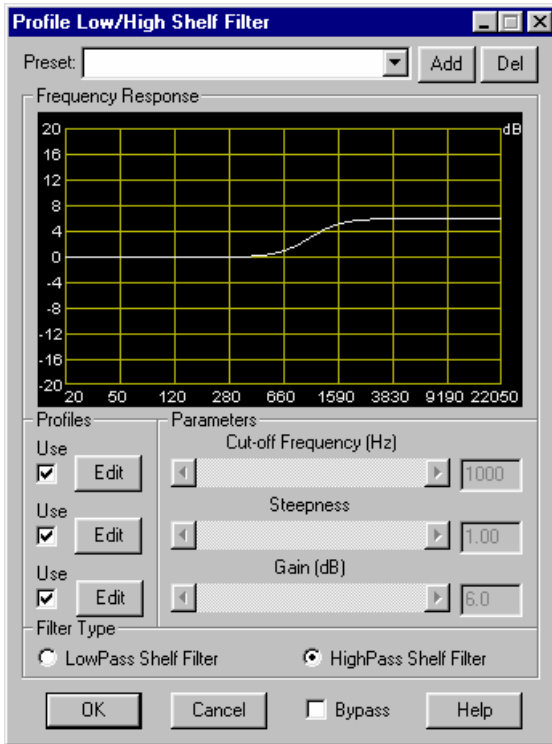
This audio effect uses the same filter as first and last filters of **Parametric Equalizer**: you can lift or notch volume in low-frequency or high-frequency band with it. This modification of shelf filter allows you to define and edit change of filter's parameters with profiles.

Shelf filter can be used for boosting or suppressing low or high frequencies of sound.

This audio effect supports profiles for its parameters: Cut-off Frequency, Steepness and Gain at cut-off frequency. Edit buttons and Use switches. Some audio effects that are included with Forward AV Studio allow you to define 'scenario' (profile) of change of their parameters in time (name of such effects always start with Profile). It means that you can not only set static values of effect's parameters, but you can also draw profiles on audio clips that denote how parameters should be changed in time. Profiles of audio effects are edited with

the same manner as when editing volume/panorama profiles, with mouse and keyboard shortcuts.

Note: effects with profiles can be applied on audio clips only.

Use Edit button at the left of parameter's controls (scrollbar and edit box) to make its profile active and edit it on audio clip where this audio effect is placed. If you turn off Use switch, profile will be turned off, and you will be able to set constant value of parameter manually with scrollbar or edit box:

Profile of effect's parameter is turned on; manual setting of value of parameter with scrollbar and edit box is disabled.

Profile of effect's parameter is turned off; manual setting of value of parameter with scrollbar and edit box is enabled.

Tip: profiles of audio effects can be turned on/off and selected for editing from audio effects list dialog. See also section about working with audio effects in Forward AV Studio.

Cut-off frequency of the filter is being changed with profile in logarithmical scale in correspondence with features of human's perceptions of sound (frequency change is linear in octaves).

Click at the name of control to get its description:

Cut-off frequency. Cut-off edge frequency of filter's low or high frequency band (in Hz). This frequency must be greater than zero and less than a half of sampling frequency of sound being processed.

Steepness parameter defines steepness (slope) of filter's frequency response.

Gain at zero frequency for lowpass filter or at a half of sample rate for highpass filter (in dB). You can both peak (gain > 0 dB) and notch (gain < 0 dB) sound in filter's band.

Lowpass shelf filter selects lowpass shelf type of filter: gain is set for 0 Hz.

Highpass shelf filter selects highpass shelf type of filter: gain is set for a half of sample rate frequency.

10. *Audio effects*

Note: current frequency response of the filter is shown on the diagram. It is being updated when you change values of parameters manually or during real-time playback when you press Play button in effects list dialog. You can also use frequency and phase response dialog to analyze effects more deeply.

Profile shelf filter supports bypass function and presets. You can also set quality of processing for this effect.

11 DDSound Volume Control

DDSound Volume Control is an application included with Forward AV Studio. It allows adjusting the settings of audio devices: changing the volume, turning on/off audio outputs for playback, selecting source inputs for recording, saving and restoring the states of audio devices.

For more detail, please, select one of the following sections:

DDSound Volume Control overview

Main window overview

Toolbar

Device selection

Saving and Restoring states

Using with Forward AV Studio

Local Menu

Settings

Some tips

11.1 DDSound Volume Control overview

DDSound Volume Control is an additional application included with Forward AV Studio. It allows adjusting the settings of audio devices: changing the volume, turning on/off audio outputs for playback and selecting source inputs for recording. The application window can be activated from *Forward AV Studio*: press F8 when the main *Project* window is active or use the DDSound Volume Control command from the Window menu.

DDSound Volume Control is user-friendlier than the standard volume control system (however, you can run it using the Volume Control command on the Tools menu). In *DDSound Volume Control* you can adjust the volume in decibels (dB) and percent save the state of any audio device and restore any state with a mouse click. You may also define two different states for playback and recording that is set automatically when playback/recording actually start in Forward AV Studio. It may be used, for example, to mute some audio input channels during playback and turn them on automatically when the playback is stopped.

DDSound Volume Control can run independently of Forward AV Studio: you may launch it by its item on Forward AV Studio folder in the system Start menu (for example, Start –> Programs –> Forward AV Studio–> DDSound Volume Control).

11.2 **Main window overview**
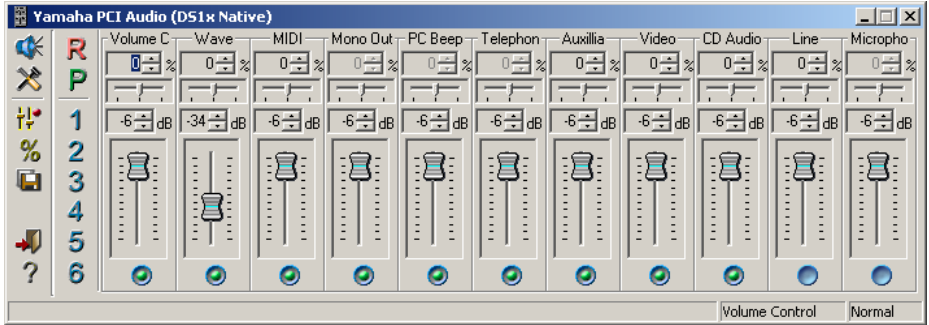
The main window of *DDSound Volume Control* consists of two parts: a toolbar at the left and audio devices controls with faders and selection buttons at the right.

The window title contains the name of the currently selected audio mixer device (soundcard), for example, Yamaha PCI Audio or FD300 Wave 1B0 (see figure below).

Each fader corresponds to one audio input/output (control), such as the main volume control, audio CD, microphone, line input, MIDI synthesizer etc. The name of an audio control is shown at the fader top (for example, 'Audio CD'). A long name can be truncated, but if you move the mouse cursor over the fader and hold the cursor for about one second, a tooltip with the full name will pop up. The first numeric field below the name allows the adjustment of the audio

balance (to the left/right). The slider can also be used for this purpose (move it to the left/right). The second numeric field and vertical fader allow changing the volume of sound. The volume can be represented in percent or decibels (100% and 0 dB correspond to the maximum volume). Press icon on the toolbar to switch between % and dB. Button below the fader allows selecting (including in playback/recording) or muting (disabling) the audio control. When selected, playback controls are shown with green and record controls with red buttons. You can see if a control is selected or not by putting the mouse cursor over the button and holding it they're for about a second. Press icon on the toolbar to switch between playback/recording controls for the current audio device (soundcard). Typically 'Volume Control' or 'Recording control' is shown at the bottom of the main window to indicate which control is currently displayed (the displayed text may differ depending on the soundcard).

The number of faders may also vary depending on the soundcard used, and some controls may be disabled and not shown. Press icon on the toolbar to select the current audio device (soundcard) and choose the controls to be shown as faders.

Note that some professional soundcards (for example 'Card Deluxe' by Digital Audio Labs) do not have an audio mixer device. You cannot adjust the input/output volume level without a mixer device, and for such soundcards *DDSound Volume Control* does not show controls at all.

Most commands are accessible via the toolbar and local menu.

11.3 Toolbar
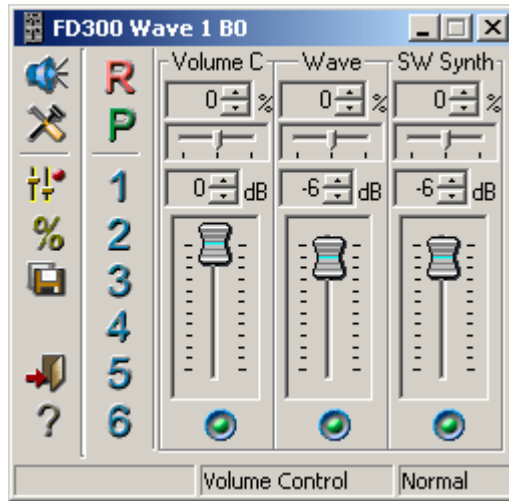
Toolbar is located at the left of the *DDSound Volume Control* main window. It consists of two vertical lines with the following icons.

select audio mixer device (soundcard) and audio controls to be shown in the main window. Calls the device selection dialog box.

change the program settings.

switch between playback/recording controls for the current audio device (typically 'Volume Control' or 'Recording control' are shown at the bottom of the main window to indicate which controls are currently displayed).

show the volume in decibels (dB) or percent (%).

save the current state of devices. Calls the *Save state* dialog box.

close *DDSound Volume Control* main window.

show *About* dialog box.

Icons in the second line allow restoring (recalling) any state of a previously saved device.

a state saved for recording.

a state saved for playback.

These two states can be restored automatically when the recording/playback actually starts in Forward AV Studio. See the section about using with Forward AV Studio for details. You may recall recording/playback states manually by pressing these two icons (see also *Saving and restoring states*).

The last icons with numbers restore user-defined states of devices (Forward AV Studio will never automatically restore such states). For example, you may save some of the preferred states with different volumes and audio controls selected (or muted) for listening CD, playing multimedia files, recording something etc. and recall any state with a mouse click.

When you move the mouse cursor over any icon on the toolbar and hold the cursor there for about a second, there pops up a tooltip with the icon's text description. For the first line of icons, the tooltips contain short descriptions of actions that can be performed by pressing on these icons. For the second line of icons, there appears the name of the saved state. If 'No saved state' is shown, indicating that no state has been saved for this icon, pressing the icon would give no result (the current state of audio devices cannot be changed in any way).

Note that most commands are also accessible via the local menu!

11.4 Device selection dialog box
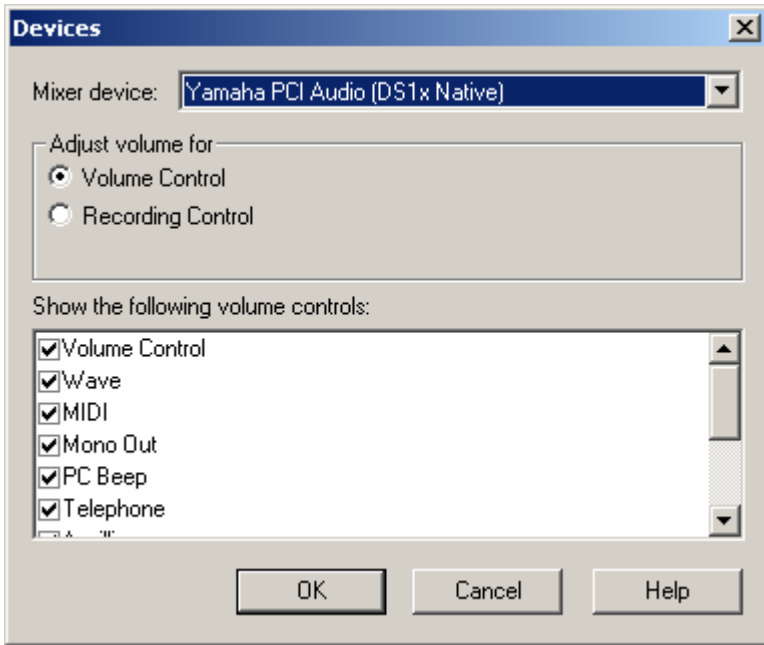
Device selection dialog box can be called by 🔊 icon on the toolbar or via the local menu. This dialog box allows selecting the current audio mixer device (soundcard) and choosing audio controls to be shown in the main window with faders and selection buttons.

Mixer device contains the list of audio mixer devices installed on your system. Note that some professional soundcards have no mixer device. You cannot control playback volume and recording level on such soundcards. *DDSound Volume Control* does not include them in the list of available mixer devices.

Adjust volume for group allows selecting the current group of audio controls for a selected audio mixer device. The list of audio controls of a selected group is displayed at the bottom of the dialog box. If the checkbox at the left of audio control title is on, this control is displayed in the main window.

On the sample image, you can see that 'MIDI' control is not selected. Thus, the faders for this control are not shown in the main window.

Typical names of playback controls are as follows:

Volume Control – master volume of audio output,
Line – line input volume of audio output,
Mic – microphone volume of audio output,
Audio CD – volume of audio CD,
MIDI – volume of internal MIDI synthesizer.

Modern soundcards may have many other controls. To know the capabilities of a soundcard, are referred to its documentation or the manufacturer.

11.5 Saving and restoring states
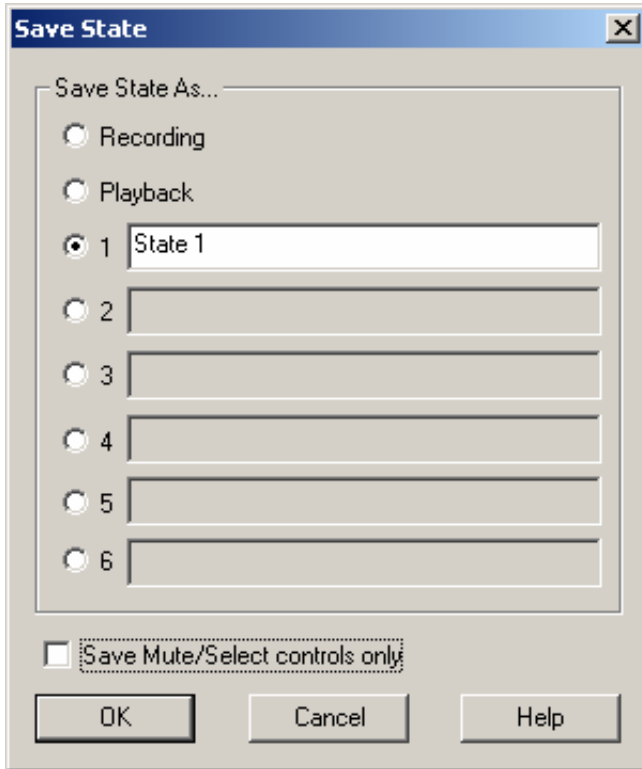
DDSound Volume Control allows saving any state of all mixer audio devices (soundcards) installed on your system and restoring any saved state with a mouse click on the toolbar. Up to 8 different states (with different volume and recording levels of audio controls) can be saved. Two special states saved for recording and

playback can be restored automatically when playback/recording start in Forward AV Studio (see section about using with Forward AV Studio).

To define a state of audio device, select or mute desired audio controls and set appropriate levels in the main window of *DDSound Volume Control*. You may need to switch between playback and recording controls of the current audio device with ⚡ icon on the toolbar. Press 🔊 icon to select a current audio device (if you have more than one soundcard installed) and choose the audio controls to be shown in the main window of *DDSound Volume Control*. Use the selection buttons to mute/select audio controls and vertical faders to set their volume.

If Save mute / select only option is on, only the state of mute/select buttons is saved (volume levels are not saved and remain unchanged when the state is restored). It may be useful if you want to mute or enable some audio controls when the state is restored without changing the current volume levels. Turn Save mute / select only off if you want the volume levels to be saved into state. If you want to change this option globally set it in the program settings. When you open the dialog box to save state next time, this option will be automatically set in accordance with program settings.

To save the current state press 💾 icon on the toolbar to call the *Save state* dialog box. Select the type of the state you want to save: Recording, Playback or any of user-defined states. Any name can be set for the latter. For example, you may save state number 1 with Audio CD control enabled (selected) and name it Listen to audio CD. State number 2 with 'Audio CD' control disabled (muted) can be named Work with audio and used while working in Forward AV Studio to mix audio without CDROM-inherent noise (especially when you work in headphones). Any of these states can be restored with a click on appropriate icons on the toolbar.

11.6 Using with Forward AV Studio

DDSound Volume Control can be used with Forward AV Studio to automatically restore two special states of audio devices saved for recording and playback.

When you have saved state of audio controls for playback and press Play in Forward AV Studio, *DDSound Volume Control* saves the current state (that was before the start of playback), and restores the state saved for playback. When playback is stopped, the previous state is restored.

For example, you may need to mute line input of soundcard during playback, and automatically turn it on when playback is stopped. To do this, follow the following instructions.

First, check that Automatically change mixer state is on in Devices tab of the *Settings* dialog box (press F5 and select Devices).

Save the state for playback with line input muted:

1. Check that Volume Control (not Recording control) is shown at the bottom of the main window of *DDSound Volume Control*. If recording controls are currently shown, switch to playback controls with icon on the toolbar.

2. Check that line input is enabled (selected) or muted (unselected). If line input is enabled, the selection button under fader with title 'Line' is green: and cyan if line input is muted. You may also check it by moving the mouse cursor over the selection button and holding the cursor there for about a second. The tooltip with the name of the control will be shown. Read the text in braces (Now selected or Now unselected).

3. If line input is enabled, mute it by pressing the selection button under the fader of line input control. The selection button must become cyan: . If you cannot see the fader for line input, check that it is selected in the device selection dialog box. Note that the actual title of the fader depends on the soundcard you use.

4. Save the current state for playback: press icon on the toolbar, select Playback in the *Save state* dialog box and press OK.

Now enable line input again using the selection button. When you press Play button in the main *Project* window of Forward AV Studio, *DDSound Volume Control* will restore the state saved for playback and mute line input. When playback is finished (or Stop button is pressed), Forward AV Studio will restore the previous state with line input enabled.

The same way is used to automatically restore the state saved for recording during recording audio. Switch to recording controls with icon on the toolbar (check that Recording control is shown at the bottom of the main window). Set a desired state or recording controls (select appropriate input for recording and set the desired recording level for it), press icon, select Recording in the *Save state* dialog box and press OK. The saved state will be automatically restored when recording actually starts.

You can automatically restore the selection of both audio controls during playback/recording and volume levels. For detail, see the section about program *Settings*.

Note that *DDSound Volume Control* runs simultaneously with Forward AV Studio and works even if the main window is not displayed. You do not need to keep the main window of *DDSound Volume Control* visible if you want to use automatic restoring of playback/recording states. But if you do not want to use this feature, it is not enough to just close the *DDSound Volume Control* main window. Instead you must turn off the option

11. *DDSound Volume Control*

Automatically change mixer state in Devices tab of the *Settings* dialog box in Forward AV Studio.
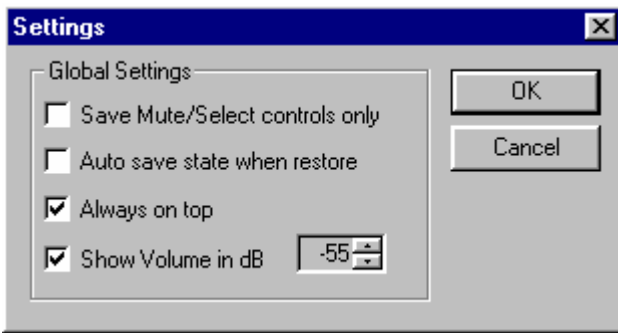
11.7 Local menu

Local menu is called by pressing the mouse right button when the mouse cursor is over the main window of *DDSound Volume Control*. Most commands of this menu are also accessible via icons on the toolbar.

This menu contains the following commands:

Device	select current audio device (soundcard) from the list in submenu;
Select Device...	the same as icon on the toolbar; allows not only selecting current audio device but also enabling/disabling audio controls to be shown as faders in the main window; calls the device selection dialog box;
Settings...	the same as icon on the toolbar; allow adjusting program settings;
Switch Playback / Record	the same as icon on the toolbar; allows switching between playback/recording controls for the current audio device (soundcard).
Show Volume in dB	the same as icon on the toolbar; switches the representation of volume level on faders between percent (%) and decibels (dB).
Save current state as...	the same as icon on the toolbar; allows saving the current state of audio devices (audio controls volume and selection depending on program settings) with restoring it later. Calls the *Save state* dialog box.
Keep always on Top	if on, it allows keeping the main window of *DDSound Volume Control* over the windows of other applications (including Forward AV Studio).
About...	show the *About* dialog box.
Close	close the *DDSound Volume Control* main window. Note that by doing so you do not exit the program if you use it with Forward AV Studio.

11.8 Settings

The settings dialog box is called by ⚒ icon on the toolbar or via the local menu. It allows changing *DDSound Volume Control* global settings.

Save Mute / Select controls only – if this option is on, *DDSound Volume Control* saves and restores the state of selection buttons and does not change volume levels of audio controls.

Auto save state when restore – if this option is on, *DDSound Volume Control* saves the changes of volume levels during playback/recording to appropriate state (the previous option must be turned on). When you start playback in Forward AV Studio, *DDSound Volume Control* saves the current state of audio device (that was before the start of playback), then recalls the state saved for playback. You can change the volume during playback, but when you stop playback and restart it again all changes will be lost. If you want to adjust the volume during playback and to save it for the next time (when playback will be started again), turn Auto save state when restore option on. The same is for recording controls: when you record audio and adjust recording level during recording, all changes will be saved in the state saved for recording.

See also sections about using with Forward AV Studio and save state dialog box.

Always on top – if this option is on, the main window of *DDSound Volume Control* is kept over other windows. This option is also accessible via the local menu.

Show Volume in dB – if this option is on, volume levels of all audio controls are shown in decibels (dB). You may also set the range of faders: maximum volume is always 0 dB (when 'handle' is at the top of fader), minimal volume is set here (when 'handle' is at the bottom of fader; by default this value is -55 dB).

This option is also accessible with ⟨dB⟩ icon on the toolbar or via the local menu.

11.9 Some tips

Do not keep all audio controls always enabled (selected) if you do not need them.

For example, if you work in Forward AV Studio and mix digital audio (without recording or when recording is done), mute all input controls (microphone and line input) in the audio output. That will protect you from hearing the noise and hum from the line, which is important if you use microphone input. Muting of audio CD is also recommended because even the most advanced CDROM models may produce annoying digital noise even when no audio CD is currently playing.

Select appropriate input for recording audio.

For example, if you want to record voice from a microphone, it is not enough to just connect the microphone cable to the soundcards' microphone input. You must select (enable) the microphone input in recording controls of the soundcard.

Unselect inputs that you don't need to avoid additional noise!

Some soundcards allow selecting many inputs for simultaneous recording. Select only one input that you want to use for recording and unselect all others that you don't need. It is not enough to mute them in playback controls. You should unselect them in recording controls. Note that even if you don't hear the input signal from the soundcards' output (in headphones, external speakers etc.) it does not necessarily mean that this input is not included in the recording. Always check recording controls before recording audio!

Use ⟨icon⟩ icon on the toolbar to switch between playback/recording controls. See the description of the main window for how to select (enable)/mute (disable) audio controls.

12 Glossary

Audio effect	preset parameters for applying to audio clips, tracks and whole project
Audio track	track for audio clips (WAW-files)
Bandpass filter	induces no changes in the volume of frequency components of the processed sound within a specified band. Bandpass filter has two parameters: center frequency and bandwidth. Components of the sound with frequencies other than the frequency within the band are suppressed.
Clip Collection	list of source multimedia files with additional information
Clip	file with video, audio and midi data
Clipboard	exchange information buffer
Current time	time value in the current time format
Declick	short *FadeIn/FadeOut* applied to the edges of audio clips to eliminate clicks on the boundaries of clips. Declick may have linear or non-linear profile.
DC-offset	constant component of audio signal. It may be caused by a DC-offset of the soundcard used for recording audio (almost all soundcards, even professional, have non-zero DC-offset). So, if you record audio signal with constant volume (e.g. sinusoidal wave) you get a file with non-equal absolute values of negative and positive samples. Increasing the file volume may cause considerable distortions. DC-offset can be almost eliminated by subtracting the average sample value from all samples of audio file.
Dithering	conversion of high-resolution audio (24-bit) to a lower resolution (8/16 bit) with adding noise. Internal audio format of Forward AV Studio is 24-bit, so conversion is needed for playing or writing audio in 8/16 bit formats. If 24-bit audio is just truncated or rounded to 16 bits, you may get audible distortions in very quiet sounds. If very quiet noise is added to the last bit of the signal before truncating, distortions are almost eliminated (become non-audible).
Effects List	list of audio effects
Fast Convolution	algorithm is used to filter audio with FIR (finite impulse response) filters. Such filters are used to filter digital

signals without phase distortions. This is very important for audio processing. Linear convolution is a simple and very slow filtering algorithm, fast convolution is a modification of filtering algorithm based on the fast Fourier transform. It allows using highest-quality FIR filters for processing audio in real time.

Fast Fourier Transform

(FFT) is a fast modification of Fourier Transform that maps the source signal from a time- to frequency-domain. It is used to obtain and analyze the frequency and phase components of the signal. The main FFT requirement is that the number of points in the processed signal must be an integer power of 2.

Frequency response of digital filter (or any processing algorithm/device) is a characteristic that describes how the filter affects the amplitude of various frequency components of the processed audio signal. Frequency response describes amplification/notch of a signal at all frequencies from 0 Hz to one-half of the sampling frequency.

Highpass filter induces no changes in the volume of high-frequency components of the processed sound. Highpass filter's most important parameter is the cut-off frequency or the boundary frequency. Components of the sound with frequencies lower than the cut-off frequency is suppressed.

Lowpass filter induces no changes in the volume of low-frequency components of the processed sound. The lowpass filter's most important parameter is the cut-off frequency. Components of the sound with frequencies higher than the cut-off frequency are suppressed.

Midi track track for midi sound (MID-files)

Phase response of digital filter (or any processing algorithm/device) is a characteristic that describes how the filter distorts phase at all frequency components of the processed audio signal. Phase response describes a phase-shift of a signal at all frequencies from 0 Hz to one-half of the sampling frequency.

Project main window

Quality of processing

feature allowing you to set the quality of processing on the *Effects* tab of the *Settings* dialog box in

Forward AV Studio (press F5 key). If you set the quality low, the processing will be performed with fewer calculations (you may encounter some distortions in the processed sound, but usually they are almost inaudible). It may be useful if you play a project with many audio effects or if you want to accelerate Normalize / Statistics functions. Please, note that not all effects support this feature and process the sound only at the highest quality setting.

Range   user-defined time interval

Resampling   changing the sample rate of digital audio signal. This is not a primitive task. All samples are recalculated to get a signal of different length, which must sound as the original one with no audible difference and distortions. Forward AV Studio uses a fast and high-quality filtering algorithm to perform audio resampling.

Resampling filter   filter is used to get high quality resampling. When audio signal is resampled to another sample rate, the simplest way is to add more samples to the signal (when the sample rate is increased), or to keep away unnecessary samples (when the sample rate is decreased). This is the simplest method that may result in considerable distortions in the resampled signal. Resampling filter is used to significantly improve the quality of resampling algorithm. The main characteristic of quality it the length of resampling filter response. Even if the length is small (some points), the distortions are almost inaudible. To get higher quality resampling, a greater length of filter is required (one-two hundred points gives very high quality).

Sample rate (ratio)   sampling frequency of digitized audio signal. The greater the sample rate, the higher the frequencies of the signal: according to the sampling theorem, a digitized signal can contain components of frequencies from zero to one-half of the sampling frequency. Sample rate is measured in samples per seconds or in Hz, both having the same meaning: the number of digital samples of a signal played during a second of playback (or recorded while digitizing the signal). For example, audio CD-quality signal is sampled at 44100 Hz. Such signal can contain frequency components of up to 22050 Hz.

Sample resolution (bits depth) denotes the precision of digital signal representation (accuracy of analog-to-digital converter while digitizing signal, for example, while recording digital audio from an analog source such as line or microphone input of a soundcard) and possible maximum dynamic range. 8-bit audio usually has audible distortions because of the high level of digital noise (dynamic range of only 48 dB); 16-bit audio is much more convenient for almost all purposes, for example, audio CD (96 dB dynamic range), 20/24-bit is professional-quality audio (120/144 dB dynamic range), soundcards with such quality and very low level of noise are very expensive. Forward AV Studio allows playback/recording audio in all resolutions.

Status bar info line at the bottom of the *Project* window

Time ruler ruler for project time reference

Toolbar accelerator keys

Video track track for video clips (AVI-files)

Window function function to be multiplied by the response before performing the Fourier transform. These functions are used to obtain signal's primary spectral components. For more detail, see literature on digital signal processing.

Working area area for editing project tracks.