

FDReplayVideoIn

Multichannel AV capture to storages

User's Guide

Revision from November 17, 2006

ReplayMachineSoftware 4.0.0

SoftLab-NSK, Ltd.

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1 Introduction

The *FDReplayVideoIn* application is a part of the *Forward Goalkeeper* and *Forward TP2* systems; it is intended for controlling the capturing of audio and video data to the computer hard disk.

The application allows the user to configure data storages, to establish connection between data input channels and storages, to start and control the procedure of recording data to storages.

The application allows the user to set interaction with two *FD300* input/output boards and control several data input channels – from one up to four. Accordingly, it is possible to perform simultaneous data input using four input channels.

2 Application start

The main *FDReplayVideoIn* window opened at the application start (Fig. 1) contains control elements for adjusting data input channels (**First Board** and **Second Board** groups), for configuring storages (**Storages** group), for controlling the procedure of data capture (**Start** and **Stop** buttons), and the application settings (the **Settings** button).

The  button in the window title bar switches the application to the background (resident) mode: the main window is minimized and the application icon appears in the taskbar. To exit the application, press the **Exit** button.

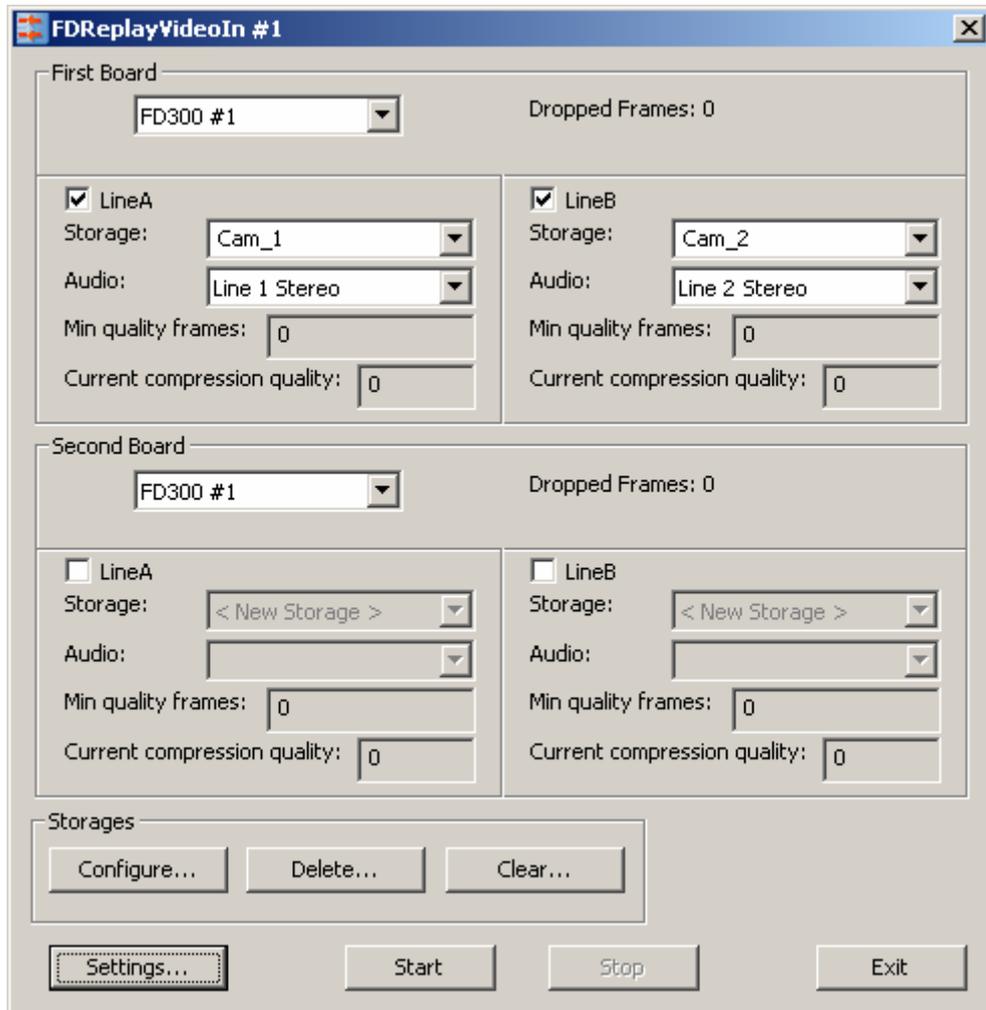


Fig. 1. The *FDReplayVideoIn* application main window overview

3 Data input channels adjustment

The application supports multichannel data input. It is possible to perform interaction with two *FD300* boards simultaneously. To achieve efficient system operation in this mode, use a high-performance computer.

 Remember that data compression is performed programmatically, so hardware resources of the computer should be sufficient for the task execution (particularly, it is recommended to use a dual-processor system).

Relation of boards with data storages on the hard disk is set and controlled with the **First Board** and **Second Board** groups of controls located in the application main window (see Fig. 1). The **First Board** group is intended for configuring channels related to the first (or the only) board. The **Second Board** group is used for adjusting input from the second board in case of simultaneous work with two input/output boards. The control elements included in these groups are the same.

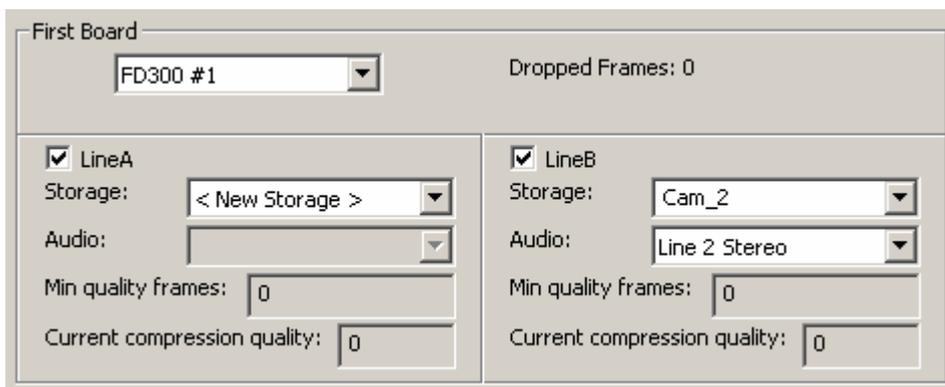


Fig. 2. Part of the application main window, the input channels settings group

The first row of the settings group (Fig. 2) includes a drop-down list with all input/output boards available on the computer, and the **Dropped Frames** information field. The drop-down list is intended for selecting the board used for audio and video data input. The board selected by default is the board having logical number 1: *FD300#1* (see *FDConfiguration User's Guide*).

The **Dropped Frames** field becomes active during data recording; it displays the number of frames dropped at input.

Frames loss may be caused by lack of the system resources for encoding and compressing data in the real-time mode. The value displayed in the **Dropped Frames** field allows estimating the signal capture quality.

The *FD300* board has two independent video inputs. The **LineA** and **LineB** sub-groups are used for setting parameters of each input.

Checking the **LineA** and/or **LineB** checkboxes enables the respective input line, after this it is possible to adjust the corresponding parameters. The **Storage** drop-down list is used for selecting a name of storage for data received from the input channel being adjusted. The list consists of names of all storages existing on the computer and the *<New Storage>* item intended for creating a new storage (about configuring a new storage see below).

The **Audio** drop-down list is used for selecting the line of audio signal input for the channel being adjusted. The list type depends on the audio recording mode selected at storage configuring: stereo or mono recording. The board has six audio inputs; one of them is selected for mono recording, one pair of three possible is selected for stereo recording.

The **Min quality frames** and **Current compression quality** fields are intended for controlling data compression quality at input procedure.

The **Min quality frames** field displays the number of frames recorded with the minimum compression rate of all data input period. The **Current compression quality** field displays the actual compression quality (in percentage terms) at the current moment.

The required data compression quality is specified at adjusting a video codec parameters (see section 5.6). The higher compression ratio value, the less disk space is required for data in a storage.

This value may vary within the specified limits in process of recording. Actual compression ratio depends on various factors including video data characteristics and processor load. When the processor power is insufficient, the compression quality is reduced automatically down to the specified lower limit. If the computer resources are still short, data are partly missed and the number of ***Dropped Frames*** grows.

Reviewing current rates of data compression and dropped frames allows the user to make up a conclusion about data recording quality and system resources usage level. To achieve the best correlation of data compression rate (the occupied disk space), stream processing speed, and the recorded data quality, adjust the data input parameters (see section 5.6) and resources distribution (see section 6).

4 Operations with data storages

The application allows creating, configuring, deleting, filling, and clearing data storages on the computer hard disk.

Creating a storage implies allocating hard disk space for audio and video data. The volume of the allocated space is determined according to the settings and it depends on the specified duration, compression rate and other parameters. Each storage is given a unique name. At **capturing** the data received from the *FD300* boards inputs is saved to the hard disk area allocated to the storage. **Clearing** is the operation of complete deletion of a storage contents while the disk area remains allocated for the storage as before. Storage **deletion** implies both deleting data and deallocating the hard disk space reserved for the storage.

To create a new storage, select the **<New Storage>** item from the **Storage** drop-down list located in the board settings controls group (Fig. 2); after that perform storage configuring (see section 5). To create several new storages, select the **<New Storage>** items in different **Storage** drop-down lists.

The **Storages** group of controls (Fig. 3) includes buttons for operations with storages: **Configure...**, **Delete...** and **Clear...**.

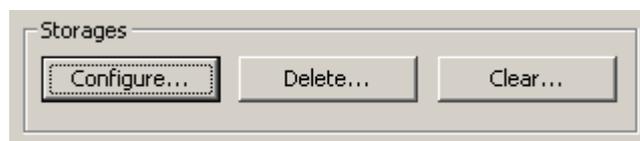


Fig. 3. Storages group of controls

Pressing the **Delete...** button (Fig. 3) opens the *Delete Storages* dialog (Fig. 4).

This window displays all storages existing on the computer in the **Storage** list. The **Delete** button deletes all checked storages.



Fig. 4. Delete Storages dialog

Clearing storages is performed in the same way. Pressing the **Clear...** button (Fig. 3) opens the *Clear storage* dialog (Fig. 5).



Fig. 5. Clear storage dialog

5 Storages configuring

5.1 Storages Configuration dialog

Pressing the **Configure...** button located in the **Storages** group of controls (Fig. 3) opens the *Storages Configuration* dialog. The procedure of configuring is intended for adjusting parameters of both existing and new storages; it is performed at once for all storages (one to four) specified in the **Storage** lists of input lines controls (Fig. 2).

 **ATTENTION!** *If an existing storage configuration is modified (except for changing its name), all data in it is deleted.*

The *Storages Configuration* dialog allows the user to specify in turns, step by step, storages and input data characteristics: duration, time shift, names, preview parameters, video compression format, audio format, method of disk space allocation, and storages distribution. The navigation through the settings pages is performed with the help of the **<Back** and **Next>** buttons. Each page includes additional information explaining the settings being specified.

5.2 Storage capacity

The *Storages Number* settings page (Fig. 6) is used for specifying duration (capacity) of storages. Duration value is specified in the *hours:minutes* format in the **Hours** and **Minutes** fields, respectively. The page also contains information about the number of storages being configured in the **Number of Storages** field.

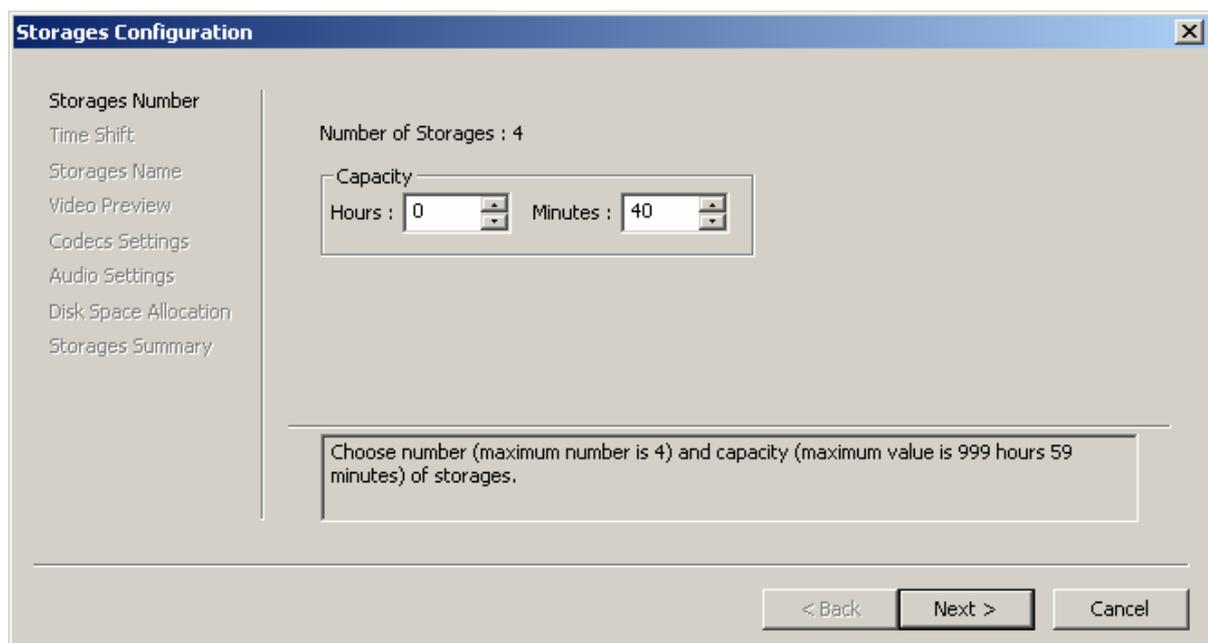


Fig. 6. Specifying storage capacity

5.3 Time shift

The *Time Shift* settings page (Fig. 7) is used for specifying the time shift value. Time values recorded into the storage will differ by the specified value from the system time at the moment of data capturing.

The value is specified in the *hours:minutes:seconds:frames* format in the **Hours**, **Minutes**, **Seconds**, **Frames** fields, respectively. The maximum possible value is 24 hours minus one frame, i. e. 23:59:59:24 for PAL and 23:59:59:29 for NTSC.

The **Offset** group is used for setting the shift type: **Positive** or **Negative**.

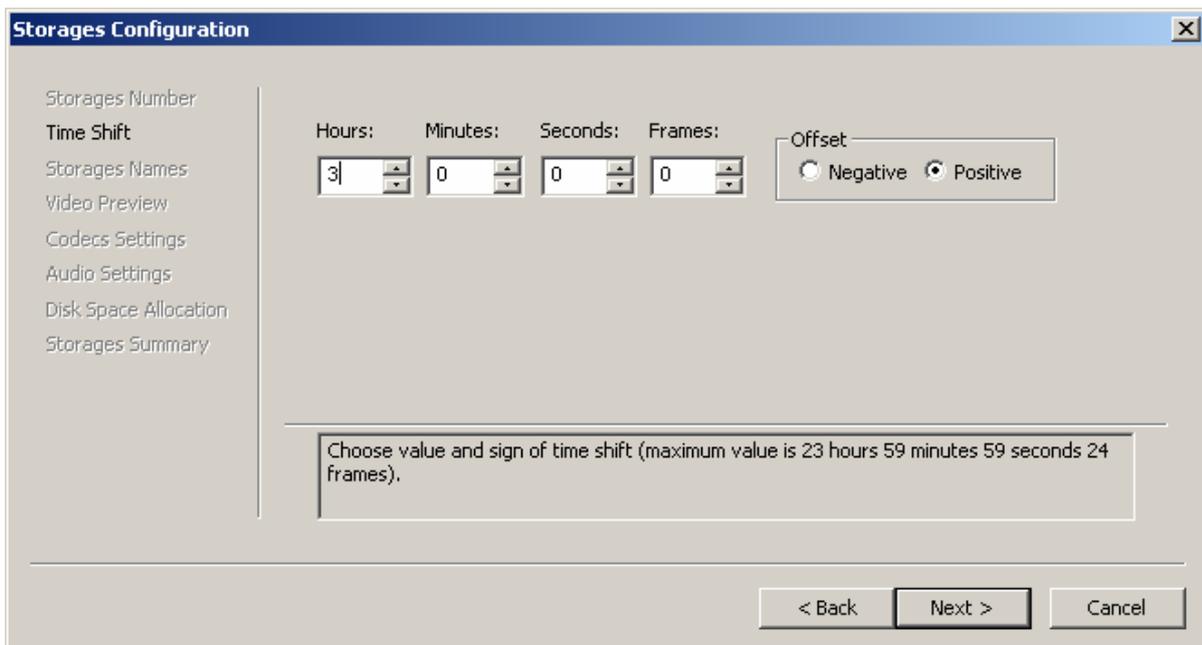


Fig. 7. Specifying time shift

Setting a time shift does not influence the audio and video data being captured, it only changes values of time marks displayed to the operator at the further data processing. Time shift simplifies the calculation of time difference at broadcast interchange between places of different time zones.

For example: a TV show from Los Angeles (time zone -08.00 UTC) is broadcast in New York (time zone -0500 UTC). The broadcast starts when it is 14.00 in Los Angeles, the time of start of receiving the signal in New York is 17.00, correspondingly. The show is to be shown in New York at the same time of day as in Los Angeles, but on the next day.

At recording of the broadcast without a time shift, the value of the storage beginning mark coincides with the time of start of receiving the signal, i. e. in the example this value is 17.00. Setting the time shift value of + 21 allows the operator to see the initial time mark, which is 14.00.

5.4 Storages names

The *Storages Names* settings page (Fig. 8) is used for assigning a name for each storage. **Storage Name** must be unique; it may include any characters.

 *Specifying a new name of an existing storage is not creating its copy with the specified name. Further modifications of the selected storage parameters lead to deleting the earlier captured data.*

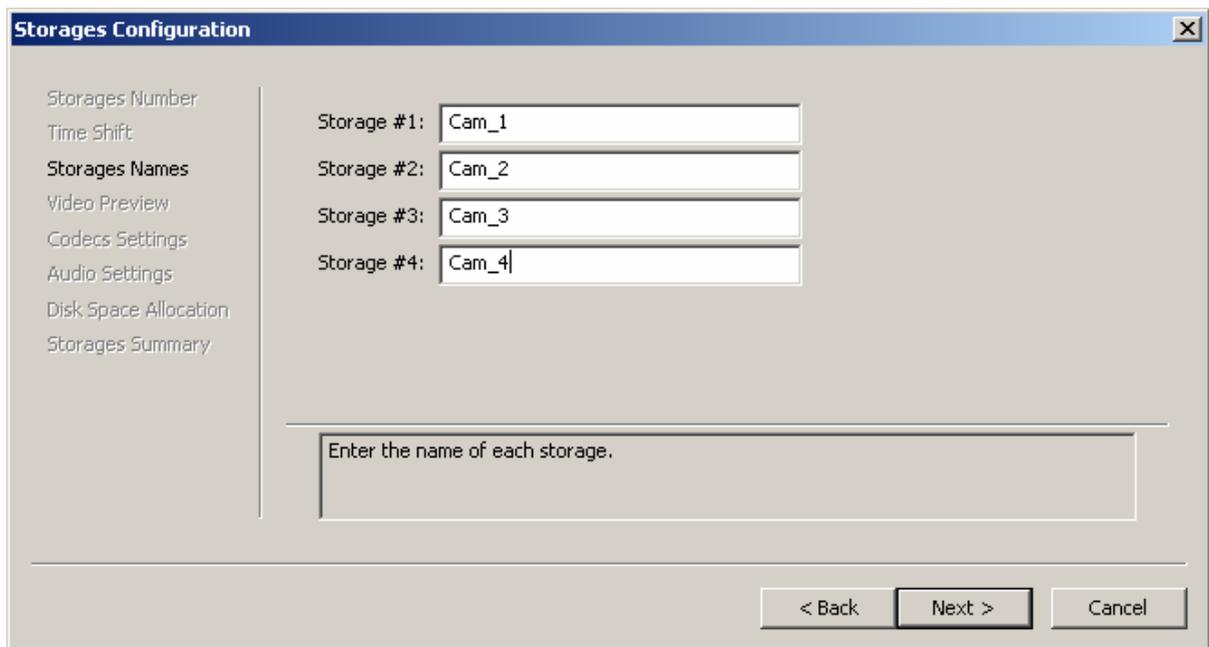


Fig. 8. Naming storages

It is impossible to assign a name that is already used for a storage to another (new or existing) storage. At attempt to specify an existing name, an error message *Wrong Storage Name* is displayed (Fig. 9).



Fig. 9. Wrong Storage Name message

5.5 Preview

The next settings page, *Video Preview* (Fig. 10), is used for setting the parameters of recording data for preview. These parameters are used at access to storages in the *FDPostPlayPreview* application.

At capturing data is recorded to the storage in two formats simultaneously: for the main playback and for preview. The requirements for the preview data quality are less than requirements for quality of the data to be played back. Besides, due to reduction of image and sound quality, the preview speed increases.

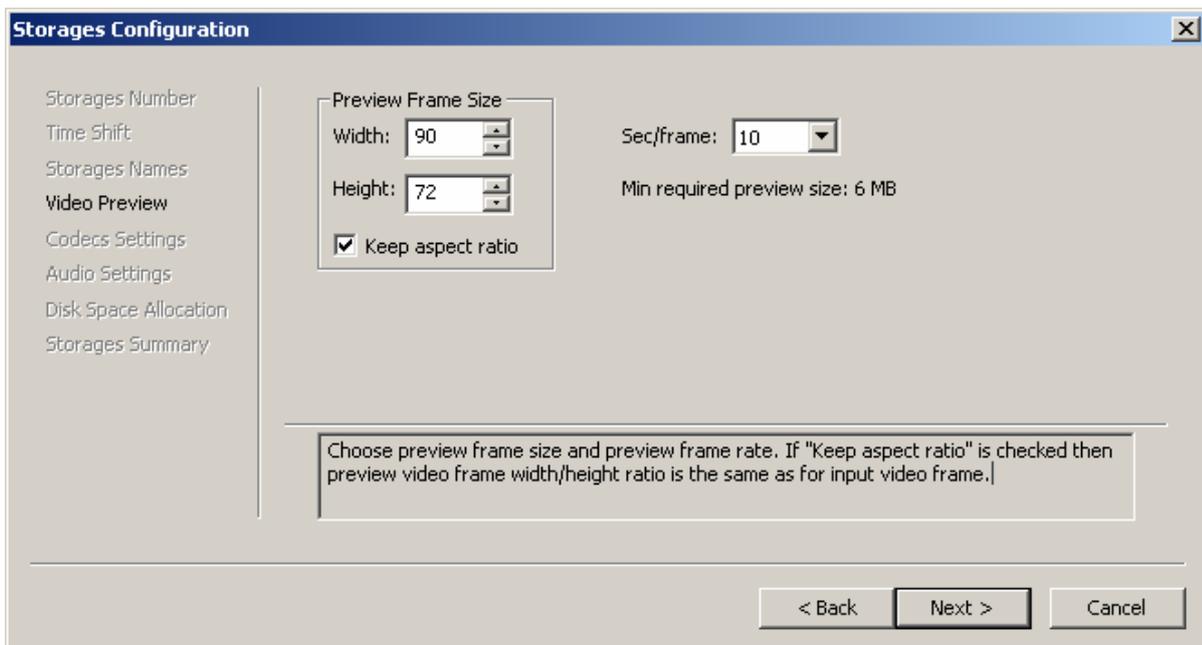


Fig. 10. Specifying the preview parameters

The **Preview Frame Size** group is used for setting the size of preview frames. The **Width** field is intended for specifying width, the **Height** field – height of the image, the values are specified in pixels. For keeping the image proportions, enable the **Keep aspect ratio** option.

A high-quality ‘smooth’ image (25 frames per second) is not necessary to get a general idea of the video materials at previewing. The **Sec/frame** drop-down list allows the user to adjust the frequency of capturing frames for previewing: it specifies the number of seconds between adjacent frames.

The **Min required preview size** line displays the memory space required for saving the video data for preview. This value is calculated automatically according to the parameters specified on this page and general storage capacity.

 *It is recommended that the **Min required preview size** field value not exceed 1/2 of general capacity of the computer main memory. If the required preview size exceeds the limit, the application shows a warning message.*

 *Since the memory space occupied with the preview images depends both on the images quality and the storage capacity, it is recommended to specify preview video parameters after setting the storage duration.*

5.6 Codecs settings

The *Codecs Settings* pages (Fig. 11) are used for adjusting the parameters of encoding and compressing video data in storages.

The **Storage name** line displays names of storages being adjusted.

When the **Use the same settings for all storages** option is enabled (checked), the specified values are set equal for all selected storages at once. If the checkbox is unchecked, each storage is adjusted individually. Yet it is impossible to specify different types of codecs for different storages. Only data rate and compression quality parameters can be specified independently.

All codecs installed on the computer and available for use are listed in the **Codec** drop-down list. There are codecs included in the *ForwardT* software package among them, namely: *SoftLab-NSK Forward JPEG*, *SoftLab-NSK DVCAM*, *SoftLab-NSK DVCPRO*, *SoftLab-NSK MPEG2 I-frames*, *SoftLab-NSK Motion JPEG*.

A codec choice depends on many factors, such as the required processing speed, compression rate, image quality and also the computer characteristics. We recommend using the *SoftLab-NSK MPEG2 I-frames* codec, as it is the most optimal choice in respect to the processing speed, and

it requires less computational capability of the processor than other codecs for the same quality of the resulting image.

Pressing the **Configure...** button to the right of the codec name field opens the codec settings dialog.

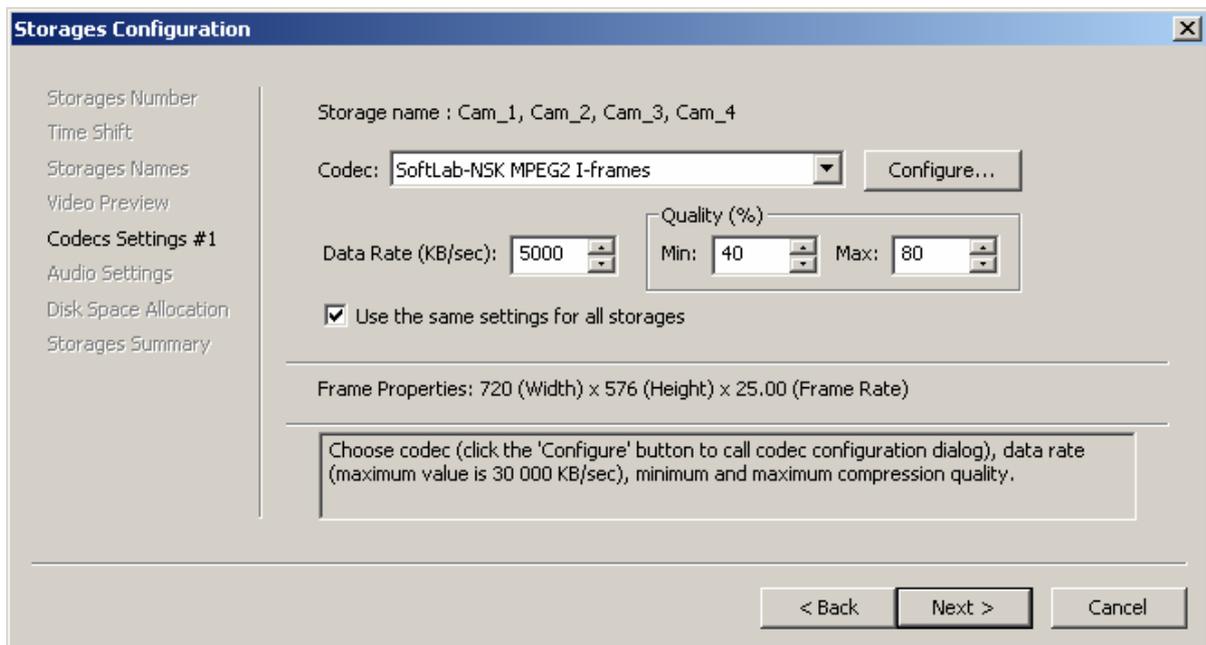


Fig. 11. Specifying the signal encoding and compressing parameters

Under the codec selection field there are control elements for adjusting data rate and compression parameters. These parameters are editable only for the codecs allowing to modify them.

The **Data Rate (KB/sec)** field is used for specifying the data rate at encoding. To provide image of high quality, it is recommended to specify the average data rate from 4000 to 6000 KB/sec.

The **Quality (%)** group includes controls specifying the quality of compressing video data being captured to a storage. The lower and the upper bounds of data compression quality variation are set in the **Min** and **Max** fields, respectively. During the capturing procedure, the quality may vary in the specified limits according to video data characteristics and processor power available.

The **Min quality frames** and **Current compression quality** information fields located in the application main window (Fig. 3) are intended for controlling the actual compression quality.

The **Frame Properties** line displays the current image properties that are specified initially at the *FD300* board configuring in the *FD300 Configuration* application (see *FD300 Configuration* the User's Guide). The properties are displayed in the *frame width x frame height x frame rate* format.

5.7 Audio settings

The *Audio Settings* page (Fig. 12) is used for adjusting the audio signal input parameters. The parameters are adjusted for the main audio data stream and for previewing (see section 5.5).

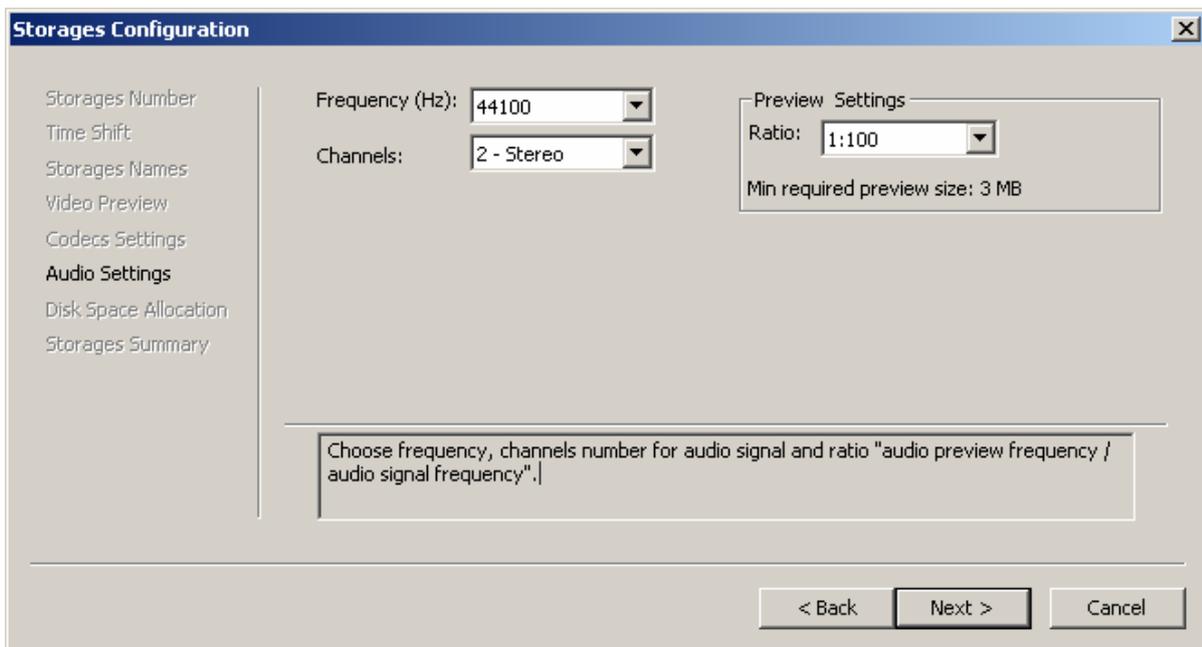


Fig. 12. Audio settings

The **Frequency (Hz)** drop-down list allows selecting the sound signal sampling frequency (in Hz). The recommended value is *44100 Гц* (or *48000 Гц*).

The **Channels** drop-down list is intended for setting the number of channels used for sound capture: one (*1-Mono*) or two (*2-Stereo*) channels. The disk space required for audio data depends on the selected mode of audio recording; stereo recording requires the disk space twice as mono recording.

The **Ratio** drop-down list of the **Preview Settings** group is used for selecting the ratio of audio quality at data previewing. The ratio determines the number of sound signal units selected for previewing from the total amount of audio data. It is recommended to use the default value: *1:100*.

The **Min required preview size** information line displays the main memory capacity required for the audio data intended for previewing. The value is calculated automatically according to the parameters specified on this page and general storage capacity.

5.8 Disk space allocation

The *Disk Space Allocation* page is used for selection of hard disks for saving data, and for allocation of available space to storages. Several settings pages serve for these purposes.

The first page (Fig. 13) is intended for selecting a method of disk space allocation and the disks to locate storages. Disks for storages are selected from the table where all disks available on the computer are listed in the **Disk** column and free space on each of them is shown in the **Free (MB)** column. A storage can be located on several disks in parts.

The **Disk Space Allocation Method** drop-down list displays all available methods of disk space allocation: *Auto (uniformly)*, *Auto (sequentially)*, *Manually*.

The *Auto (uniformly)* method implies automatic even distribution of space on the selected disks. Free space on each disk is divided between all storages in equal parts.

The *Auto (sequentially)* method also means automatic allocation. In this case the goal is to allocate each storage on one disk without splitting it between disks. The disk space is allocated sequentially for each storage. If an entire storage cannot be placed on any disk, it is split into parts.

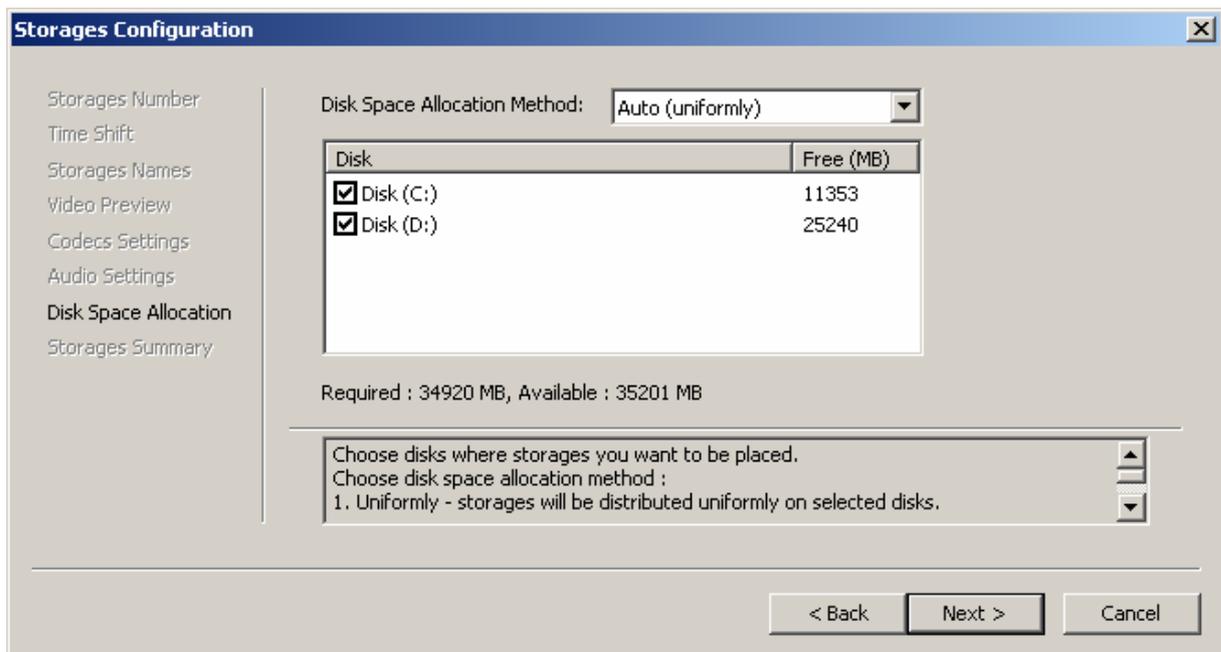


Fig. 13. Specifying the parameters of disk space allocation

The *Manually* method allows the user to allocate disk space manually, sequentially for each storage.

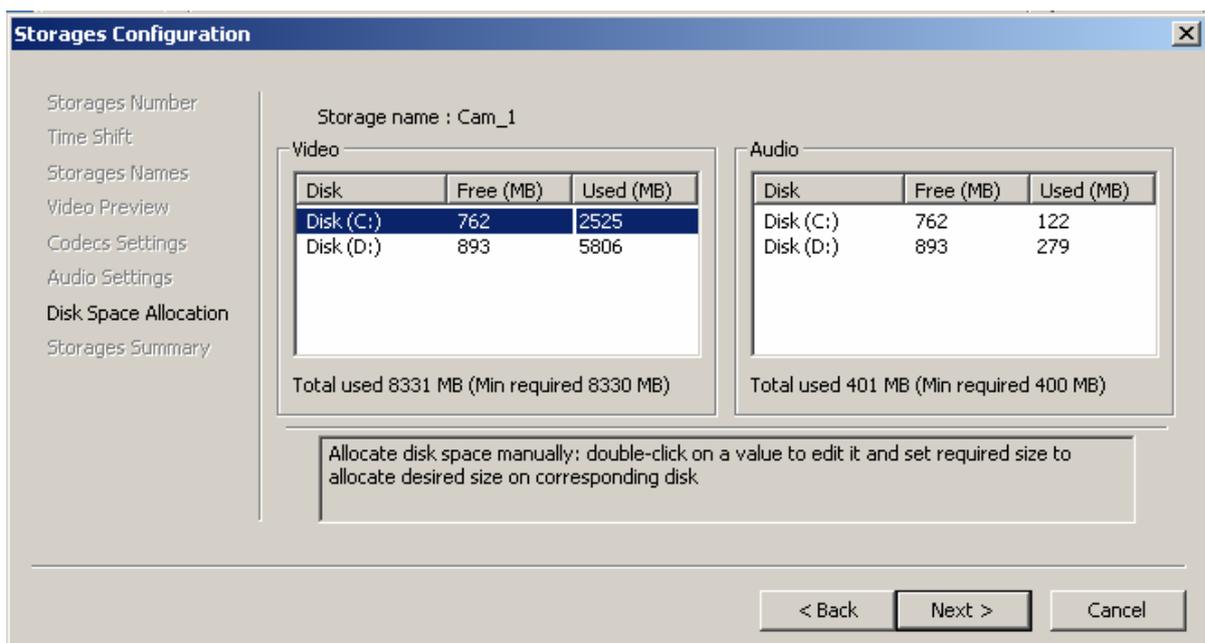


Fig. 14. Manual disk space allocation

On these pages (Fig. 14), which are displayed in turns for each storage, there are two tables, **Video** for video data and **Audio** for audio data. Each of them includes three columns: **Disk**, **Free (MB)**, and **Used (MB)**. The first column displays disks names, the second column displays free space on each disk, the third – the space allocated for a storage on the disk.

The **Used (MB)** column fields are editable. Point this column with the mouse and click the required cell to type a value in it.

The information lines under each table display the required disk space (**Min required**) and the total space allocated for the storage on all disks (**Total used**).

The required disk space is calculated automatically according to the specified settings. The calculation considers the specified storage duration, the selected codec, compression rate, sound characteristics, preview settings.

5.9 Storages summary

The last *Storages Summary* page displays the results of storages configuring: the allocated memory space and disk space distribution between audio and video data (Fig. 15).

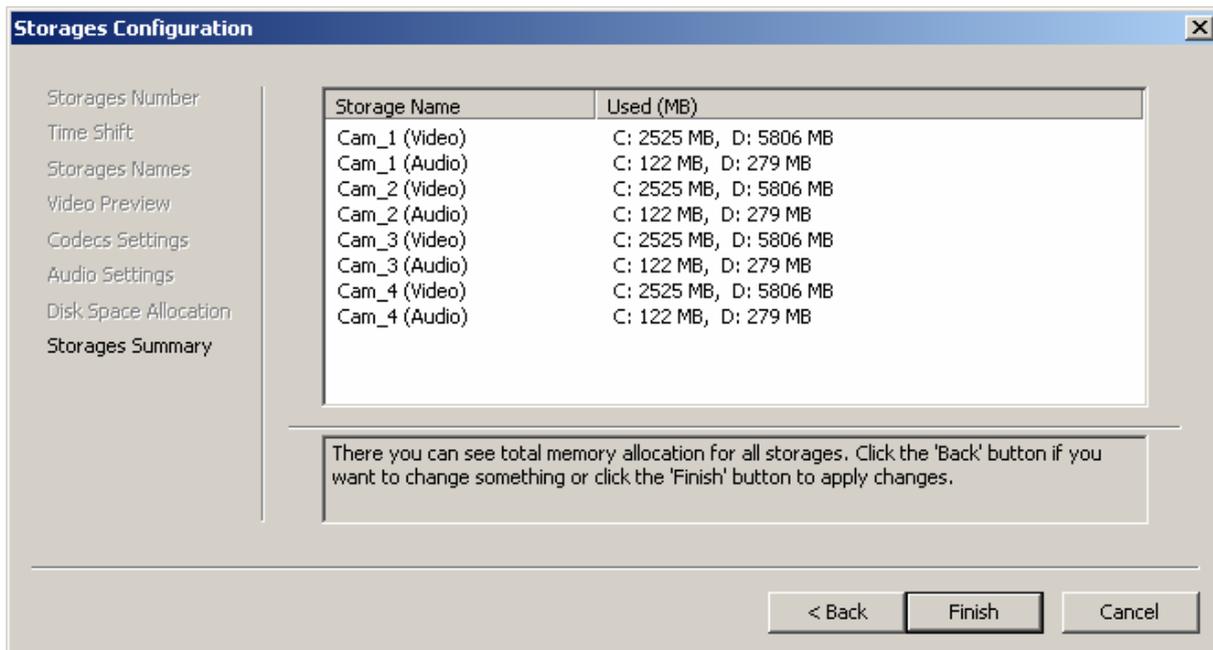


Fig. 15. Storages Configuration page displaying information about disk space allocation

The procedure of storages configuring is finished with the **Finish** button. If the procedure is performed for a storage created earlier, the application displays a warning message about clearing the storage because of applying new settings and a confirmation request for this action (Fig. 16).

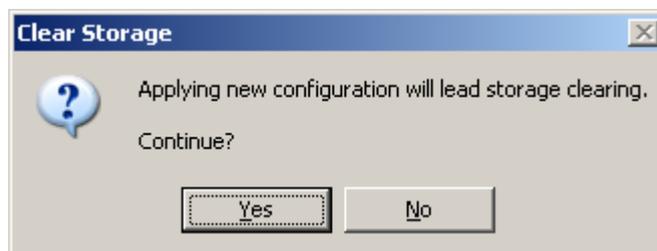


Fig. 16. Request for applying changes and clearing a storage

6 Setting the system resources distribution

It is possible to adjust the mode of interaction between the application and the system – the distribution of the computer resources between data input and recording tasks and other executed tasks. Pressing the **Settings...** button in the application main window (Fig. 1) opens the corresponding dialog.

The *Settings* dialog allows user to set the priority of the data capture task in the system and assign processors for the application execution.

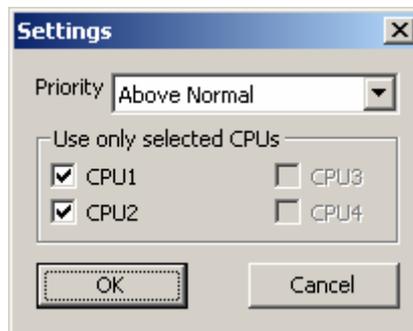


Fig. 17. Setting the application operating mode

The **Priority** drop-down list is used for setting the application priority. The following modes are listed there in ascending order: *Normal*, *Above Normal*, *High*, *Realtime*.

Processors assigned for the application execution are checked in the **Use only selected CPUs** group.

7 Data capturing procedure

The procedure of capturing data to storages is controlled with the buttons located in the bottom of the application main window (Fig. 1).

After all settings are specified, it is possible to start data capturing. This is performed with the **Start** button (Fig. 18).

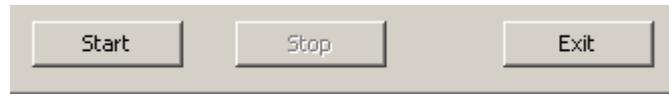


Fig. 18. Data capturing control buttons

Fig. 19 displays that during data capturing only **Stop** and **Exit** buttons are the active control elements, and also the **Dropped Frames**, **Min quality frames**, and **Current compression quality** information fields are active. All controls intended for adjusting the settings become unavailable.

The **Dropped Frames**, **Min quality frames**, and **Current compression quality** information fields display the current characteristics of video capturing: dropped frames number; number of frames captured with the minimum compression quality; current compression quality. The data compression and dropped frames characteristics allow estimating the data capturing quality and level of the system resources use.

The **Stop** button is pressed to stop the capturing. At attempt to stop the procedure, the application displays a confirmation request for this action (Fig. 19).

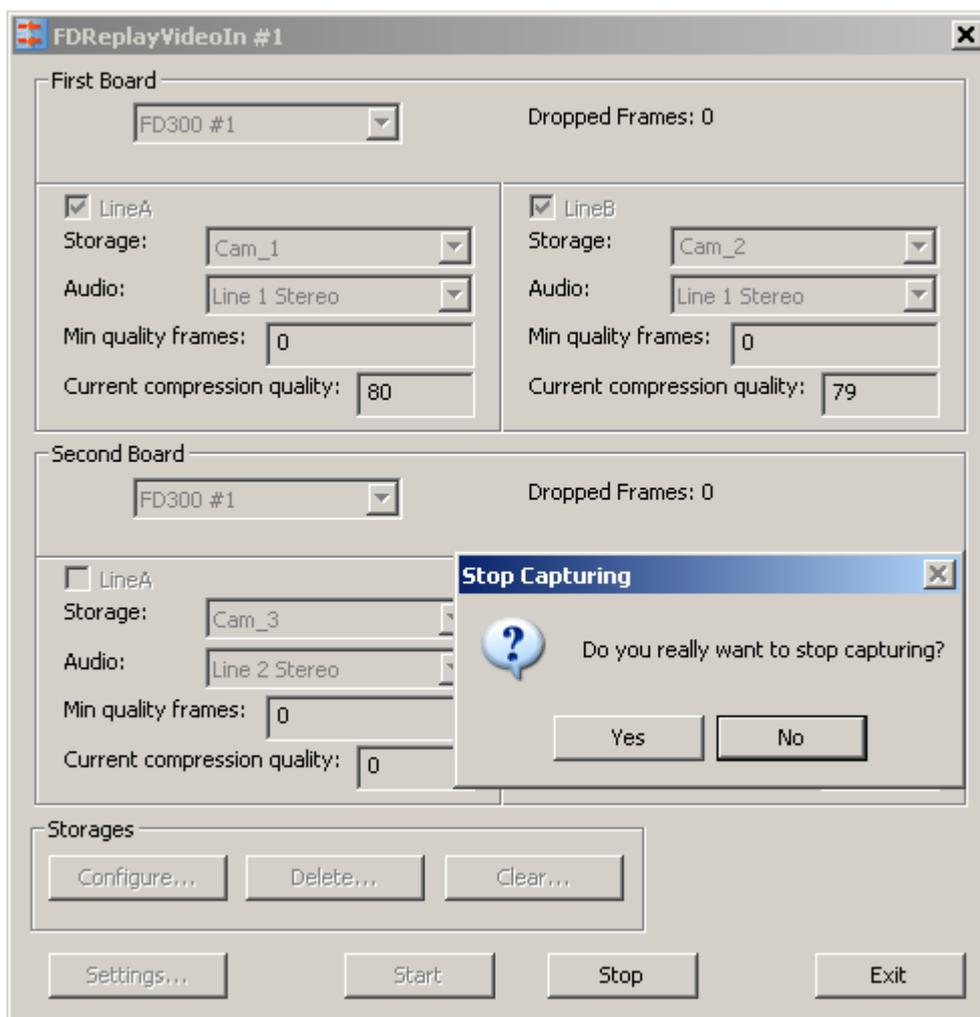


Fig. 19. Stop capturing

Pressing the **Exit** button exits the application. If the button is pressed during capturing, the application displays a request for stopping the procedure, the same as at pressing the **Stop** button.