SV Series Player Software

[NVFilePlayer]

Software Manual

Ver. 1.0

NetVision Co., Ltd.

Update History

Revision	Date	Note	
1.0	Sep 30, 2024	New File (Translation of Japanese edition ver.2.3)	R.Sugo

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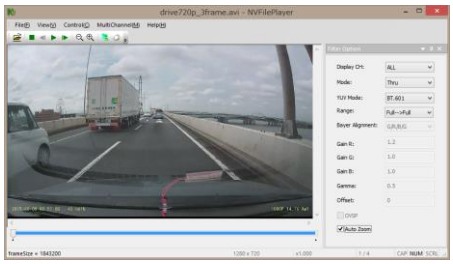
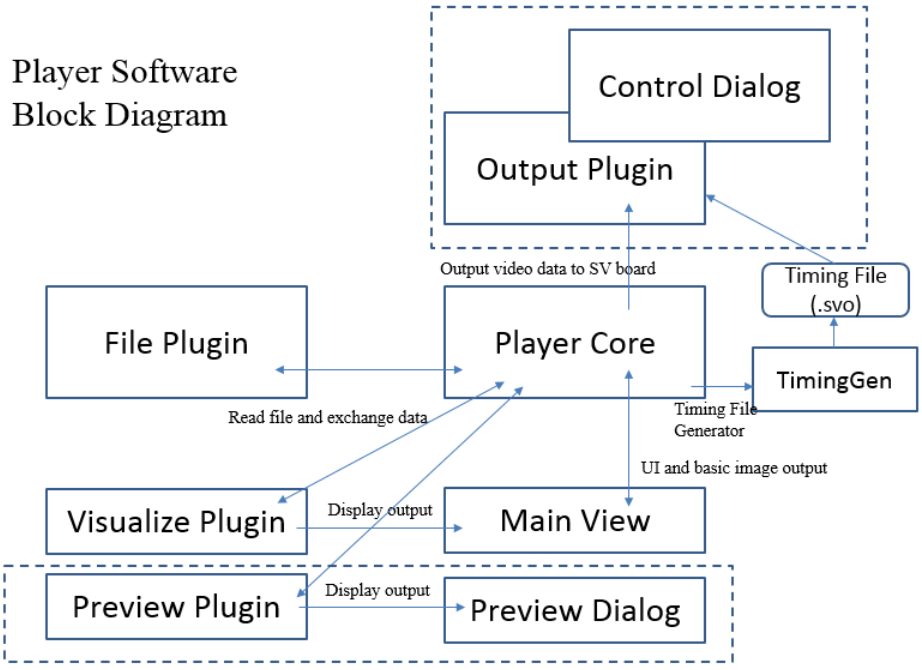
1. Overview



This is a software manual of the video output software “NVFilePlayer” for SVO series.

NVFilePlayer can read uncompressed .avi format video, send the video data to the SVO board via USB3.0, and output the video signals from the board.

This software can also be used as playback software for uncompressed video files in UYVY / RGB format (audio output is not available) without an SVO board connected.



NVFilePlayer uses a plugin-based system for file loading and screen display, and consists of the software itself and several plugins. The standard version of this includes a File Plugin for loading AVI and RAW format video files and a Visualize Plugin for displaying these video files. Output Plugin for controlling the SVO board is built into the software itself.

NVFilePlayer is configured to flexibly respond to user requirements by using customized plugins. This document describes the functions of the standard version, which includes plugins for operating the SVO board.

1.1. Specification

Item	Value	Description
Supported Boards	SVO-03 SVO-03-MIPI SVO-06 SVO-06-DSI SVP-01-G	
Input File Format	AVI (.avi) RAW (.dat, .raw) FRM (.frm) File list (.lst, .avit, .frmt)	.avi: This supports YUV422 or RGB24 format in the so-called AVI2.0 format. If CODEC is required to read the file, it cannot be read. FourCC supports “YUY2”, “UYVY”, and “DIB”. AVI files with YUV422 created with ffmpeg or ffdshow can also be read. .dat, .raw: This supports RAW format which is 16 bits/pixel with the frame data written in binary from the beginning of the file. The resolution is set in the options screen on the software. The RAW format output of still images from a digital camera is not supported. .frm: This is our proprietary uncompressed video format, and supports many image formats such as RGB888, YUV2, UYVU, RAW and etc. It can be converted from bitmap format or AVI format with our tool “FrmFileConverter”. For details on the FRM data format, please refer to the end of the hardware specification for each SVO board. Audio output is not available.

Number of Simultaneously Displayed Videos	6 (as viewer)	
Number of Simultaneous Output Videos	1	Multiple files can be output in succession by reading a file list.
Multiple Startup	Possible	
YUV – RGB Conversion Formula	Selectable from Full/Limited, BT.601/BT.709.	

- Some of the software settings are stored in the registry.
- Specifications are subject to change without notice due to future version upgrades.

1.2. Operating Environment

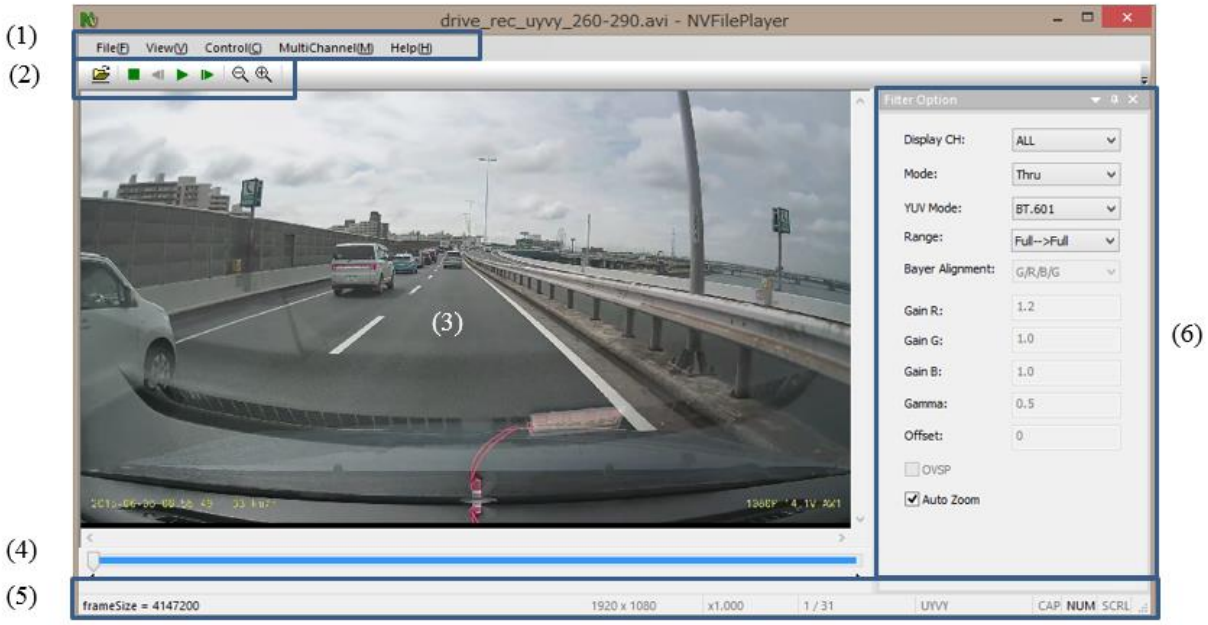
- OS: Windows 8.1, Windows 10, Windows 11 64bit
- PC with USB3.0 or USB3.1 port
- Recommended storages are SSDs with SATA or m.2 connections.

1.3. Install

Please extract the entire folder locally. Visual C++ 2015-2019 runtime is required to run the software.

If the runtime is not installed on your computer, run the supplied VC_redist.x64.exe to install the runtime.

2. Description of display screen



- The contents displayed on the screen depend on the plugin and software settings. In addition, the display position and whether it is displayed or not can be changed by user operation.

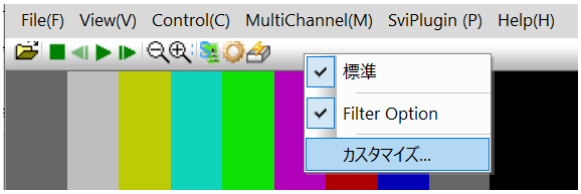
(1) Menu bar
(2) Tool bar
(3) Video display
(4) Seek bar
(5) Status bar
(6) Filter Option

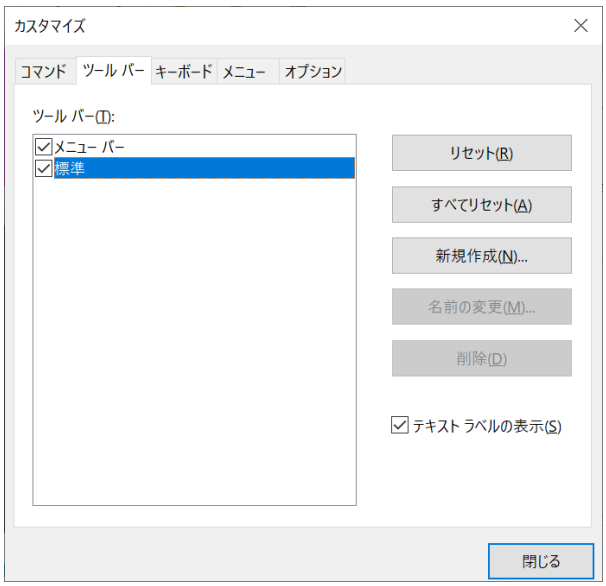
2.1. Tool Bar

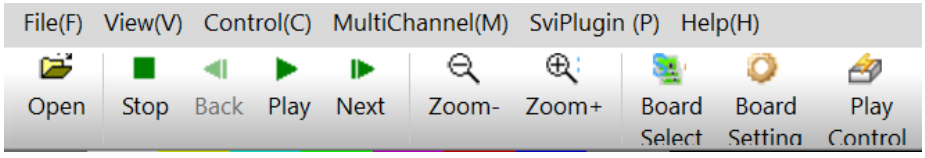
#	Name	Description
(1)	Open	Open a File.
(2)	Stop	Stop video playback.
(3)	Previous Frame	Move to the previous frame.
(4)	Play	Start video playback. (This is Preview, not Video Output.)
(5)	Next Frame	Move to the next frame.
(6)	Zoom -	Reduce the zoom factor. When the Auto Zoom = Enable, the zoom factor setting is ignored.
(7)	Zoom +	Expand the zoom factor. When the Auto Zoom = Enable, the zoom factor setting is ignored.
(8)	Board Select	Select a SVO board to be controlled.
(9)	Board Setting	Set the output video timing, signal polarity, number of MIPI lanes, synchronization settings, etc. The settings are saved in the NVFilePlayer directory under the name SVOGenerator.svo, so all settings can be duplicated in other NVFilePlayer.
(10)	Play Control	Display the video output control window.

2.2. Customize the Tool Bar

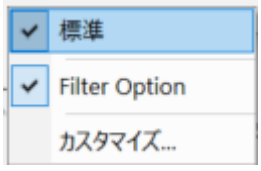
The tool bar can be customized by right-clicking and selecting “Customize”. Select Customize -> Toolbar Tab -> Standard, and then check the “Text Label” checkbox in the lower right corner to display the descriptions of the functions below each tool bar.





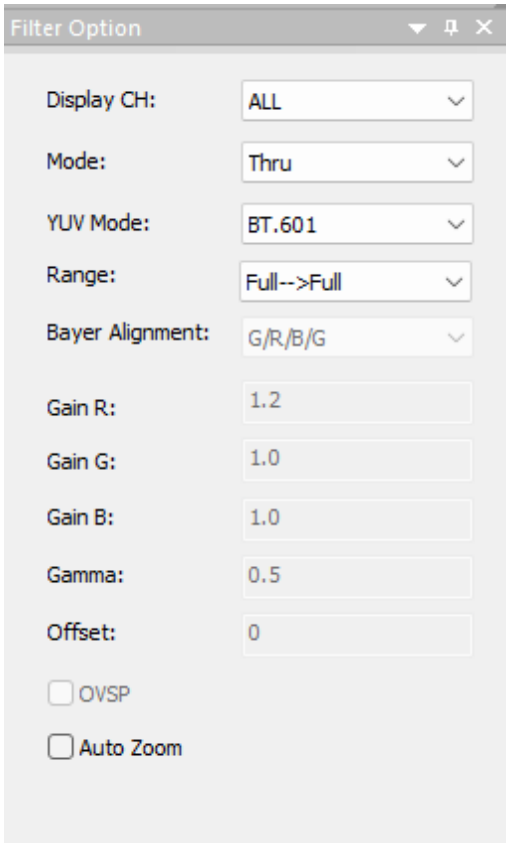


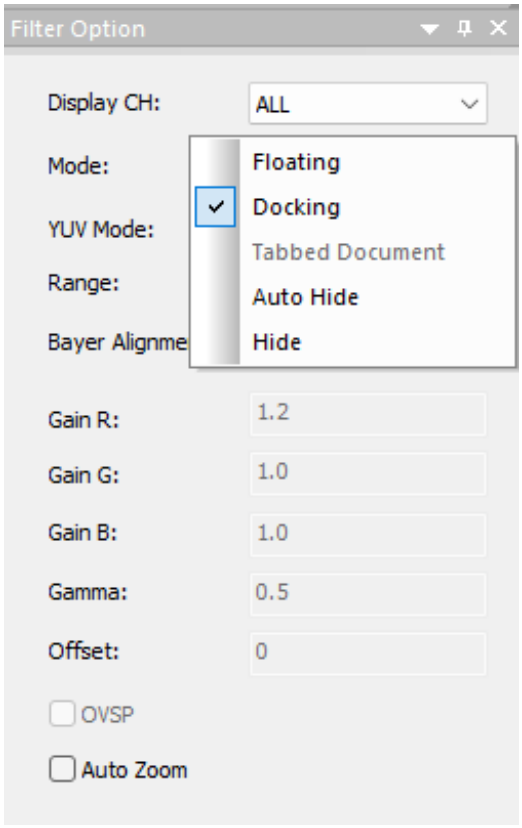
The tool bar can be toggled on and off by right-clicking and selecting “Standard”.



2.3 Customizing the Filter Option

The Filter Option can be toggled on and off. It supports Docking, Floating and Auto-Hide. Settings can be made in the menu that appears when right-clicking on the “Filter Option”.



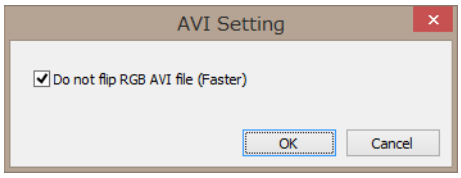


2.4. Filter Option Screen Details

Item	Description
Display CH	Specify the CH to be displayed when multiple AVI files are loaded. If “ALL" is specified, multiple AVI files are displayed simultaneously.
Mode	Specify the display mode for displaying RAW images. Specify “Thru” if the image is YUV422 format. Thru: Display according to the pixel format of the AVI file. RAWxx/Gray: Display as monochrome image, assuming grayscale RAW. RAWxx/Color: Display with demosaic processing, assuming Bayer format RAW.
YUV Mode	Specify the YUV -> RGB conversion formula.
Range	Specify the range extension method for YUV -> RGB conversion.
Bayer Alignment	Specify the Bayer format when Mode = RAWxx/Color.
Gain R/G/B	When Mode = RAWxx/Color, specify the RGB Gain. When Mode = RAWxx/Gray, specify the gain for the luminance component in Gain R. When 1.0 is specified, input = output.
Gamma	Valid when Mode = RAW. Specify the coefficient of the gamma curve. Specify the reciprocal of the general gamma value.
Offset	Valid when Mode = RAW. Specifies the offset value to be added to the luminance component.
OVSP	Valid when Mode = RAW. When checked, LSb/MSb are inverted and decoded.
Auto Zoom	When checked, the image is enlarged or reduced to fit the window size. When unchecked, the image is displayed at the magnification specified in the zoom settings.

2.5. AVI Format Read Setting

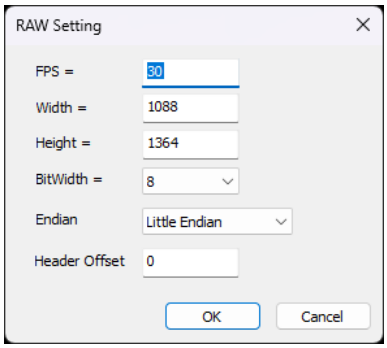
Click File -> File Plugin -> NVFilePlugin_AVI in the menu to open the AVI format loading settings.



Item	Description
Do not flip RGB AVI file	AVI files in RGB24 format store the lines in the video in order from bottom to top. This is the opposite of the top to bottom order in YUV format. This option specifies the order of the stored data when an AVI file with RGB24 format is opened. It is ignored for UYVY and YUY2 formats. If checked, frames in the AVI file are displayed in order from the top to the bottom. In this case, the process is the same as that of SVOGenerator (our old software), and the video is displayed upside down from the normal player software. If unchecked, the AVI file is flipped upside down and displayed in the same order as normal player software, from the bottom to the top. When outputting video using the SVO board, the same image as the playback screen is output. Unchecking the checkbox adds line swap processing to the frames. If the checkbox is checked, the processing time will be faster.

2.6. RAW Format Import Setting

Click File -> File Plugin -> NVFilePlugin_RAW in the menu to open the RAW format import setting.

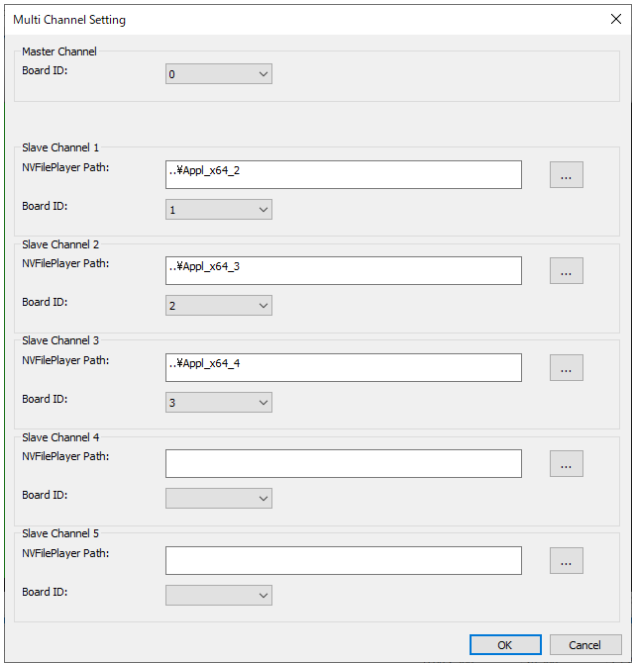


Item	Description
FPS	Sets the frame rate (FPS) when played back with NVFilePlayer. This affects the speed at which the playback button is pressed, but does not affect the frame rate at video output.
Width	Specifies the width of one frame in pixels.
Height	Specifies the height of one frame in pixels.
BitWidth	Specifies the data size of one pixel in bits.
Endian	Depending on the binary data, select either Big Endian or Little Endian.
Header Offset	Specifies the number of bytes in the header area stored at the beginning of the video file. The header can be skipped and loaded.

2.7 Initial Setting for Multi-Channel Operation

When outputting video from multiple SVO boards connected to a single PC, one NVFilePlayer can be set as the master and up to 5 channels of NVFilePlayer as slaves.

In this way, it is possible to control the playback of slaves from the master.



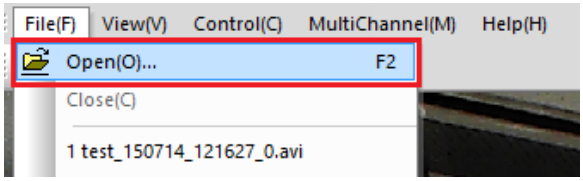
Click MultiChannel -> Setting in the menu to open the initial setup screen for multi-channel operation. In this screen, specify the board ID of the master channel, the board IDs of the slave channels and the path to the NVFilePlayer of the slave channels.

Item	Description
Master Channel Board ID	Specify the board ID of the master board. See (Operation of the Board Select) for more information on the board ID.
Slave Channel 1-5 NVFilePlayer Path	Specify the folders where the slave NVFilePlayer.exe files are stored. Ensure that all channels have separate folders by copying the folders for each slave channel. Leave [NVFilePlayer Path] blank for slave channels that are not used. Relative paths are supported, so there is no need to change the settings even when running in environments with different parent directories.

	For example, to specify the "Slave1" folder in the directory one level higher than the master NVFilePlayer, use "..¥Slave1".
Slave Channel 1-5 Board ID	Specify the slave board IDs to be operated by the slave NVFilePlayer. Different values must be set for each channel.

3. Operation Procedures

3.1. Open a Video



Select File - Open (F2) from the menu, click the “Open” icon on the toolbar, or drag and drop the file to load the video file. If the file is loaded successfully, the display screen and the seek bar will be updated. The toolbar and the seek bar can be used to set play / stop, zoom factor, and displayed frame.

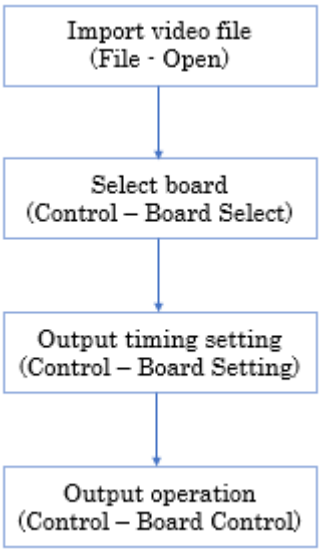
When displaying a RAW format file (data recorded with a SVM board with a RAW camera connected), change the display method according to the “Filter Options” setting.

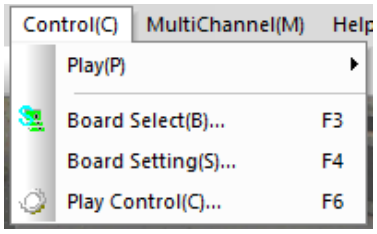
3.2. Operation When One Board is Connected

The operation procedure for connecting one SVO board (USB mode) and outputting video signals is as follows.

Load video file ⇒ Select board ⇒ Output timing setting ⇒ Output operation

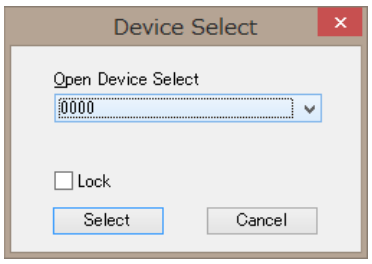
3.2.1. Operation of the Board Select





After loading the video file, select Control -> Board Select in the menu (or type F3) to select the target SVO board to operate with NVFilePlayer. Loading a video file and selecting a board can be done in any order.

As a precaution, you cannot select a board that is open in another NVFilePlayer or SVOGenerator.



Specify the board ID to be set with the DIP SW of the SVO board at Open Device Select. Up to 16 IDs can be assigned to each SVO board. The correspondence between the DIP SW and board ID is as follows.

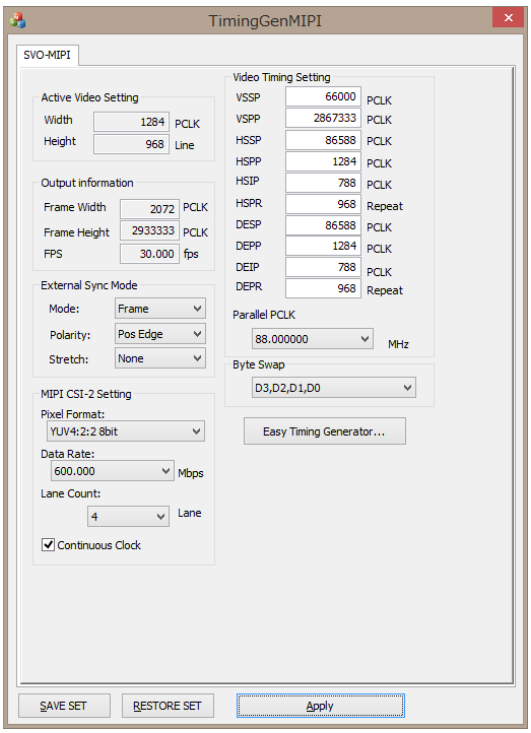
#1	#4	#5	#6	Board ID
OFF	OFF	OFF	OFF	0
OFF	ON	OFF	OFF	1
OFF	OFF	ON	OFF	2
OFF	ON	ON	OFF	3
OFF	OFF	OFF	ON	4

OFF	ON	OFF	ON	5
OFF	OFF	ON	ON	6
OFF	ON	ON	ON	7
ON	OFF	OFF	OFF	8
⋮				
ON	ON	ON	ON	15

Once “Lock” is checked, you can fix the board ID of the device to be opened with the software. If the selected board cannot be found when the Board Select screen is opened in the “Lock” state, or if multiple boards with the same board ID are detected, an error dialog box will appear.

When “Select” is clicked, the board is selected and the dialog is closed.

3.2.2. Board Setting



Next, select Control -> Board Setting in the menu (or type F4) to set output timing. NVFilePlayer displays the output timing settings by launching the “TimingGen” program.

“TimingGen” is available as individual software for each board, and can also be run TimingGen.exe file itself. The SVO board generates video signals with the timing set in this dialog.

The setting dialog depends on the type of the board opened with Board Select. The right figure shows the output timing setting screen when the SVO-03-MIPI board is opened. **For details on the settings, please refer to the hardware specifications for each board.**

When the Settings dialog is opened, the previous settings are loaded, so there is no need to change them again once they are set. Therefore, when the same board is used with the same settings, the settings in “Board Setting” can be omitted.

Click “RESTORE SET” to output the current settings to a file. In addition, click “SAVE SET” to load the settings from a file.

Click “Easy Timing Generator” to easily create timing settings from frame resolution, pixel format, and frame rate.

3.2.3. Play Control

After all settings are complete, select Control -> Play Control in the menu (or type F6) to open the Play Control screen for controlling the board output.

Click “Play” to start video output from the SVO board. When video output starts, the “Play” button becomes disabled and the “Current Output Frame” counts up.

Click “Stop” during video output to stop the video output. When all files have been transferred, the “Play” button will be enabled again.

Play Setting

Item	Description
Play cycle	When checked, video output is performed repeatedly (loop playback). When not checked, the output signal stops after one playback.
Play mode	When checked, the entire video file is sequentially output via the DRAM frame buffer on the board. If the transfer bandwidth on the PC side is not sufficient, the output video data will be invalid. When not checked, only the beginning of the video file is transferred to the DRAM on the board, and only the contents of the DRAM are output repeatedly. In this case, the video transfer from the PC to DRAM is performed only once. It is recommended to uncheck the box and use the output mode from the DRAM in the following cases: ・When multiple SV boards are connected to one PC and USB bandwidth or CPU bus bandwidth may be insufficient. ・When continuous playback of several frames is not a problem.
Image sync	When this item is checked and Play mode is ON-PC, the preview screen on the NVFilePlayer side is updated at the same time as the video output.

	The frequency of screen updates is once every few seconds, since that is when the transfer from the PC to the frame memory on the board takes place.
External Trigger	When checked, the external sync input pin is enabled. The format of the external sync signal is set from the Board Setting. When External Sync (External Sync Mode) is disabled in the Board Setting, this check box is disabled. Three types of external sync operation modes are supported: video output start sync, video output start/stop sync, and frame sync using FSYNC.
External V/HSync	Uncheck this item for normal use.
External PCLK	Uncheck this item for normal use.
Trigger Out	When checked, FSYNC signal is output from GPIO. Uncheck this item for normal use.

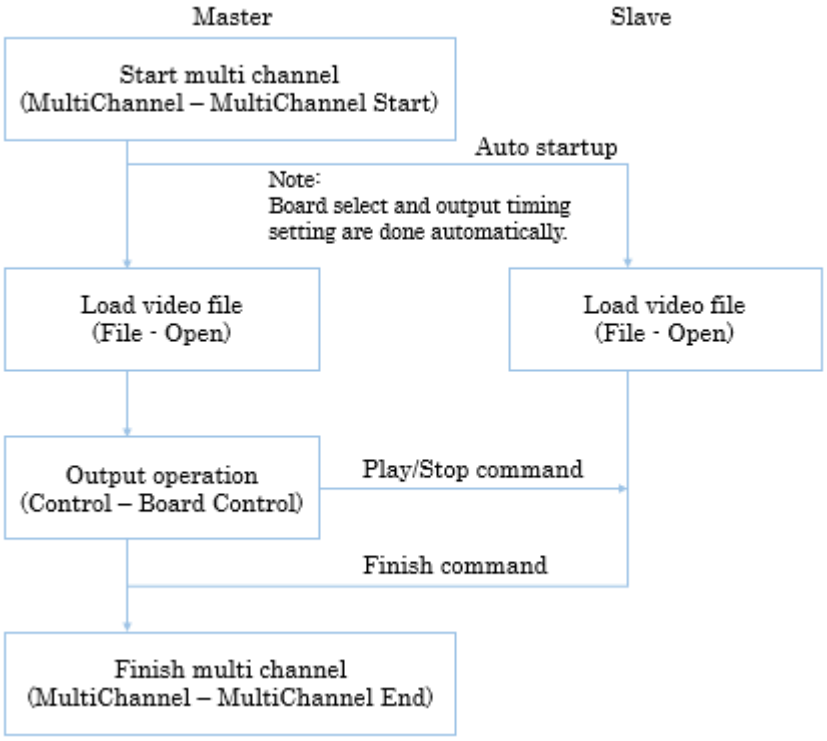
Play Information

Item	Description
Current Output Frame	Displays the number of frames that have been output since the Play was clicked.
Video File Frame Count	Displays the number of video file frames that can be output with the current settings.
Elapsed Time	Displays the time passed since the Play was clicked.

3.3. Operation When Connecting Multiple Boards (Multi-Channel Operation)

By using multiple NVFilePlayer, it is possible to output video signals from multiple SVO boards connected to one PC. (multi-channel operation).

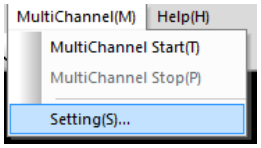
In multi-channel operation, one of the several SVO boards is used as the main operating target (master channel) and the other boards are used as automatic operation (slave channels).



To use the multi-channel mode, it is necessary to perform its start operation (MultiChannel - MultiChannel Start) with the master NVFilePlayer. In the mode, NVFilePlayer applications start up for the number of boards set in "Initial Setting".

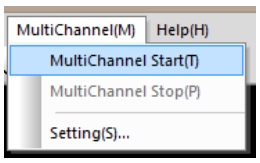
At the timing of startup, output timing settings and board selection for the master and slave channels are made internally. If an error occurs during this process, an error dialog will be displayed on the master channel.

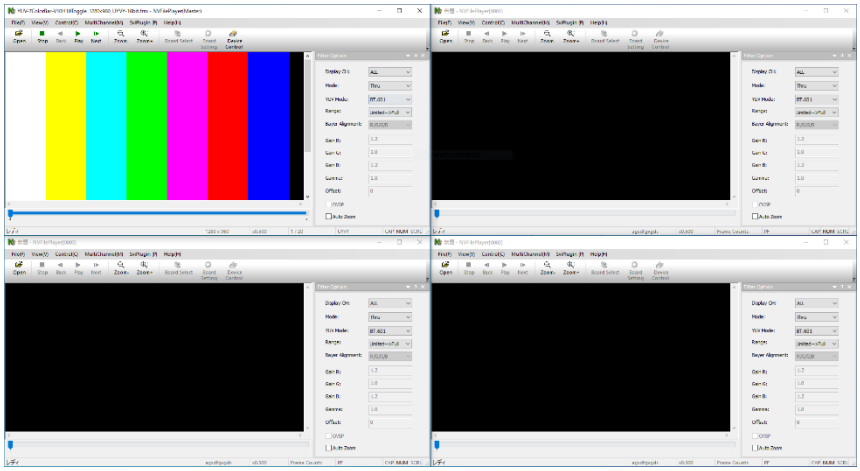
3.3.1. Operating Procedure for Multi-Channel Operation



For the first time starting multi-channel operation, click MultiChannel(M) -> Setting(S)... to make the initial settings.

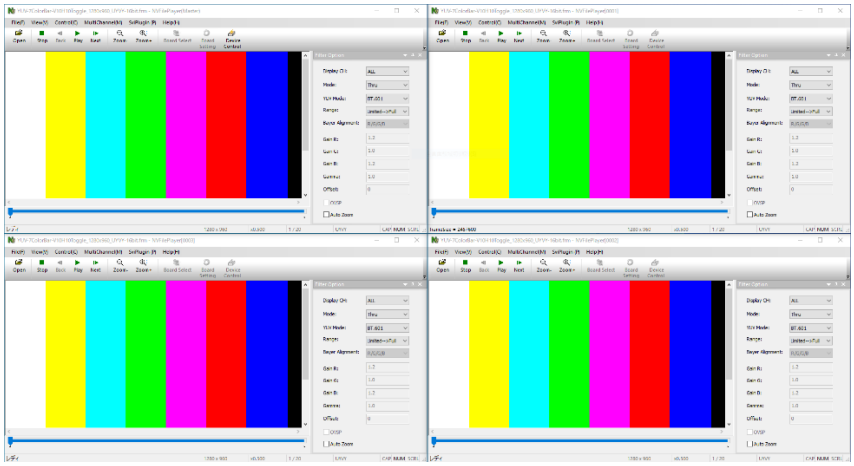
Please refer to the section on "Initial Setting" for more information.





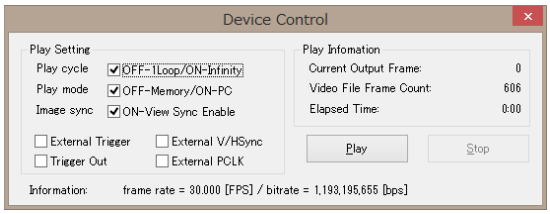
Click MultiChannel(M) - MultiChannel Start(T) to start multi-channel operation. At this time, the slaves of NVFilePlayer start up and open the corresponding SVO boards. At this time, the output timing settings for each board are also made.

If the SVO board with the Board ID selected in the setting cannot be found, an error screen is displayed.

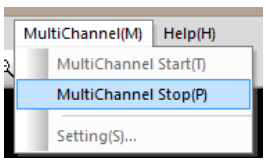


Once multi-channel operation starts, open the video files to be output in the respective NVFilePlayer.

If the number of frames in the video files is different for each channel, the video signals are output according to the video file with the lowest number of frames. The latter frames of other channels with a large number of frames are not output as video signals.



After that, click Control -> Play Control from the master channel (or type F6) to display the Play Control screen for controlling video outputs. Operate the play/stop on the Play Control to do play/stop operation to all boards.



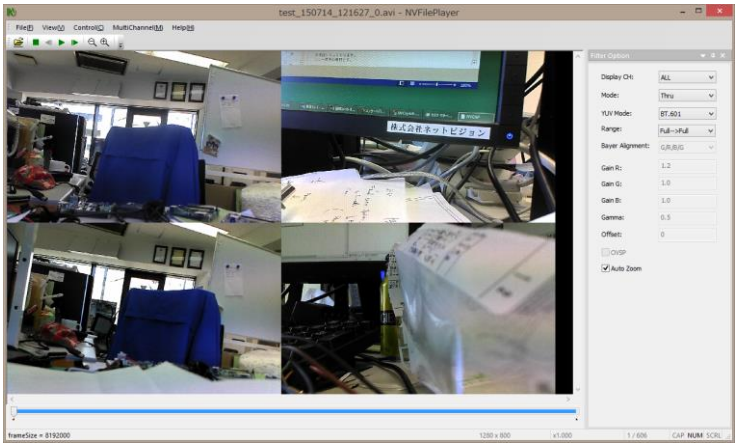
To finish multi-channel operation, click MultiChannel(M) -> MultiChannel Stop(P) in the menu. The “NVFilePlayer” on the slave side is exited automatically.

3.4. Synchronization Preview of Multiple Video Files

NVFilePlayer can load AVI files recorded by multiple SVM boards and display the frames of each file synchronously. Loading Multiple video files is automatically determined by the file names of the video files to be loaded.

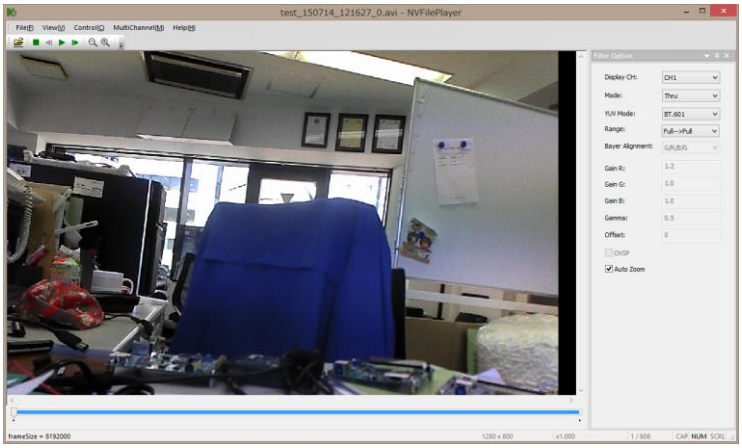
When the file names end with "_0.avi" - "_5.avi", they are considered to be multi-channel files and loaded continuously. "_0.avi" corresponds to CH1, and "_5.avi" to CH6. If files with consecutive CH numbers from CH1 exist, these files are opened. Since the file naming rule is the same as our capture system, AVI files recorded with NVCap and multiple SVM boards can be opened and played back with NVFilePlayer synchronously.

When multiple files are loaded, the display can be changed using the Display CH setting in the Filter Option. This function is used only when playing back video files. About video output, only one SVO board can be operated with one NVFilePlayer, and only the data of CH1 is output as a video signal.



(When Display CH = ALL)

Displays CH1-CH4 in this order: top left, top right, bottom left, bottom right.



(When Display CH = CH1)

Displays Only CH1.

3.5. Loading Video in List Format

By preparing a text file, multiple video files can be read continuously. The contents of the text file should be one file name per line and the extension is ".avit", ".frmt", or ".lst" to read by NVFilePlayer. However, if AVI and FRM files are mixed in the list, an error will occur.

(Example of a list file) list_example.avit

```
movie00.avi
movie01.avi
movie02.avi
```

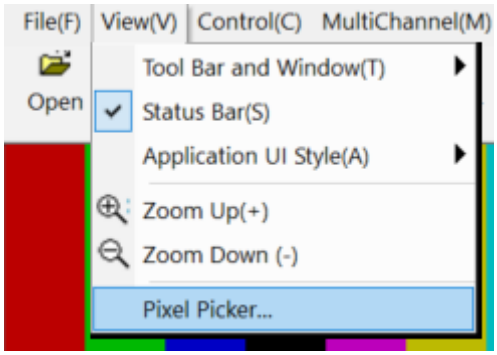
3.6. Automatic Transmission of Configuration Files at NVFilePlayer Startup

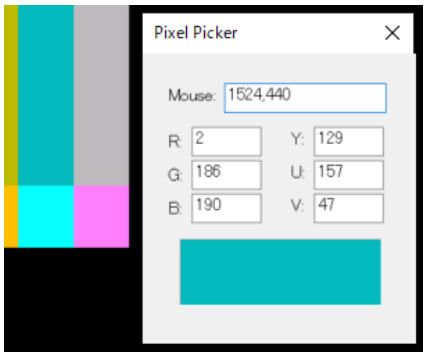
By placing configuration files with the following name in the same directory as NVFilePlayer, you can automatically configure settings for the SVO board at specific timing. The format of the configuration file is the same as that used in our control applications SVMCtl and SVOCtl.

- Control_Init.txt: After displaying the Control Dialog.
- Control_Play.txt: After clicking Play and before video output processing.
- Control_Start.txt: After clicking Play and after video output processing.
- Control_Stop.txt: After clicking Stop and after video output stop processing.

3.7. Usage of the Pixel Picker

It is possible to display the RGB/YUV elements at any point in the opened video file, using the “Pixel Picker”, which is opened by clicking View(V) -> Pixel Picker... in the menu bar. The elements of one pixel at the mouse cursor position are always displayed.





4. Application · Error Message

4.1. Application Error

Item Number	1
Error Message	Device UnOpened
Error Description	Open process of SVO board failed.
Factors of Error	·SVO board is turned off. ·There is something wrong with the SVO board. ·The board is not recognized by the application.
Solution	1. Exit the application and turn off the SVO board. 2. Turn on the board and start the application again.

Item Number	2
Error Message	Play Failure (SVOAPI error is also displayed on the second line of the dialog.)
Error Description	The process of sending data from the SVO device failed.
Factors of Error	・SVO board is executing a process. ・The board is not recognized by the application.
Solution	・Wait for the SVO board to finish the process. If this solution does not solve the problem, perform the item number 1.

Item Number	3
Error Message	Shared Memroy UnOpen
Error Description	Unable to allocate memory space for SVO memory data and image display.
Factors of Error	Insufficient virtual memory space.
Solution	Increase virtual memory space.

Item Number	4
Error Message	File Open Failure
Error Description	File open failed.
Factors of Error	・The specified file cannot be opened. ・The file has already been opened by another application. ・The file is not found at the specified path.
Solution	・If you are using a file, end it. ・Set the correct file path.

Item Number	5
Error Message	Update Incomplete
Error Description	Update FPGA or Firmware failed.
Factors of Error	・SVO device cannot open. ・SVO board is processing. ・File data is invalid.
Solution	・Terminate the SVO board process. ・Check the file.

Item Number	6
Error Message	Not Data Analyze
Error Description	Data analysis is not completed.
Factors of Error	・Data is not acquired. ・The file data cannot be analyzed.
Solution	・Obtain data. ・Check the file.

Item Number	7
Error Message	Not Selected Device
Error Description	SVO board is not selected.
Factors of Error	SVO board is not selected.
Solution	Select SVO board.

Item Number	8
Error Message	Not Idol
Error Description	SVO board is executing a process.
Factors of Error	SVO board is executing a process.
Solution	・Wait for the SVO board to finish the process. If this solution does not solve the problem, perform the item number 1.

4.2. SVOAPI Error

Item Number	9
Error Message	Win32API Error (Detailed error information on the second line)
Error Description	Windows API Error.
Factors of Error	Depends on detailed information.
Solution	Depends on detailed information.

Item Number	10
Error Message	Connect No Device or Power Off
Error Description	SVO board is not connected to USB or the power is not on.
Factors of Error	・SVO board is not connected to USB. ・SVO board is not powered on.
Solution	・Confirm that SVOUSB20 is recognized with device manager. ・Connect the SVO board to USB ・Powered on the SVO board.

Item Number	11
Error Message	Device Multi Open
Error Description	Trying to open multiple SVO boards.
Factors of Error	・Trying to open two or more SVO boards. ・Trying to double open one SVO board.
Solution	・Make sure the board is not double opened. ・Make sure you are not trying to open multiple SVO boards with one application.

Item Number	12
Error Message	Device UnOpened
Error Description	SVO board is not open.
Factors of Error	Trying to process a SVO board that is not opened.
Solution	・Open the SVO board. ・Close the Control dialog and select Control in the menu.

Item Number	13
Error Message	Parameter Incorrect
Error Description	Abnormality of setting parameter.
Factors of Error	Setting parameter is wrong.
Solution	Check the setting parameters.

Item Number	14
Error Message	FW Update TimeOut
Error Description	Firmware update fails.
Factors of Error	・SVO board is processing. ・File data is invalid.
Solution	・Terminate SVO board processing. ・Check the file data.

Item Number	15
Error Message	FPGA Update TimeOut
Error Description	FPGA update failed.
Factors of Error	・SVO board is processing. ・File data is invalid.
Solution	・Terminate SVO board processing. ・Check the file data.

Item Number	16
Error Message	Image Data Not Stored In SVO
Error Description	No data is stored in the SVO board memory.
Factors of Error	No data is stored in the SVO board memory.
Solution	Transfer data to the SVO board.

Item Number	17
Error Message	Command Busy
Error Description	SVO board is executing a process.
Factors of Error	SVO board is executing a process.
Solution	Wait for the SVO board to finish processing.

Item Number	18
Error Message	Command Incorrect
Error Description	Sent an unspecified command to the SVO board.
Factors of Error	Sent an unspecified command to the SVO board.
Solution	Check the send command.