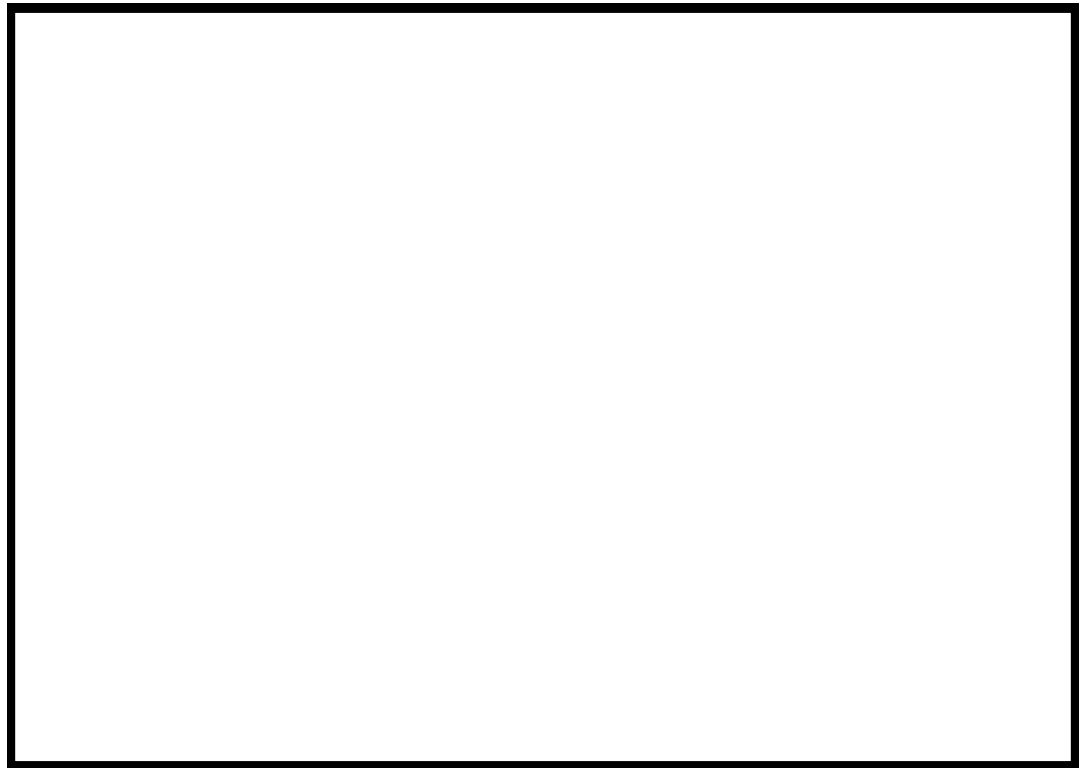

Ariel Dynamics, Inc.

TRIM MODULE

Revision 1.0



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ARIEL TRIM PROGRAM

INTRODUCTION

When video images are captured directly from the camera to the hard disk drive on the computer, it is common to capture more images than are required for the desired analysis. The Ariel **TRIM** software module is a Windows based program that provides the ability to edit several video sequences simultaneously.

The video-editing phase of analysis is performed after all camera views have been captured to the computer but prior to being digitized. The purpose of this phase is to clip the stored AVI file from each camera view based on the synchronizing event. Trimming is the process of “cutting-out” a series of images in the captured AVI file into a more manageable segment that can be used for analysis.

Although a few of the **TRIM's** features may appear complex, they are relatively easy to master once you understand the underlying concepts. This manual is arranged to teach you these concepts in a logical order by showing you, in step-by-step fashion, how to use **TRIM**.

WHAT'S NEW IN TRIM 1.0

A few of the new features you will see in **TRIM** version 1.0

1. **Multiple Video Display.** Up to four AVI files can be simultaneously displayed for synchronizing and trimming.
2. **APAS Tool Bar.** A toolbar has been added to allow the user to activate individual APAS modules from within the main programs.
3. **JVC High Speed Camcorder.** Digital Video software support for JVC High Speed camcorders has been added.

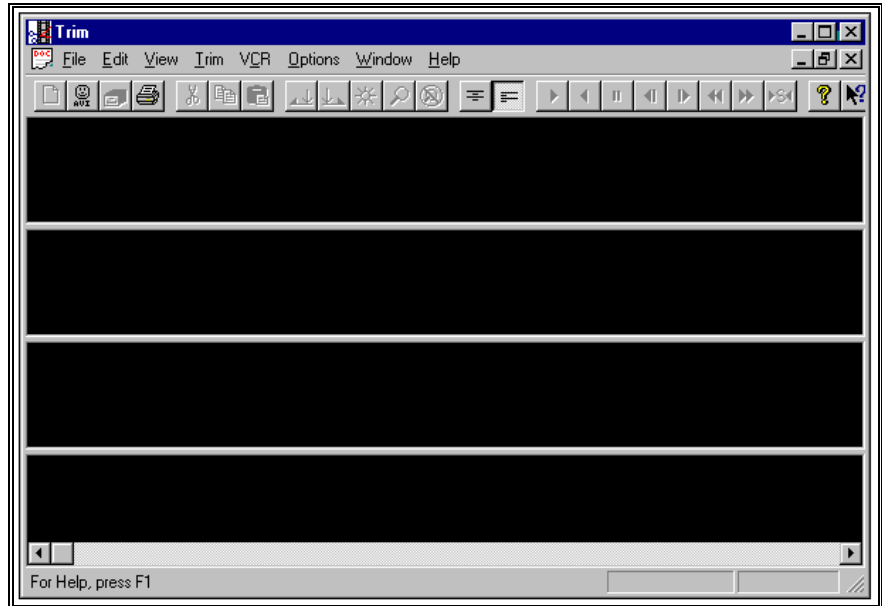
SYSTEM REQUIREMENTS

The following table provides the basic guidelines for minimum and recommended hardware to provide the best possible performance. The software requires a minimum of Microsoft Windows 98 and APAS-2000 Revision 1.0 or later.

Component	Minimum	Recommended
Pentium Computer	Pentium 233	Pentium II 333 MHz or higher
Video Display	800 x 600 @ 16 bit	High Color Display (65,000 colors or more)
RAM	32 MB	64 MB or more

TO START THE TRIMMER PROGRAM

1. Double-click the **TRIMMER** icon located in the **APAS System** window group. The main TRIM window will appear.

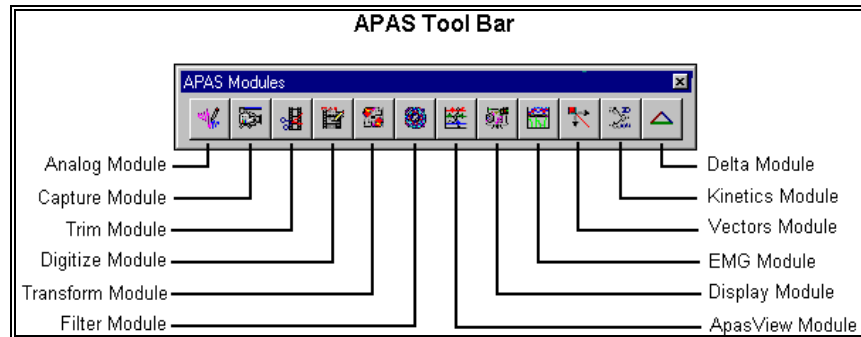


SCREEN LAYOUT

Prior to performing the trimming process, you should take the time to familiarize yourself with the format and contents of the various screens listed below:

THE APAS TOOL BAR

You can activate any of the APAS software modules from within the current program by selecting the icons located on the APAS tool bar. The tool bar is toggled on/off using the APAS Toolbar command in the VIEW menu. A check mark in the left column of the menu indicates that the toolbar is currently active. The toolbar can be re-located anywhere in the main program window by dragging it with the mouse. Clicking the appropriate icon can activate the following program modules. Icons are pictorial representations of programs, commands or functions.

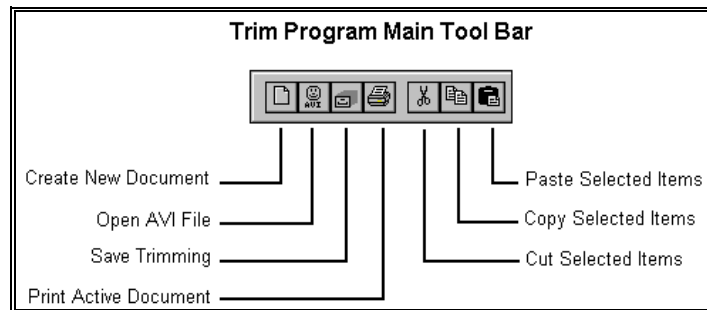


THE TOOL BAR

You can activate many functions by selecting the icons located on the **TRIM** program tool bar. The tool bar is located near the top of the window. The icons in the Trim Tool Bar can be divided into three sections (main, trimming and animation). Icons are pictorial representations of commands or functions. You can access the following commands by clicking the appropriate icon.

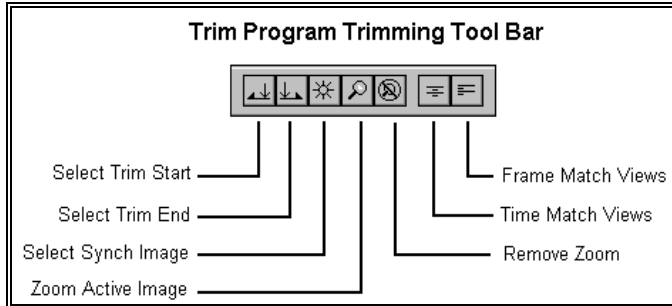
MAIN DISPLAY TOOL BAR

The Main Tool Bar icons can be used to activate general file commands.



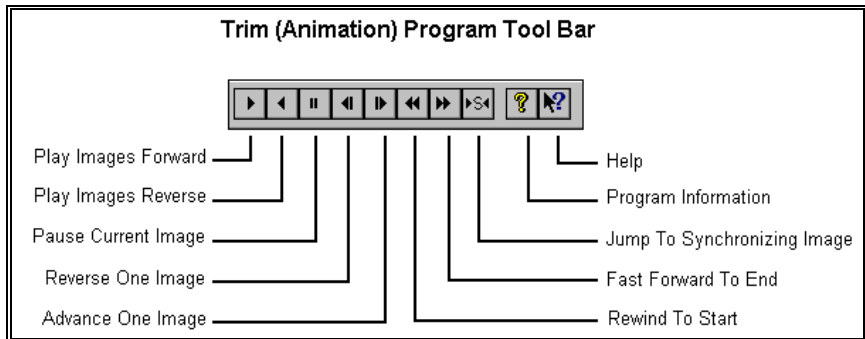
TRIMMING TOOL BAR

AVI files can be "trimmed" using the icons in the Trimming Tool Bar.



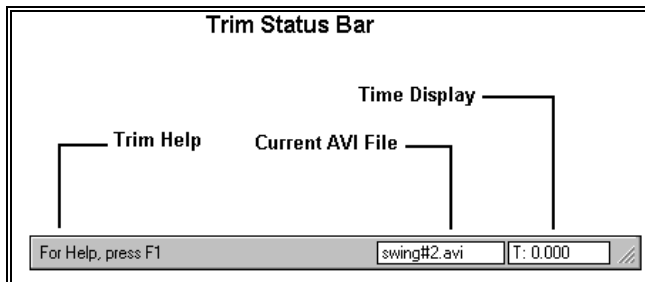
ANIMATION TOOL BAR

The icons in the Animation tool bar are used to "mimic" buttons on a VCR. When these icons are selected, all active windows will be updated with the command.



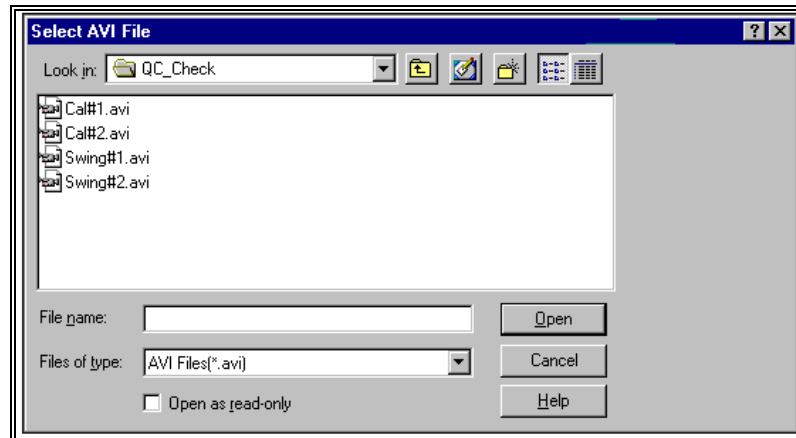
THE STATUS BAR

The status bar provides useful information about the current image status of the file during the Trimming process. The status bar is located at the bottom of the **TRIM** window. The far-left side of the status bar is divided into two separate fields. The left field displays the currently selected AVI file. The right field displays the current Time value as the sequence is being transformed.



TRIMMING AN AVI FILE

1. Choose the **OPEN** command from the **FILE** menu (or select the **OPEN** icon). The **OPEN File** Dialog box will appear.



The OPEN File Dialog box looks for a particular type of file (files that have the extension of ***.AVI**). This file is created when a video sequence is saved to the computer hard drive. The OPEN File Dialog box can be used to specify the Drive, Directory, and Name of the sequence file to be retrieved.

2. Select the AVI filename to be trimmed and then select **OK** to proceed. **NOTE:** Double-clicking on the AVI filename will perform the same function. The AVI files are sequentially displayed in one of the four window panels. Images for each AVI are numbered. Also displayed is a "Synch" indicator for the synchronizing image. By default, this is placed on the first image of each AVI file. There is always one "active" image that is indicated by a set of concentric white/black rectangles on the periphery of the active image. All action is on the active image. An image is made active by left clicking on it.
3. Repeat steps #1 & #2 for up to four AVI files of the same sequence.

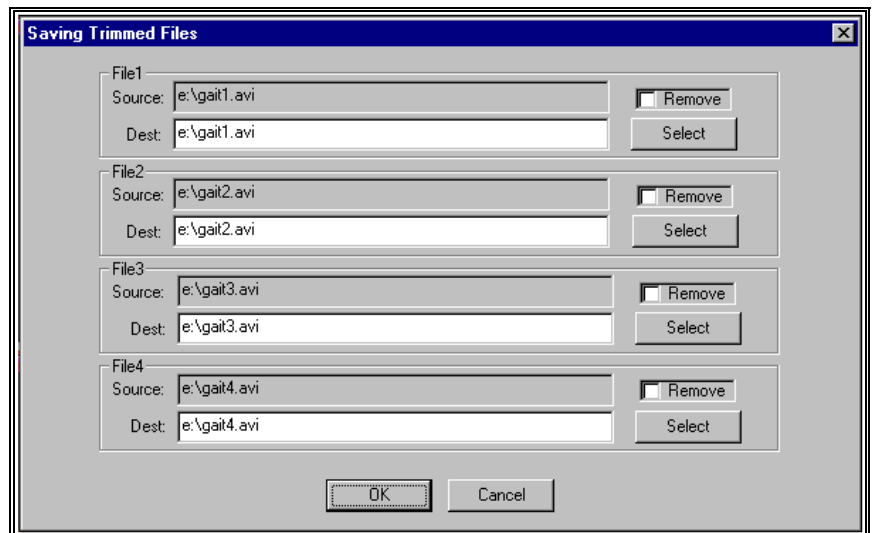
SPECIFY SYNCHRONIZING IMAGE

4. After the AVI files of interest are opened, click on an image in the 1st AVI to make it active. Then select **VIEW, ZOOM** (or select the **ZOOM** icon) to display the image full screen. Double-clicking on the image will simultaneously make the image active and zoom to full size.
5. Select **VCR** and use the VCR commands (or the VCR icons) to make the synchronizing image the active image.
6. Once the synchronizing image has been made active, select **VCR** and **SYNCH** (or select the **SYNCH** button in the toolbar) to make this the synchronizing image for this AVI file.
7. Select **VIEW** and **UNZOOM** (or select the UnZoom icon) to return to the 4 pane configuration. Double-clicking on the image will also return to the 4-pane configuration.

8. Repeat steps #4 through #7 for each remaining AVI file. The TRIM program will automatically synchronize all open AVI files based on the selected synchronizing image.
9. On any of the open AVI files, select the first image to be used in the analysis by left clicking on it.
10. Select **TRIM** and **TRIM START** (or the **TRIM START** icon to visually trim away the unwanted images before the first image to be analyzed.
11. On any of the open AVI files, select the last image of interest by left-clicking on it.
12. Select **TRIM** and **TRIM END** (or the **TRIM END** icon to visually trim away the unwanted images after the last image to be analyzed. The trimmed AVI file(s) will now be displayed.

NOTE: At this point, no actual data has been discarded and the trimming can be removed using the Trim/Untrim menu item.

13. Trimming is made permanent by selecting **FILE** and **SAVE TRIMMING** (or the **SAVE TRIMMING** icon). The original AVI files can now be overwritten with the “trimmed” file(s) or saved to a new file name.



Source - Displays the path of the original (untrimmed) AVI files.

Remove - Check this box to delete the original AVI file and save only the “trimmed: AVI file.

Destination - Displays the path where the “trimmed” file will be saved.

Select - Used to modify the destination for the “trimmed” file.

14. Select the **OK** button to proceed. If the destination is the same as the source, a confirmation menu will be displayed confirming that the original files will be overwritten.
15. Select **FILE** and **EXIT** to exit the **Ariel TRIM** program.

MATCHING INFORMATION

Several options exist for matching the active AVI files. These include either Time or Frame matching. The process of Time matching synchronizes images on a single time scale. Since each AVI file may start at a different point in time, frame one of the first file may not correspond to frame one of the second file. The APAS will only yield accurate results if digitized coordinates from simultaneous frames are used. The **TRIM** software utilizes the synchronizing event from each AVI file as a basis for time matching. The time for each image in each file is adjusted relative to the synchronizing event so that all the synchronizing events occur at the same absolute time.

Frame Matching aligns the images on a single image scale. This option is often used when synchronizing is accomplished in the Capture module. Since each AVI file is captured from the same starting point, the files are already synchronized. The TRIM program can then be used to edit the end of each file.

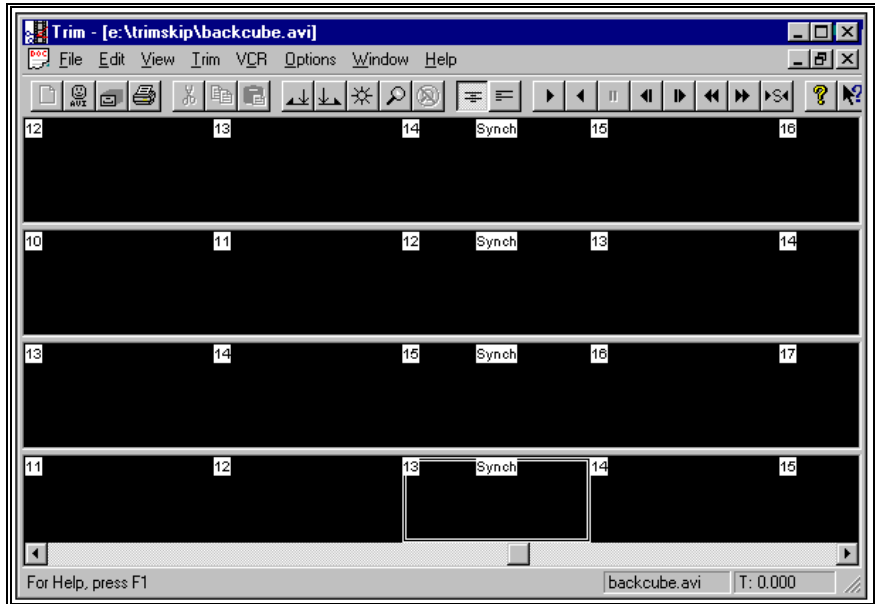
Time Match

The Time Match option is selected to display the active AVI files synchronized on the time scale. This means that the Synch images for all active files will be lined up vertically in the 4-pane display. The Synch image is designated as Time equal to 0.000 seconds. Therefore, images before the Synch image will be designated with a negative time value. Images after the Synch image will have positive values.

In the figure below, notice that the Synch image varies between images #12 through #15 for the four AVI files. When the Time Match option is selected, the Synch images are lined up vertically. This places all the active AVI files on the same time scale.

The Time Match option can be selected using the following steps.

1. Select **TRIM** and **TIME** (or select the **TIME** icon). The images will automatically adjust to a common time scale.



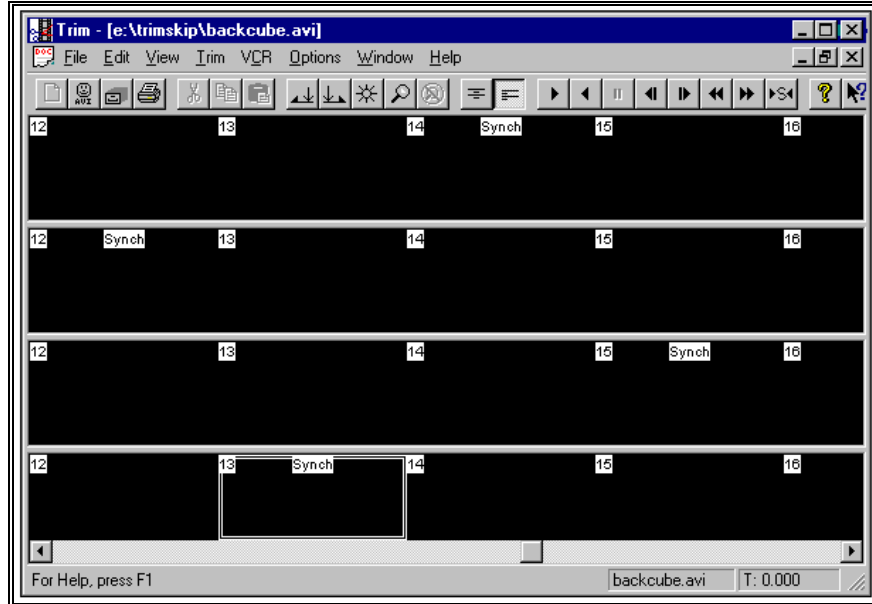
Frame Match

The Frame Match option is selected to display the active AVI files synchronized by image number. This means that the image numbers for all active files will be lined up vertically, regardless of the Synch image. The Synch image is designated as Time equal to 0.000 seconds. Therefore, images before the Synch image will be designated with a negative time value. Images after the Synch image will have positive values.

In the figure below, notice that the Synch image varies between images #12 through #15 for the four AVI files. When the Frame Match option is selected, the image numbers are lined up vertically independent of where the Synch image is specified. This places all the active AVI files on the same frame scale.

The Frame Match option can be selected using the following steps.

1. Select **TRIM** and **FRAME** (or select the **FRAME** icon). The images will automatically adjust to align image numbers.

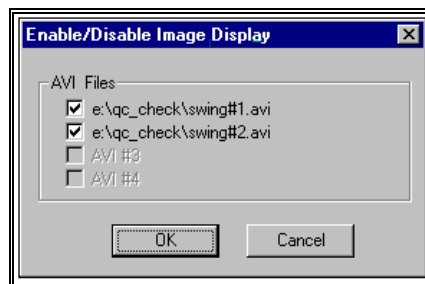


ENABLE/DISABLE IMAGE DISPLAY

When multiple AVI files are open simultaneously, individual AVI files can be turned on or off from display to the user. This option allows the user to turn off the images that are not being used, thus speeding up the display of the file being viewed. For example, let's assume that four AVI files are currently open and the user has maximized the first AVI file to determine the Synch point. When the VCR functions are utilized, all active views must be updated, thus slowing the display of the maximized AVI file. To speed up the display of the 1st AVI file, the 2nd, 3rd and 4th AVI files could be disabled.

The Enable/Disable menu can be accessed using the following steps.

1. Select **VIEW** and **VIDEO**. All active AVI files will be listed. The order of the AVI files corresponds to the 4-pane display and the order in which the files were opened.
2. Select **OK** to proceed with the changes or **CANCEL** to abort.

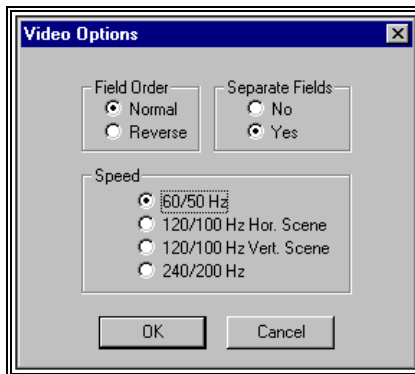


The check mark next to each filename acts as a toggle switch allowing the AVI display to be turned on (enabled) or off (disabled). A checkmark next to the filename indicates the display is enabled. Left-clicking the mouse on the desired box can change this flag. A file that has been disabled will be displayed as a black panel in the main Trim window.

OPTIONS

Select the **OPTIONS** menu to access the **VIDEO** and **CALIBRATE** options. Available options allow for the selection normal or reverse Field Order image display, Separate Fields and video Speed selection options.

VIDEO OPTIONS



FIELD ORDER

A standard video picture is made up of odd and even lines across the screen. Television standards require these lines to be interlaced. This means only half of the lines are displayed in one field. The first (odd) set of lines is displayed in the first field while the second (even) set of lines is displayed in the second field. These two fields comprise a frame, which is a complete picture.

Depending on the hardware and software combinations used for recording and displaying the AVI files, it is possible for the order of the displayed fields to be reversed. For this reason, the Ariel TRIM program provides the option to specify the order for displaying the AVI files.

If it appears that the images are “jerky” or are being displayed in a “zigzag” manner, the field order probably needs to be reversed. The field order is specified using the following steps.

1. Select the **OPTIONS** menu to display the list of video options. Left-click either Normal or Reverse in the **FIELD ORDER** section. The current selection is indicated by the black dot to the left of the option. **NOTE:** When this option is changed, it affects all other APAS software modules where the AVI file can be displayed (Capture, Digitize, Display, Vectors etc.)
2. Select **OK** to proceed and save changes or **CANCEL** to abort.

SEPARATE FIELDS

Older models of the APAS capture an analog video signal using a step capture process and a computer controlled VCR. When using the “step capture” mode, the software and VCR work in conjunction to capture only the field information from the video signal. Therefore, when using video captured from the “step capture” process, the field information is already separated and this setting should be set to NO.

Capturing digital video in real-time results in the entire frame being captured. The field information is obtained by separating the frame into the two respective fields. This is required when using digital video files and is automatically set to YES.

SPEED

The APAS is capable of digitizing from any of various video formats. These formats can be determined by a variety of factors including the type of camera used for video recording, the make and model of frame grabber as well as the selected frame rate for recording. When using the JVC digital camcorder in the high-speed mode, video images are split to either one-half or one-quarter of the original size. The user must indicate which speed and/or JVC mode was used for the video recording to allow the software to correctly separate the images during the digitizing process.

1. **60/50 Hz** - Select this option when using either NTSC/PAL video formats or Digital Video (DV) in the Normal Record mode.
2. **120/100 Hz Horizontal Scene** - Select this option when using the JVC Digital Video camera in the 2X Horizontal High-Density mode. This mode is suitable for recording horizontally moving activities such as running.
3. **120/100 Hz Vertical Scene** - Select this option when using the JVC Digital Video camera in the 2X Vertical High-Density mode. This mode is suitable for recording vertically moving activities such as golf.
4. **240/200 Hz** - Select this option when using the JVC Digital Video camera in the 4X High-Density mode. This mode is suitable for recording fast moving activities.

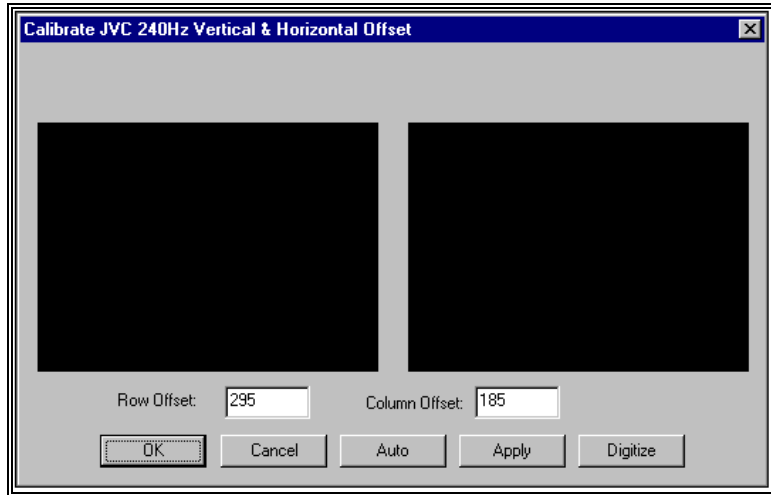
CALIBRATE

The JVC high-speed camcorder is capable of recording at a rate of either 120 or 240 images per second by splitting the image to approximately one-half or one-quarter normal screen size. When the recording is played back on any standard video player, 2 images will be simultaneously displayed in the 120 Hz mode (2X High Density Mode) while 4 images will be simultaneously displayed in the 240 Hz mode (4X High Density Mode). These images are 1/120th second apart and 1/240th second apart respectively.

In theory, the expected split would occur at the horizontal and vertical middle of the screen. This equates to horizontal line 360 and vertical line 240 since there are 720 lines of horizontal resolution and 480 lines of vertical resolution. However, reality has indicated that this is not always the situation. For this reason, the Calibrate function is used to determine the image offsets for the high-speed video.

1. Select the **CALIBRATE** command from the **OPTIONS** menu.
2. Select the **AUTO** button to perform “automatic” calibration.
3. Select **OK** to return to the main Trim Window.

The steps for calibration are almost identical for both the 120 and 240 Hz modes. Any of three options can be used to perform the calibration process, however, the “Automatic” method is recommended. These options are selected using the buttons in the lower portion of the Calibrate menu.



Manual Calibration Option

In the “Calibrate” menu, the user specifies the row or column number (or both in the case of 240 Hz) where the last high speed image appears in the normal speed video. In the case of 120 Hz, the normal video consists of 2 high speed images either horizontal scenes or vertical scenes. In the case of 240 Hz, there are 2 rows and 2 columns of high-speed images per normal image. The dialog displays 2 images, the 1st and last high-speed images for the current normal image. Edit boxes display the current values for the row/column offsets for the “Last” image. The idea is to have the top or the left or both edges of the two displayed images appear identically. One can enter a value for the offset[s] and click on the “**Apply**” button to re-display the images with this new value.

Digitize Calibration Option

The “**Digitize**” option is another method for calibration. When this option is selected, the user will be prompted to digitize the same image feature in the two images. From this information the program calculates the row and/or column offsets.

Automatic Calibration Option

Or one can select "**Auto**" and the program will automatically compare the two images pixel by pixel and determine the row and/or column offsets. The calculated offset is then entered in the Line Offset field. **This last option is the most reliable and is the recommended method.** Typically the calibration needs to be performed only once on a system. The indicator that the 120/240 Hz is NOT calibrated is the presence of jitter when advancing images.

Save Calibration Settings

This information can only be saved to a file once. This usually happens in TRIM when the trimmed file is saved. Therefore this information should be setup properly before the trimmed file is saved. It can be changed temporarily but will revert to the original values the next time the AVI is opened. To save permanently, open the video file in the TRIMMER module, specify new values, and then save the trimmed file without actually trimming any images.

TRIM QUICK REFERENCE

1. Select **FILE, OPEN** (or the **OPEN** icon in the Toolbar) to Open desired AVI file.
2. Select the correct directory and double-click on the desired AVI file.
3. Repeat steps #1 and #2 for up to four AVI files of the same sequence.

SPECIFY SYNCHRONIZING IMAGE

4. Double-click on an image in the 1st AVI window pane to simultaneously make the image active and zoom to full size.
5. Use the VCR commands to make the synchronizing image the active image.
6. Click the **SYNCH** button in the toolbar to make this the synchronizing image for this AVI file.
7. Double-click the image to return to the 4-pane configuration.
8. Repeat steps #4 through #7 for each remaining AVI file. The TRIM program will automatically synchronize all open AVI files based on the selected synchronizing image.
9. On any of the open AVI files, select the first image of interest by left clicking on it.
10. Select the Trim Start icon to visually trim away the unwanted images before the start.
11. On any of the open AVI files, select the last image of interest by left clicking on it.
12. Select the Trim End icon to visually trim away the unwanted images after the end.

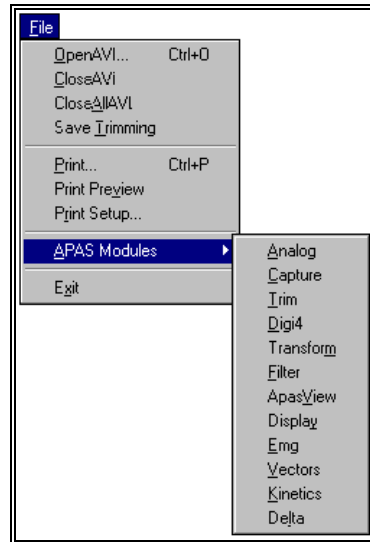
NOTE: At this point, no actual data has been discarded and the trimming can be removed using the Trim/Untrim menu item.

13. Trimming is made permanent by clicking the Save Trimming icon. The original AVI files can now be overwritten with the “trimmed” file(s) or saved to a new file name.
 14. Select the **OK** button to proceed.
 15. Select **FILE** and **EXIT** to exit the **Ariel TRIMMER** program.
- * These are only required to be selected once. The program will remember the current settings unless changed by the user.

TRIM MENUS

Listed below are the various menus for the TRIM program. Select the desired menu to see a description of the available commands for each menu.

FILE COMMAND MENU



Open AVI

Selected to OPEN an existing AVI file to perform the trimming process.

Close AVI

Selected to CLOSE the currently active AVI file.

Close All AVI

Selected to CLOSE ALL currently open AVI files.

Save Trimming

Selected to save the "trimmed" AVI file. **NOTE:** This will permanently overwrite the existing file(s).

Print

Selected to PRINT the current file on the selected printer.

Print Preview

Selected to check or examine the positioning on one or more pages. When you give the Print Preview command, a new window will be open showing the document position as it would appear on paper. To close the Print Preview window, select the Cancel button to go to the previous mode.

Print Setup

Selected to adjust the printer settings prior to issuing the PRINT command.

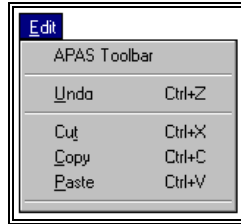
APAS Modules

Selected to open additional APAS modules while keeping the current program open. When this command is selected, the user will be presented with a list of APAS modules.

Exit

Selected to EXIT the TRIM program and return to the Microsoft Windows program manager.

EDIT COMMAND MENU



APAS Toolbar

Selected to toggle on/off the APAS toolbar. When this option is active, the APAS toolbar will be displayed and allow the user to select additional APAS modules while keeping the current program open. The toolbar can be positioned to the desired position by dragging it with the mouse.

Undo

Select the UNDO command to retrieve edited data. The undo command reflects the last change you made, such as Undo Delete or Undo Insert.

Cut

Select the CUT command to remove the selected item and temporarily copy it to the Windows Clipboard. The items are placed in the clipboard so that they can be Pasted into another area of the same application or into another Windows application. To avoid losing this item, you should Paste it before performing any additional editing.

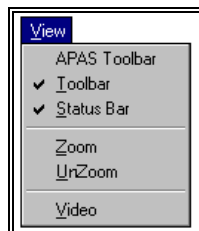
Copy

Select the COPY command to make a copy of the selected item and temporarily copy it to the Windows Clipboard. The items are placed in the clipboard so that they can be Pasted into another area of the same application or into another Windows application. To avoid losing this item, you should Paste it before performing any additional editing.

Paste

Select the PASTE command to insert a copy of the item currently in the Windows Clipboard. This item could have been cut or copied from almost any Windows application.

VIEW COMMAND MENU



APAS Toolbar

Selected to toggle on/off the APAS toolbar. When this option is active, the APAS toolbar will be displayed and allow the user to select additional APAS modules while keeping the current program open. The toolbar can be positioned to the desired position by dragging it with the mouse.

Toolbar

Selected to alternately display or hide the Toolbar. The check mark to the left indicates that the Toolbar will be visible.

Status Bar

Selected to alternately display or hide the status bar located at the bottom of the TRIM window. The check mark indicates that the Status Bar will be visible.

Zoom

Selected to ZOOM the active window to full screen.

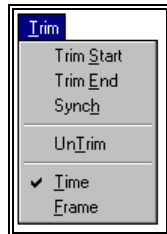
UnZoom

Selected to remove the ZOOM command and return to the 4 pane display.

Video

Selected to enable or disable individual AVI displays. This is used to increase the display reate when viewing a single AVI file.

TRIM COMMAND MENU



Trim Start

Selected to indicate the first image of the “trimmed” file. When this option is selected, images before the Start image will be removed.

Trim End

Selected to indicate the last image of the “trimmed” file. When this option is selected, images after the End image will be removed.

Synch

Selected to mark the currently active image as the Synchronizing image for the AVI file. The time value is set to zero for the Synch image.

Un-Trim

Selected to remove the temporary trimming choices of the Trim Start and Trim End and return to the original (un-trimmed) AVI file. NOTE: Once the Save Trimming command has been issued, the AVI files have already been permanently overwritten and the Un-Trim command is no longer functional.

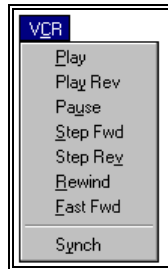
Time

Selected to synchronize and display the active AVI files on the same time scale. The synchronizing is based on the Synch image with a time equal to zero.

Frame

Selected to display the active AVI files on the same frame scale. Images are aligned based on the image number in the upper left corner of each individual image.

VCR COMMAND MENU



Play

Selected to Play the active AVI files in the forward mode.

Play Rev

Selected to Play the active AVI files in the Reverse mode.

Pause

Selected to Pause the active AVI files on the current image.

Step Forward

Selected to advance one image at a time.

Step Reverse

Selected to reverse one image at a time

Rewind

Selected to jump to the first image in the active AVI file.

Fast Forward

Selected to jump to the last image in the active AVI file.

Synch

Selected to search to the Sync point of the active AVI files.

OPTIONS COMMAND MENU



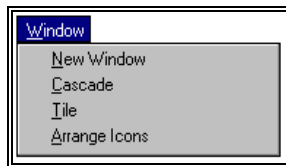
Video

Selected to open the Video Options menu and specify video parameters for the captured video file(s).

Calibrate

Selected to calibrate the image offset when using video files from the JVC camcorder in “high-speed” mode.

WINDOW COMMAND MENU



New Window

Selected to open a NEW WINDOW for the active document.

Cascade

Selected to arrange all programs that are window sized in an overlapping CASCADE. This will not arrange a program that has been minimized to an icon.

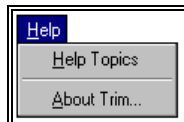
Tile

Selected to re-size the program windows to fit side-by-side on the screen. Since Windows will include all programs that are window-sized in the tile setup, it is best to minimize all programs that are not currently being used so it will not take up space on the screen.

Arrange Icons

Selected to automatically ARRANGE ICONS in a straight row. The user has no control over where the icons are placed.

HELP COMMAND MENU



Help Topics

Selected to provide an index of Help related Topics.

About TRIM

Provides program information, version number and copyright for the TRIM program.

