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## Technical Procedure for Video Enhancement

**1.0 Purpose** - The purpose of this procedure is to enhance or clarify the area of interest of a video using a digital copy of the original video.

**2.0 Scope** - This procedure describes the steps to be taken by personnel of the State Crime Laboratory in forensically enhancing video during analysis.

**3.0 Definitions** – See Digital Evidence Dictionary

### 4.0 Equipment, Materials and Reagents

- Non-linear video processor (e.g., AVID)
- Enhancement software

### 5.0 Procedure

**5.1** If excess video footage was acquired that is not relevant to the area of interest, locate the specific start and end points of the area of interest and mark them in the non-linear video processor to allow the specific section of the video to be processed.

**5.2** Determine whether the video is field or frame based video by advancing the video one field at a time. If each field advance produces a different image, then the video is considered to be field based and must be deinterlaced prior to continuing analysis.

**5.2.1** A video can be deinterlaced using the non-linear video processor. The standard “Deinterlace” settings from the Video Standard Settings Reference Guide shall be used, if possible. Any deviation from these settings shall be documented as provided by the Laboratory Procedure for Authorizing Deviations.

**5.3** Determine what, if any, further processing would enhance the video based on training and experience. Any requests made by the submitting agency shall be considered, as well as any processes that could help enhance the video, but are not specifically requested by the submitting agency. Below is a list of some of the major processes. (Note: This list should not be considered all-inclusive.)

**5.3.1** Demultiplexing: Isolates individual camera angles containing areas of interest. There are several ways to accomplish this process:

**5.3.1.1** Manual: This method involves stepping through the video frame by frame and selecting frames from the camera angles of interest. This is a good option for poor quality video, where the footage may roll causing other demultiplexing options to miss frames or insert irrelevant frames.

**5.3.1.2** Sequential: Depending on the available enhancement software, if the multiplexed video alternates consistently between camera angles, then the sequential method shall be used. It allows the user to specify how many cameras are present and how the multiplexer alternates between them. Once the software has this information, the user can specify which camera angle needs to be demultiplexed, and the non-linear video processor will mathematically select the frames from the requested camera.

- 5.3.1.3** Automatic – Single Camera: Depending on the available enhancement software, if the multiplexed video alternates randomly between cameras, then this method can be attempted. The standard “Single Camera Automatic Demultiplex” settings from the Video Standard Settings Reference Guide shall be used, if possible. Any deviation from these settings shall be documented as provided by the Laboratory Procedure for Authorizing Deviations.
- 5.3.1.4** Automatic – Multiple Cameras: Depending on the available enhancement software, if the multiplexed video alternates randomly between cameras (and multiple cameras of interest exist), then this method can be attempted.
- 5.3.1.4.1** The video must be exported from the non-linear video processor in order to demultiplex using this method. The standard “Export to Demultiplex” settings from the Video Standard Settings Reference Guide shall be used, if possible.
- 5.3.1.4.2** The exported video shall be processed with a demultiplexing tool.
- 5.3.1.4.3** After demultiplexing, the relevant camera angles shall be exported from the enhancement software to be imported to the non-linear video processor. The standard “Demultiplex Camera Angle Export” settings from the Video Standard Settings Reference Guide shall be used, if possible. Any deviation from these settings shall be documented as provided by the Procedure for Authorizing Deviations.
- 5.3.1.4.4** After exporting, the relevant camera angles should be imported to the non-linear video processor. The standard “Import from Demultiplex” settings from the Video Standard Settings Reference Guide shall be used, if possible. Any deviation from these settings shall be documented as provided by the Procedure for Authorizing Deviations.
- 5.3.2** Magnification: Enlarges a selected area of the footage. The standard “Magnification” settings from the Video Standard Settings Reference Guide shall be used, if possible. Any deviation from these settings shall be documented as provided by the Laboratory Procedure for Authorizing Deviations.
- 5.3.3** Frame averaging: Reduces noise in an area of an image that remains stationary for a period of time. The standard “Frame Averaging” settings from the Video Standard Settings Reference Guide shall be used, if possible. Any deviation from these settings shall be documented as provided by the Laboratory Procedure for Authorizing Deviations.
- 5.3.4** Speed Adjustment: Adjusts the speed of a video by duplicating existing frames or removing duplicate frames. With an accurate measure of real time, time-lapse video can be adjusted to play back at approximately real time using this method. The standard “Speed Adjustment” settings from the Video Standard Settings Reference Guide shall be used, if possible. Any deviation from these settings shall be documented as provided by the Laboratory Procedure for Authorizing Deviations.
- 5.3.5** Stabilization: Stabilizes video that may be jerky due to being taken while moving. Refer to the Ocean Systems Training Manual for more information regarding this process.

**5.3.6 Audio Clarification:** Depending on the available enhancement software, audio contained in a video may be clarified to produce more intelligible speech. Refer to the manual of the available enhancement software to determine what processes are available. Also, refer to the Audio Clarification Procedure for more information about the various audio clarification processes.

**5.4** If the video footage “rolls” during playback, the automatic demultiplexing options may not operate correctly. The manual option may need to be used instead.

**5.5 Standards and Controls** -A color bar test pattern with test tone on the media type submitted will be examined with the equipment used during the examination.

**5.6 Calibrations** – The hardware and software used in casework shall be verified before each case to ensure that they are functioning properly. The procedure for this verification process can be found in the Video Performance Verification Procedure.

**5.7 Maintenance** – N/A

**5.8 Sampling** – N/A

**5.9 Calculations** – N/A

**5.10 Uncertainty of Measurement** – N/A

## **6.0 Limitations**

**6.1** Failure to attempt all relevant, available enhancements when analyzing video could result in missed information that may be pertinent to a case.

**6.2** If excessive, unwarranted enhancements are used during the analysis, the final video may contain artifacts resulting from over-processing.

**6.3** Some factors outside of the control of the analyst could limit the end result of the enhancement process. These factors shall be recorded in the notes and laboratory report. Examples:

- Distance from the camera
- The video quality of the recording
- Submitted recording is not the original recording

**7.0 Safety** – N/A

## **8.0 References**

- Video Performance Verification Procedure
- Video Standard Settings Reference Guide
- Audio Clarification Procedure
- Ocean Systems Training Manual – Introduction to Forensic Video Analysis

**9.0 Records** – N/A

**10.0 Attachments** – N/A

| <b>Revision History</b> |                |   |
|-------------------------|----------------|---|
| Effective Date          | Version Number | Reason  |
| 08/02/2024              | 4              | Header – Updated issuing authority<br>3.0 – added reference<br>Updated Sections 5.5 and 6.0 |
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