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TECHNICAL INFORMATION

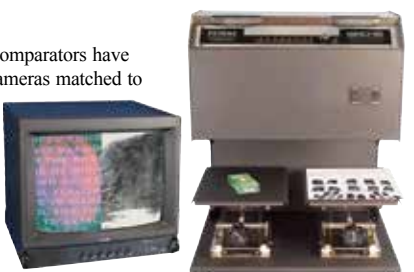
Forensic Video-Based Optical Comparators

Catalog Nos. FX10A, FX10AC

Upon initial receipt of the instrument, inspect for any visible damage. If the shipping carton(s) is damaged, please point this out to the delivering carrier. If, after opening the carton(s), any damage is apparent, save all packing material and contact Customer Service at 1-800-356-7311 immediately.

INTRODUCTION

The new FX10 Series of Forensic Video-Based Optical Comparators have been engineered to accommodate high-resolution video cameras matched to superior optics and have newly developed internal digital circuitry coupled to an eye-level control panel. The FX10AC model features color video camera, while the FX10A model has a black and white camera and video monitor. These units will directly feed video monitors, recorders or computers equipped with video capture capability. Not just a fingerprint projector, these instruments permit examination



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of a variety of items of forensic interest. The laboratory-grade focusing jacks permit viewing of both two-dimensional and three-dimensional objects, and the optics offer exceptional depth of field even when viewing curved surfaces. Not only do you get both vertical and horizontal split screens for evidence comparison, you also have the ability to overlay (superimpose) one image over another.

CAUTIONS

- **HAZARDOUS VOLTAGES ARE PRESENT INSIDE THE UNIT.** Should it become necessary to remove the access panel, be certain that power has been disconnected.
- Prior to connecting power to the unit and/or use, please read through and follow the instructions.
- The unit and the monitor both accept a power source of 110-220V AC, 50/60 Hz and auto-sense the applied input voltage.

FX10A and FX10AC CONTROLS

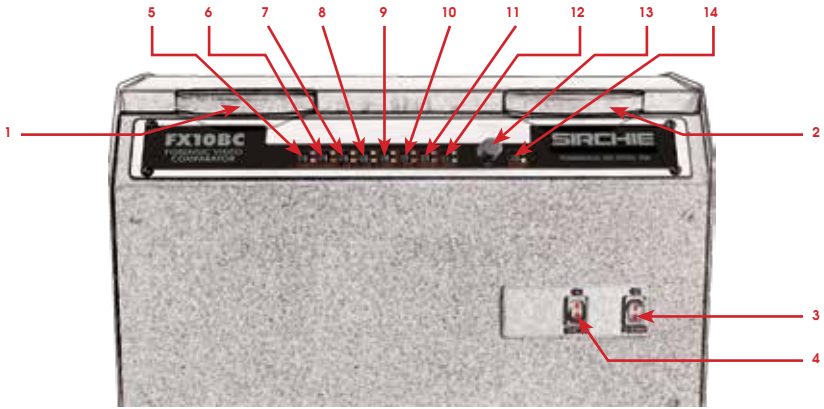
1. **ZOOM CONTROL:** Controls Channel A magnification.
2. **ZOOM CONTROL:** Controls Channel B magnification.

LOWER/FRONT CONTROL PANEL:

3. **POWER:** Master Power ON/OFF control.
4. **LIGHTS:** Activates both fluorescent lights.

UPPER CONTROL PANEL:

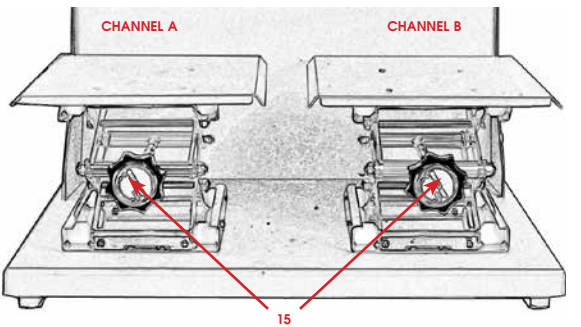
5. **CAM A:** Activation shows 100% of Camera A image in display. Red indicator will light to right of switch.
6. **CAM B:** Activation shows 100% of Camera B image in display. Red indicator will light to right of switch.
7. **L/R:** Activation splits screen vertically with CAM A image on the left and CAM B image on the right; adjust amount of split with MIX control. Green indicator will light to right of switch.



8. T/B: Activation splits screen horizontally with CAM A image on top and CAM B image on bottom; adjust amount of split with MIX control. Green indicator will light to right of switch.

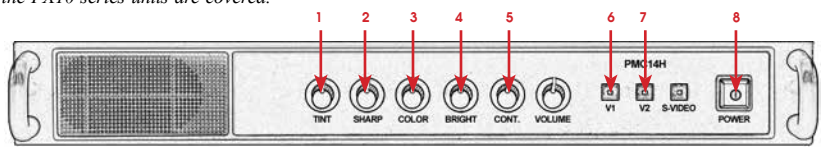
9. FADE: For overlay (latent to record print) capability. Activation superimposes CAM A on top of CAM B with MIX control set to mid-range. Adjust amount of FADE: Clockwise enhances CAM A and eliminates CAM B when turned full right; Counterclockwise enhances CAM B and eliminates CAM A when turned full left. Yellow indicator lights to right of switch.

10. **DIFF:** Activation superimposes CAM A on top of a reversed image of CAM B with MIX control set to mid-range. Adjust amount of DIFF: Clockwise intensifies CAM A and eliminates CAM B when turned full right; Counterclockwise intensifies CAM B and eliminates CAM A when turned full left. Red indicator will light to right of switch.
11. **FREEZE:** Activation captures current position of CAM B image so you need only to reposition CAM A image to align. This option can be activated when comparing in L/R, T/B, FADE, or DIFF modes. Blue indicator will light to right of switch. ***NOTE:*** *This only freezes CAM B, even if you've previously activated EXCH mode.*
12. **EXCH:** Activation swaps CAM A and CAM B images. If in L/R mode, CAM B will now appear on the left and CAM A on the right. If in T/B mode, CAM B appears on top and CAM A on bottom. Green indicator will light to right of switch. ***NOTE:*** *EXCH has no effect on images unless you are in split-screen mode.*
13. **MIX:** Rotary control knob used to adjust position or amount of split (L/R, T/B) as well as the ratio of FADE. NOTE: MIX has no effect when CAM A or CAM B switches are activated.
14. **POWER:** Activates splitter power ON/OFF (upper control panel).
15. **FOCUSING JACKS:** Focuses Channel A and Channel B respectively.



COLOR VIDEO MONITOR CONTROLS & HOOK-UPS

Included with your FX10 series units is a 14" diagonal video monitor. ***NOTE:*** *The monitor for the FX10A displays a black and white image; the monitor for the FX10AC is color.* In order to visualize the evidence you are comparing with the FX10A or FX10AC, the monitor must be connected. The monitor comes equipped with hook-ups in the rear for connection to a computer, video recorder, and the like for downloading, recording, and storing the evidence you are comparing. ***NOTE:*** *Only those controls applicable to the use of the FX10 series units are covered.*



1. TINT: Adjusts the tint of image on screen.

2. SHARP: Adjusts the sharpness of image on screen.

3. COLOR: Adjusts color saturation level of image.

4. BRIGHT: Adjusts the brightness of image.

5. CONT.: Adjusts the contrast of image.

6. V1: Activates Video 1 input option.

7. V2: Activates Video 2 input option.

8. POWER: Turns the color video monitor ON/OFF.

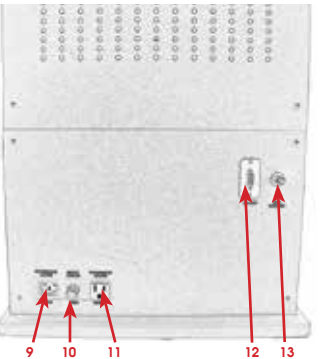
9. AC Input 110/220V

10. Fuse holder

11. AC Output

12. VGA OUT (15 pin)

13. NTSC Video Out



FEATURES

The FX10 Series Units include a wide range of features all designed to minimize the workload of the evidence examiners. These instruments permit examination of many different items of forensic interest. While primarily designed for the examination and comparison of latent evidence, these instruments may also be used for the examination of questioned documents, tool marks, hair and fiber evidence, and much more.

- Soft, indirect lighting with circular fluorescent tubes
- Laboratory-grade focusing jacks
- High resolution color video cameras (FX10AC)
- High resolution black and white video cameras (FX10A)
- Vertical and horizontal, continuously variable split-screen images
- Image overlay
- Image reversal (Channel B only)
- BNC-type video-out connector. *VGA output (Resolution: NTSC 640 x 480)

OPERATION

To better understand how the FX10 Series Units can be fully utilized in the examination of forensic evidence, we suggest you first perform the following procedure of comparing a latent print lift to a print on a 10-print fingerprint card (see Figure 1). These step-by-step instructions cover every aspect you may encounter in the examination. For the purpose of this examination, set the Focusing Jacks midway between upper and lower extremes—this is the focus point for two-dimensional objects (latent lift, 10-print card, document, etc.) which allows the image to remain in focus throughout the entire Zoom range. ***Note:*** *When examining three-dimensional objects, the jacks will need to be lowered accordingly.*

FIGURE 1

1. Plug the unit's AC power cord into a convenient outlet and plug the TV monitor into the back of the unit. Then, connect the Video Output from the unit to the appropriate Video IN connector on back of monitor.
2. Place a latent print on the left Focusing Jack (Channel A). Place a 10-print record card on the right Focusing Jack (Channel B). Adjust both jacks to the mid-range height.
3. Switch all three switches on the Lower Front Control Panel to ON.
4. Switch the Upper Control Panel Power Switch to ON. Press the CAM A switch and center the latent print under the lens (see Figure 2). Zoom to full image size with the Channel A Zoom Control. Adjust Channel A Focusing Jack for sharpest focus.

FIGURE 2

FIGURE 3

5. Press the CAM B switch and center the image under the lens (see Figure 3). Zoom to full image size with the Channel B Zoom Control. Adjust Channel B Focusing Jack for sharpest focus.
6. Turn the MIX control knob to its mid-range setting.
7. Press the L/R Switch for vertical split-screen mode and adjust the MIX control knob to achieve the desired split ratio. The previously centered images will now be split in half with CAM A image left and CAM B right (see Figure 4A). This split would be ideal for comparing one side of an image to the other. However, for the purpose of comparison, re-center the prints within the split frame and zoom as necessary (see Figure 4B).

FIGURE 4A

FIGURE 4B

8. Press the T/B Switch for horizontal split-screen mode and adjust the MIX control knob to achieve the desired split ratio. The repositioned images will now be split top-to-bottom with CAM A image on top (appearing slightly to the left), and CAM B on the bottom and slightly to the right (see Figure 5A). However, for the purpose of comparison, re-center the prints within the frame in CAM A and CAM B modes—zoom as necessary (see Figure 5B).

FIGURE 5A

FIGURE 5B

9. Press the FADE Switch with the MIX control knob at its midpoint range. CAM A image is now superimposed on top of CAM B (see Figure 6A). Adjust the amount of FADE by turning the MIX control clockwise to enhance CAM A image or counterclockwise to enhance CAM B. If the

FIGURE 6A

MIX control is turned full right, CAM B is eliminated (see Figure 6B); turned full left and CAM A is eliminated (see Figure 6C).

FIGURE 6B

FIGURE 6C

10. Press the DIFF Switch with the MIX control knob at its midpoint range. CAM A image is now superimposed on top of a reversed image of CAM B (see Figure 7A). ***NOTE:*** *This mode is particularly useful when working with prints developed with light-colored powders.* Adjust the amount of DIFF by turning the MIX control clockwise to intensify CAM A image or counterclockwise to intensify CAM B. If the MIX control is turned full right, CAM B is eliminated (see Figure 7B); turned full left and CAM A is eliminated (see Figure 7C).

FIGURE 7A

FIGURE 7B

FIGURE 7C

11. Press the FREEZE Switch to capture the current position of CAM B image. Now, you need only to reposition CAM A image to align. This is especially useful when attempting to superimpose one print over the other as in the FADE or DIFF modes. ***NOTE:*** *The FREEZE mode actually captures the image seen with CAM B. In other words, you can remove the ten-print card from the focusing jack and not loose the previous image you've now captured—that is, until you deactivate FREEZE.* The FREEZE mode can be activated when comparing in L/R, T/B, FADE, or DIFF modes. Remember, even if you had previously activated EXCH mode, only CAM B image will FREEZE.
12. Press the EXCH Switch to swap CAM A and CAM B images. If the unit is operating in L/R mode,

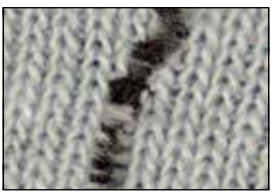
CAM B will now appear on the left and CAM A on the right (see Figure 8). If unit is in T/B mode, CAM B appears on top and CAM A on the bottom (see Figure 9). ***NOTE:*** *EXCH Switch has no effect on images unless you are in a split-screen mode.*

FIGURE 7B

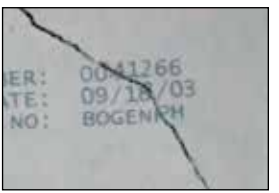
FIGURE 7C

EXPLANATION AND COMPARISON OF OTHER TYPES OF EVIDENCE

Threads of finely woven fabric.



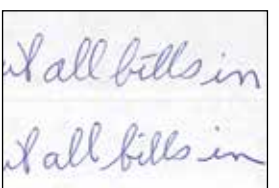
Match torn fabric easily.



View fibers of torn paper in detail.

Discern prints from background.

Latent prints viewed in L/R mode.



Handwriting viewed in T/B mode.

GENERAL MAINTENANCE

The only maintenance to be performed in the field is cleaning and lamp replacement. Lamp replacement is covered below. Clean the outer surfaces with a mild soapy warm water solution and a soft cloth. DO NOT use solvents as this may damage the finish.

Lamp Replacement

1. Disconnect the AC power cable and the video out cable from the back of the unit.
2. Tip the unit onto its back. Lower the stages fully to give comfortable access to the lamps.
3. Three spring clips hold each lamp in place (Figure 10). Gently pull the lamp to be replaced toward you, away from the retaining clips.
4. Unplug the lamp power connector (Figure 11).
5. Plug the lamp power connector into the new lamp.
6. Place the new lamp into the retaining clips.

FIG. 10—Lamp retaining ring.

FIGURE 11—Lamp connector.

FX10A SPECIFICATIONS

OPTICAL:

Zoom Ratio: ~8x

Aperture: f/7 (low mag.)-f/10 (high mag.)

Magnification: ~5X - ~45X on 14" diagonal monitor

Lens Construction: 10 elements/7 groups

Filter Size: M40.5 x P0.5

VIDEO SPLITTER:

Digital Memory: 512 x 512 w/256 Gray Levels

Video Signal: NTSC only

FX10AC SPECIFICATIONS

COLOR VIDEO CAMERA x 2

TV System: NTSC Image

Sensor: 1/4" Interline Transfer CCD

Effective Picture Element: 768H x 492V pixels

Sync. Frequency:
- Horizontal: 15.734KHz
- Vertical: 59.94Hz

Resolution: 470 TV-lines (horizontal)

S/N Ratio: More than 50Db

Minimum Illuminance: Less than 2.0 lx (f/1.2)

Gamma: 0.45

Video Output: 1.0Vp-p/75W

White Balance: Auto Tracking White balance

OPTICAL x 2

Zoom Ratio: ~8x

Aperture: f/7 (low mag.)-f/10 (high mag.)

Magnification: ~5X - ~45X on 14" diagonal color monitor

Lens Construction: 10 elements/7 groups

Filter Size: M40.5 x P0.5

VIDEO SPLITTER

Video Signal: NTSC only

Split Range:
- Horizontal: 0 to 53.3uS from start of active video >98% of screen width typical
- Vertical: 0 to 485 lines, fully variable insteps of two, 100% screen height typical

Fade Range: A:B ratio from 100%/0% to 0%/100%, 256 steps

Difference Range: A:B ratio from 100%/-0%to 0%/-100%, 256 steps

Memory: 10 megabits per channel (full frame X1 each input)

Decoding: 9 bit multi-standard digital decoding

Processing: 8 bit, 4:2:2, ITU-R601 and ITU-R656 standards

Encoding: Full Digital Modulation

Oversampling: 4x (54MHz) output oversampling

Output DACs: 10 bit Digital to Analog converters

Output Filters: Digital, plus 4 stage analog anti-aliasing filters

Horizontal Frequency: 15.734KHz typical

Vertical Frequency: 59.94Hz typical

Bandwidth: 6MHz typical

Crosstalk: Greater than 48dB

Gain Match A to B: Typ. within 1%