

LABORATORY SERVICES BUREAU

Document: Crime Scene Response Technical Procedures

Policy Number:
1700

Revision:
5

Subject: CSR-SOP-18 Forensic-Alternate Light Source

Approved:
Sanders, Nicole

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18. FORENSIC/ALTERNATE LIGHT SOURCE

A. Introduction

The forensic/alternate light source (FLS/ALS) is a compact and portable light source that can be used at a crime scene or in a laboratory setting to search for evidence and aid in the recognition and therefore collection of evidence. The basic premise of the forensic/alternate light source is that it allows for the use of isolated, specific wavelengths of light, as well as white light, for trace and biological evidence searches. By varying the wavelengths of light the FLS/ALS takes advantage of the possible fluorescent properties of those materials and/or areas to be searched. Due to the varying nature of fluorescent properties all varying combinations of wavelengths and goggles may need to be utilized. The purpose is to utilize the light source to identify possible trace or biological evidence.

B. Available FLS/ALS Equipment

- (1) Polilight PL500: A self-contained portable unit, which requires an electrical 110V power source.
- (2) Crime-lite: Five portable battery operated hand held units.
 - (a) Violet: 400-430nm
 - (b) White: 400-700nm
 - (c) Blue: 430-470nm
 - (d) Blue/Green: 460-510nm
 - (e) Green: 500-550nm
- (3) UltraLite: A battery operated hand held unit (with an optional 110V power source supply) utilizing five light attachments of varying wavelengths.
 - (a) Red- 630nm
 - (b) BMT (Blue)- 450nm
 - (c) Green- 525nm
 - (d) Yellow- 590nm
 - (e) UV- 400nm

C. Procedure/Recommendations

- (1) Polilight
 - (a) Assemble the light source, place it on a solid surface, plug it in to an electrical outlet and then turn it on.
 - (b) For best results make the room as dark as possible. Light in the room will diminish the appearance of the evidence.
 - (c) Begin scanning the room/area. Keep the light 2-12 inches from the area that is being searched, and keep the light beam as small as possible. Vary the angle of the light and use the fine tuner on the unit to vary the wavelengths while searching for evidence.
 - (d) It is essential that cooling air be able to enter the Polilight PL500. Ensure that air flow around the unit is not obstructed.

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- (e) If the unit is going to be used on an extended search, it is best to do the search in 20-minute blocks, shutting the unit down for 15-20 minutes in between. This will also prevent the unit from overheating.
 - (f) For further/more specific instruction refer to the Rofin Polilight PL500 Instruction Manual.
- (2) Crime-Lite
- (a) The Crime-lites have a similar design to conventional hand-held flashlights with the tubular handle serving as a battery compartment, accessible by unscrewing the end cap. The Crime-lites use DD batteries which may be recharged with a Mason Vactron Crime-lite Battery Charger or Multi-charger. Two (2) "D" size batteries can also be used in place of the rechargeable batteries if necessary.
 - (b) Labels on the main body of the Crime-lites give wavelength ranges and recommended fluorescence viewing filter information.
 - (c) For best results make the room as dark as possible. Light in the room will diminish the appearance of the evidence.
 - (d) Turn the Crime-lite on and begin scanning the room/area. Use varying viewing angles and distances when conducting a search.
 - (e) The Crime-lite is not as intense as larger units, such as the Polilight, so the search distance (light to evidence) will need to be shorter.
 - (f) Since the output head of the Crime-lite is recessed this allows for a range of stackable filters to be attached, either singly or in combination.
 - (g) Do not leave the Crime-lite switched on unnecessarily or use if it becomes uncomfortably hot to hold.
 - (h) For further/more specific instructions on how to use the Crime-Lite refer to the Mason Vactron Instruction Manual and Application Guide.
- (3) UltraLite ALS
- (a) The operation of the UltraLite ALS is similar to the Crime-Lite, in that it also is portable and has rechargeable batteries. The units also have a 12 volt DC power adapter.
 - (b) The unit has one UltraLite ALS body and five (5) head assemblies including red, yellow, green, BMT (blue), and UV.
 - (c) To change the head assembly, hold the body and turn the locking ring until it is free of the head assembly. Do not twist the head assembly. Pull the head assembly away from the body.
 - (d) Line up the desired head assembly and turn only the locking ring until snug. There are five small pins that must line up. Do not over tighten.
 - (e) Insert the battery pack or power adapter pack.
 - (f) Turn the unit on by pressing the blue trigger button. On the top of the body push the blue button, which will cycle through the power settings.

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- (g) Use the UltraLite ALS in the same manner as listed above for the Crime-Lite.
 - (h) The UltraLite battery pack charger will charge two batteries at once.
 - (i) For further information refer to the UltraLite ALS Operator's Manual, CAO Group Inc. or www.UltraLite-ALS.com
- (4) The Forensic/Alternate Light Source can be used to search for the following types of evidence. The chart in Part D of this procedure specifies the band, color, application type, and color of goggles to use:
- (a) Trace: This includes fibers, paint, hairs, glass, etc.
 - (b) Blood: Blood will absorb light and appear black.
 - (c) Footwear Impressions: Using an oblique angle, white light can be a useful tool when searching for footwear impressions. It is recommended that all bands be used for scanning along with the appropriate goggles. The white light from the Forensic/Alternate Light Source can also be used when photographing various impressions or imprints in dust.
 - (d) Biological evidence: This includes semen, sweat, and saliva.
 - (e) Include the results of a forensic/alternate light source search in the notes. For example, "no fluorescence consistent with probative evidence observed", or simply, "no fluorescence observed," this may also be referred to as a negative result. When the search results are positive, describe what fluoresced and collect the item(s) for further analysis in the laboratory. Circle the area that fluoresced to indicate the positive result observed.
- (5) Repackaging the light source
- (a) Turn the light source off when not in use.
 - (b) Allow the light source to cool down before re-packaging it into the carrying case.
 - (c) Return goggles to the protective fabric case, and secure with the other accessories.
- (6) Photography
- (a) If evidence is to be collected at the crime scene and impounded, a photograph will be taken of the evidence before it is removed from the crime scene.
 - (b) Equipment Needed
 - Digital camera
 - Digital media card
 - FLS/ALS
 - Appropriate Lens
 - Appropriate filter
 - Tripod
 - Marking tool (e.g. china marker, fluorescent crayon)
 - (c) Photography procedures
 - Ensure overall photographs are taken of the area examined.

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- Use a tripod and photograph the evidence.
- Set to Manual
- Adjust the f-stops and exposure times to obtain the desired result. Suggested settings for initial photography may include an ISO of 500, 10 second shutter speed, and 5.6 f-stop.
- Place barrier filter on lens or place an external barrier filter in front of lens. Use the same color of lens as the goggles you were wearing when the evidence was best viewed.
- Make sure the flash is turned off.
- Position FLS/ALS to best illuminate evidence.

D. Chart

- (1) The Forensic/Alternate Light Source emits white light, ultra violet light, varying colors of the light spectrum, and infrared wavelengths. The following charts are guidelines to be referred to when using the light source.
- (2) The following are recommendations only. Do not eliminate a filtration band without attempting to use it. Various substances have different properties that may need different filtration bands.

Band	Color	Band Width	General Application
400-680 nm	White light band	280 nm	General searching (footprints)
350 nm	Ultra Violet band	80 nm	General searching (stains, fingerprints)
415 nm	Violet (blood filter)	40 nm	Blood prints, spatter, gunshot residue
450 nm	Blue	100 nm	General searching (semen, urea, fibers)
470 nm	Blue	40 nm	General searching (Ninhydrin prints)
490 nm	Blue	40 nm	General searching (semen, urea, fibers)
505 nm	Blue/Green	40 nm	Superglue, Ninhydrin treated prints
530 nm	Green	40 nm	DFO treated prints, background reduction
555 nm	Green/Orange	27 nm	DFO treated prints, background reduction
590 nm	Orange	40 nm	Ninhydrin treatments, background reduction
620 nm	Orange/Red	40 nm	Ninhydrin treatments, background reduction
650 nm	Red	40 nm	Ninhydrin treatments, background reduction
IR	Infra-Red	40 nm	

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Goggles Usage

Filter	Clear	Yellow	Orange	Red
UV 350	X	X	X	X
415		X	X	
450			X	
470			X	
490			X	
505			X	X
530				X
555				X
590				X
620				X
White			X	
IR	Goggles will not block IR			

E. Safety

- (1) Under no circumstances should the eyes be exposed to the direct beam of light produced by the light source. Since the light bands produced are of high intensity, there is a potential for permanent damage to the unprotected eye. In all cases excessive brightness and prolonged exposure is harmful to the eyes and should be avoided.
- (2) The operator, as well as people working within the minimum safe working distance of 15 meters (approximately 49 feet), must always wear eye goggles when operating the light source.
 - (a) The orange goggles provide adequate protection for all filtered light but not for direct beam white light exposures for daily periods exceeding about 20 minutes. The red goggles provide adequate protection for 350, 505, 530, and 555nm filtered light; however, the red goggles give as little as 30 seconds protection for white or blue light (415 and 450nm) for direct beam exposure.
 - (b) With white light, the minimum safe working distance of 15m gives total permissible exposure times of 7 minutes for direct beam exposure.

F. References

- (1) Gardner, Ross M., *Practical Crime Scene Processing and Investigation*. Boca Raton, FL: CRC Press, 2005 (Chapter 9 pgs 219-225)
- (2) Champod, Christophe, C. Lennard, P. Margot, and M. Stoilovic, *Fingerprints and Other Ridge Skin Impressions*, Boca Raton, FL: CRC Press, 2004 (Chapter 3 pages 41-76)
- (3) User's Manuals for various light sources.