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TECHNICAL INFORMATION

megaMAXX™ ALS System

Catalog No. MMX300

Application	Alternate light sources are used to identify evidence normally invisible to the naked eye. Uses range anywhere from the collection of fingerprints, to the identification of bodily fluids, to distinguishing between authentic and forged documents.
Hazards/Safety Info	Warning! The intensity of the 395nm UV light can be damaging to the eyes, UV filtering goggles are recommended for general eye protection. Caution! Due to the high-intensity of the lights, do not look directly into any of the lights during use.

Information

Using only conventional lighting in the forensic examination of a crime scene can not reveal all the evidence that may be present. In fact, the type of evidence itself and what it consists of, as well as the surface containing it, can prohibit its view under conventional light. The use of what is termed alternate light sources, however, can reveal this otherwise hidden or overlooked evidence through absorption, diffused deflection, and photoluminescence.

The megaMAXX™ Alternate Light Source System is designed to assist the investigator at the crime scene or in the lab. The kit consists of handheld machine aluminum LED light sources that emit light in a controlled spectrum centered at the labeled wavelength (395-625nm). The kit also includes camera band filters and band filter goggles for viewing and photographing the photoluminescence effect of the evidence or forensic treatments used for latent evidence detection.



MMX300 Contents	<ul style="list-style-type: none"> 1- UVFT100 ForensITORCH™ Longwave UV Light (395nm) 7- Visible MMX Lights (455nm, 470nm, 505nm, 530nm, 590nm, 625nm, White) 1- Light Diffuser 1- MMXPOD Light Support Tripod 14- CR123 Lithium Batteries 3- AAA Alkaline Batteries 1- 797GV UV Protective Spectacles 1- FAL208 Yellow Goggles 1- FAL207 Red Goggles 1- BMS300 Orange Goggles 3- 52mm Camera Filters: Yellow, Red, and Orange 1- MMX100C Custom-fitted, heavy-duty Attache Case w/pre-cut foam insert; Dimensions: 18.5" x 15.5" x 5.5" (47cm x 39.4cm x 14cm); Weight: 10.41 lbs. (4.7kg)
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Specifications	<p>UV & Visible Light Sources (395nm, 455nm, 470nm, 505nm, 530nm, 590nm, 625nm, White)</p> <ul style="list-style-type: none"> • Dimensions: 5.31" x 1.06" dia. (13.5cm x 2.7cm dia.) for UV light; 5.25" x .75" dia. (13.3cm x 2cm) for visible lights • Weight w/batteries: 5.45 oz. (154.5g) for UV light; 3.55 oz. (100.6g) for visible lights • Construction: Machined Aluminum • Switch: Push-button ON/OFF • LED: One 3-watt LED; +50,000 hrs. life • Batteries: (3) AAA Alkaline for UV light; (2) CR123 Lithiums per visible light
	<p>megaMAXX™ Light Diffuser</p> <ul style="list-style-type: none"> • Dimensions: 1.06"L x 1.56" dia. (2.7cm x 4cm dia.) • Weight: .32 oz (9.1g) • Construction: Delrin
	<p>MMXPOD megaMAXX™ Tripod</p> <ul style="list-style-type: none"> • Dimensions: 14"H • Weight: 11.2 oz (9.1g) • Construction: 3 legs w/black anodized aluminum base; flexible gooseneck with mounting clip

Background on ALS Technology

Alternative light sources, sources that produce specific wavelengths of light, have been used in forensic investigation since the introduction of the first Argon ion laser in the 1970's. In the 1980's portable lasers were developed to deliver these wavelengths at the crime scene. The 1990's brought high intensity xenon arc lamps, that when used with proper band filters, could deliver a wide range of wavelengths, from ultraviolet (below 400nm) to infrared (above 700nm), and all divisions of visible light. Now, SIRCHIE utilizes LED (light emitting diode) technology to deliver alternative light in an accurate and easy to transport package.

Alternative light sources can aid the criminal investigator in their assessment of the crime scene, allowing them to see evidence that before may have gone unnoticed. Alternative light sources can be used in two ways to identify evidence, through fluorescence and in combining fluorescence with filtration. Fluorescence is when an object absorbs light energy and then re-emits that energy at a different, usually higher, wavelength. Pure fluorescence can be observed when a UV light source is used to examine bone fragments or bodily fluids and they are seen as having a bluish glow versus their surroundings, due to the energy being emitted at the higher wavelength (450nm blue vs. 400nm UV). Using wavelengths in the visible light region (410nm to 700nm) usually requires filtration to remove background colors and clearly show the desired evidence. A good example is the use of fluorescent powder, such as SIRCHIE REDESCENT™ No. LL701. A print that is identified on a multicolored surface would be difficult to photograph. Using the fluorescent powder, the fingerprint can be dusted, and then viewed with an alternative light source. In the case of REDESCENT™ powder, the absorption peak is in the 450-460nm region, so when exposed to the megaMAXX™ 455nm source light, it absorbs and then re-emits light in the 590nm-620nm region. The observer can wear orange barrier goggles (No. BMS300), which filters the background being illuminated by the blue light (450nm-460nm) and only allows the orange region to be seen (590-620nm), and thus separates the print from the background. In this same way, the fingerprint can now be photographed using the included 52mm orange barrier filter. Please refer to the usage chart for more examples of how the ALS can be used at the crime scene.

MMX300 Components

Seven Visible Light Sources

The seven (7) megaMAXX™ Visible Light Sources are identical in size and shape. Measuring 5.25" in length with a barrel diameter of only .75", these hand-held lights each weigh a mere 3.55 oz. with batteries. Each one is fitted with a very high intensity, 3-watt Light Emitting Diode (LED) constructed to provide visible light at its specific frequency. The power for the lights is supplied by 2 CR123 lithium batteries.

LED technology means there are no filters mounted on these lights. Lights with filters require a single white light source and a filter to remove all but the desired light frequency. Light loss occurs using the filter method of delivery.



MMX455nm

megaMAXX™ Light Diffuser

Due to the intensity of these lights, certain applications may require a less intense, softer light, such as photography of latent prints. To provide softer light, we have engineered a diffuser that easily slips on and off the seven (7) visible light sources.



LIGHT DIFFUSER



UVFT100

ForensiTORCH™ UV Light

In the preliminary examination and location of physical evidence, an ultraviolet light source should always be employed. The 395nm ForensiTORCH™ UV Light (UVFT100) is identical in size and shape to the seven visible light sources. It features a 3-watt UV LED and is powered by 3 AAA alkaline batteries.

megaMAXX™ Tripod

There are many times you will need to have both hands free to process an area or item of forensic interest. With this in mind, SIRCHIE has devised the megaMAXX™ Tripod (MMXPOD). This Light Support features a flexible gooseneck extension with a maximum height of 14". Not only does this allow for precision positioning of the light over the area being processed, but aids in facilitating photographs as well.



The only assembly required is to attach the legs (contained in the center compartment of your case) to the base of the tripod as shown to the left. With the tripod assembled for use, simply snap the light into the clip at the top of the tripod and position the flexible gooseneck extension as desired.



MMXPOD



797GV



BMS300



FAL207



FAL208

Barrier Filters and Goggles

Visible light sources can sometimes overpower any present fluorescence and a barrier filter must be used to block it in order to see the fluorescence. The megaMAXX™ System provides barrier filter goggles in Yellow, Orange and Red. To photograph the resultant fluorescence, similarly colored 52mm barrier filters are also provided to place over the camera lens (refer to Usage Chart).



52mm BARRIER FILTERS

When using the 395nm ForensiTORCH™ UV Light, it is not necessary to use barrier goggles, as UV fluorescence re-emits as visible blue light. However, UV light can cause damage to the eyes, so it is recommended to wear the UV filtering goggles (797GV).

Operation

Battery Installation

Prior to using the lights in your MMX300 kit for the first time, you will need to install the batteries. The UV light source operates off 3 AAA alkaline batteries and the visible light sources are powered by 2 lithium batteries. Remove the end cap from the light.



1. Remove the battery holder from the UV light barrel and install 3 AAA alkaline batteries. Observe the different polarities printed on the sides of the holder as shown to the right.
2. Reinsert the battery holder into the light barrel and screw the end cap back on firmly.
3. For the visible light sources, there is no battery holder. Simply install 2 CR123 Lithium batteries and observe polarity as shown below (this is also marked on the inside of the barrel).
4. Screw the end cap back on firmly.

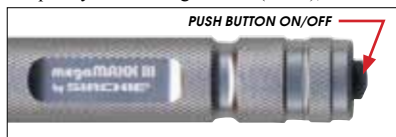


Note: It is good practice to remove the batteries from each light after use if the kit is to be stored for any period of time in order to prevent corrosion and prolong battery life.

Visible Light Sources

There are seven (7) visible light sources which are fitted with a single, very high intensity, 3-watt light emitting diode (LED). Under normal usage, lamps provide +50,000 hours of life. The LEDs are constructed to provide visible light at a specific frequency for each light: D65 (white), 625nm (red), 590nm (orange), 530nm (green), 505nm (cyan), 470nm (blue) and 455nm (royal-blue).

The lights are powered by two (2) CR123 Lithium batteries that typically provide 3-hours of constant ON operation and 5-hours intermittent duty. Battery life will be extended if light is used for short duty cycles. To activate the light, depress the ON/OFF button on the end.



All general crime scene searches should be conducted with the White megaMAXX™ Light Source. Due to the intensity of these lights, however, certain applications may require a less intense, softer light. To provide softer light, slip the Light Diffuser onto the end of the light. As more specific forensic evidence is sought, the other lights should be used in conjunction with goggles. To photograph the evidence, similarly colored barrier filters should be placed over the camera lens.



SLIPPING LIGHT DIFFUSER ONTO VISIBLE LIGHTS

Special Note: Remove protective film from the flashlight lens prior to use.

UV Light Source—ForensITORCH™ (UVFT100)

In the preliminary examination and location of physical evidence, the UV Light Source should always be employed. It is powered by 3 AAA alkaline batteries that typically provide uninterrupted light for up to 3-hours.



UV LIGHT SOURCE USED TO DETECT INVISIBLE INK MARKING ON MONEY

Usage Chart		
Evidence Type or Use	Light to Use	Barrier Filters/Goggles
Bodily fluids, semen	395nm (UV), 455nm	○ ● ●
Bone fragments	395nm (UV), 455nm	○ ●
Blood stains (untreated)	395nm (UV)	○
Latents in oils, grease	455nm	●
Cyanoacrylate stained with Basic Yellow	395nm (UV), 455nm	● ●
Cyanoacrylate stained with Rhodamine G	505nm, 530nm	● ●
DFO treated latent prints	455nm, 505nm	● ●
Trace evidence on blue or green backgrounds	595nm	● ●
Luminol observation, some trace evidence	625nm	None, ●

Maintenance

The only field maintenance required is to clean the light sources with a damp cloth. Do not use chemicals or solvents as this may cause damage to external surfaces and may damage o-ring seals.

Battery Replacement

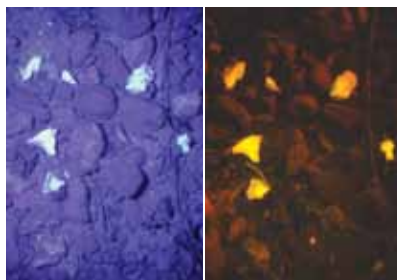
Use only AAA alkaline or CR123 Lithium batteries accordingly and be careful to observe polarity (refer to Battery Installation instructions). If the light source will not be used for a period exceeding 3 months, remove the batteries to prevent them from losing charge and corroding.

Lamp Replacement

LEDs have an estimated life of +50,000 hours and should never need to be replaced. Unlike other forensic light sources, there are no fragile filaments to break if the light is dropped while it is turned on. If for some reason the light does not illuminate when turned on and the batteries have been replaced, check the polarity of the batteries. If the problem persists, contact the factory for assistance at (919) 554-2244.

Note: Do not attempt repairs, disassemble beyond battery replacement or alter lights as this will void your warranty.

Troubleshooting		
Problem	Possible Causes	Solution
Light does not operate	Batteries not installed	Install 3 AAA alkaline or CR123 Lithium batteries
	Batteries installed incorrectly	Check polarities
	Batteries dead	Install 3 AAA alkaline or CR123 Lithium batteries
	Power switch isn't ON	Push switch in to turn ON
	Problem with internal circuitry	Return to factory for repair. NOTE: Do not attempt repairs, disassemble beyond battery replacement or alter light as this will void your warranty.
No fluorescence visible	No fluorescent material present	Check against known standard
	Wrong wavelength used	Try other wavelengths; refer to usage chart
	Wrong barrier filter used	Try other barrier filters; refer to usage chart

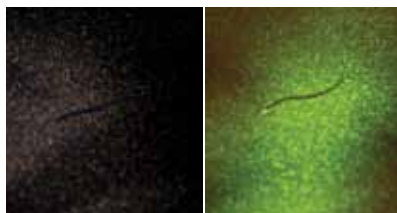


395nm & 455nm—Searching an area littered with small stones (as shown top left) complicates the search for physical evidence. Bone fragments were revealed in the middle photograph using the 395nm UV Light and 455nm in the right. (Orange barrier filter used for 455nm photograph.)



505nm—The left photograph shows prints developed on a black background using cyanoacrylate fuming and enhanced with Rhodamine 6G. This solution fluoresces well with the higher 505nm Light as shown right. (Orange barrier filter used for photograph.)

470nm—The top photograph shows prints developed using cyanoacrylate fuming and enhanced with yellow fluorescent powder. As shown in the bottom photograph, most of the multi-colored background was eliminated using the 470nm Light. (Orange barrier filter used for photograph.)



590nm—This single dark blue fiber was located on a black shirt using the 590nm Light. The fiber is not fluorescent, but the background does show slight fluorescence making the fiber stand out against the background as shown right. (Orange barrier filter used for photograph.)

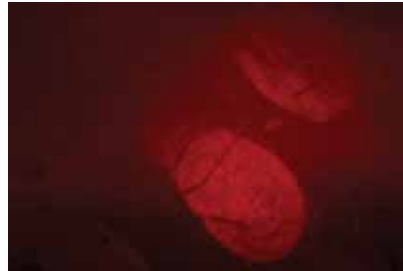
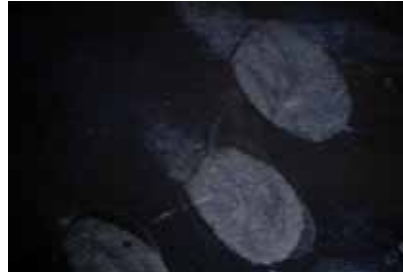


625nm—Very few substances produce fluorescence at the higher frequencies of 625nm. More often used in questioned document analysis, the 625nm Light reveals fibers in the right photograph not visible before in the left. (Red barrier filter used for photograph.)

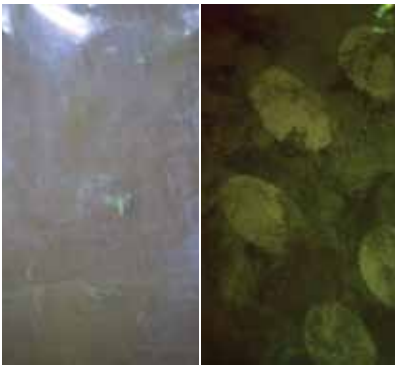




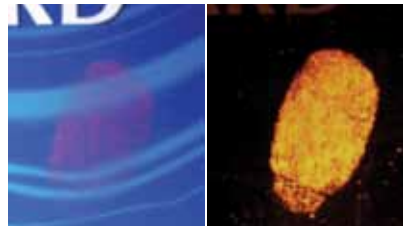
395nm—In an effort to thwart counterfeiting of US currency, a fluorescent stripe (with printing on it) is embedded between the layers of paper. In the left photo, this stripe is not visible to the naked eye or at any light frequency other than ultraviolet. The right photo was taken when the money was illuminated with the 395nm UV Light.



590nm—Cyanoacrylate prints were stained with Rhodamine 6G (top). When exposed to the 590nm Light, the contrasting ridge detail is easier to discern. (Red barrier filter used for photograph.)



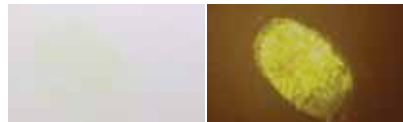
470nm—Cyanoacrylate prints on a plastic bag were stained with Basic Yellow (left). This solution produces the strongest fluorescence at 470nm (right). (Orange barrier filter used for photograph.)



395nm—A latent print was enhanced on a multi-colored background with pink fluorescent powder (left). When exposed to the 395nm UV Light (right), the ridge detail is much easier to view.



470nm—In the above prints, the left photo is a latent print on a black surface enhanced with orange fluorescent powder (no ALS). The print pops when illuminated with the 470nm (right). (Orange barrier filter used for photograph.)



455nm—When existing light can't be extinguished (left), the 455nm Light and orange barrier filter eliminate background fluorescence to better reveal print enhanced with yellow fluorescent powder (right).



455nm—Like other physiological fluids, urine produces weak fluorescence. The stain on brown wrapping paper (left) is barely visible until exposed to the 455nm Light (right). (Orange barrier filter used for photograph.)



References

1. Enotes.com Inc. **World of Forensic Science/Alternate Light Source Analysis**, <<http://www.enotes.com/forensic-science/alternate-light-source-analysis>>.
2. Forensic Magazine. **New LEDs Enable Innovations in Forensic Alternative Light Sources**, <<http://www.forensicmag.com/articles.asp?pid=44>> Daniel McGraw, PhD, June/July 2005.
3. OPPapers.com. **Forensic, Alternate Light Sources—Essay #420247365**, <<http://www.oppapers.com/essays/Forensic-Alternate-Light-Sources/113295>> April 18, 2007.
4. Stoilovic, Mulutin and Dr. Chris Lennard, **The Application of Light in Forensic Science & A Modern Approach to Fingerprint Detection and Enhancement, 3rd Edition**. Australian Federal Police Workshop Manual, AFP Forensic Services, Canberra, Australia, 2006.

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