



MAKES IT BRIGHT

GENERAL INFORMATION

The TrAc Finder is a revolutionary alternative light source (ALS) that is designed to meet the needs of crime scene investigators and those performing forensic work. The TrAc Finder consists of a portable UV lamp from the Labino® TrAc series, 4 interchangeable forensic filters and 3 forensic goggles, all neatly packed in a rugged durable case that is easy to carry.



Why do investigators use alternative light sources?

Many substances naturally fluoresce when illuminated with the right wavelength of light. Others absorb light and appear black when illuminated, such as blood. An effective ALS helps the forensic examiner detect potential traces of substances that otherwise might be impossible to see.

What sort of substances can be detected?

The purpose of the TrAc Finder is to assist the examiner in finding potential traces of various substances. This most often includes finding traces of biological fluids (such as semen, saliva, sweat, blood, etc.), narcotics, fibers, and fingerprints. Once the investigator has located potential traces, samples can be taken and sent to the laboratory for testing and analysis.

How do crime scene investigators use the TrAc Finder and filters during an investigation?

The TrAc Finder was designed to be easy to use. The filters can easily be snapped in place on the front of the lamp and are interchangeable. Knowing which filters to use and when, however is not an exact science. The investigator often acquires this knowledge through years of experience. This is because no two crime scenes are ever identical and the state and condition of material, substances and traces can vary.



Strengths and Benefits

It is the combination of strengths listed below that make the Labino TrAc Finder such a remarkable product.

Strengths

- Intense light.....
- Light, compact models.....
- Easy to use - no complicated parts.....
- Robust, IP65 certified.....
- One lamp with interchangeable filters.....
- No fan.....
- Turn on/ off repeatedly.....
- Spare parts in warehouse.....
- Global service centers.....
- Cost effective.....
- Wide range of lamps.....
 - TrAc Light at the crime scene.....*
 - TrAc Light PRO in the laboratory.....*
 - Spotlight super intense.....*
 - Midlight reflector.....*

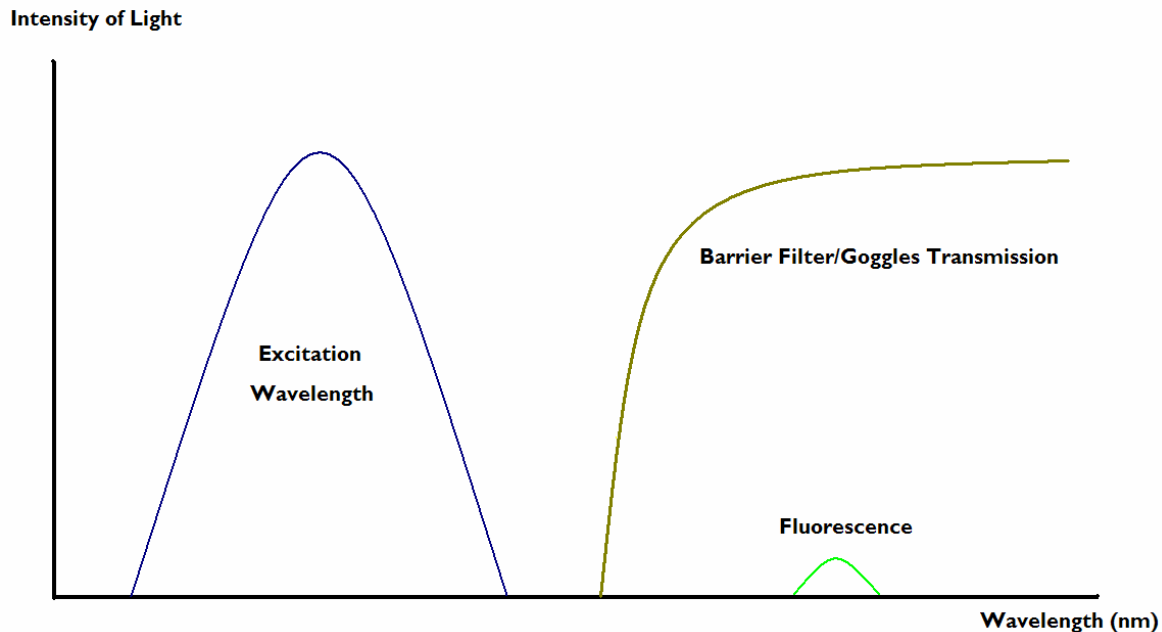
Benefits

- Better illumination at the crime scene
- Improved contrast
- Daylight investigations are possible
- Possibility to find more traces than with other lamps
- Portable - easy to transport and maneuver
- Short amount of time required to learn
- Shock resistant. Suitable for outdoor use, even in bad weather
- All-in-one product makes work easier
- Quiet. No filter to change. Water-tight. Dust proof. Low maintenance
- Quick start-up. Lamp can be switched on/off to save batteries.
- Quick service – fast delivery of spare parts
- Fast service
- Suitable for field and laboratory operations
- Choose the model which best suits your needs
- Compact, no cables, integrated battery/electronics, 1.2 hrs battery time
- Duo unit, light-weight hand unit, 2.5 hours operating time
- Conduct examinations and searches in daylight
- Large viewing area with intense light

TECHNICAL DATA

Graph A

This graph illustrates what happens when a substance is illuminated with light of sufficient intensity and the right wavelength. Some of the energy is absorbed by the area that is illuminated but most of it is reflected. There is often so much reflection in fact that it can be difficult to see the fluorescence without using an additional barrier filter, such as goggles. The role of the goggles is to cut away the reflection so that the fluorescence can be seen.



Graph A: Note: This sketch is a generalization which describes how fluorescence works in forensic investigations.

Example 1: TrAc lamp* with black UV filter

If you were to use a Labino lamp* with the UV Crime Filter, you would be able to see the fluorescence. This is because UV light is invisible to the human eye and therefore despite its intensity, you are not able to see the reflection. The UV Crime Filter also removes hazardous UVB radiation, making the lamp safer for the user.

Example 2: TrAc lamp* with Blue Crime Filter

If you were to use a Labino lamp* together with a Blue Crime Filter for example, you would NOT see the fluorescent substance because you would be “blinded” by the blue reflection. Therefore you need either goggles or another sort of barrier filter. (The Labino Blue, Green and General Crime Filters remove 100% of the UV light transmitted from the lamp). **Ok, but what effect would goggles or another type of barrier filter have?** The goggles filter away the blue reflection but let the fluorescent light pass through. The fluorescence has a higher wavelength and the goggles do not filter this away. This enables you to see the fluorescent trace.

Example 3: TrAc lamp* with no additional forensic filter

If you were to use a Labino UV lamp* without any additional filter (i.e. Black UV, Blue, Green, or General), you would NOT see the fluorescent substance because there would be so much white light that it would essentially “blind you”. Your eyes would not be able to detect any fluorescent material, hence making the investigation next to impossible. Also note that the light contains UV light in such intensity that it could be a hazard for the user.

*Assumes that the Labino lamp is fitted with a Labino DUV35 light source.

TECHNICAL QUESTIONS

What happens when a substance is illuminated with light and why does a substance fluoresce?

When the molecules in the substance absorb the light, the electrons contained in the molecule become stimulated and start to move. The electrons move outwards from their circular sphere and then fall back to their original position. When these electrons fall back, they release energy. This “output” of energy is lower than the initial “input” of energy from the light source. The lower energy has a longer wavelength that in this case falls into the visible range of light. It is this longer wavelength of energy that is visible to the human eye and this is called fluorescence.

What is the range of wavelengths that a TrAc Finder lamp emits?

A Labino lamp fitted with the DUV35 bulb (UV light source) with the clear glass protection filter, emits light between 300 and 700 nanometers.

What is the purpose of using forensic filters?

Essentially, when you choose a forensic filter, you are choosing which wavelength you are going to use, and this of course influences which substances you can see. Depending on what you are looking for, you add a filter that *cuts away the unwanted wavelengths*. That is because you don't want to see all possible substances, such as detergents for example, or cleaning agents, and so forth. If for example you place a Blue Crime Filter on the front of a Labino lamp*, then you would only see substances that fluoresce under those wavelengths that the blue filter permits (415-485 nm).

*Assumes that the Labino lamp is fitted with a Labino DUV35 light source.

The photos below illustrate a test performed by Sweden's Criminal Laboratory using a Labino TrAc Finder. The fingerprints shown in the second photo were developed using DFO.

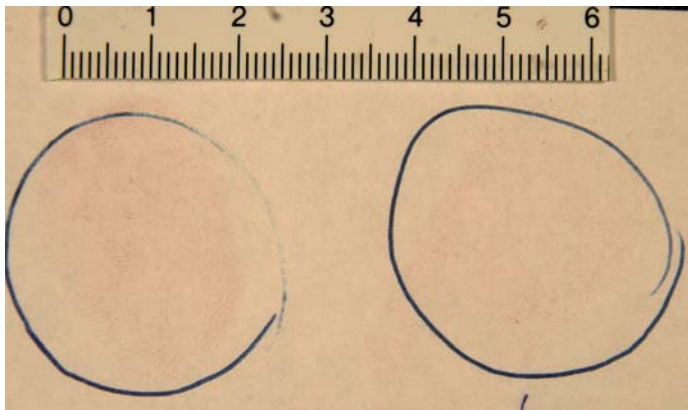


Photo 1: White light

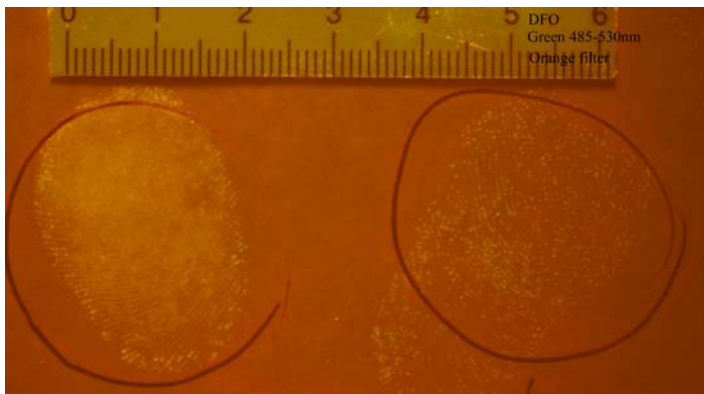


Photo 2: Filter 485-530 nm plus orange barrier filter

* Photos complimentary of Sweden's Criminal Laboratory

FORENSIC FILTERS

Forensic Filters

UV Crime Filterwavelength 310-400 nm (peaks at 365 nm)

General Crime Filter.....wavelength 400-525 nm

Blue Crime Filter.....wavelength 415-485 nm

Green Crime Filter.....wavelength 485-530 nm



UV Crime Filter (310-400 nm)

- Cuts away wavelengths outside of 310-400 nanometer range.
- Can be used when searching for traces of blood. Blood does not fluoresce but rather absorbs UV light and appears black. Effective on dark fabric and other soft materials. Can also be used to find fibers.
- Some body fluids, such as saliva, urine, and semen may fluoresce and appear a light yellow color when illuminated with UV light and when using the UV Crime Filter. Some narcotics may also fluoresce when using this filter.
- In some cases, yellow goggles improve the contrast.

General Crime Filter (400-525 nm)

- Cuts away wavelengths outside of the 400-525 nanometer range.
- Often used to get a quick overall view of the crime scene and to locate potential traces of substances.
- Mostly used together with orange or red goggles.

Blue Crime Filter (415-485 nm)

- Cuts away wavelengths outside of the 415-485 nanometer range.
- Often used in combination with fluorescent dye like Basic Yellow 40, or Ardocks and ultraviolet light after cyanoacrylate development of latent fingerprints.
- Best used together with yellow goggles or can be used with orange goggles, depending on light conditions, material and state of substance.

Green Crime Filter (485-530 nm)

- Cuts away wavelengths outside of the 485-530 nanometer range.
- Works well for biological substances especially if the background is fluorescent and if the Blue Crime Filter isn't sufficient to show traces.
- Mostly used with orange or red goggles.
- This filter is optimal when using DFO* method for developing fingerprints.

FORENSIC GOGGLES

Forensic Goggles

Yellow goggles transmit 2% at 480 nm
 Orange goggles transmit 2% at 549 nm
 Red goggles transmit 2% at 583 nm



Labino colored forensic goggles are intended for use together with Labino forensic filters. Some substances and traces are more visible to the human eye when seen through forensic goggles. The effect of combining certain forensic goggles with certain forensic filters depends often on the light conditions, surface that the evidence is on, and the state of the substance or trace. It is therefore not possible to say exactly which glasses should be combined with which filters since each crime scene is unique in nature.

Yellow goggles

- Generally used with Blue Crime Filter and UV Crime Filter to improve contrast.
- Transmits 2% at 480 nm.

Orange goggles

- Generally used in combination with Green Crime Filter to detect body fluids.
- Transmits 2% at 549 nm.

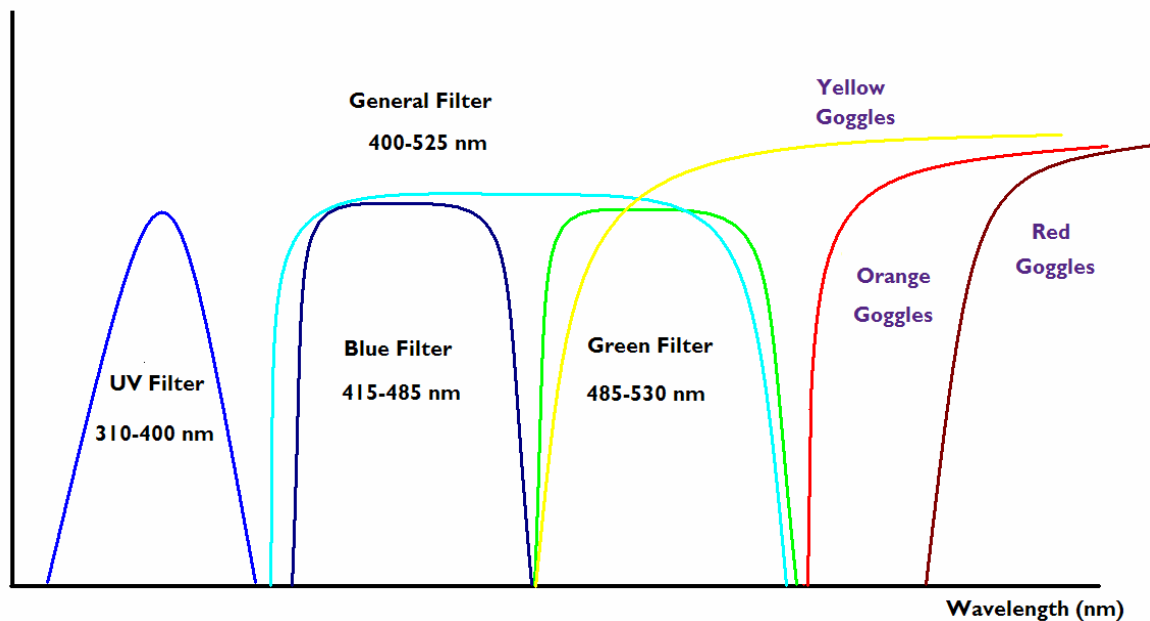
Red goggles

- Generally used in combination with General Crime Filter to improve contrast.
- Transmits 2% at 583 nm.

Graph B

This graph illustrates how light is transmitted through the various Labino crime filters and the transmission curves for Labino crime goggles.

Intensity of Light



Graph B: Note: This sketch is a generalization which describes how fluorescence works in forensic investigations.



TERMINOLOGY

Below is a general list of terms commonly used when discussing forensic lamps and forensic science.

Excitation wavelength: Light emitted from the light source (ALS) that creates fluorescence – this is the excitation wavelength. The wavelength needed varies depending on the characteristics of the substance. This is the wavelength that is absorbed by the sample and which makes the electrons excited.

Fluorescence: Fluorescence occurs when light of a visible color is emitted from a substance under stimulation or excitation by light. Fluorescence can be induced in certain substances by stimulation with light (energy) of a correct wavelength. The energy (light) that is absorbed by a substance is emitted back with a lower energy due to loss of energy in the molecules. Stokes law states that the wavelength of the fluorescent light is always longer than that of the exciting radiation. This is the “Stokes shift”. The light that is emitted is called fluorescence.

Barrier filter: For example goggles or camera filter. What a barrier filter is doing is filtering away the reflected light from the excitation light and makes the fluorescence visible. Otherwise the viewer can be “blinded” by the reflection.

Absorption filter: Absorption filters are commonly manufactured from dyed glass or pigmented gelatin resins. Absorption filters pass certain wavelengths of light while blocking or absorbing others.

Interference filter: An interference filter reflects one or more spectral bands or lines and transmits others. It is more of an “energy filter”. It blocks various wavelengths. The effect of this is a more distinct cut-on and cut-off of the transmitted wavelengths. The Labino Blue, Green and General filter use this technique. This means higher transmission over the whole wavelength span.

MPXL: MPXL lamp stands for Micro Power Xenon Light. This technology combined with our specially designed electronics and light bulbs (both UV and white) enables Labino to produce lamps that are among the most powerful on the market.

Clear glass protection filter: The primary purpose of the Clear Protection Filter is to filter away the dangerous UVC and UVB wavelengths that exist below the UVA range. Visible and UVA light passes through the Clear Protection Filter. It also enables the Labino lamp to be classified as IP65 certified since lamps fitted with this filter are both water and dust resistant (when installed with an o-ring).

Commonly used chemicals in forensic science:

DFO: 1,8-Diazafluoren-9-One, or DFO as it is more commonly called, is a ninhydrin analogue and amino acid reagent which produces fluorescent fingerprints.

Basic Yellow: Basic Yellow 40 is a highly fluorescent dye stain which stains cyanoacrylate-developed latent prints. When illuminated with an ultraviolet lamp or Forensic Light Source, latent prints fluoresce brightly, and weakly-developed latent prints that could not be seen under normal viewing conditions may be easily seen and photographed.

Cyanoacrylate: Cyanoacrylate is the generic name for ethyl-2-cyanoacrylate, and 2-octyl cyanoacrylate or n-butyl-cyanoacrylate, which in essence is an **adhesive** (*similar to “glue”*). One non-adhesive use for cyanoacrylate is as a forensic tool. Fumes from warmed CA can develop latent fingerprints on smooth surfaces like glass, plastic, etc. The invisible fingerprint residues react with the CA fumes and atmospheric moisture to form a white polymer (polycyanoacrylate) on the fingerprint ridges and can then be recorded. The developed fingerprints are, on most surfaces (except on white plastic or similar), visible to the naked eye. Non-visible or poorly visible prints can be furthermore enhanced by applying a luminescent or non-luminescent stain, such as Basic Yellow (see above).