
TECHNICAL INFORMATION

Laser Trajectory Finder Kit Catalog No. LTF100

INTRODUCTION

Laser projection is the newest and most accurate method used to determine projectile trajectories at crime scenes. The laser is attached to a penetration rod, which is then inserted into a bullet hole so that the laser beam can help to determine the direction and angle from the source. It may also be used to locate bullet exit points and other possible impact locations. The laser may be used with penetration rods and centering cones inserted into bullet holes, or it may be used with the tripod mount to project its beam through bullet holes.

The No. LTF100 Laser Trajectory Finder Kit includes a high quality Laser Pointer, Centering Cones, Rod Connectors, Universal Tripod Mount, Bullet Tips, Ballistic Angle



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Finder, Stringing Tips for attaching Colored Trajectory String, Multi-Colored Photographic Rods, and Bullet Penetration Rods all contained in a handy carrying case.

EXPLANATION OF PRINCIPAL COMPONENTS

Ballistic Laser Pointer—This is a Class IIIa laser diode with an output of <5mW and operating at a frequency of 630-680nm. Three L1154 batteries power the laser. It has a momentary ON/OFF switch with a moveable collar, which, when moved into position, permits constant ON. The laser may be mounted on the end of one of the Penetration Rods using a Rod Connector or it may be attached to the Universal Tripod Mount for use with a photographic-type tripod.

Penetration Rods—Four aluminum Penetration Rods are supplied in the kit. These are inserted into bullet holes to give a visual approximation of bullet trajectory. To facilitate entry into the bullet hole, one end of the rod is machined with a bullet-like tip. To gain a more accurate gauge of trajectory, Centering Cones are slipped onto the rod, one at the point of entry and one at the exit hole. These cones are then held in place by O-Rings. The taper of the cones provides a snug fit, thus providing more stable positioning of the rod.

Multi-Colored Photographic Rods—Six multi-colored rods are included to provide good photographic contrast at the crime scene. The Photographic Rods are attached to the Penetration Rods already positioned in the bullet holes or may be used in place of Penetration Rods. A Rod Connector is used to join the Penetration Rod and the Photographic Rod if needed.

Universal Tripod Mount—This device provides a means for mounting the laser to a photographic-type tripod. Using this configuration, the laser beam may be directed into the bullet hole(s).

Ballistic Angle Finder—Using the Universal Tripod Mount, the Ballistic Angle Finder determines the angle of trajectory from the vertical plane.

Stringing Tips and Colored Trajectory String—Once a Penetration Rod is positioned into the bullet hole, a Stringing Tip may be attached to the rod. The Colored Trajectory String may then be attached to the Stringing Tip.

CAUTIONS/WARNINGS

- **WARNING!** Laser light may cause permanent eye damage. Do not look directly into the laser beam or direct it toward others present at the scene.
- Do not look directly into the laser beam reflection if it is directed toward a mirror or other highly reflective surface.
- **CAUTION!** Do not connect more than two rods together as this added weight may damage the bullet hole.

OPERATION

Penetration Rods:

The Laser Trajectory Kit contains four Bullet Penetration Rods (aluminum-colored) that are used to mount the Laser Pointer as well as the Multi-Colored Photographic Rods.

1. One end of each Penetration Rod is machined with a bullet-like tip to permit easy insertion into bullet holes (Fig. 1).
2. Maneuver the bullet-tipped end of the rod into the bullet hole. Slip a Centering Cone onto the rod and into the hole as deeply as it will go without undue force. Slip an O-Ring onto the rod to hold the Centering Cone in place (Fig. 2).
3. If the projectile penetrated the surface and the exit hole is accessible, slip a Centering Cone and O-Ring onto the end of the rod as described below (Fig. 3).



FIGURE 1

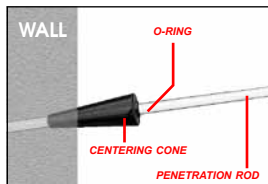


FIGURE 2—Illustration

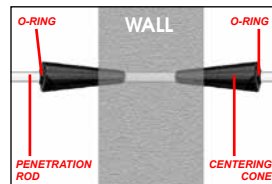


FIGURE 3—Illustration

Ballistic Laser Pointer:

The Ballistic Laser Pointer (Fig. 4) is equipped with a momentary ON/OFF switch. To activate the beam, press the push button on the body of the laser. For constant light, depress the button and slide the locking collar over the switch.

Mounting the Angle Finder and Laser Pointer:



FIGURE 5



FIGURE 6

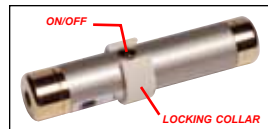


FIGURE 4—Ballistic Laser Pointer



FIGURE 7

1. Attach the Universal Tripod Mount with the two flat head machine screws provided as shown in Figs. 5 and 6.
2. For best results, mount the angle finder on a standard photography tripod (not included).
3. Attach the laser pointer to the Universal Tripod Mount using the Laser Connector as shown in Figs. 7 and 8. An additional laser pointer (not included), can be attached to the opposite side of the Universal Tripod Mount for aligning distant sequential penetrations.



FIGURE 8

4. The laser pointer can also be attached to the end of one of the Penetration Rods or Photography Rods utilizing the laser attachment, as shown in Fig. 9.

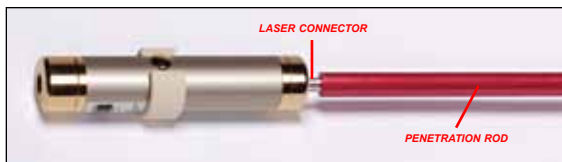


FIGURE 9

Photography

Two methods are available to photograph the actual laser beam:

Method 1: The camera should be set on a tripod and a slow shutter speed should be used (i.e., 1/15 to 1/30 sec.). Using available light or indirect flash, introduce No. LTF100S Photo Laser Smoke into the scene. This will make the laser beam visible.



FIGURE 10—(Tripod not included)



FIGURE 11—Introduce Photo Laser Smoke (LTF100S) into the scene to make laser beam visible for photos.

Method 2: Darken the room or area (Fig. 11). If outdoors, set up for photos after dark. Set the camera on a tripod and lock it into place. This technique is similar to *painting with light*. Open the lens aperture fully and set the camera for Time Exposure, or use the Bulb Setting, and use a locking cable release. If only one bullet hole is in evidence, take a time exposure of the laser beam for approximately 20* seconds. If multiple bullet holes are in evidence, cover the camera lens with a heavy black cloth, set up the beam,

and then lock the shutter open. After each time that the laser is set up in a new bullet hole, uncover the lens for 20 seconds.

**NOTE: Use 20-seconds as a starting point. If using conventional film, bracket exposures. If a digital camera is used, the results will be apparent on the camera's viewing screen.*

Photographic Rods:

Six Multi-Colored Photographic Rods are included to provide better contrast and easier recognition at the crime scene.

1. Attach a Bullet Tip to one of the Multi-Colored Photographic Rods. Insert it into a bullet hole using the same technique described above for Penetration Rods.
2. Photograph the scene using conventional techniques (i.e., available light or flash).

3. String may also be attached to the rod end using a Stringing Tip (Fig. 12).

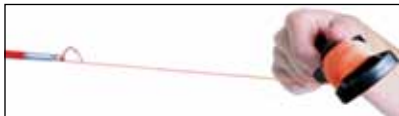


FIGURE 12—Colored Trajectory String is attached to a Photographic Rod using one of the Stringing Tips.

Ballistic Angle Finder:

The Ballistic Angle Finder is used to determine the angle of trajectory from the vertical plane. It should be used with a standard tripod for best results. The Ballistic Angle finder has a mount for the tripod and two laser pointers attached to its base (Fig. 13).



FIGURE 13—(Tripod not included)

Optional Forensic Rod Kit:

The FRK16 Optional Forensic Rod Kit is available for use with the LTF100 when a large number of bullet holes are present at the crime scene. It consists of 16 Multi-Colored Acrylic Rods and 16 Centering Cones with a Forensic Rod Container for easy transport and storage (Fig. 14).



FIGURE 14—FRK16 Components

MAINTENANCE

Battery Replacement:

The Ballistic Laser Pointer requires three (3) Type L1154 batteries (included).

1. Unscrew the cap of the battery compartment located on the rear of the laser. Remove the old batteries.
2. Install three new L1154 batteries with the + terminal facing out of the battery compartment as shown in Fig. 15 Illustration.
3. Replace the battery compartment cover.
4. Test the laser by depressing the ON/OFF button. Remember, DO NOT look directly into the laser beam.

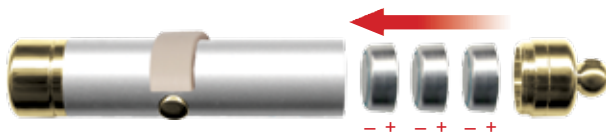


FIGURE 15—Illustration



LTF100 KIT CONTENTS:

- 1- LTF101 Ballistic Angle Finder
- 1- LTF102 Ballistic Laser Pointer Class IIIa w/batteries (type L1154)
- 1- LTF103 Bullet Penetration Rods, set of 4
- 1- LTF104 Multi-Colored Photographic Rods, set of 6
- 1 – LTF105 Laser Connector
- 3 – LTF105A Rod Connector
- 1- LTF106 Bullet Tips, set of 2
- 1- LTF107 Stringing Tips, set of 2
- 1- LTF108 Centering Cones, set of 4
- 1- LTF109 O-Rings, set of 4
- 1- LTF110 Universal Tripod Mount w/mounting screws
- 1- LTF111 Roll of Colored Trajectory String, 250 ft.
- 1- LTF100C High-Impact Carrying Case w/ Custom Foam Insert

OPTIONAL FRK16 KIT CONTENTS:

- 16- FRK001 Multi-Colored Acrylic Rods
- 16- FRK002 Centering Cones
- 1- FRK16C Forensic Rod Container

CAT. NO.	ACCESSORY ITEMS DESCRIPTIONS
LTF100S	Optional Photo Laser Smoke (aerosol can), 8 oz. (236ml)
BM6009	Optional Heavy-Duty Tripod
LFT112RS	Optional 22 Callber Rod Set, 4 each
LFT113	Optional Reflective Yarn, 275 ft. (84m)
LFT102	Extra Laser Pointer w/locking collar
FRK16	Optional Forensic Rod Kit



No. LTF100S