



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, Laser Connectors, Universal Tripod Mount, Bullet Tips, Ballistic



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Angle 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 wavelength of 630-680nm. Three 393F batteries power the laser. The battery cup which rotates and locks in either the ON or OFF position, acts as the power switch. The laser may be mounted on the end of one of the Penetration Rods with a laser 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. The rods feature both male and female ends to facilitate the connection of more than one rod.

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

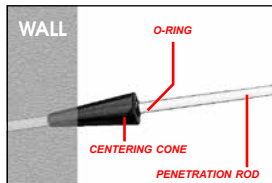


FIGURE 2—Illustration

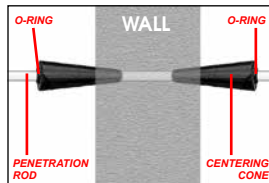


FIGURE 3—Illustration

Ballistic Laser Pointer:

The Ballistic Laser Pointer (Fig. 4) battery cup acts as the ON-OFF switch. To activate (or deactivate) the beam, rotate the battery cup. It will lock in either the ON or OFF position. The Ballistic Laser Pointer may be used in two different ways:

1. With a Photographic Rod or Penetration Rod already in place in a bullet hole(s), attach a laser connector to the Laser Pointer and screw it on the other end of the rod (Fig 5). To avoid cross-threading, use extreme care when threading the rod into the laser as these are extremely fine threads.
2. To use the laser to project a beam through a bullet hole, mount the laser onto the Universal Tripod Mount using one of the Laser Connectors. Attach the tripod mount onto a tripod using the pre-drilled 1/4-20 mounting hole. Adjust the tripod's height and lateral adjustments until the laser beam penetrates through the bullet hole (Fig. 6).



FIGURE 4—Ballistic Laser Pointer



FIGURE 5



FIGURE 6—(Tripod not included)

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.

Method 2: Darken the room or area (Fig. 7). 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.



FIGURE 7—Introduce Photo Laser Smoke (LTF100S) into the scene to make laser beam visible for photos.

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. 8).



FIGURE 8—Colored Trajectory String is attached to a Photographic Rod using one of the Stringing Tips.



FIGURE 9—(Tripod not included)

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. 9).

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-



FIGURE 10—FRK16 Components

Colored Acrylic Rods and 16 Centering Cones with a Forensic Rod Container for easy transport and storage (Fig. 10).

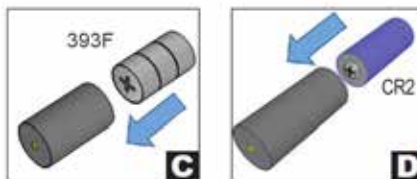
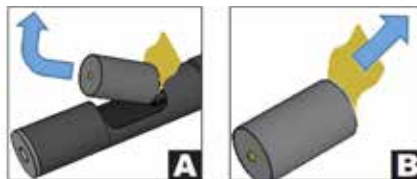
MAINTENANCE

LTF100RLZ/LTF200GLZ Laser Pointers

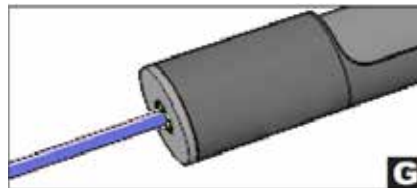
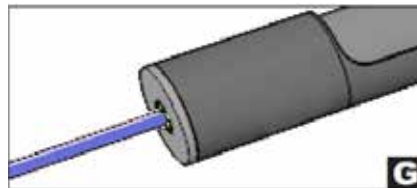
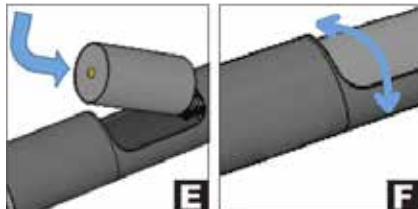
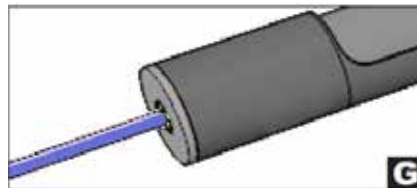
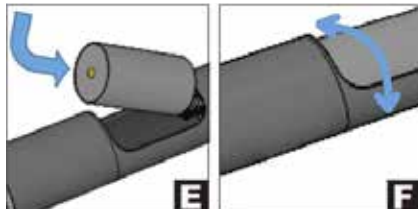
Before use, protective tape must be removed from battery tube. Push tube toward emitter (small end) of device then tilt and lift out (A). Remove and discard tape (B). Reinsert battery tube.

Battery Replacement:

1. Push battery tube toward emitter (small end) of device (A) then tilt and lift out. Discard old batteries.
2. Install battery(s) with the + terminal facing down as shown — LTF100RLZ (C) three 393F; LTF-200GLZ (D) one CR2 cell).
3. Insert the open end of the battery tube towards the
4. emitter (front end) of the device (E), snap in place.
5. Test the laser by rotating the battery cup (F).



CAUTION: Do not look directly into beam as laser radiation can permanently damage your eyes!



LTF100 KIT CONTENTS:

- 1- LTF101 Ballistic Angle Finder
- 1- LTF100RLZ Red Ballistic Laser Pointer w/3-393F batteries
- 1- LTF103 Bullet Penetration Rods, set of 4
- 1- LTF104 Multi-Colored Photographic Rods, set of 6
- 2 – LTF105 Laser Connectors
- 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
LTF200GLZ	Green Ballistic Laser Pointer w/1-CR2 cell
LTF100S	Optional Photo Laser Smoke (aerosol can), 8 oz. (236ml)
BM6009	Optional Heavy-Duty Tripod
LTF112RS	Optional 22 Caliber Rod Set, 4 each
LTF113	Optional Reflective Yarn, 275 ft. (84m)
FRK16	Optional Forensic Rod Kit



No. LTF100S