

**TENNESSEE BUREAU OF INVESTIGATION**  
*Forensic Services Division*

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Violent Crime Response Team Standard Operating Procedures  
Measuring

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**10. VCRT Procedures**

**10.18 Crime Scene Measuring Methods**

**10.18.1 Scope**

Accurate measurements are an important part of the documentation involved with processing most crime scenes. There are several tools and methods of measuring items for a crime scene sketch.

**10.18.2 Definitions**

Refer to VCRT 11.0 Definitions and Abbreviations

**10.18.3 Equipment and Supplies**

Electronic Measuring devices (e.g. Hilti PD-42)  
Measuring devices (tapes, rulers, rolling wheel)  
Leica Forensic Scanstation  
Car Odometer  
Azimuth Wheel

**10.18.4 Procedure**

The following are examples of methods that may be chosen and used in recording crime scene measurements:

Triangulation Method

Two fixed reference points (objects) are defined (including the distance between the reference points). Measurements are recorded from each reference point to the evidence location.

Rectangular Coordinate Method

The location of an object is defined by the distance of the object from two reference planes or lines positioned at right angles to each other (e.g., 6 feet 2 inches to West wall and 4 feet 8 inches to North wall).

Azimuth Wheel Method

A single reference point (center of the Azimuth wheel) and a reference direction to compass north are defined. Evidence locations are then defined by recording the distance of the evidence from the reference point and the straight line angle to the evidence (e.g., 87 feet at 273°, etc)

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#### Base Line Method

Define two reference points within the scene and connect the reference points with a tape measure, establishing a base line. Evidence locations are defined by recording the distance of the evidence from one of the reference points along the tape measure and the perpendicular distance of the evidence location from the tape measure.

The following are examples of tools that might be used in conjunction or in place of rulers and tape measures to record crime scene measurements:

#### Leica Forensic Scanstation

The Leica Forensic Scanstation is a computerized time-of-flight laser measuring device capable of making thousands of measurements every minute. These measurements are stored as the “point cloud” data. The Scanstation also takes digital photographs of the scene. Together the “point cloud” and the photographs may be entered into computer software that will make a two-dimensional or three-dimensional rendering of the area scanned.

The Leica Forensic Scanstation has operators that have received additional training in the operation and collection of this data.

#### Hilti PD-42

The Hilti PD-42 is a hand-held time of flight measuring device designed for making single measurements. A distance is measured by aiming the laser beam at a target surface and pressing the “Measure” key. The measured distance will be displayed on the screen.

Special attention shall be made to the measuring starting point of the Hilti PD-42 as it has four points that it is capable of which it makes measurements (e.g front edge, middle, rear edge and extendable spike)

It is the responsibility at each crime scene of the VCRT Leader (or designee) to confirm the accuracy where the Hilti PD-42 is used for measurements, the confirmation of the measurements should be checked in the following manner:

1. Measure a distance typically 3 to 15 feet, (e.g. a doorway, or wall) with a standard tape measure, then measure the same distance with the Hilti PD-42. If both measurements are within 1/8”, then the accuracy is confirmed.
2. Record the results in notes.

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3. If test measurements are greater than 1/8", discontinue use of the Hilti PD-42 and use a different Hilti PD-42 or measuring device until such time that the accuracy confirmation can be confirmed. Record these results in notes.