

# Fingerprinting Basics

## Study Session Overview

This Study Session will introduce you to the basics of fingerprinting. This Study Session is intended to supplement Mod 06 / Ses 08 - Fingerprinting.

## Learner Objectives

- Demonstrate an understanding of basic background information pertaining to fingerprints
- Demonstrate the proper method of taking rolled inked fingerprint impressions.
- Demonstrate various forms of print development and preservation.
- Demonstrate knowledge of fingerprint comparisons as it pertains to court evaluation.

**Total Study Time: 1 hour**

### **Main Topics of Session:**

- *Fingerprinting Basics*
- *Latent Prints*
- *Ridge Structure*
- *Pattern Types*
- *Live Scan*
- *AFIS*
- *Surface Types*
- *Elimination Prints*

### **Attached Materials:**

- *ATTACHMENT - The Basics of Fingerprint Science*
- *ATTACHMENT - Taking Legible Fingerprints*

### **You Should Bring to Class:**

- *This Study Session and Attachments*



# Fingerprinting Basics



## Background

A very important type of physical evidence is fingerprints. Fingerprints are the most positive means of identifying individuals. Of all the methods of identification, fingerprinting alone has proved to be both infallible and practical.

Use the attached handouts to begin learning about fingerprint science. You should also use other available resources and work together on this study session. Answer as many of the following questions as possible before the class session. Here are a few good Web sites to start with:

- <http://science.howstuffworks.com/fingerprinting.htm>
- [http://www.virtualsciencefair.org/2004/fren4j0/public\\_html/fingerprint\\_basics.htm](http://www.virtualsciencefair.org/2004/fren4j0/public_html/fingerprint_basics.htm)
- <http://www.fingerprinting.com/>

1. What are prints used for?

2. Why is fingerprint evidence so important?

3. What is “ridge structure”?

4. What are the fingerprint pattern types?

NOTES



## Fingerprinting Basics

5. What unique characteristics can be found in ridge detail?
6. What is Live Scan?
7. What is the Automated Fingerprint Identification System?
8. What are the various types of latent prints?
9. Which factors inhibit finding/collecting latent prints?
10. What are the various surface types?
11. What are “elimination prints”?

NOTES



# Fingerprinting Basics

12. What are “Major Case Prints”?

13. How are latent prints destroyed?

14. What should a law enforcement officer have in a quality fingerprint kit?

NOTES



STUDY

**RECOMMENDED STUDY** - ATTACHMENT - The Basics of Fingerprint Science  
- ATTACHMENT - Taking Legible Fingerprints

For: Mod 06 / Ses 08

Instructions: Use these handouts to help answer the questions above. Not all the information is contained in these materials. This is just a start.



RES

**RESOURCE MATERIAL** - Book (44 pages) - Fingerprints For Dummies [THUMB DRIVE]

Instructions: This booklet (PDF file) is available on your thumb drive and in the computer lab.



END OF STUDY SESSION



# King County Sheriff

## The Basics of Fingerprint Science

The two fundamental principles of fingerprint identification are that fingerprints are permanent and unique: fingerprints never change and no two fingerprints are the same.

### Permanence:

Fingerprints are formed before birth, and while they grow larger throughout a person's life, their basic structure remains constant. They can be temporarily obscured when the skin is damaged; but once healed, the ridges grow back in the exact same pattern. Even when a fingerprint is permanently scarred, there is almost always sufficient detail around the scar to allow a positive identification.



### Uniqueness:

Fingerprints are made up of skin ridges that have three main features: ridge endings, bifurcations, and dots. Ridge endings are points where the skin ridges stop and a new ridge begins. Bifurcations are points where a single ridge splits into two ridges forming a Y-shaped pattern. Dots are pieces of a ridge that are so small they look like a dot. There are often hundreds of these "points" on one finger. The relationship between each of these points and the surrounding ridge detail is so complex that no two fingerprints have ever been found to be exactly alike.

### Fingerprints vs. DNA

Both fingerprint identification and DNA analysis have proved to be valuable tools for personal and criminal identification. However, fingerprint identification can be more accurate than DNA analysis. Even identical twins who look exactly alike and have the same DNA structure will always have different fingerprints! This is because fingerprints are formed in the womb, where movements and natural growth randomly create some characteristics.

Retrieved on 2009-01-12 from:

<http://www.kingcounty.gov/safety/sheriff/Enforcement/AFIS/Fingerprinting.aspx>

## Taking Legible Fingerprints



### Section I. Introduction

The purpose of this program is to provide information regarding the nature of fingerprints and outline techniques for taking legible fingerprints.

Fingerprints can be recorded on a standard fingerprint card or digitally. Obtaining quality fingerprint impressions can be a matter of using proper techniques. Even though the methods of recording fingerprints may differ, the techniques for obtaining quality fingerprints are very similar.

### Section II. Fingerprint Pattern Types

Fingerprints are the result of minute ridges and valleys found on the hand of every person. In the fingers and thumbs, these ridges form patterns of loops, whorls and arches.

### Outline

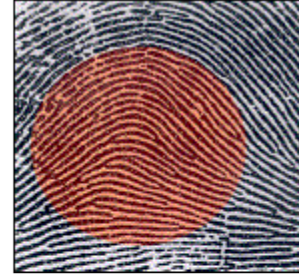
- I. **Introduction**
- II. **Fingerprint Pattern Types**
  1. Loop, Whorl, Arch
- III. **Fingerprint Impression Types**
  1. Rolled, Plain
- IV. **Basic Fingerprinting Equipment**
  1. Ink, Paper, Live Scan
- V. **Steps for Fingerprinting**
- VI. **Special Situations**
  1. Amputations
  2. Bandaged Fingers
  3. Scars
  4. Deformities
  5. Worn Fingerprints
  6. Extra Fingers
- VII. **Quality Checklist**

**LOOP**

In a loop pattern, the ridges enter from either side, re-curve and pass out or tend to pass out the same side they entered.

**WHORL**

In a whorl pattern, the ridges are usually circular.

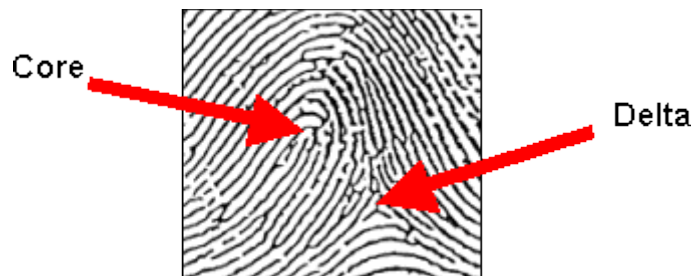
**ARCH**

In an arch pattern the ridges enter from one side, make a rise in the center and exit generally on the opposite side.

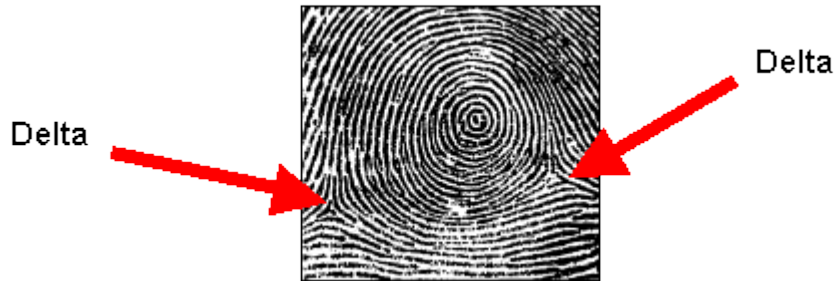
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**Each of the three pattern types have focal points which are used for classification.**

In the **Loop** pattern there are two focal points: the **Core**, or the center of the loop, and the **Delta**. The **Delta** is the area of the pattern where there is a triangulation or a dividing of the ridges. When recording fingerprints, the delta and the area between the delta and the core must be completely recorded.



A **Whorl** pattern will have two or more deltas. For a whorl pattern, all deltas and the areas between them must be recorded.



The **Arch** pattern has no delta or core; but, it too, must be fully recorded so that its individual characteristics can be readily distinguished.



### Section III. Fingerprint Impression Types

There are two types of impressions involved in taking fingerprints. The upper ten impressions are taken individually, thumb, index, middle, ring, and little fingers of each hand. These are referred to as the "rolled" impressions because the fingers are rolled from one side of the fingernail to the other, in order to obtain all available ridge detail.

The impressions at the bottom of the card are taken simultaneously without rolling, printing all of the fingers of each hand at a forty-five degree angle and then the thumbs. These are referred to as "plain," "slapped," or "flat" impressions. The plain impressions are used to verify the sequence and accuracy of the rolled impressions.





**Section IV. Basic Fingerprint Equipment**

Fingerprints can be recorded with any of the following materials:

- Ink (Black Printers Ink or Porelon Pad) and Paper (Standard Fingerprint Card, FD-249 Criminal Card or FD-258 Applicant Card). A Porelon Pad contains a built-in ink supply.
- Chemicals and Paper (Standard Fingerprint Card)
- Livescan. For a list of FBI certified Live Scan and Card Scan devices see the [FBI Certified Equipment List](http://www.fbi.gov) at [www.fbi.gov](http://www.fbi.gov).

**Section V. Steps for Fingerprinting**

The recommended height for the fingerprinting device (Card or Live-Scan) is approximately thirty-nine inches from the floor. This will allow the forearm of an average adult being fingerprinted to be parallel to the floor, at which position it is best to roll and record fingerprints. If the fingerprinting device is not at this height, care must be taken or the finger tends to rise off the device. If this happens, the technician will fail to capture the lower portion of the first joint and necessary ridge detail will be missing.

1. Fingers to be printed must be clean and dry. Wiping the individual's fingers with an alcohol swab and then drying them should prevent perspiration from being a problem. If the individual's occupation has caused a wearing down or rough surface on the fingers, use lotion to soften the fingers (be sure to wipe the lotion off before printing).
2. The individual being fingerprinted should be asked to stand in front of and at a forearm's length from the fingerprinting device. The individual should stand to the right and rear of the person taking the fingerprints.
3. Encourage the individual being fingerprinted to relax. Ask them to look at some distant object to distract them from what you are doing.
4. Grasp the individual's right hand at the base of the thumb with your right hand. Cup your hand over the individual's fingers, tucking under those fingers not being printed. Guide the finger being printed with your left hand.
5. If using the ink and paper method, roll the finger on the inking plate or Porelon Pad so that the entire fingerprint pattern area is evenly covered with ink. The ink should cover from one edge of the nail to the other and from the crease of the first joint to the tip of the finger. Using the right amount of ink is of vital importance. Too little ink and the impression will be too light. Too much ink and the fine details will run together.



6. In taking the rolled impression, the side of the bulb (see illustration above) of the finger is placed upon the paper fingerprint card or the fingerprinting device, and the finger is rolled to the other side until it faces the opposite direction. Care should be exercised so the bulb of each finger is rolled evenly from tip to below the first joint. Generally, the weight of the finger is all the pressure needed to clearly record the fingerprint.

<http://www.fbi.gov/hq/cjisd/fproll.html>



[Click here for video clip showing rolling technique](#)

7. In order to take advantage of the natural movement of the forearm, the hand should be rotated from the more difficult position to the easiest position. This requires that the thumbs be rolled toward and the fingers away from the center of the individual's body. This process relieves strain and leaves the fingers relaxed when rolling so that they may be lifted easily without danger of slipping which smudges and blurs the fingerprints.
8. Roll each finger from nail to nail in the appropriate space taking care to lift each finger up and away after rolling, to avoid smudging.
9. If using the ink and paper method and a rolled impression is not acceptable, you may use an adhesive re-tab to cover the fingerprint in its space. (No more than one re-tab per finger block is permitted.) For live scan, the image can be deleted and retaken.

10. Plain impressions are printed last, at the bottom of the card. The technician simultaneously presses the individual's four fingers (on the right hand), keeping the fingers together, on the surface of the fingerprint card or the fingerprinting device at a forty-five degree angle in order to capture all four fingers in the allotted space (see illustration). Repeat this process for the left hand. Print both thumbs simultaneously in the plain impression thumb blocks (to ensure that they are in the proper spaces).



**Please Note:** Never place a fingerprint impression on the back of a fingerprint card.

11. If using the ink and paper method, complete the information at the top of the fingerprint card (masthead). If using live scan, complete the required information.

## Section VI. Special Situations

Special attention must be given when fingerprinting an individual with abnormalities of the fingers, thumbs or hands. Special situations include:

- Amputations
- Bandaged Fingers or Hands
- Scars
- Deformities
- Worn Fingerprints
- Extra Fingers
- Webbed Fingers

### Amputations

An amputation exists when an individual has one or more fingers, thumbs or hands missing. This condition should be noted in the appropriate block of the fingerprint submission. Total amputation should be designated using the following notations:

- Amputation (AMP)
- XX
- Missing at Birth (MAB)



**Please Note:** The term "Missing," is **not** interpreted as amputation by the FBI.

### Bandaged Fingers or Hands

If the individual has a bandage or cast on a finger, thumb or hand, place the notation, "Unable to Print" or "UP" in the appropriate finger block.

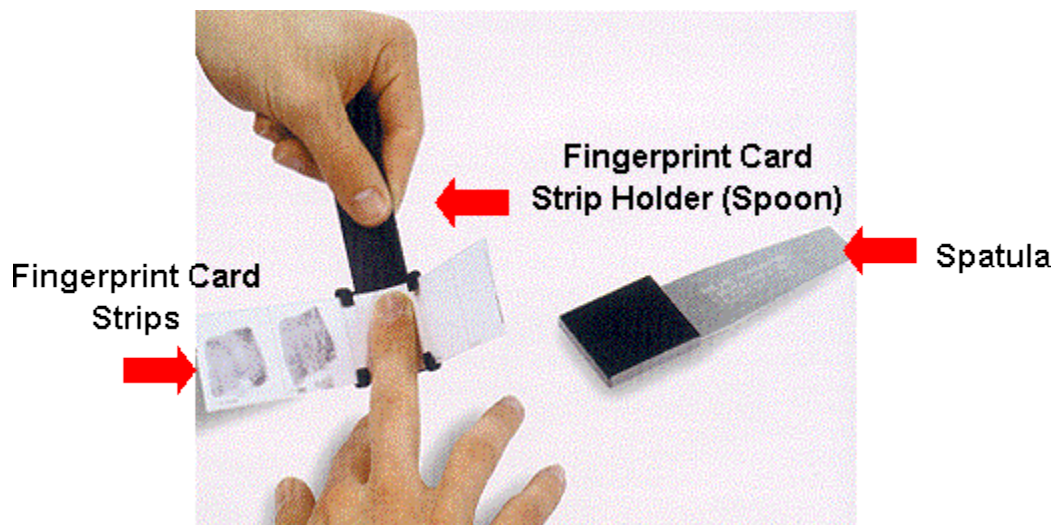
### Scars

A scar exists when an individual has permanent tissue damage to finger, thumb or hand and when only pattern areas that have been totally destroyed or the ridge detail appears distorted. These fingerprints should be taken as they exist. The scars can be noted as "Scarred," but it is not required.

### Deformities

A deformity may exist as a result of an injury, birth defect or disease. An attempt should be made to fingerprint the individual with the techniques outlined previously; although special equipment (e.g., a fingerprint spoon) may be needed when fingerprinting individuals with deformities. The equipment can be found in the "Postmortem Kit" and consists of:

- Black Printers Ink
- Spatula
- Fingerprint Card Strip Holder (Spoon)
- Fingerprint Card Strips



### How to Use the Fingerprint Spoon

1. Place a fingerprint card strip in the fingerprint card strip holder (spoon).
2. Using the spatula, ink the finger (starting with the right hand) and be sure to apply ink from nail to nail.
3. Place the inked finger on the fingerprint card strip holder (curved area) and press down. **Do not** roll the finger. The curved shape of the holder will serve the same purpose as rolling the finger.
4. Cut out the finger block from the card strip and paste in the corresponding block on the standard fingerprint card.
5. Repeat these steps for each of the remaining fingers. Be sure to record the correct finger in the correct finger block.



**Please Note:** A strip of fingerprint re-tabs can be substituted for the fingerprint card strip

If utilizing Live-Scan equipment, the use of a Fingerprint Spoon is not an option. You may want to fingerprint the individual on a standard fingerprint card using either Black Printers Ink, Porelon Pad or the Chemical method so that a Fingerprint Spoon may be used. Then either scan the fingerprint card and submit electronically, or mail the card.

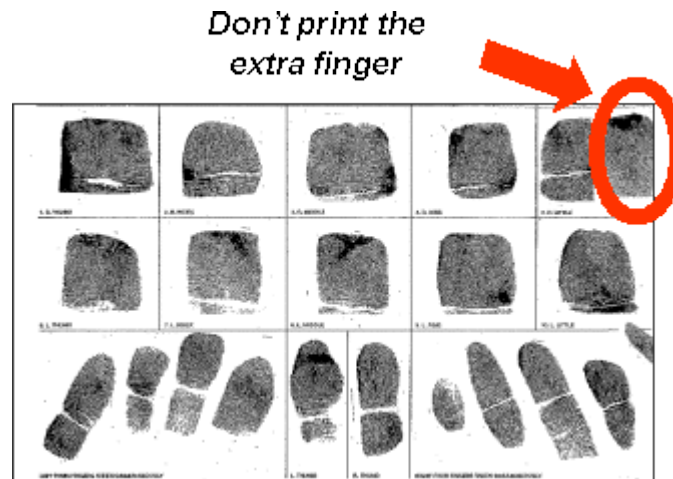
If Live-Scan is the only option, then the finger block(s) should be left empty with a notation of "Unable to Print" or "UP." However, the number of finger blocks without fingerprint images should be kept at a minimum (no more than five).

### Worn Fingerprints

An individual may, by the nature of their work or age, have very thin or worn ridges in the pattern area. Light pressure and very little ink are used to record these types of fingerprint impressions. A technique known as "milking the fingers" can be used to raise the fingerprints prior to fingerprinting. The technique involves applying pressure or rubbing the fingers in a downward motion from palm to fingertip. In a situation of dry, flaky fingers, simply add a small amount of hand lotion or ridge builder prior to fingerprinting.

### Extra Fingers

If an individual has more than ten fingers, the thumbs and the next four fingers should be printed. When a subject with more than ten fingers has an intentional amputation performed, it is invariably the extra finger on the little finger side that is amputated.



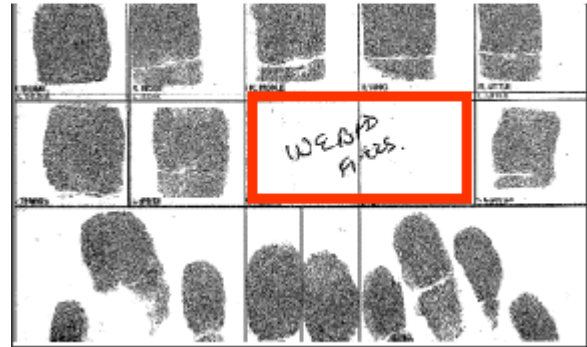
### Webbed Fingers or Split Thumbs

An individual may have two or more fingers webbed or grown together, making it impossible to roll such fingers. Such fingers should be rolled as completely as possible, and a notation made to the effect that they are joined or "webbed."

*Print if possible ...*



*...Or make a notation*

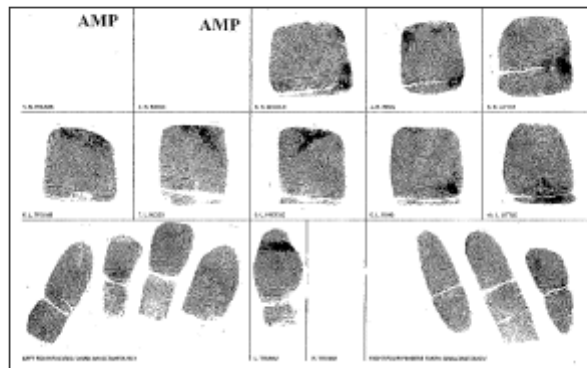


## Section VII. Quality Checklist

To verify that the fingerprint impressions meet the FBI's requirements, please use the following checklist:

1. Is there a fingerprint impression in each finger block? If there is a missing fingerprint impression, is there a reason noted in the finger block (e.g., AMP, missing at birth, unable to print, etc.)?

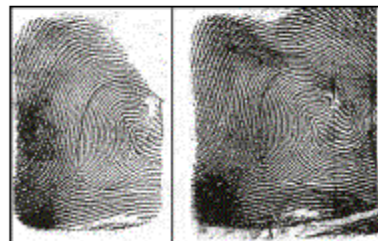
*Make sure to note when images are amputated or unable to print...*



2. Are the fingerprints rolled fully, from nail to nail?

*Same finger ...*

Not rolled fully



Acceptable

## Taking Legible Fingerprints

3. If the fingerprint impression is a loop, are the delta and core present?  
If the fingerprint impression is a whorl, are all deltas present?
4. Are the fingerprint impressions clear and distinct?
5. Are the fingerprint impressions uniform in tone and not too dark or light?

**Too Dark**  
(too much ink or pressure)



**Too Light**  
(too little ink or pressure)



**Ink Unevenly Distributed**  
(causing light and dark areas)



6. Are the four finger impressions and a thumb impression in the plain impression block for each hand?
7. Are the rolled fingerprint impressions in the correct finger blocks when compared to the plain impressions?

*Verify images are in correct order ...*



**Please Note:** *If using live scan equipment to capture fingerprint impressions, it is important to clean the equipment regularly and calibrate routinely per the manufacturers guidelines, to ensure the quality and integrity of the fingerprint images.*