# DIVERSIONARY DEVICE

## REFERENCE MANUAL
## 2nd Edition

LEGAL ASPECTS
PHYSIOLOGICAL EFFECTS
HAZARDS AND ENHANCERS
DEPLOYMENT METHODOLOGY
FUNCTIONING & NOMENCLATURE

Sid Heal

# DIVERSIONARY DEVICES MANUAL

# 2ND EDITION


## SID HEAL

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# STINGBALL & DIVERSIONARY DEVICES INSTRUCTOR COURSE

## FORWARD

This book began in the spring of 1988 when I was assigned to research and write a lesson plan on diversionary devices by my SWAT Commander, Lt. Russ Collins. At that time, there was almost no information on the use of these devices available anywhere. Our department was beginning to encounter lawsuits about how we were using them, and motions to suppress evidence in criminal cases almost always included a challenge of excessive force. Training was scarce, and the few courses that were available focused primarily on how they were built and not how they should be used.

The research took well over six months and included many interviews with audiologists, medical doctors and explosive experts, not to mention several classes in physics—a subject I never completely mastered. The first user-level lesson plan was released on December 1, 1988, and within 60 days had attracted national attention. My department was deluged with requests for copies and we were soon overwhelmed trying to reproduce and mail them to everyone who needed them. So great was the demand that I received permission to release it through the National Tactical Officers Association who provided it for the cost of printing and mailing.

I continued my research even after I was promoted and left SWAT in 1989. I began writing an instructor-level lesson plan early in 1990 which was intended as the natural extension of the user-level lesson plan. I maintained the same format but added a reference section and focused on teaching instructors. The manuscript was substantially larger, and the expense of reproducing it went up dramatically. With some trepidation, I paid for the first one-hundred manuscripts out of my own pocket and took them to the 1991 NTOA Conference in Tulsa, OK. The complete inventory sold out during the first fifteen-minute break. It was clear that, despite the increased cost, the demand for the more comprehensive version would be just as great.

As the years have passed, I have learned much by teaching, writing, and working as a consultant for civil and criminal trials throughout the United States. I've also worked with developers in improving both

flashbangs and stingballs. As the state-of-the-art continues to advance, I continue to maintain an extensive file and in 1997, decided that it was time to update this book—no small matter I assure you.

While the material presented in this 2nd Edition largely follows the original format, it has been updated and expanded and a new section on stingballs has been added. An improved format provides a wide margin for notes, illustrations and instructor cues. The tests and key sheets have been eliminated, as has the user-level lesson plan. Later, these will be available in a much improved "instructor's kit." This kit will contain not only the tests and keys, but colored graphics and computer animated presentations.

Anyone who has ever written will attest to the value of critical examination, particularly by other experts. So it is with this 2nd Edition of the *Diversionary Device Reference Manual*. After the manuscript was rewritten, I asked three experts to review it. Glen Walsh, of the Los Angeles Sheriff's Department, has been both a student and an instructor in these devices, and offered many insightful comments. His observations were especially valuable in simplifying and clarifying concepts for ease of reading and understanding. John Kolman, founder and former Director of the National Tactical Officers Association, has been the driving force behind both books. Since we first met in 1985, his unselfish sacrifice of his time and enthusiastic support provided both motivation and encouragement, not only for this 2nd Edition, but for the original one published in 1991. His contribution cannot be overstated. Last, but definitely not least, is Jon Becker, a friend and mentor for many years. Besides being a successful businessman, Jon is a lawyer who specializes in law enforcement defense cases. His experiences in both careers have provided tremendous insight and I regularly call upon him for advice and suggestions.

I very much appreciate your comments and criticisms and the book you have before you, is a direct result. Last year, I received a correction from an instructor who discovered an error in the original manuscript. Despite the fact that the book has been in print continuously for eight years, he was the first to discover the error and I want to thank him for taking the time and effort to bring it to my attention. We will all benefit by having the best and most accurate information possible. Comments, criticisms and suggestions are still enthusiastically sought. Please forward them to me, care of the National Tactical Officers Association. Like the 1st Edition, this publication is being donated to the NTOA "for the good of the cause."

## INTRODUCTION

This book is intended to be comprehensive, however it is not exhaustive. It provides detailed and scientific explanations to prepare students to teach a diversionary device and/or stingball course. These devices have proven extremely safe and effective in resolving highly volatile situations. The use of a flashbang is still the only non-lethal option available to support a dynamic entry. In order to fully exploit the potential of these less-than-lethal options, however, tacticians must fully understand their advantages and limitations. This book is designed to be used as both a lesson plan for instruction and a reference guide to quickly answer questions.

While flashbangs are primarily employed as a diversion, and stingballs are usually employed as a less-than-lethal force option, they have similar construction, employment methods and safety concerns. Consequently, they are both described in this book. It must be emphasized, however, that while similar, they are not identical and cannot be used interchangeably. Each has its own unique employment considerations.

The intent of this book is two-fold. First, it is intended to be used as a lesson plan for instruction in the employment of flashbangs and stingballs. The information is systematically arranged from the simple to complex in a lesson plan format as an aid to presentations and instruction. Second, it provides information in sufficient quantity and quality that the serious reader will gain an ability to testify as an expert in the deployment, characteristics and anticipated response of persons who experience the effects of flashbangs[a] and stingballs.

The information presented here has been well researched and quotes from reference material are used liberally to assist in further research and documentation. A bibliography and reference section is provided, as well as a glossary of terms, to aid understanding and in-depth research. Because each chapter is intended to be useful without the requirement of reading each preceding chapter, some information may be repeated. A comprehensive index is also provided to aid in quickly finding answers to questions.

The lesson plan consists of ten parts, each of which is focused on a single subject area. As of this writing (July 1999), material precisely

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[a] **Note**: The terms “flashbang,” “flash/sound device,” “diversionary device” and “distraction device” are used interchangeably throughout this book.

describing various aspects of flashbangs and stingballs, such as physiological effects, courtroom presentations and others, remains scarce. I have tried to provide some of the most critical information in the form of appendices at the end of this book.[b] Each appendix is written in "lay" terms and devoted to a single subject. Illustrations are provided to amplify and clarify key concepts which have been simplified to the maximum extent possible. Readers are hereby granted permission to copy, distribute and use this material for teaching and courtroom presentations without further notice. For other uses, contact the National Tactical Officers Association[c] for permission.

For those who have been using the 1st Edition, you will notice that the format for this 2nd Edition differs somewhat from the previous edition. For instance, the book is now printed on both sides of the page and has wide margins separated from the text by a line. These, and other changes, are in response to suggestions from readers over the years. The full-sentence format remains to avoid confusion in understanding the material while teaching.

Other formatting changes were incorporated as a result of suggestions and criticisms from the original version. One is in the use of notes and examples. Notes are used to illustrate a key point or provide interesting background material to stimulate and maintain student interest. They are now identified by small letters and listed as footnotes at the bottom of the page. To avoid clutter and confusion, reference notations are now identified by numbers and provided in the form of endnotes at the end of each chapter. Examples are used to provide meaningful analogies to better understand complex scientific or technical aspects relating to distraction devices and/or stingballs. Examples are still "called out" in the text of the lesson plan.

Key terms and definitions are now bold printed when first introduced, and critical concepts are italicized throughout the text to emphasize their importance. This not only makes them easier to identify, but emphasizes their importance in understanding and applying related skills and information.

While the lesson plan may be used as is, instructors are encouraged to augment it with their own comments, anecdotes, cues, illustrations and

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[b] **Note**: Other particularly useful articles have also been identified and referenced. Many of these articles are available from the archives of the National Tactical Officers Association.

[c] **Note**: The National Tactical Officers Association, may be contacted at any of the following: P.O. Box 797, Doylestown, PA 18901, Phone - (800) 279-9127, Email – ntoapa@aol.com, World Wide Web – http://www.ntoa.org.

other teaching aids to accommodate it to their individual needs. During any practical application for either flashbangs or stingballs, I highly recommend a review of applicable safety documents, such as those published by the California Commission on Peace Officer Standards and Training, or similar safety regulations or procedures. Although much information may be gained simply by reading this lesson plan, it is intended to supplement, *not replace*, qualified instruction.

# DIVERSIONARY DEVICES INSTRUCTOR COURSE

COURSE: Lecture/Demonstration/Evaluation/Practical Application

OBJECTIVES:

At the end of this period of instruction the student will be able to understand, discuss, and/or demonstrate the following:

1) Be able to provide classroom and scenario instruction in all aspects of the use of flash/sound diversionary devices.
2) Have an in–depth knowledge of the subject material as it relates to the deployment of these devices.
3) Be able to provide expert testimony regarding the use, deployment, safety considerations and anticipated effects of stingballs & flash/sound diversionary devices.

Upon completion of the lecture portion of the student will:

1) Demonstrate a working knowledge of the use and deployment of flash/sound diversionary devices during all phases of crisis entries.
2) Demonstrate a working knowledge of the use and deployment of stingballs in handling riot situations and violent suspects.
3) Demonstrate ability as an instructor with an in-depth knowledge of the subject material.
4) Demonstrate an ability to provide scenario training and provide expert advice in answering technical questions regarding the use of these devices.

LENGTH OF INSTRUCTION: ..... 24 hours

TIME CHART:

Lecture…… ..... 16 hours
Review & Evaluation…..... 2 hours
Practical Application - Instruction ..... 2 hours
Practical Application - Deployment ..... 4 hours

MATERIALS NEEDED:

Blackboard or Inkboard, Overhead Projector, Inert Flash/Sound Diversionary Devices, Overheads/Slides, and/or Videos.

TRAINING SITE:

Classroom and suitable training site for deployment of diversionary devices.

POINT OF CONTACT: Not applicable

NOTIFICATIONS REQUIRED: None

REFERENCES: See “Bibliography and References” Section

SPECIAL INSTRUCTIONS:

Each student must have a waiver of liability form on file, prior to attending the demonstration portion of this class.

Students should have successfully completed a basic course in the use of diversionary devices. This requirement may be waived by the instructor if the student has demonstrated sufficient knowledge to be able to participate in this advanced class.

DATE PREPARED: August 23, 1991

PREPARED BY: Sid Heal, National Tactical Officer’s Association

REVISED: September 1, 2001

# DIVERSIONARY DEVICES INSTRUCTOR COURSE

## PART 1 — HISTORICAL BACKGROUND

A. Explosives have been used by mankind for a variety of purposes since before the birth of Christ.

B. "Black powder, using ... charcoal and sulfur was probably the first explosive developed and is attributed either to Chinese or Egyptian ingenuity."[1]

1. "It was first used as a gun propellant about 1320 and as a blasting agent in the early 1600s."[2]

    a. An English monk by the name of Roger Bacon first recorded the formula for gunpowder in 1245 AD.

    b. The first *recorded* use of black powder as a gun propellant was between the English 2and French at the Battle of Crecy in 1346.

2. "Black powder became the standard gun propellant until the 19th century."[3]

    a. Black powder is still used in breech loading rifles and shotguns but virtually all rifle and pistol ammunitions use the cleaner and hotter burning smokeless powder.

    b. Today, black powder is predominately used in igniters, safety fuses and fireworks.[a]

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[a] **Note**: Black powder is not named for the color of the material, but rather the English translation of the German word "Schwarzpulver," named after Berthold Schwarz who did extensive experiments with it during the 14th Century. When translated from German to English, Schwarz means "black."

C. The invention of grenades provided another use for gunpowder.

1. The invention of gunpowder led to the development of explosive grenades about the 13th century.

2. The first published reports of grenades dates back to the crusades.[b]

   a. The grenades were made with jars, kegs, pots and glass globes primarily for incendiary reasons.

   b. The word “grenade” is derived from the Spanish “granada,” which means pomegranate.

      (1) The early grenades resembled this fruit.

      (2) The likeness of spherical black containers with burning fuses sticking out has been portrayed by countless artists and cartoonists and is so familiar that it has become an icon.

   c. Hand grenades continued to evolve over the centuries.

      (1) The first modern hand grenade was the “Mills Bomb” manufactured by W. Mills of Birmingham, England.

      (2) This device used a burning-type delay fuse which allowed the grenade to be thrown without danger of accidental detonation until the device left the hand.

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[b] **Note**: It has been reported that hand-thrown incendiary devices were used in 250 BC by the Romans to combat the elephant assaults of Pierre, King of Epire.

D. **Bouchon (defined)** — This modern fuze[c] system (called a bouchon) has become the standard in hand grenades, and is now used by the modern diversionary devices we see today.

1. The modern bouchon is constructed of either metal or plastic.

2. They are designed to provide a time delay from about 3/4 of a second to about 2 seconds.

E. The main charge in modern diversionary devices (flashbangs) has evolved from black powder.

1. Most modern diversionary devices now use a "flash" powder.[d] This powder usually consists of a metal fuel, such as aluminum or magnesium, and an oxidizer, such as barium nitrate or potassium perchlorate.

2. This type of diversionary device is a relatively modern invention.

   a. There is no reference to where the idea first originated.

   b. The United States Army has been using similar devices as training aids from at least the 1950s.

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[c] **Note**: Two words which are often confused are "fuse" and "fuze." While similar, a *fuse* is a pyrotechnic device which serves as the initiator to an explosive charge, while a *fuze* is a mechanical device used for the same purpose.

[d] **Note**: Flash powders are pyrotechnics and consist of a mixture of a fuel and an oxidizer. When compared with other explosives, they burn very rapidly, but relatively little gas is produced.

(1) Devices such as grenade simulators, gunflash simulators, artillery simulators and air burst simulators, have been and are still being used to make training more realistic.

(2) This type of training has been safely conducted for almost fifty years.[e]

3. Flash powder diversionary devices began appearing in the news media in the mid-1970's when counter-terrorist units began using them in actual operations.

   a. The Israeli rescue of hostages being held at the Entebbe airport in Uganda, July 3, 1976.[f]

   b. The German (GSG9) rescue of hostages from a Lufthansa airliner in Mogadishu, Somalia, October 18, 1977.

   c. The British S.A.S. rescue of hostages who were being systematically executed in the Iranian Embassy, Princes Gate, London, England, May 5, 1980.

   d. The Swiss Group-De-Intervention Gendarmerie rescue of hostages being held in the Polish Embassy in Bern, Switzerland, September 9, 1982.

   e. The tremendous success of these and other operations attracted worldwide attention.

4. The distraction devices we see today bear only a resemblance to their ancestors.

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[e] **Note**: Training devices used by the U.S. military, such as the M-115 Artillery Simulator, M-116 Grenade Simulator and others, are still in use.

[f] **Note**: This incident is generally accepted as the first recorded use of flashbangs in support of a tactical operation.

a. The modern distraction device is not a true grenade.

(1) A flashbang emits *only* the byproducts of combustion: heat, light, sound and smoke.

(2) True grenades of old, as well as those used today, use combustion or detonation to emit other substances, e.g., colored smoke, chemical agents, stingballs, shrapnel, and so forth.

b. Unlike their ancestors, modern distraction devices are specifically designed not to injure.

(1) Manufacturers of modern devices have gone to great lengths to allow the device to perform its purpose of distraction without injury.

(a) It is interesting to note that the modern flashbang itself is a product of evolution.

(b) Modern flashbangs have downloaded charges, improved bouchons, safer firing methods, less smoke and better quality control than the devices manufactured just a few years previously.

(2) The modern distraction device will undoubtedly continue to evolve as more uses are discovered and newer, more improved canisters, bouchons and powder compositions are discovered.

5. These devices are now manufactured commercially by a number of companies, and are available for use by military and police tactical units throughout the world.

    a. Companies such as Defense Technologies Corporation (Def-Tec), Omni Distribution, Inc., Precision Ordinance Products, Inc., Universal Propulsion Company, Inc. (UPCO), Combined Tactical Systems, Inc., Technical Solutions Group Ammunition, MK Ballistics Systems, Combined Tactical Systems, Ensign-Bickford Aerospace, Flashbang2000 Inc., NICO Pyrotechnik, and many others, now provide a variety of diversionary devices designed and built especially for tactical operations.[g]

    b. A number of other companies already manufacturing related products, such as fireworks or riot control agents, are also contemplating developing and manufacturing distraction devices.

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[1] *SCIENTIFIC ENCYCLOPEDIA*, Sixth Ed., Van Nostrand Reinhold Col., New York, 1982.
[2] SCIENTIFIC, 1982.
[3] SCIENTIFIC, 1982.

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[g] **Note**: This list is not comprehensive and includes only the most popular models currently available in the continental United States. Other manufacturers, particularly foreign, offer a wide variety of devices with features such as multiple "pops," audible whistles, etc. Not all devices are available for law enforcement purchase.

## PART 2 — TYPES OF DIVERSIONS

A. To fully understand how a diversionary device works, it is necessary for the instructor to have a thorough knowledge of the types of diversions and why they work.

   1. The information provided here is taken from a number of sources which are identified and liberally quoted.

   2. To the maximum possible extent, the definitions and descriptions provided in this chapter use "layman's" terms and avoid complex scientific verbiage. Consequently, some generalization is unavoidable.

B. **Diversion (defined)** — Webster defines a diversion as "a diverting or turning aside. A distraction of attention as a diversion from the enemy*, anything that distracts or diverts the attention*." (emphasis added)

   1. The purpose of a diversion is to provide a distraction or diverting of attention.

      a. A flashbang provides this distraction or diversion by temporarily creating a state of confusion or disorientation.

         (1) It creates this state by an instantaneous combination of sound, light and pressure.

         (2) The modern distraction device seeks to achieve the state of confusion and disorientation necessary for a distraction without injury to either hostages, bystanders or suspects.

(a) "In deciding that . . . noise level which might be used, consideration must be given to producing the least amount of potential damage to hostages while accomplishing the mission of a diversionary charge."[1]

(b) The bright flash from these devices causes harmless physiological effects in the eye, which make it difficult to see.

(c) The pressure wave adds to the stimuli which the body must correctly interpret in order to appropriately respond.

b. All these stimuli are compressed into a tiny fraction of a second and assist in creating a state of disorientation and confusion.

2. Diversions fall into two broad categories.

a. **Deceptive** — something that deceives, as an illusion. (This type of deception is sometimes referred to as a "psychological diversion.")

b. **Physiological** — having to do with the functions of an organism.

3. **Deceptive diversions** require the suspect to form a false conclusion, no matter how brief.

a. Because this type of diversion requires the suspect to draw an inference, you must take into account the reasoning ability of the suspect.

(1) Deceptive diversions have a greater chance of failure than the physiological type.

(2) The possibility always exists that the suspect won't be fooled.

(a) The ruse was too complicated or the suspect used the same stimulus (deception) and arrived at a different conclusion.

(b) The suspect's reasoning ability was defective from drugs, emotion, fatigue, or mental deficiency.

b. Deceptive diversions are difficult (at best) to perform more than once in the same operation.

(1) Once a suspect has been knowingly fooled, a "breach of trust," even though only implied, is destroyed.

(2) The suspect will, forever more, be suspicious of even honest efforts.

c. Deceptive diversions can be defended against.

(1) The inherent distrust many suspects have against any authority (much less a tactical team), often causes them to view with suspicion any information that can be attributed to them.

(2) The simpler the deception, the greater the chance for success.

(a) You must control all the variables.

(b) Anticipate failure! Because a deceptive diversion can be defended against, and because suspects are not always logical, anticipate repercussions if it fails.

(3) Deceptive diversions do not need to be loud or violent, just misleading.

(a) If information is provided as the deception, it is best if the suspect cannot attribute it to the authorities.

(b) If possible, provide the information in such a manner that the suspect is likely to attribute it to a logical source (e.g., TV, radio, trusted person, etc.).

(4) The predominate advantage of deceptive diversions is that they last longer than physiological diversions.

(a) The human body has a remarkable ability to recover from physiological effects (e.g., sound, light, pain, etc.).

(b) However, once convinced of a course of action (deception), a person will continue to act on this information until something causes them to doubt or change their mind again.

(5) Everyone on a tactical team needs to know when a diversion (either type), is to be used.

(a) Personnel on a tactical team can be fooled just as easily as a suspect.

(b) The adage, “If you’re not part of the plan, you’re part of the problem!” is never more true than when using diversions.

(6) For these reasons, deceptive diversions require a great deal of planning and preparation.

(a) When planning to use a deceptive diversion, you must attempt to identify all the possible consequences.

(b) A failed deception may initiate an unwanted course of action.

**EXAMPLE**: Sometimes deceptive diversions offer advantages which would be otherwise unavailable. For example, during negotiations a suspect is told that an audible alarm with a preset time will go off because there is no way to shut it off. In reality, at the preset time, a tactical team opens an alarmed door and gains entry despite the alarm. Because of the deception, the suspect may ignore the alarm.

4. **Physiological diversions** act directly on the suspect by affecting one or more of the five senses.

a. Of the five senses, three are most apt to be affected by a flashbang.

(1) Hearing — Loud noise

(2) Sight — Brilliant flash, dazzling light

(a) Sight is the most important sense.

(b) "We view, experience and interpret our world largely through vision."[2]

(3) Feeling — An instantaneous increase and decrease in atmospheric pressure.

(a) Humans are accustomed to a "normal" atmospheric pressure (14.7 PSI at mean sea level and 32° Fahrenheit).

(b) The only noticeable difference in atmospheric pressure a person is likely to experience is during a rapid increase or decrease in elevation, as when flying, riding in an elevator, or when diving in water.[a]

(c) A flashbang creates an instantaneous pressure wave which can increase and decrease normal atmospheric pressure by as much as +5 to about -.6 PSI.

(d) The experience of instantly being in high pressure followed by low pressure is one more stimulus for an organism to process and contributes to the desired sensory overload to create the distraction.
(see Part 3, Types of Explosions)

**EXAMPLE**: A native in the jungle needs hearing as much as sight. City dwellers primarily depend upon sight alone, and may actually filter out sounds which are not a threat to them (e.g., distant barking dogs, airplanes, etc.). Our desire to survive and cope with our surroundings develops those senses which we seem to need the most.[3]

5. To best understand how a physiological diversion works we must have a basic understanding of some of the processes the body and mind go through for the few seconds the flashbang affects them.

6. **Fear** is "a reaction to a recognized threat, characterized by a feeling of disagreeable tension and an impulse to escape the danger."[4]

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[a] **Note**: Although weather fronts will increase and decrease the atmospheric pressure (e.g., "high" pressure areas and "low" pressure areas), the change is too gradual to be noticed.

a. Fear is ". . . as real as hunger or thirst or pain. (a man's) heart pounds, his muscles tense, and his breath comes in gasps as his entire body automatically prepares itself to flee or do battle."[5]

b. "When a person finds himself in a threatening situation, large quantities of adrenaline are secreted, quickening the heart beat, sending blood to the brain and muscles, and in general mobilizing the organism for 'fight or flight.'"[6]

    (1) In our distant evolutionary past, fear was a tool. Life was a struggle and danger lurked everywhere.

    (2) The "fight or flight" response vastly improved the evolutionary odds of those who had developed it to the highest degree.

    (3) "Strictly speaking, it is not really a fear, but the body's instinctual response to fear, an alarm bell rung by the perception of imminent danger."[7]

c. "Although these reactions usually have the positive effect of alerting the individual to meet the emergency, there are situations, *especially in panic*, where the body becomes overmobilized and behavior becomes disorganized."[8] (emphasis added)

    (1) "Fear then, can be either stimulating or paralyzing, either constructive or destructive. Since no one's life is entirely free of threat, it is a normal, understandable reaction in many situations."[9]

(2) "The intensity of fear in any situation varies among individuals and depends partly on the potential danger that causes the fear."[10]

(3) "Most people think of panic as an irrational, unthinking response to a catastrophe. In fact, however, panic as a reaction to catastrophe is rare."[11]

(a) The body's response to this type of fear is involuntary. The "instinctual" response has been built in.[b]

(b) ". . . the anxiety alarm system is tripped from within; a switch is thrown and the body reacts with all the severe physiological stresses of a full-blown fear response."[12]

7. "A good part of the history of life can be written in terms of fear—both the common fears that most of us experience in greater or lesser degree, and the unique fears we develop as individuals."[13]

a. "The first responses that can be definitely identified as fear do not emerge until about seven months of age."[14]

(1) The infant withdraws from almost any sudden stimulation, like loud noises.

(2) "Loss of support" (falling) is also apt to cause fear at this age.

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[b] **Note**: The ignition of a flashbang instantly puts this "instinctual response" in action and the body attempts to mobilize for "flight or fight," but because of the sensory overload this takes several seconds. These seconds are the goal of the distraction, and the ability to create this condition has tremendous tactical significance.

b. All fears are learned or "conditioned" responses.

(1) Almost every one has experienced a fear of darkness when they were younger.

(a) "Children are commonly afraid of the dark, perhaps because two natural cues are present when one is alone in the dark: strangeness and isolation."[15]

(b) As children mature they begin to discard this fear until they, quite literally, outgrow it.

(2) Common individual fears include:

(a) Fear of heights (acrophobia)

(b) Fear of closed-in spaces (claustrophobia).

(c) Fear of spiders (arachnophobia).

(d) Fear of speaking in public (the most common adult fear).

c. As children grow into adults they accumulate and discard a number of fears as they learn to deal with their new world.[c]

8. **Panic** is "an acute reaction of confusion and terror arising out of a situation of overwhelming danger and threat; complete demoralization characterized by irrational nonadaptive behavior."[16]

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[c] **Note**: A flashbang addresses some of a person's first fears when it produces a large "bang" (sudden stimulation and loud noise), and a loss of support from the effects of the pressure wave passing over him.

a. Panic is a tremendously heightened sense of fear, although of shorter duration.[d]

b. Panic is characterized by "collective surprise and shock, suggestion, mass imitation, mental contagion, shattering of group bonds, wild flight."[17] (A L Strauss 1944)

(1) Panic leads the individual to make an attempt to "keep alive regardless of the rules and customs that ordinarily govern behavior."[18]
(P.B. Foreman 1953)

(2) "Situations of this kind are followed by acute feelings of terror, and often by screams, shouts, and excited physical movements that occur when all attempts to understand and master the situation are blocked."[19]

(a) A sensory overload creates an inability to correctly interpret life's stimuli.

(b) The instant ignition of a flashbang creates a sensory overload which involuntarily "distracts or diverts" the attention of the suspect.

9. The opposite of the "fight or flight" response is the "**acetylcholine effect**."

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[d] **Note**: "It is said that the ancient Greek god, Pan, amused himself by frightening mortals who ventured into the lonely woods where he lived. The word 'panic' is derived from the contagious fear he caused."[d]

a. “Acetylcholine is a chemical compound characteristic of a biological surrender. This is the agent found in large doses in a hibernating bear’s bloodstream. It can also be found in the bloodstreams of possums when they ‘play dead.’ The pulse rate, blood pressure, and blood sugar all go down. The animal is then biologically prepared for surrender.”[20]

b. The acetylcholine effect is associated with total emotional surrender.

c. When suspects have endured conditions that have kept them in a high state of emotional tension for long hours, it is possible the effects of a flashbang may be attenuated.

    (1) Like the “fight or flight” syndrome, the effect is temporary.

    (2) A flashbang will cause a heightened state of tension but may not be as effective if the suspect is under the effects of the acetylcholine.

d. Of important note is that unlike the “fight or flight” syndrome which is unavoidable, the acetylcholine effect *is!*

    (1) A positive mental attitude and/or strong determination will prevent the onset of the acetylcholine effect.

    (2) Even when under the effects of the acetylcholine, surrender may not be likely.

        (a) Suspects may simply see their fate as unavoidable, and accept it.

(b) Suspects who believe they will die regardless, become a much more formidable adversary.

(3) During the acetylcholine effect, the reactions of persons vary from overly submissive to more resistant.[e]

10. We now have an understanding of what the body and mind experience as a result of fear and panic. What relationship does this experience have to do with physiological diversions?

    a. An ability to create a condition which causes disorientation and confused thinking is of great aid during a tactical intervention.

    b. The tactical team needs to exploit this period of confusion and immediately place the suspect at such a disadvantage that surrender becomes likely and resistance futile.[f]

11. Physiological diversions assist in distracting a suspect's attention and preventing organized resistance.

    a. It creates a sensory overload with light, noise and air pressure.

    b. Because it works on the organism (suspect) directly and does not require an inference, it is faster and more sure.

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[e] **Note**: The acetylcholine effect is one of the emotional cycles a suspect experiences during long periods of high tension. Persons who must make recommendations or approve the use of flashbangs need to have an understanding of some of the aspects which inhibit the effects of physiological diversions.

[f] **Note**: This course of action is called a "tactical dilemma" and is one of the most fundamental methods for effectively resolving tactical problems involving adversaries.

c. The effects are of shorter duration than a deceptive diversion since the body can recover from “shock” extremely fast, (almost always less than 6 to 8 seconds).

d. Despite the relatively short duration, this “**exploitation window**” has momentous tactical significance.

(1) The exploitation window begins, not when the flashbang is thrown, but at the instant it ignites.

(2) Thus, the window for exploitation begins at about 2 seconds (after the fuze has burned and the device ignites) and continues until the body has recovered sufficiently enough to put up an effective resistance.[g]

e. Closely associated with the exploitation window is the “window of vulnerability.”

(1) The window of vulnerability is a period during which the suspect is aware of the tactical team’s presence, but before being affected by the flashbang.

(2) Generally it lasts from zero to about two seconds. (0-2 seconds)

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[g] **Note**: Flashbangs do *not* prevent a suspect from resisting. They prevent him from *effectively* resisting. A suspect with a gun in his hand may be able to fire (in fact, he might fire unintentionally by flinching when startled by the flashbang). However, during the time he is under the influence of the flashbang (exploitation window), he is incapable of rational thought and his ability to put up an effective resistance is tremendously diminished. *This crucial concept is a frequent point of contention in courtroom presentations.*

(3) This period begins when the suspect becomes aware of the team (e.g., opening a door or window to deploy a flashbang) and continues until he is overwhelmed by the physiological effects.

12. Because the flashbang affects the organism (suspect) directly through the senses, there is no defense against it.

    a. A physiological response is involuntary. It works whether you want it to or not. It is simply the body's reaction to a given stimulus.

    b. Because of this, it works equally well time after time. This is the predominate advantage of a physiological diversion.

    c. We view and interpret our world largely through vision.[21]

        (1) This can be easily illustrated by the fact that much of our entertainment is visual.

        (2) Our homes and workplaces are arranged and painted for our visual enjoyment.

        (3) As much as 85% of our knowledge is gained through visual means.

        (4) When our vision is impaired, so is our ability to correctly interpret the "cues" for appropriate reactions in our everyday lives.

    d. The dazzling light from the flashbang temporarily impairs the suspect's vision by two methods.

(1) The pupil of the eye constricts when it is exposed to a bright light.

(a) The constriction of the pupil takes place in approximately one-half second.

(b) It will take up to two minutes for the pupil to dilate after being exposed to a bright light.[h]

(2) The most important part of adaptation to light and dark occurs in the retina portion of the eye when a light-gathering fluid called rhodopsin is bleached.

(a) **Rhodopsin** – Sometimes called "visual purple," is a pigment, and is located in the retina portion of the eye. It consists of proteins and vitamin A.

(b) The color of the rhodopsin varies with the amount of light to which it is exposed. The more light, the lighter color it is, and the less light, the darker the color.

(c) When rhodopsin is bleached, as from the brilliant light of a flashbang, it will take *from ten to thirty minutes* for the rhodopsin to be renewed.

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[h] **Note**: The pupil constricts because of muscle contraction. However, in order for it to dilate, the same muscle must relax. This takes longer.

(d) The darker the area in which a flashbang is deployed, the greater the effect on the suspect's eyes because it takes longer to recover and regain night vision than in brighter light.

**EXAMPLE**: The pupil in the human eye constricts in about one-half second, but takes up to two minutes to dilate, and up to twenty minutes to regain full night vision. When stimulated by light, for instance a flashbang, the 2,000,000+ candlepower flashes in less time than the eye can constrict, (sensory overload). *A typical flashbang emits enough light to cause constriction of a person's pupils even through closed eyelids!*

e. The flashbang also temporarily interferes with the suspect's ability to hear well.

(1) Flashbangs create a sound called "**impulse noise**." Impulse noise is simply noise that lasts for less than one second.

(2) The loud boom that is heard when a flashbang ignites causes a temporary threshold shift of the suspect's hearing.

(a) This creates an additional stimulus that the organism (suspect) must interpret and correctly respond to.

(b) Because of the body's amazing ability to recover from this over stimulation, the effects will usually last for only a few seconds, but the suspect may have a ringing in his ears for several hours.

(c) The loud boom can be compared with a gunshot or the sound of an airbag when it deploys inside a car.
(For a more complete discussion, see, Appendix D, Physiological Effects of Flashbangs.)

f. Another sense affected by the use of these devices is that of feeling.

(1) Humans are accustomed to normal air pressure, (about 14.7 PSI at mean sea level).

(a) Among the few ways humans will notice a change in air pressure are when they are flying, diving or rising rapidly in an elevator.

(b) The sensation has been felt by most persons, and is usually described as a "stuffiness" or "fullness" of the head. Although this normally takes several seconds, a flashbang "washes" the suspect in this wave in less time than it takes to blink your eye.

(2) When the flashbang ignites, it creates an overpressure followed by an underpressure.

(a) The suspect is "washed" by this wave which may raise and lower the atmospheric pressure as much as +5 to about -.6 PSI.

(b) This sensation stimulates the organism still further and contributes to the desired sensory overload.

13. The human body has a built in "lag" time. **Lag time** is the interval between when an organism is stimulated and when it responds.

a. In humans this is about three-quarters of a second, (.7 to .8 seconds).

b. There are three major characteristics that affect a person's lag time.

(1) *Age* — the younger you are, the quicker you are. A teenager has a quicker reaction time than a sixty year old man.

(2) *Physical condition* — The better your physical condition, the faster your reflexes.

(3) *Fatigue* — A well-rested person reacts faster than one who is fatigued.

**Example**: Demonstrate a physiological diversion by using "gun takeaway" with lag time, using a common signal first and an independent signal second.

Demonstrate a deceptive diversion by having a strong person grab your arm and then pulling it loose using a diversion to the crotch area.

14. Is there anything a person can do to reduce this lag time?

a. The answer is a definite yes. If a person has trained for this situation, they can often overcome panic and react effectively.

b. The military uses an "immediate action drill" to condition troops to this eventuality.

(1) An "**immediate action drill**" is any action, technique or procedure which is initiated by an event rather than a signal.

(2) The immediate action is mastered by numerous rehearsals, which take place when a given event occurs, e.g., Shot—take cover, Ambush—take cover and aggress, and so forth.

(3) The ability to do this is borne out in psychological research.

(a) An army frequently faces situations without panicking, which challenge conventional feelings of safety.

(b) The concept "Train like you fight and you'll fight like you trained!" has long been an axiom with military, police and the fire services for people facing life-threatening situations.

(c) "Some writers also stress the need for training the group itself to respond automatically in critical situations."[22]

**EXAMPLE**: Race car drivers consistently respond to stimuli in about one-tenth of a second, (conditioned response). Young school children are taught emergency evacuation drills to a one-two-three-four command, or to martial music, (regimented behavior).

15. The important thing to remember is that in stressful situations you will react the way you have been trained.

a. Your ability to act in a controlled and coordinated manner during high-risk situations is not only crucial, but is dictated by your state of readiness.

b. Suspects with military training who have been conditioned in "immediate action drills" may react differently than those who have not practiced these drills.

[1]*AN ACOUSTICAL ASSESSMENT OF THE IMPULSE NOISE OF GRENADE SIMULATORS EXPLODING IN ENCLOSURES*, a study conducted by the Human Engineering Laboratory (HEL), Aberdeen Proving Ground, Aberdeen, Maryland, December 1981 to January 1982, p3.
[2] Taken from a lecture given by Dr. Harvey Schlossberg, 0950 hours on October 12, 1988, San Jose State University, at the Los Gatos Lodge, Los Gatos, California.
[3] Taken from a lecture given by Dr. Harvey Schlossberg, October 12, 1988.
[4] Goldstein, Robert M. Ph.D., The *ENCYCLOPEDIA OF HUMAN BEHAVIOR: PSYCHOLOGY, PSYCHIATRY AND MENTAL HEALTH*, Volumes 1 & 2, Doubleday and Co., Inc., 1970.
[5]Gold, Mark S., M.D., *THE GOOD NEWS ABOUT PANIC, ANXIETY & PHOBIAS*, Villard Books, New York, New York, 1989, p51.
[6]Goldstein, *ENCYCLOPEDIA*, 1970.
[7]Gold, THEGOOD NEWS ABOUT PANIC, ANXIETY & PHOBIAS, 1989, p51.
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[10]Hyde, Margaret O. and Forsyth, Elizabeth H., M.D., *HORROR, FRIGHT & PANIC!* Walker and Company, New York, New York, 1977 & 1987, p6.
[11]Hyde and Forsyth, *HORROR, FRIGHT & PANIC!* 1977 & 1987, p10.
[12]Gold, THEGOOD NEWS ABOUT PANIC, ANXIETY & PHOBIAS, New York, 1989, p53.
[13]Goldstein, *ENCYCLOPEDIA*, 1970.
[14]Goldstein, *ENCYCLOPEDIA*, 1970.
[15]Hyde, Margaret O. and Forsyth, Elizabeth H., M.D., *HORROR, FRIGHT & PANIC!* Walker and Company, New York, New York, 1977 & 1987, p53.
[16]Goldstein, *ENCYCLOPEDIA*, 1970.
[17]Goldstein, *ENCYCLOPEDIA*, 1970.
[18]Goldstein, *ENCYCLOPEDIA*, 1970.
[19]Goldstein, *ENCYCLOPEDIA*, 1970.
[20]Ascencio, Diego and Nancy, *OUR MAN IS INSIDE*, New York, Atlantic-Little, Brown Books, 1983, p108 as quoted in “Surviving the Hostage Incident,” by Quarles, Chester L., Law Enforcement and Criminal Justice Programs, The University of Mississippi.
[21] Taken from a lecture given by Dr. Harvey Schlossberg, 0950 hours on October 12, 1988, San Jose State University, at the Los Gatos Lodge, Los Gatos, California.
[22]Goldstein, *ENCYCLOPEDIA*, 1970.

## PART 3 — TYPES OF EXPLOSIONS

A. **Explosion (defined)** — An explosion is defined as a blowing up, or bursting with a loud noise; the noise made by an explosion; a bursting.

1. Actually, this broad definition of an explosion needs to be more precise in order for an instructor to fully understand how and why a flashbang works.

    a. Because of negative connotations associated with explosions, it can be a great advantage to show how harmless explosions occur regularly in our everyday lives.

    b. An instructor must be able to explain to students in more precise terms how a flashbang works.

2. There are actually three different types of explosions.

    a. **Mechanical Explosion** — A mechanical explosion is characterized by a gradual but constant build-up of pressure to a point where the container bursts and suddenly releases its pressure.

        (1) An example of a mechanical explosion would be a grape or potato bursting in a microwave oven.

        (2) The water inside these types of food is heated by the microwaves and begins to boil, which changes the water to steam. This expands and bursts the fragile skin.

(3) A mechanical explosion usually creates a high temperature, and is characterized by a loud noise and increased pressure by the release of gas.[a]

b. **Nuclear Explosion** — A nuclear explosion is initiated by either fission or fusion.

(1) Fission occurs when the nuclei of atoms are split.

(2) Fusion occurs when, under great pressure, the nuclei of the atoms are joined together.

(3) No matter which type of nuclear explosion occurs, there is again a high temperature, loud noise and a tremendous release of pressure.

c. **Chemical Explosion** — A chemical explosion is characterized by a rapid conversion of a solid or liquid explosive compound into gases. The gases occupy a greater volume than the substances from which they were produced.

(1) The conversion from a solid or liquid to a gas is measured in milliseconds.

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[a] **Note**: Although mechanical explosions are characterized by an increase in temperature, some mechanical explosions, such as that produced when an "overfilled" balloon bursts, result in an increase which can be scientifically measured but may not be perceived.

(2) A chemical explosion, like the other two, usually produces a high temperature, loud noise and a tremendous release of pressure.[b]

(3) All commercially available explosives are of the chemical explosion type.

(4) A common example of a chemical explosion is gasoline in the combustion chamber of an automobile or a bullet traveling down a rifle barrel.[c]

3. Chemical explosives are further defined as being either "deflagrating" or "detonating."

   a. A **detonating explosive**, also called a "high" explosive is characterized by ". . . very rapid chemical reactions, thus causing tremendously high pressure and brisance, (shattering action)."[1]

      (1) The initiation of a detonating explosive is propagated from the point of initiation by a supersonic shock wave or detonation wave.

      (2) Detonating explosives are subject to "**sympathetic detonations**," which are the result of a similar compound exploding next to it.

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[b] **Note**: In the case of a flashbang, the conversion takes place in less time than it takes to blink your eye, and the temperature will reach over 2000° Centigrade (between 2030° and 2700° C), at the point of the explosion. The noise is comparable to a rifle at its muzzle or an airbag deploying in a car.

[c] **Note**: Flashbangs are examples of chemical explosions, however the canister or body of the device acts like a mechanical explosion by allowing the gases to escape at a predetermined pressure level.

(3) The flame from a detonating explosive is carried by the shock wave. The shock wave may travel with velocities of over 9,000 m/sec (>29,500 ft/sec) and reach 5000° Centigrade.[2]

(a) The entire explosion of a detonating explosive is measured in *millionths of a second.* (The detonation is complete in about 10 microseconds.)

(b) The resulting shock wave travels faster than the speed of sound, creating a tremendous shattering action.

(4) A detonating explosion is characterized by a sudden buildup and release of pressure.

(a) This sudden buildup and release of pressure causes a condition known as “brisance.”

(b) **Brisance** is a term given for the breaking or shattering effect from the sudden release of energy.

(5) Examples of detonating explosives include nitroglycerin, TNT, PETN, RDX, C-4, Composition B, amatol and tritonal.[d]

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[d] **Note**: While a flashbang will complete the ignition cycle in about 50 thousandths of a second, a detonating explosion will complete its cycle in about 10 millionths of a second and a nuclear explosion is complete in about 30 *billionths* of a second. Using distance as a comparison, light will travel about 10,000 miles in 54 milliseconds, about 982 feet in 10 microseconds but less than *36 inches* in 30 nanoseconds.

b. A **deflagrating explosive**, also called a "low" explosive, is characterized by relatively slow burning processes with progressive reaction rates and buildup of pressure, which creates a heaving action.

(1) The initiation of a deflagrating explosive is propagated from the point of initiation by combustion.

(2) Generally, deflagrating explosives are not subject to "sympathetic detonations" because the chemical compound is more likely to burn.[e]

(3) The flame from a deflagrating explosive is carried by conduction and diffusion and can only burn as long as there is oxygen available.

(a) The entire explosion of a deflagrating explosive is measured in *thousandths of a second*.[f]

(b) The deflagration for a flashbang is complete in about 50 thousandths of a second.

(c) The resulting shock wave travels at about 1,300 feet per second.

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[e] **Note**: One exception, while rare, can occur if a deflagrating explosive is confined in such a manner that the expanding gases cannot escape, then the pressure continues to build. Eventually, given sufficient pressure, this can result in a detonation.

[f] **Note**: Deflagrating explosives (propellants) burning at one atmosphere in pressure are as much as 10 million times slower than detonating explosives!

(4) A deflagrating explosive is characterized by a relatively slow and gradual increase in pressure. [g]

(5) Examples of deflagrating explosives include gasoline, kerosene, black powder, flash powder, liquid natural gas and other types of pyrotechnics and propellants.

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[1] *SCIENTIFIC ENCYCLOPEDIA*, Van Nostrand's, Sixth Edition, Van Nostrand Reinhold Company, New York, New York, Consideine, Douglas M. P.E. Editor, 1982, p1138.
[2] Cooper, Paul W. and Kurowski, Stanley R., *INTRODUCTION TO THE TECHNOLOGY OF EXPLOSIVES*, Wiley-Vch, New York, New York, 1996, p8.

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[g] **Note**: The chief difference between a deflagrating and a detonating explosive is that a detonating explosive is initiated by the supersonic shock wave, while the deflagrating explosive is initiated by combustion. At normal atmospheric pressure (14.69 psi), and 0° Centigrade (32° Fahrenheit), the expansion of gases for a flashbang will increase the volume of its chemical compound from about 1.5 cubic inches to over 33 cubic feet in about 50 milliseconds. That equates to an increase of 3800 times!

## PART 4 — TYPES OF DEVICES

A. As mentioned previously, modern distraction devices on the market today bear only a resemblance to their predecessors.

1. Early models of flash/sound diversionary devices were actually grenade simulators, which were modified with a metal fuze assembly (bouchon) to allow firing with only one hand and initiation within two seconds.

    a. Upon ignition, these early models often propelled the bouchon with sufficient force to cause injury if someone were struck.

    b. The problem identified was how to ignite the flashbang without propelling the bouchon?

2. The grenade simulators used for training were made of cardboard and had burning fuses for ignition.

    a. The fuse burning time required 8 to 10 seconds for initiation.

    b. These devices were manufactured for training and were to be used outside rather than inside buildings.

    c. These fuses were very reliable and, because they were made from lightweight materials, did not throw dangerous components when the device exploded.

    d. The primary problem with these fuses was the excessive length of time required for them to function.

3. Modern devices are vastly safer than earlier models and continue to be improved.

    a. Devices have been made safer by reducing decibel and overpressure levels.

b. Newer devices have greatly reduced the chance of injury by the flying bouchon, (fuze assembly).

B. The predominant problem confronted by the manufacturers of both diversionary devices and stingballs has been to find a method to prevent the bouchon from being thrown when they ignite.

1. At present, this problem has been resolved for diversionary devices by one of three methods.

a. The first method uses a bursting canister.

(1) The **bursting-canister** method works by rupturing the canister and allowing the expanding gases to escape at a low enough pressure to prevent the bouchon from being thrown.

(2) This is a complex engineering problem in that the canister must contain sufficient pressure to allow the flashbang to be effective, but low enough to prevent the bouchon from being thrown.

(a) The canister must be firm enough to withstand rough usage and contain the explosion, but still able to burst without throwing the bouchon.

(b) Modern devices, using new materials and configurations, have proven extremely successful in resolving this dilemma.

(3) Current models of flashbangs using this method include those manufactured by Omni Distribution and Ensign-Bickford.

(4) The Ensign-Bickford device uses a canister that ruptures in such small pieces that there is not enough mass and velocity to cause injury, while the Omni device ruptures a plastic canister.

b. The second method uses a separating submunition.

(1) Devices using a **separating submunition** have a small charge to separate the bouchon from the main charge before it ignites.

(a) Flashbangs that use this method usually have a two-part heavy cardboard construction.

(b) The canister splits to allow the main charge to be propelled from the canister and bouchon, where it ignites far enough away to prevent it becoming a dangerous missile.

(c) Almost all commercially available stingballs currently use this method to avoid injuries by the flying bouchon.

(2) Typically, the separating submunition ignites about .5 seconds after the spoon is released and the main charge is ejected from the canister. Approximately 1.5 seconds later, the main charge ignites.

(3) Current models of flashbangs using this method include those made by Precision Ordinance Products, Inc.

(4) There are two problems resulting from this method.

(a) The first is a difficulty in placing the diversionary device exactly where you want it for ignition. This has not proven to be a major detriment, since the hazards associated with most tactical conditions make it difficult to place *any* device exactly.[a]

(b) The second problem has been the unreliability of the separation in every instance. Better quality control and a recent innovation of a "friction fit" instead of glue has all but eliminated this problem.

c. The third method is by using a non-bursting canister.

(1) A non-bursting canister holds the bouchon firmly attached to a canister too heavy to be flung by the explosion.

(2) Canisters of devices using this method are most commonly metal and contain holes (called venturi) to vent the gases.

(3) Current models of flashbangs using this method include those made by Defense Technologies (Def-Tec), Combined Tactical Systems, Universal Propulsion Company, MK Ballistics Systems, NICO Pyrotechnik and others.

(4) The use of non-bursting canisters has the added advantage of being reusable, which greatly reduces the cost per use.

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[a] **Note**: Some manufacturers use a "tether" to prevent the main charge from being thrown too far from the canister.

(5) Another advantage is that the devices are heavy enough to be thrown through glass, screens, bushes and other obstacles that deflect their lighter counterparts.

(6) A disadvantage of these types of devices is that they tend to be significantly heavier than devices using either of the other two methods. Consequently, they are frequently carried as a primary device with one of the lighter varieties carried as a back-up.

2. There are predominately two methods for igniting flashbangs and one for stingballs.

   a. The first uses a bursting canister and a friction-type fuse (M3-A1) and is commonly called a “string pull,” because the fuse is ignited by pulling a string.

      (1) Today, this fuse is almost never seen on diversionary devices except on the original M116-A1 grenade simulator and M115 artillery simulator. There are no commercially available stingballs that use this method.

      (2) The average time for the firing sequence of this fuse is 8 to 10 seconds.

   b. The second is a “delay-igniting” type fuze which uses a metal body[b] with a “spoon.” When released, a metal plate strikes a primer and begins a chemical reaction. This “percussion” fuze is often called a “pin-pull” fuze.

[b] **Note**: Some manufacturers are now using bouchons made from plastic.

(1) This fuze has proven extremely reliable and is now the most common fuze on virtually all stingballs and diversionary devices.

(2) The average time for the firing sequence of this fuze is 1.5 to 2 seconds.[c]

C. In addition to making the distraction devices safer, manufacturers have also attempted to make them more useful.

1. Manufacturers now offer several models of diversionary devices for different purposes.

a. Several different loads are often offered by manufacturers to better "tailor" the diversion device to the size and area (outside or inside) in which the diversion is expected to be used.

b. Other models offer multiple bursts from a single ignition to provide a longer diversion.

c. Still other models offer different shapes for surreptitious insertion before ignition, (e.g., under doors, through holes in walls, etc.).

2. As distraction devices continue to be developed, future devices will offer even more advantages.

a. Several developers are working on a "smokeless" distraction device which may be available as soon as the spring of 2002.

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[c] **Note**: The fuze used for most flashbangs and stingballs is either the M201-A1, or one very similar. It was designed and is still used for the United States military. The military specifications (MilSpecs) for delay tolerances are 0.7 to 2.0 seconds. Some newer fuzes are now available with closer tolerances of 1.5 to 2.0 seconds.

b. A new “fuel-aerial-explosion” device may allow a distraction without shrapnel by igniting a gas which can be inserted under doors, through windows or cracks in a wall.

c. An electronic type of device may allow repetitive firings without an explosion by using an electronic discharge. The intensity and frequency of firing can be altered by the user at the scene to “tailor” the distraction the unique circumstances.

d. Some developers now provide kits for adapting conventional flashbangs and stingballs for training purposes. Similar to simulation munitions for weapons, these training devices allow tactical teams to practice at reduced cost and hazard.

D. There are several methods for deploying flashbangs and stingballs.

1. By far, the most common method of deploying both flashbangs and stingballs is by hand.

a. Personnel assigned to deploy these devices must be thoroughly familiar with safety procedures.

b. A premature ignition can cause serious injury to the person holding the device.

(1) The most common cause for a premature ignition is “milking” the spoon, that is gripping and regripping the device while holding it.

(2) When gripping a flashbang or stingball, the spoon should be held in the web of the hand to avoid accidentally releasing it.

(3) Left-handed persons can accomplish this by placing the device upside down. This will allow the device to be held with the spoon in the web of their left hand with the safety pin toward their right hand.

c. The most common cause for a failure to ignite is simply forgetting to remove the safety pin prior to deployment.

(1) This oversight may seem humorous later but can have a devastating effect on a high-risk entry.

(2) A flashbang that fails to ignite, for whatever reason, provides the suspect with a warning which considerably aggravates an already risky situation.[d]

2. Some types of diversionary devices are able to be deployed by a 37mm or 40mm delivery device (such as the Sage, ARWEN, Def-Tec or Federal Tear Gas Gun), or 12 gauge shotgun.

a. The device designed to be launched is called an “air burst simulator,” and like the grenade simulator, was originally designed as a training device.

b. The devices fired from a shotgun, have been used in agriculture to scare birds from grain crops without ruining the grain, and produce a much smaller yield than the air burst simulator.[e]

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[d] **Note**: It is strongly recommended that **inert** devices be available during classroom presentation for demonstration and practical application purposes.

[e] **Note**: At least one manufacturer (Royal Arms International, P.O. Box 6083, Woodland Hills, CA. 91365-6083, 818-704-5110, Fax 818-887-2059, RoyalRJ@aol.com) manufactures munitions specifically designed for flash/sound diversions.

c. Likewise, some stingballs are now able to be launched from a shotgun to gain distance and effectiveness by maintaining a larger stand-off distance between a mob and the authorities.

3. Some situations require innovation to deploy a distraction device.

   a. The use of a “flash stick” was pioneered by the Los Angeles County (CA) Sheriff’s Department, Special Enforcement Bureau in the early 1980s.

      (1) When drug dealers began placing chain link fences around their houses, bars over their windows and sally ports in front of their doors, a need to place a flashbang beyond these obstacles was required.

      (2) The flash stick is simply a pole (usually aluminum alloy, or some other metal, to avoid splinters) which has a flashbang taped approximately 8" to 10" from the end.

         (a) The stick projects beyond the flashbang, which allows glass to be broken and objects to be pushed aside, without stripping off the flashbang.

         (b) The flashbang is deployed by placing the flash stick through a window and then either dropping it or holding it for exact placement.

   b. Another deployment technique utilizes a variation of the flash stick, called a “painter’s pole.”

(1) The **painter's pole** is simply an extendable aluminum pole to which painters attach their rollers.

(2) A flashbang can be taped to it, similar to the way it is used on a flash stick.

i. The painter's pole technique allows flashbangs to be used to support second-story entries where a flashbang is ignited while being held outside a window or doorway, etc.

ii. The "painter's pole technique" is now commercially available and provides a more elegant solution to this problem."

4. In July, 1992, Omni Distribution introduced a "non-el"[f] firing device.

   a. This device allows remote firing of a flashbang and provides the user the ability to determine *exactly* when he wishes the ignition to take place rather than rely on mechanical devices to remove the pin.

   b. Other manufacturers have now begun to address this problem and offer commercially available remote firing systems.

   c. Since that time, several other manufacturers have also provide remote firing devices for their particular flashbangs.

[f] **Note**: "Non-el" stands for "non-electrical."

## PART 5 — NOMENCLATURE AND FUNCTIONING

A. All flashbangs have three component parts. These are the bouchon or fuze mechanism, the body or canister, and the charge or explosive mixture.[a]

1. **Bouchon** — The most common fuze assembly for distraction devices is the M201-A1. This fuze has been in service for several decades and has proven to be extremely reliable.

a. The M201-A1 fuze assembly was originally designed for use in smoke and incendiary grenades for the military.

(1) This fuze is from the M-200 fuze "family." These are the most popular grenade fuzes in the United States and are standard on devices such as smoke grenades, riot control agents, fragmentation grenades and others.

(2) This is an igniting-type fuze that creates a spark to ignite a chemical filler.

(3) A detonating-type fuze is used with high explosives and actually detonates inside the grenade body.[1]

b. Because of its proven reliability, ease of use and interchangeability, it was readily adapted for use on distraction devices and has remained a model for the newer, plastic bouchons.

c. The bouchon consists of the components of the fuze assembly. These are:

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[a] **Note**: Sometimes, the explosive charge is also called the "filler."

(1) **Safety Lever** — also called the "spoon." This is the lever which, when held, will not allow the device to be ignited.

(2) **Striker** — This is a small plate held in tension by the striker spring. When the "spoon" is released, the striker is freed to strike the primer.

(3) **Primer** — The primer is subject to a small explosion which ignites a chemical delay element.

(4) **Delay Element** — This is a chemical mixture which burns at a prescribed rate to achieve a delay to safely deploy the distraction device.

(5) **Ignition Mixture** — This mixture is ignited by the delay element which ignites the filler, (main charge).

2. The second component part of a flashbang is the **body** or **canister**.

   a. The body provides a very vital function.

      (1) It must withstand rough handling and protect the mixture inside from heat, moisture and other degrading conditions.

      (2) A container that is easily damaged becomes unreliable and unsafe.

   b. The design of the canister must take into consideration several aspects.

      (1) The distraction device must be able to be held and deployed easily.

(2) If the distraction device uses a submunition to separate the bouchon from the charge, the canister must allow this separation without building up dangerous pressures.

(3) If the distraction device uses the non-bursting canister method of controlling the bouchon, it must safely vent the gases caused by the ignition.[b]

(4) Some manufacturers use a “bursting” canister, which is designed to rupture when the flashbang ignites.

(a) The container must contain the explosion long enough to achieve the desired effects without creating a hazard by exceeding safe pressure levels.

(b) The canister must burst without propelling dangerous fragments, including portions of the canister itself.

3. The explosive mixture of a distraction device is called the **charge** or **filler**.

a. The charge most often used in flashbangs and stingballs is a chemical compound, which has evolved from more primitive forms of propellants (such as black powder) and is called “photo flash” powder.

b. The ingredients of “flash” powder vary from manufacturer to manufacturer.

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[b] **Note**: Vents which become plugged from debris, mud or other substances, can cause the retarded gases to rupture the steel canister. *This is the equivalent of a pipe bomb or fragmentation grenade!*

(1) The primary difference between black powder and flash powder is the addition of a booster, which allows the flash powder to burn more completely, brighter, with less smoke, or other characteristics which enhance the effectiveness of a distraction device.

(2) Although flash powder is an explosive, it is better classified as a propellant.

(a) This type of explosive is characterized by a progressive buildup of pressure by converting a solid (charge mixture) to gas, which occupies a greater volume (**deflagrating explosive**).

(b) In comparison, a **detonating explosive** is characterized by rapid chemical reactions causing tremendously high pressures and brisance, (shattering action).

c. The amount of sound and light is dependent on the ingredients of the charge, as well as the amount of the charge.

(1) In order for a flashbang to achieve its intended purpose, sufficient light and sound must be emitted to disorient suspects without endangering the safety of bystanders.

(2) The combination of ingredients, coupled with the amount of charge, is an exacting science and demands the utmost in quality control.

B. The operation of a flashbang can be broken down into three functions.[c]

1. The first function is the actual **deployment** of the device.

    a. The placement of a flashbang has an impact on the effectiveness of the distraction.

    b. Improper placement can greatly reduce effectiveness or endanger bystanders.

    c. The deployment function begins with the preparation of the flashbang for deployment and ends with the release of the spoon.

    d. This is the only function which requires a decision. The other two functions are the natural consequence of a properly functioning diversionary device.

        (1) Some distraction devices require the bouchon to be assembled to the canister containing the charge.

        (2) Others require that the device be removed from the packing container or a plastic bag.

        (3) The pin is removed while the spoon remains depressed in the web of the user's hand.

        (4) The user then deploys the device by tossing it to the area where he wants it to ignite.

        (5) As the user releases the spoon, the firing sequence begins.

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[c] **Note**: One easy way of remembering the sequence of operation is that the functions are alphabetical — **D**eployment, **F**iring, **I**gnition.

2. The second function is the **firing sequence**.

    a. The firing sequence refers to the mechanical operation of the fuze assembly (bouchon).

    b. The firing sequence is similar to the firing of a bullet from a firearm.

    c. The firing sequence begins with the release of the spoon and ends with the ignition of the powder mixture.

        (1) When the spoon of the bouchon is released, it frees a striking device which is held under tension by a spring but prevented from moving by the spoon.

        (2) The striker has a nipple on it that contacts the primer with sufficient force to dent the thin metallic covering and detonate the primer.[d]

        (3) The primer explodes and ignites the delay element.

            (a) The delay element is designed to allow the device to be tossed without igniting the instant the primer detonates.

            (b) Different fuzes use different lengths of delay elements. The delay for almost all distraction devices and stingballs varies from .7 to 2 seconds, with the most common delay being between 1.5 and 2 seconds.

        (4) When the delay element burns for the prescribed amount of time, it activates the igniter.

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[d] **Note**: With few exceptions, this is the only component of a flashbang or stingball that actually "detonates."

(5) The igniter acts to burn the filler substance, (charge).

3. The third function is the **ignition sequence**.[e]

   a. The ignition sequence refers to the events which take place during the burning of the charge.

   b. This sequence has been studied and takes on the characteristics of typical explosive charges.

   c. The ignition sequence describes the series of events from the end of the firing sequence to the conclusion of the combustion of the charge.

      (1) When the filler substance (charge) is ignited, it creates a chemical reaction.[f]

      (2) As the charge burns, it changes the solid flash powder to hot gases, which are under tremendous pressure and expand rapidly outward.[g]

      (3) The increase of pressure creates a sound wave which travels a little under 1-1/2 feet per every one-thousandth of a second.[h]

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[e] **Note**: Another commonly used name for this sequence is “initiation.”

[f] **Note**: This chemical reaction is a four-step process. First, the propellant surface begins to melt. Second, the melted propellant begins to boil and/or evaporate. Third, as the propellant melts and vaporizes, it begins to decompose. Fourth, the decomposed products react with each other and produce hot gases which are expelled away from the reaction.

[g] **Note**: These gases can exert pressures of as much as 500 tons per square inch at the point of ignition, but will be less than 4 to 5 pounds per square inch at five feet (usually less than 3 psi).

[h] **Note**: More precisely, this wave travels approximately 1.136 feet per millisecond at 77° Fahrenheit.

(a) This pressure wave actually compresses the air molecules and propels them outward.

i. This results in an increase in atmospheric pressure at the edge of the wave and a decrease just behind it.

ii. This positive and negative part of the wave is partly responsible for the disorientation the suspect experiences.[i]

(b) Sometimes this pressure wave may be viewed as a white, rapidly expanding circle.[2]

(4) Approximately 40 milliseconds (.040 of a second) after ignition, the chemical reaction causes a flash of light which can be well over six million candlepower.

(a) Light travels at 186,000 miles per second as opposed to the speed of sound which is 1,088 feet per second (about 742 miles per hour).

(b) Thus, even though the sound and overpressure are the first physical manifestations of the explosion, it is the light which the suspect first experiences.[j]

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[i] **Note**: Other than weather changes, the only way a human being experiences changes in atmospheric pressure is by ascending or descending in elevation. A flashbang compresses this "experience" into milliseconds!

[j] **Note**: For all practical purposes, the effects of the flashbang (light, sound and pressure) are "instantaneous," because a human is unable to perceive any difference.

(c) This flash lasts approximately 10 milliseconds.

(5) Most flashbangs will complete the ignition cycle in around 54 milliseconds.

(a) Studies have been conducted which have measured the entire cycle in as short as 6 milliseconds and as long as 196 milliseconds.[k]

(b) 54 milliseconds is the median average for the entire sample studied. (N=78)[3]

C. Of the three sequences, the deployment sequence is the most crucial to the safe and effective use of flashbangs.

1. At the present time, all commercially made flashbangs intended for diversions, (and not training) are of the pin-pull variety. A number of companies are now considering building either "command detonated" or delay fuzes, (bouchons).

a. The "standard" type of flashbang consists of a cardboard or steel tube with a pin-pull fuze on the top.

b. The fuze has a safety wire with a large ring on the side. The wire resembles a cotter-pin and is bent to the side on the opposite side of the fuze with the ring.[l]

c. Both flashbangs and stingballs are almost always deployed by hand.

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[k] **Note**: Consider that the "blink of an eye" takes about 200 to 250 milliseconds!

[l] **Note**: It takes more than 75 pounds of energy to remove a safety wire that has been flattened against the side of the bouchon. This is normally the position in which they are shipped and stored. By bending the ends to about a 30° angle, the effort can be reduced to about 15 pounds of resistance.

d. The device is deployed by placing the spoon in the web of the strong hand with the fuze pointing up. (Left handed persons must place the fuze pointing down, otherwise the ring will be on the wrong side of their hand.)

e. Pull the ring and discard it. The device will not ignite as long as the spoon is depressed.

f. *Throw* the device away from you into the area you wish it to ignite.[m]

g. There are some important safety do's and don'ts when deploying these devices.

(1) Don't “milk” the device or change hand positions. Remember, this device has only a two second fuze or less. You don't want this device to go off in your hand!

(2) Avoid removing the safety pin until just prior to throwing it. You may not be able to throw it later and it is cumbersome to balance your weapons, flashlight, or other equipment and thread a new pin into a small hole in semi or total darkness.

(3) A spare safety pin is a handy item to have available. If it becomes necessary to disarm the device, the original pin is often unavailable.

2. The string-pull (friction fuse) devices are used by the military. At present, they are not commercially available.[n]

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[m] Note*: Whenever possible, throw the device to an area visible to the officer.* This will help ensure the device doesn't land on combustibles, loose objects or too near an occupant of the location.

a. Because of the delay fuse, these may be used in situations where the two-second “pin-pull” variety are inappropriate.

b. There are a variety of methods of employing these devices.

c. To hand-deliver this device, remove the safety wire located near the bottom of the small tube (through the plastic retainer cap) on the side of the device and discard it.

d. Pull the string (attached to the retainer cap) from the tube *only* until you feel slight resistance.

e. Sharply pull the string out of the tube.[o]

f. Throw the device away from you into the area where you wish it to ignite.

g. These devices are most often used to create a diversion from the *outside* of a building.

h. These devices are especially suitable for vicious dogs and other animals and almost always deters them to the point where a tactical team can continue their mission without killing the animal. In this manner, a flashbang becomes a non-lethal deterrent.

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[n] **Note**: While these devices are not commercially available, they can sometimes be obtained from the U.S. military and employed outside as deceptive diversions or to distract vicious dogs.

[o] **Note**: You should hear a faint "popping" sound, often accompanied by a small whiff of smoke. If you do not immediately hear this sound, sharply tug the string again and watch for a whiff of smoke to indicate that the fuse has been ignited. If this fails, deploy the device as usual. *After activating the fuse, always assume it is armed!*

D. The placement of the flashbang can have a great deal of influence on its performance.

1. There are several things which impact on a flashbang's ability to disorient the suspect.

a. **Proximity** — The proximity of the flashbang to the suspect when it ignites, has a great influence.

(1) As the distance from a flashbang is doubled the effects from the sound level and pressure wave is halved.

(a) This means that a flashbang that measures 170 dB at five feet will only be about 164 dB at ten feet and only 158 dB at 20 feet, and so forth.

(b) Simply put, the farther a person is from the flashbang, the less they will "suffer" from the effects.

(2) Ideally, the flashbang needs to be placed about five feet from the suspect.

b. **Barriers** — A barrier is anything which is between the flashbang and the suspect at the time of ignition.

(1) Examples of barriers include walls, large pieces of furniture, etc.

(2) Barriers greatly attenuate the effects of the flashbang by reflection and absorption.

(3) Barriers can be of great assistance to a tactical team, since team members can remain relatively unaffected behind a wall or large piece of furniture, while a suspect experiences the full effects on the other side.

c. **Reflection** — A reflected wave can greatly enhance the effects of a flashbang.

(1) When a flashbang goes off near a surface which has the ability to reflect the pressure wave (i.e., a wall or floor) it produces a secondary (reflected) pressure wave as well as the primary, (incident) wave.

(2) When the reflected wave is partially superimposed over the primary wave, the effects are cumulative.

(a) Thus, a flashbang which goes off a few inches from a wall will have a much stronger effect than one which goes off in the middle of a room.

(b) Since most flashbangs go off on the floor, the reflected wave is directed upward and the effects of the flashbang are increased above it.

(c) Although reflection increases the effects of the flashbang, distance decreases it and thus counteracts it.

i. Because of this phenomenon, a flashbang will sound almost exactly as loud at 65 inches above the floor as 30 inches.[4]

ii. 30 inches represents the ear level of someone sitting on the floor, and 65 inches represents the ear level of someone standing.

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[1] *GRENADES AND PYROTECHNIC SIGNALS*, FM23-30, Headquarters, Department of the Army, December 1988.
[2] *DISTRACTION DEVICE LESSON PLAN*, Def-Tec Corporation, P.O. Box 240, Casper, Wyoming, 82602-0240, August 31, 1989, p56.
[3] *AN ACOUSTICAL ASSESSMENT OF THE IMPULSE NOISE OF GRENADE SIMULATORS EXPLODING IN ENCLOSURES*, a study conducted by the Human Engineering Laboratory (HEL), Aberdeen Proving Ground, Aberdeen, Maryland, December 1981 to January 1982, p29.
[4] AN ACOUSTICAL ASSESSMENT, p8.

## PART 6 — CHARACTERISTICS OF FLASHBANGS

A. Neither a flashbang nor a stingball is a panacea, and should be viewed as only another tool to safely control dangerous suspects.

   1. Likewise, neither is a substitute for good tactics.

   2. The flashbang is an excellent device to assist in high-risk entry situations and to divert the attention of dangerous suspects to enable a safer, more effective approach or entry.

      a. It is not intended to relieve the person deploying the device of any civil or moral obligation to safeguard persons near the device when it ignites.

      b. Persons tasked with teaching others to use these devices have an obligation to know and understand the hazards associated with them and to clearly communicate this information to students.

B. There are four characteristics associated with the ignition of a flashbang. These are:

   1. Loud noise

   2. Pressure wave[a]

   3. Light

   4. Heat

[a] **Note**: For most practical purposes, and for this class, the loud noise and the pressure wave are so closely related that they may be considered as one.

C. Although a great deal of effort will be spent in recognizing and comprehending the associated hazards, it must be emphasized that they are minimal, and the potential risk to life must be balanced against the potential risk of injury.[b]

1. Certain conditions may exist which may limit or prohibit the use of flashbangs.

2. The person who approves the use of these devices, as well as the person who deploys them, must be aware of aggravating circumstances which may limit their use.[c]

D. Flashbangs produce a sound known as impulse noise.

1. **Impulse noise (defined)** — Impulse noise is simply noise which lasts less than one second.[1]

a. The typical flashbang will have a duration of approximately 54 milliseconds (.054 of a second).[2]

b. When impulse noise exists, hearing loss may occur without pain.

(1) It follows then, that the absence of pain is not an indicator that hearing loss is not occurring.

(2) "Impulse noise produces a temporary threshold shift (TTS) from which an individual may recover in anywhere from a few minutes to a number of days."[3]

c. Single exposures to the impulse noise of a flashbang provide a minimal risk.

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[b] **Note**: Every instructor should painstakingly review the potential hazards of deploying flashbangs to ensure a complete and thorough understanding.

[c] **Note**: The instructor should painstakingly review the potential hazards of deploying flashbangs. See "Hearing Hazards during the use of Flashbangs" (Appendix B) and Physiological Effects of Flashbangs (Appendix D)

(1) At a worst-case scenario, only 1% of the population would be likely to have a permanent measurable hearing loss as a result of a single unprotected exposure to a flashbang.[4]

(2) There are a number of factors which affect the likelihood of hearing loss, but three are predominate. These are the noise level of the particular device, the proximity to the individual and the amount of reverberation (time the sound lasts).

d. Repeated exposures to impulse noise sufficient enough to produce a temporary threshold shift of hearing may cause a permanent hearing loss.

(1) The effects of the temporary threshold shift are characterized by a ringing in the ears (tinnitus), and/or a feeling of "stuffiness" or fullness in the ear.

(2) In a training environment, these symptoms should be sufficient to alert the person to remove himself until full recovery occurs.[d]

(3) Personnel who have been exposed to impulse noise sufficient enough to produce a temporary threshold shift must not be exposed to any subsequent incidents until a complete recovery has taken place.[5]

[d] **Note**: Instructors should be mindful of these symptoms and alert students to notify them if they experience a ringing or stuffiness in their ears.

e. Because personnel assigned to a tactical team are likely to utilize these devices more frequently, and because they may have multiple exposures, particularly in training, they are at a much greater risk of damaging their hearing.

(1) An instructor in the use of these devices will often have an even greater risk because of more repeated exposures.

(2) Proper hearing protection should be mandatory in all training scenarios.

(a) "Appropriate hearing protection for these exposures is considered to be any good quality, properly fitted earplug, earmuff, or the use of fingers to occlude the ears." (Holland, 1967 as quoted in HEL Study)[6]

(b) Hearing injuries are insidious, and the use of almost any commercially available hearing protection will completely eliminate them.

(3) Exposure to impulse noise from a diversionary device in training is likely to occur in three different situations. These are:

(a) Exposure to explosions in the same room.

i. These type of exposures often result during role playing when students play the role of suspects or hostages.

ii. Generally, even with hearing protection, exposures in the same room should be limited to no more than five per day.[7]

(b) Exposure to explosions in an adjacent room.[e]

i. With proper hearing protection, exposure from an adjacent room (away from an opening in line with the explosion), need not be restricted.

ii. Exposure to explosions in an adjacent room in line with the explosion, (i.e., in front of a door), should be considered as though the person had been exposed in the same room.

(c) Exposure to explosions occurring outdoors within 100 feet should be with hearing protection.

(d) Hearing protection is not normally required for exposures outdoors when the distance from the device is more than 100 feet.[8]

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[e] **Note**: When conducting training of this sort, the instructor should periodically query students to ensure that no one is experiencing discomfort, i.e., ringing of the ears or a feeling of fullness or dullness in the ears. *Lack of pain is not an indicator!*

E. An instructor in the use of these devices must have a thorough understanding of the nature of the loud noise and the pressure wave associated with the ignition of a flashbang.

   1. This will not only allow him to provide expert legal testimony, but enable him to furnish students with accurate and complete information concerning the sequence of events and anticipated reactions of persons exposed to the effects of these devices.

   2. Realistic planning for the employment of these devices can occur only when planners have an understanding of the anticipated effects of the devices and likely actions of the people exposed.

F. Definitions — In order to adequately understand the interrelated sequence of events which occur upon the ignition of a flashbang, it is necessary to define several terms.

   1. As stated previously, **impulse noise** is simply noise which lasts less than one second.

      a. A flashbang ignition typically lasts from 6 to 196 milliseconds. About 50 milliseconds is considered to be the median average.[f]

      b. In order to put this time in perspective, even the longest flashbang ignition will be complete in less time than it takes to blink your eye![g]

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[f] **Note**: 54 milliseconds is the median average for the M116-A1 grenade simulator which was determined based on a study published in January, 1982 by the U.S. Army Human Engineering Laboratory, Aberdeen Proving Ground, Maryland.

[g] **Note**: The “blink of an eye” takes about 200 to 250 milliseconds. This is also about as long as the pulse of a busy signal on a telephone.

2. **Sound** is defined as any pressure variation in an elastic medium, (i.e., air, water, etc.) which the human ear can detect.

    a. Because sound is defined as a pressure variation, it is necessary to consider the loud noise and pressure wave associated with the flashbang together.

    b. The various attributes of these pressure variations will be discussed individually.

3. The number of pressure variations or fluctuations per second is called the **frequency**.

    a. The human ear can detect pressure changes as small as twenty times per second.

        (1) Frequency is measured using a standard called a **Hertz** (**Hz**). This is simply one cycle of the pressure variation.

        (2) Thus, 20 Hz is the slowest sound a human ear can detect, (the pressure fluctuates 20 times per second).[h]

    b. A normal healthy human can hear a range of frequencies from 20 Hz to 20 kHz, (20 to 20,000 vibrations per second).

    c. Although the ear can detect a wide range of frequencies, it does not hear them all equally.

        (1) For instance, a wider range of frequencies in music can be detected than those used for speech.

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[h] **Note**: Atmospheric pressure is an example of pressure fluctuation (frequency), but changes too slow for the human ear to detect. Thus it does not meet the definition of sound.

(2) Therefore, we perceive some sounds as louder than others, even when they may not be.

(3) Flashbangs emit a wide range of frequencies, but mostly in the higher dimensions.

(a) In the unlikely event that hearing loss occurs, it would probably be in this area.

(b) Even if loss in this area of our hearing occurs, it may not interfere with our daily activities because the range is beyond that which we need for speech, music, etc.

(c) By far, the most common reasons for hearing injuries with flashbangs are multiple, unprotected exposures and/or at too close a proximity (within five feet).

4. The size of the pressure fluctuations is called **amplitude**.

a. The weakest sound a healthy human ear can detect is so small that it causes the eardrum to deflect a distance less than the diameter of a single hydrogen molecule!

b. The ear has an amazing range, and can tolerate sound pressures more than a million times higher.

(1) The ear has excellent properties of recovery after exposure to a noise as loud as a flashbang, and even at pressures strong enough to rupture the eardrum will heal completely with no loss of hearing. (Hodge & Garinther, 1973, as quoted in HEL study)[9]

(2) Using conventional deployment methods, there are no diversionary devices or stingballs on the market today which produce pressure levels strong enough to rupture an eardrum.

5. Sound is most commonly measured using a scale called the **decibel scale**.

   a. Because of the tremendous range of sound, it is difficult to chart or depict measurements. There simply would not be enough paper or blackboard to run the scale from the smallest detectable sound to the highest.

   b. To avoid confusion, it is not necessary to go into detail other than to say that a decibel is not an absolute measurement. A decibel is a ratio between a measured quantity and an agreed reference.[i]

      (1) The decibel scale is logarithmic. This allows the scale to compress the million increments from the faintest sound to the loudest sound into a range of only about 120 dB.[j]

         (a) This only means that an increase of one on the decibel scale does not mean that the sound is only one increment higher. In fact, it is much higher.

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[i] **Note**: It may be helpful to have the students visualize the Fahrenheit and Centigrade temperature scales. Water is used as a reference and its freezing temperature (32°F = 0°C) and boiling point (212°F = 100°C) used as reference points.

[j] **Note**: Many students, particularly those from the West Coast, will be familiar with the Richter Scale used to determine the strength of earthquakes. This is also a logarithmic scale. An increase of one on the Richter scale is actually ten times as powerful.

(b) Generally, the human ear can detect a change in loudness of about 3 dB.

(c) An increase of 6 dB is actually twice as loud as the one before it.

(d) Because of the way we hear, an increase of 10 dB “sounds” twice as loud, but in reality is almost four times as loud, (6 dB is twice as loud and 12 dB would be twice as loud again, thus four times as loud).

(2) Early devices used for flashbangs were actually intended for training military personnel by exposing them to situations which closely replicated exposure to artillery and hand grenades.

(a) These devices typically emitted decibels (dB) in the range of 175 dB to 190 dB.

(b) 185 dB is typically used as the threshold of ear damage.

(3) Modern commercially available flashbangs typically emit sounds from 165 dB to 174 dB, with almost none reaching 185 dB.[k]

(a) By now, our understanding of the measurement of sound shows that the “downloading” of these modern flashbangs has substantially reduced the risk of hearing damage.

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[k] **Note**: This assumes conventional deployment procedures, where the flashbang is not closer than about five feet.

(b) This downloading still allows adequate sound levels to accomplish the mission of the diversionary device.[I]

6. Sound propagation in the air can be compared to ripples on a tranquil pool of water.

   a. The water is an elastic medium which transmits sound waves and allows us to see what happens.

   b. When a pebble is dropped into the water, the ripples spread out uniformly in all directions, decreasing in amplitude as they move farther from the source.

   c. This same analogy may be applied to sound waves traveling through air.

G. An instructor of these devices should be aware of four other factors associated with the propagation of sound as the result of the ignition of a flashbang. These are: Distance, Reflection, Absorption, Transmittal.

   1. **Distance** has a substantial impact on how loud a sound is.

      a. For sound in air, when the distance doubles, the amplitude drops by half—which is a drop of about 6 dB.[10]

      b. If you were at a position one meter away from the source of the explosion and moved one meter farther away, you would experience a 6 dB drop in the sound.

[I] **Note**: This assumes a single, unprotected exposure.

(1) If you moved two more meters, the sound would drop by another 6 dB. If you doubled that distance, (four meters) it would drop by 6 dB again, and so forth.

(2) Thus, it is easy to see that the distance a person is from the flashbang (proximity) has a substantial impact on the sound level of the device.

2. **Reflection,** often called reverberation when speaking of sound, is a reechoing of the sound waves. A surface “throws back” the sound waves.

   a. A flashbang thrown into a large room with hard walls, or buildings with marble interiors, will produce an echo which may make the flashbang seem louder.

   b. Because of reflection, a flashbang sounds (and feels) louder inside than outside.

3. **Absorption** is a taking in and not reflecting, resulting in a partial loss of power.

   a. Open windows, drapes, carpets and other similar materials do not reflect or transmit sound very well.

   b. Furniture in a room both reflects and absorbs sound waves, depending on the composition.

      (1) A flashbang landing on a bed, couch, carpet or other similar material will have a substantially less yield than one which lands on a tile floor.

(2) Depending on the surface texture the flashbang lands on, up to 20% of the energy is lost by surface absorption. (Filippone, 1951, as quoted in HEL Study)[11]

4. **Transmittal**, often called conduction, is simply the sound waves being channeled through another medium.

   a. This is why a flashbang can be heard through the walls of another room, or even from outside a building, with no direct line from the explosion.

   b. The material in the walls carries the sound waves.

      (1) Some walls, such as stucco, brick or concrete, carry sound very poorly. Others, such as corrugated steel, aluminum, etc., carry the sound very well.

      (2) In the building trades, it is common to use a "sound" wall between apartments and townhouses. This is simply a double-thick wall filled with insulation which absorbs sound to allow for a quieter room.

      (3) Closets and bathrooms are often placed between bedrooms in houses for the same reason.

H. **Pressure and Sound** — As we have seen, pressure levels and sound are closely related.

   1. Sound is measured as a pressure change.

   2. *All* explosions have sound, since all explosions cause a pressure change which fluctuates greater than 20 times per second.

a. A typical pressure change for the ignition of a flashbang can cause a variation in atmospheric pressure from -0.6 PSI to more than 6 PSI.

b. The rapid change of atmospheric pressure as the wave passes across the suspect has a disorienting effect.

    (1) This “feeling” of rapid pressure change, coupled with the dazzling light and loud noise of the flashbang, create a sensory overload.

    (2) The suspect is temporarily unable to correctly interpret this new stimuli of the instantly altered environment.

    (3) This condition is the primary purpose of the flashbang.

        (a) “In deciding that impulse noise level which might be used, consideration must be given to producing the least amount of potential damage to hostages while accomplishing the mission of a diversionary charge.”[12]

        (b) Since the primary purpose of the flashbang is to disorient, rather than to kill, the same would hold true for the suspect.

    (4) The ability to create a state of confusion and disorientation has profound tactical significance when properly exploited.

I. **Risk Assessment**— A person who uses or authorizes the use of a diversionary device needs to have a keen understanding of the risks involved.

1. After going into substantial detail in describing the characteristics of flashbangs, it is important to put these potential hazards into perspective.

a. Although it is important for an expert witness and an instructor in the use of diversionary devices to understand the characteristics of flashbangs, the average jury and most courts will have a difficult time understanding technical terms and scientific descriptions.

(1) When testifying, it is much easier and more beneficial to compare the characteristics of a flashbang or stingball with everyday incidents and items with which the average person is familiar.

(2) Like juries, students will have a much easier time grasping concepts which they see applied in their everyday lives.

b. The following comparisons are easily placed in the context of everyday life and do not carry the "stigma" of an explosive, as does the flashbang.

(1) There is a greater risk of sustaining hearing damage from firing a weapon than from being exposed to a flashbang.13

(a) This is particularly true if the weapon is fired more than one time, (multiple unprotected exposures).

(b) A gun report produces an impulse noise similar to a flashbang and can be more damaging to hearing, depending on the characteristics of the explosion, (e.g., distance, reflection, etc.).

(2) The airbag in an automobile restraint system typically reaches 167-170 dB. (Nixon, 1969, Air Force Biological Acoustics Branch)14

(a) The impulse noise sustained from the rapidly expanding airbag has the same effect as the impulse noise of a flashbang.

(b) This is a particularly good example to use in court because it provides an example of an explosion without the connotations of threat. The airbag, like the flashbang, is designed to save lives at a very slight risk of injury.

(3) The M-72, LAAW (Land Anti-Armor Weapon) produces impulse noise reaching 180 dB.

(a) This weapon has been in use in the U.S. military for more than twenty years and was most recently used in the Persian Gulf during Operation Desert Storm.

(b) In 1971, a study was conducted by the Human Engineering Laboratory (Aberdeen Proving Ground, Aberdeen, Maryland) which showed that 96% of the persons who fired this weapon completely recovered within four days.[15]

2. Flashbangs should not be used indiscriminately.

a. Even though the risks are minimal, generally, the use of a diversionary device such as a flashbang, should be used only in life-threatening situations.

b. Generally, the use of a flashbang should not be allowed solely for the preservation of evidence.

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[1] *MEASURING SOUND*, Bruel & Kjaer, DK-2850 Naerum, Denmark, published in September 1984.
[2] *AN ACOUSTICAL ASSESSMENT OF THE IMPULSE NOISE OF GRENADE SIMULATORS EXPLODING IN ENCLOSURES*, a study conducted by the Human Engineering Laboratory (HEL), Aberdeen Proving Ground, Aberdeen, Maryland, December 1981 to January 1982.
[3] ACOUSTICAL ASSESSMENT, p13.
[4] ACOUSTICAL ASSESSMENT, p28.
[5] ACOUSTICAL ASSESSMENT, p29.
[6] ACOUSTICAL ASSESSMENT.
[7] ACOUSTICAL ASSESSMENT, p19.
[8] ACOUSTICAL ASSESSMENT, p19.
[9] Hodge & Garinther, 1973, as quoted in *AN ACOUSTICAL ASSESSMENT OF THE IMPULSE NOISE OF GRENADE SIMULATORS EXPLODING IN ENCLOSURES*, a study conducted by the Human Engineering Laboratory (HEL), Aberdeen Proving Ground, Aberdeen, Maryland, December 1981 to January 1982, p11.
[10] MEASURING SOUND, p20.
[11] Filippone, 1951, as quoted in *AN ACOUSTICAL ASSESSMENT OF THE IMPULSE NOISE OF GRENADE SIMULATORS EXPLODING IN ENCLOSURES*, a study conducted by the Human Engineering Laboratory (HEL), Aberdeen Proving Ground, Aberdeen, Maryland, December 1981 to January 1982, p21.
[12] ACOUSTICAL ASSESSMENT, p3.
[13] Schmitz, Henry D., Ph.D, as quoted in *SOUND LEVELS AND EFFECTS FROM EXPLOSIVE CHARGES USED TO GAIN BUILDING ACCESS*, a study conducted by the Los Angeles Sheriff's Department, December 11, 1980.
[14] Nixon, 1969 as reported in *AN ACOUSTICAL ASSESSMENT OF THE IMPULSE NOISE OF GRENADE SIMULATORS EXPLODING IN ENCLOSURES*, a study conducted by the Human Engineering Laboratory (HEL), Aberdeen Proving Ground, Aberdeen, Maryland, December 1981 to January 1982, p14.
[15] ACOUSTICAL ASSESSMENT, p14.

## PART 7 — STINGBALLS

A. **Stingball (defined)** — A stingball is any less-than-lethal device which uses an explosion or other method, to propel or fling pellets or other similar objects, intending to cause pain but without serious injury.

B. The use of stingballs as a force multiplier has several advantages over other methods, particularly chemical agents.

1. **More precise** — A stingball allows agitators, often located near the rear of the mob, to be impacted without striking the less committed.

    a. This avoids agitating individuals who are not as likely to take an active role while still discouraging agitators.

    b. The use of stingballs is far more precise in impacting these targets than other means, particularly chemical agents.

    c. Thus, the amount of force can be applied commensurate with the degree of violence or lawlessness—even among members of a mob.

2. **Strike suspects in defilade** — Experience has shown that many objects are thrown by persons standing at the rear or in the midst of a mob, or from behind vehicles and buildings.

    a. The stingball is one of the best methods to deter a raucous mob of throwing objects.

    b. Other options, such as chemical agents, batons and impact rounds, have not proven very effective in preventing these actions.

(1) The persons throwing the objects are shielded by others and can avoid countermeasures.

(2) Often, the more passive members of a mob who are not actively participating in the violence are impacted and more likely to become agitated.

3. **Less persistent** — The stingball is less "persistent" than chemical agents.

   a. The release of a chemical agent into the atmosphere is a cause of great concern to tactical commanders.

      (1) The dispersal of the agent is highly dependent upon atmospheric conditions, particularly wind and humidity.

      (2) The agent is often carried to areas where there are no rioters and innocent bystanders are affected.

   b. The effects of a stingball are restricted only to those in the immediate vicinity, and are extremely short lived.

4. **Quicker acting** — The effects from a stingball are virtually instantaneous.

   a. To be effective, a chemical agent (such as tear gas) must be metabolized, and rioters are able to avoid the strongest effects simply by moving out of the way, or using countermeasures such as moving to a clean air source or masking well before the effects become debilitating.

   b. The ignition of a stingball or a volley of stingballs does not allow ample time to take effective countermeasures.

5. **Requires little, or no, protective measures** — Unlike riot control agents, the use of a stingball does not require gas masks, or other protective measures by the authorities.

    a. While police officers in close proximity to a stingball when it ignites may be struck with pellets, the effects are greatly attenuated by common items such as “bullet-proof” vests and helmets.

    b. Personnel who may be struck with pellets should attempt to look away from the ignition and, when possible, protect the more vulnerable front of the body, by turning their backs to the pellets.

C. In virtually all respects, the functioning and nomenclature of stingballs are the same as for flashbangs.

    1. The most common bouchon is the M201-A1 or a similar percussion type.

    2. Nearly all commercially available stingball grenades use a separating submunition to prevent the bouchon from becoming a projectile.

    3. The chemical composition of the main charge is identical to that used in the manufacture of flashbangs.

    4. The body is a bursting canister and is designed to withstand rough handling and achieve acceptable overpressure levels while rupturing at low enough pressures to eliminate dangerous velocities from the pellets.

D. When comparing diversionary devices with stingballs, there are two notable differences.

    1. The stingball is a “true” grenade.

a. With one exception, the rubber “projectiles” designed to “sting” an aggressor are identical in every respect to the shrapnel thrown from a fragmentation-producing device.

(1) The single exception is that they are specially designed not to be lethal.

(2) The rubber stingballs are hardened to approximately 50 to 60 durometers,[a] which is hard enough to cause pain but soft enough to avoid serious injury.

(3) Further, the stingballs do not have sufficient mass to travel long distances or transfer a great deal of energy when striking other objects.

b. Used inappropriately, stingballs carry a commensurately greater degree of risk of injury.

(1) This is primarily as a result of the intent to cause pain from the onset.

(2) Since trauma is an expected consequence of the ignition of a stingball, the likelihood of injury is commensurately greater.

2. The second difference is that stingballs are designed for an entirely different application than flashbangs.

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[a] **Note**: A durometer is a measure of the hardness of rubber. It is measured by the resistance of the rubber to indentation by the blunt point of a metal rod, ball or needle. The range is from 0 to 100, with the higher numbers indicating harder rubber. 10 durometers is approximately as hard as a stiff, dry sponge and 100 durometers is about as hard as a piece of wood, which is about as hard as rubber can be made.

a. Where a flashbang is used primarily as a diversion, a stingball is primarily used for crowd and riot control.[b]

b. Because of the differences in application of the stingball, this chapter will provide a rudimentary overview of situations in which the use of stingballs may be appropriate.

E. Essential to effectively and appropriately using a stingball in riot situations is an understanding of crowds and mobs and some psychological factors which affect them.

1. Crowds and Mobs are distinctly different.

a. **Crowd (defined)** — A crowd may be defined as a casual, temporary collection of people without a strong, cohesive relationship.

b. **Mob (defined)** — A mob may be defined as a large disorderly crowd or throng.

(1) Mobs are usually emotional, loud, tumultuous, violent and lawless.

(2) Mobs need not be especially large. Even small mobs can cause substantial problems and be a formidable challenge to control.

2. The *primary* difference between a crowd and mob is whether lawless activity is occurring.

a. This distinction is based upon legal criteria rather than psychological or sociological factors.

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[b] **Note**: Although each type of device is primarily intended for one type of application, ingenuity and innovation may make them advantageous in other situations. Consequently, as long as appropriate safety measures are understood and complied with, their intended use should not discourage other uses.

b. Members of both crowds and mobs manifest many of the same emotional and psychological aspects.

c. Crowds may evolve into mobs, and early recognition of catalysts and preventive measures are essential to avoid this.

d. Generally, early intervention has proven to be among the most effective control methods available to authorities to avoid rioting.

(1) There is always some evolutionary process for the creation of a mob.

(2) Avoiding situations which encourage a crowd's violent reaction, identifying agitators, taking appropriate and decisive actions in lawless incidents and allowing the lawful expression of emotions are only some of the most effective methods for preventing mobs from forming.

3. Of all the factors involved in controlling civil disorders, an understanding of the psychological factors involved in crowds and mobs is among the most valuable.

a. It is ironic, but the use of less lethal options may very well start the riot you are trying to avoid.

b. As a result, an understanding of the factors involved becomes essential to provide a basis of understanding for when and when not a less lethal option may be likely to achieve a tactical objective.

c. Most of the reliable scientific information on crowds and mobs has been developed within the last fifteen years.

(1) Previous studies assumed that an individual in a crowd setting was motivated differently than when they were alone.

(2) More current studies have revealed that while others will certainly influence the actions of an individual, the motivations for a person's actions remain largely unchanged.[c]

(3) The most important aspect of this new revelation is that an individual remains fully cognizant of his or her actions and evaluates them in terms of achieving goals while avoiding retribution.

d. Individual feelings of a lack of accountability may "empower" an individual contemplating actions that he or she would avoid if they knew that a penalty would be applied.

(1) The appropriate use of any less lethal option, such as a stingball, can cause an individual engaging in riotous behavior to instantly reevaluate his actions when confronted with the realization that he or she is not immune from the consequences and remains accountable for his actions.

(2) Members of a mob abandon social inhibitions which govern standards of acceptable conduct.

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[c] **Note**: For a more comprehensive understanding of this aspect of crowd control, the author highly recommends reading the last three chapters of *The Myth of the Madding Crowd*, by Dr. Clark McPhail, published by Aldine De Gruyter, New York, New York, 1991.

(a) Individual actions are viewed as inconsequential when compared with the actions of the entire group.

(b) Guilt and responsibility shift from the individual to the mob as a whole.

(3) The individual tends to feel his actions will be justified or that he won't be blamed while acting with the group rather than individually.

(a) These feelings can result in acts such as looting or even violence against another.

(b) Seldom do members of a mob express feelings of guilt or remorse, even after outrageous atrocities.

(4) The difficulty in identifying individuals intensifies this feeling.

(5) The so-called "mob mentality" is largely attributed to this phenomenon.

(a) A **mob mentality**[d] is usually defined as the single-minded, obstinate and unreasonable mental attitude or disposition manifested by members of a mob.

(b) This phenomenon often results in people "acting out" lawless behavior simply because others are.

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[d] **Note**: The term "mob mentality" is nearly worthless as a description for individual actions or collective actions of a mob since the individuals comprising the mob remain fully cognizant of their actions. It is used here only for purposes of establishing a nexus between the historical perspective of a mob as an entity and the more modern view of mob as a collection of individuals acting in concert.

(c) Even so, it must be remembered that members of a mob are neither mindless nor unaware of their individual responsibility for the reasonable consequences of their actions.

e. Generally, the larger the mob, the more difficult effective intervention tactics will become.

(1) The old saying that "there's strength in numbers" is true and the larger the gathering, the more powerful the members become.

(2) Being among a large group creates a feeling of unity and righteousness.

(3) A person who would be hesitant in taking some type of action becomes empowered by the support of the members around him.

(4) A "**critical mass**"[e] is reached when the size of the mob, coupled with a high degree of agitation or commitment to a course of action exceeds the abilities of law enforcement to control them.

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[e] **Note**: The term "critical mass" is a heuristic tool used to estimate the amount of force required to effectively intervene. Generally, the critical mass is determined by three factors working together. These are the size of the crowd or mob, the degree of commitment and the amount of emotion. While the size of a crowd or mob is always a factor, the amount of control required for an effective intervention is heavily influenced by the degree of commitment and amount of emotion. For example, a highly committed crowd but with low emotion can usually be reasoned with, while a highly emotional crowd with low commitment will quickly abandon its activities when confronted. A small mob which is highly committed and extremely emotional reaches a critical mass with less numbers than a larger one with less commitment or emotion. All of these factors are usually easily observed and therefore provide strong clues for determining effective control measures.

F. In mob intervention, stingballs provide significant tactical advantages.

1. Once a situation has deteriorated to the point where intervention is required, the use of stingballs can be a significant force multiplier.

    a. A "**force multiplier**" is defined as anything which increases the power of a tactical unit.

    b. Although force multipliers are often seen as weapons, they can also be tactics, terrain or other factors which enhance a tactical team's ability to a situation.

2. There are several effective methods for employing stingballs in riot situations.

    a. In riot situations, stingballs are most effective when deployed in volleys.[f]

        (1) The effects of stingballs are due more from psychological shock than physical trauma.

        (2) In actuality, the bruising and tenderness resulting from being struck with a pellet from a stingball is trifling.

        (3) More members of the mob are simultaneously impacted and the effects are exaggerated because individuals seek to avoid aggravating circumstances which might result in them being struck again which can have an increased effect on others around them.

    b. In some circumstances, stingballs are better deployed singly.

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[f] **Note**: A common adage which has arisen in deploying stingballs is, "Deploy in volleys — exploit with tactics."

(1) Custody environments often involve fewer suspects in closer quarters.

(2) Pellets tend to ricochet, and noise and pressure tend to be reflected off walls and floors, enhancing the effects.

c. Generally, stingballs should never be used as the only option.

(1) The effects of being struck by a pellet from a stingball is only mildly painful.

(2) Heavy clothing and shielding from objects and other persons attenuate the effects even further.

(3) Stingballs work best when exploited by other force options and follow-on tactics.

d. The effects from a stingball can be enhanced by throwing a mix of stingballs and flashbangs.

(1) The flashbang does not disperse pellets but creates a substantially greater sound and blast wave.g

(2) Flashbangs which land near pellets will also tend to pick them up and throw them again.

(3) The effects of a flashbang igniting overhead, in and of itself, can create a condition that can then be exploited by other means.

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g **Note**: A flashbang which lands among loose objects or pellets from previously deployed stingballs, may throw them in the same manner as the stingball, often with greater velocities.

e. The effects of a stingball are often better with an air burst.

(1) This allows the pellets to simultaneously strike numerous suspects without being impeded by objects and other people.

(2) Care must be taken to avoid the device igniting too near someone's face and causing more serious injuries.

f. The effects of a stingball can also be enhanced with the addition of chemical agents.

(1) Stingballs are now manufactured with a coating of powdered oleoresin capsicum, CS, or other riot control agent, covering the pellets.

(2) These devices have the ability to disperse the riot control agent with the pellets, making the effects more persistent and effective.

3. It must be understood that, unlike flashbangs, stingballs are *intended* to cause pain, and more care must be taken to avoid aggravating these injuries even more.

a. Care must be taken to avoid ignition of either flashbangs or stingballs in too close a proximity.

(1) Both devices emit an extremely hot pressure wave which can cause burns.

(2) The velocity from the pellets of a stingball dramatically decreases with distance. Consequently, they strike substantially harder at closer ranges.

b. Because the pellets are intended to inflict pain, a certain amount of injury is to be expected.

(1) Generally, this is restricted to redness, swelling and bruising, with accompanying tenderness and minor pain.

(2) If in close proximity, a pellet which strikes a person on a portion of the body where bones are near the skin may result in more severe injuries.

(a) When the ignition of a stingball is in close proximity to a suspect and the person is struck in an area such as the forehead, cheekbones, collarbone, forearm or shins, the tissue is compressed between the pellet and the bone and a more severe injury may result.

(b) Although this is not a common occurrence, conditions which require tactical intervention do not lend themselves well to controlling all conditions.

(c) To alleviate these types of injuries, consider the following:

i. Shout a warning. Most persons will duck or bend over, exposing the more “meaty” portions of the body. *Do not allow sufficient time to avoid the effects altogether.*

ii. Have medical care available when persons with these types of injuries are arrested.

iii. Randomly throw a flashbang.[h] This serves as a diversion, as well as a strong warning and can be exploited similar to a stingball.

iv. A flashbang provides many of the same effects but without the trauma.[i]

c. Many of the same concerns for employing flashbangs are applicable for employment of stingballs.

(1) If combustibles are present, fire should be a consideration.

(2) If a device fails to ignite, handle it in the same manner as if it were a flashbang.

(a) Under no circumstances should a "dud" be handled without first rendering it safe.

(b) In tactical situations, it may be impractical to immediately recover duds, but every effort should be made to remove them at the first opportunity.[j]

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[h] **Note**: It is essential that the flashbang ignite at a safe distance and not cause injury in and of itself nor so far away that it creates an illusion of safety. Consequently, care should be exercised in the selection and deployment of the particular device.

[i] **Note**: If flashbangs are used exclusively (without stingballs), a mob soon realizes that the effects are extremely minimal and may simply ignore the "nuisance."

[j] Note: For a more complete description on handling duds, see "Part 8 — Deployment Concerns."

4. When employing stingballs as part of a tactical plan, several factors should be considered.

    a. The composition of a mob provides a clue to the amount of force which will be required to control it.

        (1) A mob that is comprised of people of different ages, cultures or sexes will react differently than one that is more homogenous.

        (2) Although not conclusive, the more homogenous a mob, the more likely they will react as a single entity and require a different tactical approach.

    b. The previous actions of a mob provide strong clues for the amount of individual commitment, anticipated actions and level of force necessary to control them.

        (1) Mobs that have already demonstrated a degree of violence can be reasonably presumed to continue these actions.

        (2) Historically, mobs that have demonstrated their willingness to resort to violence have continued, and many times escalated, the amount and intensity of their violent actions.

    c. The ability of a tactical team to effectively employ stingballs is another crucial aspect.

        (1) The effectiveness of stingballs is intrinsic with appropriate employment methods and conditions.

        (2) If children or innocent bystanders are likely to be impacted, more concern needs to be demonstrated.

(3) Inappropriate use of force, particularly stingballs, may itself become a catalyst for precipitating violent action.

d. Like any other force option, the actions of the mob *after* the employment of stingballs must also be considered.

e. Generally, stingballs should not be used to enforce orders until other less forceful options have failed.

(1) It is common to use a “dispersal order” to remove a lawless assembly from an area.

(2) Without further justification, the use of stingballs should never be used to enforce orders of this nature.

(3) The use of force must be commensurate with the degree of defiance. Passive resistance will not ordinarily justify the degree of force manifested by the employment of stingballs.

## PART 8 — DEPLOYMENT CONCERNS

A. An indiscriminate use of flashbangs or stingballs may result in legal restrictions being imposed upon law enforcement by the courts.

   1. A firm grasp and application of the fact that neither the flashbang nor the stingball is a panacea, but rather tools, should remove many of the contentious aspects.

      a. An experienced, well-trained officer with good intentions can present a formidable case for the necessity of these devices.

      b. On the other hand, a poorly trained officer, or one who fails to recognize the limitations of these devices, may present the use of these devices in an unfavorable light which will result in a case decision with adverse impacts.

   2. There are factors which should cause concern and others which actually enhance the effects of these devices without increasing the hazards.

      a. Given a set of circumstances, it is important for instructors and those who testify as experts in court to be able to articulate realistic expectations for the effects of these devices.

      b. Concern for the safety of the hostages, bystanders. and the suspect, must be weighed against that of tactical team members.

         (1) A thorough knowledge of the safety concerns associated with using these devices assists in evaluating the advantages and disadvantages.

(2) Sometimes conditions may be controlled or altered which may enhance the effects of these devices without increasing the danger.

B. Deployment Concerns

1. **Children** — When children are known to be in the location, more care must to be exercised.

a. Often these are the only “real” victims inside a location.

b. Injuries which would be minor to an adult are often aggravated in young children.

c. The lower the specific lung volume (lung volume to body mass), the more vulnerable they are to shock.[1]

d. Children are emotional creatures.

(1) Conditions which may be minor irritations to an emotionally mature person may be greatly exaggerated to a child.

(2) If it is necessary to use these devices when children are known to be present, the wise tactician should prepare for three things.

(a) Children will likely run away from you, often toward the suspect, with whom they may have affection and/or less fear.

(b) Most likely, children will *not* follow the directions of tactical personnel but those of the suspect.

(c) A member of the entry team should be *preassigned* to be responsible for children.

i. If SWAT uniforms are used, consider dressing the person assigned to handle children in a "Class A" uniform, which a child will more quickly recognize.

ii. Early evacuation of children will substantially reduce their fear and the trauma associated with such and event as well as simplifying other tactical problems.

2. **Elderly** — Elderly and infirm persons may also be affected more adversely than others and should be considered.

a. The startle effect from a flashbang *will* elevate blood pressure, cause a faster heartbeat and a ringing in the ears.

b. The physiological effects of these devices may aggravate a preexisting medical condition.

3. **Fire** — A fire hazard always exists when using flashbangs.[a]

a. Flashbangs ignite at about 2700 degrees Centigrade.[b]

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[a] **Note**: A survey conducted by the Minneapolis Police Department in 1989 examined approximately 10,000 uses of flashbangs. The survey revealed that less than 1/10 of 1% resulted in fires.

[b] **Note**: Although the burning temperature of black powder is approximately 2030° Centigrade, the chemical compounds which comprise the main charge in flashbangs contain "enhancers" to increase the oxygen content and alleviate the smoke. Consequently, a slightly hotter flash takes place.

b. Experience has shown that if it lands on combustible material, (oily rags, trash, dry leaves, newspaper, etc.), a fire is not only possible, but likely.

c. Drug laboratories or other explosive environments may be so hazardous as to preclude the use of these devices.

d. Consideration must be given at the planning stage to identify who will be responsible for fighting a fire and how best to extinguish it.

(1) Generally, a fire extinguisher should be readily available.

(a) It is much easier to extinguish a fire in its earliest stages.

(b) Even small fires can tremendously complicate a tactical problem by requiring a decision concerning whether to continue dealing with the suspect or divert efforts to extinguish a fire.

(c) With proper planning, this dilemma can almost always be avoided.

(2) A team member holding a fire extinguisher is effectively unarmed in a gunfight.[c]

(3) If it becomes necessary to fight a fire, protection must be provided for this person.

4. **Shrapnel and Fragmentation** — Although the flashbang is not a fragmentation producing device, *flying objects cannot be ruled out.*

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[c] **Note**: When practical, carrying a fire extinguisher on a back pack or thigh pouch may alleviate some of these disadvantages.

a. When the device lands on loose objects, the blast wave associated with the ignition may cause them to become airborne.

   (1) Use caution if there is a possibility that the device will land on loose gravel, nails, bolts, or other small, loose objects.

   (2) If it is necessary to deploy a flashbang into an area which may contain these items, throw the flashbang in an arc which will help achieve an “air burst.”

b. At a minimum, personnel assigned to deploy flashbangs should wear leather, Kevlar™ or Nomex™ gloves and goggles.[d]

c. Unlike flashbangs, stingballs intentionally propel hard rubber pellets which may cause injury to people in close proximity to the device when it ignites.

   (1) Pellets which strike portions of the body where bones are close to the surface of the skin (e.g., cheeks, forehead, shins, elbows, etc.), may experience more severe injuries.

   (2) While these types of injuries are not always avoidable, medical attention should be available and provided to persons who experience them.[e]

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d **Note**: Nomex™, or similar material, balaclavas provide additional protection but their use must be weighed against potentially adverse public reactions and allegations of concealing identity.

e **Note**: Policies relating to the employment of stingballs and flashbangs should include instructions on how injuries resulting from their use should be treated.

C. Tactical Concerns

1. **Smoke** — There is often a great deal of smoke when a flashbang ignites.

    a. Although the more modern devices have mitigated this drawback, it remains a problem.

        (1) As flashbangs have evolved, they have succeeded in avoiding the bouchon being thrown as a missile.

        (2) Future improvements have been focused on reducing the problem of excessive smoke.

    b. To best exploit the confusion caused by the flashbang, it is necessary to enter the room within one or two seconds after ignition.

        (1) During this time, most of the smoke will usually be suspended near the ceiling and vision is usually good underneath.

        (2) Within ten to fifteen seconds, the smoke will begin settling and vision becomes obscured.

        (3) In addition to obstructed vision, the smoke from a flashbang is noxious, and prolonged exposure at concentrated levels (more than a few minutes) may cause nausea, watery eyes, and runny nose.

            (a) The effects are short-lived, lasting less than 20 minutes, but should be avoided whenever possible.

(b) It is often necessary to remain in the building despite this smoke because of suspects in custody, etc. When this occurs, either evacuate to a clean air source as quickly as possible or ventilate the room.

c. A closely related problem is that the devices frequently set off smoke alarms.

(1) Smoke alarms are loud enough to prevent effective verbal communication.

(2) Some smoke alarms are connected to sprinkler systems, which automatically activate.

2. **Duds** — Occasionally a flashbang may fail to ignite.[f]

a. On a "pin-pull" device, the fuze (bouchon) should activate in from one to two seconds. If it fails to ignite, immediately deploy another flashbang, whenever possible. *(Team members should always have a back-up ready to go!)*

b. If the operation is compromised, the team leader must act accordingly.

(1) As a general rule, if it fails to ignite within 2 to 3 seconds, it won't ignite at all. (This should by no means imply that the device is "safe.")

(2) If circumstances permit, another flashbang should be immediately deployed and exploited.

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[f] **Note**: This section provides general guidelines only and agencies employing these devices are strongly encouraged to develop and promulgate more comprehensive procedures specifically relating to their own conditions and devices.

(3) Generally, if the operation is compromised, the dynamic entry should be aborted.

c. After the operation, it is necessary to remove the device.

(1) *Avoid handling it*. Use a shovel or other similar object to move it.

(a) Although the device is not likely to ignite, it has been designed for just that, and should be treated with at least the same respect as a loaded firearm.

(b) At a minimum, all persons in the vicinity of the device should be equipped with (and wear) safety goggles, ear protection and entry vests.

(2) Before moving it, check to be certain that the pin was removed and/or the safety lever has moved.

(a) Inexperience and nervousness as made forgetting to pull the pin from the device the most common “malfunction” for these devices.

(b) If the spoon is still attached to the bouchon, look closely to locate the safety pin.

(c) The device should *not* be touched until it can be determined *with absolute certainty* that the safety pin is in place and the spoon will not release.

(3) If you must transport it, consider wrapping it in an entry vest or bomb blanket.

(4) One of the best techniques developed thus far is to place the device in a pail of water.

(a) The water acts as a buffer in the unlikely event of a premature ignition.

(b) If the water can saturate the device, as it does with many, it can render the device completely harmless. This may take several hours or more.[g]

(c) Never place a cover or lid on the bucket. If it accidentally ignites, this retards the expansion of the gases and bursts the bucket.

3. **Inappropriate Reactions** — Precautions must be taken so that the ignition of a flashbang is not mistaken for gunfire.

a. Everyone involved in the operation must be aware that the use of a flashbang is anticipated.

b. Emergency situations may require that one or a number of flashbangs be thrown without prior notification.

(1) During these tense times, the ignition of the flashbang may confuse a team member not in close enough proximity to distinguish it from a heavy weapon of some sort.

(2) If possible, a predetermined "brevity code" can be used to alert other team members.

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[g] **Note**: Many devices are now waterproof and this method will not work. As with any safe handling procedures, one of the most important factors is a thorough knowledge of the characteristics of the specific device.

(a) A **brevity code** is simply a one-or two-word “code” which carries a wider meaning. It is used to broadcast essential information quickly and without unduly tying up valuable “air time.”

(b) Often the term, “Flashbang! Flashbang!” will suffice to indicate that an unscheduled deployment of a flashbang has been necessary and to react accordingly.

(c) The brevity code should be repeated 2 or 3 times to avoid confusion.

D. Training Concerns

1. Because of the nature of this course, it is important to address risks unique to training environments

2. The instructor in the use of these devices must recognize, understand and control the risks inherent in the use of any explosive device.

a. The training area must be free of debris or other materials which could become airborne when these devices are used.

(1) Because objects at a training site will undoubtedly be exposed to many more flashbangs than any ordinary deployment, objects which are normally unaffected may crack, break or shatter.

(2) The training site must be periodically examined during training, as objects such as broken glass or plaster from prior ignitions may litter a floor which was clean just seconds before.

b. Fire is *always* a concern.

(1) Generally, there is little danger of a flashbang igniting materials during deployments.

(2) Because training environments often sustain greater numbers of these devices in a small area, there is a greater chance of a fire.

(3) Firefighting equipment should be considered essential and mandatory for any training class.

(a) At a minimum, this should consist of a Class “A” fire extinguisher and a bucket of water.

(b) Other recommended firefighting equipment are a shovel and large garage broom.

c. **Protective clothing and equipment** — Protective clothing and equipment should be available and worn.

(1) Tactical conditions may preclude the use of such things as ear protection and fireproof clothing, but in the training environment, every effort must be made to ensure safe instruction.

(2) Protective clothing can be any suitable tactical uniform with long sleeves worn unfolded.

(a) The wearing of highly flammable materials such as nylon should be discouraged.

(b) For persons actually exposed to the effects of the flashbang (e.g., in the same room), a fireman's "turnout coat" is an excellent alternative. These coats are readily available easy to don and remove so multiple students can use a few coats.

(3) Fire resistant gloves, such as those made of Kevlar™ or Nomex™, should be considered for all persons throwing the devices.

(a) Although it is extremely rare for a flashbang to prematurely ignite—it has happened.

(b) The wearing of heavy gloves makes manipulation of the device difficult.

(c) Pilots use flight gloves with soft leather palms and the backs made of fireproof material called Nomex™. These gloves are ideally suited for this type of use.[h]

(4) Generally, the use of eye and ear protection should be mandatory!

(a) Appropriate hearing protection would include any good quality, properly fitted earplug, earmuff, or the use of fingers to occlude the ears.

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[h] **Note**: Nomex™ gloves are available commercially and can be purchased from a number of vendors. The gloves come in various sizes. A man's glove size is most often the same as his shoe size and, because they stretch, one size smaller is usually preferred.

(b) Eye protection should consist of any well-fitting shooting or protective eyeglass which screens the front and sides of the eye area, or any goggle which will not shatter if struck by flying debris.

(5) **Training facilities** — Training facilities must be selected which conform to safety guidelines. In California, strict guidelines have been set forth by the Commission on Peace Officer Standards and Training.

(a) "The site selected for ignition of flashbangs and related diversionary devices should be reasonably free of loose gravel, rocks, or other debris which could become flying hazards."[2]

(b) "Diversionary devices should never be ignited in areas where highly combustible materials or flammable vapors are present or suspected."[3]

(c) "Ignition of flashbang, stingball or other diversionary devices inside rooms or other enclosed spaces should be restricted to areas of adequate size and appropriate construction so as to limit the hazard caused by over pressurization."[4]

(d) "Ignition of flashbangs or related diversionary devices should occur only in areas where proper ventilation is provided."[5]

(6) Direct exposures to flashbangs must be limited.

(a) Because the effects on the body are cumulative, students and instructors are at a much greater risk of sustaining injuries than a suspect.

(b) A student or instructor is likely to be exposed to the effects of a flashbang in one of three conditions. The following are guidelines:

(c) When the person is exposed in the same room:

i. Generally, exposures under these conditions should be limited to no more than five in a 24-hour period.

ii. Periodically, students should be queried for ringing or feelings of stuffiness or fullness of the ears, and if present, must not be further exposed.

(d) When the person is exposed while in an adjacent room (not in a direct line with the flashbang, i.e., door, window, etc.):

i. With proper hearing protection, exposure need not be limited.

ii. Exposure in line with the ignition, i.e., doors, windows etc., should be treated as if exposure occurred in the same room.

(e) When the exposure occurs out of doors:

i. Exposure to a flashbang while outdoors and within 100 feet should be with adequate hearing protection.

ii. Hearing protection is not normally required when the distance from the device is greater than 100 feet.

E. **Enhancers** — There are a number of factors which can enhance the effects from a flashbang without increasing the hazards.

1. Darkness will greatly enhance the "flash" effect the suspect receives from a flashbang.

a. The human eye undergoes some drastic changes in dim light.

(1) The pupil gradually dilates, allowing more light to enter the eye.

(2) Rhodopsin, a pigment which absorbs light, darkens in dim light making the eye better able to absorb light.

(3) When the eye is exposed to bright light, the pupil will constrict in approximately 1/2 second and the rhodopsin will bleach with light, greatly reducing the eyes' ability to absorb light.

(4) It can take up to two minutes for the eye to dilate and as much as thirty minutes for the rhodopsin to regain its full light-gathering capability.

(5) The dazzling light from the flashbang is intensified and greatly hinders the suspect's ability to recover quickly.

b. It may be possible to reduce the lighting or wait for darkness in anticipation of using a flashbang to enhance the effects.

2. Because a flashbang works directly on the organism, factors which are already affecting the organism (suspect) may enhance the effects.

    a. "...exhaustion, previous shock, intoxication, bad health, and poor nourishment frequently set the stage for the heightened emotional tension and tendency to fantasy which most writers believe to be central factors in the etiology of panic."[6]
    A.L. Strauss 1944

        (1) Moreover, when people become tense and exhausted, they tend to be highly suggestible. [7]

        (2) This stage of mind leads to exaggeration of the threat of life.[8]

    b. Remember, what a diversionary device is intended to do is distract or divert the attention and you need to exploit this to the maximum extent possible.

F. Classification, Storage, Handling and Transportation Concerns

1. “The basis for the classification of explosives throughout the world is based upon conventions developed by the United Nations Committee of Experts on Transport of Dangerous Goods.”[9]

2. Explosives are divided by Hazard Class, Hazard Division and Compatibility Grouping.

    a. **Hazard Class** refers to the degree of risk in shipping and transport.

        (1) There are nine Hazard Classes, each of which are identified by a number.

(2) Explosives are a “Class 1,” indicating the highest level of risk when compared with other hazardous materials, such as gases, flammable liquids, radioactive materials and so forth.

b. **Hazard Division** refers to the specific type of hazard a material presents.

(1) There are six Hazard Divisions, which are also identified with a number.

(2) These are separated from a Hazard Class by a decimal.

(3) Division 1.1 — identifies substances and articles that have a mass explosive hazard. This is one which instantaneously affects the entire load.

(4) Division 1.2 — identifies substances and articles that have a projection hazard but not a mass explosion hazard.

(5) Division 1.3 — identifies substances and articles that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.

(6) Division 1.4 — identifies substances and articles that present no significant hazards.

(7) Division 1.5 — identifies very insensitive substances and articles but which have a mass explosion hazard. This means that there is very little probability of ignition or detonation under normal conditions of transport.

(8) Division 1.6 — identifies extremely insensitive articles that do not have a mass explosion hazard.

c. **Compatibility Grouping** identifies groups of substances that can be safely transported or stored together.

(1) There are currently 13 groupings, each of which is identified by a letter.

(2) An “A” designation identifies a primary explosive substance.

(3) A “B” designation identifies an article containing a primary explosive substance and not containing two more effective protective features.

(4) A “C” designation identifies a propellant explosive or other deflagrating explosive substance. This is the designation awarded to most diversionary devices and stingballs.

d. “Combining the class, division and group defines the classification of an explosive substance or article.”[10] Thus, an explosive is identified by its class-division-group.

**EXAMPLE**: 1.41C, which is the classification for the most common law enforcement munitions.

3. When storing any explosive, all walk-in facilities should have placards on or near the entry doors identifying personnel with authorized access.

a. All stored explosive items should be clearly labeled. At a minimum this should include:

(1) An inventory control number

(2) The name of the item

(3) A brief description of the item

(4) The weight, class/division and compatibility group.

b. Storage facilities should also take steps to control or eliminate static electricity where explosive materials may be ignited by an electrostatic discharge.

c. Any storage area must not be used for work, and vice versa.

4. If an explosive is spilled, do not use a solvent that can dissolve the explosive material for clean-up.

   a. The solvent can carry the material into small cracks and crevices and leave an explosive residue after it evaporates.

   b. "To clean small spills or small amounts of explosives, use a solution of 25% alcohol and 75% water."[11]

   c. When cleaning a large area, use copious amounts of water or a water-steam mixture.

5. A Material Safety Data Sheet (MSDS) provides vital information for the storage, transportation and handling of flashbangs and stingballs.

   a. Federal regulations require information on potentially hazardous chemicals and other substances to be recorded and provided for persons charged with handling them.

(1) The U.S. Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) and the "Community Right to Know Law" (SARA Title III) each have regulations relating to handling hazardous materials.

(2) Many state agencies also have their own regulations and persons and agencies who purchase, transport, store and handle these devices will be required to comply with them.

b. A Material Safety Data Sheet is designed to provide workers and emergency personnel with appropriate procedures for handling and working with certain substances.

c. These sheets provide information such as toxicity, health effects, reactivity, storage, disposal, flash point on the substances in flashbangs and stingballs.

d. Of particular interest is that these sheets will also provide specific information on procedures for cleaning spills, leaks or other accidents.

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[1] Cooper, Paul W., *EXPLOSIVES ENGINEERING*, Wiley-Vch, 1996, New York, New York, p417.
[2]Guideline, 6.1.2, *POST GUIDELINES FOR STUDENT SAFETY IN CERTIFIED COURSES*, The Commission on Peace Officer Standards and Training, State of California, 1990, p35.
[3]Guideline, 6.1.3, *POST GUIDELINES,* 1990, p35.
[4]Guideline, 6.1.4, *POST GUIDELINES,*1990, p36.
[5]Guideline, 6.1.5, *POST GUIDELINES,*1990, p36.
[6]Goldstein, Robert M. Ph.D, The *ENCYCLOPEDIA OF HUMAN BEHAVIOR: PSYCHOLOGY, PSYCHIATRY AND MENTAL HEALTH*, Volumes 1 & 2, Doubleday and Co., Inc., 1970.
[7]Goldstein, ENCYCLOPEDIA OF HUMAN BEHAVIOR, 1970.
[8]Goldstein, ENCYCLOPEDIA OF HUMAN BEHAVIOR, 1970.
[9] Cooper, Paul W. and Kurowski, Stanley R., *INTRODUCTION TO THE TECHNOLOGY OF EXPLOSIVES*, Wiley-Vch, New York, New York, 1996, p159.
[10] Cooper and Kurowski, *EXPLOSIVES*, New York, 1996, p163.
[11] Cooper and Kurowski, *EXPLOSIVES*, New York, 1996, p186.

## PART 9 — LEGAL ASPECTS

A. The justification for the use of a diversionary device or stingball will be closely scrutinized by the courts.

1. A motion to suppress evidence is often made after a flashbang has been used.[a]

a. The suppression motion will usually be based upon one of two legal theories.

(1) That the effects of the device made a confession or admission involuntary and thus, in violation of the Fifth Amendment to the U.S. Constitution.

(2) That the use of the device was an excessive use of force and, therefore, violated the Fourth Amendment of the U.S. Constitution.

b. Statements made and evidence gathered are often attempted to be suppressed by the use of the "**fruits of the poisonous tree doctrine**."[1]

(1) The motion often takes the form of an accusation of unnecessary or excessive force and, once the allegation is made, the burden often shifts to the prosecution to prove the flashbang was necessary.

(2) Tactical personnel should be ready to describe the necessity for the use of these devices, in detail.

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[a] **Note**: For a thorough understanding of these complex legal issues, the author highly recommends "Legal Aspects of Diversionary Devices," authored by Jon Becker, Esq. and published in *The Tactical Edge*, Spring and Summer 1996.

c. It is often necessary to provide an expertb on these devices to describe the anticipated effects, methods of employment, safety considerations as well as the standard and acceptable practices and procedures for appropriately employing them.

(1) "A number of courts which have confronted the use of diversionary devices have cited expert testimony as a basis for a favorable ruling. The need for an expert on diversionary devices cannot be understated." [2]

(2) The California Jury Instructions define an expert as a person who ". . . has special knowledge, skill, experience, training or education sufficient to qualify him/her as an expert on the subject to which his/her testimony relates."[3]

(3) "A duly qualified expert may give an opinion on questions in controversy at a trial."[4]

(4) The expert must have personal experience with these devices as well as education and training in the police special operations field.[c]

(5) One of the intentions of this course is to provide information of sufficient depth and quantity that an experienced tactical officer will be able to provide expert testimony.

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[b] **Note**: See Appendix C, Courtroom Presentations, for a list of potential questions to identify sufficient expertise to qualify a person as an expert on the use of flashbangs and/or stingballs.

[c] **Note**: Expert witnesses are especially effective if they can testify that they have been personally exposed to the effects of the flashbang. They serve as "living proof" that, when used appropriately, the devices are both harmless and effective.

2. Civil litigation regarding these devices is becoming more prevalent.

    a. Because these devices have proven to be such an asset for tactical teams, they are being used with increasing frequency.

        (1) It would be difficult to underestimate the contribution these devices have made to the safety of all concerned.

            (a) The use of flashbangs to rescue hostages has been well documented.[d]

            (b) The use of distraction devices to distract potentially deadly suspects has been documented scores of times in newspapers and magazines.

            (c) Current use of flashbangs to support an entry has allowed many suspects to be apprehended without being harmed.

        (2) The use of this “less-than-lethal” option has been enthusiastically endorsed by police and military special operations teams throughout the world.

            (a) Throughout the world, most if not all, counter-terrorist teams use these devices.

            (b) Their growing popularity with police tactical teams across the United States has proven their usefulness and safety and provided a plethora of examples in successfully and safely resolving dangerous incidents.

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[d] **Note**: See Part 2 - Historical Background

(c) A diversionary device is often the only effective less-than-lethal option available to support a dynamic entry.

b. The ability to distract a dangerous suspect and quickly exploit his disorientation and confusion has defused countless high-risk situations.

(1) As their use has increased, so have the related civil cases in which plaintiffs seek not only to gain monetarily, but in some cases to outlaw their use entirely.

(2) Law firms have arisen which derive their primary income from suing municipalities in general, and police departments in particular.

(3) For the first time in modern law enforcement, it is cost effective to provide peace officers with state-of-the-art equipment and training.

(4) Although the procurement of new equipment and providing up-to-date and periodic training is expensive, it is much less so than losing a civil case.

3. For these reasons, the courts will continue to examine our use of these devices as more and more cases provide them opportunities.

a. Peace officers who authorize the use of these devices, as well as those who deploy them, must have a realistic expectation of the anticipated effects, and rigidly adhere to safety regulations.

b. The device has been challenged in at least one state supreme court.

(1) The case stemmed from a 1987 incident in which a flashbang was used to support an entry into a “rock” house in Los Angeles.

   (a) An action was brought against the Los Angeles Police Department alleging that the use of the flashbang constituted inherently excessive force.

   (b) This case gained national recognition, and was the first serious challenge to the use of these devices.

(2) The California Supreme Court upheld the use of the flashbangs and concluded that their use did not pose an unacceptable threat to property and persons.
(Langford v. Gates 43 Cal. 3d 21, 1987)[e]

   (a) It should be noted that in holding this opinion, several areas were considered, not the least of which was the outstanding training and experience of the team which deployed it.

   (b) Although this was a landmark decision in favor of the use of flashbangs, it must be recognized for the caveat it is.

      i. The court specifically recognized the fact that the team which deployed this device was well-trained and experienced.

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[e] **Note**: Even more significant, the Langford case was one of 16 last-minute decisions issued by the California Supreme Court before Chief Justice Rose Bird and Justices Cruz Reynoso and Joseph Grodin left office after having been overwhelmingly defeated in reelection bids.

ii. It should be obvious that future court cases will be examined in light of this precedent.[f]

B. The use of a flashbang must be consistent with local department policy.

1. Except in emergency situations, most departments require the review of the planned use of these devices by a tactical commander or his equivalent.

a. It is vital that the tactical commander be well informed regarding the factors which may aggravate or mitigate the anticipated effects of a flashbang.

b. The tactical commander must be prepared to provide testimony justifying his reasoning and why approval was granted.

c. The decision of whether or not to deploy these devices must not be removed from a tactical commander.

(1) The decision to use these devices must be made by well-informed, trained personnel.

(2) Major incidents often have an "Incident Commander," who is in charge of the overall operation, and a "Tactical Commander," who is in charge of the tactical portion of the operation.

(3) The volume of knowledge about these devices and how they work is increasing.

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[f] **Note**: In the American system of jurisprudence, it is the exception that makes the rule. An unfavorable ruling will not occur because of the thousands of times a flashbang or stingball was used correctly, but because of the *one* time it was not!

(a) Tactical Commanders are more apt to have both the experience and training necessary to make logical, well-informed decisions.

(b) The Tactical Commander is most likely to have a realistic expectation of the anticipated effects and an understanding of any related hazards.

2. The department policy must be clearly understood and adhered to.

   a. The policy should be written to provide the decision-maker with a clear understanding of which circumstances justify the use of these devices and which do not.

   b. The policy should be designed to provide a commander with the fundamentals necessary for a decision.

   c. The policy must be able to be expanded to meet new criteria as new uses for these devices are discovered.

      (1) As flashbangs and stingballs continue to enter police service, tactical teams will invariably discover new uses for them.

      (2) Policies dictating the conditions in which these devices are used should be sufficiently flexible to prevent encumbering innovative techniques.

   d. The policy should not attempt to be so comprehensive that it precludes the use of these devices in incidents which do not clearly fall into a specific category.

(1) The decision-maker must have the ability to use discretion in incidents without falling "out of policy."

(a) Situations which require the use of tactical teams are often bizarre and do not readily lend themselves to easy definitions.

(b) Too restrictive a policy will not allow the on-scene commanders the authority to exercise their best judgment.[g]

(2) At a minimum, a written policy should specify who is authorized to deploy these devices.

(a) Training must be provided to avoid injuries.

(b) Periodic "refresher" training should be available for personnel who may not have used these devices for long periods of time.[h]

e. Policy should always allow a "user" the discretion to deploy these devices in emergency situations.

(1) Emergency circumstances, by their very nature, are fraught with danger and do not readily lend themselves to lengthy objective review.

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[g] **Note**: History has shown that better decisions are made by commanders who have a guideline to follow, rather than a directive that *must* be followed. Better decisions are made "on scene" than "on paper."

[h] **Note:** The issue of how frequently refresher training should be conducted has been subject to much discussion and remains undetermined. No formal national standard exists. Consequently, each agency is encouraged to develop their own standards based upon the circumstances unique to each.

(2) When properly deployed, even in a worst-case scenario, it is highly unlikely that anyone would be seriously injured from the effects of the ignition of a flashbang or stingball.

(3) Indeed, in hundreds of examples, the use of the flashbang has been cited as the *key* factor in safely resolving the situation.

(4) Many departments do not have a written flashbang or stingball policy.[i] However, virtually all have some established practice and procedures.[j]

C. When writing a policy there are several fundamental concepts which must be considered.

1. Stingballs and distraction devices are not a substitute for good tactics.[k]

a. The spectacular successes achieved by teams utilizing these devices often eclipse the sound tactics and expertise of the team members.

b. They are not a panacea, and should be viewed as another tool—nothing more.

2. They must not be used without justification.

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[i] **Note**: The Romans recognized that one of the oldest precepts of law is "*LEX QUID NON EST PROMULGATA NON EST LEX*." Translated this means, "Law which is not published (or promulgated), is not law." Therefore, it may be inferred that there is no such thing as an unwritten policy.

[j] **Note**: Of particular concern to public agencies is a landmark case entitled, Monell v. New York City Department of Public Social Services, 436 U.S. 658 in which holds that liability can be established in the absence of a written policy by an accepted practice or custom.

[k] **Note**: This is a common mistake for inexperienced teams.

a. The indiscriminate use of these devices will provide abundant opportunities to have their use curtailed or even eliminated by courts.

b. Standard review procedures will ensure these devices are not used arbitrarily without unduly limiting their use with sufficient justification.

c. A policy should delineate the conditions which merit their use and which generally do not.[l]

3. The devices should be deployed by designated, trained personnel only.

a. Both types of these devices are safe when deployed correctly.

b. Training is required if one is expected to know which conditions are safe and which are hazardous.

c. Training also provides a basis for a realistic expectation of the anticipated actions of persons exposed to their effects.

d. "Along with initial training, it is important to conduct follow-up training and practice using these devices."[5]

4. Generally, the devices should not be used solely for the preservation of evidence.

a. Flashbangs were designed to distract or divert the attention of suspects to avert violent actions.

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l **Note**: Generally, policies should not be so restrictive as to remove the discretion of the individual officer required to make decisions based upon the circumstances unique to a particular situation.

b. As stated earlier, there can be no absolutes when defining which conditions merit the use of a flashbang and which do not.

(1) Generally, it would be difficult to identify a suspect in the process of destroying evidence as a threat. Consequently, it may not justify the use of a flashbang.

(2) The policy regarding this concept must be broad enough to permit exceptions without violating policy.

D. Personnel who train others in the use of these devices must be aware of potential liability.

1. The training must be consistent with current practices.

a. Not too many years ago, the use of flashbangs was considered “state of the art.”

(1) Little written material has been available, and training has been available largely through vendors.

(2) As the use of these devices has gained in popularity and their effectiveness has been proven, more information has come into the public domain.

b. As the state of the art continues to advance, more agencies are taking an active role in providing current, accurate and relevant information.

(1) In California, the Commission on Peace Officer Standards and Training (POST)[6] has taken an active role in providing guidance and information on the use of distraction devices.

(a) Standardized curricula is being developed to ensure current and appropriate information is available and disseminated.

(b) The National Tactical Officers Association (NTOA)[7] has been instrumental in providing current information and model lesson plans.

(c) The International Association of Chief's of Police (IACP)[8] has provided training keys and related information.

2. Safety must be incorporated into any training program.

   a. Guidelines are available for conducting safe and effective training with these devices.[m]

   b. Training with flashbangs presents a unique opportunity to experience first-hand the conditions experienced by a suspect in almost identical circumstances.

      (1) This provides an opportunity for the tactical officer to testify in court as a percipient witness.

      (2) By actually experiencing the effects from these devices, when testifying, the tactical officer is "living proof" of their safety.

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[m] **Note**: An excellent resource is the California POST Training and Safety Guidelines, which establishes safety protocol for training with these devices. This information is available from the California Commission on Peace Officer Standards and Training, 1601 Alhambra Blvd., Sacramento, CA 95816-7083

E. Common terminology will alleviate much confusion regarding these devices.

1. Buzz words, such as “stun grenade” and “anti-terrorist munitions,” have been used by vendors and manufacturers to describe their products, but have created a legal quagmire in court.[n]

   a. An allegation of unnecessary or excessive force is inherent when these words are used to describe your tools.

   b. Compounding this problem is the disparity of terms used among law enforcement.

   c. Attorneys are able to use words without precise meaning to confuse and/or arouse the emotions of a jury.

2. The following are some of the more commonly misused or confusing terms and “buzz words” used to describe diversionary devices and their effects.

   a. “Stun Grenade” or “Stun Munitions” is often heard when describing these devices.

      (1) A diversionary device does not “stun” the person exposed to it.

         (a) A flashbang creates a sensory overload which inhibits the suspect from correctly interpreting life’s stimuli.

         (b) The suspect has full use of his faculties and is extremely receptive to commands while under the effects of a diversionary device.

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[n] **Note**: Emotion-arousing words, such as “detonate,” “blind,” “deafening,” “stun” and others can raise ancillary issues which confuse a jury. Remember, the prosecution has to convince 12 people that a suspect is guilty. The defense has only to confuse *one!*

i. Indeed, if the suspect couldn't hear or see you, it would be impossible to communicate with him.

ii. Experienced SWAT officers will be able to attest to the number of times suspects have complied with instructions immediately after the ignition.

(2) A diversionary device is not a grenade in the accepted use of the term.

(a) While it is true that flashbangs may have evolved from grenades, they bear little resemblance to their ancestors.

i. A flashbang emits only the byproducts of combustion, light and sound.

ii. A grenade uses an explosion to emit other objects, e.g., smoke, gas, stingballs, shrapnel, etc.[o]

(3) Better terms would be a "distraction" or "distraction device," a "flashbang" or a "flash/sound diversion," and so forth.

b. Flashbangs do not "detonate."

(1) A flashbang uses a deflagrating explosive rather than a detonating type.

(a) It more closely approximates a propellant than an explosive.

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[o] **Note**: While some chemical agent grenades use an explosion to function, most smoke and chemical agent grenades use combustion (without an explosion) to function.

(b) It cannot burn faster than there is oxygen available, and it is characterized by relatively slow progressive rates and a buildup of pressure.

(2) A more correct term for the initiation of a flashbang is “ignition.”[p]

c. The light emitted from the device is not “blinding,” nor is the sound “deafening.”

(1) The light from a flashbang causes a person’s pupils to be constricted and a fluid in the eyes, called rhodopsin, to be bleached.

(a) This condition is temporary and the person can still see, albeit poorly.

(b) Describing the effects of the light with terms like “blinding” is inviting the wrath of a jury and an allegation of excessive force.

(2) The sound from the flashbang has a disorienting effect but does not deafen.

(a) The decibel level from most flashbangs is about the same as the sound from the muzzle of a shotgun or the sound of an airbag initiation in a car.

(b) Describing the effects of the sound with terms like “deafening” is inviting challenges and allegations.

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[p] **Note**: Some more modern devices now employ a blasting cap which does detonate. Even so, the primary propellant of most devices remains a deflagrating explosive which more closely resembles a propellant.

(3) Better and more descriptive terms would be “dazzling,” “brilliant,” “glaring,” or “intense” for the light, and “loud” or “thunderous” for the sound.

d. Precise terms for the psychological effects are especially important. Words like “panic” or “hysteria” have connotations much stronger and infinitely more emotional than the effects caused by a flashbang.

(1) Not only are these terms not accurate, they provide a built-in defense for a person who is “temporarily insane” or acting in a fit of panic or hysteria.

(2) More accurate terms would be “disoriented,” “confused,” “bewildered,” or “overwhelmed.”

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[1] Wong Sun vs. United States, 1963.SCT.116 , 371 U.S. 471, 83 S. Ct. 407, 9 L. Ed. 2d 441
[2] Becker, Jon Esq., “The Legal Aspects of Using Diversionary Devices, Part 2,” *THE TACTICAL EDGE*, Summer 1996, p51.
[3]California Jury Instructions, Volume 1, 5th ed., West Publishing Company, St. Paul, Minnesota, 1988, p84.
[44]California Jury Instructions, Minnesota, 1988, p84.
[5] Becker, Jon Esq., “The Legal Aspects of Using Diversionary Devices, Part 2,” *THE TACTICAL EDGE*, Summer 1996, p52.
[6] California Commission on Peace Officers Standards and Training, 1601 Alhambra Blvd., Sacramento, CA 95816-7083.
[7] National Tactical Officers Association, P.O. Box 797, Doylestown, PA 18901, Phone — (800) 279-9127, Email — ntoapa@aol.com, World Wide Web – http://www.ntoa.org.
[8] International Association of Chiefs of Police, 515 N. Washington St., Alexandria, VA 22314-2357 (800) 843-4227.

## PART 10 — INSTRUCTION TECHNIQUES

A. Because this is a course for instructors, an abbreviated lesson on how information is successfully exchanged is provided.

   1. This information is fundamental in nature and is not intended to be comprehensive.

   2. A basic understanding of human motivation and how people learn is of great benefit to instructors.

B. For training to be effective, the information needs to be arranged and introduced in such a manner that a student is easily able to grasp rudimentary concepts and use them to build upon. Some sound principles are as follows:

   1. Effective training is sequential.

      a. For information to be understood it needs to be organized and presented sequentially, that is from the simple to the complex.

      b. Fundamental concepts are used to build upon so that more complex information and concepts are readily understood.

   2. *Training needs to be tailored to individuals,* in that it takes them from where they are at a given time to the attainment of greater proficiency.

      a. Different people learn in different ways.

         (1) "Some people are highly visual; they receive and process most information visually."[1]

         (2) Other people are primarily auditory and receive their information through actual words or sounds.

(3) Still other people are kinesthetic, that is they understand better through their feelings and emotions.

**Example**: The fact that people grasp information in different ways is often manifested in their speech. When a person says, “I see what you mean,” another says, “I hear what you’re saying,” and still another replies “I can get a grip on that.”

b. The effective instructor tailors the presentation so that the message is presented in such a manner that it appeals to as many of the senses as possible and thus to each of the primary processing modes.[a]

3. Effective training is performance oriented.

a. Whenever possible, proficiency should be demonstrated by doing some task.

b. Effective training results in having a student gain the ability to perform a new task, or an old task better, with the least expenditure of time and resources.

c. Training value must be measured in terms of the performance of skills learned.

C. Persons tasked with teaching others to use diversionary devices and stingballs have an obligation to know and understand the attributes and characteristics associated with these devices and clearly communicate this information to students.

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[a] **Note**: It has been estimated that from 80 to 85% of all people learn primarily through their sense of vision. From 9 to 11% learn by hearing, and the rest learn through our other senses.

1. This course is intended to allow future instructors to be able to answer technical questions concerning these devices as they teach their own classes.

2. The credibility of an instructor must be predicated on demonstrable ability as a teacher and an in-depth knowledge of the subject material.

    a. Students who respect the preparation, ability and knowledge of an instructor will be better able to grasp complex issues and learn more effortlessly.

    b. In order to be a successful teacher, command of the subject matter is only half of the undertaking.

        (1) Successful instructors must have a good grasp of how people learn and provide the information so that it is readily grasped.

        (2) Instructors who are able to provide information which is easily understood and in a context that students may apply in their own lives will be successful.

D. Human motivation can be readily understood when we realize that: All human behavior is pleasure seeking!

1. People are comfort seeking creatures.

    a. People seek out conditions and situations which provide pleasure.

    b. Contrarily, people avoid conditions and situations which cause discomfort.

2. Motivation then can be positive or negative.

a. An avoidance of a negative experience is in effect a movement toward the other end of the spectrum—pleasure.

b. The intensity attached to an experience, either positive or negative, is called **reinforcement**.

(1) The stronger the reinforcement, the more likely it is to be able to be recalled.[b]

(2) Students already possess a certain amount of motivation for learning the subject material simply because they chose to attend this course rather than do some other activity.

(3) A good instructor who understands how to increase this motivation will succeed when others fail.

E. A good deal of successful instruction can be related to the student's ability to recall it for use in their own life situations.

1. Memory consists of two parts, storage and recall.

a. "Many researchers now believe that we store everything that we experience in our lives."[2]

b. Unfortunately, or perhaps fortunately, we are not able to recall everything that we experience.

2. **Recall** refers to a person's ability to relate something they know or have experienced.

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[b] **Note**: Psychologists have discovered that an intensely emotional event is internalized and can be recalled in minute detail for years and even decades after the event. These experiences are called *Significant Emotional Events.* Every one has experienced these significant emotional events at sometime in their lives.

a. The principal inability to recall (forgetting), appears to be interference of memories which are piled haphazardly on each other in our brains.

b. As experiences are piled on top of each other the brain's ability to retrieve a particular one is inhibited for lack of a clear association or pattern.

c. It is important that instruction be oriented to avoid this and enhance the student's ability to recall information provided during the course.

3. There are four tools for improving a person's recall, and hence their learning.

   a. **Repetition** — has been and still is the standard tool of our educational system. It is not, however, the best or only method.

      (1) Examples of learning through repetition may be Penal Code, Vehicle Code or Radio Code numbers.

      (2) At first the recall of these numbers is seemingly impossible, but after numerous repetitions they are not only recalled at will but even used to replace words, (jargon).

      (3) Thus the more often a message or piece of information is heard or experienced, the more likely it will be able to be recalled.

         (a) It is not necessary, nor even desirable, to use the identical words or phrases to achieve repetition.

(b) By paraphrasing the message or concept, the repetition principle can be achieved without boring the students.

(c) Before moving to new areas, an instructor can summarize key points to assist the students in recognizing important topics and information.

b. **Association** — is the linking of a piece of information with something already established in our memory.

(1) "Information which can be connected to the listener's current store of information through stories or analogies will be better understood and easier to retrieve."[3]

(2) Anecdotes and examples which highlight and illustrate important points are more apt to be able to be recalled than those presented without them.

(3) One useful method is to provide an historical perspective.

(a) An historical perspective builds upon what a student already knows and provides a logical association for new information.

(b) There is no subject that is so new or so unique that some historical association is not available.

c. **Intensity** — When information is presented with an emotional content it will be more readily recalled than other information.

(1) The ability of police officers to easily recall lessons learned about officer survival is due to a high emotional attachment. Their lives depend upon it!

(2) To a certain extent, emotion can be transmitted by the instructor.

(a) Emotion can be contagious.

(b) Students will learn more readily from an enthusiastic instructor who presents a lively and animated course than one who is tedious and lackluster.

(c) Intensity can be added by voice quality. A passionate message is more apt to be remembered than one delivered in a monotone.

(3) The use of humor is a method of transmitting emotion.

(a) When information is presented in different, unexpected and incongruous ways, it is often humorous.

(b) Tasteful, good-natured humor will involve students and enhance the learning process.

d. **Involvement** — Information which is experienced by more than one of our senses is more likely to be remembered than that which involves only one.

(1) Lecture is perhaps the most common method of teaching.

(a) Lecturing involves only one sense; hearing.

(b) Learning can be enhanced when more than one sense is involved, such as sight, when using graphic aids.[c]

(2) Demonstration and practical application types of instruction involve hearing, seeing, touching and sometimes even tasting and smelling.

(a) When more senses are involved, it becomes more likely that students will recall the information presented.

(b) An instructor who presents his information so that students can use more than their sense of hearing is infinitely more effective than one who does not.

(3) A picture, graph, illustration or model is important when you want to get an idea across or emphasize a particular point.

(a) People think and remember visually.

**Example**: Write a word such as “elephant” on the blackboard. Have the students describe it. Inevitably, the description is of what the word represents (visual), rather than the word itself, (color of chalk or ink on the blackboard or ink board, and so forth).

(b) Color, images and pictures are easier to recognize and remember than words.

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[c] **Note**: Socrates taught by lecture with a stick in the sand as a graphic aid before 399 BC. An instructor of today, who uses only a blackboard as a graphic aid, is little better off.

(c) People will remember that some information was in the “red area” or was written in green ink.[d]

F. Visual aids are among an instructor’s most important tools.

1. The proper use of visual aids not only increases interest in a presentation, but enables students to more readily grasp key points.

2. The following are among the most common visual aids, with guidance provided to achieve the maximum benefits.

a. Slides

(1) Slides are quite inexpensive, and can be used with a large audience or class.

(2) A drawback with slides is that it is often necessary to darken the room while showing them. The contrast between the dark room and bright slide is fatiguing. If possible, don’t turn out the lights.

(3) Vary slides so that the presentation is a mixture of text, graphs, illustrations, pictures, and special effects.

(4) Use action words to describe key points.

(5) Use a title slide before each major section.

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[d] **Note**: Research indicates that people process color in different sequences. The first color processed is yellow. When you want to highlight a key point or concept, your students will likely perceive and remember that point first if the color yellow is used. Of interesting note is the number of road signs with black on yellow. These are usually regulatory or warning as opposed to the green and white or black and white informational signs.

(6) When possible, use a standard logo or color for key subject areas.

(a) Remember, many people tend to remember visually.

(b) Standard colors, borders and logos will help associate information.

b. Overhead Transparencies

(1) Overhead transparencies can contain more information than a slide.

(2) Transparencies can be stacked so that related information or diagrams can build upon the preceding transparency.

(3) Don’t crowd too much information on the screen at any one time.

(4) If possible, don’t turn out the lights. The contrast between the bright screen and darkened room is fatiguing.

c. Flip Charts

(1) Flip charts are great for presentations when information can be placed on the paper and then ripped off and posted for easy reference.

(2) Flip charts can be time consuming to construct during presentations. Consider preparing key charts prior to class.

(3) Flip charts are difficult to transport, especially if the instructor has to travel long distances or in airplanes.

d. Ink Boards

(1) An ink board is better than a blackboard and chalk because it allows the use of color.

(2) Mentally rehearse or have a pencil sketch of any drawing you want to put on the board during presentation time.

e. Computer-based presentations

(1) As lap-top computers have become more powerful and popular, computer-based presentations have become easier than ever.

(2) Popular presentation software such as Microsoft PowerPoint™, Aldus Persuasion™, and others, have made presentations easier, more powerful and more effective than ever before.

(3) Computer-based presentations allow full-color graphics, animation, video, audio, and annotated pictures.

f. Handouts

(1) Use a high-quality handout. This is usually the part of your course of instruction that a student will remember the longest and use the most often.

(2) Don’t hand out material before you are ready. Students will read handout material as soon as they have it. You are “stealing your own thunder.”

(3) Use illustrations, color, different fonts and other visual enhancements to make them more interesting.

(4) Handouts are great for clarifying important or complex points.

G. Testing and evaluation

1. Many, if not most, students have a strong aversion to being evaluated, particularly by means of a written test.

2. When appropriately used, however, written tests can be one of the most effective methods of focusing students' attention on critical points of instruction and ensuring that learning has actually taken place.

   a. It should be made clear from the onset that a written test will be given.

   b. Questions should be written clearly and unequivocally. Students should be encouraged to challenge any question, and any misunderstandings should be resolved in favor of the student.

   c. The grading system should be strenuous enough to be meaningful.

3. Tests should be graded in such a manner that students are not embarrassed by making mistakes nor insulted by implying that they are dishonest.

   a. One of the most common methods of grading tests is by switching papers. However this implies that a person might cheat if allowed to grade his or her own paper.

   b. In a free and open atmosphere, students will challenge a question. If a student misses a question but can effectively argue the point, the learning has occurred and they should be given the benefit of the doubt.

4. When done properly, students feel a tremendous sense of achievement by having proven their ability to master the subject matter. Additional benefits include the ability to establish expertise in court and reducing civil liability risks.

G. The key to successful instruction is a good lesson plan.

1. A good lesson plan is the *key* component for a successful instructional period.[e]

a. Lesson plans can be used by more than one teacher, but individual instructors should "customize" them to fit their own style.

b. Anecdotes, illustrations, visual aids, handout materials and demonstrations should be noted in the margins to ensure that they are not overlooked or presented out of order.

c. Lesson plans should contain references to where the information was obtained.

(1) References provide instructors with additional information if more research is desired.

(2) They also provide a readily available bibliography for students who desire more in-depth study.

(3) In the police environment, the lesson plan may be subpoenaed to court. In order to impeach the instructor and/or the lesson plan, the references must also be attacked. This is often much more difficult.

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[e] **Note**: Many professional instructors are now using computer-based material as lesson plans. This allows the instructor to view the same material as the students. While this method requires extensive preparation, it is becoming more and more popular.

d. Information should be organized as to its relative importance to the overall course objectives.

(1) Information should be organized from the fundamental to the complex.

(2) Material received first and last in a period of instruction is usually remembered longer than that received in the middle.

(a) Emphasize material you want your class to remember in the first and last seven minutes of your presentation.

(b) Use change-of-pace exercises to create “cycles” of information punctuated with breaks, humor, anecdotes or illustrations, etc.

2. Lesson objectives should be clearly stated and simple enough to grasp in the allotted time.

a. Generally, no more than three objectives should be attempted during any one period of instruction.

b. The period of instruction should vary, depending upon what method of presentation is being used, the time of day, the amount of student interest and other factors which influence attention span.

(1) Remember, the primary objective is to transfer knowledge. Factors which impede or prevent this from occurring need to be eliminated.

(2) Change the pace of instruction every 10 to 15 minutes.

(a) Lectures can be broken into "mini-talks" and punctuated with appropriate humor, anecdotes or exercises.

(b) Having students do something different than listening, even if it is just answering questions, provides relief.

(3) Generally, presentations which do not involve much student presentation, such as lectures, need to be broken into 50-minute increments with a *minimum* 10-minute break every hour.[f]

(4) When students are involved in exercises or practical applications, the breaks can be separated by an hour and a half or longer.

3. Facilities should be appropriate for the type of training to be conducted.

a. The classroom setting should be comfortable, free of distractions and provide sufficient ventilation and lighting.

b. Visual aids should enhance the presentation, not detract from it.

(1) Unfamiliarity with equipment is a common and aggravating occurrence.

(2) Equipment which malfunctions, breaks the continuity of the instruction and impedes the learning process.

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[f] **Note**: Students likely to be attending courses on flashbangs, stingballs and other tactical courses are not temperamentally equipped to sit for long periods of time. The most effective instructors take this factor into consideration when developing their courses.

c. If demonstrations, practical applications or exercises are to be conducted outdoors, consideration must be given to factors such as weather, distractions and security.

(1) Alternate training sites may have to be considered for inclement weather.

(2) Demonstrations, particularly those involving police operations, are often quite interesting to the public, and as such, may attract unwanted attention.

(3) Safety considerations may be aggravated when spectators are present.

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[1] *MINDMAPPING*, Wycoff, Joyce, The Berkley Publishing Group, 200 Madison Ave., New York, New York 10016, June 1991, p124.
[2] *MINDMAPPING*, Wycoff, June 1991, p15.
[3] *MINDMAPPING*, Wycoff, June 1991, p124.

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## Appendix A - Definitions

**Acetylcholine**
A chemical in the body of animals that enables electrical impulses between nerve cells. As an electrical impulse reaches a nerve ending, acetylcholine is released and chemically bonds with a neighboring molecule and transmits the impulse.
(See also Acetylcholine Effect)

**Acetylcholine Effect**
The temporary effect an organism experiences after long periods of high stress, characterized by a total emotional surrender.
(See also Fight or Flight Response)

**Amplitude**
The size (amount) of a pressure variation from a given standard, usually atmospheric pressure.
(See also Frequency)

**Bouchon**
The complete metal fuze assembly of a flashbang diversionary device, usually consisting of a safety pin, safety "spoon," and percussion ignition device.
(See also Fuse and Fuze)

**Brevity Code**
A one or two word phrase which, when transmitted on a radio, carries a much larger meaning. Used to keep transmission time to a minimum without unduly tying up valuable “air time.” Usually repeated twice to ensure understanding.

**Brisance**
A term given for the breaking or shattering effect from the sudden release of energy.
(See also Detonate)

**Candlepower or Candela**

The standard candle is a measurement of light intensity. It was originally defined as a $1/6^{th}$ pound candle of sperm wax, burning at the rate of 120 grains per hour. In 1921, this intensity of light was standardized in terms of incandescent lamps, and candles are no longer used for reference.

**Conditioned Response**

A learned response; a deep-rooted reaction; entrenched feelings and/or actions resulting from experience.
(See also Regimented Behavior)

**Critical Mass**

A point at which the size and agitation of a crowd exceeds the abilities of law enforcement to control.

**Crowd**

A casual, temporary collection of people without a strong, cohesive relationship.
(See also Mob)

**Deceptive Diversion**

A diversion which requires the suspect to form a conclusion, no matter how brief; any diversion that deceives, as an illusion or ruse. Any diversion which requires the suspect to make an inference. Sometimes called a psychological diversion.
(See also Physiological Diversion)

**Decibel, "dB"**

A unit of measurement used to express the relative difference in power, usually between acoustic or electrical signals. It is equal to ten times the common logarithm of the ratio between the two levels.

**Deflagrate**

To burn; consume; to burn rapidly with intense heat and dazzling light.
(See also Detonate)

**Deflagrating Explosive**

Any explosive which deflagrates rather than detonates; also called a "low" explosive it is characterized by relatively slow burning processes with progressive reaction rates and buildup of pressure which creates a heaving

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| | action.<br>(See also Detonating Explosive) |
| **Deployment Sequence** | The first of three functions when a flashbang is deployed. It refers to the manner and place in which a flashbang is deployed.<br>(See also Ignition and Firing Sequence) |
| **Detonate** | To explode violently and noisily; also called a "high" explosive it is characterized by very rapid chemical reactions, thus causing tremendously high pressure and brisance, (shattering action). |
| **Detonating explosive** | Any explosive which detonates rather than deflagrates; also called a "high" explosive it is characterized by very rapid chemical reactions, thus causing tremendously high pressure and brisance (shattering action).<br>(See also Deflagrating Explosive) |
| **Diversion** | A diverting or turning aside. A distraction of attention as a diversion from the enemy, anything that distracts or diverts the attention. (emphasis added) |
| **Expert Witness** | A person who has special knowledge, skill, experience, training or education sufficient to qualify him/her as an expert on the subject to which his/her testimony relates. |
| **Exploitation Window** | The period of time when a suspect is distracted and can be tactically exploited. Generally this begins when a flashbang ignites and lasts from six to eight seconds.<br>(See also Window of Vulnerability) |
| **Explosion** | A blowing up, or bursting with a loud noise; the noise made by an explosion; a bursting. |
| **Fight or Flight Response** | The body's instinctual reaction to fear. It manifests itself in the body by a surge of adrenaline, increased heart rate, increased blood pressure and rapid breathing.<br>(See also Acetylcholine Effect) |

**Firing Sequence**

The second of three functions when a flashbang is deployed. It refers to the mechanical action of the bouchon, (fuze assembly).
(See also Deployment and Ignition Sequence)

**Flash Stick**

A stick or pole to which a flashbang is affixed, allowing it to be precisely placed and held during ignition. Often used for exact insertion through chain link fences, windows, etc.
(See also Painter's Pole).

**Flashbang**

A diversionary device which, when ignited, emits a loud bang and bright flash. Also called a flash/sound diversion, distraction device or diversionary device.

**Force multiplier**

Anything which increases the power of a tactical unit.

**Frequency**

The number of pressure variations or fluctuations over a given time, usually one second. Usually measured in Hertz (Hz).
(See also Amplitude and Hertz)

**Fruits of the Poisonous Tree**

A legal tenet which holds that if a search is unlawful, the “fruits” of the search (evidence) can not be used as evidence in court.

**Fuse**

A narrow tube filled with combustible material, or a wick saturated with such material, for setting off an explosive charge. A pyrotechnic device which serves as the initiator to an explosive charge.
(e.g. M-3A1, friction type fuse)
(See also Fuze)

**Fuze**

Any of various devices for detonating bombs, projectiles, or explosive charges. A mechanical device used as the initiator to an explosive charge.
(e.g. M-201A1, percussion type fuze)
(See also Fuse)

| | |
|---|---|
| **Hertz (Hz)** | A standard for measuring and comparing frequency. One Hertz is one cycle of a pressure variation in one second.<br>(See also Amplitude and Frequency) |
| **Ignition Sequence** | The third of three functions when a flashbang is deployed. It refers to the events which take place during the burning of the charge.<br>(See also Deployment and Firing Sequence) |
| **Ignition** | Setting a thing on fire, to cause something to burn, in this case, the initiation of a flashbang ignition.<br>(See also Detonation) |
| **Immediate Action Drill** | Any action, technique or procedure which is initiated from an event rather than a signal. |
| **Impulse Noise** | Noise which lasts less than one second. |
| **Incident Wave** | The pressure wave which is emitted from a flashbang or stingball. This wave is characterized by both positive (overpressure) and negative (underpressure) changes in atmospheric pressure.<br>(See also Primary Wave and Reflected Wave) |
| **Lag Time** | The physiological time lag which occurs between the time a stimulus is perceived until the body responds. In a healthy, well rested human this takes about three-quarters of a second. |
| **Learned Response** | See Conditioned Response |
| **Mob**<br>(see also Crowd) | A large disorderly crowd or throng. |
| **Mob Mentality** | The single minded, obstinate and unreasonable mental attitude or disposition manifested by members of a mob. |
| **Noise Reduction Rating (NRR)** | A unit of measurement promulgated by United States Environmental Protection Agency to rate the effectiveness of hearing protection equipment. The higher the NRR (Noise Reduction Rating) the greater the level of protection. |

**Overpressure** — A condition in which atmospheric pressure is temporarily increased.

**Painter's Pole** — An extendable pole to which a flashbang is affixed allowing it to be precisely placed and held during ignition. Often used for supporting second story entries from beneath. The name is derived from the pole used by painters to hold paint rollers when painting overhead.
(see also Flash Stick)

**Physiological Diversion** — Any diversion which acts directly on one or more of the five senses.
(See also Deceptive Diversion)

**Primary Wave** — The pressure wave emitted from an explosion from the "incident" to any given point.
(See also Incident Wave and Reflected Wave)

**Reflected Wave** — A wave which strikes a hard surface and is reflected back. The reflected wave can be superimposed over the primary wave. Thus, both can exist at the same place and time, combining the effects.
(See also Primary Wave and Incident Wave)

**Regimented Behavior** — A set of conditioned responses which govern an individual's actions without conscious thought.

**Rhodopsin** — A purplish protein pigment, contained in the rods of the retina, that is transformed by the action of light and is necessary for vision in dim light.

**Sensory Overload** — A temporary inability of an organism to correctly interpret and appropriately respond to life's stimuli because of the volume of input.

**Sound** — Any pressure variation in an elastic medium, (i.e. air, water, etc.) which the human ear can detect.

**Submunition** — A small charge which is designed to separate the bouchon from the main charge. It is used to keep the bouchon from being thrown when the main charge ignites.

| | |
|---|---|
| **Underpressure** | A condition in which atmospheric pressure is temporarily decreased. |
| **Window of Vulnerability** | A period of time between when a suspect becomes aware of a tactical team's intervention efforts but before he is affected by the flashbang. This is generally considered to be zero to two seconds.<br>(See also Exploitation Window) |

# APPENDIX B - HEARING HAZARDS

During the use of flashbangs, perhaps the most controversial factor for considering the use of flashbang diversionary devices has been the potential for loss of hearing. Some police executives and managers have refused to even consider them for this reason alone. It is especially important for instructors to have a thorough understanding of the hearing hazards associated with these devices since it is the instructor who is most at risk! Although a great deal of effort will be spent in recognizing and comprehending the hearing hazards, it must first be emphasized that they are minimal and the potential risk to life must be balanced against the potential risk of injury. This essay will attempt to place these hazards in perspective as well as offer guidelines for alleviating or in some cases even eliminating these risks. Some of the information is highly technical in nature. In order to make it easier to comprehend anecdotes, analogies and illustrations have been used.

**Historical perspective** - On July 3rd, 1976, Israeli commandos used exploding diversionary devices as distractions in their historic raid to rescue hostages being held at the airport terminal in Entebbe, Uganda. This marked the first recorded incident of these devices being used for this purpose. Since that time numerous tactical teams throughout the world have utilized them in thousands of related incidents. It would be difficult to overstate the advantage a flashbang gives an entry team who must enter a small doorway and neutralize a dangerous suspect. The ability to distract a suspect, even for only a few seconds, has *profound* tactical advantage when properly exploited.

It has been said many times that a flashbang is not a panacea. It is merely another tool to be used during high risk entries and other similar situations. That these devices are less than lethal makes them particularly valuable for hostage rescue incidents and in situations which do not clearly merit the use of deadly force from the onset. They have been contentious only when someone has been hurt, usually by being burned or injured from flying parts or debris. However it is the hearing hazard which has drawn the most attention and it is this issue which this essay will address.

In order to prevent hearing loss it is necessary to have a basic understanding of how hearing occurs. Every effort has been made to simplify a quite complex phenomenon. Because of this it may be necessary for the serious student to conduct a more in-depth study.

**Sound** - Sound is defined as any pressure variation in an elastic medium, (such as air, water, etc.), which the human ear can detect. The human ear needs at least twenty variations, (or vibrations), per second in order for the sound to be detected. The more vibrations per second the higher pitched, (frequency), the sound will be. A normal healthy human can hear a range of frequencies from 20 vibrations per second to about 20,000 vibrations per second. Although the ear can detect a wide range of frequencies it does not hear them all equally. For instance, a wider range of frequencies in music can be detected than those which we use for speech. Therefore we perceive some sounds as being louder than others even when they may not be.

The size of these pressure variations is called the amplitude. The weakest sound a healthy human ear can detect is so small that it causes the eardrum to deflect a distance less than the diameter of a single hydrogen molecule and yet it is so

resilient it can tolerate sound pressures more than a *million* times higher!

Sound is measured on a scale called the decibel scale. A decibel scale begins at 0 decibels, (dB), which is the softest sound a human can hear. As the number of decibels increases it is a measure of the intensity or "loudness" of sound. Like the better known Richter scale for measuring earthquakes, the decibel scale is logarithmic. An increase of 6 dB is actually twice as loud as the one before it but because of the way we hear, an increase of 10 dB "sounds" twice as loud. The human ear can detect a change in loudness of about 3 dB.

Distance has a *substantial* impact on how loud a sound is. This is because when the distance from a source of sound is doubled, the "loudness" of the sound is halved. For example, if you were one yard away from a sound and moved one more yard away the sound would only be half as loud. If you then moved two more yards it would only sound half as loud again, and so on. Thus it is easy to see that the distance the suspect is away from the flashbang has a considerable impact on how loud it will sound.

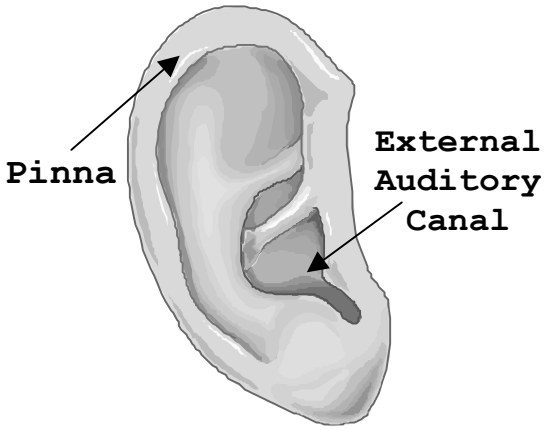
A soft whisper at about fifteen feet measures 30 dB while the average conversation at 3 feet measures 60 dB. The noise from a busy freeway is about 80 dB. The music at a discotheque can measure 120 dB and a jet aircraft taking off at 100 feet can be over 140 dB. The flashbang diversionary devices sold commercially typically produce decibel levels from about 165 dB to about 175 dB with some going as high as 180 dB. The noise is so brief however, that it would be very difficult even at these levels to permanently damage the human ear. In fact, the airbag restraint devices used in cars can reach 170 dB.

Flashbangs produce a peculiarity known as impulse noise. Impulse noise is simply noise which lasts less than one second. The typical flashbang will have a duration of approximately 54 thousandths of a second. Very loud impulse noise, as that produced by a flashbang, causes a temporary threshold shift (TTS) in the suspect's hearing. The effects of this TTS are characterized by a ringing in the ears, (tinnitus), and/or a feeling of "stuffiness" or fullness in the ear. The affect this has on a suspect further inhibits his ability to process and react to outside stimuli.

The human ear is a marvelous and wonderful organ. It not only provides us with our sense of hearing but with a sense of balance as well.

The ear is divided into three parts. The fleshy part that we all see is called the pinna. This is the outer ear and it is designed to gather sound like a radar scanner. At the center of the pinna is a bony canal leading inside to the eardrum. The middle ear is a gear-like assembly of bones designed to amplify the sounds it receives. It amplifies the movement of the eardrum by as much as 20 times. The inner ear converts sound vibrations into electrical impulses and "works out" the position the head is in.

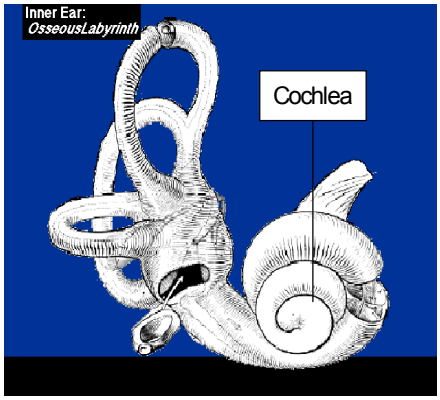
As sound is transmitted through the air it strikes the




eardrum and causes it to move. This movement is amplified by the bones of the middle ear and transmitted to the inner ear. In the inner ear is a special chamber shaped like the shell of a snail. It is called the cochlea.

At the opening, the cochlea is about 5mm tall and 9mm across. It forms a bony

canal and curls like a spiral for about two and three-quarter turns. It is about 30mm long and gradually diminishes in diameter as it coils. Throughout the length of the cochlea are thousands of tiny hairs. These tiny hairs sense changes in the pitch and loudness of sound and transmit them to the cochleal nerve which runs to a specialized part of the brain called the auditory or hearing center.




**COCHLEA – It is here that sound is converted into electrical impulses and where hearing damage is most likely to occur.**

A good way to visualize how the sound is transmitted is to imagine a vast field of ripened wheat with a gentle breeze blowing across it. Thousands upon countless thousands of individual stalks of wheat are bent and then straighten as the pressure of the air strikes each one and then passes on. From your vantage point you can see the wave as it passes across the wheat and multiple stalks bend and then straighten as the pressure wave moves across them. The hairs in the cochlea work in much the same way, bending and straightening with the varying pressures of the sound wave.

If a storm should strike this wheat field the stalks would be violently blown to and fro, breaking many of them. Sometimes whole areas could be blown flat, never to straighten again. This is what happens to the hairs in the cochlea when subjected to too much noise. The hairs are bent so much that they are unable to straighten. If too many are bent the sound is not easily carried to the auditory nerve.

**Hearing Injuries** - "Hearing loss is usually a function of a person's age. For persons under 20, the most likely cause is a congenital problem or the result of a serious infection in their ears. For people from age 20 to 50 the most common cause is noise exposure or a head injury. Those past 50 may experience such problems from noise exposure, the normal aging process or both."[1]

Hearing loss as a result of an injury usually results from damage to the small hairs in the cochlea or as a result of the ear drum being ruptured. Although this is possible, the chances of it happening are extremely remote. In fact, *at a worse case scenario*, a single, unprotected exposure to a flashbang exploding in the room would produce a small permanent hearing loss in only 1% of the population.[2]

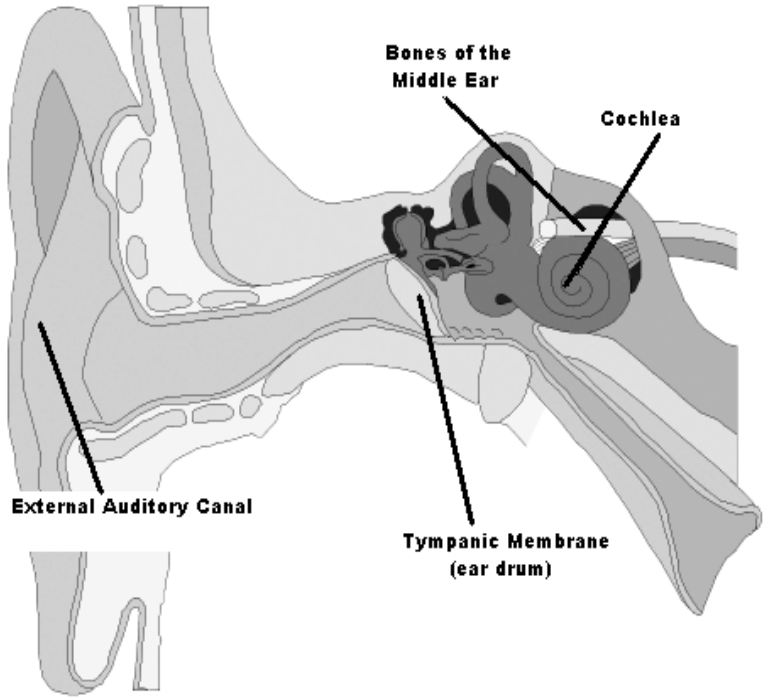
However, multiple exposures to flashbangs can cause hearing loss. The key words are *multiple* and *can*. This is because the effects of too much noise on a person's hearing is cumulative. A single exposure is negligible but continued close and unprotected exposure can reduce a person's ability to detect sounds in the high frequency range. Most of the noises people are subjected to are of low intensity and take a number of minutes or hours before hearing is damaged. When this happens the person experiences discomfort, even pain, and is apt to take precautions to eliminate or move away from the noise irritation. A flashbang emits a very high decibel level of noise but for so short a period of time that it is highly unlikely to permanently damage a person's hearing.

There are many variables which can influence this effect. The size of the room, the wall and floor coverings, where the flashbang is when it ignites, what is between you and the device and how far you are away from it when it ignites all have a bearing on the ultimate consequences. Because of the number of variables and the fact that in tactical situations many of the variables can not be controlled in any event, it

is impossible to set strict rules to govern exposure.

Before leaving this area it is necessary to emphasize one point. Excessive impulse noise can cause hearing damage with out pain.

Consequently, lack of pain is not an indicator that hearing damage is not occurring. When conducting training with these devices the instructor should periodically query students to ensure that no one is experiencing discomfort. i.e. ringing in the ears or a feeling of fullness or dullness in the ears. If these symptoms are present the student must increase his level of hearing protection or be excused from further training until his symptoms disappear.




**Hearing Conservation** - Because tactical team members are more apt to be subjected to multiple exposures they are at a much greater risk than a suspect. Further, an instructor in the use of these devices will most certainly be susceptible to greater numbers of exposures. The detrimental effects on hearing are dependent not only on the loudness of the sound but the *amount!* For instance, a sound that lasts only 50 milliseconds is much less damaging to a person's hearing than the same sound that lasts 100 or 200 milliseconds. Because of this, care must be given to the selection of the training site. For rooms in which the reverberation time of a sound is likely to be very long, such as churches with hard walls, gymnasiums or buildings with marble or concrete interiors, the exposure incidents must be reduced.

While not every situation can be anticipated, the following guidelines are suggested during training:

- Generally, hearing protection should be mandatory in all training scenarios.
- Appropriate hearing protection for exposures to flashbangs can be considered to be about the same as those for exposure to gun blasts. This would include any good quality, properly fitted earplug, earmuff, or the use of fingers to occlude the ears.
- Exposure to impulse noise from a diversionary device exploded in training is likely to occur in three different situations. These are:
- When the person is exposed while in the same room.
  - ♦ Generally, exposures under these conditions should be limited to no more than five in a 24 hour period.
- When the person is exposed while in an adjacent room.
  - ♦ With proper hearing protection, exposure to explosions in an adjacent room, (away from an opening in line with the explosion), need not be restricted.
  - ♦ Exposure to explosions in an

adjacent room in line with the explosion, (i.e. in front of a door), should be considered as having been exposed in the same room.

- Exposure to the explosion while outside.
  - ♦ Exposure to explosions occurring within 100 feet should be with hearing protection.
  - ♦ Hearing protection is not normally required during exposures when the distance from the device is greater than 100 feet.

**Hearing Protection Devices** - No one hearing protector is ideally suited for every situation or noise environment. An earmuff provides excellent protection but makes it hard to shoot a rifle. An earplug may make it difficult to hear range commands or guidance from an instructor. Because of personal preferences, what is best for one person may be totally inappropriate for another or even the same person at another time. To better assist the individual in selecting proper hearing protection the following information is provided.

Hearing protectors are not designed to stop all noise. They merely reduce the amount of noise entering the ear canal to protect the hearing of someone exposed to potentially damaging noise. The United States Environmental Protection Agency has promulgated a regulation which requires the labeling of products sold for the purpose of providing personal hearing protection. The products are labeled with a Noise Reduction Rating, (NRR), which can be used for comparing the relative protective capabilities of the various devices and whether the particular device is adequate to provide the protection. The higher the NRR the greater the protection.

The NRR provides a method of comparing the devices but it should be noted that the NRR is derived from studies using continuous low-level noise. Since it is based on the attenuation of continuous noise it may not be an accurate indicator of the protection attainable against impulsive noise, such as that from a flashbang. Nevertheless, it is at present the only available method with which to judge the effectiveness of the various hearing protectors.

The last two pages of this essay are tables. The first is a chart used to compare the more common hearing protection devices. The information is not intended to be comprehensive but instead to provide some basis for selecting hearing protection.

The second table is a conversion chart for identifying and converting decibels to pounds per square inch and vice versa. This chart identifies the decibel and PSI range that commercially manufactured flashbangs are available and the level at which they may become dangerous. This table may be used not only to compare various brands of diversionary devices but to conduct your own tests. Be being able to convert PSI to decibels an Anderson Blasgage™ can be used to identify the approximate decibel levels and the device may be compared with others by using the chart.

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[1] Fickewith, John, "Hearing Loss: An Occupational Hazard for Deputies," *DISPATCHER*, Volume X, Issue V, published by the Association of Los Angeles Deputy Sheriff's, August 1991, p4

[2] *AN ACOUSTICAL ASSESSMENT OF THE IMPULSE NOISE OF GRENADE SIMULATORS EXPLODING IN ENCLOSURES*, a study conducted by the Human Engineering Laboratory, (HEL), Aberdeen Proving Ground, Aberdeen, Maryland, December 1981 to January 1982.

# Hearing Protection Table

| TYPE | APPROX. COST | NOISE REDUCTION RATING (IN DECIBELS) | DURABILITY | COMMENTS |
|---|---|---|---|---|
| **Foam Plugs** | **25¢ to 65¢ a pair** | **29-31** | **Days** | Can be reused several times. One size fits all. Conforms to the ear canal. Available with and without a neck cord. They are easily misplaced and the foam can deteriorate. They can be washed. Wearer often feels "plugged" up. Must depress and fit into the ear. Muffles all sound. |
| **Pod Plugs** | **$3.50 to $5 a pair** | **22** | **Months** | Convenient easy-on and easy-off. Worn under the chin or over the head. They can be washed. Silicone-covered foam makes for a comfortable but poor seal. They can be draped over the neck when not in use. One size fits all. Muffles all sound. |
| **Silicone Rubber Plugs** | **$1.50 a pair** | **26** | **Months** | Soft, but difficult to insert. One size fits all. Small size and they are easy to lose. Comfortable. They can be washed. Wearer often feels "plugged" up. They are available with a neck cord. Muffles all sound. |
| **Cushioned Head Muffs** | **$12.50 to $32.50 a set.** | **19-29** | **Years** | The Noise Reduction Rating, (NRR), varies with how these are worn - over the head, behind the head, or under the chin. The muffs with the foam filled pads have a higher NRR. Fluid-filed pads are the most comfortable. The better ones have a padded headband. Muffs swivel. Replaceable pads, seals, and liners on better quality sets. Most expensive have several noise-absorbing liners. All are easy-on and easy-off. Muffle all sound. |
| **Sonic Hearing Devices** | **$12.50** | **6†** | **Months to Years** | Protects against impulse noise, allows passage of normal low intensity sounds, alleviates the plugged up feeling experienced with the more common ear plugs, activated only when high level, high impulse noise is present. |

[a†] This device is not entirely effective until activated by impulse noise. Consequently the NRR will not be a reliable indicator for the protection against this type of noise. In actuality these devices would likely provide protection similar to those of the cushioned head muffs.

## PSI to Decibel Conversion Chart

| PSI | .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 150.8 | 156.8 | 160.3 | 162.8 | 164.7 | 166.3 | 167.7 | 168.8 | 169.8 |
| 1 | 170.8 | 171.6 | 172.3 | 173.0 | 173.7 | 174.3 | 174.8 | 175.4 | 175.8 | 176.3 |
| 2 | 176.8 | 177.2 | 177.6 | 178.0 | 178.4 | 178.7 | 179.0 | 179.4 | 179.7 | 180.0 |
| 3 | 180.3 | 180.6 | 180.9 | 181.1 | 181.4 | 181.6 | 181.9 | 182.1 | 182.3 | 182.6 |
| 4 | 182.8 | 183.0 | 183.2 | 183.4 | 183.6 | 183.8 | 184.0 | 184.2 | 184.4 | 184.6 |
| *5 | 184.7 | 184.9 | 185.1 | 185.2 | 185.4 | 185.6 | 185.7 | 185.9 | 186.0 | 186.2 |
| 6 | 186.3 | 186.5 | 186.6 | 186.7 | 186.9 | 187.0 | 187.1 | 187.3 | 187.4 | 187.5 |
| 7 | 187.7 | 187.8 | 187.9 | 188.0 | 188.1 | 188.3 | 188.4 | 188.5 | 188.6 | 188.7 |
| 8 | 188.8 | 188.9 | 189.0 | 189.1 | 189.2 | 189.3 | 189.4 | 189.5 | 189.6 | 189.7 |
| 9 | 189.8 | 189.9 | 190.0 | 190.1 | 190.2 | 190.3 | 190.4 | 190.5 | 190.6 | 190.7 |
| 10 | 190.8 | 190.8 | 190.9 | 191.0 | 191.1 | 191.2 | 191.3 | 191.3 | 191.4 | 191.5 |

*5 pounds per square inch represents the threshold at which 1% of the population may sustain eardrum damage.

The decibel readings in the shaded cells represent the current range of commercially available flashbangs. The lighter shaded cells represent the ranges of the most common.

# Appendix C - COURT ROOM PRESENTATIONS REGARDING FLASHBANGS

**Historical Overview -** August 1, 1966, marked an incident which has had the most profound impact on police operations as any in modern times. It was the date that Charles Whitman climbed into a tower at the University of Texas at Austin and killed fifteen people and wounded thirty-one others. "Upon learning of the tragedy at Austin, which quickly became known as the Texas Tower incident, law enforcement administrators throughout the United States began to assess their own departmental capabilities to handle a similar incident within their jurisdictional boundaries. Most agreed that their departments were ill-equipped to resolve such problems."[a]

This incident marked the birth date of the modern police SWAT concept. The original concept emphasized the use of a long rifle team to neutralize incidents such as those at Austin, Texas. However, with the advent of criminals in fortified locations and the use of special weapons teams serving high risk warrants, the role of the counter-sniper team has taken a supporting role to the entry team.

Unlike the counter-sniper concept, in which the technology to support it was already in place, the entry team concept has only recently attracted interest in developing new tools to assist in this difficult assignment. The flashbang is an example of this new technology. This breakthrough has achieved tremendous success and as a result these devices continue to be improved. The flashbang on the market today bears only a resemblance to its ancestor used for training soldiers. The new devices are vastly safer, more reliable and continue to be improved as manufacturers respond to the suggestions of the police officers using them.

As the use of these devices has gained popularity so have the challenges to their use in courts. A motion to suppress evidence is often made after a flashbang has been used alleging that the use of the device constituted an inherently unreasonable and excessive use of force. Statements made and evidence gathered are often attempted to be suppressed by the use of the "fruits of the poisonous tree" doctrine.

As an instructor in the use of these devices, you may anticipate being called upon to particularly describe the anticipated effects, methods of employment and safety considerations. Although there is no single source which can provide you with all the necessary material you need to become an expert in court, it is essential that you are well prepared for the inevitable challenge when it comes. This essay is a compendium of some of the problems experienced during court room presentations and offers techniques to alleviate them.

**Testifying As An Expert** - As an instructor in the use of these devices you already wield a considerable amount of influence in how they are used and why. Further, it is already *expected* that you are skilled and knowledgeable regarding these devices. You have spent a considerable amount of time and effort in obtaining the ability to provide instruction for the use of these devices. Because of this you may be called to testify not only on what you teach but whether the actions of another police officer were appropriate regarding the use of a flashbang.

Be prepared to provide a brief synopsis on your education, training and experience regarding these devices. The lesson plan provided with this course has

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[a] Kolman, John A., *A GUIDE TO THE DEVELOPMENT OF SPECIAL WEAPONS AND TACTICS TEAMS*, Charles C. Thomas, Publisher, Springfield, Illinois, 1982, page 10

been thoroughly researched and documented. It has been written in a "full sentence format" to assist you in answering student's questions. For this reason it is an excellent resource and will provide answers for most, if not all, of the questions you may be asked during your testimony.

Lastly, and most importantly, you need to have personal experience with the use of these devices. When you are able to articulate the dazzling light, loud, thunderous noise, the disorientation and the feelings of helplessness you experienced, you will have made two important points. First, that the flashbang does indeed, cause the disorientation and confusion which makes it such a valuable tool to tactical teams. Second, you are living proof, that when properly used, these devices are not harmful.

**Share Your Expertise** - The fact of the matter is that these devices are so new that most prosecutors have not had much opportunity to explore the issues in actual cases. Many have never heard of them at all! Consequently, you know much more than they do regarding this subject. Generally, prosecutors are receptive to the related legal issues. It may be necessary to ask for a pretrial hearing for the sole purpose of educating a prosecutor. You can be of great assistance by being open and ready to provide your expertise on this subject. Based on your knowledge and experience, help the prosecutor anticipate the issues involved and provide him with questions you have been asked in the past as well as questions you want to be asked while on the stand. (See Figure 2)

**Know Related Case Law** - The first serious challenge to these devices occurred in California in 1987. It stemmed from a Los Angeles Police Department case in which a motorized battering ram and flashbangs were used during a drug raid on a fortified location. An action was subsequently brought against the Los Angeles Police Department contending that their use constituted inherently excessive force. This case gained national recognition and was eventually ruled upon by the California State Supreme Court under then Chief Justice Rose Bird.[b] The court held that prior judicial approval was required before using the ram, but concluded that the use of flashbangs did not pose an unacceptable threat to property and persons. However, it should be noted that in holding this opinion, several areas were considered, not the least of which was the outstanding training and experience of the team which deployed it, (Los Angeles Police Department, SWAT).

Since this time there have been a number of serious challenges and, to my knowledge, the use of these devices has been upheld in every instance. Because law enforcement has prevailed thus far in no way alleviates us from anticipating and preparing for the next challenge. We won't lose a ruling because of the thousands of times in which a flashbang was used correctly but because of the one in which it was not. Remember, in the American system of jurisprudence, it is the exception that makes the rule!

**"Buzz Words"** - "Buzz" words are those which are used to impress others and have little or imprecise meaning. They have often been used by attorneys to arouse the emotions of a jury. Avoid using them when testifying. Further, don't allow yourself to answer a question posed by an attorney which contains one of these words. Either rephrase the question in your answer using the correct word or ask the attorney to explain what he means by the buzz word. When you testify as an expert you are entitled to give your opinion. If the question is phrased so as to be misleading you *must* clarify it before answering. A number of definitions have been provided for your use in Appendix A, (Definitions), of

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[b] Langford (1987) 43 Cal. 3d 21

this lesson plan. (See also Figure 1)

| When describing | Avoid using words like: | Instead use words like: |
|---|---|---|
| **The Device** | Grenade, Bombs, Anti-Terrorist Munitions, Stun Munitions, etc. | Flash-Bang, Diversionary or Distraction Device, or Flash-Sound Diversion |
| **The Ignition** | Explosion, Detonation, Blast | Ignition, Initiation |
| **The Sound** | Deafening | Loud |
| **The Light** | Blinding | Dazzling, Brilliant, Glaring, Intense |
| **The Psychological Effects** | Panic, Fear, Hysteria, etc. | Disoriented, Confused, Bewildered or Overwhelmed |

(Figure 2)

**Defense Tactics** - One of the most common defense tactics has been to ask questions on the periphery of your expertise or clearly in another area. In the case of flashbangs, the most common area has been in the technical characteristics of the devices. Don't fall into the trap of being an expert in explosives. If you already are, go for it! But if you are not, you may be asked questions which become increasingly more technical regarding explosives in general and not flashbangs in particular. When you are eventually, and inevitably, asked a question you can't answer you have set the stage to be impeached with a defense explosive expert. Remember, your expertise lies in how the device was used, *not* in how it works! After all, do you need to be an expert in ballistics to testify on shooting?

Another tactic has been to raise an issue with a lack of training. Until the last few years training has ranged from sparse to unavailable. Qualified instruction is still infrequent and expensive. By being a provider of this training you have already gone a long way to alleviating this problem. You will undoubtedly be asked where, when and under what conditions you were trained. The use of these devices is still relatively new. An understanding of the evolution and historical overview of these devices will quickly demonstrate how little training has been available in the past and how fast the "state of the art" is progressing.

**Use Examples** - Much of the confusion regarding the technical characteristics of these devices can be eliminated when they are referenced to everyday circumstances. The human mind has an amazing ability to understand complex ideas when they are linked to concepts already understood. Because of this, much of the mystery associated with new these new tools and related tactics can be clarified if placed in light of events and objects we encounter in our everyday lives. For instance:

A flashbang ignites and is completely consumed in about 54 milliseconds. *How fast is 54 milliseconds?* It takes you about 200 to 250 milliseconds to blink your eye. A tone from a telephone busy signal is 250 milliseconds. If you <u>sharply</u> clapped your hands or knocked your knuckle on the witness stand, the sound you heard would be about 120 milliseconds long. The ignition and combustion of a flashbang is just a fraction of the time for these everyday events.

*How bright is a flashbang?* A commercially available flashbang typically ignites with a flash of between 1.8 and 2.5 million candlepower. This is approximately 90 to 125 times more powerful than your Streamlight™ flashlight or 18 to 25 times more powerful than a quartz halogen headlight or your spotlight. Is it any wonder that a suspect squints and blinks and has difficulty seeing after the light is removed?

*How loud is it?* The flashbang is about as loud as an airbag deploying in a car. It is easier on the hearing for a flashbang to go off near a suspect than it would be to experience the sound of several shots in rapid succession from a handgun or rifle.

Analogies such as these are readily placed in perspective and the ominous employment of the devices is alleviated. Comparisons such as these are a great teaching tool because they help make a point clear by placing it in the perspective of a concept already understood.

**Do's and Don'ts** - As with almost everything there are some hints as well as caveats to use or avoid, as the case may be.

**Do:**

- Know the characteristics of the device you used. You can be assured that there will be questions in this area.
- Know any policy your department has regarding the use of these devices. *This cannot be understated.* At present, most departments have an unwritten procedure rather than a written policy. Whatever the case, be thoroughly familiar with the procedural steps necessary for authorization.
- Be prepared to justify your rationale for deciding to use a flash-bang and under what conditions it was deployed. Each incident must be judged on its own merit and you must be completely familiar with what circumstances prompted the necessity for the use of a flashbang.
- Be ready to give examples of when you have used them and when you have not and why. Show how this particular case fit the criteria you have established or was similar to other cases in which they have been used successfully.
- Be able to clearly articulate your training, education and experience with using these devices. Your credibility depends on it!

**Don't:**

- Don't raise issues with your safety without showing consideration for the suspect. If you testify that you wore eye and ear protection with Nomex gloves and a balaclava, be prepared to answer questions regarding your actions, the safety of the suspect and innocent bystanders.
- Emphasize that these devices make it safer for all concerned, suspect included.
- Don't expect help from the prosecution. It is unlikely that a prosecuting attorney will have explored all the legal issues regarding these devices and may be completely unfamiliar with them.
- Don't use emotionally laden buzz words. Words and terms like stun grenades or stun munitions, blinding or deafening are not only emotionally laden and imprecise but in some cases, incorrect.

In preparing for your courtroom testimony I have assembled a compendium of fourteen of the most commonly asked questions I have had to answer. These are generic questions which apply to all types, models and manufacturers but you should know the characteristics of the individual devices you use before you take the stand.

| | |
|---|---|
| **How long have these devices been used?** | The original devises have been used in training since at least the 1950s. The more modern versions have been used in tactical situations since the mid-1970s. |
| **What are they made of?** | A bouchon or fuze, a container, usually of cardboard or plastic, and flashpowder. (At least one manufacturer now uses a container of strong non-bursting steel.) |
| **Why is it not a grenade?** | A flashbang emits only the byproducts of combustion, light and sound. A grenade uses combustion to emit other objects such as shrapnel, gas, smoke or stingballs. |
| **What is the difference between the older models and the more modern versions?** | The more modern versions have a two second "pin-pull" bouchon rather than a ten second "string-pull," the bouchon is commonly separated from the main charge prior to final ignition and they have substantially reduced decibel and overpressure levels. In short, they are vastly safer. |
| **Why do we say that flash-bangs "ignite" and not "detonate?"** | The powder used in flashbangs is classified as a deflagrating explosive, characterized by progressive reaction rates and buildup of pressure. It more closely approximates a propellant than an explosive. A detonating explosive is characterized by rapid chemical reactions causing tremendously high pressures and brisance (shattering action). |
| **How hot are they?** | Between 2030° and 2700° Centigrade (the burning temperature of black powder) |
| **How high is the fire hazard?** | Very low. Although the flashbang is quite hot the duration of the heat is measured in milliseconds and is not long enough to raise most materials to their kindling temperature. Sometimes it will ignite flammable materials in contact with it at the instant of ignition. |
| **How bright are they?** | Between 1.8 and 2.5 million candlepower, some may go as high as 6 or 7 million candlepower. |
| **How does this compare with other light sources?** | A "Streamlight" flashlight is approximately 20,000 candlepower and a spotlight or headlight from a car is about 100,000 candlepower. |
| **How loud are they?** | Between 165 and 185 dB, depending upon the manufacturer and the conditions of deployment. |
| **How does this compare with other noises?** | Roughly about as loud as the sound of a gunshot from a deer rifle at the muzzle or a little louder than a jet at takeoff |
| **How does it act on an organism?** | It constricts the pupils, causes the ears to ring and creates confusion. It may cause burns if in contact. |
| **How long do the effects last?** | The "disabling" effects last for no more than 6-8 seconds. Other effects, the constriction of the pupils for instance, may last for a number of minutes. |
| **How long does the explosion last?** | About 50 milliseconds. Consider that the "blink of an eye" takes about 200 to 250 milliseconds |

(Figure 2)

**Expert Witness Questions pertaining to Flashbangs & Stingballs**

The following are questions commonly asked to determine the expertise of a person giving testimony on the use of flashbangs and/or stingballs.

---

***Training***

1) What training have you had in the use of flashbangs/stingballs?

2) Where have you had this training?

3) What organization sponsored the training?

4) Do you remember any of your instructors?

5) What were their qualifications?

6) What subjects were covered in the training?

7) Did you receive any certificates of completion or excellence?

8) How was this training documented?

9) Have you ever been required to teach a course on the use of flashbangs/stingballs?

10) Who sponsored the training?

11) Who were the students?

---

***Specific information known by virtually all "experts" in these devices***

12) Can you explain a diversion?

13) What is their purpose?

14) Are there different kinds?

15) What are they?

16) Can you provide a brief description of how the distraction device (or stingballs) came into common use for law enforcement applications?

17) Why did this occur?

18) Can you explain the advantages and disadvantages of a deceptive diversion (sometimes referred to as "psychological diversion") and a physiological diversion?

19) How does a distraction device cause one or both of these types?

20) How did distraction devices (or stingballs) come into common use in law enforcement?

21) Why are they necessary?

22) Are there other alternatives?

23) Can you explain how distraction devices (or stingballs) work?

24) Can you explain why distraction devices work? That is, why does it distract a human being?

25) What senses (hearing, sight, smell, touch or taste) are most affected by a distraction device?

26) How does this create a distraction?

27) When a person is exposed to a distraction device (or stingball) that has just ignited, what is the most common reaction?

28) Why does this occur?

29) What is a bouchon? (Be prepared to spell this for the stenographer.)

30) Why is it important in the proper functioning of a distraction device (or stingball)?

31) Is there more than one type?

32) What are they?

33) Who currently manufactures distraction devices (or stingballs)?

34) What are some of the concerns one should consider when contemplating the employment of distraction devices (or stingballs)?

35) Are these issues usually addressed as a matter of policy or of training?

***Experience***

36) What has been your experience with flashbangs/stingballs?

37) How many have you thrown in training?

38) How many have you used in actual deployments?

39) Were the effects as you expected?

40) Did they prove successful?

41) Did this result in a safer entry for all concerned?

42) Why do you believe this occurs?

43) Is there a policy for the use of flashbangs/stingballs where you were employed?

44) What brands and types of flashbangs/stingballs have you had experience with?

45) What are the differences between the types?

46) What are the disadvantages of one type over another?

47) Have you ever been accepted by an expert in any court in the use or effects of distraction devices (or stingballs)?

48) When was that?

49) Where was that?

50) Have you ever worked as a consultant for developing policy, providing training or advice or any other service regarding the use or effects of distraction devices (or stingballs)?

51) When was that?

52) Where was that?

53) Have you ever published any article in any periodical regarding any aspect of a distraction device (or stingballs)?

54) When was that?

55) Where was that?

56) Can you provide examples from your own experience in which distraction devices (or stingballs) worked (or did not)?

57) Have you ever spoken with any of the manufacturers or vendors of any of the currently available distraction devices (or stingballs)?

58) Was this to offer suggestions or criticisms or strictly business?

59) Have you ever made a suggestion to improve a distraction device (or stingballs)?

60) What was that?

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***Education***

61) Have you had any college classes dealing with any of the various aspects in the use or effects of distraction devices (or stingballs)?

62) What were they?

63) How were these classes related?

64) Do you belong to any professional organizations that provide current information or periodic updates on the use or effects of diversionary devices?

65) What are they?

66) How is this information disseminated?

67) Do you ever attend any seminars or training updates regarding the use or effects of these devices?

68) When was the last one?

69) Where was it located?

70) Who provided the briefing?

71) Do you ever discuss the use or effects of these devices with any other experts?

72) Who are they?

73) When was the last time this occurred?

74) Do you remember the substance of the discussion?

75) Have you ever examined any crime scene, crime scene photos or other evidence regarding the use of a distraction device (or stingball)?

76) How many times?

77) Have you done any original research or participated in anyone else's research regarding any aspect of the use or effects of distraction devices (or stingballs)?

78) When was that?

79) Where was that?

80) How were the results of the research made known?

81) Have you ever discussed any of the physical manifestations (e.g. flash, sound, pressure wave) of distraction devices with any scientists, teachers or doctors?

82) What was the substance of these conversations?

83) Have you ever discussed any of the physical reactions (e.g. constriction of the pupil, bleaching of rhodopsin, increase in heartbeat, increase in adrenaline, etc.) with any scientist, teacher or doctor?

84) What was the substance of these conversations?

85) Do you ever read any articles regarding the use or effects of flashbangs/stingballs?

86) What has been the subject of some of these articles?

87) Who are the authors?

88) Do you ever share your expertise in any written form?

89) Has any of this information ever been published?

90) Where?

91) When?

92) How do you keep current on the trends, use and effects of distraction devices and/or stingballs?

93) How often do you do this?

# Appendix D - PHYSIOLOGICAL EFFECTS OF FLASHBANGS

A flashbang is a physiological diversion. It works by affecting the organism directly. When testifying as an expert, it is as important to understand and be able to describe what happens to the body while under the effects of the flashbang as it is when testifying as an expert in "dope." This essay will attempt to provide this information in laymen's terms so that a more complete understanding is possible.

"Imagine a time in our distant evolutionary past when clans of our earliest ancestors roamed open savannas in search of food. Life was a struggle, and danger lurked everywhere in the tall grass. But the alert, uncomplicated minds of those hunters and gatherers weren't cluttered by anticipatory fears. They were wary of other predators, but not fearful of them. Fear was a tool; it helped them survive. When the cheetah approaches, that's the time for fear. When there is no cheetah, there is no fear, and the search for food and water continues.

But then one of the clan steps into a small clearing and finds himself eye to eye with a hungry leopard. Now the man feels fear, as real as hunger or thirst or pain. His heart pounds, his muscles tense, and his breath comes in gasps as his entire body automatically prepares itself to flee or do battle.

But in seconds, other members of the clan appear, and the leopard, spooked by their arrival, runs away. As the big cat slips through the tall grass, the frightened hunter relaxes. In minutes, his system is back to normal and thoughts of the leopard have vanished, replaced by the more pressing preoccupation with finding food and water.

The 'fight or flight' response, which vastly improved the evolutionary odds of those early humans, is the basis of anxiety, a primal warning instinct which we share with many animals. Strictly speaking, it is not really a fear, an alarm bell rung by the perception of imminent danger.

In more intelligent creatures, this response becomes more complex. Let's jump ahead a few hundred generations, when more intellectually complex humans, capable of foresight, crouched in their cavern homes and worried about the future: Would the winter be hard? Would the hunting improve? And didn't I see a cave bear out on those ledges this afternoon?"[1]

**The body mobilized** - The suspect barricaded inside a house is experiencing the same emotions and feelings which his ancestors did countless generations ago. A small portion of the brain called the hypothalamus has alerted the pituitary gland, located near the base of the brain. The hormone, ACTH, is released into the blood stream. The ACTH goes directly to the adrenal glands which increase their output of adrenaline. Hormones bring the body to an aroused state and within a few seconds, the bloodstream has carried these stress organizers into every cell in the body. Commands are traveling through the nervous system to the heart, lungs and muscles, alerting them for action. The tiny blood vessels in the muscles constrict and the blood pressure raises. The muscles are more richly supplied with nutrients and blood is diverted from the extremities. The liver is working harder to convert its stored glycogen into glucose, which the brain and muscles need in abundance. The breathing has increased to supply much needed oxygen. This enables the muscles and brain to burn the glucose more efficiently. The heart is pumping faster,

sending a bountiful supply of blood to the priority portions of the body. The skeletal muscles brace and the blood in the stomach is reduced in favor of those high priority areas elsewhere.[2] The body is mobilized for violent physical action!

The suspect is justifiably concerned about his short term future. It is often under these circumstances that a distraction device is inserted to support a high risk entry. Is it any wonder that they are so effective?

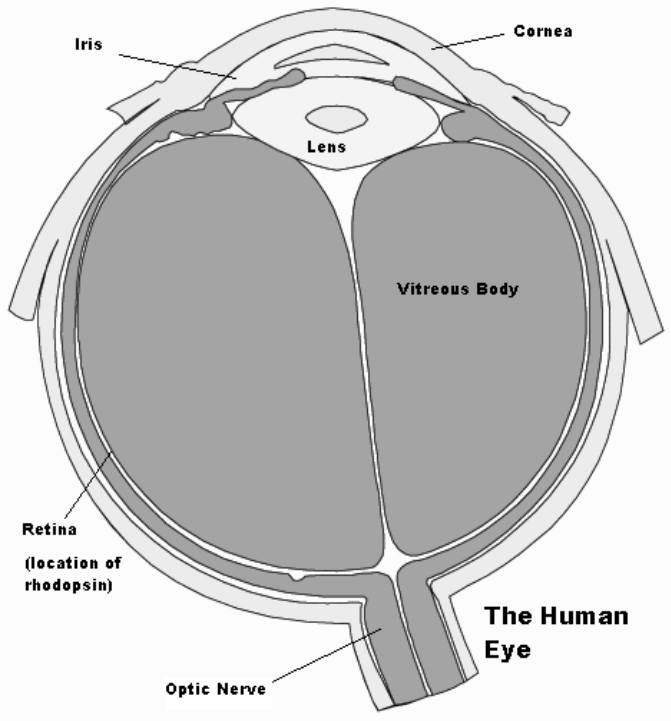
Physiological diversions work directly on the body by affecting one or more of the five senses. The dazzling light, the loud, thunderous boom and the instantaneous pressure change all bombard the organism with stimuli which the body attempts to process and react to. A heightened state of alertness, as often accompanies anxiety, only aggravates the problem and the body goes into "sensory overload." It is simply "overcome by events." There is too much information in too short a time to instantaneously process. Granted! The body does a wonderful job. In fact, even with all these stimuli the body will still be able to respond in just a few seconds. But to a well trained tactical team these few seconds can have *profound* tactical significance. The flashbang diversionary device gives a tactical team the ability to create this condition and exploit it, almost at will!

**Sight** - "We view and interpret our world largely through vision."[3] We are visual creatures. Much of our entertainment is visual. Our homes and work places are arranged and painted for our visual enjoyment. As much as 85% of our knowledge is learned through visual means. When we are given directions from one location to another it is most often "pictured" in our minds before we are able to follow the directions. When our vision is impaired so is our ability to quickly and correctly interpret the "cues" for appropriate reactions for our everyday lives.

When a suspect is exposed the brilliant light from the combustion of a flashbang his eyes will react to this light just like it would to any other bright light. "In strong light, the pupil may become as small as a pinhead and so prevent the eye from being damaged or dazzled by too much light. In the dark, it can get almost as large as the entire iris is, thus letting in as much light as possible."[4]

Although most people know about the dilation and constriction of the pupil of the eye as a reaction to different intensities of light, most do not know that this is just half of the physiological reaction. The most important part of adaptation to light and dark occurs in the retina portion of the eye.

The retina is the innermost part of the eyeball where a layer of cells sensitive to light transmit the image to the optic nerve for later transmission to the brain for processing. Light rays are absorbed by pig-



ments in the retina. These pigments consist of protein and vitamin A. Vitamin A helps give the pigments their color and this color enables the pigments to absorb light. Light changes the chemical structure of vitamin A and bleaches out the color in the pigments. "This process generates an electrical signal that the optic nerve transmits to the brain. After the pigments have been bleached, the vitamin A moves into a part of the retina known as the *retinal pigmented epithelium* (RPE)."[5] While in the RPE, the vitamin regains its original chemical structure and then returns to begin the process all over again.

"The renewal of rhodopsin - the pigment that enables the eye to see in dim light - occurs largely in the dark. Immediately after being exposed to bright light, the eyes cannot see well in dim light because of the bleached rhodopsin. It takes about 10 to 30 minutes for rhodopsin to be renewed, depending on how much was bleached. . . ." The eyes become accustomed to bright light much quicker than they do to darkness."[6]

The pupil of the human eye constricts in about one-half second but takes up to two minutes to dilate. Further, after the rhodopsin pigment is bleached it can take *up to 30 minutes* before the eye retains its original ability to see in the dark! A flashbang typically emits light in excess of 2 million candlepower. This is enough light to constrict the pupil and bleach the rhodopsin, even through *closed* eyelids. All this occurs in about 50 thousandths of a second; much too fast for the human body to react to. Quite naturally, the darker the room or area where the suspect is exposed the better the effects of the flashbang will be.

**Hearing** - Sound is defined as any pressure variation in an elastic medium, (such as air, water, etc.), which the human ear can detect. Noise is simply any loud, discordant or disagreeable sound. Sound is measured on a scale called the decibel scale. A decibel scale begins at 0 decibels, (dB), which is the softest sound a human can hear. As the number of decibels increase it is a measure of the intensity or "loudness" of sound. Like the better known Richter scale for measuring earthquakes, the decibel scale is logarithmic. An increase of 6 dB is actually twice as loud as the one before it but because of the way we hear, an increase of 10 dB "sounds" twice as loud. The human ear can detect a change in loudness of about 3 dB.

Distance has a *substantial* impact on how loud a sound is. This is because when the distance from a source of sound is doubled, the "loudness" of the sound is halved. For example, if you were one yard away from a sound and moved one more yard away the sound would only be half as loud. If you then moved two more yards it would only sound half as loud again, and so on. Thus it is easy to see that the distance the suspect is away from the flashbang has a considerable impact on how loud it will sound.

The human ear has an amazing range and can tolerate sound pressures more than a million times higher than the minimum audibility level. In fact, the weakest sound a healthy human ear can detect is so small that it causes the eardrum to deflect a distance less than the diameter of a single hydrogen molecule! A soft whisper at about fifteen feet measures 30 dB while the average conversation at 3 feet measures 60 dB. The noise from a busy freeway is about 80 dB. The music at a discotheque can measure 120 dB and a jet aircraft taking off at 100 feet can be over 140 dB. The flashbang diversionary devices sold commercially typically produce decibel levels from about 165 dB to about 175 dB with some going as high as 180 dB. The noise is so brief however, that it would be very difficult even at these levels, to permanently

damage the human ear. In fact, the airbag restraint devices used in cars can reach 170 dB.

Flashbangs produce a peculiarity known as impulse noise. Impulse noise is simply noise which lasts less than one second. The typical flashbang will have a duration of approximately 54 thousandths of a second. Impulse noise, as that produced by a flashbang, causes a temporary threshold shift (TTS) in the suspect's hearing. The effects of this TTS are characterized by a ringing in the ears, (tinnitus), and/or a feeling of "stuffiness" or fullness in the ear. The affect this has on a suspect further inhibits his ability to process and react to outside stimuli.

As with the impairment of a suspect's vision, the impairment of the suspect's hearing is also temporary. Because of the body's amazing ability to recover from shock the suspect will be able to hear quite well within a few short seconds although he may experience a ringing in his ears from several hours to several days. The risk of more permanent damage is quite minimal. In fact, *at a worse case scenario*, only 1% of the population would be likely to have a measurable hearing loss as a result of a single unprotected exposure to a flashbang. To put this into a better perspective, a person would be more likely to suffer a permanent hearing loss from the noise of several gunshots than from a single exposure to a flash-bang diversionary device.

**Feeling**[7] - Perhaps the least understood of the effects of a flashbang is they way it affects the suspect's sense of feeling. Those of us who have experienced the effects of the flashbang can attest to the sudden feeling of a loss of equilibrium and a feeling of unsteady balance. This is because of the rapid compression and decompression of the air around us.

When a flashbang explodes it compresses the air molecules around it. As the gases from the chemical compound, (main charge), expand they push these air molecules in front of them. This creates an "over pressure." Because the air molecules have not had time to fill in behind this space yet there exists a slight void and this is an "under pressure." This phenomenon creates a wave, called the blast wave. Sometimes when conditions are just right, you can even see it as it expands and appears as a white smoky looking ring.

We humans have pretty much grown accustomed to what our "normal" atmospheric pressure should be. (14.7 PSI at mean sea level) We actually don't feel any atmospheric pressure differences unless we rapidly change our altitude as when we fly or dive into water. When we do, we experience the discomfort all of us can relate to. Our ears "pop." Our heads feel "stuffy and full." We want to swallow or blow our noses to feel better. When the chemical compound from a flashbang burns it expands as much as 3,800 times in less time than it takes to blink your eye.

This wave is traveling at about the speed of sound, (1,088 feet per second at sea level), and can instantly raise and lower the "normal" atmospheric pressure as much as 4 pounds per square inch. This has a tremendous disorienting effect on our sense of equilibrium and aids in creating the sensory overload necessary for a successful physiological diversion.

As we have seen, humans react "instinctually" from times long past. When our bodies are subjected to conditions which heighten the anxiety level we experience a heightened sense of alertness and a feeling of disagreeable tension. We are becoming mobilized for "fight or flight." While we are in this state we are particularly susceptible to overreacting to life's stimuli. By being able to create a condition which, quite literally, over-

whelms a suspect with so much stimuli that for a few short seconds the body simply "shuts down," a well trained tactical team can gain a considerable tactical advantage. By being able to exploit this condition at will, many hazardous situations are tremendously diminished.

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[1] Gold, Mark S., M.D., *THE GOOD NEWS ABOUT PANIC, ANXIETY & PHOBIAS*, Villard Books, New York, New York, 1989, p51

[2]Taken from, "Sudden Stress Reactions," by Boyer, Thomas, *CALIFORNIA PEACE OFFICER,* September, 1990, p58-59

[3] Taken from a lecture given by Dr. Harvey Schlossberg, 0950 hours on October 12, 1988, San Jose State University, at the Los Gatos Lodge, Los Gatos, California

[4] *WORLD BOOK ENCYCLOPEDIA*, #6, 1989 Ed., © 1989, USA, World Book, Inc. p472

[5]ibid.

[6]ibid.

[7]NOTE: A flashbang that ignites so close to a suspect as to burn him also acts on his sense of feeling. Since this is rarely desired it has not been discussed here.

## Appendix E - TRAINING AIDS

### Why use a training aid?

- People learn in different ways. "Scientists tell us that people learn about 80 percent of what they know through their sight; 11 percent through hearing, and 9 percent through other senses."[1] Training aids will greatly assist in students' retention of classroom material as well as assisting the instructor in clarifying complex points. When an idea or concept is presented to students by words alone the students must picture in their minds what ideas are being conveyed through these words.

When the instructor uses a visual aid the concept is emphasized and the student is better able to assimilate it. "Human memory is very slippery; facts, details and information quickly evaporate unless reinforced."[2] If the students can have key points emphasized with good visual aids, their ability to remember the message will be improved dramatically.

**What do training aids do?** - First of all, training aids are designed to *assist* the instructor. They are not intended to *replace* the instructor. Properly used, training aids will:

- **Focus student thinking** - Objects which appeal to the sense of sight have great power in focusing and holding a student's attention. Complex points are often readily perceived when graphically illustrated.
- **Save time** - Training aids save time in two ways. First, training aids save time by avoiding long, involved explanations by the instructor. Lengthy or detailed explanations are often unnecessary when students can see what it is the instructor is trying to get across. Second, the use of a training aid to replace a diagram or illustration which an instructor must tediously and painstakingly depict on a black board, white board or flip chart not only saves time but allows the instruction to continue without interruption.
- **Increase retention** - Impressions secured through visual means are more vivid and lasting than those acquired solely through hearing.
- **Stimulate interest** - By appealing to more than one sense, training aids assist students in becoming more involved in their own learning. Training aids assist in breaking the monotony of lectures and appeal to the students' curiosity.
- **Develop concepts** - Visual aids are of tremendous advantage when presenting new concepts and ideas. Words alone are easily misunderstood and complex concepts are often difficult to accurately describe. A visual aid is of tremendous advantage in clarifying these points.

**What makes a good training aid?** - A good training needs to enhance the instruction and aid the student in retaining the information. For a training aid to be effective it must be:

- **Appropriate** - If a training aid does not pertain to the subject and assist in explaining or clarifying a point it is not appropriate. A training aid that is not appropriate detracts from the message and makes it difficult for the instructor to refocus his students' thoughts.
- **Visible** - Although not all training aids are visual, most of them are. Since most people learn visually, most of your training aids will involve vision in one way or another. To obtain the most from these visible aids, make them of sufficient size and color so they can be seen by everyone. Use color to improve the appeal and visibility.
- **Simple** - Training aids are designed to assist the instructor. They need to be simple and direct, focusing on only one or two key points. If they become cluttered or confusing they lose their effectiveness. If many ideas or concepts must be presented, use more training aids.

**What are some types of training aids?** - Training aids can be anything that appeals to one or more of the senses and illustrates or clarifies a key point. Those which appeal to

more than one sense and those which actually involve the students are more effective than those which do not. Most of the training aids can be defined as one of four types. These are:

- **Graphic** - This is the most common visual aid. This type is two—dimensional. Examples of graphic training aids are the blackboard and chalk, wall charts, white boards, and handouts.
- **Projected** - This type of training aid is projected onto a screen or other material. Examples of this type include slides, overhead projections and video tapes.
- **Three—Dimensional** -Three—dimensional training aids consists of actual equipment, scale models and mock—ups. Role playing could be considered a three—dimensional training aid and involves the students in situations which illustrate or even provide insight on key points.
- **Audio** - Audio training aids using hearing to clarify points. Although they appeal to the same sense as the lecture method, the effect of an audio tape should not be underestimated. What police officer hasn't felt his heart rate increase and his blood pressure rise as he listened to the radio traffic on a shooting or pursuit? It is difficult for an instructor in a classroom setting to achieve this type of emotional involvement without the use of audio training aids.

**What are the advantages and disadvantages of the various training aids? -** This section of the handout will discuss in more detail the various types of training aids and how to make them most effective. It should be noted that the imagination of the instructor is the key component in what makes an effective training aid.

- **Chalkboards and White Boards** - Perhaps the most widely used type of training aid, the chalkboard is also one of the most flexible and least expensive methods of presenting ideas. The proper use of the chalkboard can help the class develop the subject with the instructor and is a ideal for a "conference" method of instruction. It is unfortunate that because it is so readily available many instructors rely solely on this device to assist in their presentation. Some suggestions for getting the most out of the chalkboard and white board are: (1) Print in large, legible block letters. (2) Put the material on the board in a simple and concise manner but be sure that it is readily understood by the class. (3) Don't erase until all the students have had sufficient time to see the material and copy it if they desire. (4) Use a chalk or pen that provides a high contrast so that students can readily read or see the material. (5) The use of the more modern white boards can also provide high contrast colors. This provides an additional advantage over its more traditional ancestor. One additional advantage of the white board is that it can be used as a screen to project overheads and slides. The slides and overheads can then be easily annotated on the white board.
- **Wall Charts or Flip Charts** - These charts are simply large pads of medium or heavy paper. They have an advantage over the chalkboards and white boards in that many graphics can be prepared before the presentation using color and graphics to illustrate key points. During the presentation the points can be further emphasized by annotating the chart. Some suggestions for getting the most out of these training aids are: (1) Use a simple, yet comprehensive title to describe the subject material which is portrayed. (2) To illustrate key points on a chart use a pointer. This allows the students to view the chart without being blocked by the instructors body. Another method is to conceal parts of the chart with paper or other material until it is ready to be revealed to the class. (3) Acronyms are good reinforcers. When the first letters of several concepts or several components make up a word, even if

nonsensical one, students are apt to remember all the concepts by association.

- **Overhead projections, Slides, Video Tapes and Films** - The use of projected aids has increased dramatically as modern inventions have made them more available and easier to use. Video tapes and films have added advantage of appealing to the students' sense of sight and hearing. Slides and overhead projections have an advantage in that the instructor can amplify key points without stopping the projector and can pace his presentation accordingly. To be effective, projected visual aids should: (1) Illustrate as close as possible the point you are trying to make. (2) You should preview the film or video enough so that you are thoroughly familiar with it before showing it. (3) Prepare notes on key points to be discussed after the film or video. It may even be necessary to stop the film or video to emphasize a key point or to alert the students to watch for something in particular. (4) When using slides and overhead projections, have the individual slide or projection illustrate exactly what you wish to discuss. Title slides can tremendously enhance a slide presentation.

  There are several common mistakes you should avoid when using these types of training aids. (1) Avoid dimming the lights if possible. The high contrast between the screen and the darkened classroom fatigues the students quickly and attention begins to wander. Videos can be shown on several televisions at once and slides can be shown on reverse transparent screens. (2) Do not show portions of a film or video that are irrelevant. This simply distracts the students and is counterproductive. (3) Never show a film strictly for its entertainment value. When overused, this training aid can be a "drug" which simply entertains without any effective learning.
- **Models, equipment and mock—ups** - These three- dimensional training aids create a lasting impression which is difficult to duplicate with other methods. When actual equipment is used safety and accountability must be considered. At times, it may not be practical to bring actual equipment to the classroom but the class may be able to walk outside or to where the equipment is. Models have an advantage in that they can be either larger or smaller than the equipment they are being used to demonstrate. Small parts can be seen easily when enlarged and, vice versa, large pieces of equipment may be reduced for the same reason. When using models, equipment or mock—ups it is necessary to: (1) Consider the size of your class when using these devices. What may be suitable for a small class may be entirely inappropriate or difficult for a large class. (2) Models have little practical advantage if they are not to scale. (3) "Cut-away" models have an advantage of being able to illustrate things which are hidden on the actual equipment. (4) Mockups are used to simulate a unit or actual portion of equipment. This may be of an advantage when only a part of the equipment is applicable.
- **Audio Tapes** - Audio tapes have the ability to emotionally involve the students. This can have a strong reinforcement value when used to drive home points. The emotion laden audio tape has a way of "teleporting" students to the time and place where the event was recorded and having the students empathize with the events as they occurred. When using audio tapes: (1) Insure that the class' sound system is capable of clearly playing the tape so that all the students can hear. (2) Recordings can introduce other voices into a classroom setting and add interest or dramatic appeal to the lesson. (3) Recording a humorous or dramatic skit has the advantage of increasing interest.

- Handouts — A person can listen at about 800 words per minute but a speaker can only speak at about 135 words per minute. When taking notes, a person can only write at about 40 words per minute! A handout can have the advantage of being able to leave a lasting impression on the student as well as provide him with reference material for later. To be effective handouts should: (1) Not be handed out before you discuss the material. The students will inevitably read them as soon as they receive them and you will detract from what you are going to say. (2) Have them neat and professional in appearance. If possible, use illustrations to clarify points. Remember, they are a type of visual aid. (3) Use them to expand or clarify key points. Don't make them so lengthy that they become tedious to read.

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[1] *MILITARY TRAINING*, MCI 7107B, Marine Corps Institute, Staff Noncommissioned Officer's Academy, Career Nonresident Program, Marine Barracks, Washington D.C, 1983, p91

[2] *MINDMAPPING*, Wycoff, Joyce, The Berkley Publishing Group, 200 Madison Ave., New York, New York 10016, June 1991, p129

# VISUAL AIDS GUIDANCE SLIDES

| Do | Don't |
|---|---|
| Check Equipment | If possible, don't turn out the lights |
| Have one idea or concept per slide | Crowd information |
| Use a dark background with light lettering | Read your slides |
| Use a maximum of six lines per slide | Turn your back to the class |
| Use a maximum of six words per line | Unnecessarily distract the class with a pointer |
| Change slides every 15 to 20 seconds | Back up to a previous slide - use copies if you need to repeat |
| Use "build-up" slides for complex point | |
| Use bar charts or pie charts | |
| Use special effects for emphasis | |
| Keep the slides simple | |
| Use a title slide before each major section | |
| Use a standard border and design | |
| Use a standard border and design | |
| Vary your slides between text, graphics and pictures | |

# OVERHEAD TRANSPARENCIES

| Do | Don't |
|---|---|
| Make them legible | Crowd Information |
| Use colored pens to highlight information during talk | Read from the screen |
| Frame transparencies - use frame for your notes | Turn out the lights |
| Check alignment of screen before you talk | |

# ELECTRONIC PRESENTATIONS

| Do | Don't |
|---|---|
| Ensure you can run the equipment | Take for granted that equipment is set up properly or is compatible with your own computer |
| Have a back-up of your presentation available, ALWAYS | Take for granted that the site computer will accept CDs or zip disks |
| Ensure everyone can see the screen or monitors | Shut all the lights off |
| Use clip art, photographs and scanned images | Use large graphics or photos that take a long time to load |
| Use graphs and charts | Use tables and figures to express relationships |
| Use different fonts for interest and emphasis | Use more than four different fonts per presentation |
| Use a font that can be read clearly from a distance | Use a font smaller than 18 and 24 is better, or all capital letters |
| Use a font that contrasts sharply with the background | Lose contrast when text is used over graphics |
| Make your points clear and simple to understand | Use more than 5 points per slide or large blocks of text |
| Use points to amplify your presentation | Simply read the points to the audience |
| Use animations and transitions to keep interest | Detract from the primary message or theme |
| Use color and bold print for emphasis, but sparingly | Over do or the emphasis will be lost |
| Figure on 1-3 minutes speaking per slide | Don't underestimate time, tendency is to speak longer rather than shorter |

# FLIP CHARTS

| Do | Don't |
|---|---|
| Organize them in advance | Crowd information |
| Use color for emphasis | Read the Chart |
| Print legibly | |

# WHITE BOARDS

| Do | Don't |
|---|---|
| Use color for emphasis | Crowd information |
| Print legibly | |
| Have a designated "recorder" | |

# HANDOUTS

| | |
|---|---|
| Use them to emphasize important material | Hand them out until you want them read |
| Use them to expand complex material | Announce that you will provide them in advance |
| Make them look professional | |

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