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Featured K-9 Unit

**Delta Police
(BC, Canada)
Department**

K-9 Advice & Opinion

**Dog Selection and
Training: Part 1**

Scent Detection

**Explosives Detection
Canine Training:
Raising the Bar**



SCENT DETECTION

USAF Photo / Airman Edgar Grimaldo

EXPLOSIVES DETECTION CANINE TRAINING – RAISING THE BAR – “INTEGRATING SCIENCE WITH A PRACTICAL TRAINING APPROACH”

BY MATT SKOGEN

The scientific community has long pursued infallible methods for detecting explosives. These efforts have been exhaustive and run the gamut from conventional to the unusual.

In addition to engineered instruments, all manner of plants and animals, including honey bees and even rats, have been tested for their ability to discover explosives. Although the

Defense Department and other agencies have invested billions of dollars in pursuit of this goal, a well-trained dog is still regarded as the most proficient means of detecting explosives.

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Given that scientific solutions measure efficacy based on three critical criteria: selectivity, sensitivity and the timing of response, a dog's innate physiology is perfectly adapted for this role.

With respect to this highly specialized talent, it's not a stretch to consider the canine's olfactory functions as an organic computer processor. The ability to draw in scent molecules through the nostrils, process them through the olfactory lobe, and eventually the brain, is very much like a computer. According to Brent Craven, a bio-engineer at the Pennsylvania State University who modeled airflow and odor transport using high resolution MRI scans of a cadaver's nose, when dog's inhale, a fold of tissue just inside their nostril helps to separate these two functions. He found that when airflow enters the nose it splits into two different flow paths, one for olfaction and one for respiration. Craven's studies indicated that approximately 12 percent of the sniffed air

detours into a recessed area in the back of the nose that is dedicated to olfaction, while the rest of the incoming air sweeps past that nook and disappears down through the pharynx to the lungs. Within the recessed area is a mucous laden membrane known as

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the epitheum that collects odor molecules based on different chemical properties. Olfactory receptors "recognize" these odor molecules and send electrical signals to the brain for analysis.

The canine's ability to process odors utilizing air currents coupled with their ability to migrate closer to the source, and give a noticeable change or final response is what makes the canine so valuable for explosives scent detection.



SCENT DETECTION

Reliable & Trustworthy

An explosives detector dog must be the most proficient of any working dog to ensure the safety of the public. Not only must the explosives detector dog be reliable and trustworthy, but the handler must

be adequately trained to not only handle the leash but also possess knowledge regarding explosives related topics as well as the tactics necessary to safely and properly deploy, if called upon. Over the course of the last 28 years, I have

participated in numerous bomb dog handler courses and workshops. We have implemented a wide spectrum of scenario-based training exercises and tested the limits of many teams through the use of training aids associated with commonly used

pound) in fairly easy to find places and allow their dogs to look like superstars at every training session. This obviously presents a distorted picture of the dog's ability. When these teams eventually encounter a challenging training environment, their dogs invariably fail.

When conducting EDD certifications for many teams from year to year, I have an opportunity to witness trends, strengths and weaknesses of teams throughout the entire country. Most teams perform very well at certifications, but we must remember

that a certification is a test to establish the lowest level of performance necessary for deployment. When we train with low thresholds of odor in tight containment, we begin to notice lower levels of proficiency. **"We must train to locate an explosives device, not the explosives itself."**

Our dogs are great at finding the "guts" of a bomb, but are they good at finding the explosives contents within the type of construction used to package or contain an actual improvised explosives device (IED)?



Photo By: Senior Airman Krystal Wright

forms of IED containment. Everything from pipe bombs, to pressure cookers, to packages sealed for delivery. Many lessons were learned from this training and our industry must take measures to ensure we "raise the bar" on our training to improve upon our perceived state of readiness. The bomb dog industry as a whole must police itself and ensure ALL explosives detector dog teams are at a superior level. There is no room in this industry for mediocre or subpar.

As an industry we cannot over emphasize the importance of the initial selection of the canine, the quality and selection of the handler, the K-9 supervisor, the person training the dog and their level of knowledge regarding explosives and specific explosives detector dog training and subsequent certifications. All of these factors must be carefully selected for quality and performance. They must also work together harmoniously to maintain checks and balances and to

ensure compliance with policies, and overall effectiveness. If a poll were taken of all EDD handlers, most would say they are without peer. Any handler that offers an answer short of that should pursue another vocation. The problem with most detector teams regardless of discipline, is a failure to identify specific training objectives that will truly test them on a weekly basis. All too often, handlers place a certain quantity (normally ½ pound to a

BOMB DOG TRAINING PARADIGM

An explosives In addition to general leash handling and the chemistry that exists between a canine and the handler, this diagram has served me well throughout the years. It has enabled me to create lesson plans based on variations of each of these training topics. It has helped me as a trainer to devise new training objectives and to keep training interesting rather than mundane.



SELECTIVITY

The cornerstone of any detection dog is the ability to select target odor from amongst other competing odors. In the beginning, we go through the imprinting stage where we introduce the "game" and target odor using several methods most notably (1) direct presentation, (2) hunt and find, or (3) scented objects. Once the canine begins to recognize the odor on a consistent basis, we then introduce additional odors and continue this process using whichever method we feel works best.

Proofing

More advanced stages of selectivity occur when we begin to set out what some call interferences, or negative controls. I believe most dog trainers and handlers refer to the process of working our dogs through these negative controls as "proofing." This is when we place out non-target odors that a dog can inadvertently imprint and catalog in their brain, but also odors directly related to their reward or odors having increased importance to the dog. Inadvertent imprinted odors: gloves, target odor packaging such as canvas bags, plastic bags,

adhesives such as tape or evidence tape, mildew, human scent, barriers such as paper towels or cardboard, etc. These are odors that could accidentally become part of the dog's scent picture. Odors of interest: Items such as food and toy rewards such as tennis balls, Kong Balls, etc. Other methods to improve selectivity include the following:

- **Competing Odors** - Areas having odor from a lot of people, dogs, food, etc.
- **Environmental Distractions** – Dogs, noise, people, etc.
- Contaminated versus Sterile Training Aids

SCENT DETECTION

SENSITIVITY

Equally as important as the selectivity objective is the sensitivity objective which relates directly to the ability of the dog to detect target odor when the "threshold" or quantity of scent plume is challenged.

"All handlers should humble themselves on a continual basis in an attempt to find their dog's weaknesses and make the adjustments necessary for improvement."

Lowering Threshold Key to Increased Proficiency

There are several methods used to lower the threshold of available odor. If our dogs become methodical enough to process the productive seams and identify a lesser amount of odor you will undoubtedly begin to create a "Major League" bomb dog.

Understanding Varying Explosive's Vapor Pressure

Many handlers must take the time to understand the varying vapor pressure and subsequent odor prominence when it comes to the training aids within their own magazine.

When you look at this chart, you can clearly see how prominent odors such as Dynamite and DMNB within plastic explosives are compared to other odors such as HMX and Ammonium Nitrate. For this reason, we can begin to see that by virtue of training more with low vapor pressure odors we make our dog better than those that train too much on high vapor pressure explosives. EGDN is found within dynamite. It has significant vapor pressure.

If handlers are always placing one pound of explosives in fairly easy places, they are not raising the bar on training. Objectives that can be implemented to raise the bar on sensitivity include the following:

- **Increased containment** – Use a box, suitcase, backpack, etc. to hide target odor.
- **Smaller Quantities** – Use smaller quantities of explosives to make your dog better.
- **Height & Depth Challenges** – Work higher and deeper hide locations, not shallow.
- **Competing Odors** – Force dog to work through other odors such as luggage with clothing and toiletries rather than empty luggage.

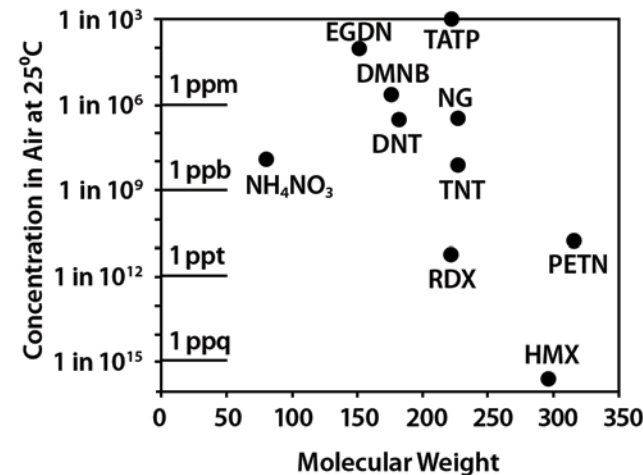
How Do We Increase Proficiency on Difficult Hides?

The key to good training is first defining exactly what makes a hide "difficult." To be difficult, there must exist characteristics that cause the target odor to be less prominent. As a general rule, I always use the PAT acronym to describe the factors having the most effect on the scent plume emanating from the target odor. These factors are the following:

- ✓ **Packaging** - How something is packaged or contained can have a profound effect on whether odor is available at all. There are certainly

many variables in regard to this.

- ✓ **Amount** – Certainly the quantity can have a profound effect on the prominence of a scent plume diffused from target odor.
- ✓ **Time** – The length of time scent molecules have had to diffuse from the target odor has a profound effect on the prominence of the scent plume available to the dog. There are other factors such as temperature and air flow, but in general, these factors should be considered when setting up training, whether a realistic scenario or just scent problem solving.



- **"Always On" Approach** – Inadvertent discovery, or areas where dog may not always think a hide should be such as area to and from a training scenario, people possessed, or break areas. Encourage an "always on" approach to scent detection.
- **Duration or conditioning** – Working the dog longer and longer to increase the conditioning and effectiveness when working longer searches.

- **Increased Blanks** – Blank areas are the remedy for false alerts and improved sensitivity to target odor and better decision making on part of the dog.
 - **Seldom Worked Presentations** – Interiors of vehicles, people, odd environments, etc.
- "Some dogs 'Gamble' to locate 'Big' odor and pass up much smaller quantities or hides within more intense containment."**

QUALITY OF FINAL RESPONSE

The quality of the final response and the events leading to the dog's decision to go to final response is very important to the final outcome or analysis on the behalf of the handler to have confidence in their dog. Some handlers deal with false alert issues so much they simply do not have confidence in their dog's accuracy. The behavior of the dog prior to the final response is ultimately what we consider the dog's "Alert." The final response is merely the disciplined, learned response displayed after the dog has exhibited the alert behaviors.

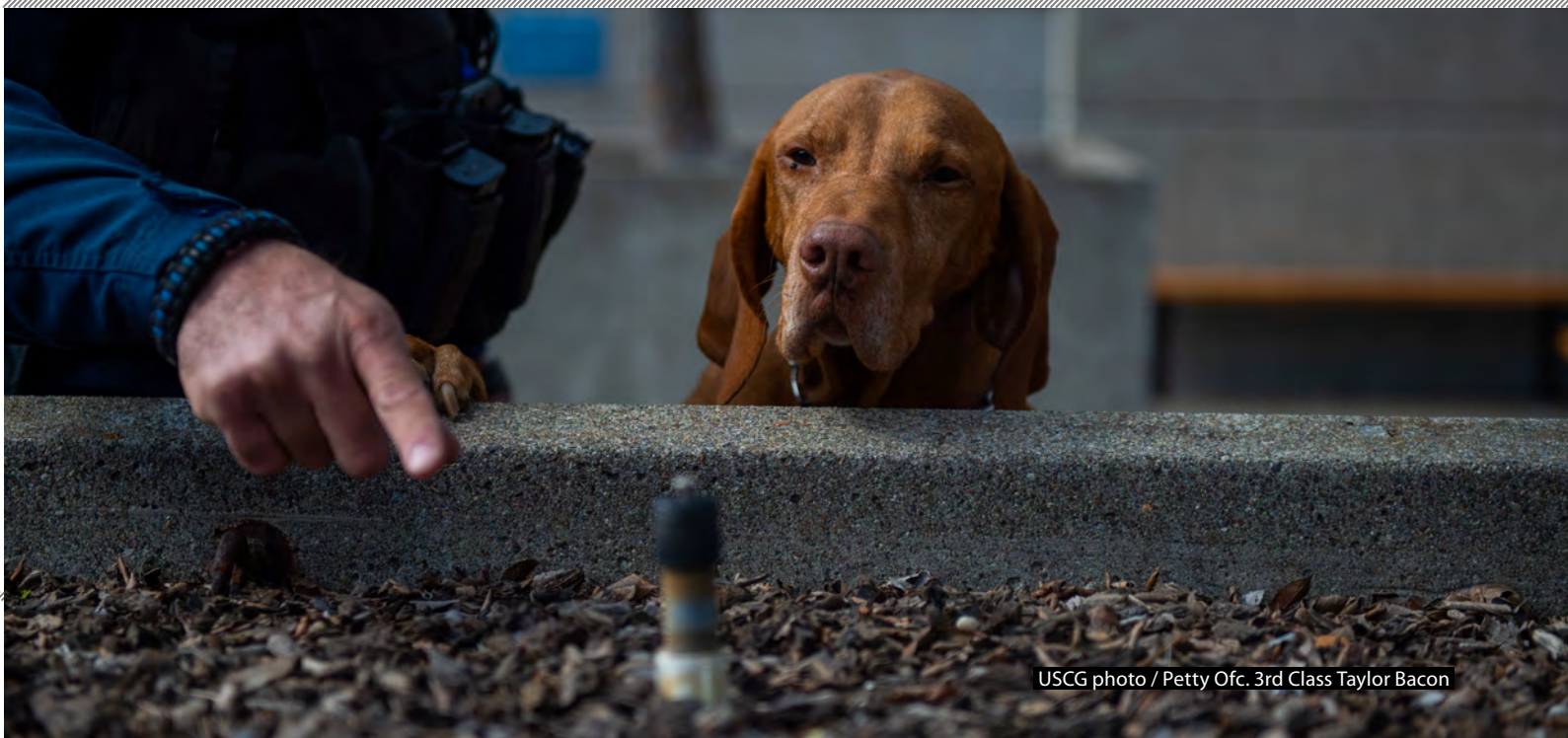
The alert behaviors of any detector dog should always include the following two changes:

- ⇒ **Changes in Breathing** – Tongue comes in, mouth closes, detailed vacuuming, etc.
- ⇒ **Changes in Body Posture** – The classic head whip, nose up, change in direction, change in speed, tail wagging, sudden excitement, etc.
- ⇒ **Final Response** – In a perfect world, we should get a final response, but it is possible some could have this without the prior two indicators which results in an incorrect response also known as a false alert.

These changes in behavior, consistent with target odor, are the elements needed in any good dog handler's written report on actual deployments. A handler simply should not state "Dog alerted on the front driver's side fender." All of the changes the handler observed prior to the final response is needed for a good report. Only the handler writes this in a report, nobody else. A disciplined final response is important to ensure the handler can readily identify the exact area where the dog alerted. Any bomb

technician is going to want to know exactly where the dog showed interest. A quality final response is also necessary to ensure the canine is not cueing on the handler. A recent defense attorney workshop for the defense of police dog alerts on drug dog cases revealed the attorneys are attacking the dog's search and subsequent alert. They go so far to say a dog that looks at the handler is a sure sign of a weak dog. As a trainer, it has always been of high importance that any dog, especially a bomb

dog, should display a very disciplined final response when locating target odor. I am BIG on focus and intense flushing behavior at source. I do not allow any of my dogs to look to me for the reward. Having said that, it is also important to have what I call an "emergency recall" used when working scenario-based training or on actual deployment. I maintain an 80% to 20% ratio in terms of toy delivery systems to maintain discipline at source and recalls away from source.





TACTICS

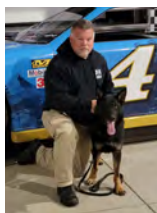
Any good explosives detector dog handler course should include training objectives directly related to actual deployment and conveying the many differences existing between other disciplines such as drug detection. "Odor is not odor," as so many handlers and trainers want to suggest.

A bomb dog handler has so many more tactical objectives to understand directly relating to the following:

- **Leash Handling** – Minimize steps when walking and being efficient, walking forward, knowing exit paths, allowing the canine to clear ahead of the handler, etc.
- **Time, Distance and Shielding Awareness**
- **Tactical Recall** – Always being persistent in maintaining quality final response, but also having the means to recall the dog and pay at handler from time to time.
- **Prioritization of Search Zones**
- **Scenario-Based Training** – Bomber methodology, evacuations, search options, etc.
- **Use of Spotters**
- **Tactical Measures** such as the "Walk Through" – good when possible.
- **Proper Hide Placement** – Hides should not be placed in areas where it would not lead to productive energy expenditures and subsequent bad handling practices in the field.
- **General Explosives and HME Awareness**
- **IED Awareness**
- **Obedience**

Conclusion

For the handlers and trainers implementing many of these objectives, I say good job and keep up the good work. I challenge each and every handler and trainer who is not consistently creating new, challenging scenarios for dog teams to make the changes necessary to create reliable, trustworthy teams capable of performing well when on actual deployments. Always make time for quality training and stay safe! 🐾



Matt Skogen

- Director of Training for IronHeart High Performance Working Dogs
- Accredited Master Trainer for North American Police Work Dog Association
- Certified Master Trainer

at VomKaiserhofe's Training Center
 • Served as Chief Trainer for Overland Park PD
 • Served as Canine Training Coordinator for federal bomb dog program

- Accredited training facility for the National Entomology Scent Detection Canine Association
- Trained the first canine to assist an endangered species in conjunction

- with the Polar Bear Species
- Survival Committee (Elvis the polar bear pregnancy dog featured on Weather Channel, Dog Fancy Magazine, National Geographic, etc.)