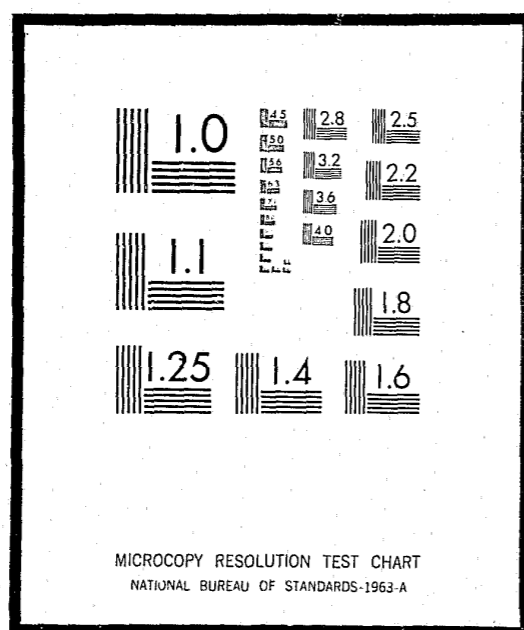


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U.S. DEPARTMENT OF JUSTICE
LAW ENFORCEMENT ASSISTANCE ADMINISTRATION
NATIONAL CRIMINAL JUSTICE REFERENCE SERVICE
WASHINGTON, D.C. 20531

Date filmed

7/9/76

This project was supported by Grant Number NI-71-100-16 awarded by the Law Enforcement Assistance Administration, U.S. Department of Justice, under the Omnibus Crime Control and Safe Streets Act of 1968, as amended. Points of view or opinions stated in this document are those of the authors and do not necessarily represent the official position or policies of the U.S. Department of Justice.

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READING ROOM

FEASIBILITY STUDY ON USING DOGS TRAINED
FOR EXPLOSIVES DETECTION IN
AN URBAN ENVIRONMENT

FINAL REPORT -- FEDERAL GRANT # NI-71-100

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AUGUST, 1972

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INTRODUCTION

BACKGROUND

In recent years there has been a significant increase in the number of bomb threats and bombings. The targets of the bombers have ranged from Local and Federal Governmental Agencies to National and International business establishments. Within the last six months, the use or threat of explosives, has additionally been directed toward Aircrafts and Luxury Liners. At this time there is little evidence that this form of protest or extremism will not present a formidable police problem in the foreseeable future.

Use of specially trained dogs in detecting ambushes and land mines has proven successful in the Armed Services in Southeast Asia. It is a logical spin off for Urban Law Enforcement Agencies to employ this innovation in their war against criminals.

SCOPE

On May 1, 1971, the New York City Police Department Bomb Section has been awarded the task of conducting a unique feasibility study under the auspices of the Law Enforcement Assistance Administration. This study involved the acquisition of two dogs, trained initially to detect the odors of hidden commercial dynamite and Composition C-4, and using them to assist an urban police Bomb Section.

Various advantages are theoretically inherent in the use of dogs to discover clandestine explosives which may be encountered in police work. This Department was given the task of assessing the validity of these advantages and of developing search techniques and procedures relating to the proper use of the dogs for this purpose.

This report is designed to describe the study and what was accomplished by using these dogs as an adjunct to the procedures presently employed by the New York City Police Department Bomb Section.

ACKNOWLEDGMENT

Special acknowledgment is due to personnel of the U.S. Army Land Warfare Laboratory, Aberdeen Proving Grounds, Maryland and Mr. Ray Phillips, University of Mississippi, whose assistance and cooperation made it possible for this program to proceed successfully.

METHODS AND MATERIALS

DOGS

Two dogs, one German Shepherd and one Black Labrador Retriever were procured from the U.S. Army Land Warfare Laboratory. These dogs were selected from six Explosive Detection Dogs who had received prior training in the basic technique of explosive detection at the Psychology Department of the University of Mississippi. Final selection was made by members of this command who also received two weeks of training at the Land Warfare Laboratory. Both dogs were female and had been spayed, de-barked and received basic obedience training.

Immediately upon receipt of the dogs, a complete medical examination was conducted at the Animal Medical Center, 510 East 62nd Street, Manhattan on May 18, 1971 by a qualified Veterinarian. Diagnosis indicated each dog was infected with heartworm, and all activities were stopped pending treatment. After an operation, the Veterinarian prescribed three weeks of complete inactivity to avoid complications. Therefore, the dogs were inactive for five weeks from May 21, to June 28, 1971.

PERSONNEL

As a part of the existing K-9 Unit, qualified personnel were assigned to implementing the program. A survey was conducted to determine the number of personnel available for the program, approximately 400. Candidates were selected...

Three men with excellent qualifications were selected. As the dogs had been trained initially to respond primarily to food rewards, rather than hand praise reward by the handlers, it was determined that this procedure would be continued thus permitting any handler to work with either dog. This policy has proven to be effective and has provided continuation of the program during vacations, sick leave, etc. by the remaining handlers.

FACILITIES

Initially the dogs were housed at a local private professional dog kennel. Subsequently, a permanent kennel with indoor and outdoor runs was constructed to house the dogs on a roof of the New York City Police Department's Police Academy located at 235 East 20th Street, Manhattan.

Various buildings, including numerous Police Department buildings, schools, commercial offices and factories, transportation facilities and other locations in New York City were made available for use in theoretical training situations. A Storage Facility for small quantities of explosives was also available. An air conditioned van type vehicle was acquired for transportation of dogs and trainers.

EXPLOSIVES

Various commercial dynamites, Composition C-3 and C-4, black powder, smokeless powder, TNT, Analytical RDX, PETN and TNT were used. Additional types of explosives manufactured in Italy, Israel, Russia, Yugoslavia, Great Britain and Germany which were used in training situations to a lesser degree.

INITIAL TRAINING & EVALUATION

During the period May 3, through May 21, 1971, extensive trials were conducted utilizing small amounts of explosive materials secreted in rooms. The dogs located dynamite "plants" in 70 to 75% of the cases. In 90% of the cases involving "plants" of Composition C-4, TNT and smokeless powder the dogs were unable to find the plant. It was concluded that the dogs were reasonably efficient in detecting the odor of dynamite but poor in detecting other explosives.

As previously noted, both dogs were inactive from May 21 to June 28, 1971, due to required medical treatment. Training was resumed on June 28, 1971, but the five weeks of inactivity did affect both dogs searching abilities.

Discrimination training was necessary to re-inforce the dogs ability to detect dynamite. After two weeks of 45 minute discrimination trials conducted twice daily, the dog's efficiency reached a point where the trainers considered the animals ready to resume room search technique training. Three weeks of training were required to achieve the level of efficiency in room search technique that existed prior to the hospitalization of the dogs.

An intense training program to improve the dogs ability to detect C-4, TNT, smokeless and black powder was implemented. In order to evaluate the dogs in various situations they were employed in crowded locations, open street situations large amusement areas

hotels, automobiles, aircrafts, ships and locations immediately after an explosion. Training in search techniques continued until September 5, 1971 and were programmed in various rooms in the Police Academy Building as well as in the field.

The results of intensive training and operating in a variety of environments indicated an efficiency rate of from 90 to 95% with all explosives tested and no significant problem with public acceptance or reduced effectiveness due to outside factors.

TESTING AT AIRPORT FACILITIES.

On September 13, 1971, the Federal Aviation Administration contacted this Department to determine if the dogs could be used to search out and discover explosives secreted in or about aircrafts, cargo buildings and relating airport structures and areas.

The dogs were initially tested aboard a 727 Aircraft and in a U.S. Customs Warehouse. In the warehouse, explosive odor training aids were placed in an aisle, storage racks and on baggage pallets. In the aircraft, galley space, 1st class and coach areas were utilized to secrete small amounts of explosive samples. The training samples were found by both dogs in varying lengths of time, from a high of three minutes to a low of 25 seconds, depending on the distance from the starting point to the target. Both dogs successfully located the training aids in all situations.

The training exercise with the Federal Aviation Administration consisted of a total of eleven separate exercises conducted aboard various aircrafts, i.e. 747, DC-7, 707 and terminal facilities of the major airlines at John F. Kennedy International Airport and LaGuardia Airport.

In each exercise, training aids were secreted in and about various areas of the airport terminal including the public passenger ticket counters, baggage claim, baggage and security areas.

Included were stored, unattended aircrafts under repair, those in final preparation for flight, and aircrafts in the final boarding process.

Some problems which caused initial difficulties were:

- A. Food scraps on aircrafts and terminal areas distracting the dogs.
- B. Moving conveyor belts.
- C. Aircraft seating configurations.
- D. Aircraft boarding ramps and stairs.

Each problem was solved by the trainers encouraging the dogs to overcome these impediments through food reward and patient understanding of the dogs behavior.

One example was the difficulty encountered by the German Shepherd in searching the seating areas due to limited floor space. After some hesitation on the part of the Shepherd to respond properly (sit) upon making the find, due to the lack of room, the animal was gradually acclimated by the handlers, and finally sat on the seat itself to indicate a find because space was not available on the floor.

The dogs performed well and improved markedly as they became more accustomed to the aircraft and airport environments. The dogs located each training aid quickly and were not distracted by the many noises and odors of airport activity.

In addition to examining the feasibility of the use of

these trained animals, training and improved expertise was gained by the handlers and security forces involved in the program. The Federal Aviation Administration's personnel wholeheartedly endorsed the idea that dogs would be a valuable tool in an airport environment and made favorable recommendations to their headquarters.

TESTING BY ISRAELI GOVERNMENT

On January 14, 1972, the Israeli Government expressed a desire to investigate the training program being conducted by this Department. A representative from the Israeli Ministry of Defense visited the New York City Police Department facilities on January 31, 1972 for a period of one week to evaluate the operation.

During this period, the Israeli Representative conducted detailed tests to ascertain if the dogs could discriminate analytical RDX, PETN and TNT which are the bases for most military explosives. Extensive discrimination trials were conducted and it was determined that the dogs could indeed detect these odors, which they had not previously encountered.

Further experiments were conducted at John F. Kennedy International Airport and the Police Academy building in which various explosives manufactured in Italy, Israel, Russia, Yugoslavia, Great Britain and Germany were used in training situations. Discrimination tests were conducted in the following manner with Analytical RDX:

Three erlenmeyer flasks were placed on the floor, one containing soap, one containing tobacco and one containing "Analytical RDX". Brandy, the German Shepherd, was allowed to investigate all three flasks and showed no recognition to said explosive. Tests were conducted with this odor and

dog was encouraged to make the proper response to the explosive stimulus (Analytical RDX).

After approximately twenty trials in which the proper response was encouraged, trials were conducted in which the dog was in no way encouraged to the proper flask. As the trials progressed, additional controls were introduced consisting of bread, oil soaked linen, salt and perfumed powder. Identical tests were performed with Sally, the Labrador Retriever. Tests were also conducted with Analytical TNT and PETN. The results are listed as follows:

DESCRIPTION OF TRIALS WITH ANALYTICAL EXPLOSIVES

TRIALS

Six flasks are placed on the floor, one containing the analytical material, five containing various distraction odors. The dog would approach and sniff the flasks until they were all investigated or until the dog responded to the flask containing the explosive stimulus.

LEGEND

- + = Proper response, dog sniffed flask and sat.
- ⊕ = Proper response, dog had to sniff flask twice then sat.
- = No response, dog unable to find explosive stimuli.
- FS = False sit, dog sat at flask other than explosive stimuli.

The proper response percentage is determined by dividing the number of all correct responses by the total of correct responses

RESULTS OF DISCRIMINATION TRIALS, FEBRUARY 1, 1972

TRAINING OBOR	# OF TRIALS	BRANDY (GERMAN SHEPHERD)			FS	PROPER RESPONSE %
		+	⊕	-		
RDX	40	19	12	9	16	34 %
TNT	40	33	7	0	0	82%
PETN	40	31	6	8	10	56%
SALLY (LABRADOR RETRIEVER)						
RDX	40	22	17	19	12	31%
TNT	40	37	8	10	3	64%
PETN	40	28	6	10	14	48%

DISCRIMINATION TRIAL RESULTS, FEBRUARY 2, 1972

RDX	24	23	1	-0	1	92%
TNT	37	27	3	5	2	73%
PETN	18	16	2	0	0	89%
SALLY (LABRADOR RETRIEVER)						
RDX	42	36	4	6	1	75%
TNT	41	36	1	2	6	80%
PETN	14	13	1	1	0	89%

DISCRIMINATION TRIAL RESULTS, FEBRUARY 3, 1972

BRANDY- (GERMAN SHEPHERD)						
RDX	49	39	7	5	1	75%
SALLY (LABRADOR RETRIEVER)						
RDX	84	57	21	13	8	57%

ROOM SEARCH

During the training program, each plant was located by both dogs. Plants were made of RDX wrapped in cotton and secured by masking tape.

plants were located by both dogs. Plants were made of RDX wrapped in cotton and secured by masking tape.

DISCRIMINATION TRIAL RESULTS, FEBRUARY 4, 1972

TRAINING OBOR	TRIALS	+	⊕	-	FS	PROPER RESPONSE %	DOG
RDX	60	48	8	3	2	79%	Brandy
TNT	60	50	10	0	1	80%	Brandy
PETN	60	46	11	4	2	73%	Brandy
RDX	60	42	16	4	5	65%	Sally
TNT	60	51	7	2	4	78%	Sally
PETN	60	47	3	7	8	73%	Sally

During the training program, several Federal Agencies such as U.S. Customs Service and the Federal Aviation Administration made facilities available and monitored the progress of the exercise because of their potential value to said agencies.

FIELD USE WITH LIVE BOMB

The success and value of this program was dramatically demonstrated on March 7, 1972 when "Brandy" the German Shepherd Explosive Detection Dog responded to a 707 Jetliner, which was airborne, and had been recalled to John F. Kennedy International Airport in answer to a bomb threat. Within a minute the dog discovered a briefcase in the cockpit of the aircraft and gave a positive reaction indicating the presence of an explosive. The case, which bore an airplane tag indicating that it was crew luggage, was carefully removed from the cockpit and found to contain a highly sophisticated time bomb, with four and a half pounds of plastic explosive (C-4). Within twelve hours, an identical bomb secreted in a first aid kit exploded in an aircraft cockpit in Nevada causing \$1,500,000 in damage. This aircraft departed John F. Kennedy International Airport but was not searched by the Explosive Detection Dogs, although several visual searches were made by crewmen and mechanics of the jet airliner.

On March 10, 1972, with the cooperation of the Federal Aviation Administration at John F. Kennedy International Airport, circumstances duplicating the situation in which the bomb exploded in Nevada was simulated. Two pounds of plastic explosive (C-4) were placed in the first aid kit attached to the wall of the cockpit. . . . Administration official remained

in the cockpit in order to observe and time the exercise. Brandy entered the cockpit and located the explosive in seven seconds. Sally, the Labrador Retriever located the explosive in five seconds.

USE OF DOGS AT DEMOCRATIC & REPUBLICAN NATIONAL CONVENTIONS.

As a result of a request from the United States Secret Service, both Explosive Detection Dogs, Dog Handlers and a Bomb Section Supervisor were sent to Miami Beach, Florida during the National Conventions.

The dogs and handlers provided a valuable service for these two weeks, by conducting searches of the Convention Hall, Podium Area, Meeting Rooms and other areas at the direction of the Secret Service. The dogs were also used extensively in searching aircraft and baggage being loaded on aircraft chartered by Candidates and Dignitaries. No problems were encountered during these operations despite the intense heat and busy schedule. Personnel of the Secret Service and Federal Aviation Administration were impressed by the efficiency of the dogs and reported favorably on the use of dogs for these type of searches.

RECOMMENDATIONS

From the experience gained during this project, the following recommendations are made to departments or agencies anticipating the development of a similar program.

SELECTION OF DOGS

Although German Shepherds and Labrador Retrievers have both proven effective during training and field use, it has been observed that the Shepherd is inherently more inquisitive than other breeds and displays a desire to more readily explore an area. The Labrador was observed to be a little hesitant during certain search procedures.

During initial training, it is essential that obedience training be thorough. This training should not limit or frustrate the natural curiosity of the dog which will be of value in later phases of training. Selection of the dogs for the program is an important phase of the initial preparation.

It is recommended that at least four dogs be selected, preferably females, and that the dogs not be selected from existing dogs previously trained for patrol or attack purposes. Should one or more of the dogs prove unsuitable as the program progresses, the other dog or dogs can continue rather than starting from the beginning with a new dog.

Dogs selected for this training should receive a thorough

physical examination by a qualified veterinarian prior to initiation

any type of training to insure the good health of the dog.

FACILITIES

Arrangements for housing the dogs should be finalized prior to the start of the program. Departments or agencies not having such facilities might consider housing the dogs at a private kennel or ASPCA kennel until suitable facilities can be built.

Arrangements for acquiring and storing small quantities of explosive materials should be made prior to the start of training.

USE OF DOGS

It should be realized that the Explosive Detection Dog is not to be used to supplant humans in the physical search of an area, rather the dog should be used to supplement the search. For example, the dogs proved to be especially valuable during a search to examine inaccessible areas and areas where a large amount of material (crates, boxes, luggage) would have to be moved to conduct a thorough search. A great deal of time and labor can be saved by the judicious use of the dogs in the appropriate situations. The converse of this principle is also recommended, i.e. the dogs should not be wasted in examining large relatively open areas which are easily and quickly searched by people.

The dog should not be utilised without the services of

a qualified bomb technician immediately available. Ideally, the handler should be a qualified bomb technician or at least have training in explosive and bomb recognition and in initial action upon discovery of a suspected explosive device.

The training and development of a capable Explosive Detection dog is a full time operation as the training must be carried through a series of closely related steps. Once the animal has proved capable in all phases and during field use, training must be continued on a regular basis to maintain this degree of proficiency.

The reward technique of training lends itself readily to the multi-handler type of operation as opposed to the one man - one dog technique, thus making the dogs available for longer periods of time.

CONCLUSIONS

1. It is feasible to employ dogs to search for clandestine bombs not readily visible.
2. The dogs are capable of detecting the odor of a variety of explosives with a high degree of reliability.
3. Any law enforcement agency can select and train Detection Dogs if that agency has an existing K-9 Unit and qualified personnel available. The expense is minimal.
4. The dogs are particularly valuable when used in the following circumstances:
 - a. Routine bomb threat situations.
 - b. Security searches for visiting dignitaries and controversial persons prior to public appearances.
 - c. At locations where explosives are discovered, or where an explosion has already occurred to seek additional secreted explosives.
 - d. When suspicious objects or packages are discovered to confirm or eliminate the possibility of the package or object containing explosives.
 - e. Upon receipt of credible confidential information that explosives are stored at a suspected location, inside or outside.
 - f. To search inside or outside areas which are particularly vulnerable to bombs and which cannot easily and readily be searched by people.
 - g. To search large quantities of packages and luggage which cannot be easily examined by other means or when supplementation of other forms of examination, such as fluoroscope, is desirable.

This is not to infer that the dogs must be used in these specific situations. All situations are unique and individual judgments must be made on an independent basis.

END