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TRAINING DOGS FOR NARCOTIC DETECTION

Final Report

By

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July 1972

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The above content is a part of a document discussing the training of narcotic detector dogs and the handling of these dogs. The document highlights the importance of proper training methods and the physical and temperamental standards required for dogs to be effective in detecting narcotics. It emphasizes the need for thorough understanding before any training begins and stresses the importance of selecting the correct selection of dogs for the project. The document also mentions the selection of dogs, the importance of physical and temperamental standards, and the role of handlers in ensuring the success of the training. The manual is based on procedures developed during the training of dogs to detect narcotics, and it is a resource for law enforcement agencies in adequately carrying out operations without compromising the well-being of the dogs or the effectiveness of the training.
Simple observation tests can be used to determine if a dog is potentially temperamentally suitable for training. By taking the dog into a new environment, a trainer can observe whether or not the dog is inquisitive. For example, taken to a room in which there are boxes or containers such as foot and wall lockers, or furniture such as desk and tables, a naturally inquisitive dog will move about and examine these objects, and most importantly, it will sniff them.

Similarly, a dog's mentality and aggressiveness can be checked by taking the dog into a room where two or three "strangers" are present. If the dog proves to be shy, or aggresive toward them, it is not a good candidate for detector dog training.

Another important observation is whether or not the dog is a hearty eater; this is a good indication that food will be a powerful reward.

A dog in new surroundings may refuse an adjustment period and should not be judged too quickly. Normally, the full observation period of 10 days will be needed to determine what a dog's behavior will be like over a more extended period.

In selecting dogs for training, twice as many should be selected as will be needed. In this way, the training quota can be met even if some of the dogs are rejected during training. When a reward is presented immediately after the dog makes a particular response, the likelihood of that response occurring again is increased—this is true of the administration of punishment. It is easy, then, to see how certain behaviors can be made less likely to occur simply by presenting rewards or punishment following certain behaviors.

A. Rewards and Punishment

The presentation of rewards or punishment, with dogs as with humans, serves to change the behavior of the animal. Not only is punishment ineffective in getting the dog to do something, but never punish the dog for not doing something. If the handler does not present the dog with food when it sits to other odor, it should not expect to receive food. Therefore, it should receive its reward only when it makes a correct response.

When some dogs are highly rewarded by almost any kind of food, most prefer foods that would be impractical to use consistently, such as GOOD DOG, a procedure which is described later in this manual.

Punishment tends to make the dog more handler-oriented and is especially troublesome for the dog trainer.

In order to change the dog's behavior only when the correct response occurs, the dog must know that the correct response is the most effective way to train a detector dog, and may, in fact, be harmful to its training.

1. Reward

When a dog first smells a narcotic, it may sniff it and exhibit curiosity, but the odor has little additional effect on its behavior. However, if every time the dog smells a narcotic odor or it is given food and put in a sitting position, this sitting response is more likely to occur the next time that it detects this odor. The problem here is, of course, that the dog does not "understand" that sitting to a narcotic odor is what results in the presentation of food, and it will not sit in the odor of any other different odor. If the handler does not present the dog with food when it sits to other odors, the dog will learn to discriminate between odors that are followed by food when it sits in other certain narcotic odors or odors that are not followed by food (all other odors).

At the final stages of training, the dog will search for the odor of the particular narcotic that results in the delivery of the food. The major thing to remember is that the dog will sit in the presence of a narcotic odor only as long as it is given a reward for this behavior. It does not have to have a reward on every trial or do anything else it wants, but it must have a reward at least once if it sits to the correct odor. If the dog works for long periods of time without reward or if the reward is given at the wrong times, the dog's behavior will break down and it will either fail to sit or sit at the correct odor.

A.2. Punishment

There are very few cases when the use of extreme punishment will be sure to correct the dog for an undesirable behavior. A dog, NO, during an immediately (not later than 3 sec) following the undesired behavior, will generally serve to reduce the chance of the behavior's reoccurrence. It should be emphasized that, generally, no physical punishment should be given during training sessions.

Punishment is effective in altering a dog's behavior only when administered following a behavior you do not want to occur or when the dog has bissed someone.

Effective use of punishment can occur only after a good bond is established between handler and dog. Punishment tends to make the dog more handler-oriented and is especially troublesome for the dog trainer.

If you want the dog to perform, reward it for doing what you want it to do, but never punish the dog for not doing it. Not only is punishment insufficient to get the dog to do something, but it will cause the dog to dislike the punisher and the place is punished. The effect of fear is to disrupt other behavior which, in many cases, may be desirable behavior. A fearful dog that receives punishment while working will not make a good detector dog.

A.3. Use of Food as a Reward

The effectiveness of food as a reward depends upon the dog's affection for the handler (the "man, one dog" relationship). Petting and praise, although administered under correct responding, are regarded as auxiliary rewards only, since their effectiveness will vary from dog to dog and from handler to handler. The principal reward for a correct response is a pellet of food.

The procedure to be described will insure that any handler will be able to use food as a powerful reward for any dog that has met the selection criteria. Moreover, the effectiveness of food will be maintained even when the dog is shifted to a completely new handler. Any properly trained handler will be able to work any properly trained dog.

With some dogs, food is highly rewarded by almost any kind of food, most prefer foods that would be impractical to use for the dog's behavior. To be available for use in training, the reward food should be small and must be available to the handler. The dog should be comfortable with the handler. The reward food should be kept on hand at all times, and the dog must be thoroughly familiar with the use of the choke collar, the collar should be used during the entire sequence.

Punishment tends to make the dog more handler-oriented and is especially troublesome for the dog trainer.

If you want the dog to perform, reward it for doing what you want it to do, but never punish the dog for not doing it. Not only is punishment insufficient to get the dog to do something, but it will cause the dog to dislike the punisher and the place is punished. The effect of fear is to disrupt other behavior which, in many cases, may be desirable behavior. A fearful dog that receives punishment while working will not make a good detector dog.

Many traditional dog trainers make excessive use of the choke collar as the primary tool in the training of dogs for narcotic tasks. Although this practice is not recommended for the training of detector dogs, its effectiveness is recognized. The verbal and limited use of the choke collar may be effective with dogs which do not respond to the less severe punishments recommended in this manual.

Specifically, it is recommended that the shock on the choke collar be used only under the following conditions: (1) if the dog bites another animal or a human; (2) if the dog runs away from the handler; (3) if the dog growsl at a person or another dog. If any of these behaviors requiring the use of the choke collar occurs, it is further recommended that a professional dog trainer who is thoroughly familiar with the use of the choke collar conduct this training.

B. Spoken Commands

Spoken commands, such as GOOD DOG and NO, have no meaning to the dog except in relation to the events which follow these commands. If pleasant consequences follow the word GOOD, then eventually the word becomes rewarded to the dog. When proper training, the word GOOD will continue to be rewarded to the dog even if it is only occasionally followed by food and petting. The word NO may be used as a command.

Punishment tends to make the dog more handler-oriented and is especially troublesome for the dog trainer.

The careful and limited use of the choke collar will be a powerful reward. If discontinues with the sound of the choke collar is given during training sessions.
I. Making the Training Odor Rewarding

Once the dog has learned to associate the reward with the training stimulus, the dog should be ready to begin the second phase of olfactory training. In this second phase, the dog will learn to distinguish between foods containing the training odor and those that do not. The trainer will use a combination of positive and negative reinforcement to teach the dog to recognize the training odor.

II. BASIC TRAINING PROCEDURES

A. Preliminary Training

1. Initial Training

The goal of preliminary training is to establish basic obedience behaviors in the dog. During this phase, the trainer will teach the dog to respond to basic commands such as "sit," "stay," and "come." The trainer will also teach the dog to respond to the training odor.

2. Intermediate Training

The goal of intermediate training is to further develop the dog's obedience behaviors and to introduce more complex commands. During this phase, the trainer will teach the dog to respond to commands such as "heel," "sit-and-stay," and "down." The trainer will also teach the dog to respond to the training odor.

3. Advanced Training

The goal of advanced training is to teach the dog more complex obedience behaviors and to introduce new commands. During this phase, the trainer will teach the dog to respond to commands such as "pivot," "circle," and "obedience drill." The trainer will also teach the dog to respond to the training odor.

4. Obedience Trial Preparation

The goal of obedience trial preparation is to prepare the dog for competition in obedience trials. During this phase, the trainer will teach the dog to respond to commands in a variety of environments and to perform obedience behaviors under competition conditions.

B. Foundation Training

1. Initial Foundation Training

The goal of initial foundation training is to teach the dog basic obedience behaviors. During this phase, the trainer will teach the dog to respond to basic commands such as "sit," "stay," and "come." The trainer will also teach the dog to respond to the training odor.

2. Intermediate Foundation Training

The goal of intermediate foundation training is to further develop the dog's obedience behaviors and to introduce more complex commands. During this phase, the trainer will teach the dog to respond to commands such as "heel," "sit-and-stay," and "down." The trainer will also teach the dog to respond to the training odor.

3. Advanced Foundation Training

The goal of advanced foundation training is to teach the dog more complex obedience behaviors and to introduce new commands. During this phase, the trainer will teach the dog to respond to commands such as "pivot," "circle," and "obedience drill." The trainer will also teach the dog to respond to the training odor.

4. Obedience Trial Foundation Preparation

The goal of obedience trial foundation preparation is to prepare the dog for competition in obedience trials. During this phase, the trainer will teach the dog to respond to commands in a variety of environments and to perform obedience behaviors under competition conditions.
symbol S refers to the presence of the odor to be detected and S− refers to the absence of that odor. S will refer to any odor other than those the dog is trained to detect. These symbols are used in this context throughout the manual.

a. Preparation. There are several problems in training a dog to detect odors, materials, one of which is “contamination,” i.e., any replication of an S+ odor to an object or to another area designated for that particular S+ until he has thoroughly washed his hands. All materials which are put into the designated area are considered contaminated and should either be kept in the area, thoroughly cleaned, or destroyed.

b. Initial training. Take one S+ odor (hereafter), and a separate place to store each S− material. This must be a place to which the dog will never be exposed. Any person who handles an S+ material should sanitize himself in the area designated for that particular S+ until he has thoroughly washed his hands. All materials which are put into the designated area are considered contaminated and should either be kept in the area, thoroughly cleaned, or destroyed.

c. Before olfactory training begins, ensure a separate place to store each S− material. This must be a place in which the dog will never be exposed. Any person who handles an S− material should sanitize himself in the area designated for that particular S− until he has thoroughly washed his hands. All materials which are put into the designated area are considered contaminated and should either be kept in the area, thoroughly cleaned, or destroyed.

d. During this initial training, one S+ odor (hereafter) will be employed. Later, in working with several S+ odors, a separate place to store each S+ material should be utilized. Only the area designated for that particular S+ until he has thoroughly washed his hands. All materials which are put into the designated area are considered contaminated and should either be kept in the area, thoroughly cleaned, or destroyed.

During the initial phase, one S+ odor (hereafter) will be employed. Later, in working with several S+ odors, a separate place to store each S+ material should be utilized. Only the area designated for that particular S+ until he has thoroughly washed his hands. All materials which are put into the designated area are considered contaminated and should either be kept in the area, thoroughly cleaned, or destroyed.

e. After coming into contact with any S+, always wash your hands and arms thoroughly before handling any objects with which the dog will subsequently come into contact. In addition, change clothes if convenient.

f. Training. The initial olfactory training procedure will consist of two phases. The first phase, after, if necessary, be conducted by one person. The second phase can be conducted by one or two persons.

The mechanism of this procedure is straightforward. During Phase I the dog should be trained and the S+ and S− stimuli brought one at a time to the dog from where all stimuli are kept, approximately 10 ft to 15 ft away from the dog. A single trial consists of placing either the S+ or S− stimulus under the dog's nose. At the dog begins to sniff, he will receive the S+ or S− odor. On S+ trials the jar is placed under the dog's nose, and the handler ness says GOOD DOG and feeds and pets the dog. On S− trials the jar is simply removed. There is no lead or pulling given on these S− trials.

Following presentations of S+ and reinforcement or removal of S−, the handler turns, moves to the place where the S+ and S− stimuli are kept, and obtains the appropriate stimulus for the next trial. If an additional person is available, he will hold the handler whether the trial is an S+ or S− trial and can record each trial on a data sheet. Otherwise, the handler himself must note the conditions for the next trial and mark the data sheet.

The schedule of S+ and S− presentations during Phase I is one of a random progression with predetermined rules for S+ and S− presentations. The schedule begins with a ratio of 2 S+ stimuli for each S− and progresses through a ratio of 10 S+ stimuli for each S−.

There are four blocks of trials at each ratio. This schedule results in 64 reinforcements in 197 trials. Broken down, the number of reinforcements and number of trials at each ratio are as follows.

<table>
<thead>
<tr>
<th>No. of S+</th>
<th>No. of S−</th>
<th>No. of Trials</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>8</td>
<td>12</td>
<td>3:1</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
<td>20</td>
<td>6:1</td>
</tr>
<tr>
<td>16</td>
<td>24</td>
<td>36</td>
<td>14:1</td>
</tr>
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<td>28</td>
<td>40</td>
<td>16:1</td>
</tr>
<tr>
<td>28</td>
<td>36</td>
<td>52</td>
<td>17:1</td>
</tr>
<tr>
<td>32</td>
<td>40</td>
<td>64</td>
<td>19:1</td>
</tr>
<tr>
<td>40</td>
<td>44</td>
<td>84</td>
<td>19:1</td>
</tr>
</tbody>
</table>

This diagram represents the physical plan used to conduct four-choice discrimination training. The S+ jar begins in the north (N) position and the S− jar in the east, south, and west positions.

There are six blocks of trials at each ratio. This schedule results in 64 reinforcements in 197 trials. Broken down, the number of reinforcements and number of trials at each ratio are as follows.

<table>
<thead>
<tr>
<th>No. of S+</th>
<th>No. of S−</th>
<th>No. of Trials</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>8</td>
<td>12</td>
<td>3:1</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
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<td>19:1</td>
</tr>
<tr>
<td>40</td>
<td>44</td>
<td>84</td>
<td>19:1</td>
</tr>
</tbody>
</table>

This procedure in Phase II is almost identical to that of Phase I; the only difference is that instead of acquiring, which is held horizontally by a second person. During Phase II if the person handling the dog jar will change the jar to the dog's preferred hand, and before the handler of the condition of each trial. The same schedule is followed in Phase III as was followed in Phase I.

3. Data Owing

The data sheets should be made out before beginning the training session and should follow the general format of the sample data sheets. The schedule of reinforcements presented across the page left to right, and from one side to the other, should be recorded. A minus (−) is a column means that an S− stimulus should be presented in the next dog. The dog should be required to respond. As each trial is completed, it should be checked off in the box below the (+) or (−) designations. In this way, one can see if he completes the training according to the schedule. The complete schedule is shown on the opposite page and in Appendix A. A partially completed data sheet is shown in the first sample trial. Trials, trials where the same jar has been used in both Phase I and Phase II.

The schedule given here should be used in both Phase I and Phase II.

4. Simple Discrimination Training

Once Phase I and II of initial olfactory training have been completed, four-choice discrimination training should be started. Discrimination training means training in which the dog will be required to make a distinction between the S+ and S− stimuli. During this phase, the dog will have to learn to sniff the jar and to sit when he smells the S+. For instance, directed at the jar to the dog in the four-choice discrimination task, the dog will begin to alert this behavior is noticeable, the sit response to the S+, jar. To ensure correctness of the building or, if there are no strong wind currents, it can be conducted outside. The materials used in this training will be north, west, south, and east (see diagram below).

Data sheets Nos. 1 and 2 are shown on the following pages, one of which (No. 1) has been filled in and can be used as the schedule to follow. The trials in Phase I can be given in 1 day as can be spread over 2 days. It is suggested that the trials in Phase II should be repeated, followed by the progression through 1:9.

The procedure in Phase I is almost identical to that of Phase II; the only difference is that instead of acquiring, which is held horizontally by a second person. During Phase II if the person handling the dog jar will change the jar to the dog's preferred hand, and before the handler of the condition of each trial. The same schedule is followed in Phase III as was followed in Phase I.

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### DATA SHEETS - INITIAL OLFACTORY TRAINING

<table>
<thead>
<tr>
<th>Experimenter</th>
<th>Schedule: ASSOCIATION OF S+ WITH REWARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trainer(s)</td>
<td></td>
</tr>
<tr>
<td>Day(s)</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

<table>
<thead>
<tr>
<th>Date:</th>
<th>Rate: S+ 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>+ + + +</td>
</tr>
<tr>
<td>1</td>
<td>+ - + -</td>
</tr>
<tr>
<td>1</td>
<td>- - + -</td>
</tr>
<tr>
<td>1</td>
<td>- - + -</td>
</tr>
<tr>
<td>1</td>
<td>- - + -</td>
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<td>- - + -</td>
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<tr>
<td>1</td>
<td>- - + -</td>
</tr>
<tr>
<td>1</td>
<td>- - + -</td>
</tr>
</tbody>
</table>

**Rats:**

<table>
<thead>
<tr>
<th>Rat(s)</th>
<th>S+</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 5</td>
<td>-</td>
</tr>
<tr>
<td>1 - 7</td>
<td>-</td>
</tr>
<tr>
<td>1 - 8</td>
<td>-</td>
</tr>
<tr>
<td>1 - 9</td>
<td>+</td>
</tr>
</tbody>
</table>

**Data Sheets:**

Data Sheet No. 1

Data Sheet No. 2
After a few trials, the physical cues should gradually be reduced until the dog is sitting to the $+$ without being prompted by the handler in any way.

There are responses other than the sit response which can be used by the dog to indicate the presence of contraband. A dog can be trained to paw the object in which contraband is found. Other responses such as barking or attacking could also be used to indicate the presence of contraband. However, it would appear that the advantages of the sit response outweigh the disadvantages more than any of these alternate responses. One advantage is the relative ease in teaching the dog this response; many dogs learn this response in only a couple of sessions.

Another major advantage of the sit response is that it does not prompt the dog to come into physical contact with the narcotic material used during training. This eliminates the possibility of the dog tearing these materials. If the dog comes into physical contact with the materials, there may be undesirable physiological reactions. Also, training will not be needed after the dog has come into physical contact with the material, because the sample would then have odor of the dog and the dog would learn to search for this odor instead of the odor of the contraband material.

In addition, the dog is learning odor discrimination at the same time it is learning the sit response; thus no additional training time is spent in shaping the response. It would appear that the only disadvantage of this response would lie in situations in which it would be difficult or impossible for the dog to be physically present as working in an automobile or other confined area. It is felt that, in such situations, the handler can easily "read the dog." If the dog does not learn to sit on command, the dog will search more vigorously when the search command is given, but the dog will continue to rely on the sense of smell in making the correct decision.

No two dogs will learn at the same rate; thus all training must be programmed to suit each individual dog. The on-the-job training program is based on the gradual assimilation of new behavior patterns which can only be learned if the dog has mastered the previous tasks. If a dog is slow in learning a particular task, it is essential that it be given additional practice at this task before it is progressed to the next training task. If a dog is pushed into new training situations before it has learned a more elementary one, it probably will not be able to learn the new task. Do not make the mistake of rushing the dog. Be sure that the dog has mastered one task before moving to the next. Sometimes the dog is performing poorly, it is essential to retreat to a simpler task; again it is performing well, gradually progress to the more complex task. If the dog continues to perform poorly on the simpler task, training should be temporarily discontinued until the cause of the problem can be determined and a solution found.

a. Search Command. It is desirable to have the dog search on command. Upon entering the area to be searched, the dog should be given the command SEARCH.

This will be the time when the dog will be required to search some particular area or object within the general area being searched. In these instances, the handler should move the area or object, get the dog's attention, indicate the object by moving his fingers to the object, and give the search command.

To issue the dog's prompt response to the search command, some rather careful training will have to be given. This training should begin as early as possible, preferably during the first stages of the four-choice discrimination task. The dog must learn that when an area or object is indicated and the search command is given, it will be more likely to receive praise or other reward if it ignores the command. In order to establish and maintain this "search-avoidance" association, systematic conditioning of this association throughout training is necessary.

Establishing the association between the verbal command SEARCH and the increased likelihood of finding an $+$ during the initial trials of the four-choice discrimination task will facilitate more rapid training of the discrimination task, and, in addition, will establish the search command as a signal for the dog to search more vigorously.

In order for the dog to learn to search more vigorously when the search command is given, the handler will have some control over the dog's activity prior to making a detection. Begin by giving the dog the opportunity to search the 5-sec of the $+$ on each trial. After several trials in which the search command is given on every trial, the command is then given on progressively fewer trials. The reward schedule followed in initial stimulus training is a good schedule to follow in programming the trials on which the dog searches in the search command.

In following this schedule, the dog should be given the search command prior to $+$ detection on each trial where there is a (+) recorded. On trials where there is a (-) recorded, the dog receives no verbal command. As the schedule indicates, the search command is given on trials 1, 2, 3, 4, 6, 9, 11, 13, and so forth. Following this schedule results in fewer and fewer trials in which the search command is given.

If the search command were given just before the dog sniffs the $+$, and at no other time, the dog would soon learn that any time it hears the search command and sits, it will be rewarded. To insure that this behavior does not develop, the search command should be given just before the dog sniffs the $+$ stimulus on some trials. The percentage of times it is given is increased gradually.

The systematic presentation of the command SEARCH outlined above will result in the dog's learning to search more vigorously when the search command is given, but the dog will continue to rely on the sense of smell in making the distinction between $+$ and $-$.

The presentation of the command SEARCH outlined above will result in the dog's learning to search more vigorously when the search command is given, but the dog will continue to rely on the sense of smell in making the distinction between $+$ and $-$.

There will be times when the dog will be required to search some particular area or object within the general area being searched. In these instances, the handler should move the area or object, get the dog's attention, indicate the object by moving his fingers to the object, and give the search command.

To issue the dog's prompt response to the search command, some rather careful training will have to be given. This training should begin as early as possible, preferably during the first stages of the four-choice discrimination task. The dog must learn that when an area or object is indicated and the search command is given, it will be more likely to receive praise or other reward if it ignores the command. In order to establish and maintain this "search-avoidance" association, systematic conditioning of this association throughout training is necessary.

Establishing the association between the verbal command SEARCH and the increased likelihood of finding an $+$ during the initial trials of the four-choice discrimination task will facilitate more rapid training of the discrimination task, and, in addition, will establish the search command as a signal for the dog to search more vigorously.

In order for the dog to learn to search more vigorously when the search command is given, the handler will have some control over the dog's activity prior to making a detection. Begin by giving the dog the opportunity to search the 5-sec of the $+$ on each trial. After several trials in which the search command is given on every trial, the command is then given on progressively fewer trials. The reward schedule followed in initial stimulus training is a good schedule to follow in programming the trials on which the dog searches in the search command.

In following this schedule, the dog should be given the search command prior to $+$ detection on each trial where there is a (+) recorded. On trials where there is a (-) recorded, the dog receives no verbal command. As the schedule indicates, the search command is given on trials 1, 2, 3, 4, 6, 9, 11, 13, and so forth. Following this schedule results in fewer and fewer trials in which the search command is given.

If the search command were given just before the dog sniffs the $+$, and at no other time, the dog would soon learn that any time it hears the search command and sits, it will be rewarded. To insure that this behavior does not develop, the search command should be given just before the dog sniffs the $+$ stimulus on some trials. The percentage of times it is given is increased gradually.

The systematic presentation of the command SEARCH outlined above will result in the dog's learning to search more vigorously when the search command is given, but the dog will continue to rely on the sense of smell in making the distinction between $+$ and $-$.
Step 3. Delay of Reward Training. Up to this point, the person who handled the dog has known the position of the S+ prior to the dog’s response. Knowledge of which jar contained the S+ odor insured that the handler could present the reinforcement at precisely the correct time. That is, the handler could say GOOD DOG, and administer the food reward or say NO and remove the dog immediately after the dog’s response. This timing was essential for rapid learning during the early stages of training. The dog might, however, learn to tolerate short delays in reinforcement. In the latter stages of training there will necessarily be times when immediate reinforcement is not feasible. Unless the dog has had some experience in such delays in reinforcement, an unexpected delay could disrupt the dog’s behavior.

There are three phases in this training step. Phase A introduces a delay between the time the handler says GOOD DOG and the time he gives food. Phase B introduces a delay between the time the dog sits and the time the handler says GOOD DOG. Phase C is a combination of both these delays on a single trial. Although the length of delay in reinforcement may be extended later in training, a moderate delay (up to 5 sec) should be sufficient at this stage of training. Each delay should be built up gradually beginning with no delay.

Step 4. Elimination of the Handler’s Knowledge of Position of S+. Under most training conditions, the handler should not know the position of the S+ stimuli. The reason for this is that a handler who knows where the S+ is cannot avoid giving cues to the dog, even though he may be unaware of doing this. It can be assumed that if he does not know where the S+ is located, he cannot use the dog for the S+. Therefore, during this training step the handler no longer knows the position of the S+ until after the dog has made a response. The dog is brought into the room and is guided to the jar in the same manner as in prior steps. When the dog responds, the programmer will give a YES to the handler if the dog has responded correctly and NO if the dog has responded incorrectly. The handler will then reward for correct responses in the usual manner.

Step 3. Off-Leash Training. The dog should be trained to work off-leash and off-seat. Once the dog is working well off-leash with a handler who does not know the position of the S+ samples in the six-choice discrimination task, a series of trials with the dog off-leash should be run. If the dog has been worked, off-seat, there should be no difficulty in working it off-leash. The dog’s search pattern can be directed by pointing to a particular odor and by verbally encouraging it to search. The handler should not know the position of the S+ during the training task.

Step 6. Sensitivity Training. Hex is an intense odor and can be very easily detected. In order for the dog to detect weaker odors, it will need to sniff in the most effective way and avoid sniffing very faint odors. This is the reason why, before working with the narcotic odors, the dog should be trained to respond to low concentrations of the training odor in the six-choice discrimination task. When the dog has mastered the discrimination task with a 3/16-in hole in the top of the S+ jar, the hole should be made smaller and smaller. The recommended sequence is 1/4, 3/16, 1/8, 3/32, and 1/64 in., and a No. 60 drill bit. Once the dog has learned to detect over the smaller amount of S+, there is less chance that difficulties will arise in training it to search larger areas for the S+.

The jars which are used during this discrimination training should be changed frequently. Once the odor concentration is reduced to very small amounts, special care must be taken to be sure that the dog is, in fact, responding to the Hex odor and not to some extraneous variable.

For this reason, all bottles and training aids should be thoroughly cleaned or destroyed after each day’s session. Each dog should be run with fresh training aids. It is also advisable to talk to the dog a completely new set of S+ and S- stimuli during the later stages of each training.

3. Performance Records for Discrimination Training

It is essential to keep records of the dog’s daily performance during discrimination training for use in planning the next day’s training session. If several dogs are being trained, it is difficult to recall the details of each dog’s performance. Every dog will have individual strong and weak points, and these must be considered in planning their work schedule.

Graphical presentation of the records, for example, graphing the daily percentage of detections throughout training is not necessary. Such graphs contain very little meaningful information, for this reason: the recorded level of performance depends largely upon the intensity of the odors that are being used, but the selection of the intensity is arbitrary, and it is difficult to determine this information at any time. The number in the location column means that the dog sniffed the S+ odor and did not avoid giving cues to the handler. The location column contains the location of the S+ stimulus in the column. Response in the S+ odor is indicated in the column labeled S+ and S- is labeled S-.

A sample data sheet is shown in the six-choice discrimination training is shown in the following page. The symbols used in these data sheets are: S+, S-, X, --, and 0. The number in the location column represents the location of the S+ stimulus in the column. Response in the S+ odor is indicated in the column labeled S+. A plus (+) in the S+ column means that the dog sniffed the S+ odor and did not avoid giving cues to the handler. A minus (-) in the S+ column means that the dog did not approach the S+ odor at all. The five columns labeled -- are the spaces to record responses to S-. The correct response, i.e., sniffing the S-
DATA SHEET—SIX-CHOICE DISCRIMINATION TRAINING

Student Discrimination Training: Site: 12x16" hole

<table>
<thead>
<tr>
<th>Trial No.</th>
<th>Location</th>
<th>S+</th>
<th>S-</th>
<th>S+</th>
<th>S-</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>-</td>
<td>4</td>
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<td>4</td>
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<tr>
<td>9</td>
<td>12</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>4</td>
</tr>
</tbody>
</table>

NOTES:

- Dog: ________________
- Handler: ____________
- Programmer: __________

Handier: ____________ Programmer: __________

Data Sheet No. ____________

10

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Begin room search in a relatively small uncluttered room. On the first trial, run S+ and S-...
1. Recording of Performance

The data sheet on the following page represents a record of the performance which might be expected from a dog with limited multimodal search training in the detection of hash, marijuana, and hashish. The analysis of the data sheet is also intended to illustrate some of the conditions which will likely be experienced during this stage of training. In addition, the analysis should further illustrate an efficient method of keeping a record of the dog's performance.

The data sheet for room search should have space to record the trial number, room number, whether the room contains an S+, the type of S+, if any, and it should have columns for recording the dog's performance. The sheet should be labeled with information regarding the purpose of the training session, the place, the name of the dog, and the names of the handler and programmer.

The dog's performance in each room and the time spent in each room should be recorded for each trial. A plus (+) recorded in the column headed condition (cond.) indicates that the room contains an S+. A minus (-) in the condition column indicates that there is not an S+ in the room. If the room contains an S+ and is initially identified as an S+, should be put beside the + in the condition column. Then, a + 15/100 for Trial 1 indicates that hash is planted in that room. If the dog detects the hash and sits, a plus should be recorded in the hit column. In Trial 2, the + 15/100 is minus. Therefore, in an M1 is recorded. The data for Trial 2 indicates that the dog did not detect it. The minus in the M1 column for Trial 2 shows that the dog approached the mark but did not sit. On Trial 3, the dog sat in the room. This is recorded by placing a plus in the column headed S+. Trial 4 shows that hashish (Hash) was planted in Room 3 and was detected.

As can be seen from the times recorded for the other rooms, the dog was kept in Room 3 for a longer period than in any of the other rooms. Although a dog should examine a room carefully, it should not be retained in a room for longer than necessary to complete the room search. If there is an S+ in the room, the dog will likely detect it in a relatively short period of time. As Trial 3 illustrates, if the dog has searched a room, retained it, and moved to the search area, the possibility of false sitting is increased. As different dogs are trained, the trainer becomes aware of their individual capabilities and will learn the speed at which a particular area can be searched most effectively.

There are two components to good search strategy: (1) percent detection, and (2) speed at which the dog searches an area. Ultimately, the dog must search an area as quickly as possible and make a high percentage of detections. If the dog does not sit in an S+ room, the programmer needs only record the time spent in the room. Trial numbers are marked to show the order in which the rooms were to be searched. The programmer plants the S+ materials, prepares the data sheet, direct the handler to the rooms according to the order outlined on the data sheet, and records the dog's performance.

Note that the schedule gives progressively longer (Room 5, 10 seconds) as the session continues.

At any time during the session the dog is cued, i.e., led to the odor, this should be recorded as such by placing an asterisk and explanatory comment for the trial. The data for Trial 4 indicates that the dog was cued, i.e., led to the odor, on Trial 5, the dog sat in the area. The asterisk and explanatory notes were again used to indicate that the dog was cued.

After the entire training session has been completed, a brief summary of the dog's performance should be recorded. Any special problems or unusual behavior should be included. A brief statement of what would be desirable in the next training session should be made.

2. Transition from Discrimination Task to Room Search with the First Narcotic

There should be very little difficulty in progressing from the six-choice discrimination task to room search with the addition of a narcotic odor. The dog has already learned to do room search for one type S+ and the search pattern is basically the same regardless of which S+ is in the area.

The dog should display nearly perfect performance on the six-choice discrimination task before the new S+ is included in the room search sessions.

When the first narcotic agent is included in room search sessions, the S+ samples should also be hidden in each room, and the number of narcotic samples initially hidden in each room should be double that of the S+ samples. On subsequent sessions the number of the first plants should be decreased gradually. The area at which the S+ plants can be decreased will depend on how quickly the dog learns to respond to the narcotic plants.

If the dog fails to detect most of the narcotic samples on these initial sessions, they should be made easier to detect; once the dog begins to detect most of them, they can be gradually made more difficult to detect.
III. ADVANCED TRAINING PROCEDURES

A. Discrimination Training with Narcotics

1. Transition from Training Odor to Narcotic Odor

After the dog has progressed through the six training stages just described, it is ready to begin discrimination training on various narcotic odors. Before proceeding with this section, refer to Appendices B and C on Maintenance of Heroin and Cocaine and Preparing and Maintaining Samples. Prior to the beginning of training to any narcotic odor, it is best to determine each type of narcotic the dog will be expected to detect. Narcotics vary tremendously in the amount of odor they emit. That is, some narcotics, such as marijuana and hashish, have very strong odors, whereas others, such as heroin and cocaine, give off very little odor. In fact, heroin and cocaine are considered odourless to humans. Although the correlation between human and canine olfactory sensitivity to various substances has not been investigated, it may be assumed that, in general, what has a strong odor to humans also has a strong odor to dogs; a material which has a weak or nonexistent odor to humans is unlikely to have a strong odor for dogs.

For the purpose of this manual, the following narcotics will be considered:

1. Marijuana—"M"
2. Hashish—"Hash"
3. Opium—"O"
4. Cocaine—"C"
5. Heroin—"H"

The first three narcotics included in this list (marijuana, hashish, and opium) are all odorous to humans and are readily detected by dogs. Heroin and cocaine, in pure form, are virtually odorless to humans and are relatively difficult for dogs to detect.

In training a dog to detect any combination of these narcotics, the training should be given in the same sequence as the narcotics are listed. That is, train the dog first to detect marijuana, then hashish, then opium, (and finally) cocaine and heroin. It is not necessary to train the dog to detect all the narcotic agents on the list, nor to confine the training to the specific narcotics listed here. Regardless of which narcotics are used, the training should be given with the least odorous narcotic last.

2. Training Procedure with the First Narcotic

After completing the six steps outlined in the section on six-choice discrimination training, the dog should be ready for training to the first narcotic odor (begin with the most odorous narcotic to which the dog will be trained). This procedure presented here for training the dog to respond to an additional odor is relatively simple and has been demonstrated to be fast and effective. The same six-choice discrimination procedure previously used with this will be used to train the dog to new narcotics. The technique for transferring to the new S+ odor is as follows:

1. Begin the session with a few trials using the training odor; this will ensure that the dog is working well on the six-choice discrimination task.
2. Once the dog is working well, remove the jar containing the training odor and put the new S+ jar, which contains a generous quantity of the narcotic, in its place.
3. On the first trial with the new S+ the dog is brought in and will begin to sniff each of the jars, just as it has previously done. At the precise instant the dog sniffs the new S+ jar, the handler should say GOOD DOG and feed the dog, just as he had done before. Initially, the handler will call the handler the position of the S+ prior to the beginning of the trial. The dog is likely to sit when the handler says GOOD DOG.

The rate at which the dog learns to respond to the new S+ odor depends largely on how well the handler times his responses. If his timing is poor, the dog will take a much longer time to learn to respond to the new odor. The most essential aspect of this transfer procedure is that the verbal cue (GOOD DOG) comes at the exact time the dog sniffs the new S+ jar. If the timing is good, it will take only a few trials for the dog to begin to associate the new odor with food and praise. Once the dog has learned this association, progress through all the steps in six-choice discrimination training with the new odor. This should not take as long as it did with the training odor.
As with all other procedures in this manual, any time the behavior of the dog becomes disrupted, go back to the task the dog has previously learned. If the dog shows an abnormal behavior or stops working, re-teach the dog the previous steps and then proceed to the new task. If the dog does not respond to any stimuli, return the dog to the training area with the new S+ and continue the procedure until the dog reliably responds to the new S+.

3. Additional Narcotic Odors

The same methods that were described for training the dog to discriminate and search for marijuana should be used in training the dog to respond to each subsequent narcotic. It is important that the dog be trained to be reliable in its responses to each odor. The dog should be able to reliably respond to each odor with 100% accuracy. The dog should always be trained to respond to 100% of the S+ stimuli presented.

It has already been pointed out that detection training with marijuana, hashish, and other odors should be well established before any attempts are made to train the dog to respond to either cocaine or heroin.

All the rules pertinent to training the dog to detect marijuana, hashish, and/or opium should be well established before any attempts are made to train the dog to respond to either cocaine or heroin.

4. Discrimination Training with Aspirin, Acetic Acid, and the Diluents Mannitol, Lactose, and Quinine

Once a reliable response to H has been established, further discrimination work with various S- substances should be carried out. The following is a list of the materials in which the dog should be trained to discriminate prior to beginning room search practice with H:

1. Glacial acetic acid: mixtures of 1/10, 1/100, 1/1000, and 1/10,000 with water should be used.
2. Common aspirin: several brands should be used. Aspirin should be processed before packaging into samples.
3. In addition to aspirin and acetic acid, both of which may have an odor similar to H, the diluents commonly used in cutting H should also be used in controlled laboratory tests.

1. Preparation of S- and S+ samples

S- samples should be prepared in the same manner as described in the section on preparation and maintenance of training samples. The S- samples should be prepared in the same way as the S+ samples. The same person should prepare both groups of samples. The rule is that both S- and S+ samples are identical except that the former contains a certain quantity of H and the S- sample contains an identical amount of one of the three diluents, aspirin, or a small quantity of a solution of aspirin and water. Although the dog can be exposed to more than one type S- in a single session, it is better to introduce only one type at a time.

2. Discrimination Training

The procedure is the same for introducing each of these S- substances, therefore only one aspirin will be described in detail here. At least two new samples (2 H and 2 aspirin) should be used with each dog during each daily session.

(1) Trials 1-10: S- H is plastic bag in cardboard box
(2) Trial 1-5: S- H is plastic bag in cardboard box
(3) Trial 5-10: S- aspirin is plastic bag in cardboard box

If the dog responds positively to the aspirin, continue to run the dog on these samples until Trial 25.

(1) Trials 1-10: S- H in plastic bag in cardboard box
(2) Trial 1-5: S- H is plastic bag in cardboard box
(3) Trial 5-10: S+ aspirin is plastic bag in cardboard box

If the dog does not respond positively to the aspirin, continue to run the dog on these samples until Trial 25.

(1) Trials 1-10: S+ H in plastic bag in cardboard box
(2) Trial 1-5: S+ H is plastic bag in cardboard box
(3) Trial 5-10: S+ aspirin is plastic bag in cardboard box

If the dog responds positively to the aspirin during the initial training trials (Trials 1-10), it should be corrected by the verbal command NO. Continue to correct the dog by the verbal command NO until the dog responds positively to the H and does not respond to the aspirin. Once the dog no longer responds to H and ignores the aspirin, introduce the fourth sample. If the dog does not make errors on the new sample, you may assume the dog has learned to discriminate between the H and the aspirin odor. If the dog performs well with a set of samples and does poorly on another set, you should prepare several sets of new samples and continue training until the dog can reliably discriminate H and aspirin.

Once the dog has learned to discriminate aspirin, each of the other S- substances should be introduced. The same procedure may be used with aspirin should be used with the acetic acid, mannitol, lactose, and quinine.

5. Training with Diluents

A good H/CC drug dog should respond to both pure H and H dilute with 10% C in an attempt to train the dog to discriminate between the H and the diluent. The dog should be trained to discriminate between the H and the diluent. The dog should be trained to discriminate between the H and the diluent. The dog should be trained to discriminate between the H and the diluent. The dog should be trained to discriminate between the H and the diluent. The dog should be trained to discriminate between the H and the diluent. The dog should be trained to discriminate between the H and the diluent. The dog should be trained to discriminate between the H and the diluent. The dog should be trained to discriminate between the H and the diluent.
Similar packages, containing packets of various S- materials, should be used along with the S+ packages. The same individual(s) who make up the S-packets should also make the S+-packets; the S- ones should always be made first in order to avoid contaminating them with S+ odors. The number of different individuals who prepare the S- and S+ packages, and also the number of different kinds of packaging and sealing materials, should be as small as practical.

The time the odor sample has been in place before the room is searched can be lengthened and also made more variable. Times up to 24 h should be included. As with the other changes mentioned, this change should be introduced gradually. The sharp odor gradient which-characterizes the recently planted samples may disappear over time, making it difficult for the dog to localize the source of an odor. In addition, when working with the less volatile odors of heroin and cocaine, a longer period of time will be required before there is an odor present.

Rooms containing gradually stronger and more varied masking odors should be included. The odors of paint, petroleum products, clothing, people, food, animals, chemicals, and vegetation are all good masking odors. Rooms containing gradually stronger and more varied masking odors should be included. Where possible, emphasis should be placed on those masking odors that the dog is most likely to encounter in actual searches.

The handler should be aware that the draft sometimes causes the dog to sit at considerable distances from the sample. If the dog will need to search drafty areas, drafts should be introduced gradually into advanced room search.

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If the dog is scheduled to search 10 rooms, then the number of S+ samples placed in these 10 rooms would be the "program" for that session. This could range from one or more S+ samples in each room to no S+ samples in only one of the 10 rooms.

The programing of the S+ odor is perhaps the most difficult task the detector team will face. The question is, how many S+ samples do you place during any particular analysis? Unfortunately, no very precise guidelines can be given, and the decision will have to be made largely on the basis of the team's experience with the program. The number and type of S+ odors to be placed will necessarily depend on many different conditions and the best program will not be the same for all dogs. The environment in which the dog is working will require different schedules of S+ programming. The dog-day change in performance of the dog will also affect subsequent programming.

The basic rule for determining the number of S- samples is: plant the number of S+ samples estimated to be required to keep the dog actively searching, plus a few additional stimuli (for good measure). If the program is too lean (too few S+ samples) the dog will not maintain good search behavior. On the other hand, if the program is too rich (too many S+ samples), a great deal of time will be taken rewarding the dog for detections and the dog's hunger will quickly become too low for effective search. The reason for the few extra plants is that too rich a schedule can do less harm than too lean a schedule. The decision on how to program a particular area will be the responsibility of the programer, and how effectively he performs this duty will be crucial in keeping the dog working efficiently. If there is any doubt about the program, or if the dog's extinction rate is decreasing or poor search behavior is shown, switch the program (plant more S+ samples) and then gradually make the program leaner.

S+ samples should be planted in all types of sessions, including operational sessions. The major purpose of planting S+ samples is to keep the dog working at maximum efficiency. The reason it keeps working is that it is very rewarding to the dog each time it detects the S+ odor. If there were no S+ stimuli to detect, the system of rewards under which the dog was trained would no longer be in effect, and the searching behavior would gradually deteriorate. If the S+ samples were planted on all types of odors except operational sessions, the dog would eventually learn to maintain efficient in all types of sessions except operational sessions.

A second purpose is to evaluate the dog's efficiency on a given session. This is especially important for those operational sessions in which no contraband is found. The detection of plants during these actual searches for contraband indicates that the failure to detect contraband was probably due to the absence of the material, rather than to any lack of efficiency of the dog.

B. Operational Session.

Although one person can conduct an operational search, the detector team should consist of two or, if possible, three persons. This allows one person to survey and program the area to be searched and one person to work the dog.

The initial duty of the programmer is to quickly ascertain the size of the area to be searched and to determine the length of time which can be allotted to the dog and handler in the area. It is his duty to determine which areas are considered high priority areas to be searched. These are areas or objects where contraband would most likely be hidden, or areas where contraband has been found previously. Other areas which a dog could quickly search but would be time consuming for a human
to search would also be an area designated for the dog to search. Places such as libraries, lockers, and areas with a great many objects, especially if they are concealed or locked, are examples which fall into this category.

The programmer must decide how to search the area most efficiently on the basis of the size and the complexity of the area and the time which is available. He also searches areas which would be difficult or impossible for a dog to search.

It is during this initial investigation that the placement of the $S+$ sample is carried out. The immediate area in which the $S+$ sample is hidden is thoroughly searched by the programmer prior to the $S+$ placement. This is done to ensure that there is no actual contraband where the $S+$ is placed; otherwise, the dog's response to hidden contraband might be confused with the response to the $S+$.

C. Maintenance Sessions

Maintenance sessions are somewhat like a continuation of advanced room search. A handler and a programmer are required to conduct these sessions. The maintenance session not only serves to keep up the efficiency level of the dog, but also helps the dog and the handler to achieve the routine which the dog is trained to conduct in these sessions. Any problems which may have been encountered during operational or evaluation sessions can be systematically dealt with during maintenance sessions.

The amount of time and effort which will be required to maintain the dog on the various odor groups will not be the same for each of the odors. For example, a dog trained to detect all five of the narcotics specified in this manual should receive more training with heroin and cocaine than with marijuana, opium, or hashish. The following is a breakdown of various maintenance methods of detector dog capabilities and the percentage of time which should be devoted to each dog during training sessions. Naturally, if the dog is trained to detect one drug 100 percent of the training time will be spent with that drug. This is shown in the extreme left hand column. The extreme right hand column shows the percentage of training time which should be devoted to each drug if the dog has been trained to all five odors.

<table>
<thead>
<tr>
<th>No. of Odors</th>
<th>Percentage of Time</th>
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<tbody>
<tr>
<td>2</td>
<td>50</td>
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<td>3</td>
<td>30</td>
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<td>4</td>
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</tr>
<tr>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

These percentages represent the relative amount of exposure the dog should receive during room search exercises. For example, if a dog has been trained to detect all five odors, 40 percent of the training time should be spent with heroin, 60 percent with cocaine, 5 percent with marijuana, 5 percent with hashish, and 10 percent with opium.

D. Evaluation Session

The purpose of the evaluation session is to ascertain the dog's effectiveness under conditions which are nearly as possible represent what would be expected in actual field search. If possible, contraband which has been confined by means other than by the dog should be used in this exercise. The service of a person associated with the narcotics squad who is not a member of the detector dog team is recommended. This person will set up a problem which is nearly as possible resemble what would be expected under actual working conditions. The detector team is given the problem and their task is to locate the hidden contraband. The individual who hid the contraband should have no contact with the programmer or handler until after the problem is terminated. This is NOT a test to prove that the dog has the capability of detecting contraband, but rather to evaluate the dog's efficiency on a particular problem which might be encountered in the field.

After the problem has been run, all aspects of the session should be discussed by the detector team and the persons who are up on the problem. This discussion should be very helpful in improving the capabilities of the detector team.

This session should be conducted by the detector team in exactly the same manner as an actual operational session would be conducted. It is very important to carefully analyze the data from these sessions. If the detector team behaves the planned search, ascertain the search procedures which led to the detection. On the other hand it can be even more beneficial if the team fails to locate the plant. For in this case, careful analysis of the session will most likely lead to some notions as to the reasons why the team failed to locate the contraband. Once these reasons are determined, the appropriate measures can be taken to improve the team's capabilities. In this way, the detector team can be continually improved.
V. POOR PERFORMANCE—CAUSES AND REMEDIES

There are three main classes of problems that can be experienced in training detector dogs. They are:

(1) Missed targets—Failure to detect one or more of the S+ stimuli.

(2) False responses—The dog sits when there is no S+ odor in the area.

(3) Poor search behavior—
- Locomotor—Dog does not move around the area to be searched.
- Sniffing—Dog moves around the areas to be searched, but does not sniff or objects with which he comes in contact.

There are a variety of reasons that may account for one or the other of these problems. The following is a list of some of the more likely causes associated with these problems, and a brief discussion of each problem as well as some clues as to how to deal with them when they arise.

Perhaps the most basic rule to follow if the dog begins to perform poorly is to revert to a simpler task, and, once the dog is performing well, gradually make the task more difficult. If the dog begins to make errors and is allowed to continue in the same task, its performance will probably continue to deteriorate and a great deal of remedial work may then be required to reverse the dog's previous level of performance.

A. Missed Targets

If the dog fails to sit when the S+ odor is in the vicinity, the most likely reason for the failure to sit is that the odor has not been detected. No dog will always detect all S+ stimuli which have been placed; however, a well-trained and well-motivated dog should detect a high percentage of the S+ stimuli which have been placed.

Extended periods of searching with no detections may result in poor performance. Therefore, a certain number of correct detections and rewards must be programmed into the dog's daily working sessions. There are two ways to insure that extended periods of searching will not go unrewarded: (1) make the items to be detected very easy to find, and (2) make the items to be detected more difficult to find, but place several of them in the area to be searched. If it is possible, place several different S+ stimuli in the area is the preferred practice. The reason is that detecting difficult stimuli requires good search behavior and thus the dog is more likely to be rewarded for good search behavior when the S+ stimuli are relatively difficult.

Missed targets can also result if the dog learns to rely on cues other than those of the narcotic material itself; when these cues are not available, the dog fails to respond to the odor.

B. Marking

There is always the possibility that the dog will "mark" the S+ stimuli. That is, when the same S+ stimuli are reused, the dog may leave a sign by licking or salivating on the material which it can detect on subsequent trials, so that it may be responding to something other than the S+ odor itself. This will result in missed targets when new stimulus materials, to which the dog has not been exposed, are used. If the detection rate is approximately the same for both the old and the new S+ stimuli, it can be assumed that the dog is responding to the S+ odor. It is essential to replace the old S+ materials with new samples frequently. This will assure that the dog is responding to the S+ odor and not on the basis of a sample which has been marked.

C. Following

When several dogs are trained to search for the same set of samples, some dogs may learn to follow others. When an area is programmed for the dog to search, it is most convenient to test several dogs on the same program, but this entails the risk of having one dog learn to follow another and, therefore, find targets that have been previously detected by another dog. Also, there is always the chance that the odor of food is also present in the vicinity of the hidden S+ after one dog has been rewarded there. Even if the dog is not depending entirely on either of these two extraneous cues, it may use either or both to locate to the general vicinity of where the S+ is hidden. If it is necessary to run more than one dog on the same program, alternate the order in which the dogs are run. If a particular dog is run first on one session, it should be run last the next session. The S+ stimuli can be moved if the programmer is certain there will be no residual odor. For example, if the S+ is hidden in a box, the box could be moved to another location in the room. If a particular dog does well when it follows another dog and does poorly when run first or when the position of the S+ is changed, there is a strong possibility that this dog is following another dog. In this case, steps should be taken to eliminate the opportunity to follow.
D. Human Odors

The sensitivity of the dog to most odors makes it possible to train it to detect almost any type of odor. Dogs are especially sensitive to the odors of humans. It is well known that dogs can be trained to detect human odors around human beings. Training problems can arise because of this keen sensitivity.

There is always the possibility that the dog is detecting the odor of the person who prepared or planted the S+ stimulus. If the dog is responding to the S+ odor, it is responding to the S+ odor, not to the actual S+ odor. This is especially troublesome if the S+ odor is weak. There is no great cause for concern if it is the S+ odor that the dog responds to, as this will be the case in the dog’s detection of contrast. The real problem arises if the dog is responding to a particular human odor which is consistently associated with the S+ odor. If the dog is not responding to the narcotic odor, but to a specific human odor which is consistently associated with it. It is important to determine if the dog is responding to the narcotic odor or rather to the human odor by, minimally having different individuals present and hold the S+ stimulus packets.

E. Other Contaminating Odors

The S+ stimulus may absorb odors of materials with which they come in contact. The contaminating odors are often far more potent than the actual S+ odor, so the dog learns to respond to the contaminates and ignore the S+ odor completely. This shows up when the old S+ samples are replaced with new ones. Frequent replacement of old contaminants will greatly reduce the opportunity for the dog to learn to respond to contaminating odors, and will reflect any such learning history to the handler and owners.

F. Handler Cues

Any behavior on the part of the handler, whether intentional or not, may affect the dog’s behavior. Handler cues may well become a problem if the handler knows where the S+ objects are hidden. The real problem arises if the dog is sensitive to the odor of the person who prepared or planted the S+ stimulus. If the dog knows where the S+ objects are hidden, it will greatly reduce the opportunity for the dog to learn to respond to contaminating odors, and will reflect any such learning history to the handler and owners.

If a handler repeatedly rewards the dog for behavior that is not required, it will greatly increase the opportunity for the dog to learn to respond to contaminating odors, and will reflect any such learning history to the handler and owners.

G. False Sits

This is a somewhat more complicated problem as there are a variety of conditions which may result in the dog sitting in an area as an S-. When a false sit occurs, do not praise or give food to the dog. At the time, investigate the reason for its false sitting, so that the necessary precautions can be taken to see that the same problem will not recur.

There are several factors which may cause false sits and there are also factors which may precipitate what appears to be a false sit. Each which actually is a correct response. The following discussion gives some of the common factors associated with false sits.

It is possible that the handler may do something to cause the dog to false sit. In this case, do not reward, but repeat the command SEARCH. In most instances, the dog will again begin to search the area until a detection is made.

If it is clear that the handler did not prompt a false sit and the possibility of contamination or residual odor have been eliminated, punishment by NO or TIME OUT should be given. The removal of the dog from a scene which affords social contact with the handler and eliminates the opportunity for the dog to react to the odor, and punishment, should be given. This TIME OUT period should always be preceded by the verbal NO. The use of the TIME OUT period should not be accompanied by physical punishment in eliminating behavior, but has none of the more harmful effects associated with physical punishment. Therefore, if the dog makes a false sit that was not prompted by the handler or other extraneous factors, the use of a TIME OUT period should not be used if the dog is responding to another odor and this ODOR IMMEDIATELY.

1. Odor Contamination

When an S+ packet is handled, some of its odor may adhere to the hands and may subsequently be transferred to other objects that are handled. Such objects are said to be contaminated with the S+ odor and may be responded to as S+ stimuli, if the dog is sensitive to the odor of the handler. If the dog is not sensitive to the odor of the handler, however, it will respond to the odor of the handler, especially if the dog is highly sensitive to the odor of the handler. Since the handler ordinarily has no way of telling that he is contaminated with the S+ odor, he runs the risk if he rewards the dog for sitting on it. Hence, every time the dog sits on a contaminated object and is not rewarded, it is actually being trained to believe a very weak S+ odor, which is just the opposite of what the handler desires. On the other hand, if the handler goes ahead and rewards the dog because he suspects contamination and there is no S+ odor present, the tendency for the dog to sit is increased. For this reason, every effort should be made to avoid unnecessary handling of either the S+ or S- objects in the area to be searched.

2. Residual Odors

After a particular odor has been planted in a certain place and then removed, it should be assumed that the odor will remain in the area for some time. This is referred to as residual odor. After an S+ packet has been placed in a specific area, the odor will remain there for several days. Certain materials such as paper or wood, but particularly something any place where an S+ odor has been placed, but do not assume that residual odors are thereby necessarily eliminated.

Residual odors can become troublesome if it is necessary to move suspected areas to the same area. Remember, however, that if the dog responds to a residual odor, this is a correct response and should be rewarded just as if a false sit had occurred. Since the dog might have remembered the place from a previous visit. The only good solution to this problem is to avoid placing a dog where a residual odor may be present.

3. Odors Similar to the S- Odor

For any given substance that the dog has been trained to detect, there will probably be several other substances that-to the dog similarsuch as S+. The dog has not been specifically trained to ignore all such odors and, therefore, is likely to react to them as S+ odors. However, if the dog responded to what the handler thought was an S+ odor, it would be punished for a correct response. This may greatly weaken the dog’s future tendency to sit in "false" S+ odor, impairing its usefulness in detecting the S+ substance. On the other hand, rewarding the dog for responding to such odors will increase the range of false odors to which it will respond.

The problem is similar to that of residual odors, but is more serious since there is no way of ensuring that the false odor will not be present, and the dog has already been trained to respond to the S+ odor.

4. False Search Behavior

If the dog is not searching properly, this will ordinarily be detected by observing him. Due to the inherent uncertainty of the S+ odor, there are many factors which may affect the dog's search behavior. These factors may be divided into two general categories: behavior that is not specific to the S+ odor, and behavior that is specific to the S+ odor. The former category is often seen in novice dogs, and may be corrected by retraining the dog in the laboratory setting and taught to respond to the S+ odor, using similar techniques. The latter category is often seen in mature dogs, and may be corrected by retraining the dog in the laboratory setting and taught to respond to the S+ odor, using similar techniques.
If the dog becomes fearful of something in particular, the following method is suggested to reduce the fear. For example, suppose that the dog is afraid of loud noises. Bring the dog very slowly to a noise source, while petting it and talking gently to it. As the dog is brought close to the noise, give it food. Do this very gradually and do not ever force the dog to move toward the noise source.

(3) Fatigue. There will be times when the dog will become fatigued during the training session. It may generally continue to search but its efficiency will be impaired. This will most likely result in the dog’s walking around the room but failing to sniff and failing to bring its nose close to objects. If signs of fatigue are noted, give the dog a short rest and then resume the training session. For extended search periods, have water available for the dog. A single search session should not exceed 1 hr, and should not be continued this long if the dog shows signs of fatigue.

The best procedure of all is to avoid leaving the dog in the working situation long enough for its behavior to be adversely affected. For extended search periods, this means allowing the dog short rest periods and access to water periodically before any signs of fatigue, thirst, or poor searching are shown.

APPENDIX A
SAMPLE DATA SHEETS
| Ratio S+ S- | 1 - 1 | 1 - 2 | 1 - 3 | 2 - 1 | 2 - 2 | 2 - 3 | 3 - 1 | 3 - 2 | 3 - 3 | 4 - 1 | 4 - 2 | 4 - 3 | 5 - 1 | 5 - 2 | 5 - 3 | 6 - 1 | 6 - 2 | 6 - 3 |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|            | +     | -     | +     | +     | +     | +     | +     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     |
|            |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Notes:     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
### DATA SHEET - SIX-CHOICE DISCRIMINATION TRAINING

**Six-choice Discrimination Training:** Hex: 1/16” hole

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**Trial No.**

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**Notes:**

- Poor health/halo glare continued press error.
- Removed from tank.

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**Data Sheet No. 2**
### DATA SHEET—ROOM SEARCH

**Room Search**

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**Place:**

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<th>Hash</th>
<th>Sec</th>
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</tr>
</tbody>
</table>

*Handler cued the dog to sit.*

*Dog circled the location of the room that had been thoroughly searched.*

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### APPENDIX B

**MAINTENANCE OF HEROIN AND COCAINE**

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APPENDIX B. MAINTENANCE OF HEROIN AND COCAINE

Both heroin and cocaine are extremely sensitive to moisture and, when exposed to the atmosphere for only a short period of time, will very quickly absorb ambient moisture. This process of hydrolysis causes a definite and discernible change in the odor profiles of both these narcotics. Because of both of these drugs deteriorate through hydrolysis, it is assumed that persons dealing in these agents would take measures to insure that they would not be exposed to moisture. In order to train dogs to respond to heroin and not to chemical radicals produced when moisture decomposes heroin, the training aids must be moisture proofed. These controls apply to both the stock samples and to the training aids.

The following is a step-by-step procedure which can be used to insure proper control of the odor profiles of heroin and cocaine. The materials needed are listed below:

<table>
<thead>
<tr>
<th>Material</th>
<th>Source</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Desiccator, Sleeve Top, Pyrex brand glass, #076-653 160 Idm</td>
<td>Curtin Scientific</td>
<td>$27.27 ea.</td>
</tr>
<tr>
<td>2. Desiccator Flasks, Porcelain Coated Serial 600 without feet</td>
<td>Curtin</td>
<td>3.01 ea.</td>
</tr>
<tr>
<td>4. Stopcock grease, Laboratory #216-651 (tube)</td>
<td>Curtin</td>
<td>75</td>
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<tr>
<td>5. Tenon lubing Penntube Plastics Co.</td>
<td>$1/32 Flexible Penn tube</td>
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</tr>
<tr>
<td>6. Rubber stoppers</td>
<td>Supelco Inc.</td>
<td>62-0409</td>
</tr>
<tr>
<td>7. Heat and plastic bags (tissue type)</td>
<td>4 x 3 x 8 in.</td>
<td></td>
</tr>
<tr>
<td>8. Nitrogen cyl. (Nitrogen gas medical grade-dry)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Nitrogen regulator</td>
<td>2-stage</td>
<td></td>
</tr>
<tr>
<td>10. Sliding powder boxes</td>
<td>Lone Star Vet Supply</td>
<td>6.00 carton</td>
</tr>
<tr>
<td>11. Dosimetric, Indicating</td>
<td>SWC Scientific Labware Inc.</td>
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</tbody>
</table>

All narcotics must be kept in a safe place and the laws are very strict in their control even for experimental and other useful purposes. The legal aspects of obtaining and keeping narcotics for the purpose of training dogs will not be covered in this manual.

The following is the procedure to be used in cleaning bulk heroin or cocaine of extraneous odors, moisture, or other contaminants not consistently associated with these narcotics. Failure to take these or similar precautions may well

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null in a dog trained to detect some extraneous odor component other than that of the narcotic. These rather involved procedures are applicable to N and C but are not necessary when working with MJ, Hash, or O.

Any quantity of H which will be designated for use in training the dog will necessarily have some odor configurations peculiar for that particular sample. It should be estimated that the dog will learn to respond to whichever odor(s) that are strongest in the sample with which it comes into contact. Therefore, if a particular batch of H has some unknown odor component which is as strong or stronger than H associated with it, the dog will actually learn to respond to the extraneous odor and may very likely fail to respond to a quantity of H if this extraneous odor is absent. It should be noted here again that heroin in its pure form has very little odor and most other substances will have a stronger odor.

The second factor which makes it necessary to clean up the H is that there will most likely have been some deterioration of the H which will be used in training. H will deteriorate to a certain extent even if it is fairly well sealed. The amount of deterioration is a function of age and how well it is sealed. The sample you are likely to have may be quite old and therefore have a high quantity of acetic odor associated with it. Acetic odors even in very minute concentrations are more obvious than pure H. For these two reasons, it is necessary to "clean up" the H which is intended to be used in training. This can be done quite quickly and efficiently with the equipment described earlier. The following is a step by step method for achieving this goal:

1. Remove the H from its original container and place the contents into the gas washing bottle.
2. Attach rubber bands to the "ears" on both sides of the wash bottle. This assures that the top portion fits snugly to the bottle portion.
3. Attach one end of the teflon tubing to the wash bottle by means of the tubular glass extension which is in the center and connects directly to the stone at the end of the glass tube located inside and toward the base of the bottle. Attach the other end of the teflon tubing to the nitrogen cylinder (this should be medical grade dry nitrogen gas) by way of the flow regulator valve.
4. Once this hook-up has been made and all connections fit firmly, open the flow regulator valve to a flow rate of 1 liter/min. This will allow dry nitrogen gas to pass from the nitrogen cylinder into the wash bottle by way of the stone. This action will purge and remove any moisture or extraneous odors from the H.
5. The amount of time required to thoroughly purge the H will depend upon several factors such as the quantity of H in the bottle, the amount of acetic odor present which must be removed, and the nitrogen flow rate. You may use this rule of thumb in determining when to consider the stock sample adequately cleaned.

Initially, as the nitrogen is passed through the bottle you will most likely be able to detect an acetic odor at the exhaust stem. Continue to check until there is no longer a discernible odor; then allow the nitrogen flow to continue for about 1 hr before packaging the training samples.
APPENDIX C. PREPARING AND MAINTAINING SAMPLES

Once the stock quantity of H has been cleaned, individual samples which will be used to train the dogs should be prepared. The materials which will be needed are:

1. A quantity of plastic bags (freezer type). The larger the variety of these bags the better.
2. A device used to heat seal plastic bags. This item can be purchased at any large department store at a nominal cost.
3. A sterile stainless steel spatula which will be used to measure out the H samples.
4. Several small pasteboard boxes suitable for storing the samples.
5. Desiccator, screw top, pyrex brand glass.
6. Desiccator plate, porcelain without feet, to fit the desiccator.
7. Drierite.
8. Glassine paper.

Prior to making the S+ samples identical S- samples should be made. These samples should be identical to the S+ samples except for the absence of the drug. The S- samples should be made up prior to making the S+ samples. They should be of the same material, made by the same person, and made in an area other than where the S+ materials are stored or otherwise worked with. These precautions eliminate the possibility of unwanted contamination of the control samples.

In preparing the S+ samples, the first step is to determine the number of samples which are needed and the quantity of drug in each sample. Glassine paper is placed on a scale and the desired quantity is removed from the stock bottle with the sterile spatula and put into the plastic freezer bags. The plastic bag is then heat sealed to insure that a minimum of humidity and other contaminates will become associated with the heroin. These S+ samples should be placed in appropriately sized pasteboard boxes for storage and transfer.

The following is a description of how the S+ samples should be stored when not in use: S+ samples will be stored in a large desiccator. A generous quantity of Drierite should be placed in the bottom of the desiccator jar and the porcelain plate placed in position. Drierite changes color after it absorbs moisture and therefore should be replaced when this occurs. The samples can be stored inside the pasteboard boxes or removed from the boxes and stored in the plastic bags. The desiccator in which the samples are stored should be vacuumed off and then purged with dry nitrogen after the samples have been placed inside.

A tube leading from the vacuum pump should be connected to the intake sleeve. The desiccator should be vacuumed and the sleeve rotated to maintain the vacuum. The tube from the nitrogen cylinder should then be connected to the sleeve arm, the sleeve arm is then rotated back to the position which allows gas flow back into the desiccator. Nitrogen gas flow should be continued until the desiccator has reached equilibrium. The sleeve should again be rotated so as to exclude outside air from entering the desiccator.
Teflon Tubing

Out

Fits for Rubber Band

Gas Washing Bottle

Substance Washed with Nitrogen

Nitrogen Cylinder

Desiccator Plate

Desiccator Training Sample

charite (Indicating)

Flow Rate 500 cc/Minute at 12 PSI

Reduce Atmosphere 5 Min to 10 Min

GAS WAShING BOTTLE

Flow Regulator Valve—To Slow Flow Down When Using in Leo Odor Detecting

2 Stage Regulator

Desiccator

Flow Rate 500 cc/Minute at 12 PSI

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The abuse of hard narcotics (heroin and cocaine) has risen sharply in recent years, and coping with this problem has become an important responsibility of law enforcement agencies. In order to assist these agencies in adequately carrying out this increasingly important responsibility, methods have been developed for the training and use of narcotic detector dogs.

Considering these advantages it is obvious that a good detector dog and a well trained handler can search for narcotics rapidly and efficiently. A detector dog can be a valuable asset in narcotic detector work and this manual is designed to describe, in a step by step fashion, how to train dogs to effectively search out and respond to hard narcotics.