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Instructions For Using Gas Identification Sets

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Chemical Warfare School
Edgewood Arsenal, Maryland
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INSTRUCTIONS FOR USING

GAS IDENTIFICATION SETS

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SECTION I

DESCRIPTION OF SETS

1. GENERAL. - a. Two types of gas identification sets are manufactured and issued by the Chemical Warfare Service. The set, Gas Identification, Instructional, MI, consists of seven glass bottles. Four are filledwith approximately 50 cubic centimeters (3.7 cubic inches) of granular activated charcoal saturated with a chemical agent. Three contain solids without charcoal. This set is commonly known as the "sniff" set. It is intended for use indoors to -instruct military personnel in recognizing the odors of chemical agents.

b. The set, Gas Identification, Detonation, MI contains forty-eight l-ounce tubes filled with liquid chemical agents. It' is designed for use outdoors in instructing military forces in the field to identify chemical agents by odor and other immediate effects.

2. SET, GAS IDENTIFICATION, INSTRUCTIONAL, MI. - a. This set consists of seven 4-ounce wide-mouth glass bottles, including two bottles containing charcoal saturated with mustard (HS); one each containing charcoal saturated with chlorpicrin (PS) and lewisite (M-l); one each containing adamsite (DM) and chloracetophenone (CN) as solids; and one containing simulated phosgene (CG) (solid triphosgene, which upon contact with the air decomposes, giving off pure phosgene).

b. The charcoal used in these bottles is standard gas mask type activated charcoal which has been thoroughly dried. Enough chemical agent is added to saturate the, dry charcoal.

c. The stoppers are ground to fit each bottle and should be

kept in the bottle with which originally issued. Each bottle is packed in a metal can with a friction top. The symbol of the agent in each bottle is etched on the surface of the glass bottle. and marked on the metal container. Wood pulp or sawdust is used as a packing to surround each bottle after it is placed in its metal container. The seven metal containers are then packed in a shipping container (wood). Each metal can is surrounded by about one inch of wood pulp packing. This method of packing and shipping conforms to Interstate Commerce Commission regulations.

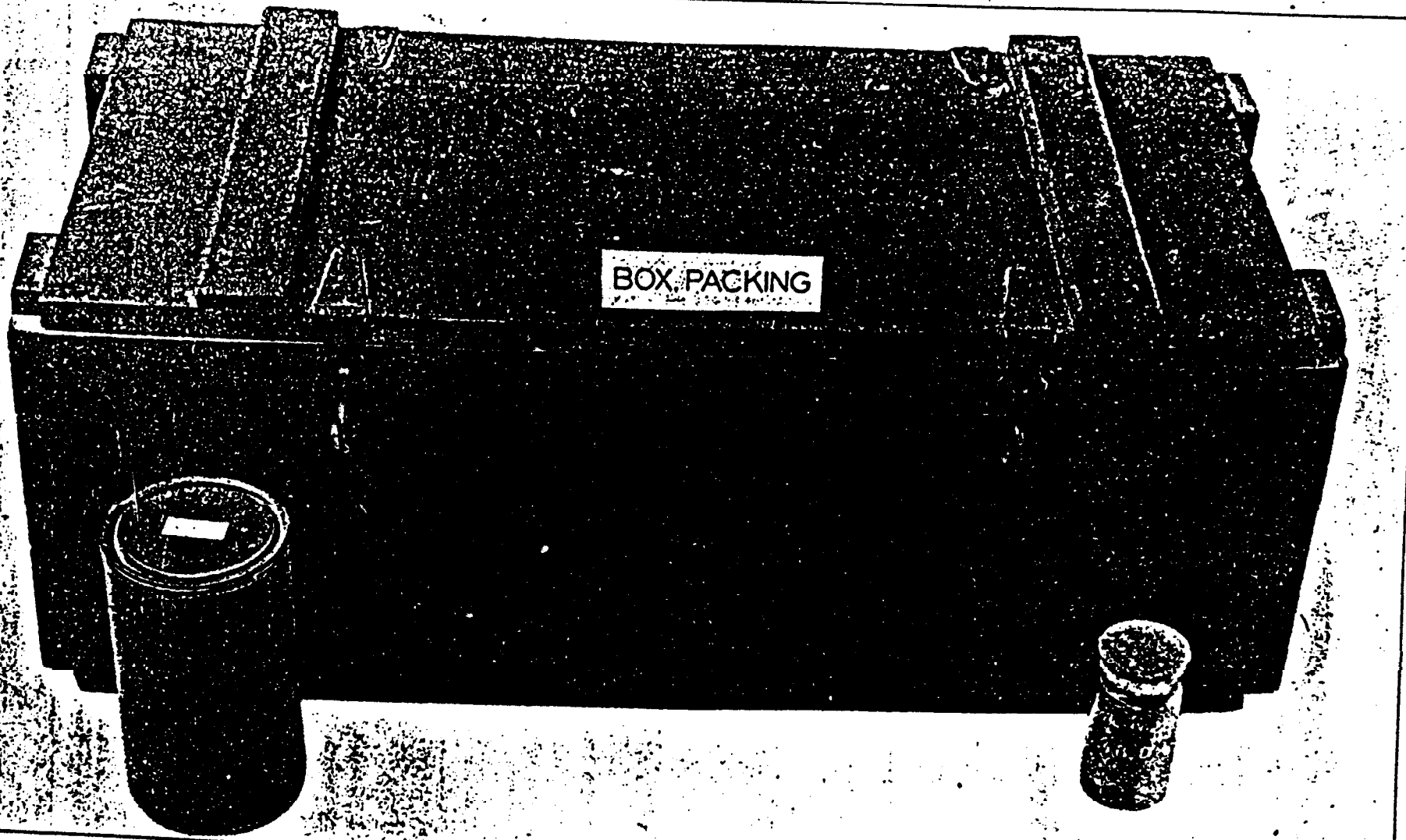
d. A little of the chemical agent is vaporized from the solid agent or saturated charcoal and is held in the bottle. When the stopper is removed and the mouth of the bottle is brought near the nose, the odor of the agent can be detected. The stopper must be kept tightly closed except when the bottle is actually being used, otherwise the chemical agent evaporates until no further odor is produced,

e. When sniff bottles have reached the stage of exhaustion, requisition should be made on the Chief of the Chemical Warfare Service for necessary sets, sample replacement, for gas identification set, instructional, MI. These replacement sets consist of units of two bottles of agents packed in a wooden box. Upon receipt of the sample replacements, the newly filled bottles should be removed and placed in the standard set. The empty bottles should then be placed in the sample replacement box and returned, immediately to the Edgewood Chemical Warfare Depot.

3. SET, GAS IDENTIFICATION, DETONATION, 'MI. -,a. This identification set consists of forty-eight hermetically sealed pyrex glass tubes, each about 1 inch ln diameter, 7 inches (See Figure 3) long, containing 40 cc (approximately 1 ounce) of the agent or a solution thereof. (HS - 5% inchloroform; M-l - 5% in chloroform; PS - 50% in chloroform; CG - 100%.) Twelve tubes each of mustard gas (HS), lewisite (M- 1), phosgene (CG), and chlorpicrin (PS) are provided.

b. Each individual glass tube of agent is packed in a separate cardboard tube container. The symbol of the agent is stenciled on the top as well as on the side of the individual cardboard tube container. Twelve tubes of agents in their individual cardboard containers, together with one tape holder, complete with adhesive tape, are packed in a metal container known as tube container, multiple, and measuring approximately 5-3/4 inches in diameter and 9-1/2 inches long.

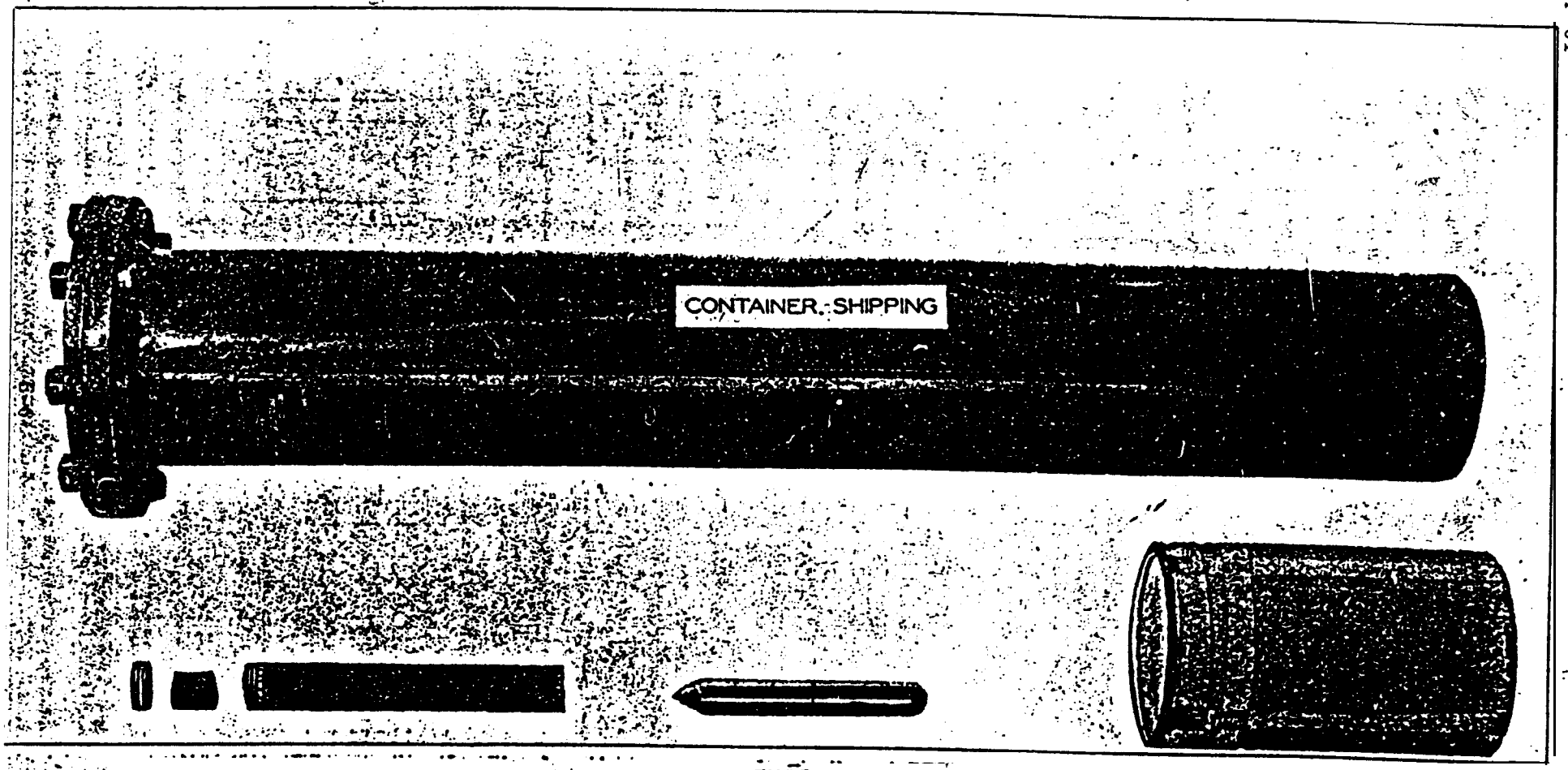
c. Four of these tube containers, with instructions (blueprints) for setting up and firing the gas tubes in the field, are packed in a drawn steel container. Corrugated strawboard, 5/32-inch thick, is used as a filler for the two ends between the four multiple tube containers. The open end of the steel shipping container is flanged and the cover is held in place by eight 5/8-inch machine bolts. The shipping container is airtight and will withstand an internal air pressure of 250 pounds per square inch with-



CONTAINER

BOTTLE, FOUR OUNCE

FIGURE 1.- COMPONENTS OF SET, G A S IDENTIFICATION, INSTRUCTIONAL, MI



TUBE CONTAINER, INDIVIDUAL

TUBE, GAS

TUBE, CONTAINER, MULTIPLE

(CONTAINERS FOR CG TUBES ARE MARKED "DO NOT OPEN")

FIGURE 2. - COMPONENTS OF SET, GAS IDENTIFICATION, DETONATION, MI

out leaking or deformation of the cylinder.

d. Interstate Commerce Commission regulations require that toxic agents be packed in a suitable steel container before they can be shipped by common carrier. For this reason it is necessary to return the complete gas identification set, less the glass tubes and such individual tube containers as may be expended, to the Edgewood Chemical Warfare Depot when replacements are required.

e. Detonators and pliers are shipped separately. They should be requisitioned along with the detonation set. Detonators are packed and shipped in accordance with Interstate. Commerce Commission regulations governing the shipment of explosives.

SECTION II

INSTRUCTIONS FOR USE

4. PROPERTIES OF AGENTS. In the field the odors of chemical agents provide the most certain means of identification.. However, other immediate effects on the body, such as irritation of eyes, nose, throat, or prickling of the skin, assist a trained observer in identifying the agent being used. All of the information presented in Table 1 is therefore of assistance in recognizing chemical agents.

5. USE OF SET, GAS IDENTIFICATION INSTRUCTIONAL, MI.

a. When it is desired to smell the odor of any agent, the bottle should be placed in one hand and brought near the nose, while the other hand is used to remove the stopper and to fan the air across the mouth of the bottle toward the nose. At the same time air should be alternately inhaled and exhaled, avoiding deep inhalations. If the odor is not obtained the first time, the bottle should be brought progressively closer until a distinct odor is obtained.

b. If the odor does not seem to correspond to that given in Table 1, the student should note exactly what the agent smells like to him. There is more variation in odor perception than in any other faculty; hence, it is to be expected that different men will describe the same odor in different terms. All odors become more penetrating and stronger as the concentration is increased, so that the concentration as well as the in-

AGENT	SYMBOL	ODOR	OTHER IMMEDIATE EFFECT
Mustard Gas	HS	Garlic; horseradish	None
Lewisite	M-I	Geraniums	Sneezing; nasal Irritation
Phosgene	C G	Ensilage; fresh cut hay	Thin white cloud produced. -Coughing; tightness in chest; eye irritation
Chlorpicrin	PS	Sweetish; like flypaper or licorice	Lacrimation: vomiting; nose and throat irritation
Chloracetophenone	CN	Locust or apple blossoms. Ripe fruit'	Lacrimation; Irritation of skin in hot weather
Adamsite	DM	No distinguishing odor	Canary yellow smoke haze. Headache; vomiting; nausea
*Diphenylchlorarsine	DA	Like shoe polish	Sneezing, vomiting, headache'
*Titanium tetra-chloride	FM	Acrid (mild)	Very slight irritation on eyes. Dense smoke
*Sulfur trioxide in chlorsulfonic acid	FS	Acrid (strong)	Prickly sensation on skin. Eye irritation. Dense smoke.
*HC Mixture	HC	Smoky odor. Sometimes odor resembles camphor	Dense smoke. Slight suffocating feeling; heavy concentration sometimes causes nausea
*White Phosphorus	WP	Like old fashioned matches	Glow from burning particles, incendiary effect. Dense smoke

*These agents, not Included In Identification sets, are inserted here for additional theoretical instruction.

TABLE 1 - IDENTIFYING CHARACTERISTICS OF AGENTS"

dividual variation in odor perception must be considered when identifying agents from sniff bottles.

c. This identification set is intended for indoor instruction prior to the use in the field of the set, gas identification, detonation, MI.

6. PRECAUTIONS IN USE OF SET, GAS IDENTIFICATION, INSTRUCTIONAL, MI. Personnel opening newbottles and containers, or those which have been closed for some time, should wear well adjusted gas masks and keep the face turned away from the bottles. Occasionally pressure builds up within bottles that have not been opened for long periods, which is sufficient to throw charcoal or dust into the opener's eyes. It is therefore advisable to have all bottles opened and closed some time prior to the instruction. No great. accumulation of pressure can be expected for 24 hours. Bottles not in use should be kept carefully corked at all times. Care must be taken to insure that bottles and tubes are stored where they cannot be tampered with.

7. USE OF SET, GAS IDENTIFICATION, DETONATION, MI.

a. This set is used only out-of-doors. The gas mask should always be worn when handling or preparing to fire any of the detonation tubes.

b. The detonators are to be fastened to the glass tubes containing KS, M-l, and PS, and to the cardboard container of the CC-filled glass tubes with the adhesive tape strips provided with the set. (See Fig. 3) Electrical connections and connection with the blasting machine are shown in Figure 4. The tubes and attached detonators are to be placed in small pits as indicated in Figure 4. Care should be exercised to keep the detonators on the underside of the glass or cardboard tube to insure the discharge of the agent into the air,

c. Extreme care should be exercised at all times in handling detonators. They are filled with fulminate of mercury, an extremely unstable and violent explosive, which may be fired accidently either by heat or shock. They should not be held in the hand any longer than is absolutely necessary and never held near the face.

d. The number of tubes of an agent necessary for a satisfactory exercise will be determined by the officer in charge. Under normal weather conditions, one tube of each agent will suffice for a group of twenty persons. For larger groups, or for demonstrations under adverse weather conditions, more tubes are required. When two or more tubes are detonated simultaneously, the firing line should be at right angles to the wind direction.

e. The blasting machine should be placed about 25 yards upwind from the firing line. The class or observers should be placed from 25 to 40 yards downwind. If a blasting machine is not available, one tube

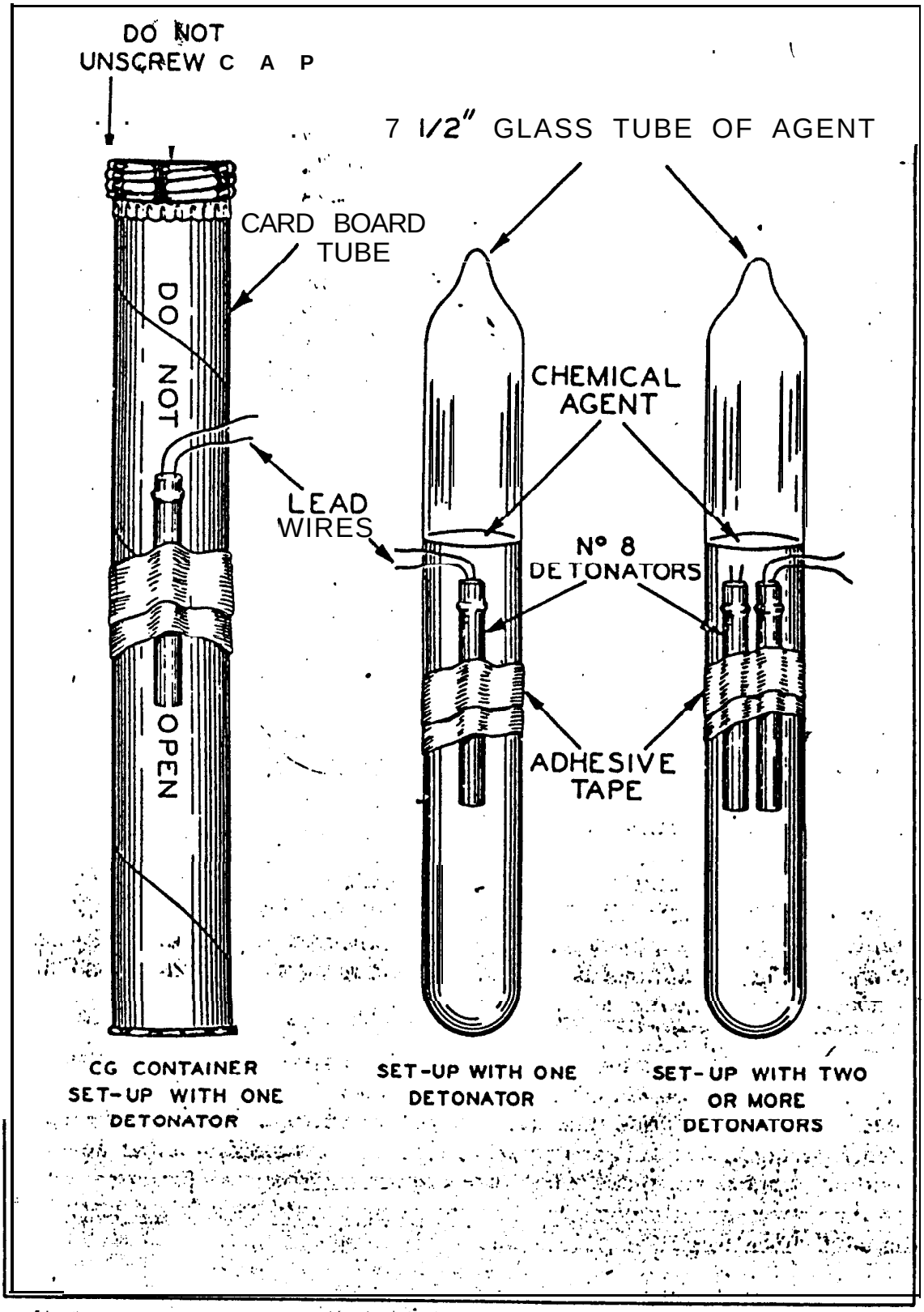


FIGURE 3. - DETONATOR CONNECTION OF TUBES, GAS IDENTIFICATION SET, DETONATION, MI.

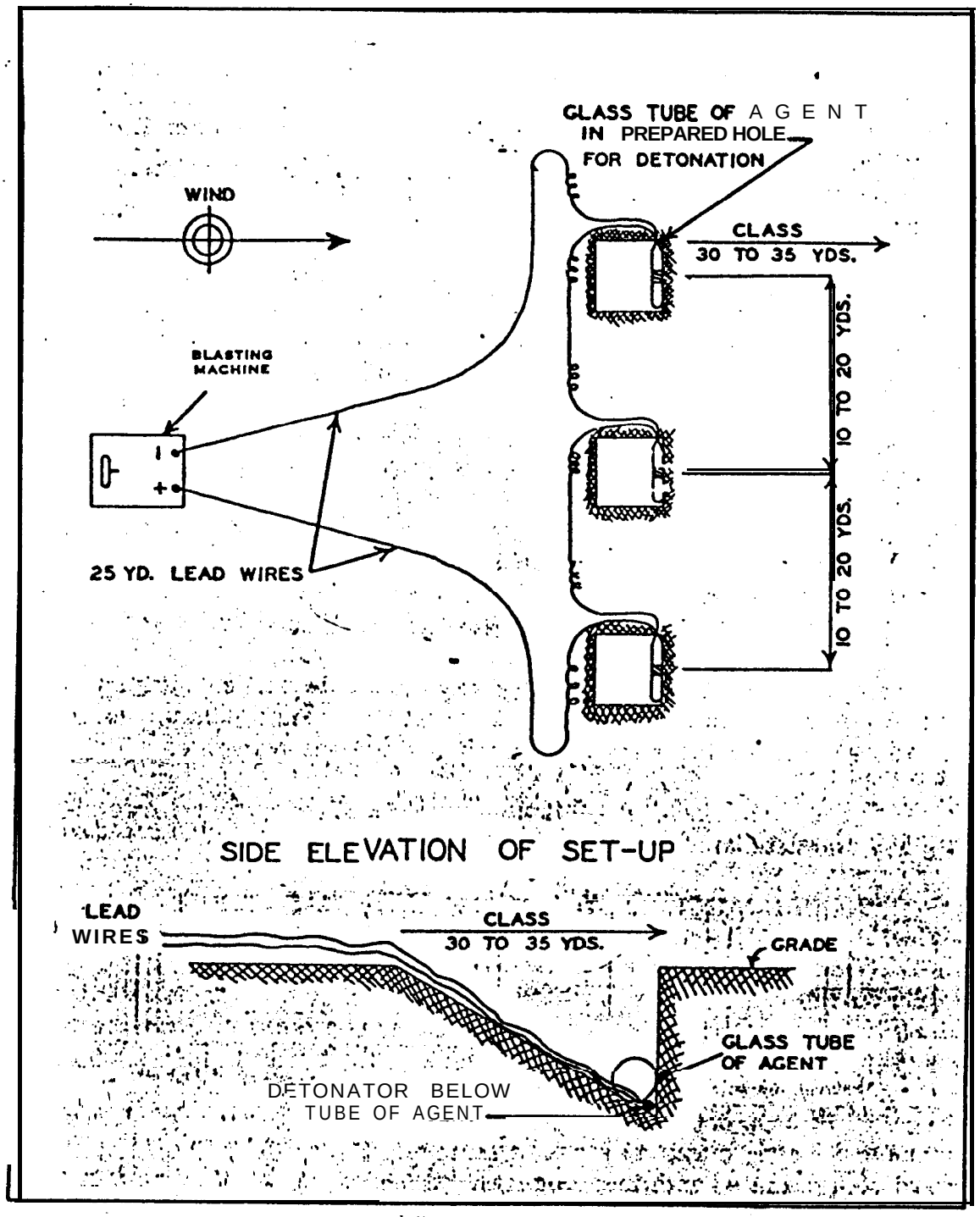


FIGURE 4. - DIAGRAMS SHOWING SET-UP FOR USE OF GAS IDENTIFICATION SET, DETONATION, M1.

at a time may be detonated by means of an ordinary No. 6 dry cell.

f. When the gas tubes are detonated, small puffs of smoke are produced by the detonators. The gas cloud is usually colorless, but moves along with the smoke. In a shifting wind the students will change positions accordingly so as to be in the path of the agent. As soon as students have obtained the odor of the agent, they move out of the cloud at right angles to the wind direction.

g. When persistent agents are used it frequently happens that a few individuals do not get the characteristic odor of the agent from the cloud. When this occurs, use a spade or board to dig up a small quantity of the earth from the detonation pit. Move downwind at least 10 yards; then have those so desiring pass by and sniff the contaminated earth. This can be done with all agents in the set.

h. The distance the class is stationed downwind must be carefully controlled. On days with little wind, a distance of 25 yards is suitable; with strong winds, particularly when temperature is low, the distance should be increased to 40 yards. In the latter case, the low temperature causes less volatilization and strong winds concentrate much of the liquid as a spray which, if the class is near, may result in some getting liquid ontheface or hands. In the case of vesicants, this may cause severe irritation of the skin or granulation of the eyelids.

i. Use only one detonator, electric, No. 8, with tubes of phosgene (CG), chlorpicrin (PS), and lewisite (M-l); two detonators are desirable and should be used. on mustard (HS).

j. With this set there is always possible danger of injury from broken glass, exploding detonators, or -from the agents themselves. First aid packets should therefore be at hand during each exercise.

k. Always fill up detonation holes and remove any large pieces of glass and detonator lead wires after an exercise.

8. PRECAUTIONS IN USE OF SET, GAS IDENTIFICATION, DETONATION, MI. - a. Occasionally enough pressure may develop in the tubes containing phosgene (CG) to cause them to burst spontaneously. If a tube bursts while being handled, personnel may be seriously injured. Glass tubes containing phosgene (CG) must not be removed from the cardboard tubes. Tubes have orange lacquered caps to facilitate recognition.

b. Do not explode glass tubes containing HS or M-1 in their cardboard tubes; burns may result from contact with fragments of cardboard contaminated with these agents.

c. Pieces of glass and liquid spray may be thrown as far as

15 yards, Be sure no one is within this danger radius when the tubes are detonated.

d. Vegetation in the immediate vicinity of the detonationhole may becontaminated from HS and M-l. The ground in the detonation hole is always dangerous for *some* time. After detonation, no one but the firing personnel should be allowed within 10 yards of the detonation holes.

SECTION III

SUGGESTED SCHEDULE OF INSTRUCTION

9. GENERAL. - a. The sense of smell quickly becomes fatigued or confused by odors from chemical agents, some of which are violent poisons and irritants. A number of short exercises is therefore preferable to one long exercise.

b. During the indoor training period the sniff set should be placed where men can test for gas odors during intermissions of classroom exercises. Contests can be arranged and the spirit of competition introduced by covering the symbol designating the agent and assigning a number, then having the student write down the symbol of the agent corresponding to the number,

c. Indoor instruction with the sniff set should be as thorough as practicable before using the detonation set. The actual cost of each tube fired is about 60 cents, while a sniff from a bottle may cost less than a cent. Therefore, the detonation set should not be used until the class is ready to profit by its use. Then the use of the detonation set is important in order that actual field conditions may be simulated.

10. SCHEDULE FOR ONE HOUR OF INSTRUCTION. -The following schedule is suggested for use in an organization that can devote only one hour of instruction to this subject. However, it must be remembered that a reasonable degree of proficiency in the identification of chemical agents by odor can'come only through continuous repetition. To attain proficiency, it is necessary to make extended use of the sniff set. This can be done by having the set constantly available and using it to fill in vacant 10 or 15 minute periods, using it with small or specialized groups, and to help fill in rainy day schedules.

First period - 10 minutes. (Instructional set, MI). Test odors of PS, M-l, HS, CG. Have each man write down his own idea of what each agent smells like.

Second period - 10 minutes. (Instructional set, MI). Announce the agent, then let each man sniff to identity the odor.

Third period - 10 minutes. (Instructional set, MI). Cover the Symbol on the bottle with a number and have class identify bottles by number. (The average man should get three of the four agents correctly.)

Fourth period - 15 minutes. (Detonation set, MI). Detonate first HS, then 'PS. Have class pass through the cloud, then test earth from both. detonation holes. Have class write down the odor and other effects from each agent. (Use different detonation holes for' each agent.)

Fifth 'period - 15 minutes. (Detonation set, MI). Detonate M-l,' then CG. Use different holes for , each agent. Proceed as ln fourth period.

11.' 'ADDITIONAL INSTRUCTION. - Additional instruction in the identification of chemical agents should be given all unit gas noncommissloned officers, and men designated as gas sentries. Wlthln the limits of material available, such personnel should be taught not only to identify each agent positively, but also how to estimate the concentration of each agent as being either mild, moderately strong, or high. Tactical protective measures frequently depend'upon the concentration present as well as upon the agent used.

12. INSTRUCTIONAL PROCEDURE. - The value of any instructional perlodcanbe enhancedlf careful thought is given to its preparation. Recognizing that the time ordinarily available for instruction in defense against chemical attack is limited, every opportunity should be taken to add new facts or refresh previously presented material. In the conduct of exercises onfleld identification, there is always tlme just prior to firing to give a short resume of data pertinent to the agent about to be fired. With small groups under close control, an alert instructor can malntaln a running comment of information about the exercise and the agents used: safety precautions; odor to be expected; physiological action of the agent; tactical use; first aid for field casualties; and manner of firing in combat. In this way the periods will be made interesting and the scope of lnstruction broadened.

PHYSICAL DESCRIPTION OF SETS

HANDY GUIDE

HANOOUT 4

SET TYPE (DODAC)	CONTAINER	DESCRIPTION
K941	PIG	(1) 6 CANS PER PIG - CANS ARE 6-1/4" HIGH
		(2) CANS HAVE "SARDINE CAN" KEY Off BOTTOM AND ARE PRESSURE SEALED
		(3) 4 BOTTLES PER CAN PACKED IN SAWDUST
		(4) BOTTLES ARE ROUND AND HAVE A SMALL SCREW TOP; HEAT RESISTANT PAINT INDICATES "H" OR "HS" OR "HD", "TOXIC GAS SET, Ml"
K942		(1) 28 CANS PER PAIL - CANS ARE BOTTLE SIZED
		(2) 1 LARGE AMPOULE WHICH LDDKS LIKE A HEAT SEALED BOTTLE, IN EACH CAN
K945	WOOD BOX	(1) BOX MEASURES 12 X 5-1/2 X 4 INCHES
		(2) VAPOR BARRIER BAG
		(3) TACKLE BOX
		(4) 8 SQUARE BOTTLES AND 3 SMALL ROUND BOTTLES IN TACKLE BOX
K951/952/953/954	P I G	(1) 4 CANS PER PIG - CANS ARE 9-1/4" HIGH
		(2). CANS ARE PRESS FIT LIDS
		(3) 12 AMPOULES PER CAN - NO SAWDUST - AMPOULES ARE IN CARDBOARD MAILING TUBES
		(4) AMPOULES LOOK LIKE TALL TEST TUBE AND ARE ABOUT 8" HIGH - HEAT SEALED
		(5) AGENT TYPE INDICATED BY LETTERS ON MAILING TUBE LID

APPENDIX F
Photographs of Various Sets

The following photographs of the various sets and their respective containers will aid in determining the positive identification of these sets and agent fill.