

**TECHNICAL MANUAL**

**OPERATOR'S AND ORGANIZATIONAL**

**MAINTENANCE MANUAL**

**DETECTOR KIT,**

**CHEMICAL AGENT,**

**ABC-M18A2**

**(NSN 6665-00-903-4767)**

**This copy is a reprint which includes current  
pages from Change 1.**

### **WARNINGS**

Because of possible injury or death if toxic agents are present, protective masks with hoods, clothing, and gloves must be worn when using the kit.

Remain masked until ordered to unmask.

Do not use on outdated kit because it will give unreliable test indications. A false negative indication would give a false sense of security which may result in removal of protective masks and clothing while toxic agents are actually present. Due to low volatility of V-agents, liquid agent may be present even though no vapor is detected.

TECHNICAL MANUAL

No. 3-6665-254-12



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**OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL**

**DETECTOR KIT, CHEMICAL AGENT, ABC-M18A2**

**NSN 6665-00-903-4767**

You can improve this manual by recommending changes using DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 (Test) located in the back of the manual. Mail the form direct to Commander, Edgewood Arsenal, ATTN: SAREA-DE-ET, Aberdeen Proving Ground, MD 21010. A reply will be furnished direct to you.

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## SECTION I

### INTRODUCTION

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#### 1. Scope

This manual describes the ABC-M18A2 chemical agent detector kit and provides instructions for its use and maintenance. These instructions are for operator and organizational maintenance use.

#### 2. Report Forms

Equipment maintenance forms and procedures for their use are prescribed in TM 38-750.

#### 3. Purpose of Kit

The ABC-M18A2 chemical agent detector kit is designed primarily for detecting dangerous concentrations of vapors, aerosols, and liquid droplets of chemical agents which are listed in paragraph 4. This kit will be used primarily by chemical specialty personnel (MOS trained) assigned at organizational level. The kit's capability provides for the sampling of unknown NBC agents. If a chemical agent is suspected but cannot be detected with the kit, vapor samples can be collected in sampling tubes (para 10) for forwarding to a laboratory for identification. The principal uses of the kit are-

- a. For reconnaissance in areas suspected of chemical agent contamination.
- b. For finding the boundaries of contaminated areas.
- c. For determining the absence of a chemical agent so that unmasking following a chemical agent attack can be initiated under the conditions set forth in FM 21-40.
- d. For testing for the presence of a chemical agent after decontamination.
- e. For collecting samples of suspected but unidentified chemical agents.

#### WARNING

Remain masked until ordered to unmask.

#### 4. Agents Detected

Agents listed below are detected by the ABC-M18A2 chemical agent detector kit:

Cyanogen Chloride (CK)

Mustards [ (H), (HD), (HN), and (HT)]

Phosgene oxime (CX)

Hydrocyanic acid (AC)

Phosgene (CG)

Lewisite (L)

Ethyl dichloroarsine (ED)

Methyl dichloroarsine (MD)

Nerve agents (V- and G-agents)

## SECTION II

### DESCRIPTION

#### 5. General

Detector tubes, tickets, and paper in the ABC- M18A2 chemical agent detector kit (fig.1) are used to detect the presence of chemical agents listed in paragraph 4 (vapors, aerosols, liquids). The presence of a chemical agent is detected by distinctive color changes which are fully described in section IV. Some chemical agents produce direct color changes; others require the addition of reagent solutions to effect color changes.

#### 6. Components of Kit

*a. General.* The ABC-M18A2 chemical agent detector kit when initially issued consists of the components listed in b below. However, in use, many components are expended. As long as sufficient serviceable components remain in the kit to perform at least five complete series of tests, the kit is considered serviceable (para 33).

*b. Components of Kit.* The components of the kit (fig. 2) consist of the following items which are contained in a carrier (1):

- Carrier (pencil attached) (1)
- Instruction cards (2)
- Detector tubes (5 clips of 25 each) (3)
  - Blue-band tubes (2 clips)
  - Red-band tubes (1 clip)
  - Green-band tubes (1 clip)
  - Yellow-band tubes (1 clip)
- Sampling tubes-white band (1 clip of 25 each) (3)
- ABC-M8 VGH chemical agent detector paper (1 book of 25 papers) (4)
- Inspection date record card (5)
- Detector tickets (1 belt of 40 each) (6)
- Color coded plastic squeeze bottles with matching colored caps (3 each) (7)
  - Blue-marked- bottle of sodium hydroxide
  - White-marked bottle of buffered water
  - Green-marked bottle, empty
- Aspirator bulb assembly (8)
- Glass vial, green-marked, containing 14 tablets (compound 34) (9)
- Packets (straws) containing powder reagent (sodium pyrophosphate peroxide) (14 each) (10)
- Plastic container for glass vial and packets (straws) of powdered reagent (11)

kit.

- Report cards in envelopes (5 each) (12)
- Red-marked dispenser (substrate solution) (13)

*c. Discard Dates*



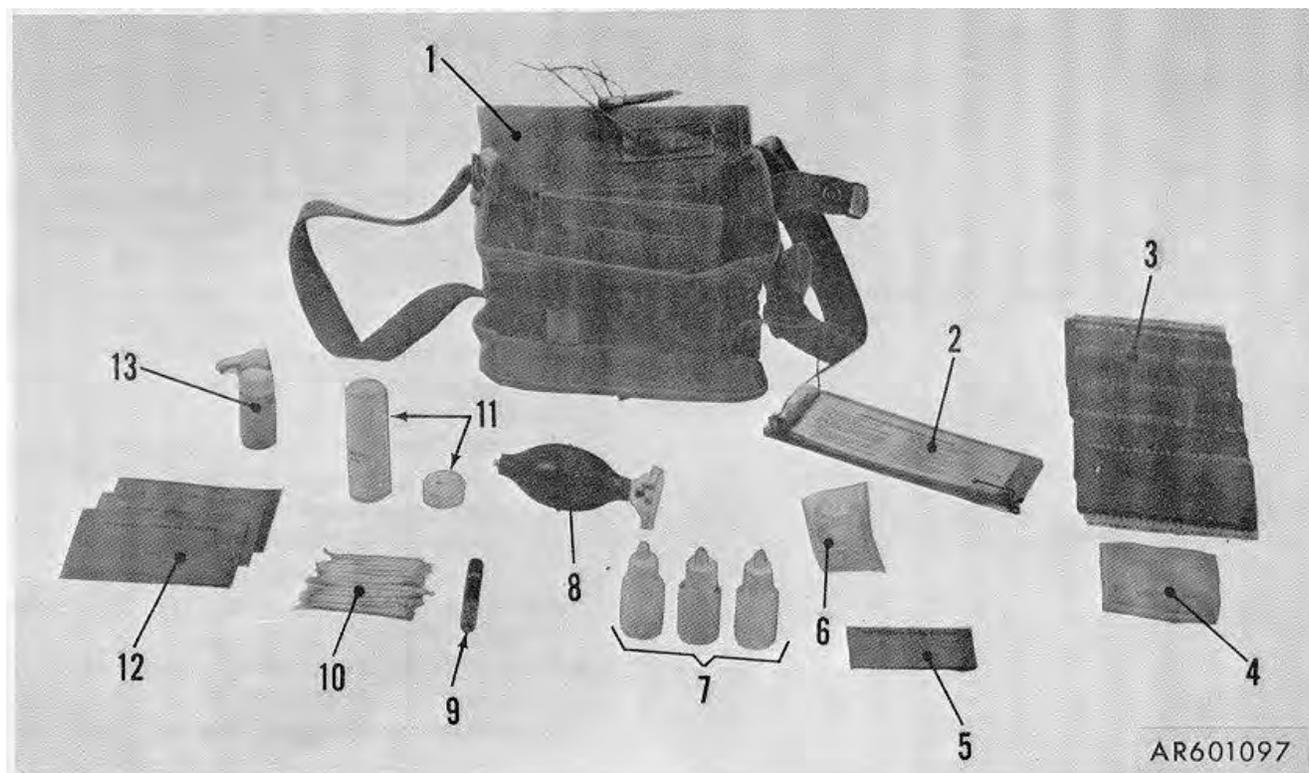
Figure 1. ABC-M18A2 chemical detector

#### WARNING

Do not use an outdated kit because it will give unreliable test results. A false negative indication would give a false sense of security which may result in

removal of protective masks and clothing while toxic agents are actually present.

A discard date is marked on the outside of the carrier of the latest issue kits. Turn in an out-dated kit for a new kit. There are no refill kits for the ABC-M18A2 Chemical Agent Detector Kits. For units doing extensive or training in nerve agent detection, refer to para 21j.



- |   |                               |    |  |
|---|-------------------------------|----|--|
| 1 | Carrier, pencil attached      | 8  | Aspirator bulb assembly                |
| 2 | Instruction cards             | 9  | Vial containing tablets (green-marked) |
| 3 | Detector and sampling tubes   | 10 | Packets of powder reagent              |
| 4 | Chemical agent detector paper | 11 | Plastic container                      |
| 5 | Inspection date record card   | 12 | Report cards                           |
| 6 | Detector tickets              | 13 | Substrate (red-marked) dispenser       |
| 7 | Squeeze bottles               |    |  |

Figure 2. Components of kit.

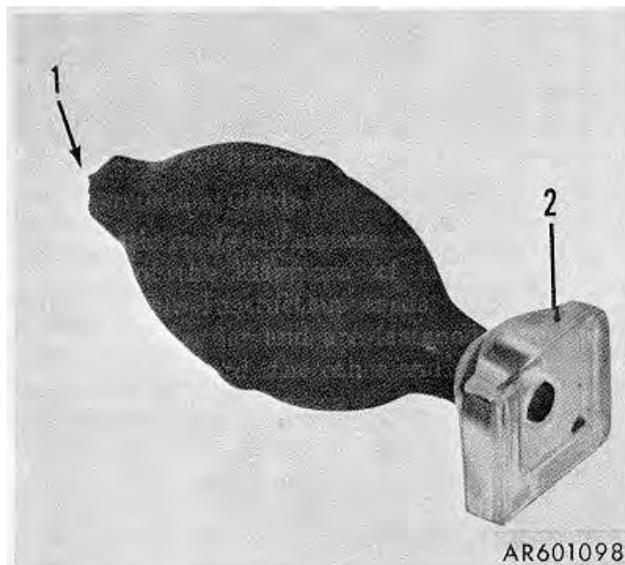
### 7. Carrier

The carrier (1, fig. 2), which is made of heavy olive-drab canvas material is approximately 8 inches long, 6 inches high, and 3 inches wide. It has an adjustable cotton-web carrying strap, which is attached by snaphooks to D-rings at the back of the carrier. A pencil is attached to the carrier by a cord. The carrier with contents weighs approximately 2 1/2 pounds.

### 8. Aspirator Bulb Assembly (fig. 3)

a. The aspirator bulb assembly consists of a rubber bulb with a one-way valve (1, fig. 3) in its air-discharge end and a plastic adapter (2) in its air-intake end; and a lanyard (not shown) which ties the bulb to the carrier. The plastic adapter is designed to hold a detector ticket, a detector tube, or a sampling tube.

b. When the air-intake end is closed by a detector ticket or a tube, compression of the bulb forces air out of the valve. Releasing the bulb closes the valve and causes air to be drawn through the ticket or the tube into the bulb. The incoming air, passing through the ticket or tube, is checked for contamination



1 Valve 2 Adapter

Figure 3. Aspirator bulb assembly

### 9. Detector Ticket

A detector ticket (6, fig. 2) is a thin (approx 3/64 inch) plastic holder, approximately 2 inches long by 1 inch wide, rounded at one end and square at the other. A fiberglass disk is mounted in a circular hole in the square end; a second fiberglass disk is mounted in a circular depression in the rounded end. Forty detector tickets are contained in a strip (belt) of individually sealed plastic envelopes.

### 10. Detector Tube and Sampling Tube

a. There are four types of glass detector tubes in the ABC-M18A2 kit (blue-band, red-band, green-band, and yellow-band). Each glass tube is 3 inches long and sealed at both ends. A small quantity of chemical-impregnated silica gel is held in the middle of the tube by fabric plugs and a short piece of wire. The impregnate is a different chemical reagent for each of the four types of detector tubes. The tube is lightly scored about 5/8 of an inch from each end to permit the ends to be broken off easily. Each tube is marked at one end with two colored bands, one on each side of the score mark. Twenty-five detector tubes of a single type are packaged in a fiberboard clip (3, fig. 2). A discard date is marked on the outside of the carrier. The tubes should not be used after this discard date is reached.

b. *Sampling Tube.* A sampling tube is identical with a detector tube except that the silica gel it contains is not impregnated with a chemical reagent. Sampling tubes are marked with two white bands in the same manner as detector tubes. They are packaged 25 in a fiberboard clip.

### 11. Instruction Cards

Six plastic cards (12 pages) contain instructions for use of the kit (para 21 through 30, test Procedures). Instruction cards (2, fig. 2) are arranged in order and are fastened together by one end of a cord, the other end of which is attached to the carrier.

### 12. Plastic Squeeze Bottles

Three squeeze bottles (7, fig. 2) are made of translucent plastic. They are approximately 2-5/8 inches high and are fitted with screwcaps, which cover and protect removable dropper tips. Tips can be removed from the tops of the bottles with finger pressure. Each bottle is equipped with a colored plastic cap which matches a colored band on the bottle. The blue-marked bottle contains a solid reagent which must be dissolved in water before it is used. The white-marked bottle contains buffered water solution. The green-marked bottle is empty; it is used to contain a reagent solution which must be prepared fresh each day that the kit is used (para 17).

### 13. Reagents

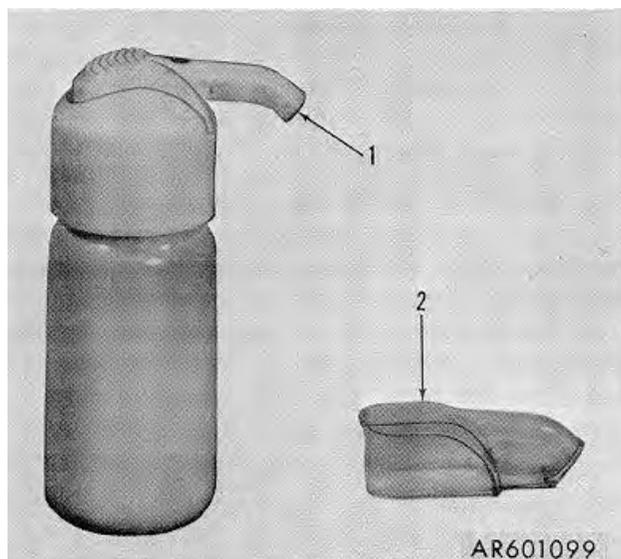
Solid reagents used to prepare the solution to fill the green-marked bottle are held in a plastic container (12, fig. 2).

a. Fourteen tablets are contained in a small glass vial (10). The stopper and the top third of the vial are green.

b. Fourteen straws containing powder reagent (11) are made of clear plastic; they are about 5/32 inch in diameter and 1-7/8 inches long.

### 14. Substrate Dispenser (fig. 4)

The substrate dispenser (13, fig. 2) is a plastic coated glass bottle (1/2 ounce) capped with a red-marked plastic nozzle (1). The nozzle is covered with a removable plastic protective cap (2). The dispenser is filled with substrate solution under pressure. Carefully depressing the top of the dispenser releases substrate solution drop-by-drop from the nozzle.



1. Nozzle                      2. Protective cap

Figure 4. Substrate dispenser.

### 15. Detector Paper

One book of ABC-M8 VGH chemical agent detector paper (fig. 5) is packaged in a plastic envelope. Each book contains 25 sheets of detector paper capable of detecting liquid nerve and blister agents by color changes. Colors for comparison purposes and instructions for using the paper are printed on the cover of the book.

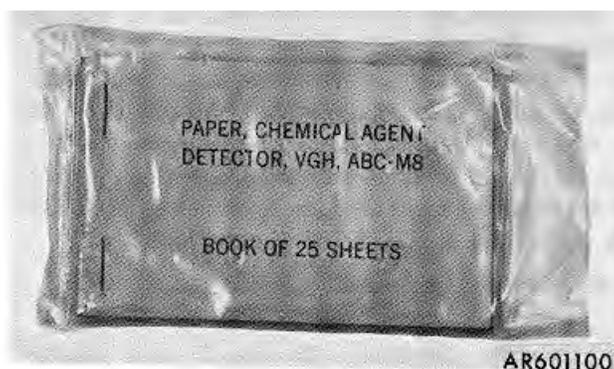


Figure 5. Book of ABC-M8 VGH chemical agent detector paper

### 16. Report Cards and Inspection Date Card

a. There are five report cards (12, fig. 2) each contained in a moisture-resistant envelope. A completed report card is enclosed in the envelope with samples of unknown agent taken in white-band sampling tubes (para 30). Samples are forwarded for analysis and identification to the chemical laboratory designated in the unit's SOP.

b. The inspection card (5) remains in the kit at all times. On it are recorded the dates on which the kit was inspected for condition of components. The date on the inspection card also provides a check of the discard date stamped on the outside of the carrier to determine if detector kit should be exchanged for a new one.

#### NOTE

Plastic pockets furnished with present kits are no longer needed. Future kits will not include them.

## SECTION III

## PREPARATION OF SOLUTIONS

**17. Green-Marked Squeeze Bottle**

Prepare a fresh reagent solution in the green- marked bottle every day that the kit is used.

- a. Unscrew and remove the cap on the green-marked bottle.
- b. Remove the dropper tip from the bottle (fig. 6).

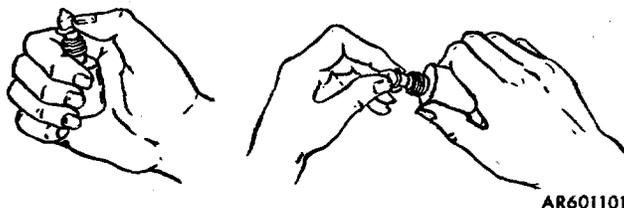


Figure 6. Removing dropper tip from bottle

- c. Empty the contents of one plastic packet of reagent (10, fig. 2) into the bottle taking care not to spill any of the reagent. Add one tablet from the green-top vial (9). Crush the tablet inside the plastic bottle by squeezing the walls of the bottle gently. The plastic packets of powder reagent and the green-top vial of tablet reagent are contained in a plastic container (11, fig 2).

- d. Pour clear water (any water fit for drinking, treated or untreated) into the bottle until the liquid level reaches the mark on the side of the bottle.

- e. Replace the dropper tip and screw the cap on tightly. Shake the bottle vigorously until little or no solid material settles to the bottom of the bottle.

- f. The prepared solution is good for approximately 24 hours. Discard the solution remaining in the bottle after 24 hours and wash the bottle.

**18. Blue-Marked Squeeze Bottle**

- a. The first time that the kit issued, remove the cap and the dropper tip (fig. 6) and fill the bottle with clear water up to the mark on the side of the bottle.

- b. Replace the tip and screw the cap on tightly. Shake the contents until the solid reagent dissolves.

**NOTE**

This solution may be used until exhausted.

**19. White-Marked Squeeze Bottle**

The solution in the white-marked bottle is ready for use as received.

**20. Red-Marked Dispenser**

The substrate solution in the red-marked dispenser is ready for use as received.

## SECTION IV TEST PROCEDURES

### 21. General

#### **WARNING**

Because of possible injury or death if toxic agents are present, protective masks with hoods, clothing, and gloves must be worn when using the kit.

a. Chemical agents will be detected either as gases or fine aerosols, as surface contamination (invisible or residual), or as visible liquid. In making the tests, bear in mind that chemical agents in the form of gas or aerosols will be borne away by wind or ventilation, provided the upwind area is uncontaminated. Chemical agents that are present as surface contamination or visible liquid will persist until they have evaporated or have been decontaminated.

#### **NOTE**

It might be helpful for depot personnel and other users wearing rubber gloves to use the carrier snap fastener opening to break detector tubes at the score marks.

b. When using the ABC-M18A2 chemical agent detector kit, make tests in sequence as described in paragraphs 22 through 29, or as indicated in the instruction cards discussed in paragraph 11. If all tests are negative, but physiological or physical evidence of the presence of an agent seems to exist, collect samples in five white-band sampling tubes (para 30).

#### **CAUTION**

Discard used detector tickets and detector tubes after completing and reporting test results. Color changes on detector tickets and detector tubes are transient. Colors should be viewed within 5 minutes because they will change or fade on standing.

c. Color changes which represent positive tests are described for each test procedure. No color change, or a color change other than that described in the respective test, is considered as a negative test.

d. The validity of positive tests made with the ABC- M18A2 detector kit is not affected by extremes of temperature. However, in below freezing temperatures, carry the plastic squeeze bottles and the substrate dispenser beneath the outer garments to keep the liquid reagents from freezing. Between 32°F and approximately 550F, colors may take up to 5 minutes to develop.

e. When testing for a chemical agent at night, observe the ticket and tube colors under white light such as a flashlight. Place tube flat across the flashlight so that the middle of the tube is directly over the flashlight bulb, and view the tube from the side.

f. Sample for vapors DOWNWIND from the source of contamination and take the sample as close as possible to the surface or object suspected of contamination without touching the surface.

g. To concentrate vapors for sampling of suspected surface contamination-

(1) Place a small can or box over a portion of the suspected area for about 5 minutes.

(2) Punch a hole in the can or box. Hold the detector ticket directly over the hole or insert a detector tube in the hole, and sample. Do not allow the detector ticket or the tube to touch the contaminant.

h. Recap reagent bottles immediately after use to prevent contamination of the reagents. Return them to the kit after use.

i. Use ABC-M8 VGH chemical agent detector paper to test for suspected liquid G or V agents or blister agents (para 29). Make sure that the detector paper touches the suspected liquid. If the paper test indicates positive results for an area in which decontaminants have been used, confirm these positive tests with vapor tests by using appropriate detector tubes or the detector ticket. This confirmation is necessary because some decontaminants will give false positive tests on the detector paper. Concentrate the agent vapors (g above), if necessary.

j. Use of the components in the M3OA1 Refill Kit, NSN 6665-00-909-3647, is recommended when doing extensive testing or training in nerve agent detection. The M3OA1 Refill Kit contains one filled buffer solution (white-marked bottle), one substrate solution (red- marked dispenser), one belt of 40 tickets, one book of ABC-M8 VGH Chemical Agent Detector Paper, and instruction card. The use of the M3OA1 Refill Kit will preclude depletion of these components in the M18A2 detector kits. Simulator, Detector Tickets, Chemical Agents, M5, NSN 6665-00-702-6070, may also be used for training purposes.

### 22. Test for V and G Vapors (Detector Ticket)

a. *General* Use detector tickets to test for the presence of nerve agents (V and G) in the atmosphere. Bear in mind that the detector ticket test will not differentiate between V and G. Use one or more detector tickets as required to accomplish the sampling mission. Handle the ticket by the edges to avoid touching the disks.

#### **WARNING**

Due to low volatility of V-agents, liquid agent may be present even though no vapor is detected.

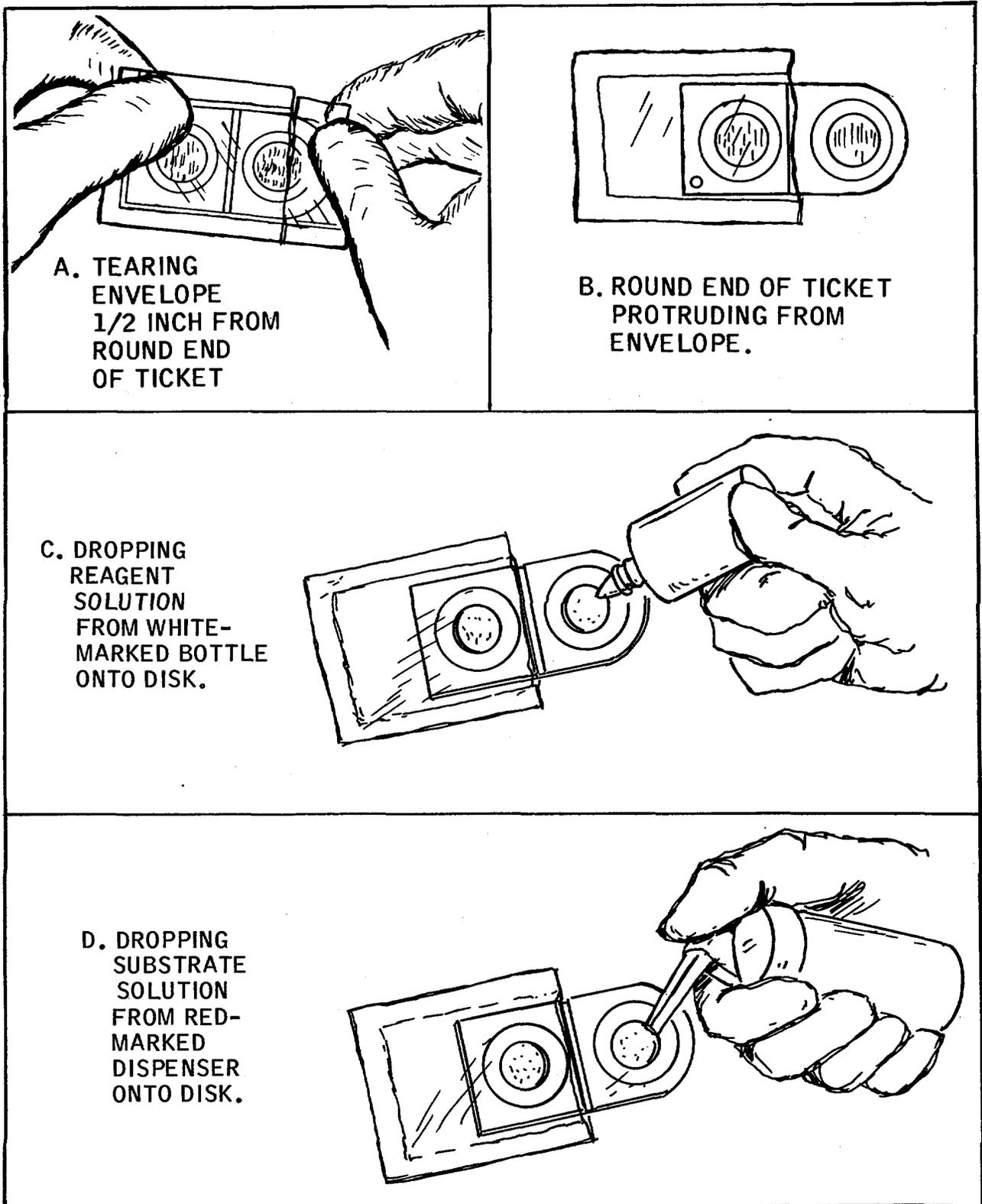
b. *Checking the Belt of Detector Tickets Before Use* (fig 7). The following check of detector tickets in a belt

should be performed just prior to each entry into a contaminated area to assure that the belt is serviceable. The check is necessary to avoid false positive indications and should be conducted in an uncontaminated area. No further check of this belt of tickets is required if used within a reasonable time (up to one week) after the last check. Under the procedure below, a maximum of three tickets will be checked prior to use of the belt of tickets. If a blue color is obtained on two of three checks of tickets from the belt, the belt is usable. If a blue color cannot be obtained on two of three checks of tickets, the belt of tickets is unusable and a fresh kit should be obtained. All tickets used for the check should be discarded after the check, as use of the procedure below may destroy the ability of the tickets to detect agent.

#### NOTE

The following procedure for checking detector tickets before use may differ from that given in the detector kit instruction cards. The procedure listed below is the preferred procedure.

- (1) Detach a plastic envelope containing a detector ticket from the belt of tickets.
- (2) Tear the envelope approximately one-half inch from the top of the round end of the ticket(A). The existing notch or small slash in the envelope will assist in making this tear.
- (3) Push the round end of the ticket out of the envelope (B).
- (4) Add two drops of reagent from the white- marked bottle onto the disk (C). If the disk does not wet easily, insert the ticket into the envelope and massage the round end of the ticket in the envelope until the disk is uniformly wet.
- (5) Remove the plastic guard from the red-marked substrate dispenser. Push the round end of the ticket out of the envelope if it had been placed in the envelope (step 4). Carefully add two drops of the substrate solution onto the wetted disk (D). If disk does not turn blue within 3 minutes, insert the ticket into the envelope and massage the ticket. If a blue color does not develop, discard the ticket and obtain a fresh one.
- (6) After the belt of tickets has been determined to be serviceable, proceed with step c, below.

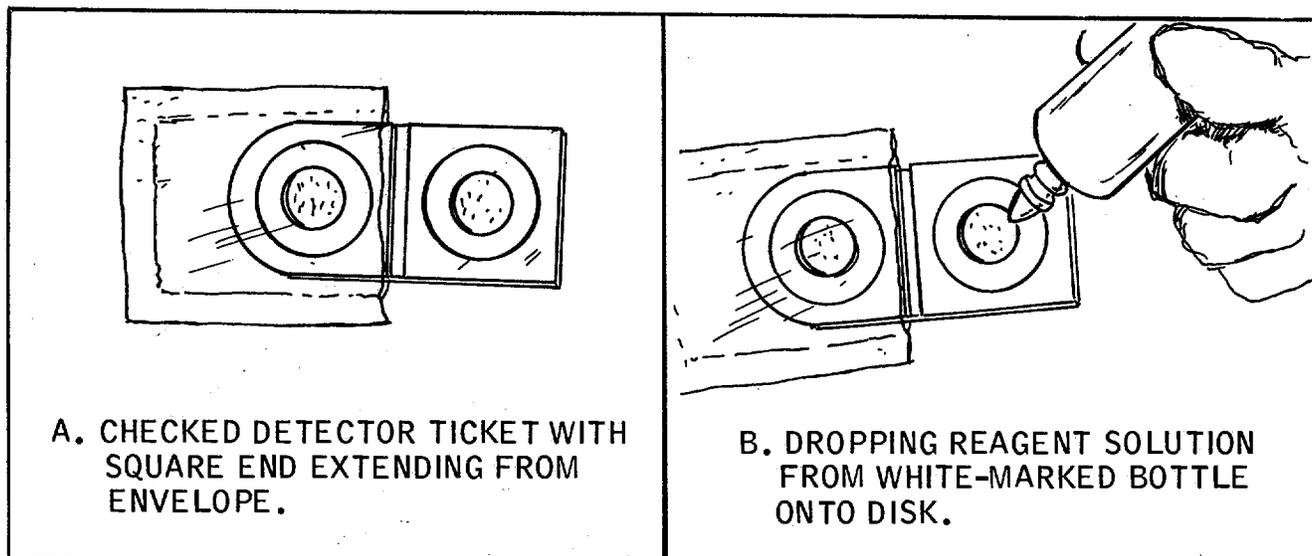


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Figure 7. Checking detector ticket before use.

c. *Preparing Ticket for Use* (fig. 8). The ticket is prepared for use just prior to going into a contaminated area, or while in a contaminated area.

- (1) Detach a plastic envelope containing a detector ticket from the belt of tickets.
- (2) Tear the envelope approximately one-half inch from the top of the round end of the ticket. The existing notch or small slash in the envelope will assist in this tear.
- (3) Reverse the ticket in the envelope until the square end is out of the envelope (A).
- (4) Add two drops of reagent from the white- marked bottle onto the disk in the square end (B). If the disk does not wet easily, reinsert the ticket into the envelope and massage the square end of the ticket until the disk is uniformly wet.

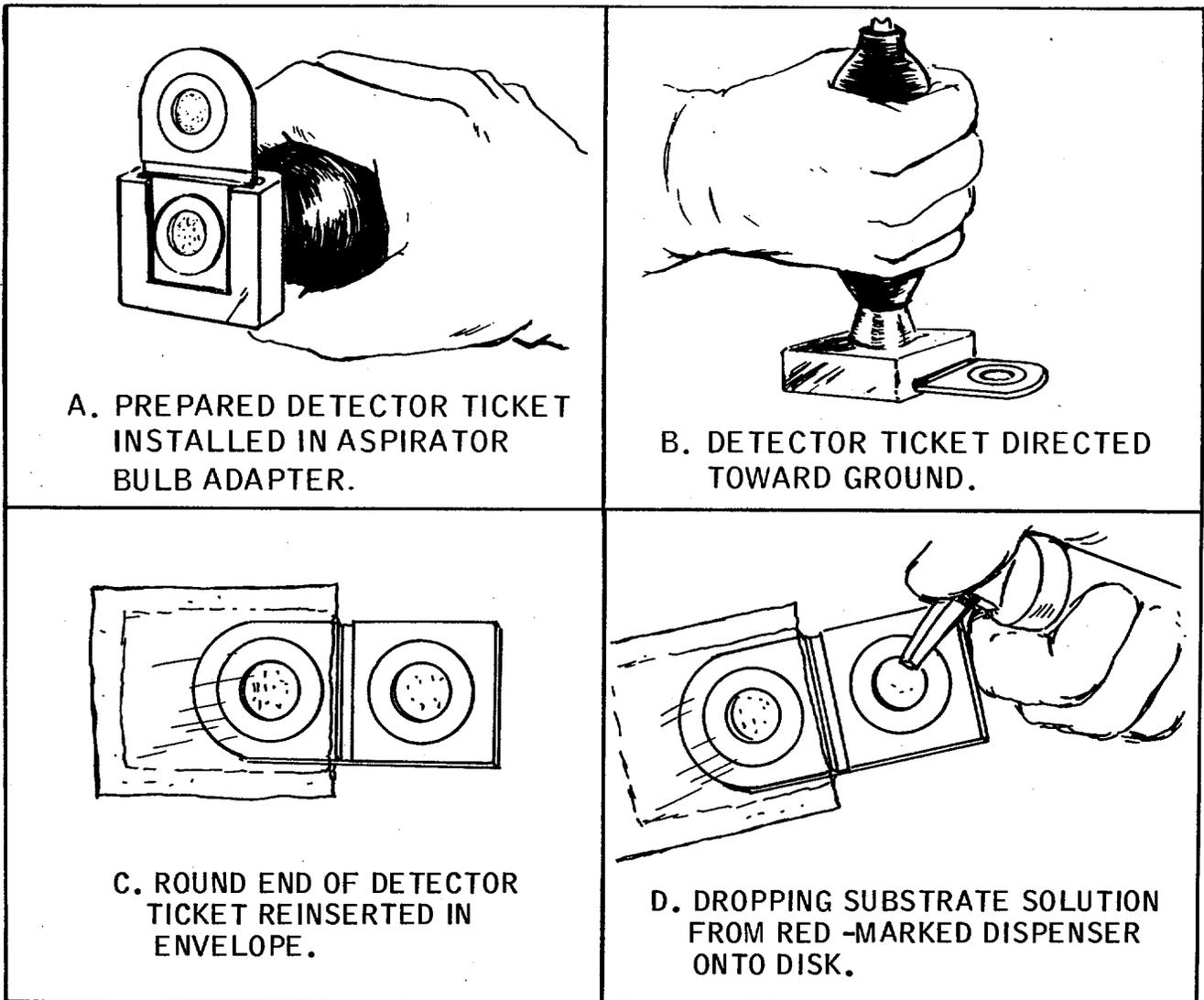


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Figure 8. Preparing ticket for use.

d. *Collecting and Testing Vapor Samples* (fig. 9).

- (1) Install the square end of a prepared detector ticket in the aspirator bulb adapter with the plastic cross support behind the disk facing toward the bulb (A).
- (2) Direct the ticket toward the ground (B) and compress the bulb sixty times. Allow the bulb to reinflate completely between compressions.
- (3) Withdraw the ticket from the aspirator bulb adapter and insert the round end of the ticket into the envelope (C) so that the square end still is not covered by the plastic (C).
- (4) Carefully add two drops of substrate solution onto the disk at the square end of the ticket (D). Push the ticket all the way into the envelope. Massage the ticket in the envelope.
- (5) Observe the color of the disk in the square end of the detector ticket. Indication will appear within 3 minutes.
  - (a) If the disk is white or light red- orange, V- or G-agent, or a combination of V- and G-agent is present in the atmosphere.
  - (b) If the disk is blue, no V- or G-agent is present in the atmosphere.
  - (c) If most of the disk is white or light red-orange, with a fringe of blue, very low concentrations of V or G agents are present.



AR601104

Figure 9. Collecting and testing vapor samples.

**23. Test for CK**

- a. Snap both ends from a blue-band detector tube at the scorings and press the unmarked end of the detector tube into the adapter as shown in figure 10. With the detector tube pointing down, compress the bulb sixty times.
- b. Remove the detector tube from the adapter. If a yellow or orange color appears in the detector tube, CK is present. Discard the detector tube and omit the test for G-agent (para 24) and the test for mustards or CX (para 25).

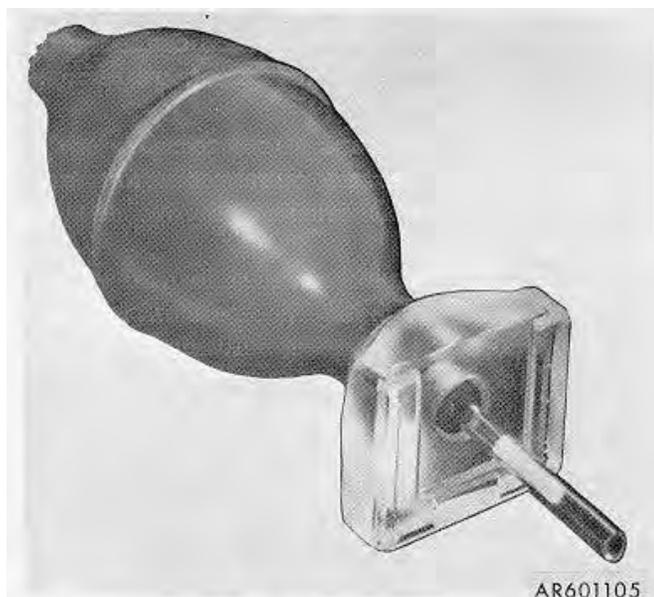


Figure 10. Detector tube in position in adapter.

#### 24. Test for G-Agent

a. Perform this test only if the CK test (para 23) is negative (no yellow color) following detector ticket test (para 22). Use the blue-band detector tube from the CK test for this test. White-band detector tubes may be used if there is a shortage of blue-band tubes. However, the white-band tubes are not to be used to test for other than G agents.

b. Squeeze one drop of reagent solution from the green-marked bottle into the banded end of the detector tube. If yellow appears within 1 minute, G-agent is present.

#### 25. Test for Mustard or CX Vapors

a. Perform this test only if the CK test (para 23) is negative. Use a blue-band detector tube for this test.

Figure 10. Detector tube in position in adapter.

b. Snap both ends from the detector tube at the scorings and press the unmarked end of the tube into the adapter and with the detector tube pointing down, compress the bulb sixty times. Remove the detector tube from the adapter.

c. Wait at least 2 minutes after sampling, then drop one drop of reagent solution from the blue-marked bottle into the banded end of the detector tube.

d. If the purple-blue ring or color appears, H, HD, HN, or HT is present. If a red-brown ring or color appears, CX is present (a light brown color which fades within 15 seconds is not a positive test).

#### 26. Test for L, ED, or MD

Use a yellow-band detector tube to determine whether L, ED, or MD is present in the area. 4-6

a. Snap both ends from a yellow-band detector tube at the scorings and press the unmarked end of the detector tube into the adapter and with the detector tube pointing down, compress the bulb sixty times.

b. Remove the detector tube from the adapter and observe the color. If a blue-green ring or color is observed, ED or a high concentration of L is present.

c. Squeeze one drop of reagent solution from the blue-marked bottle into the banded end of the detector tube. If a blue or blue-green ring or color appears, L, ED, or MD (singly or in combination) is present.

#### 27. Test for CG

Use a green-band detector tube to determine whether CG is present in the area.

a. Snap both ends from a green-band detector tube at the scorings and press the unmarked end of the tube into the adapter and, with the detector tube pointing down, compress the bulb sixty times.

b. Remove the detector tube from the adapter and observe the color. If a green ring or color appears, CG is present.

#### 28. Test for AC

Use a red-band detector tube for the presence of AC in an area.

a. Snap both ends of the detector tube at the scorings and press the unmarked end of the detector tube into the adapter and with the detector tube pointing down, compress the bulb sixty times.

b. Remove the detector tube from the adapter. If the blue ring or color appears in the detector tube, AC is present.

#### 29. Test for Liquid Agents (Blister and Nerve Agents) On Surfaces

If the suspected surface contamination is in liquid form (puddles, small drops, or barely visible droplets), test for agent with ABC-M8 VGH chemical agent detector paper.

a. Tear out a sheet of detector paper from the book.

b. Place the paper in contact with the suspected surface (blot-do not rub) and observe the color change, if any.

c. Compare the color change with the typical colors shown on the inside front cover of the book. Yellow indicates the presence of G-agent, red indicates the presence of blister agents (H, L, and CX) and dark green indicates the presence of V-agent.

**NOTE**

Certain G-agents give a red-brown color which is intermediate between the typical H and G colors. Decontaminants such as DS2 will turn M8 paper dark green (nearly black) and caustic soda will turn the paper red. Caution should be taken in interpreting M8 paper color changes when DS2 and caustic soda are in the area being sampled.

**30. Sampling for Unknown Agents**

When no positive tests are obtained with the preceding tests and the presence of chemical agent is suspected-

a. Complete a report card. Be sure to record information which may be helpful in determining the nature of the unknown agent, such as identification of the unit taking the samples; the place, date, and time the samples are taken; observed characteristics of the agent, and the effect of the agent on men. List the observed color effects on the various types of detector tubes.

b. Select an area for sampling that is likely to have a high concentration of agent (a depression in the ground or just above a puddle of liquid agent). Take samples in five white-band sampling tubes. The instructions given below apply to each of the five sampling tubes.

- (1) Snap both ends from a white-band sampling tube at the scoring and press the unmarked end into the adapter.
- (2) With the sampling tube pointing down, compress the bulb sixty times.
- (3) Remove the sampling tube from the adapter and place it in the envelope containing the completed report card.

c. Place the five sampling tubes and the report card in an envelope, seal the envelope, and forward to the chemical laboratory designated in the unit's SOP.

**31. Summary of Tests**

Tests (para 22 through 30) in sequence are summarized in table 1.

Table 1. Summary of Tests

Test	Using	Bulb compression	Add from bottle	If you get (positive test)	You have
1 (para 22)	Detector ticket	60	white-marked (2 drops) red-marked (2 drops)	Square end white or light red-orange	nerve agent G or V (or both)
If test 1 is negative, omit test 3.					
2 (para 23)	Blue-band tube	60	nothing	yellow or orange	CK
If test 2 is positive, omit tests 3 and 4. If test 2 is negative, use the tube from test 2 with no additional bulb compressions.					
3 (para 24)	Blue-band tube	O	green-marked (1 drop)	yellow (within 1 minute)	G
4 (para 25)	Blue-band tube	60	after 2 minutes blue-marked (1 drop)	purple-blue ring red-brown ring	H, HD, HT, HN CX
5 (para 26)	Yellow-band tube	60	Blue-marked (1 drop)	Blue-green or blue ring.	L, ED, or MD
6 (para 27)	Green-band tube	60	Nothing	Green ring	CG
7 (para 28)	Red-band tube	60	Nothing	Blue-ring	AC
If tests 1-7 do not positively detect the chemical agent, and a chemical agent is suspected, takes samples in five white-band tubes.					
8 (para 29)	VGH chemical agent detector paper	NA	Nothing	Yellow Red Dark green	G H,L,CX V
9 (para 30)	White-band tubes	60	Place exposed tubes in envelope with completed REPORT FORM and send to the chemical laboratory designated in the unit SOP.		

## SECTION V

MAINTENANCE INSTRUCTIONS

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**32. Operator Maintenance**

- a. It is the operator's (user's) responsibility-
  - (1) To keep the kit dry (the kit is not waterproof).
  - (2) To request the organization supply activity to initiate a requisition for a replacement kit in a timely manner to insure that a usable kit is always available (paragraph 33). Exception date should be cited on the requisition, i.e., "Condition Code A Assets Only," to prevent receipts of kits with unacceptable remaining useful life.
  - (3) To examine the red-band and green-band detector tubes (without regard to detector kit discard date) to determine whether they are in usable condition.
- b. A red-band tube is in usable condition when the impregnated silica gel is colorless or light pink. Discard red-band tubes when the impregnated silica gel is blue or green. (See instruction cards for color.)
- c. A green-band tube is in usable condition when the impregnated silica gel is yellow or light tan. Discard green-band tubes when the impregnated silica gel is brown or green. (See instruction cards for color.)

**33. Organizational Maintenance**

- a. It is the responsibility of the organization to maintain a usable kit at all times and to store the kit when not in use. A usable kit is one in which-
  - (1) The discard date of the kit (as stamped on out- side of the carrier) has not expired.
  - (2) There are sufficient components to perform at least five complete series of each test (para 22 through 30).
  - (3) The aspirator bulb assembly is functioning pro- perly.
- b. Check the aspirator bulb at least semiannually. Insert the end of a sealed detector tube (end unbroken) in the aspirator bulb adapter and compress the bulb holding the valve end up. The bulb should require at least 10 seconds to reinflate after the bulb has been released. If the bulb reinflates in less than 10 seconds, it leaks. To replace the bulb (NSN 6640-00-630-79659)
  - (1) Detach the lanyard from the bulb and pull the adapter from the defective bulb.
  - (2) Insert the adapter in the open end of the replacement bulb and attach the lanyard to the bulb.

**SECTION VI****SHIPMENT, STORAGE, AND DESTRUCTION TO PREVENT ENEMY USE**

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**34. Shipment**

Each ABC-M18A2 chemical agent detector kit is packaged in a fiberboard box. Ten packaged kits are packed for shipment in a wood box. The filled carton weighs approximately 40 pounds and occupies 1.7 cubic foot.

**35. Storage**

a. Store the detector kits in the shipping cartons in which they are received. Store them in a dry place protected to the extent possible from extremes of temperature.

b. Refer to TM 740-90-1 for additional storage instructions.

**36. Destruction to Prevent Enemy Use**

Refer to TM 43-0002-31 for instructions to destroy the detector kits to prevent enemy use.

**APPENDIX A****REFERENCES**

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TM 3-9	Military Chemistry and Chemical Commands (AFR 355-7).
FM 21-40	Chemical, Biological, Radiological, and Nuclear Defense.
FM 21-41	Soldier's Handbook for Defense Against Chemical and Biological Operations and Nuclear Warfare.
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 43-0002-31	Destruction of Chemical Weapons and Defense Equipment to Prevent Enemy Use.
TM 740-90-1	Administrative Storage of Equipment.

By Order of the Secretary of the Army:

Official:

PAUL T. SMITH  
Major General, United States Army  
The Adjutant General

FRED C. WEYAND  
*General, United States Army*  
*Chief of Staff*

Distribution:

To be distributed in accordance with DA Form 12-28, (qty rqr block No. 73) Operator maintenance requirements for Detector, Agent.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

 <div style="border: 1px solid black; border-radius: 15px; padding: 5px; display: inline-block; margin-left: 20px;"> <p style="font-size: small; margin: 0;">THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.</p> </div>		SOMETHING WRONG WITH PUBLICATION	
		FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)	
		DATE SENT	
PUBLICATION NUMBER		PUBLICATION DATE	PUBLICATION TITLE
BE EXACT PIN-POINT WHERE IT IS			
PAGE NO.	PARA- GRAPH	FIGURE NO.	TABLE NO.
IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.			
PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER			SIGN HERE

# THE METRIC SYSTEM AND EQUIVALENTS

## WEIGHT MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches  
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches  
 1 Kilometer = 1000 Meters = 0.621 Miles

## WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces  
 1 Kilogram = 1000 Grams = 2.2 lb.  
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

## LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces  
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

## SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches  
 1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet  
 1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

## CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches  
 1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

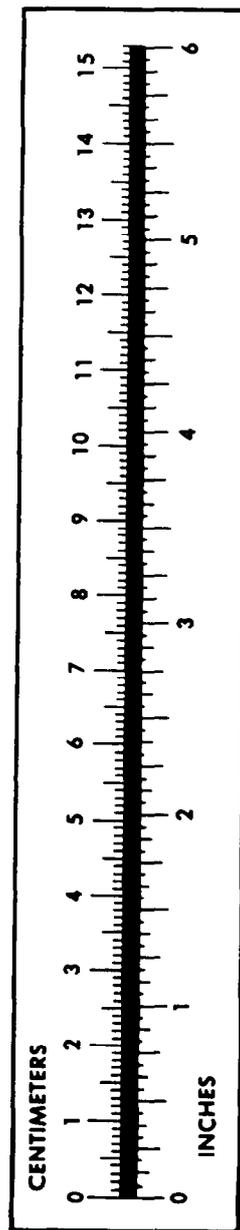
## TEMPERATURE

$5/9(^{\circ}\text{F} - 32) = ^{\circ}\text{C}$   
 212° Fahrenheit is equivalent to 100° Celsius  
 90° Fahrenheit is equivalent to 32.2° Celsius  
 32° Fahrenheit is equivalent to 0° Celsius  
 $9/5^{\circ}\text{C} + 32 = ^{\circ}\text{F}$

## APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
its	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
ometers per Liter	Miles per Gallon	2.354
ometers per Hour	Miles per Hour	0.621



**PIN: 025848-001**