

# *Chemical warfare agent detection*



Lesson topic 4.2

# *Enabling Objectives*

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- ★ ***Perform*** the procedures to detect and classify chemical agent stimulants
- 🕒 ***Describe*** the characteristics and capabilities of shipboard chemical agent detection equipment
- 🕒 ***Describe*** the procedures to use the M256A1 chemical agent detection kit for unusual conditions
- 🕒 ***Describe*** the procedures to use the M9 chemical agent detection paper for usual and unusual conditions

# *Enabling Objectives*

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- 🕒 Describe the characteristics and capabilities of the M256A1 chemical agent detection kit
- 🕒 Describe the characteristics and capabilities of the M9 chemical agent paper

# *Chemical Agent Detection Kit*

## *M256A1*

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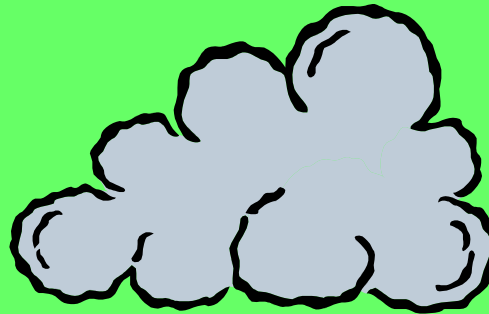
⌘ Identifies the following

☑ Blister agents

☑ Blood agents

☑ Nerve agents

⌘ Vapor state only



# *Characteristics*



- ⌘ Twelve sampler detectors
- ⌘ 8 glass ampoules
- ⌘ 3 test spots: blister, blood & nerve
- ⌘ Chemical heater (for blister agent)
- ⌘ Protective strips & Tabs
- ⌘ Lewisite detection tablet

# *Characteristics*



- ⌘ One book M-8 paper
- ⌘ One set of operational instruction cards

# *Identifying agents*

## ⌘ Blister agent test spot

- ☒ Purple/blue, mustard agent present
- ☒ Red/purple, phosgene oxime present
- ☒ Colorless, no blister agent

## ⌘ Blood agent test spot

- ☒ Pink or blue, blood agent present
- ☒ Colorless/tan, no blood agent

# *Identifying agents*

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## ⌘ Nerve agent test spot

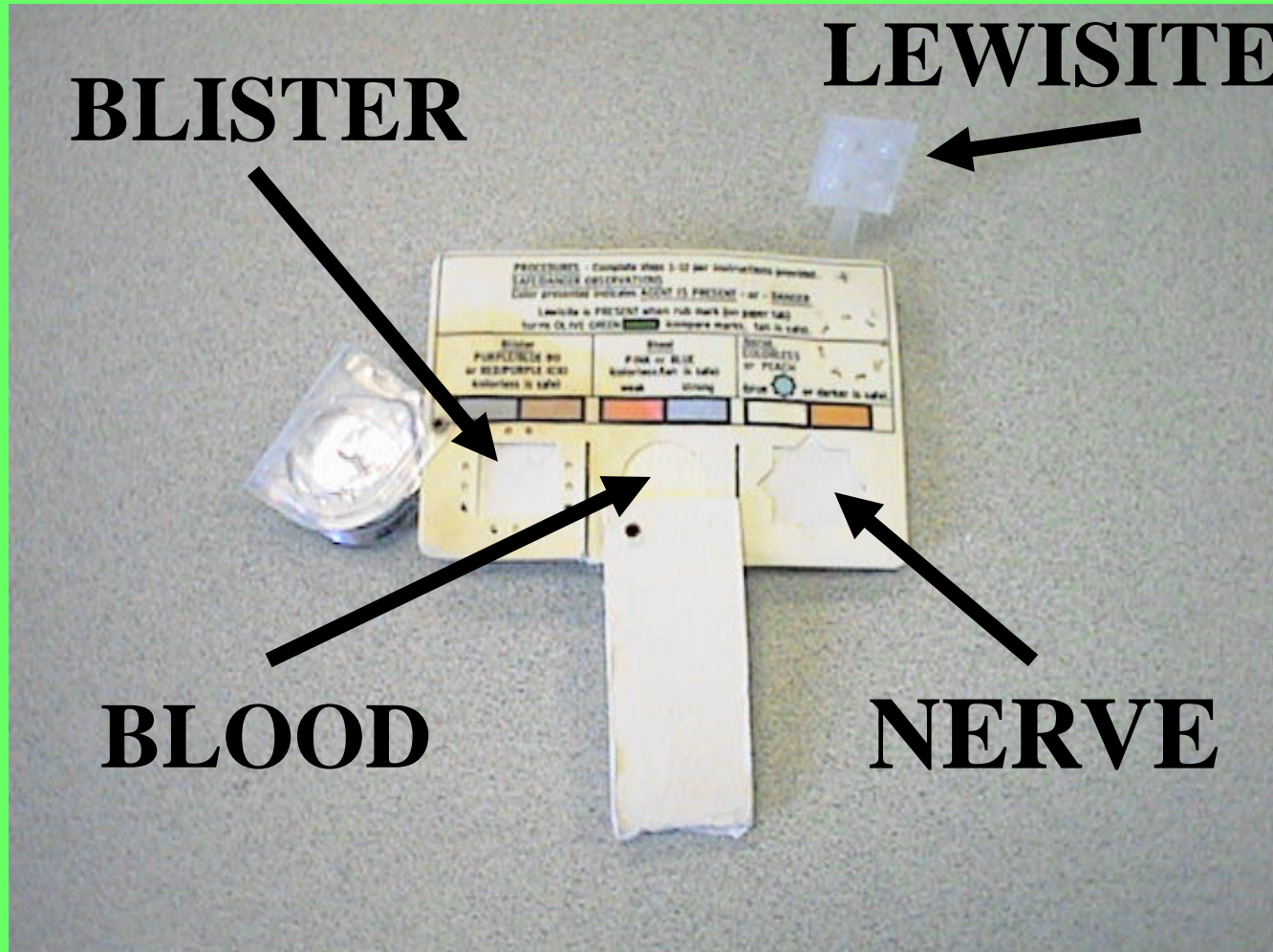
- ☑ Colorless or peach, nerve agent present
- ☑ Blue, no nerve agent

## ⌘ Lewisite marking pad

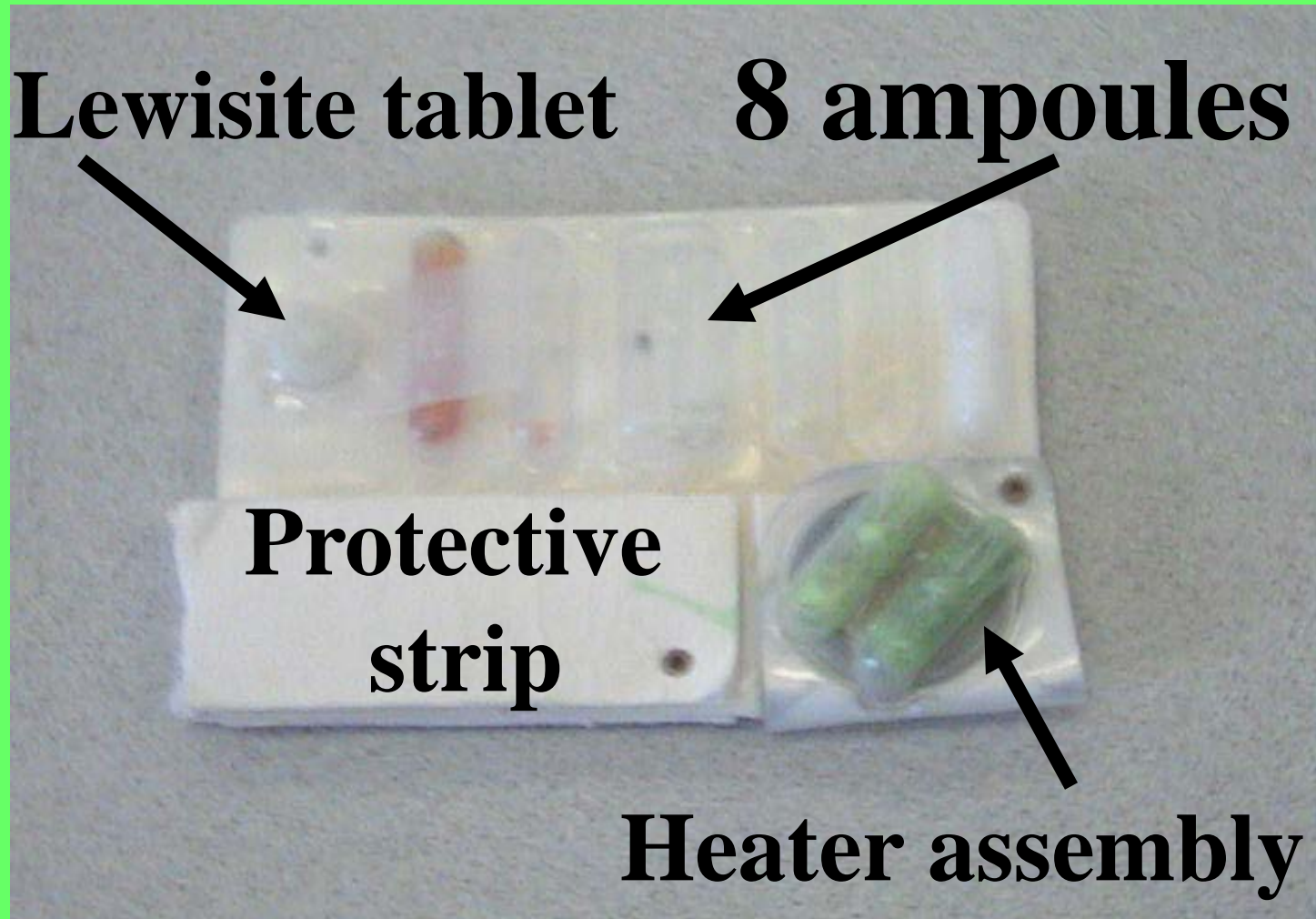
- ☑ Olive green, Lewisite present
- ☑ Tan, Lewisite not present



# M256A1 kit



# *M256A1 kit*



# *M-8 paper*

⌘ 25 sheets, 50 if perforated

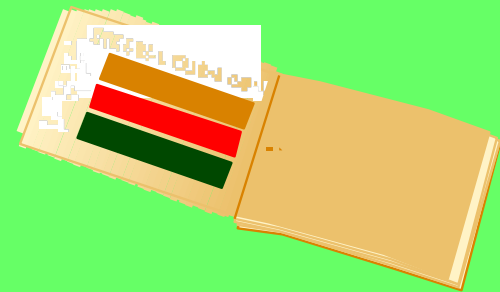
⌘ Capabilities

☑ Nerve

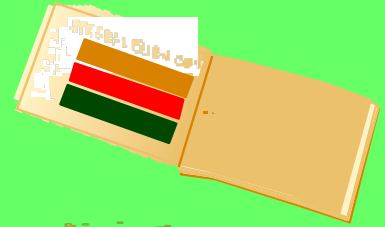
☑ Blister

☑ Liquid form only

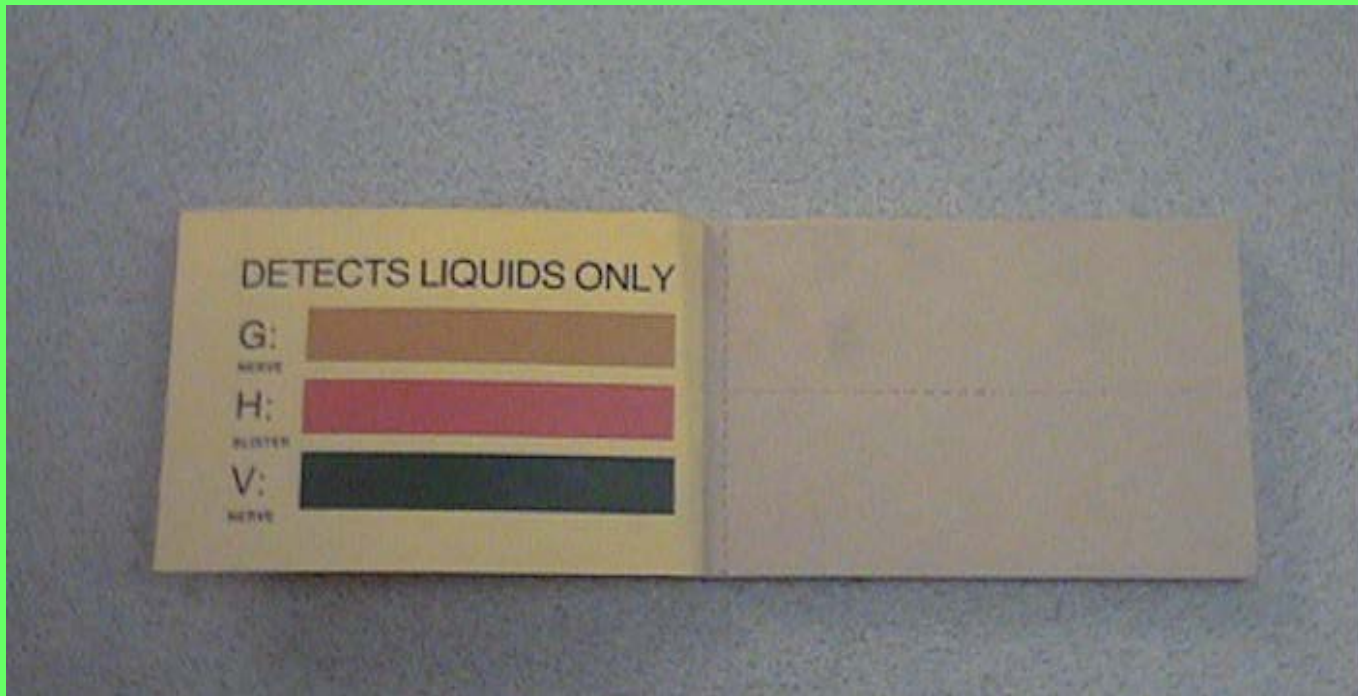
☑ Response time 20 seconds or less



# *M-8 paper*

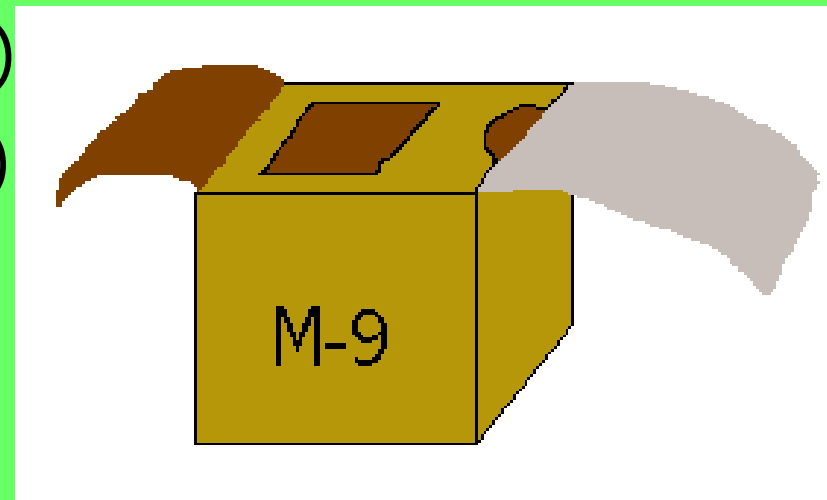


- ⌘ Paper turns yellow, G-nerve agent
- ⌘ Paper turns dark green, V-nerve agent
- ⌘ paper turns red, blister agent



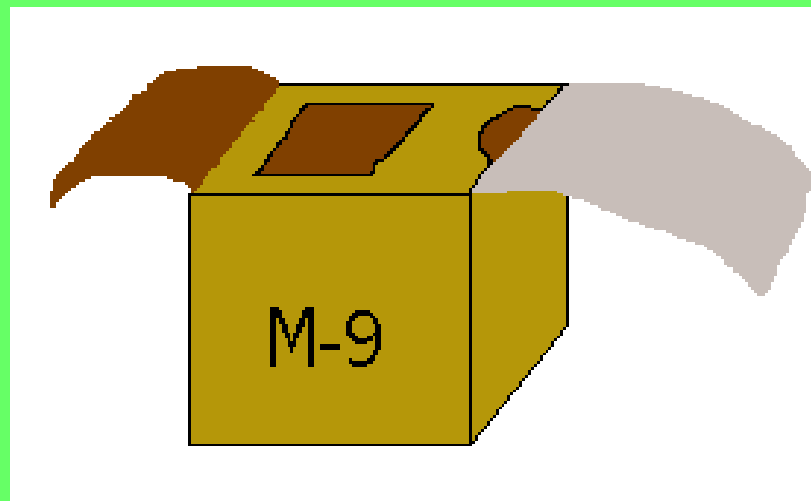
# *M-9 paper*

- ⌘ Colored green for camouflage
- ⌘ Adhesive back
- ⌘ Single roll in a cardboard dispenser
- ⌘ Detection capabilities
  - ☑ Nerve Agents (G and V)
  - ☑ blister agents (H and L)
  - ☑ liquid state only



# *M-9 paper*

- ⌘ Response time 10 seconds or less
- ⌘ Will work in rain, snow and sleet
- ⌘ Reaction is slower when paper is wet
- ⌘ Only red color appears for all agents



# M-9 paper



# *M-9 paper*

- ☠ PAPER MAY CAUSE CANCER
- ☠ ALWAYS WEAR PROTECTIVE GLOVES
- ☠ DO NOT PLACE IN OR NEAR YOUR MOUTH OR ON YOUR SKIN

**DANGER!**

**DANGER!**



# *Chemical Warfare Directional Detector (CWDD) or (AN/KAS-1)*

- ⌘ Shipboard mounted
- ⌘ Portable unit



# *Chemical Warfare Directional Detector (CWDD) or (AN/KAS-1)*

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## ⌘ Primary function

- ☒ Passive infrared imaging sensor that detects nerve agent clouds

## ⌘ Used for

- ☒ Attacks against sister ships in a task force
- ☒ Amphibious ships/boats proceeding ashore
- ☒ Forces in the vicinity of the landing area

# *Chemical Warfare Directional Detector (CWDD) or (AN/KAS-1)*

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## ⌘ Secondary functions

- ☑ Useful in low visibility/night & surveillance
- ☑ Relative bearings

## ⌘ Components

- ☑ Sensor unit
- ☑ Pivot mount
- ☑ Power conversion unit (PCU)

*Chemical Warfare Directional Detector  
(CWDD) or (AN/KAS-1)*

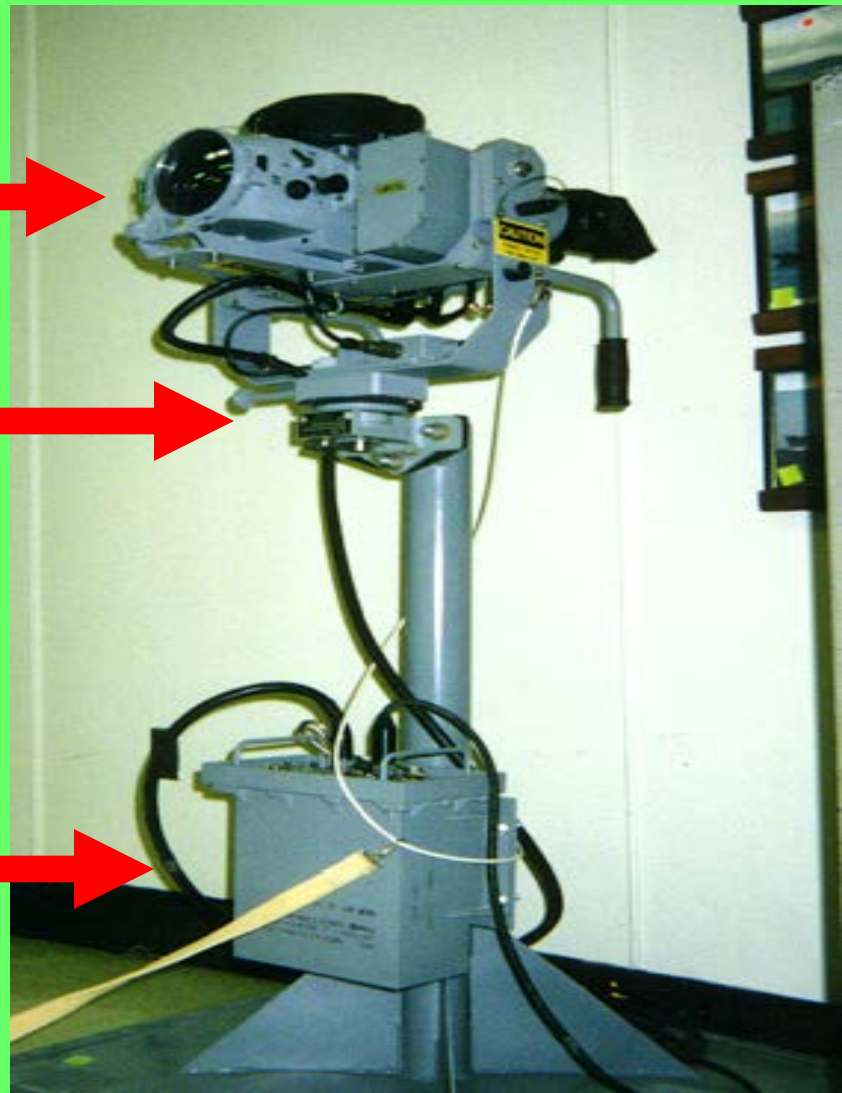
**Sensor unit**



**Pivot mount**



**Power conversion  
unit**



# *Improved (Chemical Agent) Point Detector System (IPDS)*

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- ⌘ Shipboard mounted
- ⌘ Permanent unit
- ⌘ Automatic
- ⌘ Detects vapor nerve agents at a level of 0.3 mg/m<sup>3</sup>
  - ☑ Sarin (GB)
  - ☑ Soman (GD)
  - ☑ VX

# *Improved Agent Point Detector System (IPDS)*

## ⌘ Components

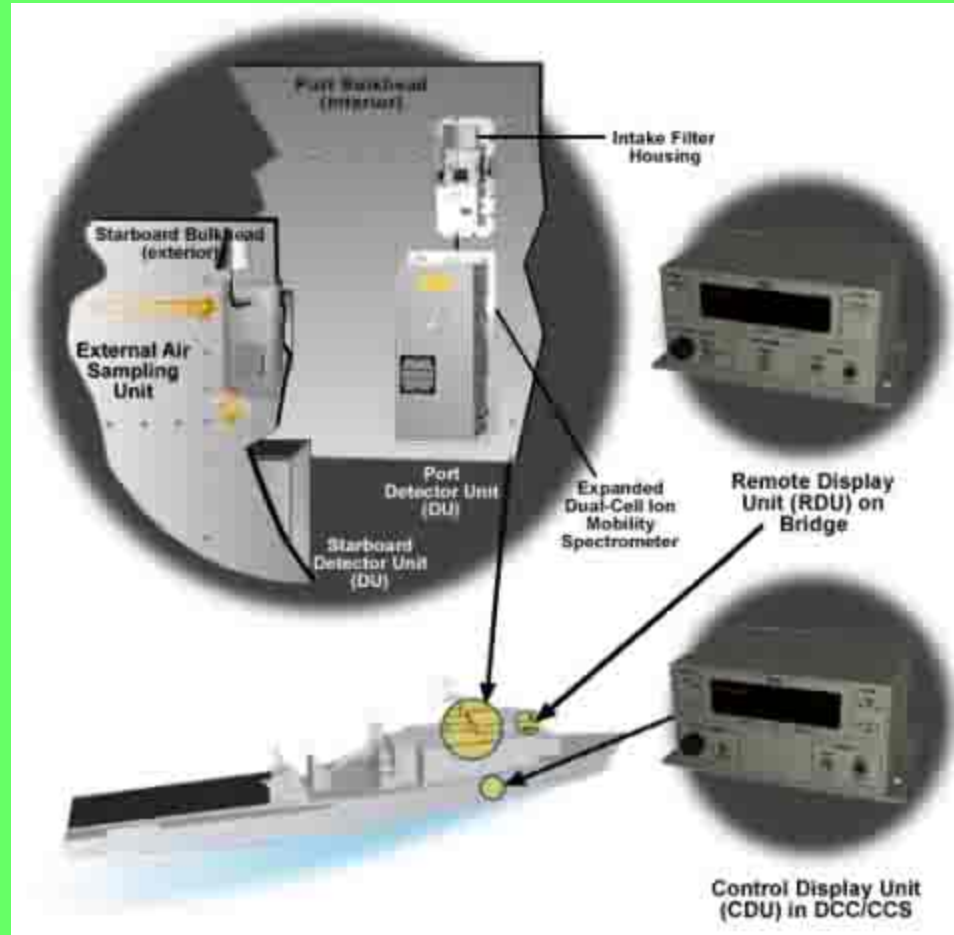
- ☒ 1 detector on bridge (RDU)
- ☒ 2 Intake Filter Housing Units (Port & STBD side on Bridge)
- ☒ Expanded Dual Cell Ion Mobility Spectrometer
- ☒ 1 CDU (Control Display Unit in DCC).

## ⌘ Response time 3 minutes

# *Improved Agent Point Detector System (IPDS)*



# Improved Agent Point Detector System (IPDS)





## *Improved Agent Point Detector System (IPDS)*


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**a fixed-point detection system designed for continuous operation during periods of elevated threat. As a fixed point detector, IPDS does not inform the operator of conditions everywhere on the ship; rather, it informs the operator of conditions at two external air sampling points, and provides an alarm at even low agent vapor concentrations.**

# *Improved Agent Point Detector System (IPDS)*


**After a chemical attack, agent may be present both as liquid and as a vapor cloud around all or part of the ship; or in the event of a near miss; the vapor cloud might be all that the ship encounters. Monitoring with IPDS would alert the crew to the presence of the agent vapor, and detector paper (not a part of IPDS) would indicate the presence of liquid agent**

## *Improved Agent Point Detector System (IPDS)*



**Chemical agents considered to pose the greatest threat may be divided into groups: Nerve Agents such as, GA, GB, GD, and VX, and Blister Agent HD, which primarily attacks the skin and respiratory system. All are extremely toxic, a few breaths of nerve agent vapor can be lethal, and small amount of blister can cause severe burns. These agents, when present in a liquid form, can also be absorbed through the skin with lethal results**

# *Improved Agent Point Detector System (IPDS)*



**IPDS has two Detection Units (DU), each contain two ion mobility spectroscopy (IMS) cells, which have opposite polarities so that nerve and blister agents can be detected simultaneously. The IMS cells are maintained at an elevated temperature of 180 degrees F. to eliminate the effects of ambient environmental conditions and to prevent condensation of the agent vapor in the system. The external temperature of the operator accessible portions of the DU is approximately 140 degrees F.**

# Summary and review

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- ⌘ (IPDS) Improved (Chemical Agent) Point Detection System
- ⌘ Use of the (IPDS)
- ⌘ M-8 & M-9 Paper
- ⌘ Chemical Warfare Directional Detector (CWDD).  
AN/KAS-1