



HAZMATCAD™*

Hazardous Material Chemical Agent Detector

[for First Responders]

Chemical warfare agents (CWAs) and toxic industrial chemicals (TICs) are potential weapons in the arsenal of the terrorist. They can range from sophisticated nerve agents like GB to commonly available chemicals like chlorine. This broad range of threats has led to the development of the HAZMATCAD line of Advanced Hazardous Material Chemical Agent Detectors. This document is designed to help users develop standard operating procedures for using the HAZMATCAD and HAZMATCAD Plus Detectors. These units are designed for ease-of-use and for competency with minimal training.

* HAZMATCAD is a Trademark of Microsensor Systems, Inc.



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Understanding the Technology

First Responders to a chemical attack may be police, firefighters or emergency medical technicians. Their specialties require a broad range of talents and skills. However, their knowledge of analytical methods to identify chemical weapons is often limited.

The HAZMATCAD instrument is based on surface acoustic wave (SAW) technology. The unit incorporates an array of three small solid state sensors coated with specific polymers. The time, amplitude and pattern of signals from all three SAW detectors are used to determine if a nerve or blister agent is present and to eliminate false alarms.

The HAZMATCAD Plus Detector incorporates electrochemical cells in addition to SAW sensors to detect the presence of hydrogen cyanide (blood agent), phosgene (choke agent), halogen gases (chlorine, nitrogen dioxide, fluorine) and hydride gases (arsine, hydrogen sulfide). Electrochemical cells are a common and well-defined detection method; and, while they are not as specific as SAW sensors, they provide reliable results for classes of TIC gases and vapors.

Analytical instruments available to First Responders fall into three general categories:

Detectors look for specific chemicals and alert the user if they are present in a sample. They show little or no interference and are used in a go/no-go type evaluation. Detectors are generally smaller, lighter and easier to use than monitors and analyzers but, have limited flexibility. The HAZMATCAD Detector is in this class of equipment as are colorimetric tubes. Detectors are best suited for the personal protection role.

Monitors generally are employed when a chemical is known to be present and its concentration must be measured and monitored. This type of equipment quantifies the concentration of a specific chemical and is generally more sensitive to a specific chemical than a detector. Monitors can report false positives when non-target chemicals are present. An example of a monitor is an ion mobility spectrometer. Monitors are the first choice in decontamination of victims and equipment.

Analyzers are the most sophisticated of the three categories of instruments. Most have the ability to identify and quantify several vapors or compounds simultaneously. Analyzers are more expensive and require more training than detectors and monitors. Mass spectrometers or gas chromatographs are examples of this category of instrument. Analyzers are best suited to the evidence recovery or forensic investigation phases of an incident.

For the initial assessment of a potential chemical warfare agent attack or toxic industrial chemical spill, **a detector is the instrument of choice.**

Deploying the HAZMATCAD Detector

If it is determined from evidence at the scene that there was a potential use of chemical warfare agents or toxic industrial chemicals, a HAZMATCAD series detector should be selected for site entry and deployed in the following manner:

1. Remove the HAZMATCAD unit from the storage case and open the battery compartment door. Insert two **fully-charged** Sony Lithium Ion batteries NP-550 into the battery compartment and close the battery door.
2. Slide the three-position sample port cover, at the top of the instrument, to the

DUST FILTER position to help prevent particulates from entering the unit.

3. Press the **ON** button. The HAZMATCAD unit will begin a series of diagnostic self-checks.
4. Upon successful completion of the self-test, the green **SYS. OK** status LED will begin flashing, indicating the HAZMATCAD unit is



functioning properly. (Should a fault be detected, the HAZMATCAD Detector will display the fault information on the display.) Additionally, the remaining battery power will be indicated on the display in the form of a 12-line bar graph (more lines mean more battery life).

5. Next the current mode of operation ("**FAST MODE**" or "**HI S MODE**") will flash on the display. The default mode is "**FAST**".
6. At this point the HAZMATCAD unit will perform a system purge to make sure the instrument is free of contaminants that may have accumulated over time. During this initial start-up, "**WARM UP**" will flash on the display.

7. When the display goes blank, the unit is operational. Additionally, the **SYS. OK** status LED will flash a green light and the first sample analysis will begin. After the analysis is complete, the HAZMATCAD Detector will have a steady green **ALL CLEAR** LED light if the safe zone area has no contamination, or **it will alarm if a hazardous agent is present**.

8. As the response team develops its entry plan, let the HAZMATCAD unit continue to run. The instrument will be ready for use in under two minutes. (**In low temperatures, it is advisable to start up the unit in a warm environment to minimize battery drain and maximize performance.**)

9. **Lastly, before leaving the safe zone**, test the HAZMATCAD Detector to make sure it is properly detecting nerve and blister agents by exposing the unit to **the vapor simulant check source** using the following procedure:

- a. Slide the three-position sample port cover to the **OPEN** position.
- b. Remove both caps from the **simulant check source** and firmly place the tube against the sample inlet port for **3 to 4 seconds** while the sampling pump is operating. (**Sampling longer** may require running the unit for several minutes to clear out high levels of simulant.)
- c. If functioning correctly, the chemical contained in the

tube, DMMP (dimethylmethylphosphonate), will cause the HAZMATCAD Detector to display a "**G**" alarm. A "**G**" alarm on the instrument indicates it is **properly detecting both nerve and blister agents**.

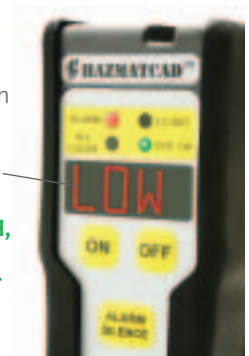
- d. Continue running the HAZMATCAD unit until the **ALL CLEAR** status LED displays a steady green light.

- e. Slide the three position sample port cover back to the **DUST FILTER** position.

- f. **NOTE:** To check the response of the **halogen cell** on a **HAZMATCAD Plus Detector**, use chlorine bleach on a cotton swab held close to, **but not touching**, the sample inlet port then repeat **steps d) and e)**.

10. **The HAZMATCAD Detector is now ready for use.** As you proceed into the potentially hazardous area, the HAZMATCAD unit will respond with either a continued **ALL CLEAR** response or with an alarm. An alarm is indicated by a **red** LED and the associated type and level of the chemical agent.

Toggles between detected level (**LOW, MED or HIGH**), and chemical agent code (**G, H, or TOX, BLoD, CHOK, HYdR, or HALO**)



Instrument Decontamination

After the unit has been deployed and been in contact with a chemical warfare agent or other unknown compounds, it is necessary to check the HAZMATCAD Detector for contamination:

1. Allow the instrument to run in clean air for 15 minutes or longer to purge trace contaminants from inside the HAZMATCAD unit.
2. Turn off the HAZMATCAD Detector and slide the three-position sample port cover to the **CLOSED** position.
3. The HAZMATCAD unit can now be wiped down with soapy water or, if dictated, a 10% bleach solution.
4. The rubber boot should be properly discarded if it shows any visible staining.
5. Remove any residual liquids then wipe down the HAZMATCAD unit with clean water.

The best method of determining whether the decontamination was successful is to place the HAZMATCAD unit in a large plastic bag and seal it tightly. After 60 minutes, sample the air in the bag with another HAZMATCAD Detector or any other appropriate instrument. If any trace contamination is

detected, repeat the instrument decontamination process or contact MSA for help.

Training

In order to become competent with any tool, a certain amount of training is necessary. The HAZMATCAD line of detectors is designed to minimize this time with simple one button activation. Familiarization with the instrument, its capabilities and its limitations can be often accomplished in less than one hour.

It is difficult to perform drills with equipment that does not provide real-world feedback. To provide First Responders with realistic training, a Training Mode is included in all new HAZMATCAD Detectors. This allows the instrument to respond to common chemicals as if they were chemical warfare agents.

Follow this process to provide realistic training opportunities using the HAZMATCAD Detector in Training Mode:

1. Follow the normal start up procedures.
2. When the LED display indicates the first bars of the battery life indicator, press and hold the **MODE** button until the LED display shows the mode of operation (e.g. **"FAST MODE"**). The audible

alarm will activate periodically, indicating that the HAZMATCAD unit is in Training Mode.

3. To activate a chemical warfare agent alarm use several drops, **very small amounts**, of the following products:
 - **Alcohols** such as **isopropyl** will produce a **"G"** or **nerve agent** alarm.
 - **Gasoline** or **other fuels** for an **"H"** or **blister** alarm.
4. To deactivate the Training Mode, turn off the HAZMATCAD Detector. The next time the unit is turned on, it will return to the default detection mode.

The Training Mode allows instructors to develop more realistic simulations and increase First Responder capabilities. An older (or existing) HAZMATCAD Detector can be upgraded with this capability at no charge by contacting MSA.

Conclusion

The HAZMATCAD and HAZMATCAD Plus Detectors are easy to use, reliable and dependable detectors designed for the First Responder community. They provide the ability to screen for a broad range of chemical threats including the most likely chemical warfare agents as well as some of the most toxic industrial chemicals.

Note: This Data Sheet contains only a general description of the product shown. While uses and performance capabilities are described, under no circumstances should the product be used except by qualified, trained personnel, and not until the instructions, labels or other literature accompanying the product have been carefully read and understood and the precautions therein set forth followed. Only they contain the complete and detailed information concerning this product.

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