OPERATION MANUAL

EX - DETECT ™, MODEL XD-2

EXPLOSIVES DETECTOR

SPECTREX CORPORATION
3580 HAVEN AVE
REDWOOD CITY, CA
TEL: (650) 365-6567
WWW.SPECTREX.COM
EMAIL: SPECTREX@SPECTREX.COM

Table of Contents

Title	Page
Introduction	3
Power Sources	3
Operation / Detection	4
Swipe Analysis	4
Swab Analysis	5
System Maintenance	6
Specifications	6
Safety	6
Customer Support	7
Limited Warranty	7
Appendix 1	8
Appendix 2	9

INTRODUCTION

EX-DETECT™ Model XD-2 is considered a semi-automated system, and the time required for the operator to obtain detection is from 0 to 30 seconds. XD-2 performs the entire suite (over 40 different explosives) in this time frame without intervals of calibration between samples. In addition, there is no bake-out or down time after a positive result. Samples for detection analysis are particles collected on swipes or swabs. The detection limits for explosive residue are in low nanogram levels and the detection range is very large, up to grams levels without loss in sensitivity of subsequent samples. The XD-2 uses a combination of proprietary solutions and heat that are applied to the sample swipe material that causes colorless explosives to become colored dyes. The operator dispenses a few drops of the first solution onto the swipe and presses the "heat" button to begin a 20 second heating cycle. Color will immediately appear if aromatic explosives are present on the swipe. Common examples are TNT, DNT, Tetryl, TNB, and DNB. After the "heat" light turns off all other explosives such as RDX (C-4), HMX, PETN (Semtex), NG, EGDN, and DNG are detected by applying the second solution and the second heating cycle. Any color change to the swipe indicates the presence of explosives or energetic materials. Therefore, memorization of colors is unnecessary. If no color change occurs, there is no explosive present as tested by TSL and PSDB.

(Note: The color yellow is not an explosive but is an extremely rare test result with XD-2 as tested by TSA. Of the forty explosives tested, all are blue, green, orange, pink, vermilion, but none exhibit a yellow color. See Appendices 1 & 2.)

Model XD-2 is not hampered with interferences, is not susceptible to environmental backgrounds, and does not require calibration. It designed for all weather use, is rugged, and is ready to use as fast as it can be removed from its carrying case.

POWER SOURCES

Three different power supplies are in each kit: 8 AA batteries provide 250 sample runs, a 110V to 12V at 1-1.6A DC converter for indefinite sample runs, and an automobile cigarette lighter power adapter also for indefinite sample runs.

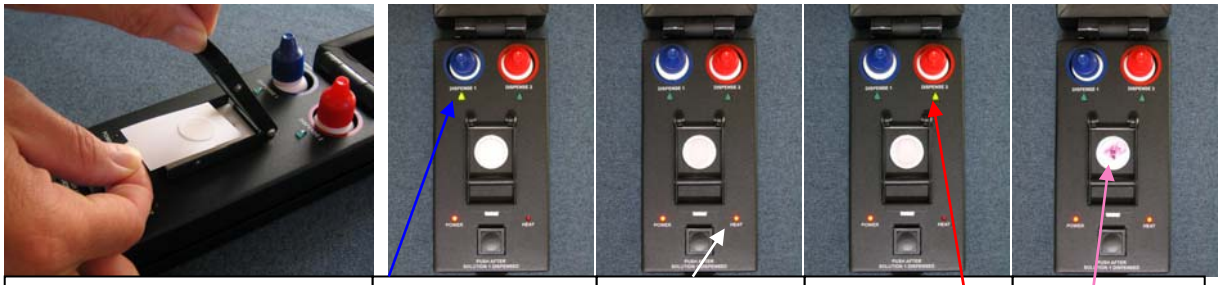
OPERATION

Swipe Analysis

The simplicity of the XD-2 operation is demonstrated in the following 6 basic steps:

1. Lift up the swipe clamp in center of EX-DETECT's sample tray and turn on the power
2. Swipe the article in question (food, suitcase, metal, soil, etc.) by rubbing the swipe over the surface in question.
3. Place the swipe with its attached plastic backing into the sample tray with cloth swipe pad facing up.
4. Snap the hinged clamp back into place to secure the swipe. The green LED arrow in the upper left-hand corner will flash, indicating to dispense two drops of Solution 1 onto the swipe. Three drops ensures the entire swipe pad is wetted to its perimeter edge. The instantaneous appearance of shades of red, vermilion, magenta, orange, blue, or green colors on the swipe indicates positive for nitro-aromatic explosives (TNT, TNB, DNB, DNT, etc.), and therefore an instantaneous testing time.

   (*Note: yellow is not a positive response.)*
5. If no explosives are detected, press the black "heat" button located towards the front center section of XD-2. The red LED in the bottom right corner will turn on for 20 seconds. Heating enhances some of the colors and prepares for the next step.



Lock in swipe	3 Drops Sol.1	Heat	2 Drops Sol.2	Detection/Heat

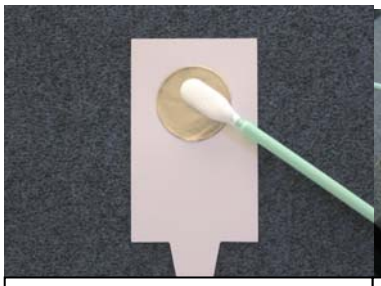
6. After the 20-second heating cycle is complete, the green LED arrow in the upper right hand corner begins flashing indicating to dispense one drop of Solution 2. Instantaneous appearance of shades of red, orange, vermilion, or magenta colors to the swipe indicates positive for nitramine and nitroso-explosives. To enhance the color and dry the swipe, switch on the heater again.

   Note: If the operator feels a mistake was made at any time during the procedure, simply lift the swipe clamp and the device will automatically reset itself to the beginning.

Swab Analysis

1. Place the foil and its attached plastic backing into the sample tray with foil facing up registering it into proper orientation on the sample tray.
2. Snap the hinged clamp back into place to secure the foil.
3. Dispense two drops of Solution 1 onto the swab. The immediate appearance of shades of red, vermilion, magenta, orange, blue, or green colors on the swab indicates that explosives are present.

   Note: yellow is not a positive result.
4. Press the swab on the foil and then press the black square "heat" button.
5. Turn swab over after 10 seconds to ensure heating occurs on both sides of the swab.
6. Wait for the next green LED indicator to flash and then add one drop of Solution 2 to the swab. Any appearance of shades of red, orange, vermilion, or magenta colors to the swab indicates explosives. As above, press the swab on the foil and then press the "heat" button. Heating will enhance the color and dry the swab.



Example of Swab & Foil

Analyzing Swab

We have also designed a two-step test (as described above) that results in a dry, neutralized, and disposable swipe when finished. Battery acid, DMSO, or sprays are not used, and it is not necessary for the operator to hold the swipe during the process. The test solutions have 5 month shelf life when stored and handled properly.

SYSTEM MAINTENANCE

- If battery operation is used, replace the eight AA batteries after 200-250 sample runs.
- The XD-2 surfaces should be wiped clean from rugged outdoor use. For convenience, a cleaning kit available through www.spectrex.com.
- Test the XD-2 unit with a swipe. If the swipe tests positive, then the XD-2 is contaminated and/or the operator's hands are contaminated. Wash hands thoroughly and then wipe the down XD-2 surfaces with wetted paper or cloth towels (water or water/alcohol mixture). The best solvent is acetone, especially for plastic explosives, but is very flammable and care must be taken.

SPECFICATIONS

Dimensions	l x b x h (mm) 165 x 86 x 70
Weight	0.7 kg
Power Supplies	8 ea. AA Batteries (for remote applications) 220V to DC Converter Automobile Cigarette Lighter Power Adapter
Kit Consumables	40 Swabs with 40 Heater Foils 80 Swipes 8 ml Solution # 1 8 ml Solution # 2
Re-supply Test Kit # 1	40 Swabs with 40 Heater Foils 8 ml Solution # 1 8 ml Solution # 2
Re-supply Test Kit # 2	80 Swipes 8 ml Solution # 1 8 ml Solution # 2

SAFETY

The proprietary test solutions are manufactured, and QA/QC controlled in-house and by Sigma-Aldrich. The two-step test results in a swipe that is dry, neutralized, and disposable when finished or can be held for evidence. Solution 1 and 2 are small eight ml dropper bottles with controlled dropper tip that is designed to deliver 50 micro liter drops at a controlled rate. No battery acid is used, or DMSO, or sprays, nor does the operator have to hold the swipe during the procedure as with other colorimetric techniques on the market. Refer to the MSDS for additional information.

XD-2 is compliant with OSHA electrical standards, 29 CFR 1910.303 (a) and 1910.303 (b) (1) (i).

CUSTOMER SUPPORT

EX-DETECT™, Model XD-2

Phone: (650) 365-6567

Fax: 650 365 5845

http://www.spectrex.com

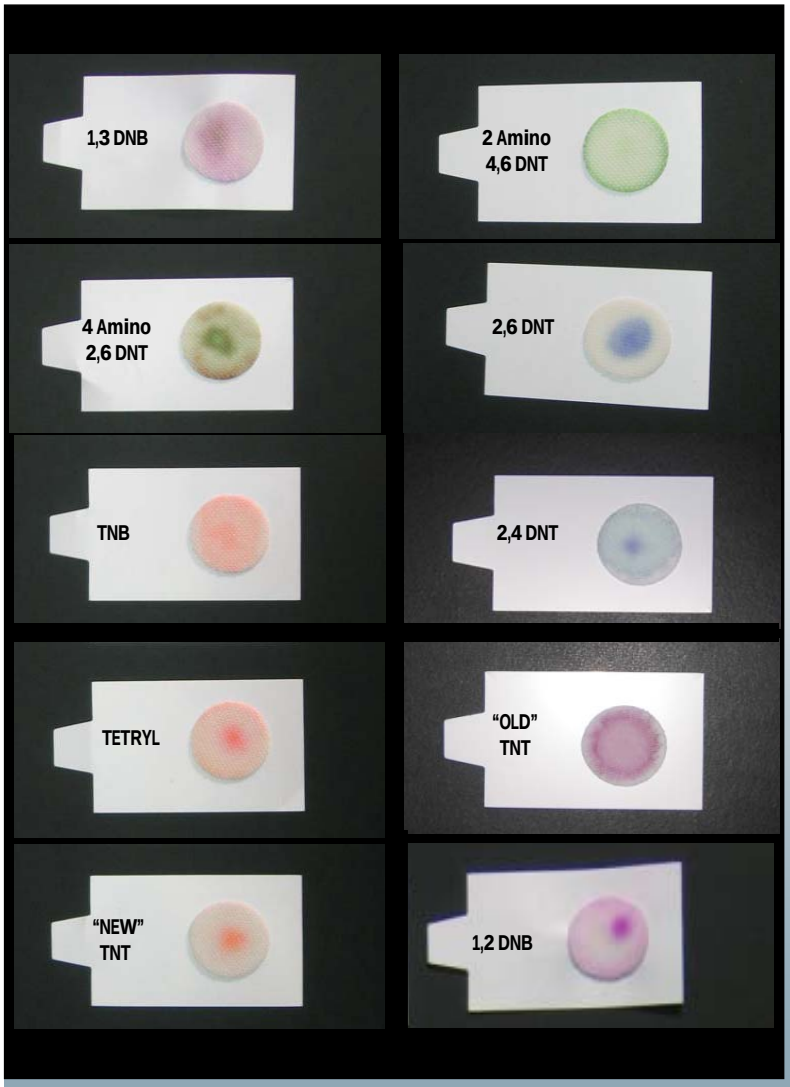
Training is also available.

LIMITED WARRANTY

Spectrex Corporation will replace or repair the XD-2 within 24 hours after receipt for any faulty or failed components not caused by misuse during the first year.

APPENDIX 1

Examples of Explosives with Instantaneous Results



Explosives Detected Instantaneously:

2,4,6-Trinitrotoluene
2,4-Dinitrotoluene
3,4-Dinitrotoluene
2,6-Dinitrotoluene
2-Amino-4,6-dinitrotoluene
4-Amino-2,6-dinitrotoluene
Tetryl
Ethyl Tetryl
1,3,5-Trinitrobenzene
1,3-Dinitrobenzene
1,2-Dinitrobenzene
Lead Styphnate
Hexanitrostilbene

Commercial Mixtures Containing Explosives Above Will Be Detected, Instantaneously As Well; Examples:

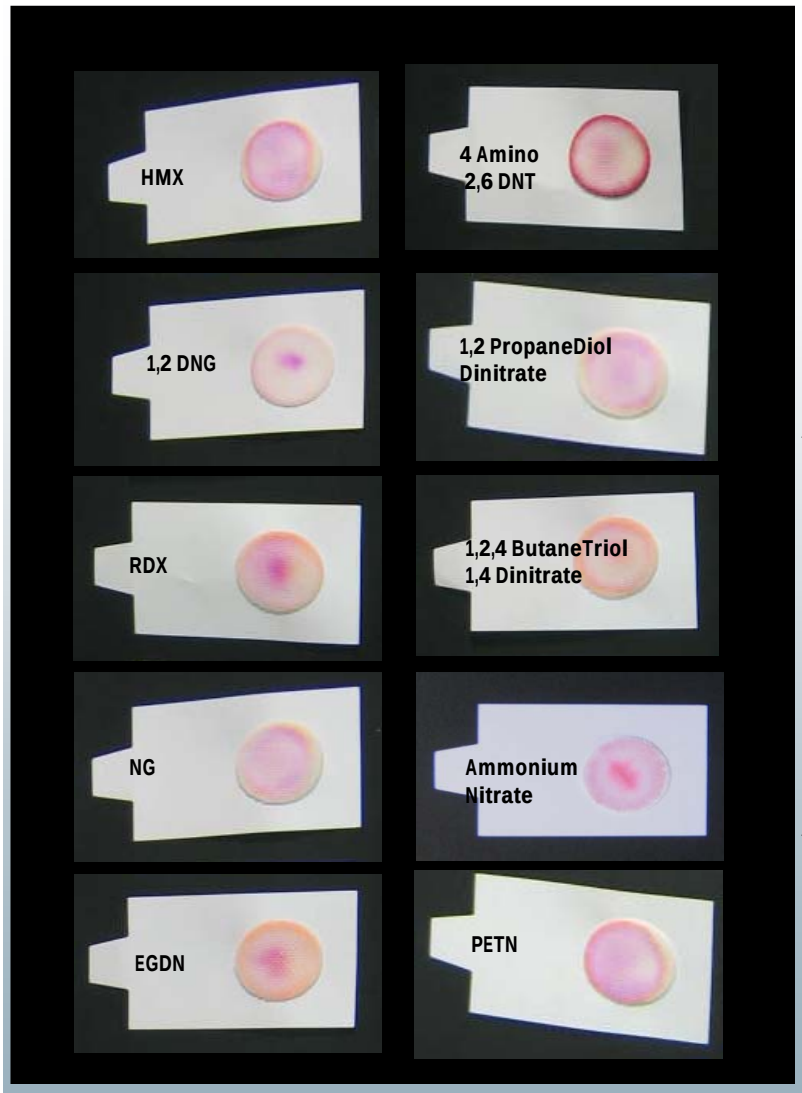
Amatol
Tetrytol
Comp B
Tritonal
Picratol
Pentolite
Octol
Ednatol
Also, over forty formulations of military single, double, and triple base propellants, e.g., M-1, M-6, M-8, M-31, M38, etc.

Other Explosives Chemically Conducive To Instantaneous Detection (Not Tested)

Heptryl
2,4,6-Trinitropyridine
TNX
Trinitrophenoxethyl nitrate
2,4,6-Trinitrocresol
Trinitroanisole
Trinitroaniline
Dinitrophenoxethyl nitrate
Tacot

APPENDIX 2

Explosives Detected Within 20 Seconds



Explosives Detected:

Nitroglycerin (NG)
1,3-Dinitroglycerin (1,3-DNG)
1,2-Dinitroglycerin (1,2-DNG)
RDX
HMX
PETN
Ethyleneglycoldinitrate (EGDN)
1,2,4-Butanetriol trinitrate
1,2,4-Butanetriol-1,4-dinitrate
1,2-Propandiol dinitrate
Nitrocellulose
1-Mononitroglycerin
2-Mononitroglycerin
Pyrodex
Ammonium nitrate (ANFO)
Ammonium Picrate (explosive D)
TEGN
Nitrocellulose

Commercial Mixtures Containing Explosives Above Will Be Detected As Well:

Dynamite
Amatol
C-4, C-3, C-4
Comp B
Comp I, Comp II
Picratol
Pentolite
Octol
Ednatol
Also, over forty formulations of military single, double, and triple base propellants, e.g., M-1, M-6, M-8, M-31, M38, etc.

Other Explosives Chemically Conducive to Detection (Not Tested):

Heptryl
Manito hexanitrate
PETRIN
Diglycerol tetranitrate
Metriol Trinitrate
Ethriol Trinitrate