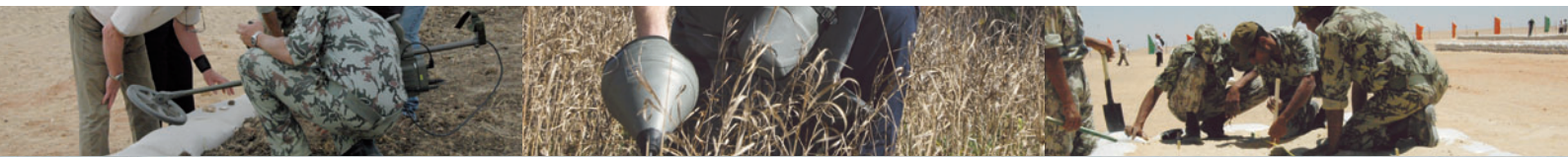


Detectors and Personal

Protective Equipment



Catalogue 2009



GICHD | CIDHG





The Geneva International Centre for Humanitarian Demining (GICHD) strives for a world free of anti-personnel land from the threat of other landmines and explosive remnants of war, and where the sufferings and concerns of populations living in affected areas are addressed.

Detectors and Personal Protective Equipment Catalogue 2009, GICHD; Geneva, January 2009.
ISBN 2-940369-23-2.



© Geneva International Centre for Humanitarian Demining

The description of the detectors and personal protective equipment in this catalogue are those of the manufacturers. Test results mentioned in this catalogue are extracts or quotations of test reports provided either by the manufacturers or published at the International Test and Evaluation Programme (ITEP) website www.itep.ws. The sources are given. They do not necessarily represent the views of the Geneva International Centre for Humanitarian Demining, or the Government of Germany. The views expressed in this publication are otherwise those of the Geneva International Centre for Humanitarian Demining and do not necessarily represent those of the Government of Germany. The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of UNMAS, the Government of Germany, or the Geneva International Centre for Humanitarian Demining concerning the legal status of any country, territory or area, or of its authorities or armed groups, or concerning the delimitation of its frontiers or boundaries.

Acknowledgements

This project was managed by Lieutenant-Colonel Klaus Koppetsch, Mechanical Studies Specialist, GICHD.

All photographs have been provided by the manufacturers concerned, or by the GICHD.

DETECTORS AND PERSONAL PROTECTIVE EQUIPMENT

CATALOGUE 2009



CONTENTS

FOREWORD	2
DETECTOR SYSTEMS	
METAL DETECTORS	5
> Beijing Geological Instrument Factory (BGIF) GTL115	6
> CEIA MIL-D1	12
> Ebinger EBEX® 421 GC	20
> Ebinger EBEX® 420 PBD	26
> Ebinger EBEX® 420 H-Solar	32
> Foerster MINEX 2FD 4.530	36
> Geoinstruments (GI) EXPLORER TM D	42
> Minelab F1A4	46
> Minelab F3	52
> Schiebel AN-19-2	58
> Schiebel ATMID™	64
> Schiebel MIMID™	70
> Vallon VMC1	74
> Vallon VMH3	80
> Vallon VMH3CS	86
> Vallon VMM3	92
> Vallon VMW1	98
> Vallon MW1630B	104
UXO DETECTORS	109
ELECTROMAGNETIC DETECTORS	
> CEIA MIL D1-DS	110
> Ebinger UPEX® 740 M	116
> Vallon VMXC1	120
> Vallon VMX3	126
MAGNETOMETOR DETECTORS	133
> Beijing Geological Instrument Factory (BGIF) CCT-2 Magnetic Detector	134
> Ebinger MAGNEX 120 LW	138
> Foerster FEREX 4.032	142
> Foerster FEREX DATALINE 4.800	150
> GEOMETRICS G-858	154
> Schonstedt GA-52 CX and GA-72 CD/ML	160
> Vallon EL1302-1303	168
> Vallon VET2	176
> Vallon VXC1	180
> Vallon V XV4	184
DUAL SENSOR AND GPR SYSTEMS	189
> Centre for Northeast Asian Studies, Tohoku University ALIS and ALIS-EMI	190
> Geological Prospecting Mirador	198
> L3-CyTerra AN/PSS-14 Detection System	204
> Vallon VMR2	210

VEHICLE-MOUNTED DETECTORS	217
> FOERSTER MULTICAT 4.850	218
> Minelab STMR MK II ARRAY	226
> Schiebel VAMIDS	232
> Vallon VMV8	238
> Vallon VMXV	242

PERSONAL PROTECTIVE EQUIPMENT

PROTECTIVE CLOTHING	247
> Allen Vanguard (Med-Eng) ACE	248
> Allen Vanguard (Med-Eng) LDE	249
> Allen Vanguard (Med-Eng) SRS-5	250
> Allen Vanguard (Med-Eng) Demining Apron	251
> Dachrng Advanced Material Co. (DC) Protection Vest	252
> Envostar body armour	254
> Garant Demining Apron	255
> Garant Demining Vest	256
> Garant Search Suit	257
> Research Institute of Surgery FBF210 Explosion-Proof Outfit	258
> ROFI ARMADILLO Vest	260
> ROFI Fender HPB Demining Apron	262
> ROFI RAVELIN Demining Vest	263
> Security Devices Apron and SD Apron 450	264

HELMETS, VISORS AND MASKS	265
> Allen Vanguard (Med-Eng) LDH	266
> Allen Vanguard (Med-Eng) VBS-250-450	266
> Envostar visor	266
> Garant Demining Visor	267
> Garant Demining Helmet	267
> ROFI Face mask	268
> ROFI visor	268

MINE PROTECTIVE BOOTS	269
> AGIS Boots	270
> Allen Vanguard (Med-Eng) Spider Boot	272
> Blast and fragment Resistant (BfR) Combat Boot V-50	274
> Wellco Boots	276

TEST REPORTS ON PERSONAL PROTECTIVE EQUIPMENT	278
> List of reports	278

ANNEXES

A. List of manufacturers	281
B. Glossary of terms	295

Metal Detectors and PPE Catalogue has been the title of this publication for its first three editions, in 2003, 2005 and 2007. However, this title neither reflects the current detection technologies available on the market nor the systems in use for detection of mines and unexploded ordnance (UXO) in the field today – for example, dual sensors are an increasingly important tool. We have therefore changed the title to *Detectors and Personal Protective Equipment Catalogue* to more accurately describe the full range of options available to those working in the field of mine detection.

Nevertheless the metal detector remains a standard tool for detection of mines and UXO. New developments of detection technologies and personal protective equipment (PPE) are rare, and they are a long way from being ready for series production. User-friendly and easy-to-operate detection systems are needed in the field and deminers must have the best personal protective equipment. All stakeholders should maintain their efforts to fulfil these aims.

The Catalogue has two main sections - detector systems and personal protective equipment. The sub-categories in the detector systems chapter are: Metal Detectors, UXO Detectors, Vehicle Mounted Detectors and Dual Sensor - and Ground Penetrating Radar Systems. For PPE the sub-categories are: Protective Clothing, Helmets, Visors and Masks, and Mine Protective Boots.

The GICHD *Detectors and Personal Protective Equipment Catalogue 2009* provides a comprehensive directory of detector systems and personal protective equipment under one cover. Unfortunately there are some omissions because not all major manufacturers contributed information. A number of detector systems and PPE being used in the field are not featured.

The interested reader can find further general information on detection technologies and systems in the GICHD's 2006 publication *Guidelines on Detection Technologies and Systems for Humanitarian Demining*.

There are relatively few independent performance tests on detector systems and PPE. Those interested in detectors and PPE that have been tested should either contact manufacturers directly or refer to the website of the International Test and Evaluation Programme for Humanitarian Demining: www.itep.ws. A non-exhaustive list of test results on PPE available on this website can be found at the end of the PPE chapter.

The Catalogue is available in hard copy, CD-ROM, or can be viewed by visiting the GICHD website at www.gichd.org. The information provided is accurate as of November 2008.

The GICHD would like to thank the Government of the Federal Republic of Germany for its generous financial support to this project.

Ambassador Stephan Husy
Director
Geneva International Centre for Humanitarian Demining



DETECTOR SYSTEMS

METAL DETECTORS



Beijing Geological Instrument Factory | China

GENERAL DESCRIPTION

The Beijing Geological Instrument Factory (BGIF) has manufactured precision instruments for use in detection and in laboratories for more than 40 years. It has significant research and production capacities.

The *GTL115-2 Metal Detector* is designed to locate a wide variety of mines or buried exploded remnants of war (ERW) with minimum-metal content even under difficult soil conditions. Working on the electromagnetic induction principle, the detector employs dynamic detecting technologies, and its features include automatic low battery alarm and magnetic soil interference rejection. The detector – operated by a single operator in upright or kneeling position – is highly sensitive, lightweight, portable, easy to assemble and operate, with a low power requirement and reliable performance.

The GTL115-2 consists of a search head, a search pole and an earphone. There are two types of search heads to choose according to the surroundings. The device also has an extension pole with an arm support as an accessory. In operation, the search head is mounted on the pole by connecting the plug of the search head to the socket on the front of the pole. The plug and socket have a protective cover against dirt to ensure a reliable connection. For transport or storage the search head and the pole are packed apart in an aluminium case to protect against extrusion and collision, and against moisture and mildew.



The GTL 115-2 metal detector with the two available search heads

Search head

There are two types of search head available. Search head A is circular, 200mm in diameter; search head B is oval (300 x 68 mm). The angle between either of the two types of search heads and the pole can be adjusted freely.

Search pole

Both the electronics and the batteries are fixed inside the pole. The integration of the structure makes the detector portable and easy to operate. The detector can be used from a kneeling position and, with the extension pole, from a standing position. The three-pin connector at the front end of the pole can be adapted to the two different search heads, which improves detection efficiency. A power/sensitivity knob fixed to one side of the search pole provides protection and is easy to operate.

Earphone

- > The single-piece earphone enables the operator to be aware of the surroundings while detecting mines.
- > With a spiral cable which can extend to 4 metres, the earphone is flexible and convenient to use, even with the extension pole.
- > The detector's power is off as long as the operator removes the earphone, even if he forgets to turn the detector off.

WORKING METHODOLOGY

According to electromagnetic theory, metal objects will generate eddy currents in an electromagnetic field and these eddy currents generate a secondary field. When a metal object is within range of the search head coil, the secondary field generated by the eddy currents will be distorted the original electromagnetic field and cause changes to the equivalent impedance in the circuit. The alarm sent through the earphone after demodulation and signal processing indicates the existence of a metal object.

POWER SUPPLY

- > Eight pieces of common AA-size R6 battery can work continuously for more than 20 hours.
- > Eight pieces of Ni-MH AA-size battery (1600mAh) can work continuously for more than 60 hours.

DETECTORS IN USE TO DATE

No detailed information was provided by the manufacturer but the detector is known to be in current service in Angola, Cambodia, Ethiopia, Eritrea, Lebanon, Mozambique, Namibia and Rwanda.



FACTORY SUPPORT

- > BGIF assures supply period and product quality.
- > Spare parts can be delivered to the customer.
- > Operation and maintenance training can be offered at BGIF facilities or at a location chosen by the customer and at their own expense.
- > The user's manual includes instructions on operation and maintenance and is available in English and other languages on request.
- > The manufacturer provides a warranty of 24 months.

MAINTENANCE AND SUPPORT

- > There are no special requirements for technicians or workshop facilities.
- > A special tool is offered with the unit; any others required are standard tools available in the market.
- > For each detector, a user's manual is offered with detailed instructions for operation and maintenance.

TEST AND EVALUATION

- > The GTL115-2 has been field tested in all climates by the manufacturer and all detector specifications are fully proven.
- > Currently under testing and evaluation by the European Commission Joint Research Centre. Reports will soon be published on the JRC website: <http://ec.europa.eu/dgs/jrc/index.cfm>

REPORTED LIMITATIONS AND STRENGTHS

No information available.



The GTL 115-2 metal detector with the two available search heads

DETECTOR

1. Brand	BGIF
2. Model	GTL115-2
3. Version	01 2005
4. Used detection technology	Metal mine detector pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	750 mm (basic)
> max. length	1340 mm (with extension pole)
6. Search head	
> Size	
Search head A	200 mm in diameter
Search head B	300 x 68 mm
> Weight	
Search head A	0.43 kg
Search head B	0.55 kg
> Shape	
Search head A	Circular
Search head B	Oval
7. Transport case	
> Weight	4.9 kg
> With equipment (full)	11 kg
> Dimensions	645 x 330 x 175 mm
> Hard Soft case (material)	Hard case aluminum
8. Weight, hand-held unit	—
9. Weight, carrying (operational detection set)	—
10. Weight, additional equipment	0.5 kg
11. Weight distribution Balance	—
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status	In production
14. Detectors Systems in use to date	—
15. Other types	No
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	MIL STD
18. Temperature (limitations)	
> Storage	-50° C to +70° C
> Operational	-20° C to + 50° C
19. Water resistant	Yes, in shallow water and up to 2/3 of the first section of the search pole
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Automatically
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Up to 40 h depending on battery type and capacity
> medium temperature (around 20° C)	Up to 60 h depending on battery type and capacity
> high temperature (higher than 30° C)	Up to 60 h depending on battery type and capacity

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Manual or automatic
> Duration	Continual
24. Detection range Sensitivity details Detection performance Working depth	Control of working depth: Sensitivity adjustment
> Low-metal-content mines	
Search head A	0.8 cm
Search head B	12 cm
> Anti-vehicle mines	
> Search head A	
Plastic AT mine	12 cm
Ferrous cased AT mine	70 cm
> Search head B	
Plastic AT mine	12 cm
Ferrous cased AT mine	75 cm
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	Can be compensated
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.2-1.5 m/s
31. Search coil Antenna	
Search head A	Circular, 200 mm in diameter
Search head B	Oval, 300 x 68 mm
32. Limitations	No
33. Interference (with other detectors)	Two detectors in use should have a distance of 1 m between each other

POWER

34. Power supply Source	Battery
35. Operating time	See item 22
36. Power supply	
> weight	—
> no. of batteries size type	8 x common AA size R6 battery, or 8 x Ni-MH AA size battery
> rechargeable	rechargeable (Ni-MH AA size battery)
> other	—

COSTS

37. Price	
> for one detector	US\$ 1,400
> reduction for higher quantity	Yes
38. System price	
> with training	Upon request
> spare parts	Not given
> extended warranty	—
39. Total	Not given
40. Possibility to rent/lease	—

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	—
43. Additional technical data information	—
44. Compliant standards	ISO-9001

GENERAL DESCRIPTION

The *MIL-D1* is a portable, high-sensitivity metal detector designed to detect all metals in conductive and non-conductive soils, including laterite. The metal detector consists of a detection head, a telescopic handle, an electronics unit, a canvas carry-bag and a high-impact polypropylene case. The detection head is light, and the wiring is protected from damage. The electronic unit can be carried over the shoulder, attached to the belt, or as an integral part of the telescopic handle. The manufacturer says that the MIL-D1 does not require any daily manual calibration; optimum sensitivity is ensured over all types of terrain due to CEIA's Automated Soil Compensation System. The detector is manufactured in compliance with the ISO-9001 standard and has been designed to satisfy the most stringent operational requirements for both humanitarian and military demining.



CEIA-MIL-D1 in use at the Egyptian test site: measurement of "in air reference height"

Main characteristics

- > State of the Art Digital Metal Detector.
- > High detection distance in all soil types.
- > Precision target detection and localization with double tone pin-pointing.
- > Detection of all metals, magnetic and non magnetic.
- > Static and dynamic detection, independent of speed.
- > Capability to compensate complex soils, optimised by a simple auto-learn procedure.

- > Robust and reliable, consistent performance over time.
- > Long battery life.
- > Control unit may be integrated with the telescopic pole or worn separately.
- > Open construction of the search head for easier visibility of the target area.
- > Easy-to-use control panel.
- > Auto-diagnostic system.
- > Flash-supported software upgrade.

CEIA offers a single, proven state-of-the-art model (MIL-D1) optimised to provide comprehensive detection capability across the entire spectrum of metals and soil types. A backlit LCD display on the control panel is available as an option. A hand-held remote programmer allows for MIL-D1 flash memory upgrades under any conditions. MD Scope software for PCs is available for troubleshooting and annual verification of MIL-D1 calibration.

WORKING METHODOLOGY

Location of metal objects is optimised by a two-tone audible pinpointing system, which allows the position of the detected mass to be identified accurately. When the metal detector approaches a metal mass, the system produces a signal of acoustic intensity proportional to the metal mass. The metal mass is pinpointed at the position of the centre of the search head at the moment in which the audible signal tone changes. An audible signal is transmitted either through an internal speaker or external monaural headphone.

CEIA's Automated Soil Compensation System ensures an above-average sensitivity in all types of soil. The detector, during soil compensation (conducted prior to the search operation), the detector uses digital processing of the electromagnetic response from the target soil to determine the most effective strategy. The presence of water does not affect detector performance. Soil compensation capability covers all different soils.

POWER SUPPLY

- > ANSI STD D-IEC STD LR20
- > 4 x 1.5V alkaline batteries or 4 x 1.2V Ni-MH rechargeable batteries (available on request).
- > 65 hours with alkaline batteries at 20° C.
- > 50 hours with alkaline batteries at 5° C.
- > 40 hours with Ni-MH rechargeable batteries (7000 mA) at 20° C.

DETECTORS IN USE TO DATE

About 13,000 detectors are in service with various humanitarian aid organisations, commercial mine clearance organisations and armed forces in the following countries: Afghanistan, Austria, Bangladesh, Bosnia and Herzegovina, Burundi, Cambodia, Colombia, Croatia, Denmark, Djibouti, Egypt, Eritrea, Ethiopia, Finland, France, Hong Kong, India, Indonesia, Iraq, Italy, Jordan, Kenya, Kyrgyzstan, Laos, Lebanon, Mozambique, Malaysia, Morocco, Namibia, Pakistan, Portugal, Senegal, Serbia, Spain, South Africa, Sudan, Sweden, Switzerland, Thailand, Turkey, the U.S., Venezuela and Yemen.

FACTORY SUPPORT

- > The proposed spare parts package is arranged in accordance with a life cycle management study by the manufacturer. The actual quantity/composition of spare parts package is defined by customer requirements and contract.
- > Spare parts are available from either the manufacturer or from local representatives.
- > An extensive programme is available for both operators and maintenance personnel.
- > Factory based training is included in the purchasing package. On-site training is subject to contract.
- > Instruction manuals and documentation are provided in Arabic, English, French, Italian, Portuguese and Spanish. Other languages available on request.
- > The standard warranty is two years. Extended warranty periods can be arranged.
- > Comprehensive factory follow-up includes services via Internet contact, mail and personal contact.
- > On-site training, supply of training aids, diagnostic software, portable remote programmer are available as accessories.
- > Other services by the manufacturer include software upgrading, comprehensive technical assistance, mine simulant study and manufacturing, availability of factory test lanes.



CEIA-MIL-D1 | Transport case

MAINTENANCE AND SUPPORT

The detector is considered user-friendly and, with the proper training supplied by CEIA, the customer can completely maintain the equipment. It is not necessary to return the unit to the factory for troubleshooting or verification of calibration. The MIL-D1 electronics board is based on full digital technology, which means there is no requirement to trim or refine the performance using laboratory equipment.

TEST AND EVALUATION

- > CEIA is equipped with extensive laboratory and outdoor testing facilities where the MIL D1 capabilities have been evaluated and subsequently reported.
- > The MIL-D1 has been subjected to extensive testing (in terms of reliability and capability of detection) by international test organisations, UNOPS, national defence departments and humanitarian demining organisations.

Test following test results are available at the ITEP website: www.itep.ws

1. Humanitarian Demining Robot Gryphon - An Objective Evaluation. IARP International Workshop HUDEM 2008, Cairo, March 28-30, 2008; 2008.
2. Improved Landmine Discrimination With an Off-the-Shelf Metal Detector. Journal of Mine Action, Issue 12.1, Summer 2008; 2008.
3. Lessons Learned from field Tests in Croatia and Cambodia. Journal of Mine Action, Issue 11.2, Spring 2008; 2008.
4. Test and Evaluation of Japanese GPR-EMI Dual Sensor Systems at Benkovac Test Site in Croatia: CROMAC - Centre for Testing, Development and Training; published 2008.
5. Experimental Cairo Testing and Evaluation of Mine and UXO Detectors: Faculty of Engineering, Cairo University, Giza, Egypt; 2008.
6. Results of Systematic Test & Evaluation of Metal Detectors (STEMD) Trials; (Annex of *Metal Detectors and PPE Catalogue 2007*). GICHD; 2007.
7. STEMD; Interim Report Laboratory Tests Italy. Joint Research Centre - European Commission (JRC/EC); 2006.
8. STEMD; Interim Report field Trials Mozambique. Journal of Mine Action, Issue 10.1, August 2006; 2006.
9. STEMD; Interim Report field Trial Lao, 27 September - 5 November 2004. Joint Research Centre - European Commission; 2005.
10. STEMD; Interim Report field Trial Mozambique, 12 April - 5 May 2005; 2005.
11. Metal Detector Trial - Colombia: Results from 2002; 2003.
12. Development Tests for Measuring the Detection Capabilities of Metal-Detectors; published in 2003.
13. Metal Detector Trial - Colombia; Results from 2002. Defence R&D Canada – Suffield; 2003.
14. Summary of Metal Detector Trial Report, UN Mine Action Programme Afghanistan; 2002.



CEIA-MIL-D1 in operation

REPORTED LIMITATIONS AND STRENGTHS

Limitations

Please refer to the test reports mentioned above.

Strengths

- > High electrical and mechanical reliability.
- > High-impact polypropylene transport case allows for transportation under the most extreme conditions.

DETECTOR

1. Brand	CEIA
2. Model	MIL-D1
3. Version	3.4
4. Used detection technology	Electromagnetic induction CW (Continuous Wave)

DIMENSIONAL DATA

5. Working length	
> min. length	1,000 mm
> max. length	1,620 mm
6. Search head	
> Size	280 mm (external diameter)
> Weight	0.645 kg
> Shape	Circular
7. Transport case	
> Weight	7 kg
> With equipment (full)	12.5 kg
> Dimensions	950 x 440 x 155 mm
> Hard Soft case (material)	High impact polypropylene / synthetic canvas
8. Weight, hand-held unit	—
9. Weight, carrying (operational detection set)	3.2 kg
10. Weight, additional equipment	—
11. Weight distribution Balance	Well balanced Optimized for continuous operation
12. Other specifications	Control of working depth Knob sensitivity adjustment

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	13,000
15. Other types Models	—
16. Location of use	Afghanistan , Austria, Bangladesh, Bosnia and Herzegovina, Burundi, Cambodia, Colombia, Croatia, Denmark, Djibouti, Egypt, Eritrea, Ethiopia, finland, France, Hong Kong, India, Indonesia, Iraq, Italy, Jordan, Kenya, Kyrgyzstan, Laos, Lebanon, Mozambique, Malaysia, Morocco, Namibia, Pakistan, Portugal, Senegal, Serbia, Spain, South Africa, Sudan, Sweden, Switzerland, Thailand, Turkey, the U.S., Venezuela and Yemen.

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	No influence
18. Temperature (limitations)	
> Storage	-55° C to +75° C
> Operational	-46° C to +65° C
19. Water resistant (Yes / No)	Yes resistant
20. Shock Vibration resistant	Yes exceeding MIL STD 810 E
21. Environmental Compensation	Automatically
22. Operational hours Operating endurance	
> low temperature (around 0° C)	MTBF = 27,500 according to MIL-HDBK 217
> medium temperature (around 20° C)	MTBF = 22,500 according to MIL-HDBK 217
> high temperature (higher than 30° C)	At 35° C MTBF = 18,000 according to MIL-HDBK 217

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic
> Duration	No limit
24. Detection range Sensitivity details Detection performance Working depth	
> Small metal content mines (type of mine)	Optimized according to the mines and soils
> Anti-tank mines (type of mine)	Optimized according to the mines and soils
> ERW (please specify)	Optimized according to the mines and soils
25. Output indicator	Sound (display as option)
26. Pinpointing feature	Dual tone
27. Adjustment of search head angle	0° C up to 97° C
28. Soil influence	—
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	From 0 cm/s to the maximum human operator sweep
31. Search coil Antenna	Circular
32. Limitations	—
33. Interference (with other detectors)	—

POWER

34. Power supply Source	4 x 1.5V alkaline batteries or 4 x 1.2V NI-MH rechargeable batteries
35. Operating time	> 65 h with alkaline batteries; > 35 h with rechargeable batteries
36. Power supply	
> weight	Total for 4 batteries = 0.580 kg (alkaline batteries) = 0.61 kg (rechargeable batteries)
> no. of batteries size type	4 ANSI Std D IEC Std LR20, alkaline or rechargeable
> rechargeable	Yes
> other	—

COSTS

37. Price	
> for one detector on request	—
> reduction for higher quantity	—
38. System price	
> with training	—
> spare parts	—
> extended warranty	—
39. Total	—
40. Possibility to rent/lease	—

OTHERS

41. Duration of warranty	2 years
42. Additional equipment	Battery charger MIL-D1/BC
43. Additional technical data information	On request
44. Compliant standards	MIL-STD 810 E and others on requests

EBINGER EBEX 421 GC

Ebinger GmbH | Germany

GENERAL DESCRIPTION

The *EBEX 421 GC* is a modular, compact, lightweight, battery-operated, hand-held metal detector which is suitable for all kinds of demining operations. The modular design ensures that each component is interchangeable with other detectors of the same “family”. Each component can be ordered individually. The EBEX 421 GC is the enhanced version of the EBEX 420 GC. The system is able to detect mines with minimum-metal content to a high level of reliability and can be used in both shallow fresh or salt water. Enlarged search heads can also be used to clear battle areas of deeply buried ordnance.

The rugged design qualifies the detector to be used under all climatic conditions.



The EBEX 421 GC in service in Sudan

Main characteristics

- > Simple to set up and easy to operate.
- > Can compensate for inhomogeneous laterite or mineralisation while maintaining high detection sensitivity.
- > Large dynamics in the audio alarm system help operators to discriminate small from large metal items.
- > Audio control pulses indicate the battery condition.
- > Confidence clicks inform operators that equipment is functioning correctly.
- > Operates on a dynamic search mode.
- > The equipment widely filters interference from conductive ground or salt water.
- > Little user maintenance required, thereby saving time and expense.

As optional accessories the manufacturer offers

- > Probe sensor 30 x 290 mm
- > Enlarged search head 280 x 400 mm (for deep search)
- > Enlarged head 450 x 630 mm (for deep search)
- > Handgrip and armrest
- > Rechargeable battery pack 12V / 2,0 Ah, and
- > Loudspeaker.

WORKING METHODOLOGY

The EBEX 421 GC uses bipolar pulse induction for detection and is designed to operate in high metallic soils by including a soil compensation feature. No further detailed information is given by the manufacturer.

DETECTORS IN USE TO DATE

Since 1998, more than 2,500 EBEX 420 GC detectors have been bought. They are in use with various humanitarian demining organisations, the United Nations and many commercial mine clearance companies.

For the 421 GC version no figures are available.

POWER SUPPLY

- > The EBEX 421 GC is powered by 8 x 1.5V C-cell or alternative; rechargeable battery pack 3.8 A/h, 12V.
- > Operational life of battery (8 x 1.5V alkaline 8A/h) approximately 20 hours.
- > Operational life of battery pack (12V, 3.8A/h) approximately 10 hours.

FACTORY SUPPORT

- > All detectors are covered by a 24-month warranty. The worldwide service network ensures permanent availability of spare parts.
- > Operation and maintenance training is provided at Ebinger facilities or on site.
- > Additional factory support by specially trained staff is provided on request.
- > Instruction and maintenance manuals are available in Arabic, English, French, German, Italian, Russian and other languages on request.

MAINTENANCE AND SUPPORT

There are no special requirements for the technicians or the workshop facilities. Most repairs can be carried out by Ebinger-trained staff on site. The step-by-step explanations in the manuals help to ensure easy maintenance.

TEST AND EVALUATION

The detector went through comprehensive internal and comparative tests (in terms of reliability and capability of detection).

Tests conducted on the EBEX 420 GC include:

- > Nicaraguan field Test Report, 2001 (EBEX 420 GC)
- > International Pilot Project for Technology Cooperation (IPPTC), 2001 (EBEX 420 GC)
- > International Detector Test, UNDP Yemen, 2002
- > UN Mine Action Programme Afghanistan, February-March 2002 (EBEX 420 GC), and
- > US Department of Defense Humanitarian Demining Research and Development Program, Nicaraguan field Test Report, October 2001, p. 15.

The EBEX 421 GC was tested by the EC's Joint Research Centre in Laos in 2004 and in a comparative field trail in Mozambique in 2005 as well as in a laboratory test trail by JRC, Institute for the Protection and Security of the Citizen, in Italy from November 2003 to January 2006.

The following test results are available at the ITEP website: www.itep.ws.

1. Systematic Test and Evaluation of Metal Detectors (STEMD). Interim Report field Trial Mozambique, 12 April - 5 May 2005.
2. Systematic Test and Evaluation of Metal Detectors (STEMD). Interim Report field Trial Lao, 27 September - 5 November 2004.



The EBEX 421 GC in service in Sudan



Deminer equipped with the EBEX 412 GC in Sudan

REPORTED LIMITATIONS AND STRENGTHS

Limitations

No significant limitations reported to date.

Strengths

“During the two weeks of the training and trial, no difficulties in use or technical questions arose. The detector had no problems in compensating the ground influence in all lanes and could well cope with the physically different structures of the soils i.e. the stones as well as with the magnetic properties. The signal interpretation is easy because there is little background noise. ...”¹

¹ Guelle, Dieter M., Lewis, Adam M., Pike, Matthew A. and Christo Crail. *Systematic Test and Evaluation of Metal Detectors (STEMD). Interim Report field Trial Mozambique, 12 April - 5 May 2005*, Nov. 2005, at <http://www.itep.ws/reports/results1.php>, p. 52.

DETECTOR

1. Brand	EBINGER
2. Model	EBEX® 421 GC (stands for Ground Compensation)
3. Version	11 2002
4. Used detection technology	Metal detector pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	1,000 mm (short version)
> max. length	1,700 mm (long version)
6. Search head	
> Size	Ø 230 mm (300 x 170 mm)
> Weight	0.5 kg
> Shape	Circular, oval
7. Transport case	
> Weight	2 kg
> With equipment (full)	3.8 8.5 kg
> Dimensions	—
> Hard Soft case (material)	Hard plastic canvas satchel
8. Weight, hand-held unit	2.2 kg (short) 2.4 kg (long)
9. Weight, carrying (operational detection set)	2.2 kg (short) 2.4 kg (long)
10. Weight, additional equipment	—
11. Weight distribution Balance	—
12. Other specifications	Modular systems without any cables

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Approx. 2,000
15. Other types Models	—
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	0 - 95 %
18. Temperature (limitations)	
> Storage	-53° C to +70° C
> Operational	-30° C to +55° C
19. Water resistant (Yes / No)	Yes up to 1.3 m
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto Manual
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Up to 75 h, GC mode up to 25 h, depends on type of battery
> medium temperature (around 20° C)	Up to 75 h, GC mode up to 25 h, depends on type of battery
> high temperature (higher than 30° C)	Up to 75 h, GC mode up to 25 h, depends on type of battery 50 h

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Manual or Automatic
> Duration	Continual
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment manual
> Low-metal-content mines	Depending on their size, material and the local interference
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	Specially developed for laterite soil
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.2 - 1.5 m/s
31. Search coil Antenna	Ø 230 mm circular, (300 x 170 mm oval)
32. Limitations	No
33. Interference (with other detectors)	< Safety distance

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	—
> no. of batteries size type	8 x 1.5V dry batteries C-cell
> rechargeable	8 x 1.2V rechargeable batteries
> other	1 x 12V battery pack

COSTS

37. Price	
> for one detector on request	US\$ 2,000 - US\$ 3,000
> reduction for higher quantity	Yes
38. System price	
> with training	On request
> spare parts	On request
> extended warranty	On request
39. Total	—
40. Possibility to rent/lease	On request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	UXO head 45 cm
43. Additional technical data information	—
44. Compliant standards	MIL-STD 461, MIL-STD 810, DIN EN ISO 9001:2000

GENERAL DESCRIPTION

The *EBEX 420 PBD* is a modular, easy-to-use piece of equipment, which is in daily use in Afghanistan, Angola, Bosnia and Herzegovina, Cambodia, El Salvador, Georgia, Mozambique, Viet Nam and Zimbabwe, as well as other mine-affected countries. The detector design eases logistics and maintenance, allowing fault identification and remedy without tools and advanced training.

Main characteristics

- > The equipment is designed for easy assembly and operation.
- > High sensitivity enables detection of low-metal-content mines.
- > Good adaptation to conductive soil, good pinpointing and fast work progress.
- > Large dynamics in the audio alarm system helps operators to discriminate small from large metal items.
- > Audio control pulses indicate the battery condition. Audible confidence clicks inform operators that equipment is functioning correctly.
- > Operates on a dynamic search mode.
- > The equipment widely filters interference from conductive ground or salt water.
- > Little user maintenance is required, saving time and expense.



The EBEX 420 PBD in operation

WORKING METHODOLOGY

The EBEX 420 PBD hand-held mine detector is the pulse induction version of the EB 420. It was developed in cooperation with military personnel serving in the United Nations and humanitarian mine clearance operations around the world. It is intended to suit large-scale mine and battle area clearance in adverse conditions and requires only minimal training and logistic support.



The EBEX 420 PBD in operation

The detector operates with the dynamic Ebinger pulse induction system. Its search head sends out short magnetic pulses which cause conductive targets to respond with an electromagnetic echo field which is detected and transduced into an audible signal. The intensity and characteristics of the signals depend on the size and distance of the detected target. The dynamic search mode adapts the detector to homogenous soil interference and provides a good resolution between several targets buried at close together.

The EBEX 420 PBD was designed to locate low-metal-content mines and to detect ERW hidden in undergrowth or buried underground. Its simplicity of use by one adjuster makes it ideal for deployment in adverse conditions or in difficult operations.

It is lightweight with the electronics integrated into the handle. This avoids the need for cables and additional control boxes or a battery compartment. The detector can even be operated with a loudspeaker.

The EBEX 420 PBD can be operated in a short mode of approximately 1m for search in the prone position or in an extended version of 1.6 m when used in the standing position. Its large dynamics and wide adjustability facilitate the suppression of interference from conductive ground.

DETECTORS IN USE TO DATE

Since 1995, more than 5,000 EBEX 420 PBD detectors have been sold. They are in use with various humanitarian demining organisations, the United Nations and many commercial companies.

POWER SUPPLY

- > The EBEX 420 PBD is powered by 6 x 1.5V C cell or alternative; rechargeable battery pack 3.8 A/h, 12V.
- > Operational life of battery (6 x 1.5V alkaline 8A/h) approximately 50 hours.
- > Operational life of battery pack (12V 3.8A/h) approximately 35 hours.

FACTORY SUPPORT

- > All detectors are covered by a 24-month warranty. The worldwide service network ensures permanent availability of spare part.
- > Operation and maintenance training is provided at Ebinger facilities or on site.
- > Additional factory support by specially trained staff is provided on request.
- > Instruction and maintenance manuals are available in Arabic, English, French, German, Italian, Russian and other languages on request.

MAINTENANCE AND SUPPORT

- > There are no special requirements for the technicians or the workshop facilities. Most repairs can be carried out by Ebinger-trained staff on site.
- > The step-by-step explanations in the manuals help to ensure easy maintenance.



Deminer equipped with EBEX 420 PBD in Angola

TEST AND EVALUATION

The detector has had several tests:

- > UNAVEM III Demining School – Commander (Memorandum) 1996;
- > International Detector Test UNADP Mozambique, December 2000;
- > European Commission Directorate General JRC, March 2001.
- > Reports of the last two tests are available at the ITEP website, www.itep.ws

REPORTED LIMITATIONS AND STRENGTHS

Despite the number of tests and trials of the detector, no general scientific evidence is available regarding detection performance under different soil conditions or other key qualities. But the detector has been shown to be capable of detecting a VPROM1 with a sufficient safety margin at all angles.¹

¹ M. Fernandez, A. Lewis, F. Littmann, *PROM 1 Anti-personnel landmines - Probability of activation by physical contact with a metal detector*, Special publication No. I.01.29, European Commission Directorate General JRC Joint Research Centre Institute for Systems, Informatics & Safety, Ispra, March 2001

DETECTOR

1. Brand	EBINGER
2. Model	EBEX® PBD (stands for Pulse Bipolar Dynamic)
3. Version	11 1996
4. Used detection technology	Metal detector pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	1,080 mm (short version)
> max. length	1,650 mm (long version)
6. Search head	
> Size	Ø 260 x 156 mm
> Weight	0.5 kg
> Shape	Oval
7. Transport case	
> Weight	2 kg
> With equipment (full)	8.5 kg
> Dimensions	—
> Hard Soft case (material)	Hard plastic canvas satchel
8. Weight, hand-held unit	2.2 kg (short) 2.4 kg (long)
9. Weight, carrying (operational detection set)	2.2 kg (short) 2.4 kg (long)
10. Weight, additional equipment	—
11. Weight distribution Balance	—
12. Other specifications	Modular systems without any cables

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Approx. 5,000
15. Other types Models	—
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	0 - 95 %
18. Temperature (limitations)	
> Storage	-53° C to +70° C
> Operational	-30° C to +55° C
19. Water resistant (Yes / No)	Yes up to 1.3 m
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto Manual
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Up to 50 h, depends on type of battery
> medium temperature (around 20° C)	Up to 50 h, depends on type of battery
> high temperature (higher than 30° C)	Up to 50 h, depends on type of battery

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Manual or Automatic
> Duration	Continual
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment manual
> Low-metal-content mines	Depending on their size, material and the local interference
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	—
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Under certain circumstances
30. Optimal sweep speed	0.2 - 1.5 m/s
31. Search coil Antenna	Ø 260 x 156 mm oval
32. Limitations	No
33. Interference (with other detectors)	< Safety distance

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	—
> no. of batteries size type	6 x 1.5V dry batteries C-cell
> rechargeable	6 x 1.2V rechargeable batteries
> other	1 x 12V battery pack

COSTS

37. Price	
> for one detector on request	US\$ 2,000-US\$ 3,000
> reduction for higher quantity	Yes
38. System price	
> with training	On request
> spare parts	On request
> extended warranty	On request
39. Total	—
40. Possibility to rent/lease	On request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	UX0 head 45 cm, cylinder probe
43. Additional technical data information	—
44. Compliant standards	MIL-STD 461, MIL-STD 810, DIN EN ISO 9001:2000

EBINGER EBEX 420 H-SOLAR

Ebinger GmbH | Germany

GENERAL DESCRIPTION

The hand-held mine detector *EBEX 420 H-Solar* is an evolution of the EBEX 420 and was designed to support one-man-one-lane mine clearance drills. It is a single-piece tool without external boxes or cables.

Main characteristics

- > The equipment is designed for easy assembly and operation.
- > It is highly sensitive to minimum-metal mines such as the MAI 75 and R2M2.
- > Little user maintenance is required.
- > It is powered by a solar panel or by batteries.



The one-piece EBEX 420 H with its integrated solar panel

WORKING METHODOLOGY

The EBEX 420 H-Solar uses the very sensitive Ebinger sine wave system and detects metal components, including wires, by an electromagnetic field of low frequency. The product's designers made special efforts to achieve a good resolution of several mines buried close together, either to each other or to other interfering metal.

The detector was also designed to locate landmines or ERW containing only a minimum amount of metal. The detector electronics are fully integrated into the handle. It can be used in a short mode (approximately 0.6 m) for searching in the prone position. In the standing position an extension rod takes the detector length to 1.2 m. Its simplicity in operation and the absence of cable-linked components make it ideal for the single-operator clearance drill.

DETECTORS IN USE

The EBEX 420 H-Solar is in service in 26 countries including: Afghanistan, Angola, Cambodia, El Salvador, Guatemala, Kuwait, Lebanon, Mozambique, Nicaragua and Somalia.

Since 1998, more than 2,100 units have been sold to various humanitarian demining organisations, the United Nations and many other commercial companies.

POWER SUPPLY

- > The EBEX 420 H is powered by 1 x 9V U9VL LR61 or alternative; rechargeable battery 9V LR61.
- > Operational life of battery (1 x 9V alkaline 600mA/h): approx. 45 hours (without solar radiation).
- > Operational life of battery pack (9V 110mA/h): approximately 20 hours (without solar radiation).

FACTORY SUPPORT

- > All detectors are covered by a 24-month warranty. The worldwide service network ensures permanent availability of spare parts.
- > Operation and maintenance training is provided at Ebinger facilities or on site.
- > Additional factory support by specially trained staff is provided on request.
- > Instruction and maintenance manuals are available in Arabic, English, French, German, Italian and Russian, and other languages on request.

MAINTENANCE AND SUPPORT

- > There are no special requirements for the technicians or workshop facilities. Most repairs can be carried out by Ebinger-trained staff on site.
- > The step-by-step explanations in the manuals help to ensure easy maintenance.

TEST AND EVALUATION

The detector went through comprehensive internal tests. Reports displaying the performance can be provided by the manufacturer on request. The detector was also tested in a comparative test trail (Systematic Test and Evaluation of Metal Detectors. Interim Report field Trial Mozambique, 12 April - 5 May 2005) by the European Commission, Joint Research Centre, in Mozambique in 2005 as well as in a laboratory test trail by JRC, Institute for the Protection and Security of the Citizen, in Italy from November 2003 to January 2006.

The comparative test report is available at the ITEP website: www.itep.ws.

REPORTED LIMITATIONS AND STRENGTHS

Limitations

“The absence of ground compensation made the use of the detector quite dependent on the individual abilities of the operator. The detector could be used in the different lanes by reducing the sensitivity so that the ground did not create a signal ... The loss of sensitivity with the increasing electromagnetic properties of the ground was significant and depends strongly on the type of the target. We do not recommend use of this detector for finding minimum-metal mines when the ground conditions are similar to L3 (CWA Classification: moderate; author’s note) or worse. The simple construction and low power consumption may make it valuable in less severe ground conditions.”¹

Strengths

- > Easy set-up and operation.
- > Ease of maintenance.

¹ Guelle, Dieter M., Lewis, Adam M., Pike, Matthew A. and Christo Crail. *Systematic Test and Evaluation of Metal Detectors (STEMD). Interim Report field Trial Mozambique, 12th April - 5th May 2005*, Nov. 2005, at <http://www.itep.ws/reports/results1.php>, p.58.

DETECTOR

1. Brand	EBINGER
2. Model	EBEX® 420 H
3. Version	01 2002
4. Used detection technology	Metal detector sine wave

DIMENSIONAL DATA

5. Working length	
> min. length	670 mm (short version)
> max. length	1,840 mm (long version)
6. Search head	
> Size	Ø 200 mm
> Weight	0.5 kg
> Shape	Circular
7. Transport case	
> Weight	2 kg
> With equipment (full)	5 kg
> Dimensions	—
> Hard Soft case (material)	Hard plastic canvas satchel
8. Weight, hand-held unit	0.88 kg (short) 1.45 kg (long)
9. Weight, carrying (operational detection set)	0.88 kg (short) 1.45 kg (long)
10. Weight, additional equipment	—
11. Weight distribution Balance	—
12. Other specifications	Modular systems without any cables

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Approx. 2,000
15. Other types Models	—
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	0 - 95 %
18. Temperature (limitations)	
> Storage	-53° C to +70° C
> Operational	-30° C to +55° C
19. Water resistant (Yes / No)	Yes up to 1.3 m
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Manual
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Up to 75 h, depends on solar radiation
> medium temperature (around 20° C)	Up to 75 h, depends on solar radiation
> high temperature (higher than 30° C)	Up to 75 h, depends on solar radiation

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Manual
> Duration	Continual
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment manual
> Low-metal-content mines	Depending on their size, material and the local interference
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	—
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	No
30. Optimal sweep speed	0.2 - 1.5 m/s
31. Search coil Antenna	Ø 200 mm circular
32. Limitations	No
33. Interference (with other detectors)	< Safety distance

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	—
> no. of batteries size type	1 x 9V dry battery LR61
> rechargeable	1 x 9V rechargeable LR61
> other	Power supply from solar panel

COSTS

37. Price	
> for one detector on request	US\$ 1,000-US\$ 2,000
> reduction for higher quantity	Yes
38. System price	
> with training	On request
> spare parts	On request
> extended warranty	On request
39. Total	—
40. Possibility to rent/lease	On request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Extension rod
43. Additional technical data information	—
44. Compliant standards	MIL-STD 461, MIL-STD 810, DIN EN ISO 900: 2000

Institut Dr. Foerster | Germany

GENERAL DESCRIPTION

The *MINEX 2FD 4.530* metal detector works on the continuous-wave EMI principle with two parallel frequencies. It is an improved version of the MINEX 2FD available as an off-the-shelf product since November 2005.

The one-piece design aims to make the machine fast to put into operation, low in weight and precisely balanced, mechanically durable and with as few mechanically “weak points” (like cables or plugs) as possible. A drillsafe telescopic bar with improved fast-lock clips keeps the searchhead in the chosen position.

The MINEX 2FD 4.530 is equipped with an easy-to-use, push-button, ground-learn procedure to adapt to all soil conditions. A digital data interface downloads ground condition data, which are used for further software improvement. The same data interface is to update software, which can be done by the customer: programme and software updates are supplied free.

Safety considerations strongly influenced the MINEX development. An audible alarm informs the operator about malfunctions. Low battery levels are indicated by a red LED, while still ensuring hours of safe work without any loss of sensitivity. When the battery level is critically low, an additional audible alarm is activated. Extra safety is ensured by a steady ticking-sound during operation. The searchhead does not need to be moved to indicate a signal: keeping the head stationary over an object will not lead to a drop in signal level.

By covering different frequencies, all metals can be found with approximately the same sensitivity setting.



FOERSTER MINEX 2FD 4.530 in service at the Egyptian test site

WORKING METHODOLOGY

By using a non-dynamic principle, there is no minimum speed for the movement of the coil. The gradiometric arrangement of the search coil indicates metallic objects with a switching sound when the centre of the coil passes over them. Thus it is possible to pinpoint objects exactly, to separate objects close to each other and to work alongside big metal objects such as fences, railways and gates.

As an example, minimum metal mines in a horizontal distance of about 10-15 cm from each other can be separated and localised. The only steady background noise is an unobtrusive control-tick .

Salt and fresh water does not influence the MINEX's detection capabilities. Different soil types are identified on site with the simple push-button ground-learning device. This ensures that the detector is adapted to particular soils without choosing and using preset soil types. The 2FD 4.530 offers five possible sensitivity settings, by a switch on the back of the detector, thus enabling clear identification of the chosen setting by a supervisor from the rear. The "optimised" sensitivity step offers maximum sensitivity for the "learned" soil type at full ground compensation. One higher and three lower sensitivity settings are available.

POWER SUPPLY

As standard, the MINEX 2FD 4.530 is powered by three 1.5V D cells. Rechargeable batteries can be used, varying the indicated operating times depending on their quality and age. Battery charge status is indicated (low-medium-high) when switching on the detector.

Under all circumstances the sensitivity and detection quality is not influenced by the battery conditions.

At 20° C approximately 30 hours of continuous operation are generated. With a normal operating schedule (four hours twice a day) a total operating time of approximately 50 hours can be achieved.

Under most circumstances, one set of batteries ensures sufficient supply for one working week.

DETECTORS IN USE

- > The MINEX 2FD 4.530 has been in service with demining forces in Africa and Asia since early 2006.
- > The MINEX 2FD 4.500 has been in service since 2000, mainly in Afghanistan, Australia, Austria, Croatia, Denmark, Egypt, France, Guinea Bissau, India, Mozambique, Oman, Portugal, Spain, Switzerland, Tunisia, the U.S. and Viet Nam.
- > The previous version, MINEX 2FD 4.400 with identical features to the 4.500 version, has been in field use since 1991.
- > The MINEX 2 FD series is in service with humanitarian demining and military forces in more than 30 countries.

FACTORY SUPPORT

Spare parts are available exclusively from Foerster. Rechargeable batteries similar to those used for the MINEX can be purchased on the free market.

Besides Foerster's direct support, the company is represented in more than 40 countries, most of them offering complete after-sales service. They can also provide on-site training and have modern test and training areas at their facilities in Reutlingen, Germany. These areas offer excellent training conditions for mine/ERW search under various scenarios. A full training programme for trainers – including lessons on background knowledge and various training materials – is available in German and English. Training can be requested as part of the purchase package. Manuals and service documentation are available in German, English. Training can be requested as part of the purchase package.

Manuals and service documentation are available in German, English, French, Portuguese and Spanish as standard, plus other languages on request.



The MINEX 2FD in transit case

MAINTENANCE AND SUPPORT

MINEX maintenance is at two levels: basic field maintenance and workshop maintenance. Personnel handling a workshop must have some basic knowledge of mechanical and electronic repairs. Foerster can supply complete tool sets and testing equipment as well as service training. Fully equipped workshops with trained personnel can handle all repairs to factory final assembly level.

TEST AND EVALUATION

Foerster tests its equipment within its own facilities, mainly for research and quality control, for the most part and as far as possible under "real" conditions. This includes the targets (mines and ERW) as well as the circumstances (soil, disturbing influences, etc.). The results are not available publicly but the Foerster training site allows interested customers to see the equipment working under these conditions.



The MINEX 2FD 4.530



FOERSTER MINEX 2FD 4.530 in service at the test site

The MINEX 2FD 4.530 was tested by the EC's Joint Research Centre in Laos in 2004 and in a comparative field trial in Mozambique in 2005 as well as in a laboratory test trail by JRC, Institute for the Protection and Security of the Citizen, in Italy from November 2003 to January 2006.

The following test results are available at the ITEP website: www.itep.ws

1. Systematic Test and Evaluation of Metal Detectors. Interim Report field Trial Mozambique, 12 April - 5 May 2005; published in 2005 (see also: <http://maic.jmu.edu/journal/10.1/notes/guelle/guelle.htm>).
2. Systematic Test and Evaluation of Metal Detectors. Interim Report field Trial Lao, 27 September - 5 November 2004; published in 2005.
3. Development Tests for Measuring the Detection Capabilities of Metal-Detectors; published in 2003.

The MINEX FD 4.530 prototype was tested in May 2005 by BAM-Berlin at the Benkovac test site in Croatia. Test results are available from BAM; (see also http://www.bam.de/de/aktuell/presse/newsletter/newsletter_medien/newsletter_7_2005.pdf).

REPORTED LIMITATIONS AND STRENGTHS

As the MINEX FD 4.530 is new no independent test reports are yet available.

Limitations

No significant limitations reported to date.

Strengths

- > One-piece design.
- > Ease of operation.
- > Easy ground-learn-procedure for adapting to all soil conditions.

DETECTOR

1. Brand	FOERSTER
2. Model	MINEX 2FD
3. Version	4.530
4. Used detection technology	Continuous - wave EMI with two parallel frequencies in combination with gradiometric receiving coil system

DIMENSIONAL DATA

5. Working length	
> min. length	930 mm
> max. length	1,660 mm
6. Search head	
> Size	210 x 285 mm
> Weight	N/A due to one-piece design
> Shape	Oval
7. Transport case	
> Weight	5.7 kg
> With equipment (full)	Approx. 8 kg
> Dimensions	97 x 24 x 37 cm
> Hard Soft case (material)	Plastic hardcase backpack optional
8. Weight, hand-held unit	2.2 kg
9. Weight, carrying (operational detection set)	2.6 kg incl batteries
10. Weight, additional equipment	Backpack 0.8 kg headphone 0.1 kg
11. Weight distribution Balance	Balanced around the handgrip
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	—
15. Other types Models	Previous versions MINEX 2FD 4.500 and 4.400
16. Location of use	Humanitarian and military demining forces in more than 30 countries worldwide.

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	No limitations
18. Temperature (limitations)	
> Storage	-57° C to +71° C (-135° F to +160° F)
> Operational	-37° C to +71° C (-99° F to +160° F)
19. Water resistant (Yes / No)	Search head waterproof, control unit splash water proof acc. MIL STD 810E
20. Shock Vibration resistant	Acc. MIL STD 810E
21. Environmental Compensation	Automatic very aggressive soil compensated by automatic learning sequence
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Depending of working sequence up to 25 h
> medium temperature (around 20° C)	Depending of working sequence 30 to 50 h
> high temperature (higher than 30° C)	Depending of working sequence 30 to 50 h

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic, manual check with test piece
> Duration	30 s

24. Detection range Sensitivity details Detection performance Working depth	Type 72A approx. 18 cm TM 62M up to 60 cm See AT mine for exemplary comparison on bigger objects. For UX0-search Foerster offers highly-specialized magnetometers
> Small metal content mines (type of mine)	
> Anti-tank mines (type of mine)	
> ERW (please specify)	
25. Output indicator	Audio by inbuilt speaker or headphones
26. Pinpointing feature	Two sounds, switching when passing an object with the center of the searchhead
27. Adjustment of search head angle	Manual
28. Soil influence	Up to a certain degree automatic adaption, aggressive soil can be learned by operating a push-button
29. Best use in	Yes
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	Signal quality not speed-dependent, no particular limit
31. Search coil Antenna	Gradiometric coil system (1 sending 2 receiving coils) Printed multi-layer construction
32. Limitations	Not usable by divers
33. Interference (with other detectors)	Approx. 5 m

POWER

34. Power supply Source	3 x 1.5V mono-cell IECLR 20 (ANSI Std. size "D")
35. Operating time	25-50 h with alkaline batteries
36. Power supply	
> weight	—
> no. of batteries size type	3 x 1.5V mono-cell IECLR 20 (ANSI Std. size "D")
> rechargeable	Yes, possible
> other	—

COSTS

37. Price	
> for one detector on request	—
> reduction for higher quantity	—
38. System price	
> with training	Depending on quantity
> spare parts	Depending on quantity
> extended warranty	Available on request
39. Total	T.B.D.
40. Possibility to rent/lease	Available

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Headphones, backpack, workshop equipment & tools
43. Additional technical data information	Service manuals, training program
44. Compliant standards	MIL-STD 810E 514.4-1 Random vibration MIL-STD 810E 516.4 Procedure I Mechanical Shock MIL-STD 810E 516.4 Procedure IV Drop Test MIL-STD 810E 501.3 High Temperatures MIL-STD 810E 502.3 Low Temperatures MIL-STD 810E 506.3-1 Blowing Rain MIL-STD 810E 503.3 Temperature Shock MIL-STD 810E 512.2 Leakage Test MIL-STD 810E 505.3 Procedure I Solar Radiation (Sunshine)
	Mission MTBF = 24 760 h(in accordance to MIL-STD-217F)
	EMC according to EN 55022:1998(ClassB) and EN 61000-4-3:1996+A1:1998

GI EXPLORER TM-D

Geoinstruments | Czech Republic

GENERAL DESCRIPTION

The *Explorer TM-D* belongs to a family of high-sensitivity metal detectors for detecting and dimensional discrimination of magnetic and electrically conductive non-magnetic targets buried in ground or shallow water. An earlier non-discriminative model, the EXPLORER TM-93, is still available.

The Explorer TM-D is a pulse-induction electromagnetic metal detector. It analyses both magnitude and decay rate of the signal produced by the object signal. Decay rate yields information about object size. A microcomputer samples the object signal at 200 and 300 microseconds delay instants, computes a ratio of sample magnitudes and converts the ratio into object size, which is displayed on an LCD. Detector depth range depends on coil size. The 13 cm diameter circular coil is used for minimum-size objects (e.g. mines with minimum metal content), while the 100 x 100 cm square coil can detect very large objects (e.g. metal reinforced bunkers) as deep as 500 cm. A 24 cm and 50 cm circular coil are also available.

A wide range of accessories from the Explorer TM family is available and are listed on the manufacturer's website: www.geoinstruments.cz



GI EXPLORER TM-D in service | Packed in a backpack

WORKING METHODOLOGY

A time-varying current in the transmitter coil of the search head generates a low frequency electromagnetic field, which induces electric (“eddy”) currents in nearby metallic objects buried in the ground, an effect which can be enhanced in the case of magnetic objects. These eddy currents in turn induce a time-varying current in the receiver coil(s) of the search head. The generated signals are automatically analysed by the microcomputer of the D model, and the microcomputer displays object dimensional discrimination on the LCD.



GI EXPLORER TM-D | Control panel

POWER SUPPLY

Power supply is provided by a sealed lead/acid battery 12V, 2,6Ah. The battery is rechargeable by mains electricity or by a 24V truck battery. Operating time depends on the model and varies from 5 to 20 hours.

DETECTORS IN USE TO DATE

The Explorer TM-93 has been in service for 15 years and the TM-D model for 10 years, in Asia, Europe and North America.

FACTORY SUPPORT

- > Spare parts are available from the manufacturer.
- > Two-year warranty.

MAINTENANCE AND SUPPORT

- > No special maintenance is required

TEST AND EVALUATION

No information available.

REPORTED LIMITATIONS AND STRENGTHS

No information available.

DETECTOR

1. Brand	All-metal, non-motion discriminative metal detector
2. Model	EXPLORER TM-D
3. Version	TM-D
4. Used detection technology	Pulse Induction electromagnetic method

DIMENSIONAL DATA

5. Working length	
> min. length	—
> max. length	—
6. Search head	
> Size	13 cm 24 cm 50 cm 100 cm
> Weight	0.3 kg 0.5 kg 0.9 kg 4.5 kg
> Shape	Circular Circular Circular Circular
7. Transport case	
> Weight	—
> With equipment (full)	13 kg
> Dimensions	57 x 57 x 14 cm
> Hard Soft case (material)	Metal covered wood
8. Weight, hand-held unit	—
9. Weight, carrying (operational detection set)	2.3 kg housing with electronics
10. Weight, additional equipment	—
11. Weight distribution Balance	—
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	App. 300 pieces with military, police and field exploration professionals
15. Other types Models	TM-93; TM-DS
16. Location of use	Europe, Asia, North America

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	—
18. Temperature (limitations)	
> Storage	-20° C to +70° C
> Operational	-25° C to +50° C
19. Water resistant (Yes / No)	Yes
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Automatically
22. Operational hours Operating endurance	5 to 20 h depend on power used
> low temperature (around 0° C)	—
> medium temperature (around 20° C)	—
> high temperature (higher than 30° C)	—

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	—
> Duration	—
24. Detection range Sensitivity details Detection performance Working depth	
> Small metal content mines (type of mine)	Several cm with circular 13 cm coil
> Anti-tank mines (type of mine)	50 cm to 200 cm depending on coil used
> ERW (please specify)	—
25. Output indicator	LCD display, beeper, phones, deflection meter needle
26. Pinpointing feature	Meter deflection, beeper tone
27. Adjustment of search head angle	—
28. Soil influence	Automatic compensation of varying ground mineralization
29. Best use in	
> Sand	—
> Peat	—
> Clay	—
> Ferruginous soil (laterite)	—
30. Optimal sweep speed	—
31. Search coil Antenna	—
32. Limitations	—
33. Interference (with other detectors)	No interference due to detector adjustable frequency offset

POWER

34. Power supply Source	Sealed lead - acid battery
35. Operating time	5 to 20 h depend on power used
36. Power supply	One rechargeable battery
> weight	—
> no. of batteries size type	1
> rechargeable	Yes
> other	—

COSTS

37. Price	1,600 USD for minimum setup, 3,500 USD for standard setup with 3 circular coils; extra 1,300 USD for 100 x 100 cm square coil
> for one detector on request	—
> reduction for higher quantity	—
38. System price	See above
> with training	—
> spare parts	—
> extended warranty	—
39. Total	
40. Possibility to rent/lease	Yes

OTHERS

41. Duration of warranty	2 years
42. Additional equipment	List of accessories available
43. Additional technical data information	—
44. Compliant standards	—

MINELAB F1A4

Minelab Electronics Pty Ltd. | Australia

GENERAL DESCRIPTION

The *Minelab F1A4* metal mine detector was originally designed and developed in 1996 for use in the Cambodian Mine Action Centre (CMAC) to be able to detect minimum-metal mines in all ground conditions but particularly in heavily mineralised soils. Following comprehensive comparative trials in 1998, CMAC announced the F1A4 was its “detector of choice”.

To date, the F1A4 remains CMAC’s detector of choice having undergone continuous design improvement. The F1A4 is also in operation in more than 50 countries having been selected for its ease of use, robustness, detection capability in all types of soils and built-in safety features. In 2006, the F1A4 was selected to replace the in-service fleet of detectors with the Ethiopian Mine Action Office.

The F1A4 includes an RS232 output for computer logging of target responses. This feature, when coupled to a GPS facility, makes it ideal for UXO detection and mapping. The F1A4 UXO version also includes an interchangeable large coil (450 mm diameter), for deeper detection against large targets.

Using a constant Threshold Tone, the operator can easily discern the sound of a deeply buried target. The mono-loop design of the search coil ensures sensitivity is consistent across the entire surface of the coil, producing no blind spots. Consequently, the risk of missing targets is reduced and pinpointing is enhanced.



MINELAB F1A4 in service in Sudan

WORKING METHODOLOGY

The F1A4 is a pulse induction detector (time domain) that incorporates Minelab’s unique and patented Multi-Period-Sensing (MPS) technology that permits detection in the heaviest of mineralised soils. This is achieved via the F1A4 electronics that produces two target channels and one ground channel. Using MPS to identify interference from the ground, complex algorithms remove the interference while maintaining appropriate sensitivity in the target channels.

The F1A4 also incorporates a “noise cancel” feature, which allows an operator to conduct a simple procedure to reduce or eliminate any environmental interference resulting from, for example, other detectors nearby or overhead power lines.

For operator safety, the battery power supply of the detector is constantly monitored by its electronics to ensure detection sensitivity does not decrease as battery voltage reduces.



The F1A4 in service | In service in Bosnia and Herzegovina | The F1A4 | Military training

DETECTORS IN USE TO DATE

The F1A4 Version 1 went into service in 1998 and has undergone several design improvements, resulting in the current Version 8.

Buyers of the F1A4 include the United Nations, the US Department of State, the Japanese International Cooperation Agency and various non-government organisations, commercial demining companies and militaries.

Over the past eight years the F1A4 has been supplied to more than 200 customers in more than 50 countries. There are more than 10,000 units in operation.

The F1A4 is designed for countermine as well as humanitarian demining operations and has been purchased by the militaries of Australia, Canada, Sri Lanka, Sudan, U.S.A and Vietnam.

In 2006, the F1A4 was selected to replace the in-service fleet of detectors with the Ethiopian Mine Action Office.

POWER SUPPLY

The F1A4 uses commercially available 4 x D-cell alkaline and rechargeable batteries.

The operating period for alkaline and rechargeable batteries is approximately 24 hours and 12 hours respectively.

Minelab’s F Series Battery Charger is automatic, intelligent, fast-charging and cost-effective.

FACTORY SUPPORT

- > Customer support is provided from Minelab facilities in Australia, Ireland and the U.S.A.
- > Minelab offers comprehensive “train the trainer” operator and technical maintenance training, which can be conducted in the field or within classroom facilities.
- > All training documentation is provided free as part of a training management plan. The principal language is English with other languages provided on request.
- > All Minelab trainers are experienced instructors also qualified in adult education techniques.
- > Where required, Minelab establishes in-country technical repair and maintenance for all warranty and non-warranty repairs. This provides timely access to spare parts.
- > Where applicable, routine customer visits to provide on-going advice on training and maintenance are provided free as part of Minelab’s global travel commitments.
- > Manufacturer’s warranty is for 15 months with extended warranty provided on a case-by-case basis.

MAINTENANCE AND SUPPORT

- > All F1A4 components are interchangeable and require no routine calibration.
- > Diagnostics, fault finding and component replacement can occur in the field as part of Minelab’s Level 1 repair and maintenance philosophy.
- > Level 2 maintenance requires basic electronic workshop facilities.

TEST AND EVALUATION

The following trials have been conducted on the F1A4:

- > UNMAC, Bosnia and Herzegovina, 1997
- > CMAC – final Confirmation, 1998
- > UNOCHA, Afghanistan, 2000
- > ADP, Mozambique, 2000
- > International Pilot Project for Technology Cooperation, 2001
- > UNOPS, Afghanistan, 2002
- > JUXOCO, USA, 2002
- > Canadian Forces, 2002
- > CMAC – Review, 2004
- > STEMMD, Laos, 2004
- > STEMMD, Mozambique, 2005
- > South-East Europe Interim Report field Trial Croatia, 2006.

Copies of evaluations are available upon request.

The following test results are available at the ITEP website: www.itep.ws

1. Results of STEMMD Trials (Annex of *Metal Detectors and PPE Catalogue 2007*); 2007.
2. South-East Europe Interim Report field Trial Croatia (STEMMD - continuation), 25 September – 18 October 2006; 2007.
3. Systematic Test and Evaluation of Metal Detectors. Interim Report field Trial Mozambique, 12 April - 5 May 2005; 2005 (see also: <http://maic.jmu.edu/journal/10.1/notes/guelle/guelle.htm>).
4. Systematic Test and Evaluation of Metal Detectors. Interim Report field Trial Lao, 27 September - 5 November 2004; 2005.

REPORTED LIMITATIONS AND STRENGTHS

Limitations

“The loss of sensitivity with the increasing electromagnetic properties of the ground was significant but most of the used targets i.e. mines and simulants of mines could be detected in all lanes to 130 mm depth.”¹

Limitations in the past and the solutions of the manufactures are as follows:

- > Problem: Initial problem in robustness of shaft connector to coil.
Solution: New manufacturing material to increase strength.
- > Problem: Initial breakage of armrest.
Solution: Redesign.
- > Problem: Initial breakage of ear set cable.
Solution: Introduction of steel core to cable.

Strengths

- > Simple to use.
- > Lightweight.
- > Speed of pinpointing.
- > All-round sensitivity of mono-loop coil.
- > Ability to work in all soils and environmental conditions.

“During the two weeks of the training and trial, no difficulties in use or technical questions arose. The detector had no problems in completing its automatic soil compensation process in all lanes and could well cope with the physically different structures of the soils i.e. the stones as well as with the magnetic properties. The signal interpretation is easy because of the relatively low background noise. The detector kept a good level of sensitivity to all lanes.”¹

“...The two Minelab detectors (F3 and F1A4, author’s note) had the highest POD (Probability of Detection, author’s note) and the lowest FAR (False Alarm Rate, author’s note) in the trial.”²

¹ Guelle, Dieter M., Lewis, Adam M., Pike, Matthew A. and Christo Crail. *Systematic Test and Evaluation of Metal Detectors (STEMMD). Interim Report field Trial Mozambique, 12 April - 5 May 2005*, Nov. 2005, at <http://www.itep.ws/reports/results1.php>, p. 77.

² GICHD, *Metal Detector and PPE Catalogue 2007*, Results of STEMMD Trials by Mate Gaal, Dieter Guelle, and Dr. Christina Müller; Geneva 2007, p.191

DETECTOR

1. Brand	MINELAB
2. Model	F1A4
3. Version	Version 8
4. Used detection technology	Pulse induction multi-period-sensing

DIMENSIONAL DATA

5. Working length	
> min. length	1,200 mm
> max. length	1,450 mm
6. Search head	
> Size	200 mm diameter
> Weight	—
> Shape	Circular with protective skid plate
7. Transport case	
> Weight	4 kg
> With equipment (full)	8 kg
> Dimensions	320 mm x 840 mm x 180 mm
> Hard Soft case (material)	Impact plastic/cordura
8. Weight, hand-held unit	1.5 kg (control box detached)
9. Weight, carrying (operational detection set)	3.1 kg
10. Weight, additional equipment	—
11. Weight distribution Balance	Adjustable
12. Other specifications	Internal speaker and external earset

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	10,000 plus
15. Other types Models	F1A4 UX0 version
16. Location of use	50+ countries

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	Nil
18. Temperature (limitations)	
> Storage	-55° C to +75° C
> Operational	-30° C to +60° C
19. Water resistant (Yes / No)	Yes (control box IP 65)
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	—
> medium temperature (around 20° C)	24 h
> high temperature (higher than 30° C)	—

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Auto
> Duration	min assembly 10 sec switch and go
24. Detection range Sensitivity details Detection performance Working depth	
> Small metal content mines (type of mine)	Type 72 at 15-19 cm
> Anti-tank mines (type of mine)	Metal mine at 1.0 m
> ERW (please specify)	500 lb bomb at 1.8 m
25. Output indicator	Audio
26. Pinpointing feature	Edge detection
27. Adjustment of search head angle	Yes
28. Soil influence	Automatic rejection and compensation
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.6 m/s
31. Search coil Antenna	Enclosed circular
32. Limitations	–
33. Interference (with other detectors)	2 m

POWER

34. Power supply Source	4 x D cell alkaline or rechargeable
35. Operating time	Alkaline 24 h rechargeable 12 h
36. Power supply	
> weight	0.8 kg
> no. of batteries size type	4 x D cell 1.5V LR20
> rechargeable	4 x D cell 4.5 Ahnicad
> other	–

COSTS

37. Price	
> for one detector on request	US\$ 1,000 - US\$ 2,000
> reduction for higher quantity	Yes
38. System price	
> with training	Subject to location and quantity purchased
> spare parts	On Minelab recommendation
> extended warranty	Yes
39. Total	Subject to quantity purchased
40. Possibility to rent/lease	On request

OTHERS

41. Duration of warranty	15 months (extendable on request)
42. Additional equipment	F Series battery charger
43. Additional technical data information	On request
44. Compliant standards	Designed to MIL STD 810 F

MINELAB F3

Minelab Electronics Pty Ltd. | Australia

GENERAL DESCRIPTION

The *Minelab F3* metal mine detector was designed in consultation with many of Minelab's clients. Building on the proven technology of the highly successful F1A4 detector, the F3 entered into production in July 2003 and immediately impressed with its robust mechanical design and simplicity of use.

Although the F3 shares many of the technological features of the F1A4, including its renowned ability to remove the effects of mineralised soils, it also includes several innovative new features. For example, the F3 introduced the concept of a Sensitivity End Cap, which permits an operator to reduce the sensitivity of the detector in those situations where maximum sensitivity is not required. By using End Caps it is impossible for an operator to accidentally reduce the sensitivity of the detector, unlike other detectors that use knobs, dials or switches.

The F3 also uses BiPolar technology which minimises the threat posed by magnetic influence mines. It is a "static" detector that results in an alarm tone when a target is present regardless of the relative motion of the search coil.

Using a constant Threshold Tone, the operator can easily discern the sound of a deeply buried target. Also, the mono-loop design of the search coil ensures that sensitivity is consistent across the entire surface of the coil, producing no blind spots. Consequently, the risk of missing targets is reduced and pinpointing is enhanced.



MINELAB F3 in service

The following configurations of the F3 are available:

- > **F3L** – the F3L includes a Light Emitting Diode display and volume/sensitivity controls located on the hand assembly. The display provides a visual indication of the size and depth of a target and increases pinpointing accuracy. When combined with the black (maximum sensitivity) and red (minimum sensitivity) End Caps, the F3L introduces 22 levels of volume/sensitivity.
- > **F3S** – the F3S configuration permits a user to customise the sensitivity of an F3 or F3L for use with a Yellow End Cap. Via a Minelab-produced, Windows-based software programme, a user can adjust the internal sensitivity and volume settings of the detector. Once programmed, these settings will come into effect whenever a Yellow End Cap is fitted. With the F3S configuration, the capability of the detector can be optimised for operation in specific soils, against specific targets and under various local electro-magnetic interference conditions.
- > **F3UX0** – for detection of large, deeply buried targets, the F3UX0 incorporates a 450 mm coil. The F3UX0 can also be operated using F3L and F3S configurations.



F3L hand assembly



F3S-yellow end cap



F3UX0 version

WORKING METHODOLOGY

The F3 is a pulse induction detector (time domain - BiPolar) that incorporates Minelab's unique and patented Multi-Period-Sensing technology which permits detection in the heaviest of mineralised soils. Its unique mechanical design allows the detector to be adjusted to suit various demining positions adopted by an operator. The F3 has no exposed cables and is extremely robust having been manufactured from high-impact plastics, aluminium and carbon fibre.

The F3 also incorporates a "noise cancel" feature, which allows an operator to conduct a simple procedure to reduce or eliminate any environmental interference resulting from, for example, other detectors nearby or overhead power lines.

DETECTORS IN USE TO DATE

The standard F3 went into service in 2003 and there are now more than 5,000 detectors in use throughout the world. The F3L and F3S configurations are more recent.

Designed for countermine as well as humanitarian demining, significant purchases of F3 detectors have been made by the militaries of Australia, the Netherlands, New Zealand, Sri Lanka, Sudan, Thailand, the US and Viet Nam.

The F3 electronics and coil are also incorporated into the US HSTAMIDS detector, which combines metal detection with ground penetrating radar. In August 2006, the US issued a multi-year contract for the manufacture of up to 17,000 units.

POWER SUPPLY

- > Operates with 4 x D Cell commercially available alkaline and rechargeable batteries.
- > Operating period:
 - > Alkaline – 27 hours.
 - > Rechargeable – 15 hours.
- > Minelab's F Series battery charger is automatic, intelligent, fast charging and cost effective.

FACTORY SUPPORT

- > Customer support is provided from Minelab facilities in Australia, Ireland or the US.
- > Minelab offers comprehensive "train the trainer" operator and technical maintenance training, in the field or in classroom facilities.
- > All training documentation is provided free as part of a training management plan. The principal language is English with other languages provided on request.
- > All Minelab trainers are experienced instructors also qualified in adult education techniques.
- > Where required, Minelab establishes in-country technical repair and maintenance for all warranty and non-warranty repairs. This also provides timely access to spare parts.
- > Where applicable, routine customer visits to provide on-going advice on training and maintenance are provided free as part of Minelab's global travel commitments.
- > Manufacturer's warranty is for 15 months with extended warranty provided on a case-by-case basis.

MAINTENANCE AND SUPPORT

- > All F3 components are interchangeable and require no routine calibration.
- > Diagnostics, fault finding and component replacement can occur in the field as part of Minelab's Level 1 repair and maintenance philosophy.
- > Level 2 maintenance requires basic electronic workshop facilities.

TEST AND EVALUATION

The following trials have been conducted on the F3:

- > Joint Unexploded Ordnance Coordination Office, USA, 2002.
- > Mines Advisory Group, Laos, 2002.
- > Joint Research Centre, ISPRA, 2002.
- > Royal Netherlands Army, 2004.
- > STEMMD Laos, 2004
- > STEMMD Mozambique, 2005
- > South-East Europe Interim Report field Trial Croatia, 2006
- > Experimental Cairo Testing & Evaluation, 2007.



F3 in service in Cambodia



At the test site

Copies of evaluations are available on request from the manufacturer. The following test results are available at the ITEP website: www.itep.ws

1. Experimental Cairo Testing and Evaluation of Mine and UXO Detectors , 14 – 18 May 2007; 2007.
2. Results of STEMMD Trials (Annex of Metal Detectors and PPE Catalogue 2007); in 2007.
3. South-East Europe Interim Report field Trial Croatia (STEMMD - continuation), 25 September – 18 October 2006; 2007.
4. Systematic Test and Evaluation of Metal Detectors. Interim Report field Trial Mozambique, 12 April - 5 May 2005; 2005 (see also: <http://maic.jmu.edu/journal/10.1/notes/guelle/guelle.htm>).
5. Systematic Test and Evaluation of Metal Detectors. Interim Report field Trial Lao, 27 September - 5 November 2004; 2005.

REPORTED LIMITATIONS AND STRENGTHS

Limitations

No significant limitations reported to date.

Strengths

- > Simple to use, minimising training requirements.
- > Lightweight.
- > Speed of pinpointing.
- > All-round sensitivity of mono-loop coil.
- > Robustness.
- > No exposed cables.
- > Ability to work in all type of soils and environmental conditions.

DETECTOR

1. Brand	MINELAB
2. Model	F3
3. Version	Available in F3L, F3S & UX0 configurations
4. Used detection technology	Pulse induction multi-period-sensing-bipolar

DIMENSIONAL DATA

5. Working length	
> min. length	760 mm
> max. length	1,500 mm
6. Search head	
> Size	200 mm diametre (450 mm UX0 coil)
> Weight	—
> Shape	Circular with protective skid plate
7. Transport case	
> Weight	6.5 kg
> With equipment (full)	10.5 kg
> Dimensions	1,600 mm x 1,200 mm x 180 mm
> Hard Soft case (material)	Impact plastic/cordura
8. Weight, hand-held unit	2.3 kg (battery pack detached)
9. Weight, carrying (operational detection set)	3.2 kg
10. Weight, additional equipment	Optional led display with volume/sensitivity control
11. Weight distribution Balance	Adjustable
12. Other specifications	Internal speaker and external earset Sensitivity end caps Programmable sensitivity (F3 S configuration)

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	5,000 plus
15. Other types Models	—
16. Location of use	25+ countries

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	Nil
18. Temperature (limitations)	
> Storage	-55° C to +75° C
> Operational	-30° C to +60° C
19. Water resistant (Yes / No)	Yes IP 67
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	—
> medium temperature (around 20° C)	27 h
> high temperature (higher than 30° C)	—

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Auto
> Duration	10 sec switch and go
24. Detection range Sensitivity details Detection performance Working depth	
> Small metal content mines (type of mine)	Type 72 at 15-19 cm
> Anti-tank mines (type of mine)	Metal mine at 1.0 m
> ERW (please specify)	500 lb bomb at 1.8 m
25. Output indicator	Audio and optional led
26. Pinpointing feature	Edge detection
27. Adjustment of search head angle	Yes
28. Soil influence	Automatic rejection and compensation
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.6 m/s
31. Search coil Antenna	enclosed circular
32. Limitations	–
33. Interference (with other detectors)	2 m

POWER

34. Power supply Source	4 x D cell alkaline or rechargeable
35. Operating time	Alkaline 27 h; rechargeable 15 h
36. Power supply	
> weight	0.8 kg
> no. of batteries size type	4 x D cell 1.5V LR20
> rechargeable	4 x D cell 4.5 Ahnicad
> other	–

COSTS

37. Price	
> for one detector on request	US\$ 2,000 - US\$ 3,000
> reduction for higher quantity	Yes
38. System price	
> with training	Subject to location and quantity purchased
> spare parts	On Minelab recommendation
> extended warranty	Yes
39. Total	Subject to quantity purchased
40. Possibility to rent/lease	On request

OTHERS

41. Duration of warranty	15 months (extendable on request)
42. Additional equipment	F Series battery charger
43. Additional technical data information	On request
44. Compliant standards	Designed to MIL STD 810 F

GENERAL DESCRIPTION

The *AN-19/2 mine detecting set* is one of the most widely used and easily recognisable mine detectors in the world. It is built to military standards to meet the requirements for mine clearance on the battlefield and is now also used for humanitarian demining. It has been in daily use for the last 13 years in the world's most mine-affected countries and is the standard detector for many NATO countries, including the US Army (designated as the AN/PSS-12).

Because of its ease of use, low power requirement, lightweight design and the low mutual interference, the AN-19/2 is mission-suitable for all kinds of demining activities. The equipment is able to detect mines with minimum metallic content and can be used in shallow fresh or salt water. Unaffected by ambient temperature, the detection characteristics of the AN-19/2 qualify the equipment for use in all climates. It is a reliable, long-life product based on rigorous quality control standards during manufacture. Although there have been several modifications to the original AN-19/2 pulse detector, culminating in the current Modification 7, the method of operation has remained the same. Since many Schiebel detectors have been in operation for more than 10 years, the company offers a kit that upgrades older detectors to the latest technology. This allows the user to retain the trusted and proven design of the AN-19/2 while increasing sensitivity and allowing operation of the detector in mineralised soils such as laterite and magnetite.



The SCHIEBEL AN-19/2

The upgrade consists of a new search head and a new electronics card which allow the detector to act either as an AN-19/2 or an All Terrain Mine Detector (ATMID) depending on which search head is used. In the pulse, or AN-19/2 mode, the detector operates in the same way as the original detector, yet with increased capacity in normal soils. In the continuous wave (ATMID) mode, the detector uses new technology and a new search head to detect minimum-metal mines in even the most difficult mineralised soils. The upgrade combines both technologies in one detector, providing versatility in varied operating conditions.

WORKING METHODOLOGY

The search head emits an electromagnetic pulse, which induces eddy currents in nearby metal objects. These eddy currents give rise to a secondary field, which is detected by the search head receiving coil. The detected signal is processed in the electronics unit. The presence of a metal object is indicated by a tone in the head-phone and by an optional LED visual signal, if fitted. The AN-19/2 detects mines at their operational depth (or deeper). Schiebel's own testing uses a 0.15 g steel pin (approximately the same signature as the Chinese Type 72A anti-personnel mine) that can be detected when buried at 17 cm (or only 12 cm in light magnetic soil: for heavier magnetic soil the ATMID should be used). This is maintained in fresh/salt water (down to 2 m). For large magnetic signature mines/ERW, the detector gives an over edge of target indication enabling the same precise location as for smaller targets.

POWER SUPPLY

AN-19/2 is powered by four standard D-cell batteries. The recommended alkaline cells provide approximately 70 hours operation. Similar rechargeable nickel-cadmium cells provide approximately 35 hours. All recommended cells are available worldwide as are suitable automatic chargers.

Rechargeable cells last for at least one year if correctly used/charged.

DETECTORS IN USE TO DATE

The manufacturer says that more than 40,000 AN-19/2s have been sold in four versions since 1990. It is impossible to say how many of each are in service as many have been upgraded.

Different versions are in use in mine-affected regions all over the world, including in Afghanistan, Angola, Bosnia and Herzegovina, Croatia, Cambodia, Iraq, Kosovo and Mozambique. Clients include the UN, Mines Advisory Group, Cambodian Mine Action Centre, Handicap International, most NATO countries and many other armed forces (including Bangladesh, Colombia, India, Sweden and Thailand).

FACTORY SUPPORT

- > All detectors are covered by a 12-month, no-cost warranty and operator / maintenance training is provided (on site or at the factory, as requested) as part of the procurement package. Further training can be provided at cost.
- > Spare parts, all interchangeable (regardless of detector version), are available for 10 years after purchase. These can be obtained directly from the factory or from the worldwide network of Schiebel agents.
- > Operator and maintenance manuals are provided in most major languages (eg English, French, German, Spanish).
- > Schiebel technicians/factory repairs are available worldwide for additional support when required.

MAINTENANCE AND SUPPORT

The AN-19/2 requires little maintenance and can be upgraded to the latest modification state. Most repairs can be carried out, at field level, by Schiebel-trained personnel. Workshop repairs can be carried out by Schiebel-trained technicians, using recommended tools and test equipment (digital multi-meter and oscilloscope).

TEST AND EVALUATION

The AN-19/2 has been comprehensively field tested in all climates by the manufacturer and all detector specifications are fully proven. It has also been evaluated and selected by a wide range of operators, including the US Army and Mines Advisory Group. Additional test reports are available on request from the manufacturer.

The EC's Joint Research Centre says the Schiebel AN-19/2 detects a VPROM 1 with a sufficient safety margin at all angles.¹

The detector performed above average in all types of soil (sand, clay, peat, and ferruginous).²

The most significant tests passed by the detector are:

- > International Pilot Project for Technology Cooperation, March 1999 – June 2000.
- > International Detector Test UNADP Mozambique, December 2000.
- > US Army Communications Electronics Command – Nicaraguan field Test, October 2001.
- > European Commission Directorate General JRC – Institute for Systems, Informatics & Safety.

Test reports were partially published and two reports are accessible at the ITEP website: www.itep.ws

REPORTED LIMITATIONS AND STRENGTHS

Limitations

- > No external speaker.
- > Exposed cable.
- > Lack of standard bracket to mount electronics box on detector shaft.

Strengths

- > Lightweight.
- > Rugged and weatherproof.
- > Easy to use.

¹ M. Fernandez, A. Lewis, F. Littmann, PROM 1 Anti-personnel landmines - Probability of activation by physical contact with a metal detector, Special publication No. I.01.29, European Commission Directorate General JRC Joint Research Centre Institute for Systems, Informatics & Safety, Ispra, March 2001, Annex A, p. 100.

² Y. Das, J.T. Dean, D. Lewis, J.H.J. Roosenboom, G. Zahaczewsky (eds), A multi-national technical evaluation of performances of commercial off the shelf metal detectors in the context of humanitarian demining, International Pilot Project for Technology Co-operation, final report, European Commission, Joint Research Centre, Ispra, Italy, 2001, Annex A, p. 101.

DETECTOR

1. Brand	SCHIEBEL
2. Model	AN-19/2 Mine Detecting Set
3. Version	Mod 7
4. Used detection technology	Electromagnetic pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	1,400 mm
> max. length	1,600 mm
6. Search head	
> Size	267 mm diameter
> Weight	0.6 kg
> Shape	Round
7. Transport case	
> Weight	2.2 kg
> With equipment (full)	6.02 kg
> Dimensions	802 mm x 315 mm x 125 mm
> Hard Soft case (material)	Metal
> Soft material, backpack carry bag with accessories and detector	4 kg
8. Weight, hand-held unit	Search head with telescopic pole 1.22 kg
9. Weight, carrying (operational detection set)	2.41 kg + set of batteries 0.58 kg
10. Weight, additional equipment	—
11. Weight distribution Balance	Electronic unit is shoulder-strap mounted, headphone on head, and hand-held item is balanced by the armrest
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	More than 40,000
15. Other types Models	—
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	No
18. Temperature (limitations)	
> Storage	-55° C to +85° C (-67° F to +185° F)
> Operational	-40° C to +70° C (-40° F to +158° F)
19. Water resistant (Yes / No)	Yes
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Approx. 65 h
> medium temperature (around 20° C)	Approx. 70 h
> high temperature (higher than 30° C)	75 h or more

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Calibration not required. Manual set-up using single control for sensitivity. Sound may also be adjusted to suit local conditions.
> Duration	Less than 30 s
24. Detection range Sensitivity details Detection performance Working depth	
> Low-metal-content mines	72A – 18 cm M14 – 14 cm
> Anti-vehicle mines	Metal anti-vehicle at 1 m; plastic anti-vehicle: nearly all types at operational threat depth
> ERW (please specify)	NATO standard 7.62 rounds at 40 cm, AK 47 at 30+ cm; all larger items down to 1 m in depth.
25. Output indicator	Sound and optional visual-led display
26. Pinpointing feature	Yes by edge of target warbling tone
27. Adjustment of search head angle	Easily adjusted by angel wingnut to cover all necessary operational situations (more than 180 degrees)
28. Soil influence	Can operate in light magnetic soil with reduced but normally acceptable performance
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	No
30. Optimal sweep speed	Static to 2 m/s
31. Search coil Antenna	Yes
32. Limitations	Medium and heavy (strong) magnetic soil
33. Interference (with other detectors)	None at distance above 2 m separation

POWER

34. Power supply Source	Standard D size alkaline cells
35. Operating time	Approx. 70 h
36. Power supply	
> weight	0.58 kg
> no. of batteries size type	4 x 1.5V R20 ANSI size D
> rechargeable	Rechargeable Ni-Cad cells can be used but operating time is reduced to 38 h
> other	–

COSTS

37. Price	
> for one detector on request	US\$ 2,000 - US\$ 3,000
> reduction for higher quantity	Yes
38. System price	
> with training	–
> spare parts	–
> extended warranty	–
39. Total	–
40. Possibility to rent/lease	–

OTHERS

41. Duration of warranty	12 months (extension possible)
42. Additional equipment	–
43. Additional technical data information	–
44. Compliant standards	ISO-9001, AQA P4

GENERAL DESCRIPTION

The *ATMID all terrain mine detector*) is the latest improvement of the AN-19/2 using the continuous wave mode combined with ground-compensating technology. The ATMID is a military standard detector that is unaffected by climatic variations and has been optimised to detect landmines with minimum metal content in all types of soil, including laterite terrain, and in fresh or salt water. The manufacturer states that its sensitivity in ferromagnetic soils remains at the same level. The detector, including all accessories, is packed in a rucksack-style bag.

When fitted with the standard AN-19/2 search head, the ATMID will function in pulse mode with the same performance as the AN-19/2. Because of its ease of use, low power requirement, lightweight design, environmental stability and automatic ground compensation, the ATMID is suitable for use anywhere in the world, in any terrain.

The ATMID is also available as an upgrade to the AN-19/2. The upgrade consists of a new search head and a new electronics card which allow the detector to act either as an AN-19/2 or an ATMID depending on which search head is used. In the pulse (AN-19/2) mode, the detector operates the same way as the original detector, yet with increased capacity in normal soils. In ATMID mode, the detector uses new technology and a new search head to detect minimum metal mines in even the most difficult mineralised soils.



The SCHIEBEL ATMID™ in service

WORKING METHODOLOGY

The ATMID transmitting coil transmits a continuous wave that creates a magnetic field and which is able to compensate for magnetic soil. The sweeping movement of the search head over the ground induces eddy currents in any nearby metallic objects, which affect the created magnetic field. The receiver coil detects the resultant changes in magnetic field and produces a signal that is processed in the electronics unit to provide an audio tone indicating the presence of metal. ATMID detects nearly all mines at deeper than operational depth in any/all soils. Schiebel's test piece incorporates a 0.15 g steel pin (approximately the same signature as the Chinese Type 72A anti-personnel mine) that can be detected at 18 cm when buried in the ground, including under surface fresh/salt water.

For large magnetic-signature mines or ERW, the ATMID gives an edge-of-target indication enabling the same precise location as for smaller targets.

POWER SUPPLY

The ATMID is powered by four standard D cell batteries. The recommended alkaline cells provide approximately 70 hours operation (in most conditions). Similar rechargeable nickel-cadmium cells provide approximately 35 hours operation. All recommended cells are available worldwide, as are suitable automatic chargers. Rechargeable cells last for at least one year if correctly used/charged.

DETECTORS IN USE TO DATE

The ATMID has been in service for more than three years and there are now more than 1,000 in use worldwide. They are being deployed in many regions, including Cambodia, Croatia, Ecuador, Laos, Lebanon, Mozambique, Peru, Slovakia, Taiwan, the U.S. and Viet Nam. They are being used by armed forces from a number of countries (Cambodia, Sweden, the U.S., etc.), humanitarian demining organisations (CMAC, CROMAC, MAG, etc.) and commercial demining companies (Specialist Ghurkha Services (SGS), RONCO, Milsearch, TADS, etc.).¹

¹ Y. Das, J.T. Dean, D. Lewis, J.H.J. Roosenboom, G. Zahaczewsky (eds), A multi-national technical evaluation of performances of commercial off the shelf metal detectors in the context of humanitarian demining, International Pilot Project for Technology Co-operation, final report, European Commission, Joint Research Centre, Ispra, Italy, 2001, Annex A, p. 102.

FACTORY SUPPORT

- > All detectors are covered by a 12-month, no-cost warranty and operator / maintenance training is provided (on site or at the factory as requested), as part of the procurement package. Further training can be provided at cost.
- > Spare parts, all interchangeable, are available for 10 years after purchase. These can be obtained directly from the factory or from the worldwide network of Schiebel agents. Operator and maintenance manuals are provided in most major languages (eg English, German, Spanish).;
- > Schiebel technicians/factory repairs are available worldwide for additional support when required.

MAINTENANCE AND SUPPORT

The ATMID requires little maintenance. Most repairs can be carried out in the field by Schiebel-trained personnel. Limited workshop repairs can be carried out by Schiebel-trained technicians, using recommended tools and test equipment (digital multi-meter and oscilloscope).

TEST AND EVALUATION

The detector was tested by the EC's Joint Research Centre in Laos in 2004 and in a comparative field trial in Mozambique in 2005, in a laboratory test trail by JRC, Institute for the Protection and Security of the Citizen, in Italy from November 2003 to January 2006 as well as in a field trial in Croatia in 2006.

The following test results are available at the ITEP website: www.itep.ws

1. Results of STEMMD Trials (Annex of *Metal Detectors and PPE Catalogue 2007*); 2007.
2. South-East Europe Interim Report field Trial Croatia (STEMMD - continuation), 25 September – 18 October 2006; 2007.
3. Systematic Test & Evaluation of Metal Detectors: Interim Report Laboratory Tests Italy; 2006.
4. Systematic Test and Evaluation of Metal Detectors. Interim Report field Trial Mozambique, 12 April - 5 May 2005; published in 2005 (see also: <http://maic.jmu.edu/journal/10.1/notes/guelle/guelle.htm>).
5. Systematic Test and Evaluation of Metal Detectors. Interim Report field Trial Lao, 27 September - 5 November 2004; published in 2005.
6. Summary of Metal detector Trial Report, UN Mine Action Programme Afghanistan; published 2002.
7. International Pilot Project Technical Cooperation (IPPTC); published 2001.
8. final Report, International Detector Test, UNADP; published 2000.
9. Preliminary Results: International Detector Test UNADP; published 1999.



The SCHIEBEL ATMID™ in service

REPORTED LIMITATIONS AND STRENGTHS

Limitations

- > No external speaker.¹
- > Exposed cable.
- > Lack of documentation for search head use.
- > “The detector had a substantial loss of sensitivity from L1 to L7.”²

Strengths

- > Lightweight and easy to use.
- > Rugged and weatherproof.
- > Versatile.

“During the two weeks of the training and trial, no difficulties in use or technical questions arose. The detector had no problems in completing its automatic soil compensation process in all lanes and could well cope with the physically different structures of the soils ie the stones as well as with the magnetic properties. The signal interpretation is easy because of the low background noise.”²

¹ Y. Das, J.T. Dean, D. Lewis, J.H.J. Roosenboom, G. Zahaczewsky (eds), A multi-national technical evaluation of performances of commercial off the shelf metal detectors in the context of humanitarian demining, International Pilot Project for Technology Co-operation, final report, European Commission, Joint Research Centre, Ispra, Italy, 2001, Annex A, p. 102.

² Guelle, Dieter M., Lewis, Adam M., Pike, Matthew A. and Christo Crail. *Systematic Test and Evaluation of Metal Detectors (STEMD). Interim Report field Trial Mozambique, 12h April - 5th May 2005*, Nov. 2005, at <http://www.itep.ws/reports/results1.php>, p. 87

DETECTOR

1. Brand	SCHIEBEL
2. Model	ATMID™ All Terrain Mine Detector
3. Version	–
4. Used detection technology	Electromagnetic pulse induction and continuous wave induction

DIMENSIONAL DATA

5. Working length	
> min. length	1,400 mm
> max. length	1,600 mm
6. Search head	
> Size	267 mm diameter
> Weight	0.82 kg
> Shape	Round
7. Transport case	
> Weight	2.2 kg
> With equipment (full)	6.36 kg
> Dimensions	802 x 315 x 125 mm
> Hard Soft case (material)	Metal
8. Weight, hand-held unit	1.61 kg
9. Weight, carrying (operational detection set)	3.27 kg including set of batteries
10. Weight, additional equipment	Headphone 0.17 kg
11. Weight distribution Balance	Electronic unit is shoulder-strap mounted, headphone on head, and hand-held item is balanced by the armrest
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	More than 900
15. Other types Models	AN-19/2 various, MIMID
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	No
18. Temperature (limitations)	
> Storage	-55° C to +85° C
> Operational	-40° C to +70° C
19. Water resistant (Yes / No)	Yes
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Approx. 65 h
> medium temperature (around 20° C)	Approx. 70 h
> high temperature (higher than 30° C)	Approx. 75 h

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic ground balance; manually initiated and sensitivity then manually adjusted by a single control
> Duration	Approx. 30 s
24. Detection range Sensitivity details Detection performance Working depth	
> Low-metal-content mines	Type 72A – 20 cm M14 – 16 cm
> Anti-vehicle mines	Metal anti-vehicle at down 1 m; plastic anti-vehicle nearly all types at operational threat depth
> ERW (please specify)	NATO standard 7.62 rounds, at 40+ cm, larger items down to 1 m in depth
25. Output indicator	Audio tone
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Easily adjusted by angel wingnut to cover all necessary operational situations (more than 180 degrees)
28. Soil influence	Automatically balanced out
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.25 - 0.7 m/s
31. Search coil Antenna	Search coil
32. Limitations	Proximity to high power rf/radar transmitters
33. Interference (with other detectors)	Mutual interference possible up to 8 m in CW mode

POWER

34. Power supply Source	Battery DC voltage
35. Operating time	Approx. 70 h
36. Power supply	
> weight	0.58 kg
> no. of batteries size type	4 x 1.5V R20 ANSI size D
> rechargeable	Ni/Cad 1.5 V
> other	–

COSTS

37. Price	
> for one detector on request	US\$ 2,000 - US\$ 3,000
> reduction for higher quantity	Yes
38. System price	
> with training	–
> spare parts	–
> extended warranty	–
39. Total	–
40. Possibility to rent/lease	–

OTHERS

41. Duration of warranty	12 months
42. Additional equipment	–
43. Additional technical data information	–
44. Compliant standards	ISO-9001, AQA P4

GENERAL DESCRIPTION

The *Schiebel MIMID miniature mine detector* is based on the pulse mode technology of the AN-19/2 mine detector that has been the worldwide standard for minimal-metal-mine detection in both military and humanitarian demining for the past 10 years. It was developed to meet the specific operational requirements of the US Army Humanitarian Demining Team. It is waterproof to 30 m and is suitable for use both on land and under water. The detector has been in service since 1997.

The lightweight, one-piece, foldable design makes it suitable for use by special forces or anyone likely to come into contact with mines. The folded unit can be carried on a belt, in a trouser pocket or in a rucksack, a unique feature allowing operators immediate access to the unit.

The MIMID can be set up for operation in 30 seconds. Controls are within easy reach of the operator and are identical to those of the AN-19/2. The length of its telescopic pole can be quickly adjusted for operation in the upright, kneeling or prone positions.

WORKING METHODOLOGY

The transmitting coil of the search head emits an electromagnetic pulse, which induces an eddy current in metal objects in the vicinity of the search head. These eddy currents give rise to a secondary field, which is picked up by the receiving coil. The signal from this coil is processed in the electronics unit. The operator is alerted to the presence of a metal object by a sound in the headphone and a light signal on the visual indicator.

Schiebel's test piece incorporates a 0.15 g steel pin (approximately the same signature as the Chinese Type 72A anti-personnel mine) that can be detected at a depth of 13 cm when buried in the ground. This performance is maintained in underwater depths of some 30 m. For large-magnetic-signature mines/UXO, the detector gives an over edge of target indication enabling the same precise location as for smaller targets.

POWER SUPPLY

The MIMID is powered by four standard AA-size cells. The recommended alkaline cells provide around seven hours operation. Similar rechargeable nickel-cadmium cells provide approximately four hours. All recommended cells are available worldwide as are suitable automatic chargers.

Rechargeable cells last for at least one year if correctly used/charged.

DETECTORS IN USE TO DATE

More than 1,500 MIMID detectors have been sold since 1997. They have been used by a number of armed forces, for example Israel and the U.S.

FACTORY SUPPORT

- > All detectors are covered by a 12-month, no-cost warranty, and operator / maintenance training is provided, (on site or at the factory as requested), as part of the procurement package. Further training can be provided at cost.
- > Spare parts, all interchangeable, are available for 10 years after purchase. These can be obtained directly from the factory or from the worldwide network of Schiebel agents.



The SCHIEBEL MIMID™ in service

- > Operator and maintenance manuals are provided in English, German, and Spanish. Schiebel technicians / factory repairs are available worldwide for additional support on request.

MAINTENANCE AND SUPPORT

The MIMID requires little maintenance due to its high reliability. Most repairs can be carried out at a workshop by Schiebel-trained technicians, using the recommended tools and test equipment (digital multi-meter and oscilloscope).

TEST AND EVALUATION

The MIMID has been comprehensively field tested in all climates by the manufacturer, including underwater trials to 30 m, and all detector specifications are fully proven. It has also been evaluated by Ecuador and the U.S. Test reports are available on request from the manufacturer. The detector scored well in all kinds of soil type. The results achieved in ferruginous soil were above average.

Tests passed by the detector include:

- > International Pilot Project for Technology Cooperation, March 1999-June 2000.
- > Gruppe Rüstung (Switzerland): Technische Erprobung von Minensuchgeräten, August 2001.

Test reports were partially published and the first is available at the ITEP website: www.itep.ws.

REPORTED LIMITATIONS AND STRENGTHS¹

Limitations

- > No transit case.
- > Handle does not lock down.
- > Elbow restraints and shaft latches are weak.

Strengths

- > Lightweight and compact.
- > Weatherproof.
- > Pre-assembled.

¹ Y. Das, J.T. Dean, D. Lewis, J.H.J. Roosenboom, G. Zahaczewsky (eds), A multi-national technical evaluation of performances of commercial off the shelf metal detectors in the context of humanitarian demining, International Pilot Project for Technology Cooperation, final report, European Commission, Joint Research Centre, Ispra, Italy, 2001, Annex A, p. 104.

DETECTOR

1. Brand	SCHIEBEL
2. Model	MIMID™ Miniature Mine Detector
3. Version	–
4. Used detection technology	Electromagnetic pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	656 mm
> max. length	1,262 mm
6. Search head	
> Size	328 mm
> Weight	Integrated in mine detector
> Shape	Rectangular
7. Transport case	
> Weight	0.64 kg
> With equipment (full)	2 kg
> Dimensions	328 x 102 x 56 mm
> Hard Soft case (material)	Soft
8. Weight, hand-held unit	1.36 kg
9. Weight, carrying (operational detection set)	1.36 kg + set of batteries 0.1 kg
10. Weight, additional equipment	Mine prodder
11. Weight distribution Balance	Various. All of the weight is hand-held but the unit is counterbalanced at the handle by the entire armrest
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	More than 1,500
15. Other types Models	–
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	No
18. Temperature (limitations)	
> Storage	-55° C to +85° C
> Operational	-40° C to +70° C
19. Water resistant (Yes / No)	Waterproof to 30 m
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Approx. 6.5 h
> medium temperature (around 20° C)	Approx. 7 h
> high temperature (higher than 30° C)	Approx. 7.5 h

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Calibration not required. Manual set-up using single control for sensitivity. Sound may also be adjusted to suit local conditions
> Duration	Less than 30 s
24. Detection range Sensitivity details Detection performance Working depth	
> Low-metal-content mines	Type 72 A - 14 cm; M14 – 12 cm
> Anti-vehicle mines	Metallic mines down to 80 cm - plastic mines at threat depth
> ERW (please specify)	NATO standard 7.62 round - 32 cm Larger items down to 80 cm
25. Output indicator	Audio tone and visual LED display
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Easily adjusted to cover all necessary operational situations (more than 180 degrees)
28. Soil influence	–
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Light laterite with reduced sensitivity
30. Optimal sweep speed	0 - 2 m/s
31. Search coil Antenna	Search coil
32. Limitations	–
33. Interference (with other detectors)	None above 2 m separation

POWER

34. Power supply Source	Battery DC voltage
35. Operating time	Approx. 7 h
36. Power supply	
> weight	0.1 kg
> no. of batteries size type	4 x 1.5V LR6 ANSI size AA
> rechargeable	Yes, but operating time is reduced to 4 h
> other	–

COSTS

37. Price	
> for one detector on request	US\$ 3,000 - US\$ 4,000
> reduction for higher quantity	Yes
38. System price	
> with training	–
> spare parts	–
> extended warranty	–
39. Total	–
40. Possibility to rent/lease	–

OTHERS

41. Duration of warranty	12 months
42. Additional equipment	Titanium mine prodder, test piece. Carry bag available in green, camouflage or black
43. Additional technical data information	–
44. Compliant standards	ISO-9001, AQA P4

VALLON VMC1

Vallon | Germany

GENERAL DESCRIPTION

The *VMC1 Metal Mine Detector* has been designed for highly accurate detection of all types of metallic mines as well as plastic mines with minimal metal content, bombs, ammunition and other metallic objects in the ground or in shallow water.

It is a one-piece retractable detector supplied in a soft carrying bag with a carrying belt housing the complete mine detecting set and an optional non-magnetic prodder. Due to its small size it is easily transported and stored. Ergonomic operation and indication elements integrated in the detector housing ensure easy operation and minimum operator training. Metal alarm is by audio signal, visual bargraph and vibration alarm.

Operator controls are limited to one mode selector with two soil programmes and three push-buttons for setting sensitivity level, volume of the audio signal and compensation/ground balance. Another push-button integrated in the handle is used to activate the pinpoint mode. Data input allows for further upgrade of the detector's firmware.

Along with its digital signal processor, the VMC1 uses an advanced pulse-field function specially improved by Vallon. It can work in mineralised soils, such as laterite, magnetite and magmatite, as well as in shallow salt and fresh water, and under the electromagnetic influence of main power lines without greatly affecting sensitivity.



The VALLON VMC1 unfolded and folded

Main characteristics

- > Oval search head with telescopic carrying bar. Detector electronics with integrated non-magnetic loudspeaker, power supply and battery compartment. LED bargraph with 14 elements and a vibrator. Three robust push-buttons for sensitivity control, volume control and ground compensation on the front of the housing. ON/OFF switch for two different ground conditions. Push-button integrated in the handle to activate the pinpoint mode.
- > Non-magnetic test piece.
- > One set (3 EA) round cells 1.5 V IEC R 14 Alkaline C-size.
- > field and Operation manuals.
- > field backpack for storing the complete detector with all accessories.

Optional accessories (*available on request*)

- > Headset.
- > Hard case for storing the complete detector with all accessories.
- > Non-magnetic prodding needle.

The detector complies with environmental conditions according to MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1.

WORKING METHODOLOGY

The search head continuously emits electromagnetic pulses as the operator sweeps close to the surface. The search head acts as both an emitter and a receiver sensing the pulsed field. If there is a metal object in the magnetic field, the following happens:

- > The electronics unit detects a deviation from the previous state; thus an alarm signal is produced depending on the size of the metal target.
- > The shape of the pulse in the VMC1 is bipolar to reduce the effect on magnetically fused mines.

To ensure optimal use worldwide under different soil conditions, the VMC1 is provided with a programme switch to set the optimum detection features.

The correct programme setting and the wide range of detection sensitivity allow detection of even plastic mines with minimum metal content in mineralised soil and also near to 50 Hz or 60 Hz power lines.

The detector has a built-in-test procedure continuously checking reliability and proper function during operation. The pulse signal generation, signal processing, battery voltage, external connections and – most important – the internal operation voltages are constantly monitored. Visual and acoustic alarms are produced when a fault is found. With such reliability, the user can operate the VMC1 easily and concentrate fully on the detection tasks.

VALLON VMC1

Vallon | Germany

DETECTORS IN USE

The detectors are in service with various humanitarian aid organisations, NGOs, commercial mine clearance organisations and several armed forces.



The VALLON VMC1 hard case



Sensitivity-, control-, and ground compensation push buttons with LED bargraph on the front of the housing

POWER SUPPLY

VMC1 is powered by three round 1.5V IEC R 14 alkaline C cell batteries or rechargeable 1.2V C cells. The operational life of batteries is said to be approximately 12 hours, depending on the age, quality and the capacity of the batteries.

FACTORY SUPPORT

- > Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- > Operation and maintenance training are offered at the Vallon facilities or at the customer's location.
- > Operation and maintenance manuals are available in different languages.
- > Warranty 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. A maintenance manual is available for each detector, with step-by-step explanations.



The VALLON VMC1 unfolded

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

Two test reports are available at the ITEP website, www.itep.ws, as follows:

1. Results of STEMMD Trials (*Annex of Metal Detectors and PPE Catalogue 2007*); 2007.
2. South-East Europe Interim Report field Trial Croatia (STEMMD - continuation); 2007.

REPORTED LIMITATIONS AND STRENGTHS

Vallon says there are no limitations on the detector's use for terrain, soil or vegetation.

DETECTOR

1. Brand	VALLON
2. Model	VMC1
3. Version	–
4. Used detection technology	Metal detector Pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	55 cm (from grip to search head)
> max. length	126 cm (long version)
6. Search head	
> Size	14 x 33 cm
> Weight	–
> Shape	Oval
7. Transport case	
> Weight	Hard case: approx. 2 kg (optional accessory) field backpack: approx. 0.3 kg (standard accessory)
> With equipment (full)	Hard case with equipment (full): approx. 5 kg (optional accessory) field backpack: approx. 3.1 kg (standard accessory)
> Dimensions	Hard case (optional accessory): 41 x 33 x 17 cm field backpack (standard accessory): 37 x 25 x 12 cm
> Hard Soft case (material)	Hard case / Plastic (optional accessory) field backpack / Textile (standard accessory)
8. Weight, hand-held unit	Approx. 2.3 kg
9. Weight, carrying (operational detection set)	Approx. 2.3 kg
10. Weight, additional equipment	Head set 110 g
11. Weight distribution Balance	–
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	VMH3CS VMM3 VMH3
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIL STD 810F
18. Temperature (limitations)	
> Storage	-57° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes up to 4 m
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	Up to 8 h depending on battery type and capacity

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment
> Small metal content mines (type of mine)	Depending on their size, material and the local interference
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound, visual bargraph, vibration
26. Pinpointing feature	Yes
27. Adjustment of search head angle	With a joint
28. Soil influence	Adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.2 – 1.5 m/s, pinpoint mode: 0 – 0.2 m/s
31. Search coil Antenna	Oval shape with 138 x 325 mm
32. Limitations	No
33. Interference (with other detectors)	2 detectors should have a distance of 2 m to each other

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	–
> no. of batteries size type	3 ea. 1.5V standard batteries C-size
> rechargeable	3 ea. 1.2V rechargeable battery C-size
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Headset, hard case, non-magnetic prodder, data recording
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1

Vallon | Germany

GENERAL DESCRIPTION

The one-piece *VMH3 metal mine detector* has been designed for highly accurate detection of all types of metallic mines as well as plastic mines with minimal metal content, bombs, ammunition and other metallic objects in the ground or in shallow water.

Ease of operation and a robust mechanical design ensure reliable operation for professional ordnance clearing in battlefield operations, military training programmes and humanitarian demining.

Metal alarm is by audio signal, visual bargraph and vibration alarm.

Along with its digital signal processor the VMH3 uses an advanced pulse-field function specially improved by Vallon. It works in mineralized soils, such as laterite, magnetite and magmatite, as well as in shallow salt and fresh water and under the electromagnetic influence of main power lines without greatly affecting sensitivity.

Data input allows for further upgrade of the detector firmware, and data output enables measured data to be evaluated using VALLON EVA2000 software, running on a laptop or personal computer. The detector can also be connected to the Vallon data loggers.



The VALLON VMH3 free adjustable

Hand grip with bargraph (14 LEDs)

Main components of the VMH3

- > Watertight oval search head with telescopic carrying bar (two sections) and an internally run connection cable with integrated electronics unit, non-magnetic loudspeaker, power supply, ON/OFF switch for two different ground conditions and vibrator, arm-rest and battery compartment, hand grip with bargraph (14 LEDs), four robust push-buttons for sensitivity control, volume control, ground compensation and pinpointing.
- > Non-magnetic test piece.
- > One set (3 EA) single cell batteries.
- > Operation manual.
- > field manual
- > field backpack for storing the detector set with all accessories.

Optional accessories *(available on request)*

- > Headset.
- > Data recording and software.

The detector complies to environmental conditions according to MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1.

WORKING METHODOLOGY

The search head acts as both an emitter of electromagnetic pulses and a receiver sensing the pulsed field. If there is a metal object in the magnetic field, the following happens:

- > The electronics unit detects a deviation from the previous state; thus an alarm signal is produced depending on the size of the metal target.
- > The shape of the pulse in the VMH3 is bipolar to reduce the effect on magnetically fused mines.

To ensure worldwide use under different soil conditions, the VMH3, has a programme switch to set the optimal detection features.

The correct programme setting and the wide range of detection sensitivity allows detection of plastic mines with minimum metal content in mineralized soil, even near to 50-60-Hz-power lines.

The detector has a built-in test procedure continuously checking the reliability and proper function of the detector. The pulse signal generation, signal processing, battery voltage, external connections and – most important – the internal operation voltages are constantly monitored. Visual and acoustic alarms are produced when a fault is found.

With such reliability the user can operate the VMH3 easily and concentrate on detection tasks.

DETECTORS IN USE

The detectors are in service with various humanitarian aid organisations, commercial mine clearance organisations and several armed forces.

POWER SUPPLY

VMH3 is powered by three 1.5V mono-cells IEC R20 (ANSI std. D) or rechargeable RSH 4 KR 35/62. The operational life of batteries is said to be as approximately 18 to 25 hours depending on the age, quality and the capacity of the batteries.

FACTORY SUPPORT

- > Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- > Operation and maintenance training are offered either in the Vallon facilities or at the customer's location.
- > Operation and maintenance manuals are available in English, French, German and Spanish. Other languages on request.
- > Warranty 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. For each detector a maintenance manual, with step-by-step explanations.

TEST AND EVALUATION

The detector was tested by the EC's Joint Research Centre in Laos in 2004 and in a comparative field trial in Mozambique in 2005 as well as in a laboratory test trail by JRC, Institute for the Protection and Security of the Citizen, in Italy from November 2003 to January 2006.

The following test results are available at the ITEP website: www.itep.ws

1. Results of STEMMD Trials (Annex of *Metal Detectors and PPE Catalogue 2007*); 2007.
2. Systematic Test & Evaluation of Metal Detectors (STEMMD): Interim Report field Trials Mozambique; 2006.
3. STEMMD: Interim Report Laboratory Tests Italy; 2006.
4. STEMMD: Interim Report field Trial Mozambique, 12 April - 5 May 2005; 2005 (see also: <http://maic.jmu.edu/journal/10.1/notes/guelle/guelle.htm>).
5. STEMMD: Interim Report field Trial Lao, 27 September - 5 November 2004; 2005.



The VALLON VMH3 packed in hard case

REPORTED LIMITATIONS AND STRENGTHS

Limitations

A loss of sensitivity to smaller targets.¹

Strengths

“During the two weeks of the training and trial, no difficulties in use or technical questions arose. The detector had no problems in completing its automatic soil compensation process in all lanes.”²

¹ Guelle, Dieter M., Lewis, Adam M., Pike, Matthew A. and Christo Crail. *Systematic Test and Evaluation of Metal Detectors (STEMD). Interim Report field Trial Mozambique, 12 April - 5 May 2005*, Nov. 2005, at <http://www.itep.ws/reports/results1.php>, p. 99.

² Ibid, p.99.

DETECTOR

1. Brand	VALLON
2. Model	VMH3
3. Version	–
4. Used detection technology	Metal detector Pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	Approx. 79 cm (short version)
> max. length	Approx. 139 cm (long version)
6. Search head	
> Size	17 x 31 cm (oval search head)
> Weight	0.63 kg (oval search head)
> Shape	Oval (oval search head)
7. Transport case	
> Weight	Approx. 1 kg
> With equipment (full)	Approx. 4.8 kg
> Dimensions	85 x 26 x 33 cm
> Hard Soft case (material)	Soft case (textile)
8. Weight, hand-held unit	2.5 kg (with oval search head)
9. Weight, carrying (operational detection set)	2.5 kg
10. Weight, additional equipment	Head set 110 g
11. Weight distribution Balance	–
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	VMH3CS VMC1 VMM3
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIL STD 810F
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes up to 4 m
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0°C)	Up to 15 h depending on battery type and capacity
> medium temperature (around 20°C)	Up to 30 h depending on battery type and capacity
> high temperature (higher than 30°C)	Up to 30 h depending on battery type and capacity

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Auto
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment
> Small metal content mines (type of mine)	Depending on their size, material and the local interference
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound, visual bargraph, vibration
26. Pinpointing feature	Yes
27. Adjustment of search head angle	With a joint
28. Soil influence	Adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.2 – 5 m/s, pinpoint mode: 0 – 0.2 m/s
31. Search coil Antenna	Oval shape with 17 x 31 cm
32. Limitations	No
33. Interference (with other detectors)	2 detectors should have a distance of 2 m to each other

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	–
> no. of batteries size type	3 ea. 1.5V standard batteries D-size
> rechargeable	3 ea. 1.24V rechargeable battery KR35/62
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Upon request
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Headset, hard case, data recording and software
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1

Vallon | Germany

GENERAL DESCRIPTION

The *VMH3CS metal mine detector* has been designed for the highly accurate detection of all types of metallic mines as well as plastic mines with minimal metal content, bombs, ammunition and other metallic objects in the ground or in shallow water. A round 30 cm or round 60 cm search head can additionally be used to locate metal-cased mines and unexploded ordnance at larger depths.

Ease of operation and a robust mechanical design ensure reliable operation for professional clearing in battlefield operations, military training programmes and humanitarian demining. Metal alarm is by audio signal, visual bargraph and vibration alarm.

Along with its digital signal processor the VMH3CS uses an advanced pulse-field function specially improved by Vallon. It works in mineralized soils, such as laterite, magnetite and magmatite, as well as in shallow salt and fresh water and under the electromagnetic influence of main power lines without greatly affecting sensitivity.

Data input allows for further upgrades of the detector firmware, and data output enables measured data to be evaluated using Vallon EVA2000 software, running on a laptop or personal computer. The detector can also be connected to the Vallon data loggers.



The VMH3CS-lengths continuously adjustable | The VALLON VMH3CS with the UXO head

Main components of the VMH3CS

- > Detector electronics with integrated arm-rest, non-magnetic loudspeaker, power supply, battery compartment, ON/OFF switch for two different ground conditions and vibrator. Hand grip with visual bargraph (14 elements), four robust push-buttons for sensitivity control, volume control, ground compensation and pinpointing. Two-piece telescopic carrying bar with plug-in connection for search head.
- > Watertight oval search head with carrying bar and plug-in connection to the electronics unit.
- > Non-magnetic test piece.
- > One set (3 EA) single D cell batteries.;
- > field and Operation manuals.
- > field backpack for storing the detector set with all accessories.

Optional accessories *(available on request)*

- > Headset.
- > Hard case for storing the complete detector set with all accessories.
- > UXO search head (search head with 60 cm diameter) with soft case.
- > Universal hard case for storing the complete detector set with all accessories and 60 cm search head.
- > Stick probe.
- > Data recording and software.

The detector complies to environmental conditions according to MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1.

WORKING METHODOLOGY

The search head acts as both an emitter of electromagnetic pulses and a receiver sensing the pulsed field. If there is a metal object in the magnetic field, the following happens:

- > The electronics unit detects a deviation from the previous state; thus an alarm signal is produced depending on the size of the metal target.
- > The shape of the pulse in the VMH3CS is bipolar to reduce the effect on magnetically fused mines.

For use worldwide under different soil conditions, the VMH3CS can be switched to set optimal detection features.

The correct programme setting and the wide range of detection sensitivity allow detection of plastic mines with minimum metal content in mineralised soil even near to 50 Hz/60 Hz power lines.

The detector has a built-in-test procedure continuously checking the reliability and proper function of the detector. The pulse signal generation, signal processing, battery voltage, external connections, and – most important – the internal operation voltages are constantly monitored. Visual and acoustic alarms are produced when a fault is found.

With such reliability, the user can operate the VMH3CS easily and concentrate fully on detection tasks.

VALLON VMH3CS

Vallon | Germany

DETECTORS IN USE

The detectors are in service with various humanitarian aid organisations, commercial mine clearance organisations and several armed forces.

POWER SUPPLY

VMH3CS is powered by three 1.5V mono-cells IEC R20 (ANSI std. D) or rechargeable RSH 4 KR 35/62. The operational life of batteries is said to be approximately 30 hours depending on the age, quality and capacity of the batteries.

FACTORY SUPPORT

- > Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- > Operation and maintenance training are offered either in the Vallon facilities or at the customer's location.
- > Operation and maintenance manuals are available in different languages.
- > Warranty 24 months.



The VMH3CS in service at the Egyptian test site

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. For each detector a maintenance manual is available, with step-by-step explanations.

TEST AND EVALUATION

The manufacturer allows access to several available test reports.

The following test result is available at the ITEP website: www.itep.ws

1. Experimental Cairo Testing and Evaluation of Mine and UXO Detectors; 2007.
2. Results of STEMMD Trials (*Annex of Metal Detectors and PPE Catalogue 2007*); 2007.
3. South-East Europe Interim Report field Trial Croatia (STEMMD - continuation); 2007.
4. Systematic Test and Evaluation of Metal Detectors: Interim Report field Trial Lao, 27 September - 5 November 2004; published in 2005.



The VMH3CS

REPORTED LIMITATIONS AND STRENGTHS

Vallon says there are no limitations on the detector's use for terrain, soil and vegetation.

TECHNICAL SPECIFICATIONS

VALLON

DETECTOR

1. Brand	VALLON
2. Model	VMH3CS
3. Version	–
4. Used detection technology	Metal detector Pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	Approx. 92 cm (short version with oval search head) Approx. 98 cm (short version with 60 cm search head) Approx. 94 cm (short version with stick probe)
> max. length	126 cm (long version with oval search head) 132 cm (long version with 60 cm search head) 128 cm (long version with stick probe)
6. Search head	
> Size	17 x 31 cm (oval search head); 60 cm Ø (60 cm search head) 4 cm Ø x 44.5 cm long (Stick Probe)
> Weight	Approx. 0.63 kg (oval search head) Approx. 1.1 kg (60 cm search head) Approx. 0.5 kg (Stick Probe)
> Shape	Oval (oval search head); Round (60 cm search head); Stick (Stick Probe)
7. Transport case	
> Weight	Field backpack (for oval search head) approx. 0.9 kg (standard accessory) Soft case (for 60 cm search head) approx 1.7 kg (optional accessory) Hard case (for oval search head) approx 5 kg (optional accessory)
> With equipment (full)	Field backpack (for oval search head) approx. 3.4 kg (standard accessory) Soft case (for 60 cm search head) approx 2.8 kg (optional accessory) Hard case (for oval search head) approx 8.8 kg (optional accessory)
> Dimensions	Field backpack approx. 53 x 28 x 15 cm (standard) Soft case for 60 cm search head approx. 66 x 70 x 11 cm (optional) Hard case for oval search head approx. 56 x 35 x 23 cm (optional)
> Hard Soft case (material)	Field backpack textile (standard accessory) Hard case plastic (optional accessory) Soft case for UX0 search head textile (optional accessory)
8. Weight, hand-held unit	2.5 kg (with oval search head) 2.9 kg (with UX0 search head) 2.4 kg (with Stick Probe)
9. Weight, carrying (operational detection set)	2.5 kg (with oval search head) 2.9 kg (with UX0 search head)
10. Weight, additional equipment	Head set 110 g
11. Weight distribution Balance	–
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	VMH3 VMC1 VMM3 VMXC1 VMXC1-3
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIL STD 810F
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C

19. Water resistant (Yes / No)	Yes up to 4 m
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Up to 15 hours depending on battery type and capacity
> medium temperature (around 20° C)	Up to 30 hours depending on battery type and capacity
> high temperature (higher than 30° C)	Up to 30 hours depending on battery type and capacity

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Auto
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Small metal content mines (type of mine)	Depending on their size, material and the local interference
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound, visual bargraph, vibration
26. Pinpointing feature	Yes
27. Adjustment of search head angle	With a joint
28. Soil influence	Adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	standard 0.2-1.5 m/s; pinpoint mode: 0-0.2 m/s
31. Search coil Antenna	Oval shape with 17 x 31 cm Round shape with 30 cm Ø Round shape with 60 cm Ø Stick Probe with 4 cm Ø and 44.5 cm length
32. Limitations	No
33. Interference (with other detectors)	2 detectors with oval search head should have a minimum distance of 2 m to each other

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	–
> no. of batteries size type	3 ea. 1.5V standard batteries D-size
> rechargeable	3 ea. 1.24V rechargeable batteries KR35/62
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Headset, hard case, universal hard case, 30 cm search head, 60 cm search head, stick probe, data recording and software
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1

VALLON VMM3

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon VMM3 metal mine detector* has been designed for accurate detection of all types of metallic mines as well as plastic mines with minimal metal content, bombs, ammunition and other metallic objects in the ground or in shallow water.

A 60 cm search head can be added to locate buried metal-cased mines and unexploded ordnance in greater depths. Ease of operation and a robust mechanical design ensure reliable operation for professional ordnance clearing in battlefield operations military training programmes.

Along with its digital signal processor the VMM3 uses an advanced pulse-field function specially improved by Vallon. It works also in mineralised soils, such as laterite, magnetite and magmatite as well as in shallow salt and fresh water and under the electromagnetic influence of main power lines without greatly affecting sensitivity.

Data input allows upgrades of the detector firmware, and data output enables data to be evaluated by the Vallon EVA2000 software on a laptop. The detector can also be connected to Vallon data loggers.



The VALLON VMM3 with detachable electronic unit The 60 cm UX0 search head

Main components of the VMM3

- > Watertight oval search head with telescopic carrying bar (three sections) with internally running connection cable and an electronics unit consisting of:
 - > integrated non-magnetic loudspeaker
 - > four batteries (alkaline D cells, or rechargeable)
 - > operating controls, all on the front panel and protected against mechanical damage or unintentional changes
 - > programme selector with integrated on/off switch; “COMP” button for automatic fine adaptation to mineralised soil
 - > data connector (with protective cap) for data input for upgrading the firmware, data output for computer-aided detection and headset connection.
- > Detection test piece (non-magnetic);
- > Non-magnetic, watertight headset;
- > Carrying belt for the electronics unit, handle, armrest and supplementary arm-belt;
- > Operation and field manuals.
- > Aluminum carrying case and backpack.

Optional accessories are the 60 cm diameter search head and a stick probe.

The detector complies to environmental conditions according to MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1 .

WORKING METHODOLOGY

The search head acts as both an emitter and a receiver sensing the pulsed field.

If a metal object is in the magnetic field, the unit detects a deviation from the previous state producing an alarm signal, depending on the size of the metal target. The VMM3's pulse is bipolar to reduce the effect on magnetically fused mines.

For worldwide use under different soil conditions, VMM3 has a programme to set optimal detection features. With the correct programme setting and the wide range of detection sensitivity it can detect even plastic mines with minimum metal content in mineralised soils, and operates near to 50 Hz/60 Hz -power lines.

The detector has a built-in test procedure for reliability and proper functioning. The pulse signal generation, signal processing, battery voltage, external connections, and – most important – the internal operation voltages are constantly monitored. Visual and acoustic alarms are produced when a fault is found.

The VMM3 is reliable and easy to use, allowing the operator to concentrate fully on detection tasks.

VALLON VMM3

Vallon | Germany



The VALLON VMM3 packed in the transport aluminium case

DETECTORS IN USE

The detectors are in service with commercial mine clearance organisations and several armed forces (including NATO members).

POWER SUPPLY

Four 4 x 1.5V batteries IECLR 20 (ANSI STD. D cell) or rechargeable KR35/62. Battery operational life is 40 to 50 hours depending on age, quality and the of the batteries.

FACTORY SUPPORT

- > Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- > Operation and maintenance training are offered either in the Vallon facilities or at a location required by the customer.
- > Operation and maintenance manuals are available in different languages.
- > Warranty for 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The maintenance manual has step-by-step explanations for repairs.

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

The manufacturer says there are no limitations for terrain, soil and vegetation.



UXO version

Tool kit

DETECTOR

1. Brand	VALLON
2. Model	VMM3
3. Version	–
4. Used detection technology	Metal detector Pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	Approx. 100 cm (short version)
> max. length	Approx. 192 cm (long version)
6. Search head	
> Size	17 x 24 x 31 cm
> Weight	With telescopic pole 1.3 kg
> Shape	Oval
7. Transport case	
> Weight	Approx. 5.6 kg
> With equipment (full)	Approx. 11 kg
> Dimensions	78 x 30 x 14 cm
> Hard Soft case (material)	Hard case Aluminium
8. Weight, hand-held unit	1.8 kg
9. Weight, carrying (operational detection set)	3.5 kg
10. Weight, additional equipment	Head set 110 g
11. Weight distribution Balance	–
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	VMH3 VMH3CS VMC1
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIL STD 810F
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes up to 4 m (search head)
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Up to 20 h depending on battery type and capacity
> medium temperature (around 20° C)	Up to 50 h depending on battery type and capacity
> high temperature (higher than 30° C)	Up to 50 h depending on battery type and capacity

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment
> Small metal content mines (type of mine)	Depending on their size, material and the local interference
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound (loudspeaker or headset)
26. Pinpointing feature	Yes
27. Adjustment of search head angle	With a joint
28. Soil influence	Adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.2 – 1.5 m/s
31. Search coil Antenna	Oval shape with 17 x 31 cm Round shape with 615 mm diameter (UXO search head as optional accessory). Stick Probe with 40 mm diameter (option)
32. Limitations	No
33. Interference (with other detectors)	2 detectors should have a distance of 5 m to each other

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	–
> no. of batteries size type	4 ea. 1.5V standard batteries D-size
> rechargeable	4 ea. 1.24V rechargeable batteries KR35/62
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	UXO search head, stick probe
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon VMW1 underwater metal detector* is a retractable detector for demining of shores, rivers and lakes, seas, and also on land. It is supplied with a hard case housing the complete mine detecting set. Its small size and light weight facilitate underwater as well as onshore operations.

The rugged search head contains the Digital Pulse Induction Sensor with integrated noise reduction features. Its shape facilitates operation in difficult and dense vegetation ashore as well as in shallow or deep water and mud. The unique design allows precise pinpointing and an excellent recognition of targets close to each other without loss of detection speed.

The telescopic pole consists of three tubes. Length is easily adjusted even during operation so that detection work can be done in standing, kneeling or swimming positions. The detected metals are clearly indicated by the pluggable non-magnetic speaker or headset and LED bargraph.

Automatic continuous built-in tests and automatic detection level controls maintain stable the sensitivity over hours of continuous operation and independent of battery level, temperature and other environmental conditions. System failures are immediately indicated by a special audio alarm. The VMW1 requires only minimal operator training.



The VMW1



The VMW1 length continuously adjustable from 55 cm to 124 cm | Packed in transport case

Main components of the VMW1

- > Complete detector with electronics unit and battery compartment, operation elements, visual indication, watertight socket for headset, integrated telescopic carrying bar with oval search head.
- > Headset.
- > Non-magnetic test piece.
- > One set (3 EA) Round cells 1.5V IEC R 14 alkaline C cell batteries, 7.8 Ah each;
- > Safety belt.
- > Operation manual.
- > Hard case for storing the complete detector set with all accessories.

The detector complies to environmental conditions according to MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1.

VALLON VMW1

Vallon | Germany

WORKING METHODOLOGY

The search head acts as both an emitter and a receiver sensing the pulsed field.

If a metal object is in the magnetic field, the unit detects a deviation from the previous state producing an alarm signal, depending on the size of the metal target.

The detector has a built-in test procedure for reliability and proper functioning. The pulse signal generation, signal processing, battery voltage, external connections, and – most important – the internal operation voltages are constantly monitored. Visual and acoustic alarms are produced when a fault is found.

The bipolar pulse of the VMW1 reduces the effect on magnetically fuzed mines.

The VMW1 is reliable and easy to use, allowing the operator to concentrate fully on detection tasks.

POWER SUPPLY

Powered by three round cells 1.5V IEC R 14 alkaline C cell batteries or rechargeable 1.2V C cells. Operational life of the batteries is said to be approximately 9 hours depending on age, quality and capacity.

DETECTORS IN USE

The detectors are in service in several countries.



The Underwater Dectector VMW1 of VALLON
The VALLON VMW1 detector packed in a small hard case

FACTORY SUPPORT

- > Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- > Operation and maintenance training are offered either in the Vallon facilities or at a location required by the customer.
- > Operation and maintenance manuals are available in different languages.
- > Warranty for 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The maintenance manual has step-by-step explanations for repairs.

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

The manufacturer says there are no limitations for terrain, soil and vegetation, and up to a water depth of 30 m.

DETECTOR

1. Brand	VALLON
2. Model	VMW1
3. Version	–
4. Used detection technology	Metal detector Pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	56 cm
> max. length	1,240 cm (long version)
6. Search head	
> Size	14 x 33 cm
> Weight	–
> Shape	Oval
7. Transport case	
> Weight	Approx. 2.3 kg
> With equipment (full)	Approx. 5.4 kg
> Dimensions	41 x 31 x 17 cm
> Hard Soft case (material)	Hard case Plastic
8. Weight, hand-held unit	Approx. 2.9 kg ashore, approx. 0.9 kg in the water
9. Weight, carrying (operational detection set)	Approx. 2.3 kg ashore, approx. 0.5 kg in the water
10. Weight, additional equipment	Head set 230 g
11. Weight distribution Balance	–
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	MW1630B
16. Location of use	Worldwide underwater or on land

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIL STD 810F
18. Temperature (limitations)	
> Storage	-57° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes up to 30 m
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	Up to 9 h depending on battery type and capacity

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Auto
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment
> Small metal content mines (type of mine)	Depending on their size, material and the local interference
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound, visual bargraph
26. Pinpointing feature	Yes
27. Adjustment of search head angle	With a joint
28. Soil influence	Adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.3 – 1.5 m/s ashore, 0.1 – 1 m/s in the water
31. Search coil Antenna	Oval shape with 14 x 33 cm
32. Limitations	No
33. Interference (with other detectors)	2 detectors should have a distance of 2 m to each other

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	–
> no. of batteries size type	3 ea. 1.5V standard batteries D-size
> rechargeable	3 ea. 1.2V rechargeable battery C-size
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Upon request
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	–
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon MW1630B* underwater mine detector is optimised for divers for underwater operations to a depth of 60 m, and for operation in rivers with strong currents and at sea.

The electronics unit is carried attached to the diver's leg, leaving only the search head, with its light telescopic pole to be carried by hand. The electronics are housed in a cylindrical, rigid, non-metallic case with sensitivity adjustment carried out by a single mechanical rotary switch and a volume control operated by a two-step toggle switch.

The detector can operate in fresh and salt water without loss of sensitivity. The search head is oval in shape, providing a small sweep path (17 cm wide) suitable for operations in areas with dense clutter, rocks and plants. The detectors also feature permanent monitoring of the circuits and voltages without affecting the acoustic search signal. The unit provides constant sensitivity almost down to battery discharge level. An acoustic alarm sounds when the lowest voltage point is reached.



VALLON MW1630B in service | MW1630B components

Main characteristics

- > Watertight oval search head with telescopic carrying bar (two sections), and an internally run connection cable.
- > Watertight electronics unit which houses the detector electronics, power supply (separately sealed battery compartment), and cable for the search head and the headset.
- > Detection test piece (non-magnetic).
- > Non-magnetic, watertight headset.
- > Handle, armrest and supplementary arm-belt.
- > Operation manual.
- > Aluminum carrying case.

An extension bar for operation on land is available as optional accessory.

The detector complies with environmental conditions according to MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1.

WORKING METHODOLOGY

The search head acts as both an emitter and a receiver sensing the pulsed field. If a metal object is in the magnetic field, the unit detects a deviation from the previous state producing an alarm signal, depending on the size of the metal target. The MW1630B's pulse is bipolar to reduce the effect on magnetically fused mines.

The detector has a built-in test procedure for reliability and proper functioning. The pulse signal generation, signal processing, battery voltage, external connections, and – most important – the internal operation voltages are constantly monitored. Acoustic alarms are produced when a fault is found.

The MW1630B is reliable and easy to use, allowing the operator to concentrate fully on detection tasks.

DETECTORS IN USE TO DATE

The detectors are in service with commercial mine clearance organisations and several armed forces (including NATO members).

POWER SUPPLY

Three 3 x 1.5V batteries IECLR 20 (ANSI STD. D cell) or rechargeable KR35/62. Battery operational life is 15 to 40 hours depending on operation mode, age and quality of the batteries.

FACTORY SUPPORT

- > Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- > Operation and maintenance training are offered either in the Vallon facilities or at a location required by the customer.
- > Operation and maintenance manuals are available in different languages.
- > Warranty for 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The maintenance manual has step-by-step explanations for repairs.

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

The manufacturer says there are no limitations for terrain, soil and vegetation.

DETECTOR

1. Brand	VALLON
2. Model	MW1630B
3. Version	–
4. Used detection technology	Metal detector Pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	54 cm (short version)
> max. length	87 cm (long version without extension bar) 145 cm (long version with extension bar)
6. Search head	
> Size	17 x 2.4 x 31 cm
> Weight	–
> Shape	Oval
7. Transport case	
> Weight	5.6 kg
> With equipment (full)	11.6 kg
> Dimensions	78 x 30 x 14 cm
> Hard Soft case (material)	Hard case / Aluminium
8. Weight, hand-held unit	Approx. 1 kg
9. Weight, carrying (operational detection set)	3.9 kg
10. Weight, additional equipment	Head set 110 g
11. Weight distribution Balance	–
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	VMW1
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIL STD 810F
18. Temperature (limitations)	
> Storage	-57° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes up to 60 m
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Up to 40 h depending on battery type and capacity
> medium temperature (around 20° C)	Up to 50 h depending on battery type and capacity
> high temperature (higher than 30° C)	Up to 50 h depending on battery type and capacity

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment
> Small metal content mines (type of mine)	Depending on their size, material and the local interference
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound (headset)
26. Pinpointing feature	Yes
27. Adjustment of search head angle	With a joint
28. Soil influence	Adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.3 – 1 m/s on land, 0.05 - 1 m/s under water
31. Search coil Antenna	Oval shape with 17 x 31 cm
32. Limitations	No
33. Interference (with other detectors)	2 detectors should have a distance of 2 m to each other

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	–
> no. of batteries size type	3 ea. 1.5 V standard batteries D-size
> rechargeable	3 ea. 1.24 V rechargeable batteries KR35/62
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

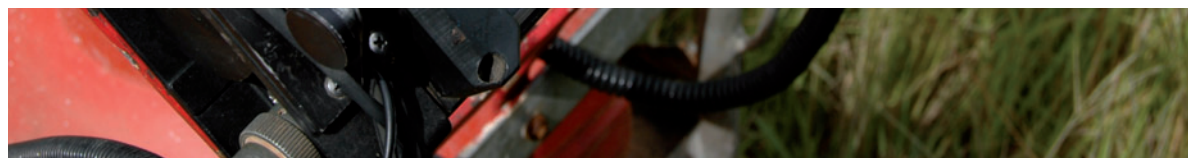
OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Extension bar
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1

DETECTOR SYSTEMS

UXO DETECTORS

ELECTROMAGNETIC DETECTORS



CEIA | Italy

GENERAL DESCRIPTION

The *MIL-D1* is a portable, high-sensitivity metal detector designed to detect all metals in conductive and non-conductive soils, including laterite. The metal detector consists of a detection head, a telescopic handle, an electronics unit, a canvas carry-bag and a high-impact polypropylene case. The detection head is light, and the wiring is protected from damage. The electronic unit can be carried over the shoulder, attached to the belt, or as an integral part of the telescopic handle.

The manufacturer says that the MIL-D1 does not require any daily manual calibration; optimum sensitivity is ensured over all types of terrain due to CEIA's Automated Soil Compensation System. The detector is manufactured in compliance with the ISO-9001 standard and has been designed to satisfy the most stringent operational requirements for both humanitarian and military demining.



The CEIA MIL-D1/DS transport case

Main features are as follows:

- > State of the Art Digital Metal Detector.
- > High detection distance in all soil types.
- > Precision target detection and localization with double tone pin-pointing.
- > Detection of all metals, magnetic and non magnetic.
- > Static and dynamic detection, independent of speed.
- > Capability to compensate complex soils, optimised by a simple auto-learn procedure.
- > Robust and reliable, consistent performance over time.
- > Long battery life.
- > Control unit may be integrated with the telescopic pole or worn separately.
- > Open construction of the search head for easier visibility of the target area.
- > Easy-to-use control panel.
- > Auto-diagnostic system.
- > Flash-supported software upgrade.

CEIA offers a single, proven, state-of-the-art model (MIL-D1) optimised to provide comprehensive detection capability across the entire spectrum of metals and soil types. A backlit LCD display on the control panel is available as an option. A hand-held remote programmer allows for MIL-D1 flash memory upgrades under any conditions. MD Scope software for PCs is available for troubleshooting and annual verification of MIL-D1 calibration.

WORKING METHODOLOGY

Location of metal objects is optimised by a two-tone audible pinpointing system, which allows the position of the detected mass to be identified accurately. When the metal detector approaches a metal mass, the system produces a signal of acoustic intensity proportional to the metal mass. The metal mass is pinpointed at the position of the centre of the search head at the moment in which the audible signal tone changes. An audible signal is transmitted either through an internal speaker or external monaural headphone.

CEIA's Automated Soil Compensation System ensures an above-average sensitivity in all types of soil. During soil compensation (conducted prior to the search operation), the detector uses digital processing of the electromagnetic response from the target soil to determine the most effective strategy. The presence of water does not affect detector performance. Soil compensation capability covers all different soils.

POWER SUPPLY

- > ANSI STD D-IEC STD LR20
- > 4 x 1.5V alkaline batteries or 4 x 1.2V Ni-MH rechargeable batteries (available on request).
- > 65 hours with alkaline batteries at 20° C.
- > 50 hours with alkaline batteries at 5° C.
- > 35 hours with Ni-MH rechargeable batteries (7000 mA) at 20° C.

DETECTORS IN USE

Approximately 13,000 detectors are in service with various humanitarian aid organisations, commercial mine clearance organisations and armed forces in the following countries: Afghanistan, Austria, Bangladesh, Bosnia and Herzegovina, Burundi, Cambodia, Colombia, Croatia, Denmark, Djibouti, Egypt, Eritrea, Ethiopia, Finland, France, Hong Kong, India, Indonesia, Iraq, Italy, Jordan, Kenya, Kyrgyzstan, Laos, Lebanon, Mozambique, Malaysia, Morocco, Namibia, Pakistan, Portugal, Senegal, Serbia, Spain, South Africa, Sudan, Sweden, Switzerland, Thailand, Turkey, the U.S., Venezuela and Yemen.

FACTORY SUPPORT

- > The proposed spare parts package is arranged in accordance with a life cycle management study by the manufacturer. The actual quantity/ composition of spare parts package is defined by customer requirements and contract.
- > Spare parts are available from either the manufacturer or from local representatives.
- > An extensive programme is available for both operators and maintenance personnel.
- > Factory based training is included in the purchasing package. On-site training is subject to contract.
- > Instruction manuals and documentation are provided in Arabic, English, French, Italian, Portuguese and Spanish. Other languages available on request.
- > The standard warranty is two years. Extended warranty periods can be arranged.
- > Comprehensive factory follow-up includes services via Internet contact, mail and personal contact.
- > On-site training, supply of training aids, diagnostic software, portable remote programmer are available as accessories.
- > Other services by the manufacturer include software upgrading, comprehensive technical assistance, mine simulat study and manufacturing, availability of factory test lanes.

MAINTENANCE SUPPORT

The detector is considered user-friendly and, with the proper training supplied by CEIA, the customer can completely maintain the equipment. It is not necessary to return the unit to the factory for troubleshooting or verification of calibration. The MIL-D1 electronics board is based on full digital technology, which means there is no requirement to trim or refine the performance using laboratory equipment.

TEST AND EVALUATION

- > CEIA is equipped with extensive laboratory and outdoor testing facilities where the MIL D1 capabilities have been evaluated and subsequently reported.
- > The MIL-D1 has been subjected to extensive testing (in terms of reliability and capability of detection) by international test organisations, UNOPS, national defence departments and humanitarian demining organisations.

Test following test results are available at the ITEP website: www.itep.ws

1. Humanitarian Demining Robot Gryphon - An Objective Evaluation. IARP International Workshop HUDEM 2008, Cairo, March 28-30, 2008; 2008.
2. Improved Landmine Discrimination With an Off-the-Shelf Metal Detector. Journal of Mine Action, Issue 12.1, Summer 2008; 2008.
3. Lessons Learned from field Tests in Croatia and Cambodia. Journal of Mine Action, Issue 11.2, Spring 2008; 2008.



The CEIA MIL-D1/DS in service in Cambodia

4. Test and Evaluation of Japanese GPR-EMI Dual Sensor Systems at Benkovac Test Site in Croatia: CROMAC - Centre for Testing, Development and Training; published 2008.
5. Experimental Cairo Testing and Evaluation of Mine and UXO Detectors: Faculty of Engineering, Cairo University, Giza, Egypt; 2008.
6. Results of Systematic Test & Evaluation of Metal Detectors (STEMD) Trials; (Annex of *Metal Detectors and PPE Catalogue 2007*). GICHD; 2007.
7. STEMMD; Interim Report Laboratory Tests Italy. Joint Research Centre - European Commission (JRC/EC); 2006.
8. STEMMD; Interim Report field Trials Mozambique. *Journal of Mine Action*, Issue 10.1, August 2006; 2006.
9. STEMMD; Interim Report field Trial Lao, 27 September - 5 November 2004. Joint Research Centre - European Commission; 2005.
10. STEMMD; Interim Report field Trial Mozambique, 12 April - 5 May 2005; 2005.
11. Metal Detector Trial - Colombia: Results from 2002; 2003.
12. Development Tests for Measuring the Detection Capabilities of Metal Detectors; published in 2003.
13. Metal Detector Trial - Colombia; Results from 2002. Defence R&D Canada – Suffield; 2003.
14. Summary of Metal Detector Trial Report, UN Mine Action Programme Afghanistan; 2002.

REPORTED LIMITATIONS AND STRENGTHS

Limitations

Please refer to the test reports mentioned above.

Strengths

- > High electrical and mechanical reliability.
- > High-impact polypropylene transport case allows for transportation under the most extreme conditions.

DETECTOR

1. Brand	CEIA
2. Model	MIL-D1 / DS
3. Version	6.0
4. Used detection technology	Electromagnetic induction CW (Continuous Wave)

DIMENSIONAL DATA

5. Working length	
> min. length	Telescopic pole 1,120 mm
> max. length	Telescopic pole 1,620 mm
6. Search head	
> Size	280 mm (external diameter)
> Weight	—
> Shape	2 x Circular
7. Transport case	
> Weight	7.8 kg
> With equipment (full)	14 kg
> Dimensions	950 x 440 x 155 mm
> Hard Soft case (material)	High impact polypropylene / synthetic canvas
8. Weight, hand-held unit	—
9. Weight, carrying (operational detection set)	5.5 kg
10. Weight, additional equipment	—
11. Weight distribution Balance	Well balanced Optimized for continuous operation
12. Other specifications	Control of working depth Knob sensitivity adjustment

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	—
15. Other types Models	—
16. Location of use	Cambodia, Laos, Sudan, Denmark, Egypt, France, Italy, Switzerland, USA, Yemen

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	No influence
18. Temperature (limitations)	
> Storage	-55° C to +75° C
> Operational	-46° C to +65° C
19. Water resistant (Yes / No)	Yes IP68 (IEC 529)
20. Shock Vibration resistant	Yes exceeding MIL STD 810 E
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	MTBF = 27,500 according to MIL-HDBK 217
> medium temperature (around 20° C)	MTBF = 22,500 according to MIL-HDBK 217
> high temperature (higher than 30° C)	At 35° C MTBF = 18,000 according to MIL-HDBK 217

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic
> Duration	No limit
24. Detection range Sensitivity details Detection performance Working depth	
> Small metal content mines (type of mine)	Optimized according to the UXOs and soils
> Anti-tank mines (type of mine)	Optimized according to the mines and soils
> ERW (please specify)	Optimized according to the mines and soils
25. Output indicator	Sound and bar display
26. Pinpointing feature	Bar display and pulsing tone
27. Adjustment of search head angle	0° front 90° rear
28. Soil influence	Automatically compensated
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	From 0 cm/s to the maximum human operator walking speed
31. Search coil Antenna	Circular
32. Limitations	—
33. Interference (with other detectors)	—

POWER

34. Power supply Source	4 x 1.5V alkaline batteries or 4 x 1.2V NI-MH rechargeable batteries
35. Operating time	> 18 h with alkaline batteries; > 16 h with rechargeables batteries
36. Power supply	
> weight	Total for 4 batteries = 0.580 kg (alkaline batteries) = 0.61 kg (rechargeables batteries)
> no. of batteries size type	4 ANSI Std D IEC Std LR20, alkaline or rechargeable
> rechargeable	Yes
> other	—

COSTS

37. Price	
> for one detector on request	—
> reduction for higher quantity	—
38. System price	
> with training	—
> spare parts	—
> extended warranty	—
39. Total	—
40. Possibility to rent/lease	—

OTHERS

41. Duration of warranty	—
42. Additional equipment	Battery charger MIL-D1/BC
43. Additional technical data information	On request
44. Compliant standards	MIL-STD 810 E and others on requests

Ebinger | Germany

GENERAL DESCRIPTION

The *Ebinger Large Loop Technology UPEX 740 M* is a valuable asset in the field of explosive remnants of war. It has been used for humanitarian and commercial battle area clearance operations in Afghanistan, Angola, Cambodia, France, Kosovo, Laos, the UK and Viet Nam.

Due to its size, large areas can be inspected and cleared of ammunition in a short time. A vehicle-mounted configuration has been developed which is applicable for route clearance/ verification, area reduction or quality assurance. It can be mounted on virtually any heavy-duty vehicle and can provide an efficient and cost-effective detection system.

The system can be supplied with two different loop configurations. The number of channels can be varied between two and eight. The search process can be optimised by combining the system with a GPS to precisely locate the potential target. Colour-coded maps can be generated to facilitate the follow-on demining operation.

Main characteristics

- > The sturdy electronics unit is compact, lightweight and splash-proof.
- > Target acquisition is indicated by audio alarm and by galvanometer reading.
- > Detection results can be stored in a data logger for plotting or further processing by software.
- > Different indication characteristics can be selected to suit adverse working conditions.
- > The equipment's audio control pulses indicate the battery condition. Audible confidence clicks inform operators that equipment is functioning correctly.
- > UPEX is also available for underwater use or vehicle-mounted.



The Ebinger UPEX 740 M in service

WORKING METHODOLOGY

UPEX 740 M is as easy to use as a conventional mine detector. Detection signals are easy to interpret and no advanced training is required for the operators. The UPEX detector applies the eddy current pulse induction principle for the detection of metal components in ERW. The device can be adjusted to various types of non-cooperative soils and to suppress surface-bound small fragmentation.

No further technical information is given by the manufacturer.



The Ebinger UPEX 740 M in operation at the Egyptian test site and on a road

DETECTORS IN USE

Since 1993, more than 500 UPEX 740M units have been purchased. The detector is in service with various humanitarian demining organisations, the UN and many commercial companies.

POWER SUPPLY

The UPEX 740 M is powered by 8 x 1.5V C cell or alternatives; rechargeable battery pack 3.8A/h, 12V.

- > Operational life of battery (8x1.5V alkaline 8A/h): 55 hours in Low, 25 hours in High.
- > Operational life of rechargeable batteries (8x1.2V 3.5A/h): 38 hours in Low, 19 hours in High.

FACTORY SUPPORT

- > All detectors are covered by a 24-month warranty. A worldwide service network ensures permanent availability of spare parts.
- > Operation and maintenance training is provided at Ebinger facilities or on site.
- > Additional factory support by specially trained staff is provided on request.
- > Instruction and maintenance manuals are available in Arabic, English, French, German, Italian and Russian; other languages available on request.

MAINTENANCE SUPPORT

- > There are no special requirements for technicians or workshop facilities. Most repairs can be carried out by Ebinger-trained staff on site.
- > Step-by-step explanations in the manuals help to ensure easy maintenance.

TEST AND EVALUATION

The detector went through comprehensive internal tests. Reports displaying the performance can be provided by the manufacturer on request.

REPORTED LIMITATIONS AND STRENGTHS

The system has been in service for several years, but has not been tested in comparative trials. Therefore no statement of known limitations and strengths can be made.

DETECTOR

1. Brand	EBINGER
2. Model	UPEX® 740M-V and UPEX® MM (vehicle)
3. Version	—
4. Used detection technology	AEM-PI

DIMENSIONAL DATA

5. Working length	
> min. length	Depending on construction on vehicle
> max. length	Depending on construction on vehicle
6. Search head	
> size	1,000 x 2,000 mm or multiple
> weight	Approx. 3 kg including support frame
> shape	Rectangular
7. Transport case	
> weight	—
> with equipment (full)	—
> dimensions	—
> hard soft case (material)	—
8. Weight, hand-held unit	—
9. Weight, carrying (operational detection set)	—
10. Weight, additional equipment	—
11. Weight distribution balance	—
12. Other specifications	Alarm and reset device inside the cabin

DETECTION SYSTEM SPECIFICATIONS

13. Status	In production
14. Detectors systems in use to date	50
15. Other types	—
16. Location of use	Angola, Cambodia, Eritrea, Mozambique, Sudan

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	None
18. Temperature (limitations)	
> storage	None
> operational	None
19. Water resistant	Yes
20. Shock vibration resistant	Yes
21. Environmental compensation	Manual
22. Operational hours operating endurance	Unlimited (car battery)

DETECTION OPERATION

23. Calibration set-up	
> auto manual	Manual
24. Detection range sensitivity details detection performance working depth	
> Control of working depth	Test piece
> low-metal-content mines	Not suitable
> anti-vehicle mines	Designed for
> ERW	Designed for
25. Output indicator	Acoustical, optical, analogic output for data recording
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Not necessary
28. Soil influence:	Adjustable
29. Best use in	
> sand	Yes
> peat	Yes
> clay	Yes
> ferruginous soil (laterite)	Limited
30. Optimal sweep speed	—
31. Search coil antenna	Rectangular
32. Limitations	—
33. Interference (with other detectors)	12 m

POWER

34. Power supply source	Car battery
35. Operating time	Unlimited
36. Power supply	
> weight	—
> no. of batteries size type	—
> other	System supplied with power cables

COSTS

37. Price	
> for one detector	More than US\$ 5,000
> reduction for higher quantity	Yes
38. System price	
> with training	Included
> spare parts	Included
> extended warranty	On request
39. Total	—
40. Possibility to rent lease	Yes

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Support frame for vehicle on request
43. Additional technical data information	Available on request
44. Compliant standards	MIL-STD

Vallon | Germany

GENERAL DESCRIPTION

The *VMXC1 UXO detector* is based on the VMH3CS mine detector and has a metal discrimination mode. Larger search heads and a special firmware for unexploded ordnance (UXO) detection, which is custom designed for different applications, offer a reliable and specific detection of ordnance, submunition and metal-cased mines with fewer false alarms from other metallic waste.

With effective ground compensation the VMXC1 is recommended if the use of magnetometers is limited in mineralised soils. Experiences in different countries with challenging ammunition problems have shown a higher detection efficiency.

Objects are indicated by audio, visual and vibrations alarm. In “metal discrimination” mode the audio and visual alarms differentiate between ferrous and non-ferrous metals, or ammunition and metallic waste if the ammunition is defined and stored in the firmware.

Data output and input offer data acquisition for computer-aided detection as well as upgrade or customisation of the detection features on site.

Three versions are offered, the VMXC1-1 with a slim search head, the VMXC1-3 with a round 30 cm diameter search head, and the VMXC1-6 with a round 60 cm diameter search head.



The VMXC1 - 60 cm search head



The VMXC1 - 30 cm search head

Main components of the VMXC1

- > Detector electronics with integrated arm-rest, non-magnetic loudspeaker, power supply, battery compartment, on/off switch for two different search patterns, and vibrator. Hand grip with visual bargraph (14 elements), four robust push buttons for sensitivity control, volume control, ground compensation and pinpointing. Two-piece telescopic carrying bar with plug-in connection for search head.
- > Watertight oval search head, round 30 cm diameter search head, or round 60 cm diameter search head with carrying bar and plug-in connection to the electronics unit.
- > Non-magnetic test piece.
- > One set (3 EA) single D-cell batteries.
- > Operation manual.
- > field manual.
- > field backpack for storing the detector set with all accessories.
- > Soft case for storing the 60-cm-search head

Optional accessories (available on request)

- > Headset.
- > Hard case for storing the complete detector set VMXC1-1 or VMXC1-3 with all accessories.
- > Data recording and software.
- > field computer VFC2.

The detector complies with environmental conditions according to MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1.



The VMXC1

WORKING METHODOLOGY

The search head acts as both an emitter of electromagnetic pulses and a receiver sensing the pulsed field. If there is a metal object in the magnetic field, the following happens:

- > The electronics unit detects a deviation from the previous state; thus an alarm signal is produced depending on the size and type of the metal target.
- > The shape of the pulse in the VMXC1 is bipolar to reduce the effect on magnetically fuzed mines.

For worldwide use under different soil conditions, the VMXC1 can be set up for optimal detection features.

The detector has a built-in test procedure continuously checking the reliability and proper function of the detector. The pulse signal generation, signal processing, battery voltage, external connections, and – most important – the internal operation voltages are constantly monitored. Visual and acoustic alarms are produced when a fault is found.

With such reliability, the user can operate the VMXC1 easily and concentrate fully on detection tasks.

DETECTORS IN USE

The detectors are in service with various humanitarian aid organisations, commercial mine clearance organisations and several armed forces.

POWER SUPPLY

VMXC1 is powered by three 1.5V mono-cells IEC R20 (ANSI std. D) or rechargeable RSH 4 KR 35/62. The operational life of batteries is said to be approximately 27 to 33 hours depending on the age, quality and capacity of the batteries.

FACTORY SUPPORT

- > Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- > Operation and maintenance training are offered either in the Vallon facilities or at the customer's location.
- > Operation and maintenance manuals are available in different languages.
- > Warranty is 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. For each detector a maintenance manual is available, with step-by-step explanations.

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

There are no limitations for terrain, soil and vegetation.



The VMXC1 packed in a transport case

TECHNICAL SPECIFICATIONS

VALLON

DETECTOR

1. Brand	VALLON
2. Model	VMXC1
3. Version	–
4. Used detection technology	Metal detector Pulse induction Metal discrimination

DIMENSIONAL DATA

5. Working length		
> min. length	Approx. 92 cm (short version with oval search head) Approx. 92 cm (short version with 30 cm search head) Approx. 98 cm (short version with 60 cm search head)	
> max. length	126 cm (long version with oval search head) 126 cm (long version with 30 cm search head) 132 cm (long version with 60 cm search head)	
6. Search head		
> Size	17 x 31 cm (oval search head); 30 cm Ø (30 cm search head); 60 cm Ø (60 cm search head)	
> Weight	Approx. 0.63 kg (oval search head) Approx. 0.8 kg (30 cm search head) Approx. 1.1 kg (60 cm search head)	
> Shape	Oval (oval search head); Round (30 cm search head); Round (60 cm search head)	
7. Transport case		
> Weight	Field backpack (for oval search head) approx. 0.3 kg (standard accessory) Field backpack (for 30 cm search head) approx 1.25 kg (optional accessory) Hard case (for oval search head) approx 5 kg (optional accessory)	Hard case (for 30 cm search head) approx 7.2 kg (optional accessory) Soft case (for 60 cm search head) approx 1.7 kg (optional accessory)
> With equipment (full)	Field backpack (for oval search head) approx. 3.4 kg (standard accessory) Field backpack (for 30 cm search head) approx 4.2 kg (optional accessory) Hard case (for oval search head) approx 9 kg (optional accessory)	Hard case (for 30 cm search head) approx 11.4 kg (optional accessory) Soft case (for 60 cm search head) approx 2.8 kg (optional accessory)
> Dimensions	Field backpack 53 x 28 x 15 cm (standard for oval search head) Field backpack 53 x 32 x 15 cm (standard for 30 cm search head) Hard case 56 x 35 x 23 cm (optional for oval search head)	Hard case 65 x 50 x 25 cm (optional for 30 cm search head) Hard case 66 x 70 x 11 cm (optional for 60 cm search head)
> Hard Soft case (material)	Field backpack textile (standard accessory) Hard case plastic (optional accessory) Soft case for 60 cm search head textile (optional accessory)	
8. Weight, hand-held unit	2.5 kg (with oval search head) 2.7 kg (with 30 cm search head) 2.9 kg (with 60 cm search head)	
9. Weight, carrying (operational detection set)	2.5 kg (with oval search head) 2.7 kg (with 30 cm search head) 2.9 kg (with 60 cm search head)	
10. Weight, additional equipment	Head set 110 g	
11. Weight distribution Balance	–	
12. Other specifications	–	

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	VMH3 VMH3CS VMC1 VMM3 VMX3
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIL STD 810F
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C

19. Water resistant (Yes / No)	Yes up to 1.5 m
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Up to 15 h depending on battery type and capacity
> medium temperature (around 20° C)	Up to 33 h depending on battery type and capacity
> high temperature (higher than 30° C)	Up to 33 h depending on battery type and capacity

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Auto
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Small metal content mines (type of mine)	Depending on their size, material and the local interference as well as implemented firmware
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound, visual bargraph, vibration
26. Pinpointing feature	Yes
27. Adjustment of search head angle	With a joint
28. Soil influence	Adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	standard 0.2-1.5 m/s; pinpoint mode: 0-0.2 m/s
31. Search coil Antenna	Oval shape with 17 x 31 cm Round shape with 30 cm Ø Round shape with 60 cm Ø Stick Probe with 4 cm Ø and 44.5 cm length
32. Limitations	No
33. Interference (with other detectors)	2 detectors with oval search head should have a minimum distance of 2 m to each other

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	–
> no. of batteries size type	3 ea. 1.5V standard batteries D-size
> rechargeable	3 ea. 1.24V rechargeable batteries KR35/62
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Headset, hard case, 30 cm search head, 60 cm search head, data recording and software
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon VMX3 Metal and UXO Detector* has been designed for the detection of buried metal-cased mines and non-exploded ordnance in larger depths. The special UXO firmware ignores small metal parts. Ease of operation and a robust mechanical design ensure very reliable operation for professional ordnance clearing in battlefield operations, in military training programmes and in humanitarian demining.

Along with its digital signal processor the VMX3 uses an advanced pulse-field function specially improved by Vallon. It can also work in mineralized soils, such as laterite, magnetite and magmatite as well as in shallow salt and fresh water and under the electromagnetic influence of main power lines without greatly affecting sensitivity. The VMX3 is specially recommended in strong ferruginous soils where the standard ferrous locators (fluxgate sensors) are not working.

The detector can be connected to Vallon data loggers. Data input allows for further upgrades of the detector firmware, and data output enables measured data to be recorded and evaluated using Vallon EVA2000 software, running on a laptop or personal computer.



The VMX3

Main components are

- > Large search head with telescopic pole.
- > Detector electronics with integrated non-magnetic loudspeaker, power supply and battery compartment. Watertight sockets for the search head and headset/data input or data output via RS 232 on the front panel of the housing as well as visual indication of operational readiness, programme selector with integrated on/off switch, "COMP" key for automatic fine adaptation to mineralised soil and control knob for setting the volume and detection sensitivity.
- > Non-magnetic test piece.
- > Carrying bag for electronics unit.
- > Carrying belt for electronics unit.
- > Handle, armrest and supplementary arm-belt.
- > Headset.
- > One set (4 EA) single cell batteries 1.5V IEC R 20/D-cell alkaline.
- > Operation and field manuals.
- > Soft case, which can be used as backpack.

The detector complies to environmental conditions according to MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1.

WORKING METHODOLOGY

The search head continuously emits electromagnetic pulses as the operator sweeps close to the surface.

The search head acts as both an emitter and a receiver sensing the pulsed field. If there is a metal object in the magnetic field, the following happens:

- > The electronics unit detects a deviation from the previous state: thus an alarm signal is produced depending on the size of the metal target.
- > The shape of the pulse in the VMX3 is bipolar to reduce the effect on magnetically fused mines.

For use worldwide under different soil conditions, the VMX3 is provided with a programme to set the optimal detection features. The correct programme setting and the wide range of detection sensitivity allow detection of plastic mines with big metal content in mineralised soil and also near to 50 Hz/60 Hz-power lines.

The detector has a built-in test procedure to continuously check reliability and functioning during operation. The pulse signal generation, signal processing, battery voltage, external connections and – most important – the internal operation voltages are constantly monitored. Visual and acoustic alarms are produced when a fault is found.

The detector's high reliability allows the user to operate the VMX3 easily and concentrate fully on detection tasks.

VALLON VMX3

Vallon | Germany

DETECTORS IN USE

The detectors are in service with commercial mine clearance organisations and several armed forces (including NATO members).

POWER SUPPLY

- > VMX3 is powered by four 4 x 1.5V mono-cell IECLR 20 (ANSI STD. D cell) or rechargeable KR35/62.
- > Operational life of battery is 40 to 50 hours depending on age, quality and capacity of the batteries.



The VMX3 packed in a transport case

FACTORY SUPPORT

- > Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- > Operation and maintenance training are offered either in the Vallon facilities or at a location required by the customer.
- > Operation and maintenance manuals are available in different languages.
- > Warranty for 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. For each detector a maintenance manual is available, with step-by-step explanations for repairs.

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

There are no limitations for terrain, soil and vegetation.

DETECTOR

1. Brand	VALLON
2. Model	VMX3
3. Version	–
4. Used detection technology	Metal detector Pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	92 cm (short version)
> max. length	137 cm (long version)
6. Search head	
> Size	615 mm diameter
> Weight	With telescopic pole 1.9 kg
> Shape	Round
7. Transport case	
> Weight	Approx 3.5 kg
> With equipment (full)	Approx. 9.1 kg
> Dimensions	75 x 70 x 22 cm
> Hard Soft case (material)	Soft case Textile
8. Weight, hand-held unit	1.9 kg (weight of search head with rod) 1.8 kg (weight of electronics with batteries)
9. Weight, carrying (operational detection set)	1.9 kg + 3.7 kg
10. Weight, additional equipment	Head set 110 g
11. Weight distribution Balance	–
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	VMH3CS with UXO search head VMM3 with UXO search head
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIL STD 810F
18. Temperature (limitations)	
> Storage	-57° C to +71° C
> Operational	-32° C to +55° C
19. Water resistant (Yes / No)	Yes up to 4 m
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Up to 20 h depending on battery type and capacity
> medium temperature (around 20° C)	Up to 50 h depending on battery type and capacity
> high temperature (higher than 30° C)	Up to 50 h depending on battery type and capacity

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment
> Small metal content mines (type of mine)	Designed for UXO, only plastic mines with big metal content or mines with metal case depending on their size, material and the local interference
> Anti-tank mines (type of mine)	Designed for UXO, only plastic mines with big metal content or mines with metal case depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound (loudspeaker or headset)
26. Pinpointing feature	Yes
27. Adjustment of search head angle	With a joint
28. Soil influence	Adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.2 – 1.5 m/s
31. Search coil Antenna	Round shape with 615 mm diameter
32. Limitations	No
33. Interference (with other detectors)	2 detectors should have a distance of 5 meter to each other

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	–
> no. of batteries size type	4 ea. 1.5V standard batteries D-size
> rechargeable	4 ea. 1.24V rechargeable batteries KR35/62
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Headset, data recording, software
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1

DETECTOR SYSTEMS

UXO DETECTORS

MAGNETOMETER DETECTORS



BGIF CCT-2 MAGNETIC DETECTOR

Beijing Geological Instrument Factory | China

GENERAL DESCRIPTION

The *CCT-2 Magnetic Detector* is a highly sensitive differential magnetometer used for the detection of bombs, shells, anti-tank mines and underground pipeline with ferrous content buried in earth or water, working on a fluxgate principle.

A 192 x 64 dots liquid crystal display (LCD) on the front panel of the CCT-2 displays the set parameters in operation. The real-time detecting result appears either in the form of digits or in the form of curves. Simultaneously, the detector saves the result in a storage system with the capacity of 8,000 detecting points. When the operation in the whole detecting area is complete, the results can be transferred to a computer and output as a result chart with a special software. The pinpoint of the object can be easily decided by analysing the chart.

Detection can be performed in two ways: stationary operation and continuous operation. The former is adopted to circle the range of the object while the latter is used to pinpoint the object.

The detector has a keyboard on the panel to set various parameters of the unit and to control the operation.

Operation is simple, with only a short training period required before operation. When detection is performed over large areas, several detectors can be used at the same time without any interference.

The main components of the CCT-2 are the working unit, the sensor, the charger, a set of adjusting tools, the carrying belt, an aluminium shipping and storage case, and the operation and maintenance manual.



The CCT-2 Magnetic Detector in service

WORKING METHODOLOGY

The CCT-2 works on the principle of measuring the distortion of the earth's magnetic field. Two magnetic sensors are vertically mounted in a tube 50 cm apart to measure the magnetic field. When no ferromagnetic target exists between the sensors, both values are subtracted and result in zero. When a ferromagnetic target is disturbing the homogenous field the result is two different values so that the difference is not zero. Depending on the signal amplitude and polarity, the alarm signal is computed.

POWER SUPPLY

The CCT-2 works with a 4.4 Ah rechargeable lithium battery fixed inside, which ensures the unit to work for eight hours continuously. A special charger for all kinds of power supply mode is offered as an accessory.

DETECTORS IN USE TO DATE

No detailed information was provided by the manufacturer. The manufacture states there has been a heavy demand from past and new clients since the release of the tool to the market.

FACTORY SUPPORT

- > BGIF has manufactured precision instruments for use in detection and in laboratories for more than 40 years. It has good research and production capacities.
- > The manufacturer assures supply period and product quality.
- > Spare parts can be delivered to the customer.
- > Operation and maintenance training can be offered at BGIF facilities or at a customer's location at their expense.
- > The user's manual (including instructions on operation and maintenance) is available in English, and other languages on request.
- > The manufacturer provides a warranty of 24 months.

MAINTENANCE SUPPORT

- > There are no special requirements for technicians or workshop facilities.
- > A special tool is offered with the unit. Others needed are standard ones available in the market.
- > The user's manual has detailed explanations for operation and maintenance.

TEST AND EVALUATION

The manufacturer provides several available test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

The CCT-2 detects ferrous targets only. No additional information is available.

DETECTOR

1. Brand	BGIF
2. Model	CCT-2
3. Version	01 2005
4. Used detection technology	Difference magnetometer working on fluxgate principle

DIMENSIONAL DATA

5. Working length	
> min. length	—
> max. length	1,100 mm (search pole)
6. Search head	
> Size	Ø 40 x 750 mm
> Weight	2.23 kg
> Shape	Tube
7. Transport case	
> Weight	6.2 kg
> With equipment (full)	12.5 kg
> Dimensions	820 x 380 x 170 mm
> Hard Soft case (material)	Hard case aluminum
8. Weight, hand-held unit	—
9. Weight, carrying (operational detection set)	—
10. Weight, additional equipment	—
11. Weight distribution Balance	—
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status	In production
14. Detectors Systems in use to date	Not given
15. Other types	—
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	MIL STD
18. Temperature (limitations)	
> Storage	- 50° C to + 70° C
> Operational	- 20° C to + 50° C
19. Water resistant	Yes
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Manual, cannot be used in magnetic soil
22. Operational hours Operating endurance	Over 8 h

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Manual or automatic
> Duration	Continual or point
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity switch
> Low-metal-content mines	Depending on their size, material and the local interference
> Anti-vehicle mines	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Visual by real-time display on LCD screen
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	See item 29
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Limited
30. Optimal sweep speed	0.2-1 m/s
31. Search coil Antenna	Tube
32. Limitations	Only ferromagnetic targets
33. Interference (with other detectors)	Same detector type no

POWER

34. Power supply Source	4.4 Ah rechargeable Lithium battery pack (over 2y)
35. Operating time	Over 8 hours
36. Power supply	
> weight	—
> no. of batteries size type	4.4 Ah rechargeable Lithium battery pack rechargeable (BGIF charger applying to all power supply mode)
> rechargeable	
> other	—

COSTS

37. Price	
> for one detector	Not given
> reduction for higher quantity	Yes
38. System price	
> with training	Upon request
> spare parts	Upon request
> software	Upon request
> extended warranty	Upon request
39. Total	—
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	—
43. Additional technical data information	—
44. Compliant standards	ISO-9001

EBINGER MAGNEX 120 LW

Ebinger | Germany

GENERAL DESCRIPTION

The *MAGNEX 120 LW metal detector* has been developed particularly for the detection of ferromagnetic ammunition in the ground or in shallow water. The locator is designed for borehole use to indicate deeply buried UXO/ERW, or for operation in areas with substantial interference from surface fragments.

The pinpoint location with audio signal and the digital multi-channel system ensure a high level of reliability and user friendliness.



Schematic diagram of Ebinger MAGNEX 120 LW

WORKING METHODOLOGY

The MAGNEX 120 LW works on the gradiometer principle, which detects geomagnetic field interference. Objects made from ferromagnetic material can show a magnetic field which superimposes on the natural terrestrial field. Amplitude and polarity of the local anomaly are used to indicate the position of the ERW.

Digital measurement data logging

To ease data collection and storage the MAGNEX locators and the MAGNETO system suit each other well and substantially increase productivity in bomb disposal. A high degree of field input makes the system very user friendly. Its functionality facilitates its use when investigating the extent of pollution or when processing detection data from ammunition. In conjunction with the DLM datalogger, the system can be used as a man-portable single-channel or triple-channel system.

The detector is equipped with a new Ebinger-developed inductor system which ensures a base clearance of 430 mm.

Ease of operation and a rigid mechanical design facilitate reliable operation for professional clearing tasks. The stepping switch offers the following sensitivity ranges:

- > Level 1: 3,000 nT/m;
- > Level 2: 1,000 nT/m;
- > Level 3: 300 nT/m;
- > Level 4: 100 nT/m;
- > Level 5: 30 nT/m;
- > Level 6: 10 nT/m.

No further information is given by the manufacturer.

DETECTORS IN USE TO DATE

Since 1993, more than 1,200 units of MAGNEX 120 have been purchased. The detector is in service with various NGOs and commercial companies worldwide.

POWER SUPPLY

- > The MAGNEX 120 LW is powered by 6 x 1.5V round cell LR20 batteries.
- > Operational life of battery is approximately 40 hours.

FACTORY SUPPORT

- > All detectors are covered by a 24-month warranty. A worldwide service network ensures permanent availability of spare parts.
- > Operation and maintenance training is provided at Ebinger facilities or on site.
- > Additional factory support by specially trained staff is provided on request.
- > Instruction and maintenance manuals are available in Arabic, English, French, German, Italian and Russian; other languages available on request.

MAINTENANCE SUPPORT

- > There are no special requirements for technicians or workshop facilities. Most repairs can be carried out by Ebinger-trained staff on site.
- > Step-by-step explanations in the manuals ensure easy maintenance of the system.

TEST AND EVALUATION

The detector went through comprehensive internal tests: reports can be provided by the manufacturer on request.

REPORTED LIMITATIONS AND STRENGTHS

No information available at this time.

DETECTOR

1. Brand	EBINGER
2. Model	MAGNEX® 120 LW MAGNETOMETER
3. Version	05 2001
4. Used detection technology	Difference magnetometer using fluxgate principle

DIMENSIONAL DATA

5. Working length	
> Length	1,280 mm (complete)
> Probe	600 mm
6. Search head	
> Size	600 x 43 mm
> Weight	1.5 kg
> Shape	Circular probe
7. Transport case	
> Weight	3 kg
> With equipment (full)	4.2 kg 1 kg
> Dimensions	800 x 280 x 180 mm
> Hard Soft case (material)	Hard plastic canvas satchel
8. Weight, hand-held unit	1.2 kg
9. Weight, carrying (operational detection set)	4.2 kg
10. Weight, additional equipment	—
11. Weight distribution Balance	—
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	More than 1,200
15. Other types Models	—
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	0 - 95 %
18. Temperature (limitations)	
> Storage	-53° C to +70° C
> Operational	-30° C to +55° C
19. Water resistant (Yes / No)	Yes
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto manual
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Up to 75 h, depends on type of battery
> medium temperature (around 20° C)	Up to 75 h, depends on type of battery
> high temperature (higher than 30° C)	Up to 75 h, depends on type of battery

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Manual automatic
> Duration	Continual
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment manual auto
> Low-metal-content mines	—
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Optical, sound and data output
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	—
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.2-1.5 m/s
31. Search coil Antenna	Probe 600 mm
32. Limitations	Only ferromagnetic material
33. Interference (with other detectors)	< Safety distance

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	—
> no. of batteries size type	6 x 1.5V dry batteries LR-20
> rechargeable	7 x 1.2V rechargeable batteries
> other	—

COSTS

37. Price	
> for one detector on request	US\$ 4,000-US\$ 5,000
> reduction for higher quantity	Yes
38. System price	
> with training	On request
> spare parts	On request
> extended warranty	On request
39. Total	—
40. Possibility to rent/lease	On request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Borehole cable
43. Additional technical data information	—
44. Compliant standards	EMC tests according to MIL-STD 461 D, DIN EN ISO 9001:2000

FOERSTER FEREX 4.032

Institut Dr. Foerster | Germany

GENERAL DESCRIPTION

The *FEREX 4.032 metal detector* uses the fluxgate magnetometer principle to detect magnetic anomalies caused by ferromagnetic objects. Its primary use is to search for ERW buried deep in the ground. Under certain circumstances (for example, anti-vehicle mines covered by desert sand), the FEREX can successfully be used for mine detection.

The detector replaces the FEREX 4.021, which was introduced in the mid-1990s. Due to the tension band technology inside the Foerster magnetometer, the system is one of the most sensitive fluxgate magnetometers available. These probes are lifetime calibrated – even if used within a rough environment or within an extreme climate. The standard hand-held version “FEREX 4.032 API” indicates ferromagnetic objects by a pointer instrument and sound.

As it is a modular system, a simple exchange of the control box upgrades the unit to a FEREX 4.032 DLG (data logger). This detector combines the API features with an integrated four-channel data logger for scanning fields in order to evaluate the resulting map of magnetic anomalies on a standard PC.



The FEREX 4.032 DLG (datalogger) in the Egyptian test site

The FEREX 4.032 DLG (datalogger) multi-sensor detection with GPS

The FEREX 4.032 DLG (datalogger) GPS

The FEREX Dataline software calculates, among other data, the exact position, depth or orientation of the scanned objects (see further description below).

The system is capable of fulfilling tasks such as underwater or borehole search. The high-end solution within this instrument family is a vehicle-based multichannel system (Foerster Multicat), supported by a differential global positioning system (GPS). In 2002, following customer feedback, the FEREX 4.032 was modified to minimise its length. Some smaller mechanical modifications have been undertaken to optimise handling. At the same time, the Dataline software was equipped with a bundle of optional features. New types of multi-probe-holder have been introduced.

Foerster supplies FEREX in three versions: the API (with a classic pointer instrument) and the two data logger versions, DLG STD and DLG GPS Cartograph. The DLG GPS Cartograph is designed for connection to all conventional GPS with RTK (Real Time Kinematic) operational mode and laser positioning systems (Tachymeter Total Station).

WORKING METHODOLOGY

By detecting variations within the earth's magnetic field, the FEREX indicates plus and minus poles of ferromagnetic objects. Geometry and strength of the detected poles enable the user to determine the location, depth and size of the object. In general, problematic soil types do not influence the results gained from this working principle.

POWER SUPPLY

- > As standard, the FEREX 4.032 is powered by four 1.5V D-cells.
- > Rechargeable batteries are available on the open market.
- > Sensitivity and detection quality are never influenced by battery condition.
- > Operating time with one set of alkaline batteries reaches 60 hours (in intermittent operation) or 36 hours (data logger).

DETECTORS IN USE TO DATE

The FEREX 4.032 has been in service since 2000 and has been used in Afghanistan, Australia, Austria, Bulgaria, Canada, Croatia, Denmark, Egypt, Finland, France, Germany, Indonesia, Iran, Ireland, Italy, Japan, the Netherlands, Portugal, Poland, Russia, Spain, Tunisia, UK, Uruguay, the US and Viet Nam.

FACTORY SUPPORT

- > Spare parts are available exclusively from Foerster which has a network of representatives in more than 40 countries. Most offer complete after-sales service.
- > Besides offering training on the customer's site, Foerster provides modern test and training facilities in Reutlingen, Germany. A full training programme for trainers, including lessons on background knowledge and using a variety of training materials, is available in English and German. On request, training forms part of a purchasing package.
- > Standard manuals and service documentation are available in English, French, German, Russian and Spanish. Other languages available on request.



The FEREX 4.032 DLG (datalogger) multi-sensor detection with wheel set.

MAINTENANCE AND SUPPORT

- > The FEREX maintenance system is on two levels: basic field maintenance and workshop maintenance.
- > The recommended number of workshops depends on the logistical set-up. The personnel for handling a workshop must have basic knowledge of mechanical and electronic repairs.
- > Foerster offers supply of complete tool sets and testing equipment as well as service training. Fully equipped workshops with trained personnel can handle all repairs down to factory final assembly level.

TEST AND EVALUATION

Foerster performs tests within its own facilities mainly for research and quality control. The manufacturer states that tests are largely carried out under “real” conditions.

One test report is available at the ITEP website as follows:

1. A. M. El-Nadi, *Experimental Cairo Testing and Evaluation of Mine and UXO Detectors*, by Faculty of Engineering, Cairo University, Giza, Egypt, published 2007.

REPORTED LIMITATIONS AND STRENGTHS

No information is available at this time.

DETECTOR

1. Brand	FOERSTER
2. Model	FEREX 4.032
3. Version	API, DLG, DLG Kartograph
4. Used detection technology	Metal detector working by fluxgate magnetometers

DIMENSIONAL DATA

5. Working length	Approx. 1.4 m
6. Search sensor	
> Size	Length 853 - 1,435 mm Ø 35 mm
> Weight	0.55 - 1 kg
> Shape	Tube
7. Transport case	
> Weight	Approx. 4 kg
> With equipment (full)	Approx. 9 kg
> Dimensions	1,000 x 280 x 340 mm
> Hard Soft case (material)	Hardcase plastics
8. Weight, hand-held unit	Approx. 4 kg
9. Weight, carrying (operational detection set)	Approx. 4 kg
10. Weight, additional equipment	Headphones 0.1 kg; Carrying belt 0.16 kg
11. Weight distribution Balance	Balanced around the handgrip
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	—
15. Other types Models	—
16. Location of use	—

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	No limitations
18. Temperature (limitations)	
> Storage	-57° C to +70° C
> Operational	-35° C to +70° C
19. Water resistant (Yes / No)	Sensor is 100 m sea-waterproof. Electronics unit is highly splash-proof. See MIL-STD specs.
20. Shock Vibration resistant	See MIL-STD specs.
21. Environmental Compensation	6 operation modes for suppression of electromagnetic influences and filter for big/small objects.
22. Operational hours Operating endurance	
> medium temperature (around 20° C)	Depending on working rhythm and instrument type: approx. 35-80 h with alkaline batteries.

DETECTION OPERATION

23. Calibration Set-up	—
24. Detection range Sensitivity details Detection performance Working depth	
> Low-metal-content (type of mine)	No
> Anti-vehicle mines (type of mine)	Full metal case (ferromagnetic) see figure on bottom
> ERW	Hand grenade; 500 lbs bomb (Mk 82);
25. Output indicator	Audio by inbuilt speaker or headphones, visible by pointer instrument and on screen via evaluation software Dataline
26. Pinpointing feature	—
27. Adjustment of search head angle	Manual
28. Soil influence	—
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	—
31. Search coil Antenna	—
32. Limitations	—
33. Interference (with other detectors)	No

POWER

34. Power supply Source	Battery
35. Operating time	35 80 h with alkaline batteries
36. Power supply	
> weight	Not applicable since forming part of the unit
> no. of batteries size type	4 x 1.5V mono-cell IECLR (ANSI standard size D)
> rechargeable	Possible
> other	No applicable

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Depending on quantity
> spare parts	Depending on quantity
> extended warranty	Available on request
39. Total	T.B.D.
40. Possibility to rent/lease	Available

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Headphones, workshop equipment and tools, GPS, multiprobe-holders (hand-held and vehicle-based), underwater cables, borehole equipment
43. Additional technical data information	Service manuals, training programme
44. Compliant standards	Military standards MIL-STD 810E 514.4-1 Vibration MIL-STD 810E 516.4 Mechanical shock, Procedure I MIL-STD 810E 516.4 Drop test, Procedure IV MIL-STD 810E 501.3 High temperatures MIL-STD 810E 502.3 Low temperatures MIL-STD 810E 506.3-1 Rain MIL-STD 810E 503.3 Temperature shock (transport) MIL-STD 810E 512.2 Leak test MIL-STD 810E 505.3 Solar radiation (sunshine), Procedure I MIL-STD 461DRE 102 5.3.13.1 Radiation MIL-STD 461DRS 103 Irradiation EMC according to MIL-STD 461D



Institut Dr. Foerster | Germany

GENERAL DESCRIPTION

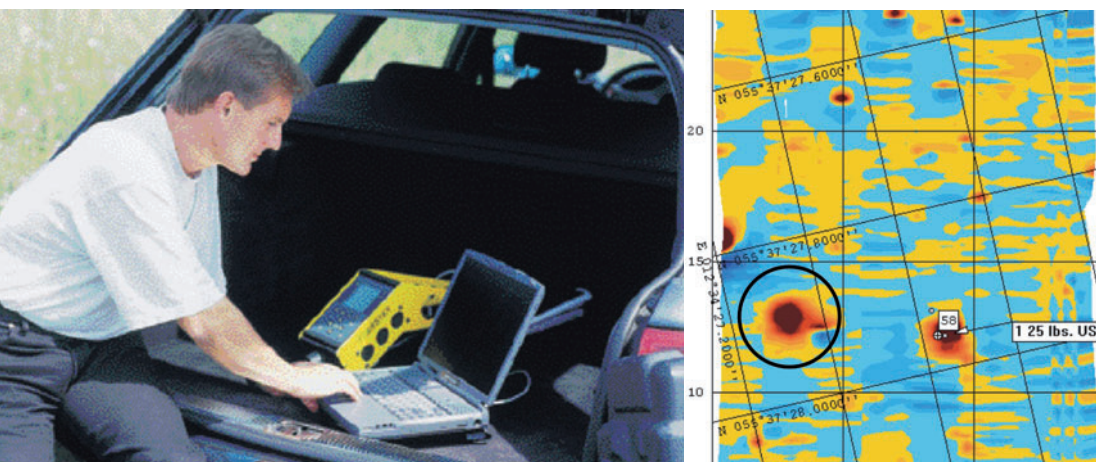
The *FEREX DATALINE 4.800 software package* is available in both STD (standard) and GPS versions as well as in the corresponding filter versions. With this software Foerster offers an evaluation programme for magnetic field data (geomagnetic data) which are acquired in a plane by a metal detector using the fluxgate magnetometer principle to detect magnetic anomalies caused by ferromagnetic objects. Primary detected objects are ERW buried deep in the ground. Under certain circumstances (for example, anti-vehicle mines covered by desert sand), the FEREX data logger can be successfully used for mine detection.

Acquired data can be conveniently and quickly transferred to a PC or laptop and analyzed, evaluated and displayed with FEREX DATALINE. The software calculates, among other data, the exact position, depth or orientation of the scanned objects.

If the FEREX data logger was supported during data acquisition by a DGPS (Differential Global Positioning System) with RTK (Real Time Kinematik) as high-end solution GPS, coordinates are stored with the magnetic field data. FEREX DATALINE then overlays the GPS coordinates grid to the coloured map. GPS data are also assigned to calculated objects in the object map.

The FEREX DATALINE BM 4.800 is capable of fulfilling tasks such as evaluation of acquired data by borehole search.

Foerster supplies FEREX DATALINE in five versions: the DATALINE STD (standard version), DATALINE STD-F (standard filter version), DATALINE GPS, DATALINE GPS-F (filter version) and DATALINE BM (borehole version).



Data transfer from the FEREX data logger to a Laptop for evaluation with DATALINE
An identified dipole is marked by a black circle: the grid of GPS coordinates is overlaid and a second object is named by a number and a comment

WORKING METHODOLOGY

By detecting variations within the earth's magnetic field, the DATALINE converts the field file and indicates plus and minus poles ("magnetic dipoles" with positive and negative extreme values) of ferromagnetic objects as a colour-coded map. Geometry and strength of the detected poles enable the user to determine the location, depth and size of the object. In general, problematic soil types do not influence the results gained from this working principle.

The colour-coded map is the base for all further object evaluations. The user selects dipoles which are forming pairs of each object.

PC/LAPTOP REQUIREMENTS

The DATALINE 4.800 software can run with the following minimum system requirements on a PC, laptop or notebook:

- > Pentium processor, minimum Pentium 4
- > 512 MB RAM
- > VGA graphics card or better, 256 colours wherever possible
- > 1 free serial port RS 232
- > 1 usable USB port for the dongle.

EVALUATION SOFTWARE FOR DETECTORS IN USE

The DATALINE 4.800 has been in service since 1997 and has been used worldwide.

FACTORY SUPPORT

- > Foerster has a network of representatives in more than 40 countries. They are qualified for software support. Most offer complete after-sales service.
- > Besides offering training at customer's sites, Foerster provides modern test and training facilities in Reutlingen, Germany. A full training programme for trainers is available in English and German. On request, training forms part of a purchasing package.
- > Software and standard manuals and service documentation are available in English, French, German, Polish and Russian. Other languages available on request.

MAINTENANCE AND SUPPORT

- > The recommended number of training workshops depends on the knowledge and experience of the customer's personnel. The personnel for handling a workshop must have user and field administration knowledge. Operating personnel requirements:
 - > Knowledge of Windows
 - > Ability to identify and setup hardware ports on the PC
 - > Experience of installing programmes.

TEST AND EVALUATION

Foerster performs tests within its own facilities mainly for research and quality control. The manufacturer states that tests are largely carried out under "real" conditions.

REPORTED LIMITATIONS AND STRENGTHS

One of the reliable strengths is the user administration function which permits the assignment of the evaluated field to the responsible programme operator. Responsibilities can thus be traced and documented at all times.

By using the introduced colour coding for open fields it is immediately possible to identify whether one is dealing with a field with raw data or if the field data was actually recorded with a "non-Foerster system".

EVALUATION UNIT

1. Brand	FOERSTER
2. Model	FEREX DATALINE 4.800
3. Versions	STD, STD-F, GPS, GPS-F, BM
4. Used evaluation technology	<p>The use of the FEREX DATALINE evaluation software is subject to a license contract, which grants you the opportunity to use the program as it was intended and as described in the instruction manual.</p> <p>This software calculates ferromagnetic objects using magnetic data taken in a plane and applies mathematical, iterative computation methods which refer to the magnetic moment of a spherical body. However as the detected objects generally involve geometries that deviate from the sphere, the calculations are best possible approximations of the real-life situation. Therefore we do not accept any liability for any attempt on the part of the program user to derive a hidden objects standardization on the basis of the evaluation results.</p>

DIMENSIONAL DATA

5. Working length	—
6. Search sensor	Magnetic field data acquired by a FEREX data logger working with fluxgate magnetometers
7. Transport case	Software CD with USB dongle in transparent case
> Weight	Approx. 0.1 kg
> With equipment (full)	—
> Dimensions	135 x 190 x 15 mm
> Hard Soft case (material)	Plastics
8. Weight, hand-held unit	—
9. Weight, carrying (operational detection set)	—
10. Weight, additional equipment	—
11. Weight distribution Balance	—
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status	In production
14. Detectors Systems in use to date	Worldwide (countries see FEREX 4.032 data logger)
15. Other types Models	—
16. Location of use	—

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	Notes for handling and storage of data CDs
18. Temperature (limitations)	Notes for handling and storage of data CDs
19. Water resistant (Yes / No)	Notes for handling and storage of data CDs
20. Shock Vibration resistant	Notes for handling and storage of data CDs
21. Environmental Compensation	—
22. Operational hours Operating endurance	—

DETECTION OPERATION

23. Calibration Set-up	—
24. Detection range Sensitivity details Detection performance Working depth	
> Low-metal-content (type of mine)	—
> Anti-vehicle mines (type of mine)	—
25. Output indicator	On screen of the PC/Laptop
26. Pinpointing feature	Calculated object co-ordinates
27. Adjustment of search head angle	—
28. Soil influence	—
29. Best use in	
> Sand	—
> Peat	—
> Clay	—
> Ferruginous soil (laterite)	—
30. Optimal sweep speed	—
31. Search coil Antenna	—
32. Limitations	—
33. Interference (with other detectors)	—

POWER

34. Power supply Source	—
35. Operating time	—
36. Power supply	
> weight	—
> no. of batteries size type	—
> rechargeable	—
> other	—

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Depending on quantity
> spare parts	—
> extended warranty	Available on request
39. Total	T.B.D.
40. Possibility to rent/lease	Available

OTHERS

41. Duration of warranty	12 months
42. Additional equipment	—
43. Additional technical data information	Operational manuals, training programme
44. Compliant standards	—

PERFORMANCE FEATURES (OVER ALL VERSIONS)

45. Diverse options for calculation of the:	
> object coordinates,	
> position, depth and size of presumed ferromagnetic objects specifying a quality number	
46. Reading out of individual or several fields from the data logger in a procedure with individual or incremental designation	

GEOMETRICS G-858

Geometrics | U.S.A.

GENERAL DESCRIPTION

Geometrics designs and manufactures high-sensitivity total field magnetometers for locating ferrous objects underground. The primary tool for this application is the G-858 Cesium Vapor MagMapper system. The *Geometrics G-858* is a portable caesium vapour magnetometer system for demining and ERW detection. The main components are the sensor, belt-mounted display/logging console and a hand-held counterbalanced staff.

The G-858 can be configured with one or two sensors, allowing for gradient measurements as well as logging of GPS for positioning. The system samples at 10 times per second at noise levels of about 0.05nT thus providing extremely rapid survey of large areas of land, up to 2 acres (1 hectare) per hour. "A basic software package MagMap™ is supplied as an integral part of the G-858 system and provides:

- > Transfer of the raw magnetometer, base station and other survey data to the client PC;
- > Standard corrections for position errors, transients, and time varying errors (diurnal);
- > Repositioning, linear interpolation and format of corrected data into X,Y, Z ASCII columnar values for use with Surfer for Windows, Geosoft or other client-supplied contouring programs. Surfer for Windows by Golden Software can be employed to grid the data and to generate 2D and 3D color contour maps with full text annotations."¹



Cart with 3 sensors mounted

¹ Geometrics, Portable Cesium Magnetometer/Gradiometer Model G-858, A Professional Magnetic Mapping System, <http://www.expins.com/images/products/106020.pdf#search=%22Professional%20Magnetic%20Mapping%20System%22>, p.3.

WORKING METHODOLOGY

The basic operating principle of the optically pumped cesium vapour magnetometer is described at the website <http://en.wikipedia.org/wiki/Magnetometer>. Basically it is an atomic clock which oscillates at a frequency dependent on the ambient magnetic field. It is a passive device, measuring distortion in the earth's magnetic field, thus allowing much greater range than that typically associated with metal detectors. The rule of thumb is that 250 lb (110 kg) of iron or steel can be detected at 50 ft (15 m); 30 lb (13 kg) at 25 ft (7 m); and 4 lbs (2 kg) at 9 ft (3 m). Output is visual and audio. The most powerful feature is its mapping ability, which can detect small ferrous objects or deeper objects not detectable with metal detectors or in search mode. This is especially useful in initial reconnaissance and certifying site clearance. The magnetometer only senses ferrous material (containing iron or steel) and thus soil conditions, types, presence of water, etc., do not impact performance. However, the magnetometer cannot detect the presence of gold, aluminium, brass or plastic. It is sensitive to excavation where normal soil magnetisation has been disturbed.



The Geometrics G-858 console



Three consoles complete

DETECTORS IN USE

There are more than 500 G-858 systems operational worldwide and the system has been in service for 10 years. The G-858 can be used for ERW detection, mining/oil/gas survey, environmental assessment, utility location, forensics and archaeology. Geometrics has supplied this equipment to Naval Research Labs, the Army Corps of Engineers, UXB, Parsons and most other large ERW detection companies and institutes.

POWER SUPPLY

The battery is a rechargeable lead acid gel cell, 24V, magnetically compensated, giving 3 to 4 hours of use per charge for gradiometer, 8 hours for single sensor operation. The battery is worn as a belt.

FACTORY SUPPORT

- > Spares are available from the Geometrics factory in San Jose, California.
- > Lifetime telephone applications assistance and technical support is offered.
- > Instruction manuals are available in English or Spanish.
- > The manufacturer offers factory training in California or at the customer's site. The system price includes one day of training.
- > The detector is available for hire.
- > Two-year warranty for parts and labour.

MAINTENANCE AND SUPPORT

- > Geometrics say that no maintenance is required on the G-858 other than cleaning of connectors.
- > The system can be operated by one person. The company recommends two operators per system to maximise productivity and to assist in positioning of survey lines.



Cart in service



Cart with 2 sensors mounted



The G-858 system in operation

REPORTED LIMITATIONS AND STRENGTHS

The magnetometer does not perform well in highly magnetic volcanic soils (such as those in Hawaii) which mask buried object signatures near the detector.

DETECTOR

1. Brand	GEOMETRICS
2. Model	G-858
3. Version	Man carry and towable version (back pack and non-magnetic cart versions are available)
4. Used detection technology	Self oscillating split-beam cesium vapor (non-radioactive)

DIMENSIONAL DATA

5. Working length	
> Min. Length	2.4 m (8 feet)
> Max. Length	2.4 m (8 feet)
6. Search head	
> Size	Ø 60.32 mm 158.75 mm long
> Weight	0.34 kg (12 ounces)
> Shape	Cylindrical
7. Transport case	
> Weight	9.5 kg (21 lbs)
> With equipment (full)	29.5 kg (65 lbs)
> Dimensions	0.81 x 0.28 x 0.41 m (32 x 11 x 16 inches)
> Hard Soft case (material)	Hard case
8. Weight, hand-held unit	Sensor + staff + counter balance = 3 kg (6.5 lbs)
9. Weight, carrying (operational detection set)	Waist console + battery belt = 5.9 kg (13 lbs)
10. Weight, additional equipment	—
11. Weight distribution Balance	Balanced
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	> 2,000 sensors > 500 of model G-858
15. Other types Models	Airborne and marine magnetometer types
16. Location of use	US and Hawaii, Japan, China, Europe, Cambodia, Vietnam and all theaters of war

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	None
18. Temperature (limitations)	
> Storage	-35° C to +60° C
> Operational	-15° C to +50° C
19. Water resistant (Yes / No)	Yes
20. Shock Vibration resistant	Yes 3 foot drop
21. Environmental Compensation	None
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Unaffected
> medium temperature (around 20° C)	—
> high temperature (higher than 30° C)	—

DETECTION OPERATION

23. Calibration Set-up <ul style="list-style-type: none">> Auto Manual> Duration	The sensors never need calibration or alignment The sensors never need calibration or alignment
24. Detection range Sensitivity details Detection performance Working depth <ul style="list-style-type: none">> Small metal content (type of mine)> Anti-tank mines (type of mine)> ERW (please specify)	Depends on the size and the material of the object being detected, typically 2 kg at 3 m — — —
25. Output indicator	Daylight readable LCD display and audio tone
26. Pinpointing feature	The LCD displays the peak amplitude over the target
27. Adjustment of search head angle	Fully adjustable
28. Soil influence	Highly magnetic soils cause field distortion (Kaulave)
29. Best use in <ul style="list-style-type: none">> Sand> Peat> Clay> Ferruginous soil (laterite)	Yes Yes Yes Yes
30. Optimal sweep speed	Any sweep speed is ok
31. Search coil Antenna	Omnidirectional sensor head
32. Limitations	—
33. Interference (with other detectors)	None known, certain EM gear (EM-61 will interfere with magnetometer)

POWER

34. Power supply Source	Rechargeable battery
35. Operating time	8 h for single sensor model 3-4 h for 2 sensors gradiometer version
36. Power supply <ul style="list-style-type: none">> weight> no. of batteries size type> rechargeable> other	4.1 kg (9 lbs) (worn around waist) Dual 12V Gel Cell, magnetically compensated Yes

COSTS

37. Price <ul style="list-style-type: none">> for one detector on request> other information regarding price> reduction for higher quantity	More than US\$ 5,000 Approximately \$ 18K Yes
38. System price <ul style="list-style-type: none">> with training> spare parts> extended warranty	1 day training included Prices on request Available
39. Total	Contact factory www.geometrics.com
40. Possibility to rent/lease	Yes

OTHERS

41. Duration of warranty	One year parts and labor
42. Additional equipment	Non-magnetic carts, GPS, steering, data processing, UXO characterization software
43. Additional technical data information	Contact factory
44. Compliant standards	Civil

Schonstedt | U.S.A.

GENERAL DESCRIPTION

The off-the-shelf *GA magnetic detectors* manufactured by Schonstedt are fluxgate magnetometers using patented, ultra-sensitive and ultra-stable heliflux sensors. These instruments are hand held, light weight and self contained (no separate detection head). They are easy to use and reliable, providing audible and/or visual indication of the target's presence (depending on the model).

Instruments are self contained. Sensors, controls and indicators are all packaged in a light weight, hand-held unit. All models are proven detectors that have been in the market from five to 15 years.

The *GA-52 CX* provides audible indication of proximity to target by modulating the audio output frequency.



The GA-72 CD in service

Main characteristics

- > piezoelectric speaker
- > clear, sharp, detection signal pinpoints the target
- > five individual sensitive settings
- > no response to aluminium, brass, or copper
- > with experience, user can distinguish between small pieces of scrap iron and actual targets
- > modular construction, high performance components
- > weather protected controls
- > rugged lightweight carrying case.

The *GA-72 CD* provides, in addition to the same audio output, a bargraph display of signal strength and polarity, plus a measurement of the magnetic field in MGauss.

Main features

- > digital readout and expanding bar graph displays signal strength and polarity
- > four sensitive settings: low, medium, high and extra high
- > piezoelectric speaker
- > analog output for data logger entry
- > 4-segment BATT LCD monitors battery charge
- > modular construction, high performance components
- > no response to aluminium, brass or copper.

The *GA-72 CD ML* has the same outputs as the 72 CD but comes with rechargeable lithium batteries and in desert tan colour instead of standard yellow.

WORKING METHODOLOGY

Passive detectors such as the Schonstedt models operate on the principle of magnetic fluxgate. The fluxgate consists of two sensors separated by a fixed distance and mechanically aligned. In the absence of a ferromagnetic material, the earth magnetic flux is the same at both sensors, therefore the fluxgate output is zero. When an object close to the bottom sensor alters the earth magnetic flux due to its own magnetic field, the balance of the gate is altered, producing a measurable output.

The detection range is greatly dependent on the mass and orientation of the target, ranging from a couple of centimetres to several metres.

Any object containing ferromagnetic materials (iron, steel and alloys) is detected.

POWER SUPPLY

The detectors are powered as follows:

- > GA-52 CX by 2 x 9V alkaline batteries, operational life of battery: ~50 hrs;
- > GA-72 CD by 2 x 9V lithium batteries; operational life of battery: ~60 hrs; and
- > GA-72 CD ML by 2 x 9V lithium rechargeable batteries, operational life of battery: ~40 hrs.

The power consumption per hour is under half a Watt for each detector.

SCHONSTEDT GA-52 CX AND GA-72 CD/ML

Schonstedt | U.S.A.

DETECTORS IN USE

The detectors are in service with the US Army and numerous UXO contractors, as well as government agencies, NGOs and many commercial users worldwide.

Schonstedt have sold about 90,000 of the GA-52 CX, about 20,000 of the GA-72 CD and about 2000 of the GA-72 CD ML.



Schonstedt GA-52 CX

Schonstedt GA-72 CD/ML

FACTORY SUPPORT

- > Support is normally provided as part of the purchase package.
- > One-year warranty on parts and labour.
- > Spare parts are available through the manufacturer or authorised dealers, but limited to those parts that do not require factory installation.
- > Factory training of operators and mechanics can be provided by the manufacturer on request. It is not a standard offering, tailored for need at nominal cost. A training DVD is available.
- > Instruction manuals and documentation available in English and Spanish. The website is available in English and Chinese.
- > Other services are provided by Schonstedt through telephone as well as e-mail assistance.
- > More information is available at the Schonstedt website.

MAINTENANCE AND SUPPORT

There are no special requirements for technicians or workshop facilities. Only a minimum of training is requested.

TEST AND EVALUATION

Schonstedt detectors have been extensively tested by the US Army and numerous EOD/UXO organisations.

The following test result is available at the ITEP website: www.itep.ws:

1. Clearance System Study Report. Norwegian People Aid, United States State Department – Office of Weapons Removal and Abatement; published 2006.

REPORTED LIMITATIONS AND STRENGTHS

Limitations

- > Battery change requires opening the unit and exposing PC boards. The manufacturer plans to develop and produce a more rugged version with a separate battery compartment.

Strengths

- > Commercial quality product.

DETECTOR

1. Brand	SCHONSTEDT
2. Model	GA-52 CX
3. Version	—
4. Used detection technology	Fluxgate - Patented heliflux sensor

DIMENSIONAL DATA

5. Working length	
> min. length	1.07 m
> max. length	1.07 m
6. Search head	
> Size	—
> Weight	—
> Shape	—
7. Transport case	
> Weight	0.3 kg
> With equipment (full)	1.5 kg
> Dimensions	1.20 m
> Hard Soft case (material)	Hard (plastic)
8. Weight, hand-held unit	1.2 kg
9. Weight, carrying (operational detection set)	1.2 kg
10. Weight, additional equipment	None
11. Weight distribution Balance	Top heavy
12. Other specifications	

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	> 90,000
15. Other types Models	—
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	—
18. Temperature (limitations)	
> Storage	-25° C to +60° C
> Operational	-25° C to +60° C
19. Water resistant (Yes / No)	Yes
20. Shock Vibration resistant	Yes
21. Environmental Compensation	None
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Continuous
> medium temperature (around 20° C)	Continuous
> high temperature (higher than 30° C)	Continuous

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	No set up. Factory calibrated
> Duration	Indefinite
24. Detection range Sensitivity details Detection performance Working depth	Target dependent, from a few cm to several meters
> Small metal content mines (type of mine)	
> Anti-tank mines (type of mine)	
> ERW (please specify)	
25. Output indicator	Sound
26. Pinpointing feature	—
27. Adjustment of search head angle	—
28. Soil influence	None, unless ferrous
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Depends
30. Optimal sweep speed	About 2 Hz
31. Search coil Antenna	—
32. Limitations	—
33. Interference (with other detectors)	With surrounding ferrous metals

POWER

34. Power supply Source	Batteries
35. Operating time	40 hrs
36. Power supply	
> weight	—
> no. of batteries size type	2.9V, alkaline
> rechargeable	No
> other	

COSTS

37. Price	
> for one detector on request	Less than US\$ 1,000
> reduction for higher quantity	Yes
38. System price	
> with training	
> spare parts	
> extended warranty	
39. Total	
40. Possibility to rent/lease	No

OTHERS

41. Duration of warranty	1 year
42. Additional equipment	Accessories
43. Additional technical data information	
44. Compliant standards	

DETECTOR

1. Brand	SCHONSTEDT
2. Model	GA-72 CD-ML
3. Version	—
4. Used detection technology	Fluxgate - Patented heliflux sensor

DIMENSIONAL DATA

5. Working length	
> min. length	0.88 m
> max. length	0.88 m
6. Search head	
> Size	—
> Weight	—
> Shape	—
7. Transport case	
> Weight	0.3 kg
> With equipment (full)	1.5 kg
> Dimensions	1.10 m
> Hard Soft case (material)	Hard (plastic)
8. Weight, hand-held unit	1.2 kg
9. Weight, carrying (operational detection set)	1.2 kg
10. Weight, additional equipment	None
11. Weight distribution Balance	Top heavy
12. Other specifications	

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	> 2,000
15. Other types Models	—
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	—
18. Temperature (limitations)	
> Storage	-25° C to +60° C
> Operational	-25° C to +60° C
19. Water resistant (Yes / No)	Yes
20. Shock Vibration resistant	Yes
21. Environmental Compensation	None
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Continuous
> medium temperature (around 20° C)	Continuous
> high temperature (higher than 30° C)	Continuous

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	No set up. Factory calibrated
> Duration	Indefinite
24. Detection range Sensitivity details Detection performance Working depth	Target dependent, from a few cm to several meters
> Small metal content mines (type of mine)	
> Anti-tank mines (type of mine)	
> ERW (please specify)	
25. Output indicator	Sound and display
26. Pinpointing feature	—
27. Adjustment of search head angle	—
28. Soil influence	None, unless ferrous
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Depends
30. Optimal sweep speed	About 2 Hz
31. Search coil Antenna	—
32. Limitations	—
33. Interference (with other detectors)	With surrounding ferrous metals

POWER

34. Power supply Source	Batteries
35. Operating time	40 hrs
36. Power supply	
> weight	—
> no. of batteries size type	2.9V, alkaline
> rechargeable	Yes
> other	

COSTS

37. Price	
> for one detector on request	Between US\$ 1,000 and US\$ 2,000
> reduction for higher quantity	Yes
38. System price	
> with training	
> spare parts	
> extended warranty	
39. Total	
40. Possibility to rent/lease	No

OTHERS

41. Duration of warranty	1 year
42. Additional equipment	Accessories
43. Additional technical data information	
44. Compliant standards	

VALLON EL1302-D2 AND EL1303-D2

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon EL1302-D2 ferrous locator* is a highly sensitive difference magnetometer used for the detection of bombs, shells, mortar projectiles and other unexploded ordnance. It indicates any disturbance caused in the earth's magnetic field by buried ferrous objects, providing indications to the operator both acoustically and visually. The *EL1302-D2* is used for land-based detection while the *EL1303-D2* is used for detection on land and under water and in boreholes.

The detectors are designed for all-weather use, using glass fibre and carbon fibre materials to reduce its weight. They are equipped with a digital signal output for direct connection via cable or via Bluetooth¹ to Vallon data loggers and for direct data recording in conjunction with a commercial laptop computer running the Vallon EVA2000 software. To relate the exact x-y co-ordinates to the measured data, the Vallon sensor positioning system (SEPOS)² or a DGPS³ receiver with antenna can be connected.

Operation is simple, with only a short training period required before operation.



Vallon EL1302-D2



Vallon EL1303-D2

¹ Bluetooth is a registered trade mark of Bluetooth SIG, Inc., 500 108th Avenue NE, Suite 250, Bellevue, WA 98004, USA

² SEPOS is trade mark of Vallon GmbH for the patented positioning system for land survey and borehole detection with ferrous locators.

³ DGPS is a Differential Global Positioning System, various brands, providing NMEA-GGA data, can be used.

Main components are

- > electronics unit with battery compartment
- > sensor part with carrying bar and control unit
- > non-magnetic headset
- > carrying belt
- > one set (6 EA) round cells 1.5V IEC R 14 alkaline C-cell
- > operation manual
- > aluminium shipping and storage case for EL1302-D2 or plastic hard case for EL1303-D2.

The detector complies to environmental conditions according to MIL STD 810F 501.3, 502.3, 503.3, 506.3, 514.4.

WORKING METHODOLOGY

The Vallon differential magnetometers work on the principle of measuring the distortion of the earth magnetic field. Two sensors for the magnetic field, which are adjusted for the machine's lifetime, are vertically mounted in a tube 50 cm apart to measure the earth's magnetic field. Both values are subtracted and result in zero. A ferromagnetic target disturbs the homogenous field and results in two different values so that the difference is not zero. Depending on the signal amplitude and polarity the alarm signal is computed.

DETECTORS IN USE

The locators are in service with many commercial ordnance disposal organisations, several NATO partners and other armed forces.

POWER SUPPLY

The two models are powered by six 1.5V round cells IECR14 alkaline or rechargeable 1.2V Ni-MH batteries RSH 1.8. The operational life of batteries is said to be approximately 60 - 80 hours with alkaline batteries without the data logger and depending on age, quality and capacity of the batteries.

FACTORY SUPPORT

- > Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- > Operation and maintenance training are offered either in the Vallon facilities or at a location required by the customer.
- > Operation and maintenance manuals are available in different languages.
- > Warranty of 24 months.



Vallon EL1302-D2 cable free data logger

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The sensors do not need any adjustment.



The EL1303D with accessories



The EL1303D

TEST AND EVALUATION

Several test reports are available from the manufacturer on request.

REPORTED LIMITATIONS AND STRENGTHS

Detection of ferrous targets only.

DETECTOR

1. Brand	VALLON
2. Model	EL 1302-D2
3. Version	D2
4. Used detection technology	Difference magnetometer using fluxgate principle

DIMENSIONAL DATA

5. Working length	Approx. 135 cm
6. Search head	
> Size	Length approx. 60 cm Ø approx. 3.2 cm
> Weight	Approx. 4 kg
> Shape	Tube
7. Transport case	
> Weight	Approx. 6.3 kg
> With equipment (full)	Approx. 12 kg
> Dimensions	79 x 29 x 14 cm
> Hard Soft case (material)	Hard case aluminium
8. Weight, hand-held unit	Approx. 4 kg (with batteries)
9. Weight, carrying (operational detection set)	Approx. 4 kg (with batteries)
10. Weight, additional equipment	Head set 110 g
11. Weight distribution Balance	Balanced around the hand grip
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	EL 1303D2 VET2 VXC1 VMXC1 VMXC1-3
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIN STD 810E
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto, cannot be used in magnetic soil
22. Operational hours Operating endurance	
> low temperature (around 0°C)	–
> medium temperature (around 20°C)	60 - 80 h without bluetooth® and approx. 30 h with bluetooth® with alkaline batteries depending on operation periods
> high temperature (higher than 30°C)	–

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Manual Automatic
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity switch
> Small metal content mines (type of mine)	No
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Audio by inbuilt loudspeaker or headset, visual by indication meter, optional real-time-display on screen of data logger or PC with evaluation software VALLON EVA2000®
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	See item 29
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Limited
30. Optimal sweep speed	0–2 m/s
31. Search coil Antenna	Tube with Ø 35 mm
32. Limitations	Only ferromagnetic targets
33. Interference (with other detectors)	Same detector type no

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	6 batteries approx. 400 g
> no. of batteries size type	6 ea. 1.5V round cells (IEC R 14) C-size
> rechargeable	6 ea. 1.2V NI-MH batteries RSH 1.8
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Upon request
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Data logger, evaluation software, DGPS, sensor positioning system SEPOS®, multisensor platform
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810E, 501.3, 502.3, 503.3, 506.3, 514.4 MIL STD 461D

DETECTOR

1. Brand	VALLON
2. Model	EL 1303-D2
3. Version	–
4. Used detection technology	Difference magnetometer using fluxgate principle

DIMENSIONAL DATA

5. Working length	Approx. 1350 mm
6. Search head	
> Size	Length approx. 600 mm Ø approx. 3.2 cm
> Weight	Approx. 0.6 kg
> Shape	Tube
7. Transport case	
> Weight	Approx. 9.5 kg
> With equipment (full)	Approx. 20 kg (including cable drum)
> Dimensions	80 x 52 x 31 cm
> Hard Soft case (material)	Hard case plastic
8. Weight, hand-held unit	Approx. 4 kg (with batteries)
9. Weight, carrying (operational detection set)	Approx. 3.8 kg (with batteries)
10. Weight, additional equipment	Head set 110 g
11. Weight distribution Balance	Balanced around the hand grip
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	EL 1302D2 VET2 VXC1 VMXC1 VMXC1-3
16. Location of use	Worldwide land, water, borehole

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIN STD 810E
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes, sensor tube 60 m
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Manual cannot be used in magnetic soil
22. Operational hours Operating endurance	
> low temperature (around 0° C)	–
> medium temperature (around 20° C)	60 - 80 h without bluetooth® and approx. 30 h with bluetooth® with alkaline batteries depending on operation periods
> high temperature (higher than 30° C)	–

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Manual Automatic
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity switch
> Small metal content mines (type of mine)	No
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Audio by inbuilt loudspeaker or headset, visual by indication meter, optional real-time-display on screen of data logger or PC with evaluation software VALLON EVA2000®
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	See item 29
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Limited
30. Optimal sweep speed	0–2 m/s
31. Search coil Antenna	Tube with Ø 32 mm
32. Limitations	Only ferromagnetic targets
33. Interference (with other detectors)	Same detector type no

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	6 batteries approx. 400 g
> no. of batteries size type	6 ea. 1.5V round cells (IEC R 14) C-size
> rechargeable	6 ea. 1.2V NI-MH batteries RSH 1.8
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Upon request
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Data logger, evaluation software, DGPS, sensor positioning system SEPOS®, multisensor platform, cable for deep underwater detection
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810E, 501.3, 502.3, 503.3, 506.3, 514.4 MIL STD 461D

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon VET2 ferrous locator* is a highly sensitive difference magnetometer designed for the detection of bombs deep in the ground. The large distance between the sensors of the VET2 (170 cm) enables the detection of field strength differences produced by very deeply buried objects and is mainly used for the examination of the subsoil. The manufacturer recommends an initial area survey using a standard ferrous locator in order to clear ferromagnetic objects up to a depth of 2-3 m.

The locator monitors the earth's magnetic field and signals visually or acoustically any disturbances of the field by buried ferrous objects. During conventional detection the measured data are read off the indication meter.

By connecting the Vallon field computers VFC1 or VFC2 the measured data can be stored, displayed as graphs and subsequently evaluated. To relate the exact x-y coordinates to the measured data the Vallon sensor positioning system (SEPOS)¹ or a digital global positioning system (DGPS)² receiver with antenna can be connected.

On completion of the survey, the recorded data are downloaded to the laptop or PC running the VALLON EVA2000 software. The operator can then evaluate any suspected unexploded ordnance targets. A complete target list and true-to-scale map can be printed out for follow-up operations. Both the lists and maps indicate the field and each target by its DGPS position in latitude and longitude.

Operation is simple, with only a short training period required before operation.

Main components are

- > electronics unit with LED display
- > sensor part with carrying bar
- > handle
- > non-magnetic headset
- > carrying system
- > accumulator block with charger
- > operation manual
- > aluminium shipping and storage case for VET2
- > robust textile bag for the carrying system with accessories.

The detector complies with environmental conditions according to MIL STD 810F 501.3, 502.3, 503.3, 506.3, 514.4.



Vallon VET2

¹ SEPOS is a registered trade mark of Vallon GmbH for the patented positioning system for land survey and borehole detection with ferrous locators.

² Various brands of DGPS exist: for use with Vallon they need to be able to read NMEA-GGA data.

WORKING METHODOLOGY

The Vallon differential magnetometers work on the principle of measuring the distortion of the earth magnetic field. Two sensors for the magnetic field, which are adjusted for the machine's lifetime, are vertically mounted in a tube 170 cm apart to measure the earth's magnetic field. Both values are subtracted and result in zero. A ferromagnetic target disturbs the homogenous field and results in two different values so that the difference is not zero. Depending on the signal amplitude and polarity the alarm signal is computed.

DETECTORS IN USE

The locators are in service with many commercial ordnance disposal organisations, several NATO partners and other armed forces.

POWER SUPPLY

The VET2 is powered by a rechargeable battery set 12V DC.

FACTORY SUPPORT

- > Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- > Operation and maintenance training are offered either in the Vallon facilities or at a location required by the customer.
- > Operation and maintenance manuals are available in different languages.
- > Warranty of 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The sensors do not need any adjustment.

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

Detection of ferrous targets only, thus non-magnetic metal objects, ie, aluminium foil, cans, etc, are excluded.

DETECTOR

1. Brand	VALLON
2. Model	VET2
3. Version	–
4. Used detection technology	Difference magnetometer using fluxgate principle

DIMENSIONAL DATA

5. Working length	Approx. 1.2 m
6. Search head	
> Size	Length approx. 203 cm Ø approx. 3.5 cm
> Weight	Approx. 1.7 kg
> Shape	Tube
7. Transport case	
> Weight	Approx. 16.3 kg
> With equipment (full)	Approx. 22 kg
> Dimensions	203 x 34 x 23 cm
> Hard Soft case (material)	Hard case aluminium
8. Weight, hand-held unit	Approx. 9 kg (with batteries)
9. Weight, carrying (operational detection set)	Approx. 9 kg (with batteries)
10. Weight, additional equipment	Head set 110 g
11. Weight distribution Balance	Balanced around the hand grip
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	EL 1302D2 EL 1303D2 VET2 VXC1
16. Location of use	Worldwide land, water, borehole

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIN STD 810E
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Manual cannot be used in magnetic soil
22. Operational hours Operating endurance	
> low temperature (around 0° C)	–
> medium temperature (around 20° C)	Approx. 30 h
> high temperature (higher than 30° C)	–

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Manual Automatic
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity switch
> Small metal content mines (type of mine)	No
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Audio by inbuilt loudspeaker or headset, visual by indication meter, optional real-time-display on screen of data logger or PC with evaluation software VALLON EVA2000®
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	See item 29
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Limited
30. Optimal sweep speed	0–2 m/s
31. Search coil Antenna	Tube with 35 mm Ø
32. Limitations	Only ferromagnetic targets
33. Interference (with other detectors)	Same detector type no

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	Approx. 3.4 kg
> no. of batteries size type	Accumulator set 12V
> rechargeable	Accumulator set 12V
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Upon request
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Data logger, evaluation software, DGPS, sensor positioning system SEPOS®, multisensor platform, GPS
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810E, 501.3, 502.3, 503.3, 506.3, 514.4 MIL STD 461D

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon VXC1 differential magnetometer* is a very compact portable and robust instrument for explosive ordnance detection on land and in shallow waters. Due to its compact and lightweight construction it is highly recommended for detection work in dense vegetation and during digging activities.

The modern electronics are designed to withstand all typical environmental and vibration requirements and meet MIL STD 810F. Detected objects are clearly indicated by audio signal and the LED bargraph in the hand grip.

Operator controls are limited to a mode selector and three push buttons for sensitivity level, audio signal volume and compensation/ground balance. The detector can be used with minimal operator training.



The VXC1

Main components are

- > locator VXC1
- > one set (2 EA) single-cell batteries IEC R20/D-cell
- > operation manual
- > field backpack.

Optional accessories (available on request) include a headset and a hard case.

The detector complies to environmental conditions according to MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1.

WORKING METHODOLOGY

The Vallon differential magnetometer measures the distortion of the earth's magnetic field by ferromagnetic items through two sensors – adjusted for machine's lifetime – vertically mounted in a tube 30 cm apart. Normally both values are subtracted and result in zero. When a ferromagnetic target disturbs the homogenous field the difference in two values is not zero. Depending on the signal amplitude and polarity the alarm signal is computed and indicated.

DETECTORS IN USE

The locators are in service with various humanitarian and commercial mine clearance organisations.

POWER SUPPLY

- > VXC1 is powered by two 1.5V single-cells IECR20 or rechargeable 1.24 V Ni-MH batteries RSH 4KR.
- > The operational life of batteries is said to be approximately 120 hours with alkaline batteries depending on age, quality and capacity of the batteries.

FACTORY SUPPORT

- > Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- > Operation and maintenance training are offered either in the Vallon facilities or at a location required by the customer.
- > Operation and maintenance manuals are available in different languages.
- > Warranty for 24 months.

MAINTENANCE SUPPORT

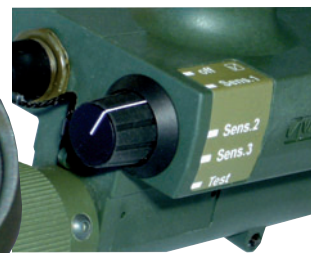
There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The sensors do not need any adjustment.



VXC1 with accessories



VXC1 display LED



VXC1 mode selector

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

Detection of ferrous targets only.

DETECTOR

1. Brand	VALLON
2. Model	VXC1
3. Version	–
4. Used detection technology	Difference magnetometer using fluxgate principle

DIMENSIONAL DATA

5. Working length	Adjustable from 56 to 90 cm
6. Search head	
> Size	Length approx. 46 cm Ø approx. 3.8 cm
> Weight	Approx. 2.4 kg
> Shape	Tube
7. Transport case	
> Weight	Field backpack approx. 1 kg (standard accessory) Hard case approx. 4.9 kg (optional accessory)
> With equipment (full)	Field backpack with equipment (full) approx. 3.5 kg (standard accessory) Hard case with equipment (full) approx. 8.4 kg (optional accessory)
> Dimensions	Field backpack (standard accessory) 53 x 29 x 12 cm Hard case (optional accessory) 55 x 35 x 23 cm
> Hard Soft case (material)	Field backpack (standard accessory) Textile Hard case (optional accessory) Plastic
8. Weight, hand-held unit	Approx. 2.4 kg (with batteries)
9. Weight, carrying (operational detection set)	Approx. 2.4 kg (with batteries)
10. Weight, additional equipment	Head set 110 g
11. Weight distribution Balance	Balanced around the hand grip
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	EL1302D2 EL1303D2 VET2 VMXC1 VMXC1-3
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIL STD 810F
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Manual, cannot be used in magnetic soil
22. Operational hours Operating endurance	Medium temperature (around 20°C) Approx. 120 h with alkaline batteries depending on operation periods

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Manual Automatic
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity switch
> Small metal content mines (type of mine)	No
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Audio by inbuilt loudspeaker or headset, visual by LED-bargraph
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	See item 29
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Limited
30. Optimal sweep speed	0 – 1 m/s
31. Search coil Antenna	Tube with 38 mm Ø
32. Limitations	Only ferromagnetic targets
33. Interference (with other detectors)	Same detector type no

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	2 batteries approx. 100 g
> no. of batteries size type	2 ea. 1.5V single-cell batteries IEC R20/D-size
> rechargeable	2 ea. 1.24V (RSH 4 KR35/62, D-size)
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Hard case, headset
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1 MIL STD 461D

VALLON VXV4 OR VXV8

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon VXV4/VXV8 sensor platforms* with up to four or eight highly sensitive ferrous locators were developed for the detection of unexploded ordnance (UXO) over large areas.

The vehicle incorporates an array of ferrous locators operating with the Vallon field computer VFC2 or a laptop PC as data logger. To relate the exact x-y coordinates to the measured data the Vallon sensor positioning system (SEPOS)¹ or a digital global positioning system (DGPS) receiver with antenna can be connected.

The VXV4 carries standard up to four Vallon ferrous sensors for land use and the VXV8 has eight ferrous sensors. Other special vehicles are required to carry the locators on or under water.

After survey all data are transferred to a laptop or a PC and evaluated using the VALLON EVA2000 software package.



3 sensors mounted at vehicle

Main components are

- > 4/8 fluxgate sensors
- > central electronics VCU2 unit in a weatherproof housing
- > customised sensor platform for fluxgate sensors for land and/or under water use
- > battery pack
- > data logger: VFC2 or laptop PC
- > portable laptop with USB memory stick, data transfer cable and 12 V DC-adapter
- > VALLON EVA2000 2.X. software
- > DGPS system.

¹ SEPOS is a registered trade mark of Vallon GmbH for the patented positioning system for land survey and borehole detection with ferrous locators.

WORKING METHODOLOGY

The complete version comprises a platform with fluxgate sensors. Several differential magnetometers are arranged in one array across the walking/driving direction on a special frame. The sensors detect interferences of the normally homogenous magnetic field of the earth. Steel and iron objects in the ground or in the water affect the earth's magnetic field.

Data recording is made directly by connecting the sensor electronics to a laptop using MS Windows 2000/XP/Vista and the VALLON EVA2000 2.X software. The software can simultaneously record data from the sensors and DGPS. During data survey, the measured values are displayed in real time and the covered distance is displayed in real time for navigation.

DETECTORS IN USE

The system is in operation worldwide with commercial UXO clearance operators.

POWER SUPPLY

The detection system works with its own battery or external 12V DC supply.

FACTORY SUPPORT

The manufacturer offers operation and maintenance training at their facilities or on-site worldwide. Spare parts can be supplied in very short time. Warranty is for 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The maintenance manual has step-by-step explanations for repairs.

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

Detection of ferrous targets only. Thus non-magnetic metal objects, ie, aluminium foil, cans, etc, are excluded.

DETECTOR

1. Brand	VALLON
2. Model	VXV4
3. Version	Vehicle Mounted Multi Sensor System (customized solutions)
4. Used detection technology	Difference magnetometer (fluxgate)

DIMENSIONAL DATA

5. Working length	Depending on the customer’s requirements
6. Search head	
> Size	Customized from 1 to 4 m detection width
> Weight	Depending on the construction
> Shape	Rectangle
Protective spoiler	
> Size	Depending on search head size
> Weight	Depending on search head size
> Shape	Depending on search head size
7. Transport case	
> Weight	Depending on the customer’s requirements
> With equipment (full)	Depending on the customer’s requirements
> Dimensions	Depending on the customer’s requirements
> Hard Soft case (material)	Wooden case
8. Weight, hand-held unit	–
9. Weight, carrying (operational detection set)	–
10. Weight, additional equipment	–
11. Weight distribution Balance	–
12. Other specifications	

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	VMXV4 for UXO and mine detection or VMV8 for mine detection only
16. Location of use	Worldwide land, water, borehole

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIN STD 810E
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes up to 5 m (search head)
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	Depending on the customer’s requirements
> medium temperature (around 20° C)	Depending on the customer’s requirements
> high temperature (higher than 30° C)	Depending on the customer’s requirements

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment
> Small metal content mines (type of mine)	Not applicable, UXO detector
> Anti-tank mines (type of mine)	Depends on the construction
> ERW (please specify)	Depends on the construction
25. Output indicator	Alarm sound and visual display on PC screen
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Manual
28. Soil influence	Automatic and adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Limited
30. Optimal sweep speed	Depending on used sensors up to 10 km/h
31. Search coil Antenna	Fluxgate
32. Limitations	–
33. Interference (with other detectors)	–

POWER

34. Power supply Source	Battery pack or separated car/truck battery
35. Operating time	15 h, car/truck battery: unlimited
36. Power supply	
> weight	–
> no. of batteries size type	Vehicle battery or own rechargeable battery
> rechargeable	Yes
> other	Works with 12V DC

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Upon request
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Max 24 months
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Depending on the customer's requirements
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1

DETECTOR SYSTEMS

DUAL SENSOR AND GPR SYSTEMS



GENERAL DESCRIPTION

ALIS has been developed by the Centre for Northeast Asian Studies at the Tohoku University which is now planning its commercial production.

ALIS is a hand-held dual-sensor system, which consists of a metal detector and a ground-penetrating radar (GPR). A unique feature of *ALIS* is its visualization function of detection readings from both the metal detector and GPR. Operators can easily identify buried mines on the visualized image.

The system is based on a commercial metal detector, MIL-D1 (CEIA) and an impulse GPR (ALSI-PG) or a stepped-frequency GPR (ALIS-VNA). The full features of MIL-D1 are available, for example the soil compensation function and the pinpointing capability. The GPR antennas are integrated into the search head together with metal detector coils. The control unit holds all the electronics and a rechargeable battery and is designed to be shouldered. The colour LCD display provides the survey results both from the metal detector and the GPR as images. Audio alert is also available for the metal detector indication using an earphone.



ALIS at the test site

WORKING METHODOLOGY

The dual-sensor technology using metal detector and GPR provides discrimination capability of mines from metal clutter. The metal detector and the GPR in this system are supposed to be used as primary and secondary sensors respectively. First, the metal detector detects and pinpoints all the objects containing metal pieces, and then the GPR depicts shapes of the objects. Small pieces of metals do not appear in the GPR images, while objects whose size is comparable to a mine are visible. The operator can find these shapes in the GPR images, which are horizontal slices of the underground at different depths, and can compare them with the image from the metal detector.

POWER SUPPLY

ALIS employs a Li-ion rechargeable battery in the control unit. The battery drives all the units for more than 3.5 hours in the dual-sensor mode. (The battery life can be longer using only the metal detector mode). The battery can be charged by connecting the AC cable to the control unit and also by the external charger. The system can also be driven by an AC cable.

DETECTORS IN USE

Two sets of ALIS-PG and three sets of ALIS-VNA have been manufactured. The two ALIS-PGs were used in minefield tests by CROMAC in Croatia for six months. Several prototypes of ALIS were manufactured before these five sets. They were tested in controlled conditions in Afghanistan, Cambodia, Croatia and Egypt.

FACTORY SUPPORT

No information yet available.

MAINTENANCE SUPPORT

No information yet available.

TEST AND EVALUATION

- > The system has undergone several trials, eg in Croatia in 2006 (report available at: www.itep.ws/pdf/JapaneseTrialsCroatia2006.pdf), in Cambodia in 2006 and again in Croatia in 2007 (report available at: www.itep.ws/pdf/TestDualSensorJST_CTRO2007.pdf).
- > A long-term evaluation campaign on QC/QA process (using ALIS as a detection tool) has been conducted in real mine fields by the Croatian Mine Action Centre – Centre for Testing, Development and Training in 2008.
- > The metal detector in the ALIS system has been tested many times as a stand-alone detectors, eg the STEMMD trial in Croatia in 2005 (report available at: www.itep.ws).

REPORTED LIMITATIONS AND STRENGTHS

As the ALIS is the final stage of R&D no further information is available.

GENERAL DESCRIPTION

ALIS-EMI is an add-on system, which can be fitted to any metal detector (with digital output, i.e., RS232C, USB required). One prototype has been made.

The ALIS-EMI provides a visualisation function to a hand-held metal detector. Operators can easily identify buried mines on the visualised image on a colour LCD display of a palmtop PC. Audio alert is also available for the metal detector indication using the earphone. A CCD (closed circuit digital) camera can be equipped on a metal detector pole, and no modification to the metal detector is required.



ALIS-EMI

ALIS at the test site

WORKING METHODOLOGY

The operation of ALIS-EMI is like that of conventional metal detectors, except that the operator can see an image from the metal detector superimposed on the ground surface picture. Compared to the conventional audio signal, the visualized signal can show much more information to the operator.

The advantages of visualisation include:

- > Very weak signals can be enhanced on the image, which avoids missing objects.
- > Discrimination of two mines close together is possible, by the shape of the visual response.

Power supply to the metal detector and the ALIS-EMI is separated. ALIS-EMI can be installed on any small palmtop PC, powered by the PC.



ALIS Sensor head



ALIS at the test site

DETECTOR

1. Brand	TOHOKU University
2. Model	ALIS
3. Version	ALIS-PG/ALIS-VNA
4. Used detection technology	Continuous wave (CW) Electromagnetic induction (EMI) & ground-penetrating radar (GPR)

DIMENSIONAL DATA

5. Working length	
> min. length	1,070 mm
> max. length	1,600 mm
6. Search head	
> Size	External Ø 260 mm
> Weight	0.78 kg
> Shape	Circular
7. Transport case	
> Weight	5 kg
> With equipment (full)	15 kg
> Dimensions	0.8 x 0.5 x 0.6 m
> Hard Soft case (material)	Hard
8. Weight, hand-held unit	2 kg
9. Weight, carrying (operational detection set)	8 kg
10. Weight, additional equipment	—
11. Weight distribution Balance	Well balanced Optimised for continuous operation
12. Other specifications	Knob sensitivity adjustment for EMI Mode switch button (EMI/EMI+GPR)

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	Development (final phase)
14. Detectors Systems in use to date	—
15. Other types Models	ALIS
16. Location of use	—

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	< 80 %
18. Temperature (limitations)	
> Storage	-20° C to +60° C
> Operational	0° C to +40° C
19. Water resistant (Yes / No)	IP 54
20. Shock Vibration resistant	Not tested
21. Environmental Compensation	Automatically
22. Operational hours Operating endurance	
> low temperature (around 0° C)	> 3.5 h
> medium temperature (around 20° C)	> 3.5 h
> high temperature (higher than 30° C)	> 3.5 h

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic
> Duration	No limit
24. Detection range Sensitivity details Detection performance Working depth	
> Small metal content mines (type of mine)	Optimised according to the mines and soils
> Anti-tank mines (type of mine)	Optimised according to the mines and soils
> ERW (please specify)	Optimised according to the mines and soils
25. Output indicator	Sound (EMI) Display (EMI and GPR)
26. Pinpointing feature	Dual tone
27. Adjustment of search head angle	0° up to 95°
28. Soil influence	No influence for EMI
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	Any speed for EMI 20 cm/s for GPR
31. Search coil Antenna	Circular (EMI) Spiral (GPR)
32. Limitations	Extremely inhomogeneous soil, large terrain variation
33. Interference (with other detectors)	No

POWER

34. Power supply Source	Rechargeable battery
35. Operating time	> 3.5 h
36. Power supply	
> weight	0.7 kg
> no. of batteries size type	1 of LI-ION rechargeable battery
> rechargeable	Yes
> other	AC drive and external battery charge possible

COSTS

37. Price	
> for one detector on request	
> reduction for higher quantity	
38. System price	
> with training	
> spare parts	
> extended warranty	
39. Total	
40. Possibility to rent/lease	

OTHERS

41. Duration of warranty	
42. Additional equipment	
43. Additional technical data information	
44. Compliant standards	

DETECTOR

1. Brand	TOHOKU University
2. Model	ALIS-EMI
3. Version	1
4. Used detection technology	Electromagnetic induction (EMI)

DIMENSIONAL DATA

5. Working length	
> min. length	
> max. length	
6. Search head	(As of the attached sensor)
> Size	
> Weight	
> Shape	
7. Transport case	
> Weight	—
> With equipment (full)	—
> Dimensions	—
> Hard Soft case (material)	—
8. Weight, hand-held unit	13 x 9 x 5 cm (PC)
9. Weight, carrying (operational detection set)	0.5 kg (PC)
10. Weight, additional equipment	—
11. Weight distribution Balance	
12. Other specifications	

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	
15. Other types Models	
16. Location of use	

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	
18. Temperature (limitations)	
> Storage	
> Operational	
19. Water resistant (Yes / No)	
20. Shock Vibration resistant	
21. Environmental Compensation	
22. Operational hours Operating endurance	
> low temperature (around 0° C)	
> medium temperature (around 20° C)	
> high temperature (higher than 30° C)	

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic
> Duration	No limit
24. Detection range Sensitivity details Detection performance Working depth	
> Small metal content mines (type of mine)	Optimised according to the mines and soils
> Anti-tank mines (type of mine)	Optimised according to the mines and soils
> ERW (please specify)	Optimised according to the mines and soils
25. Output indicator	Sound (EMI) Display (EMI and GPR)
26. Pinpointing feature	Dual tone
27. Adjustment of search head angle	0° up to 95°
28. Soil influence	No influence for EMI
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	Any speed for EMI 20 cm/s for GPR
31. Search coil Antenna	Circular (EMI) Spiral (GPR)
32. Limitations	Extremely inhomogeneous soil, large terrain variation
33. Interference (with other detectors)	No

POWER

34. Power supply Source	Rechargeable battery
35. Operating time	> 3.5 h
36. Power supply	
> weight	0.7 kg
> no. of batteries size type	1 of Li-ion rechargeable battery
> rechargeable	Yes
> other	AC drive and external battery charge possible

COSTS

37. Price	
> for one detector on request	
> reduction for higher quantity	
38. System price	
> with training	
> spare parts	
> extended warranty	
39. Total	
40. Possibility to rent/lease	

OTHERS

41. Duration of warranty	
42. Additional equipment	
43. Additional technical data information	
44. Compliant standards	

MIRADOR GEO-RADAR

Geological Prospecting Rus. Ltd. | Russia

GENERAL DESCRIPTION

The *MIRADOR detector* is a video pulse geo-radar capable of detecting objects in the ground which differ from surrounding ground in dielectric permittivity or conductivity and have size, which is not small in comparison with the mean wavelength of the spectrum of signal. Search objects can be not only metallic objects but also mines with dielectric casing and minimum metal content.

The first model of the MIRADOR –TR-GEO-03 – was developed about eight years ago. The central frequency of the spectrum is about 1 GHz and has been used to search for items within roads and buildings. It has been tested for detection of anti-personnel plastic mines and metal mines with a diameter of about 10 cm (such as PMN2, PMN). The MIRADOR can find wide application in humanitarian demining when combined with the use of metal detectors and other mine detectors. A portable computer is used for signal processing and visualisation of results. The search head (antenna unit) consists of receiving and transmitting antennas. The dimensions of the search head are 12 × 35 × 3 cm. The maximum depth of detection ranges between 0.5 and 1 m depending on ground moisture content.

The average frequency of 1 GHz is not sufficient to search for small plastic mines less than about 3-5 cm in size. The manufacturer is therefore developing a new model – MIRADOR-2009 – radiating a pulse with central frequency of the spectrum 2.5-3 GHz.

The geo-radar TR-GEO-04 has also been recently developed with an average frequency about 1.5-2 GHz. This can be used for detection on roads. Ten examples of this model have been produced for mounting on a car for road scanning.

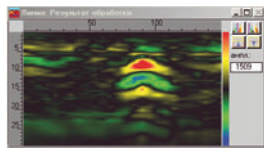
WORKING METHODOLOGY

The MIRADOR system radiates ultra-short video pulse of electromagnetic waves into the ground and receives reflections from the objects. The system can detect plastic and metal mines with a minimum size of about 10 cm. (The MIRADOR-2009 will be able to detect objects of 3-5 cm size.) Maximum depth of sounding is 50 cm in dry and sandy soils and 10 cm in moist and clay soils. After signal processing a 2-D (a 3-D imaging is also possible) are displayed on the laptop screen. The processing of signals includes preliminary processing (subtraction of direct transmission signal between receiving and transmitting antennas, taking into account the effect of surface unevenness on direct transmission signal) and possibly some other additional processing (auto-correlation, identification algorithms).

The MIRADOR geo-radar operate as follows. The antenna unit mounted on a telescopic bar moves at small height (about 5 cm) above the ground surface along a line of nearby 1 m in width. Once the movement of the antenna unit is completed, the monitor displays the vertical ground section (cross sectional area) along the scanning line.

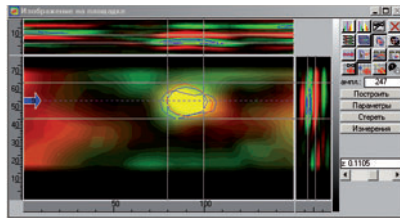


MIRADOR old version

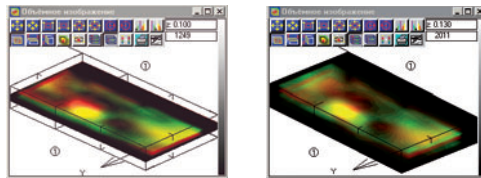


A vertical section of the ground along the scanning line identifies a PMN mine, after preliminary processing. The ground: dry sand. Height of the sensor head: 5 cm

The reflected signal contains two basic oscillation half-cycles. Type of object (metallic or having dielectric permittivity less than the surrounding ground) can be identified by the sign of the first oscillation, the reflected signal. Vertical sections as shown here may be used by the operator for preliminary viewing. Recording of signals along several lines along the surface allows horizontal sections or 3-D images to be obtained (see below). An acoustic signal during scanning indicates the presence of an object.



Result of sounding from a PMN mine on horizontal sections. (The sensor head was close to the ground surface.)

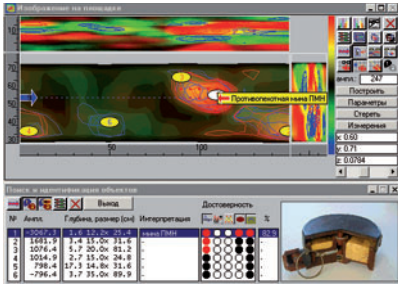


Result of sounding from a PMN mine in 3-D view.

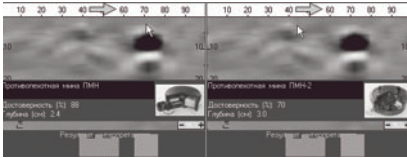
New features under development include the algorithm of recognition of mine classes, based on artificial neural networks methods. This algorithm should use a database of records of reflected signals from various types of mines. In this method the database is used for training of the neural network. An automatic interpretation programme will be applied either during scanning along lines or as an additional processing after scanning over all the surface for drawing 3-D images. When identifying the object the programme will display a photo chosen from the database with assessment of reliability level of identification, and labels the object on vertical or horizontal sections. Some algorithms of automatic identification (also including neural network algorithm) have been tested. Result of identification of PMN mine is shown on the following page.

MIRADOR GEO-RADAR

Geological Prospecting Rus. Ltd. | Russia



Result of identification algorithm for the plastic mine with metal ring (PMN). (Sensor head was close to the ground surface.) Results of identification of PMN and PMN2 mines (by another programme) are shown below. When recognition algorithm is applied during scanning, the acoustic signal indicates detection of a recognised mine or mine-like object.



Result of quick diagnostics for identification of PMN, PMN2 mines, placed in dry sand. (Sensor head was close to the ground surface.)

DETECTORS IN USE

- > 10 TR-GEO-04 geo-radars have been mounted on car-scanners for testing of roads in Russia.
- > Four geo-radars of older models (TR-GEO-03, MIRADOR) with central frequencies 1 GHz have been used by Geological Prospecting Rus. Ltd.

POWER SUPPLY

- > the system is powered by rechargeable batteries.
- > Operational life of batteries is 6-8 hours.

FACTORY SUPPORT

- > Support is normally provided as part of the purchase package.
- > The manufacturer provides a one-year warranty.
- > The manufacturer provides theoretical lessons and practical training.
- > Spare parts available from manufacturer/supplier.

MAINTENANCE SUPPORT

- > Recommended crew (operators): one operator.
- > Replacing and charging of batteries.

TEST AND EVALUATION

The prototype of the device has been tested with two models of anti-personnel plastic mines (PMN, PMN2). The PMN mine was clearly visible in dry sand. The PMN2 plastic mine was visible on the monitor when the ground was wet.

REPORTED LIMITATIONS AND STRENGTHS

Limitations

- > Plastic mines are not visible in dry soil.
- > Small depth of detection in clay and loam and in moist soil.
- > Small height (5-10 cm) of the sensor head (antenna unit) above the ground is desirable: operation at heights up to 20 cm is possible but will reduce detection depth.

Strengths

- > The system is able to detect minimum-metal content mines as well metal-content mines.

DETECTOR

1. Brand	TR-GEO
2. Model	TR-GEO-04, MIRADOR
3. Version	MIRADOR 2009
4. Used detection technology	Ultra-short video pulses of electromagnetic waves

DIMENSIONAL DATA

5. Working length	
> min. length	0.5 m
> max. length	1.5 m
6. Search head	
> Size	Antenna unit: 18 x 6 x 2 cm Telescopic bar: 0.8 x 1.7 m
> Weight	Sensor head (antenna unit): 1 kg; total 5-6 kg
> Shape	Parallepiped antenna unit (18 x 6 x 2 cm) mounted on a telescopic bar
7. Transport case	
> Weight	—
> With equipment (full)	About 5-6 kg
> Dimensions	0.9 x 0.3 x 0.2 m
> Hard Soft case (material)	—
8. Weight, hand-held unit	1-1.5 kg
9. Weight, carrying (operational detection set)	5 kg
10. Weight, additional equipment	None
11. Weight distribution Balance	Hand-held sensor head (antenna unit) on telescopic bar; electronic unit, battery and computer (monitor) separately (possibly on belt)
12. Other specifications	Composition of the georadar Antenna unit on telescopic bar; Electronic unit; Computer/monitor; Battery Pulse (frequency) specification Central frequency of spectrum: 2-3 GHz Frequency range - F2: F1 of top F2 and bottom F1 frequencies at level -10 dB - not less than 3-3.5 Amplitude of the pulse of the generator 15-20V

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	Development
14. Detectors Systems in use to date	TR-GEO-03; TR-GEO-04
15. Other types Models	TR-GEO-03; MIRADOR; TR-GEO-04
16. Location of use	Roads in Russia

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	—
18. Temperature (limitations)	0 to +35° C
> Storage	Computer or built-in flash memory
> Operational	
19. Water resistant (Yes / No)	Antenna unit: yes; other blocks: no
20. Shock Vibration resistant	Yes
21. Environmental Compensation	None
22. Operational hours Operating endurance	6 h
> low temperature (around 0° C)	6 h
> medium temperature (around 20° C)	6 h
> high temperature (higher than 30° C)	6 h

DETECTION OPERATION

23. Calibration Set-up	Measuring of calibrated signals for various types of mines and soils may be demanded
24. Detection procedure includes	Moving of sensor head (antenna unit) by an operator manually above the ground at a height 5-10 cm along a line 0.5-1.5 m. Imaging of 2-D profile on the monitor after scanning
Detection range Sensitivity details Detection performance Working depth	Objects (dielectric, metallic) with size (diameter) 5-7 cm at a depths: 0.1 m in moist or clayey soils 0.5-0.7 m in dry sandy soil
25. Output indicator	—
26. Pinpointing feature	No
27. Adjustment of search head angle	No
28. Soil influence	Moisture and high conductivity diminishes amplitude of the signal and depth of sounding
29. Best use in	+
> Sand	—
> Peat	—
> Clay	—
> Ferruginous soil (laterite)	—
30. Optimal sweep speed	20 cm/s
31. Search coil Antenna	Antenna unit - transmitting and receiving antenna
32. Limitations	Roughness of the surface, vegetation, small depth of sounding in clays and moist soils, plastic mines are not visible in dry soil
33. Interference (with other detectors)	Metal detectors (pulsed and sine-wave) closely placed, similar radar, mobile phones

POWER

34. Power supply Source	Ni-MH rechargeable battery
35. Operating time	6-8 h without recharging
36. Power supply	Radar only (without the computer): 3-5 W
> weight	0.5 kg search unit; about 3 kg units on the belt; total about 4 kg
> no. of batteries size type	Ni-MH rechargeable battery
> rechargeable	Yes
> other	—

COSTS

37. Price	US\$ 10,000
> for one detector on request	US\$ 5,000
> reduction for higher quantity	US\$ 8,000
38. System price	US\$ 10,000
> with training	US\$ 2,000
> spare parts	No
> extended warranty	One year - US\$ 3,000
39. Total	US\$ 12,000
40. Possibility to rent/lease	No

OTHERS

41. Duration of warranty	One year
42. Additional equipment	Computer
43. Additional technical data information	Manual and technical description for users
44. Compliant standards	No

THE AN/PSS-14 DETECTION SYSTEM

(formerly HSTAMIDS: Handheld Standoff Mine Detection System)

L3-CyTerra | USA

GENERAL DESCRIPTION

The L3-CyTerra company says the *AN/PSS-14 system* can revolutionise landmine detection by combining ground penetrating radar (GPR), highly sensitive metal detector (MD) technology and advanced data fusion algorithms in a unique manner that enables the system to reliably and consistently detect low-metallic anti-personnel and anti-tank mines.

The AN/PSS-14 is claimed further by the manufacturer to offer the highest probability of detection of any hand-held system along with an extremely low false alarm rate. This high level of performance is also claimed to be maintained across all soil types, including wet, dry, frozen, laterite (iron-rich), clay and sand.

The data fusion algorithms allow the operator to effectively discriminate between clutter and mines. CyTerra notes that the algorithms are based on terrain modelling using a real time novelty methodology. As the operator advances, the terrain model is continuously updated, enabling the system to automatically adapt to varying soil conditions. Potential mine detection alerts are provided to the operator via audio signals.



The HSTAMIDS-AN-PSS-14

Main features are

- > wideband ground penetrating radar plus advanced metal detector; locates even hard-to-detect low-metal anti-tank and anti-personnel mines
- > low false alarm rate – discriminates mines from clutter; effective in all soils
- > ergonomic – adjustable counterbalance; night-vision capable
- > efficient, trouble-free, all-weather operation
- > compact for easy transport and deployment
- > telescoping wand design facilitates operation in standing, kneeling and prone positions.

WORKING METHODOLOGY

The system combines a GPR and a highly sensitive MD. Two different audio signals are provided simultaneously to the operator. The MD signal is provided in the traditional format of a metal detector in which the signal varies in volume and pitch depending on the metal type, size and depth. The other audio signal is the output of the data fusion algorithms, also known as the Aided Target Recognition (ATR) algorithms, and is a sharp beep. This beep is generated only when the ATR processing determines that both the GPR and MD data indicates a “mine like” object.

Because the MD and ATR sounds are distinctly different they can be present together without distracting the operator as may happen with two continuously varying audio signals. Situation awareness is therefore maintained while allowing full operation of the GPR and MD sub-systems.

The operator cannot turn off (accidentally or deliberately) either the MD or GPR sub-systems. However, audio muting on a temporary basis to allow the operator to better focus on one of the audio signals is available. This feature is particularly helpful when investigating high-metal anti-tank mines where the constant high volume of the MD can be distracting to the operator.

POWER SUPPLY

To power the AN/PSS-14 (HSTAMIDS)/AMD-14 a 12V battery with a power consumption of 30W is requested. The operational life of a nickel metal hydride battery (required for the AN/PSS-14) is said to be four hours, as is the NP-Fx70 series Li-ion battery for the AMD-14.

For the AN/PSS-14 the battery is mounted externally on the operator’s hip belt, therefore the system can be adapted to use other batteries, provided basic V/ahr ratings are met.

DETECTORS IN USE

Systems are available for individual country or organisation evaluation (subject to a suitable US Export License being obtained).

FACTORY SUPPORT

Mine detection training is a critical part of mission success. L3-CyTerra provides training where and when it is needed.

MAINTENANCE SUPPORT

No information provided.

TEST AND EVALUATION

- > HSTAMIDS has been undergoing extensive operational field trials and demonstration under the ITEP banner, supported by mine action centres and/or NGOs.

The following test results and reports are available at the ITEP website www.itep.ws:

1. The HALO Trust and HSTAMIDS. Journal of Mine Action, Issue 12.1, Summer 2008.
2. Development of Region Processing Algorithm for HSTAMIDS: Status and field Test Results. SPIE, Detection and Remediation Technologies for Mines and Minelike Targets XII, Florida, USA, 2007.
3. Guidebook on Detection Technologies and Systems for Humanitarian Demining; GICHD; published 2006.
4. Handheld Standoff Mine Detection System (HSTAMIDS) field evaluation in Namibia. SPIE, Detection and Remediation Technologies for Mines and Minelike Targets XI, Florida, USA; published 2006.
5. HSTAMIDS with Acoustic Vibration Sensing. U.S. Army, CECOM, Night Vision and Electronic Sensors Directorate - Humanitarian Demining Research and Development Program; published 2006.
6. Tests and evaluation of dual sensor mine detectors based on a combination of Metal Detector and Ground Penetrating Radar (TEDS). Joint Research Centre - European Commission (JRC/EC); published 2006.
7. HSTAMIDS operational with deminers in Cambodia, Afghanistan, and Thailand, published 2006.
8. Handheld Standoff Mine Detection System (HSTAMIDS) field Evaluation in Thailand, published 2005.



Detail of AMD-14 control handle

REPORTED LIMITATIONS AND STRENGTHS

The performance of all GPR systems is limited for physical reasons if they are operated in heavy clay soil conditions or the soil is saturated with salt water.

The GPR system can discriminate between metallic clutter and low-metal-content mines, so the false alarm rate should decrease.

A detailed description of GPR radar systems, particularly of CyTerra HSTAMIDS, is given in: *Guidebook on Detection Technologies and Systems for Humanitarian Demining*, GICHD, Geneva, March 2006. The Guidebook is available at the GICHD website: www.gichd.org/gichd-publications/guidebook-on-detection-technologies/.



The HSTAMIDS-AN-PSS-14

DETECTOR

1. Brand	CYTERRA
2. Model	AN/PSS-14 (HSTAMIDS) / AMD-14 (Humanitarian demining model) MD: similar to MINELAB F3
3. Version	–
4. Used detection technology	MD, GPR

DIMENSIONAL DATA

5. Working length	
> min. length	AN/PSS-14: 96 cm AMD-14: 93 cm
> max. length	AN/PSS-14: 147 cm AMD-14: 166 cm
6. Search head	
> Size	AN/PSS-14: width 21 cm AMD-14: width 21 cm height 10 cm
> Weight	–
> Shape	Circular, closed style
7. Transport case	
> Weight	AN/PSS-14: 20 kg AMD-14: 20 kg
> With equipment (full)	–
> Dimensions	AN/PSS-14: hardcase 64 x 53 x 36 cm AMD-14: hardcase 95 x 45 x 25 cm
> Hard Soft case (material)	–
8. Weight, hand-held unit	AN/PSS-14: 4.9 kg AMD-14: 4.3 kg (both excluding batteries)
9. Weight, carrying (operational detection set)	AN/PSS-14: 4 kg AMD-14: 4.3 kg
10. Weight, additional equipment	AMD-14: batteries, 0.6 kg
11. Weight distribution Balance	Counterbalanced for easy use
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	Continuous improvement process
14. Detectors Systems in use to date	AN/PSS-14 more than 2,000
15. Other types Models	–
16. Location of use	–

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	AN/PSS-14 meets and exceeds all US Army Requirements ¹⁾ overall -32° C to +49° C, 0 – 100% humidity. AMD-14 STANAG 2895 A1 (dry desert), B1 (tropical), C1 (cold) and B3 (hot and humid) overall -32° C to +49° C, 0 – 100% humidity
18. Temperature (limitations)	
> Storage	AN/PSS-14: -46° C to +73° C AMD-14: -46° C to +73° C
> Operational	AN/PSS-14: -32° C to +49° C AMD-14: -32° C to +49° C
19. Water resistant (Yes / No)	HSTAMIDS: AMD-14: 1 m
20. Shock Vibration resistant	–
21. Environmental Compensation	–
22. Operational hours Operating endurance	
> low temperature (around 0° C)	–
> medium temperature (around 20° C)	–
> high temperature (higher than 30° C)	–

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	–
> Duration	–
24. Detection range Sensitivity details Detection performance Working depth	
> Small metal content mines (type of mine)	AN/PSS-14 & AMD-14: Will detect mines presenting an operational threat (PD, PFA: ^{a)}).
> Anti-tank mines (type of mine)	AN/PSS-14 & AMD-14: Will detect mines presenting an operational threat (PD, PFA: ^{a)}).
> ERW	–
25. Output indicator	AN/PSS-14 & AMD-14 Audio, external speaker or headphones
26. Pinpointing feature	Combination of MD and ATR signals
27. Adjustment of search head angle	–
28. Soil influence	Usable in all soils
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.3 to 0.75 m/s
31. Search coil Antenna	–
32. Limitations	Power line suppression: not available
33. Interference (with other detectors)	–

POWER

34. Power supply Source	30W
35. Operating time	AN/PSS-14: 4 h (Nickel Metal Hydride) AMD-14: 4 h (NP-Fx70 series Li-ion)
36. Power supply	
> weight	AMD-14: 0.6 kg (Li-ion pair) rechargeable
> no. of batteries size type	AN/PSS-14: NiMH rechargeable battery
> rechargeable	–
> other	AN/PSS-14 Battery is mounted externally on operators' hip belt, therefore system can be adapted to use other batteries, provided basic V/Ahr ratings are met AMD-14 battery pack mounted on handheld system or on belt with optional cable

COSTS

37. Price	
> for one detector on request	More than US\$ 5,000
> other information regarding price	
> reduction for higher quantity	
38. System price	
> with training	
> spare parts	
> extended warranty	
39. Total	
40. Possibility to rent/lease	None

OTHERS

41. Duration of warranty	–
42. Additional equipment	–
43. Additional technical data information	–
44. Compliant standards	–

VALLON VMR2

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon VMR2 dual-sensor detector* (called *Minebound*) is a combined metal detector and ground penetrating radar (GPR) system designed specifically for use in humanitarian demining operations and military operations using advanced technology.

Vallon has built the VMR2 by combining the techniques of its VMH3 metal detector with a custom-designed 1 GHz GPR designed by ERA Technology Ltd. The GPR is a time-domain radar transmitting 1 ns duration pulses at a repetition frequency of 1 MHz. A dedicated state-of-the-art DSP processor is used to provide all control and signal processing functions.

The VMR2 is simple to use, providing the operator with clear audio signals of the potential mine threat. When a threat is located, the detector provides both position information and mass of metal indication. The GPR audio provides additional position and depth information, and identifies the radar cross-section of the target. Both detectors can be used independently or simultaneously. The GPR responds to even the smallest flush buried mine (diam. > 5 cm), but not to small metal fragments. This means that metallic clutter (such as bullet casings, small arms rounds and shrapnel, which commonly cause false alarms) is rejected by the system.



Vallon VMR2

The GPR also detects zero or minimum-metal mines which are normally difficult to locate using metal detection techniques alone.

The VMR2 is switched on by a rotary control, which has switch positions for the metal detector programmes (normal soil and conductive soil) as well as mine detector and GPR volume. A headset is provided and an internal speaker, which can be muted, is also used. Mode control is provided by a push button mounted on the control handle, which allows the operator to select mine detector or GPR or both functions. LEDs indicate which function is operating.

The detection function is the prime search capability and offers a highly sensitive technology to locate even minimum-metal mines (such as PMA3). The operator can set the detection sensitivity, which is observed by a LED bargraph display.

The GPR is self-calibrating and gives an audio confidence tick every 7.5 sec. to indicate correct operation. If an error occurs in the GPR, the LED displays flashes.

The VMR2 is a new technology which requires training of the operating team before working in a live minefield situation.



Vallon VMR2 accumulator



Vallon VMR2 charger

DETECTORS IN USE

In use in several countries.

POWER SUPPLY

A Lithium polymer rechargeable battery pack is supplied as standard accessory. The operational life of the rechargeable batteries is said to be up to eight hours depending on age of the rechargeable batteries. Optionally, an attachable battery compartment with four standard D-cells is offered.



Vallon display



Vallon VMR2 panel

FACTORY SUPPORT

- > Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- > Operation and maintenance training are offered either in the Vallon facilities or at a location required by the customer.
- > Operation and maintenance manuals are available in different languages.
- > Warranty for 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The maintenance manual has step-by-step explanations for repairs.

TEST AND EVALUATION

The manufacturer allows access to several test reports.

Three reports about field trials in Cambodia, Bosnia and Angola are available at the ITEP website: www.itep.ws :

1. Experimental Cairo Testing and Evaluation of Mine and UXO Detectors; published 2007.
2. MINEHOUND™ Detector System; published 2006.
3. Tests and evaluation of dual sensor mine detectors based on a combination of Metal Detector and Ground Penetrating Radar (TEDS); published in 2006.
4. ERA Technology, MINEHOUND trials 2005-2006: Summary report, October 2006.
5. Mine Action Technology Newsletter, June 2006 Issue No. 4: MINEHOUND Detector System, 2006.
6. Dibsall I., MINEHOUND tests underway in Cambodia and Bosnia, September 2005.

REPORTED LIMITATIONS AND STRENGTHS

The performance of all GPR systems is limited due to physical reasons if they are operated in heavy clay soil conditions or if the soil is saturated with salt water.

The GPR system can discriminate between metallic clutter and low-metal content mines, so the false alarm rate should decrease.

A detailed description of ground penetrating radar systems, particularly of Vallon's VMR1 -Minehound, is given in: *Guidebook on Detection Technologies and Systems for Humanitarian Demining*, GICHD, Geneva, March 2006. The Guidebook is available at the GICHD website: www.gichd.org/gichd-publications/guidebook-on-detection-technologies/.



VMR2 packed in transport box

DETECTOR

1. Brand	VALLON
2. Model	VMR2
3. Version	
4. Used detection technology	Metal detector with ground penetrating radar

DIMENSIONAL DATA

5. Working length	
> min. length	Approx. 56 cm
> max. length	Approx. 102 cm
6. Search head	
> Size	–
> Weight	18 x 32 cm
> Shape	Oval
7. Transport case	
> Weight	–
> With equipment (full)	Approx. 14 kg
> Dimensions	Approx. 102 x 43 x 17 cm
> Hard Soft case (material)	Hard
8. Weight, hand-held unit	< 4 kg
9. Weight, carrying (operational detection set)	< 4 kg
10. Weight, additional equipment	Head set 110 g
11. Weight distribution Balance	–
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	–
15. Other types Models	–
16. Location of use	–

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIN STD 810F
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	Up to 8 h depending on battery capacity
> low temperature (around 0° C)	
> medium temperature (around 20° C)	
> high temperature (higher than 30° C)	

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment
> Small metal content mines (type of mine)	Depending on their size, material and local interference
> Anti-tank mines (type of mine)	Depending on their size, material and local interference
> ERW (please specify)	–
25. Output indicator	Sound, visual bargraph
26. Pinpointing feature	Yes
27. Adjustment of search head angle	With a joint
28. Soil influence	Adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes, but GPR limited
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.2-1.5 m/s standard mode 0-0.2 m/s pinpointing (metal detector)
31. Search coil Antenna	Oval shape with 18 x 32 cm
32. Limitations	Excluding salt water and heavy clay for GPR only
33. Interference (with other detectors)	–

POWER

34. Power supply Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	–
> no. of batteries size type	–
> rechargeable	Rechargeable lithium polymer battery set (standard)
> other	Attachable battery compartment with 4 ea. 1.5V standard batteries D-size (optional accessory)

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	–
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1

DETECTOR SYSTEMS

VEHICLE-MOUNTED DETECTORS



FOERSTER MULTICAT 4.850

Institut Dr. Foerster | Germany

GENERAL DESCRIPTION

The *Foerster MULTICAT* is a trailer vehicle used for large-area detection, localisation, identification and mapping of ferromagnetic historical burdens and UXO.

Restoration of contaminated ground areas is continually increasing in importance. Freeing such areas from historical burdens, some of them of military origin in the form of ammunition and ammunition components, takes up an essential share of the overall effort involved in re-cultivation.

The MULTICAT can be used efficiently in three main fields of application:

- > Localising and mapping unexploded ammunitions and ammunition components (UXO).
- > Quality control in combination with a mine-clearing hoe, involving automatic localisation of unexploded or inadequately shattered OZM /ferromagnetic mines and UXO.
- > Quality control and documentation after clearance.



The MULTICAT equipped with four FEREX probes and GPS antenna

The MULTICAT has an entirely non-ferromagnetic design. It is equipped with gradient-magnetometer sensor technology. The standard complement consists of four probes which can be upgraded to eight probes. The probe spacing is 0.25 or 0.5 m depending on the size and type of the smallest UXO to be detected. The typical scanning width of a system is 2 m.

The standard data logger used for recording the magnetic field values has four channels.

An area is scanned without omission in straight tracks between a start-of-area line and an end-of-area line, using foam marking for track navigation.

On systems featuring a DGPS for data recording and mapping, a data logger (CARTO) can record both magnetic and GPS co-ordinates and additionally has some navigation display.

Up to four units can be combined and controlled centrally via a PC running Data Monitor software. The area can be scanned following either freely selectable or predefined tracks. A navigation indicator on the PC serves as a navigation aid. The travel speed during data recording can be up to 2.5 m/s.

The MULTICAT is designed to be used in any terrain and is also suitable for wheel-driven vehicles.

The metal detector used is the well-known FEREX 4.032 with data logger using the fluxgate magnetometer principle to detect magnetic anomalies caused by ferromagnetic objects. Due to the tension band technology inside the Foerster magnetometer, the system is known as one of the most sensitive fluxgate magnetometers available. These probes are lifetime-calibrated – even if used in a rough environment or in an extreme climate.

The FEREX DATALINE software, the component for magnetic field measurement evaluation and documentation, completes the MULTICAT system. The software calculates, among other data, the exact position, depth or orientation of the scanned objects.

WORKING METHODOLOGY

By detecting variations within the earth's magnetic field, the FEREX data logger indicates plus and minus poles of ferromagnetic objects. Geometry and strength of the detected poles enable the user to determine the location, depth and size of the object. In general, problematic soil types do not influence the results from this working principle.

POWER SUPPLY

As standard, the data logger of the MULTICAT 4.850 is powered by four 1.5V alkaline D-cell batteries (ANSI STD size "D" IEC LR 20), or four equivalent rechargeable batteries, or 6V supply from a car battery . Rechargeable batteries are available on the open market.

Sensitivity and detection quality are never influenced by battery condition. Operating time with one set of alkaline batteries reaches >14 hours (in intermittent operation with four FEREX probes).

If a foam marking system is integrated, a 12V DC supply is necessary (from towing vehicle).

DETECTORS IN USE TO DATE

The MULTICAT 4.850 has been in service since 1997 and has been used in Austria, Denmark, Germany, Iran, the U.K. and the U.S.

FACTORY SUPPORT

- > Spare parts are available exclusively from Foerster which has a network of representatives in more than 40 countries. Most offer complete after-sales service.
- > Besides offering training on the customer's site, Foerster provides modern test and training facilities in Reutlingen, Germany. A full training programme for trainers, including lessons on background knowledge and using a variety of training materials, is available in English and German. On request, training forms part of a purchasing package.
- > Standard manuals and service documentation are available in English, French, German, Polish and Russian. Other languages available on request.

MAINTENANCE AND SUPPORT

- > Including FEREX maintenance, the system is on two levels: basic field maintenance and workshop maintenance.
- > The recommended number of workshops depends on the logistical set-up. The personnel for handling a workshop must have basic knowledge of mechanical and electronic repairs.
- > Foerster offers supply of complete tool sets and testing equipment as well as service training. Fully equipped workshops with trained personnel can handle all repairs down to factory final assembly level.

TEST AND EVALUATION

Foerster performs tests within its own facilities mainly for research and quality control. The manufacturer states that tests are largely carried out under “real” conditions.

Test reports about the FEREX 4032 data logger can be found at the ITEP website: www.itep.ws (see also the article on the Foerster FEREX 4032 in this catalogue).

REPORTED LIMITATIONS AND STRENGTHS

No information available at this time.



The MULTICAT in use on scrubland



The MULTICAT in use on sandy soil

Towed vehicle for large area scanning with FEREX data logger multi-sensor system with gradient-magnetometer technology.

NON-MAGNETIC VEHICLE

1. Brand	FOERSTER
2. Model	FOERSTER MULTICAT
3. Version	Standard vehicle for 4 or 8 probe scanning
4. Used detection technology	Metal detector working by fluxgate magnetometers

DIMENSIONAL DATA

5. Working length	Approx. 6 m with draw bar
Working width	Typically approx. 2.5 m
6. Search sensors	
> Sensor type used	4 FEREX probes CON 650
> Size	Length 853-1.435 mm Diameter 35 mm inserted in the vehicles body
> Weight	0.55-1 kg
> Shape	Tube
> Sensor spacing	0.25 m or 0.5 m
> Scanning width	Typically 2 m with 4 FEREX probes, 4 m upon request
7. Transport dimensions	
> Weight	Approx. 138 kg
> With equipment (full)	Approx. 145 kg
> Dimensions	(vehicle only without built-in components) width x length (with drawbar) x height 2.20 x 0.9 (up to 6 m) x 0.9 m For transportation in a station-wagon/estate car with wheels and draw bar removed 1.90 x 0.9 x 0.9 m
8. Travel speed	2.5 m/s during scanning
9. Weight, carrying (operational detection set)	—
10. Weight, additional equipment	Foam marking system with full emulsion tank 20 dm ³ approx. 22 kg, compressor approx. 5 kg, hose and nozzle system approx. 3 kg, switch box approx 1 kg (emulsion tank, compressor and switch box usually are mounted on the drawing vehicle)
11. Weight distribution Balance	Balanced so that the FEREX probes typically remain vertical
12. Other specifications	DGPS can be integrated upon request

SYSTEM STATUS AND DEPLOYMENT

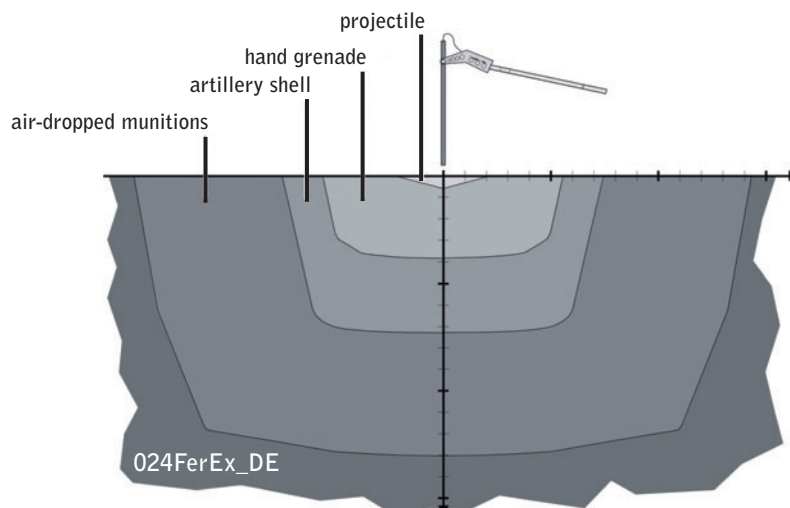
13. Status (Development In production)	In production
14. Detectors Systems in use to date	—
15. Other types Models	—
16. Location of use	—

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	No limitations
18. Temperature (limitations)	Depending on the used FEREX data logger
> Storage	-57° C to +70° C
> Operational	-35° C to +70° C
19. Water resistant (Yes / No)	Sensor cables with sealing plug available. FEREX electronics unit is highly splash-proof. See MIL-STD specs.
20. Shock Vibration resistant	See MIL-STD specs.
21. Environmental Compensation	6 operation modes for suppression of electromagnetic influences and filter for big/small objects
22. Operational hours Operating endurance	Depending on working rhythm and number of used probes: >14h with 4 probes and using alkaline batteries
> medium temperature (around 20°C)	

DETECTION OPERATION

23. Calibration Set-up	–
24. Detection range Sensitivity details Detection performance Working depth	
> Low-metal-content mines	No
> Anti-vehicle mines	Full metal case (ferromagnetic) see illustration below
> ERW (please specify)	Hand grenade; 500 lbs bomb (Mk 82); 1,000 lb bomb see illustration below
25. Output indicator	Audio by inbuilt speaker or headphones, visible on screen via evaluation software FEREX DATALINE
26. Pinpointing feature	Not applicable as evaluation is carried out with separate evaluation software
27. Adjustment of search head angle	Mechanically via hinge of the draw bar
28. Soil influence	–
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	Not relevant as vehicle with mounted sensors is drawn with speeds up to 2 m/s
31. Search coil Antenna	–
32. Limitations	Terrain were no drawing vehicle can drive
33. Interference (with other detectors)	No



POWER

34. Power supply Source	Battery
35. Operating time	>14 h with 4 probes and alkaline batteries (IEC LR 20)
36. Power supply	Not applicable since lying in the drawing vehicle
> weight	4 x 1.5V alkaline cells IEC LR 20 (ANSI standard size D)
> no. of batteries size type	Possible
> rechargeable	Not applicable
> other	

COSTS

37. Price	Upon request
> for one detector on request	Yes
> reduction for higher quantity	
38. System price	Depending on configuration
> with training	Depending on quantity
> spare parts	Available on request
> extended warranty	
39. Total	To be determined
40. Possibility to rent/lease	Available

OTHERS

41. Duration of warranty	12 months
42. Additional equipment	DATAMONITOR for navigation, Headphones, workshop equipment and tools, GPS, tachymeter total station
43. Additional technical data information	Service manuals, training programme
44. Compliant standards	Military standards (FEREX datalogger)
	MIL-STD 810E 514.4-1
	Vibration
	MIL-STD 810E 516.4
	Mechanical shock, Procedure I
	MIL-STD 810E 516.4
	Drop test, Procedure IV
	MIL-STD 810E 501.3
	High temperatures
	MIL-STD 810E 502.3
	Low temperatures
	MIL-STD 810E 506.3-1
	Rain
	MIL-STD 810E 503.3
	Temperature shock (transport)
	MIL-STD 810E 512.2
	Leak test
	MIL-STD 810E 505.3
	Solar radiation (sunshine), Procedure I
	MIL-STD 461DRE 102 5.3.13.1
	Radiation
	MIL-STD 461DRS 103
	Irradiation
	EMC according to MIL-STD 461D



MINELAB STMR MK II ARRAY

Minelab Electronics Pty Ltd. | Australia

GENERAL DESCRIPTION

The *Minelab STMR (single transmit multiple receive) Mk II* was originally designed and developed for the Australian Department of Defence's successful Rapid Route and Area Mine Neutralisation System (RRAMNS) Concept Technology Demonstrator in 2003. Due to its proven capability, it was selected for further development in the US Force Protection Demining, which led to the Nemesis demining system.

STMR has undergone continued development and is now available as a Mk II version, which includes the advanced sensing head that permits ferrous and non-ferrous discrimination. STMR Mark II can be configured with:

- > standard sensing head (fixed)
- > standard sensing head (flexible)
- > advanced sensing head (monolith).



Fixed sensor head

STMR Mk II comprises a sensor head containing a large transmit coil and multiple receive coils, and an electronic enclosure that contains the power supply and electronics. The advantage of the STMR system comes from the uniform transmit field that is produced. Signal-to-noise ratios are reduced thereby increasing depth of detection and sensitivity to large and small targets typical of ERW and landmine characteristics.

STMR Mk II is ideal for route and area clearance operations and can be combined with other sensors such as GPR and Thermal Imagery. Minelab's Windows-based software allows an operator to view real-time display of target information.

The sensor head can be located in the front, to the side or towed behind a vehicle and can be dragged along or lifted above a surface depending on the requirements of the customer.

WORKING CHARACTERISTICS

STMR incorporates Minelab's renowned and proven Multi-Period-Sensing technology also contained in the F1A4 and F3 hand-held detectors. Using pulse induction, three target channels and one ground channel allow the system to automatically compensate for mineralised ground.

Selectable digital low-pass filters allow the system to operate at speeds up to 15 km/h although higher speeds of operation can be achieved if required.

The system operates on vehicle power and a data link is achieved via 100 MB/s Ethernet to a host PC or any system capable of TCP/IP communications.

The sensor head can be manufactured to either a 1.8 m or 3.2 m width and cable length from sensor head to electronics enclosure can reach up to 6 m.

Through a GPS interface, target locations can be logged and investigated later if required.

DETECTORS IN USE

STMR has been supplied to several militaries and commercial demining companies.

POWER SUPPLY

STMR operates on a 24V DC power supply (5A max).



Flexible sensor head

MINELAB STMR MK II ARRAY

Minelab Electronics Pty Ltd. | Australia

FACTORY SUPPORT

- > Customer support is provided from either Minelab facilities in Australia, the US or Ireland.
- > Minelab offers comprehensive “train the trainer” operator and technical maintenance training in the field or in classroom facilities.
- > All training documentation is provided free as part of a training management plan. The principal language is English with other languages provided on request.
- > All Minelab trainers are experienced instructors qualified in adult education techniques.
- > Where required, Minelab establishes in-country technical repair and maintenance for all warranty and non-warranty repairs. This provides timely access to spare parts.
- > Where applicable, routine customer visits to provide advice on training and maintenance are provided free as part of Minelab’s global travel commitments.
- > Manufacturers warranty is for 12 months with extended warranty provided on a case-by-case basis.



Enclosure & Laptop Display



Electronics enclosure

MAINTENANCE AND SUPPORT

- > STMR is designed to enable fast and simple replacement of modular components in the field.
- > No special tools are required and Level 2 maintenance is achievable through basic workshop facilities.

TEST AND EVALUATION

The following trials have been conducted on the STMR and are available from the manufacturer on request:

- > Internal Minelab field test reports.
- > Australian Department of Defence, RRAMNS Project.
- > Applied Research Associates, FPDS Project.
- > Various user acceptance trials.

KNOWN LIMITATIONS AND STRENGTHS

No limitations reported to date.

Strengths, according to the manufacturer:

- > Low signal-to-noise ratio.
- > Depth and sensitivity of detection.
- > Ease of use.
- > Simple maintenance.
- > Ability to work in all soils and environmental conditions.

DETECTOR

1. Brand	MINELAB
2. Model	STMR ARRAY
3. Version	2
4. Used detection technology	Pulse induction multi-period-sensing-bipolar

DIMENSIONAL DATA

5. Working length	
> min. length	sensor head 1.8 m
> max. length	sensor head 3.2 m
6. Search head	
> Size	1,800 or 3,200 x 400 x 300 mm
> Weight	17 or 32 kg
> Shape	Rectangular fibre glass composite
7. Electronics enclosure	
> Size	535 x 500 x 350 mm 6U MIL spec.
> Weight	25 kg
8. Weight, hand-held unit	—
9. Weight, carrying (operational detection set)	—
10. Weight, additional equipment	—
11. Weight distribution Balance	—
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production development
14. Detectors Systems in use to date	Research and commercial applications
15. Other types Models	—
16. Location of use	Africa, Middle East, US

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	Nil
18. Temperature (limitations)	
> Storage	-55° C to +75° C
> Operational	-30° C to +60° C with thermal protection shutdown
19. Water resistant (Yes / No)	Min IP65
20. Shock Vibration resistant	MIL STD 4,150, 28,800
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	
> low temperature (around 0° C)	—
> medium temperature (around 20° C)	—
> high temperature (higher than 30° C)	—

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Auto
> Duration	–
24. Detection range Sensitivity details Detection performance Working depth	
> Small metal content mines (type of mine)	PMN2 55 cm IO 22 cm
> Anti-tank mines (type of mine)	ATMC > 160 cm
> ERW (please specify)	500 lb bomb > 1.8 m
25. Output indicator	Visual and audio if requested
26. Pinpointing feature	Localisation via RX coil ID
27. Adjustment of search head angle	Can be raised off ground as required and subject to target characteristics
28. Soil influence	Automatic rejection and compensation
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	Up to 15KPH (higher speed if required)
31. Search coil Antenna	Single TX multiple RX Each RX module 400 x 280 x 30 mm
32. Limitations	NIL
33. Interference (with other detectors)	–

POWER

34. Power supply Source	24V DC
35. Operating time	–
36. Power supply	Vehicle

COSTS

37. Price	
> for one detector on request	More than US\$ 5,000
> other information regarding price	POA
> reduction for higher quantity	Yes
38. System price	
> with training	Subject to location and quantity purchased
> spare parts	On minelab recommendation
> extended warranty	Available
39. Total	Subject to quantity purchased
40. Possibility to rent/lease	No

OTHERS

41. Duration of warranty	12 months (extendable on request)
42. Additional equipment	Marking system optional
43. Additional technical data information	On request
44. Compliant standards	Designed to MIL STD 4,150, 28,800

Schiebel Elektronische Geräte GmbH | Austria

GENERAL DESCRIPTION

The *Schiebel VAMIDS system* provides the ability to detect low metal-content mines from a vehicular platform. It is ideal for route clearance/verification, area reduction and quality assurance. It can be mounted on virtually any medium- or heavy-duty tactical or civilian vehicle, providing an efficient and cost-effective detection system. The system is designed for use on established (although possibly primitive) routes but is also well suited for clear, open land.

The system is capable of operating at speeds of up to 10 km/h while providing real-time detection, which significantly increases the productivity of clearance operations. VAMIDS is based on the proven technology of the AN-19/2 Mine Detecting Set, by combining this technology with a sophisticated visualisation and marking system.

VAMIDS allows its operators to quickly and efficiently detect landmines and mark the ground prior to clearance. The marking system is designed to accurately mark the location of targets and the cleared lane using an easily identifiable fluid. With up to eight spray nozzles per metre the system provides highly accurate, target-proportional marking capability. The criteria for marking is selected and controlled via the VAMIDS Manager software. A wide variety of marking fluids may be used.



SCHIEBEL VAMIDS in service in Sudan

WORKING METHODOLOGY

The flexible arrays are pulled over the ground, ensuring optimal coverage. The individual detection heads are mounted on a flexible drawbed structure that serves as a wear sheet, both supporting and protecting the assembled detection heads.

VAMIDS requires only one dedicated operator, who can normally be trained on all operational aspects within a day. All functions are controlled, and all parameters are set, using the VAMIDS Manager software.

Once the system is calibrated (in a metal-free area), and a functional check is completed, the system is ready for deployment. The operator may observe the metal content in the ground under the machine with the real-time display on the system console. The operator has full control over all marking and safety alarm parameters.

POWER SUPPLY

- > The control unit is powered from a nominal 12V up to 36V DC standard vehicle battery. The input power is fused and filtered on the power card.
- > All DC-DC converters can operate over an input range from 10V DC to 40V DC thereby providing large margins for the specified nominal battery supply voltage.

DETECTORS IN USE TO DATE

VAMIDS has been purchased and used by humanitarian and commercial demining organisations in several countries. No further detailed information is given by the manufacturer.

FACTORY SUPPORT

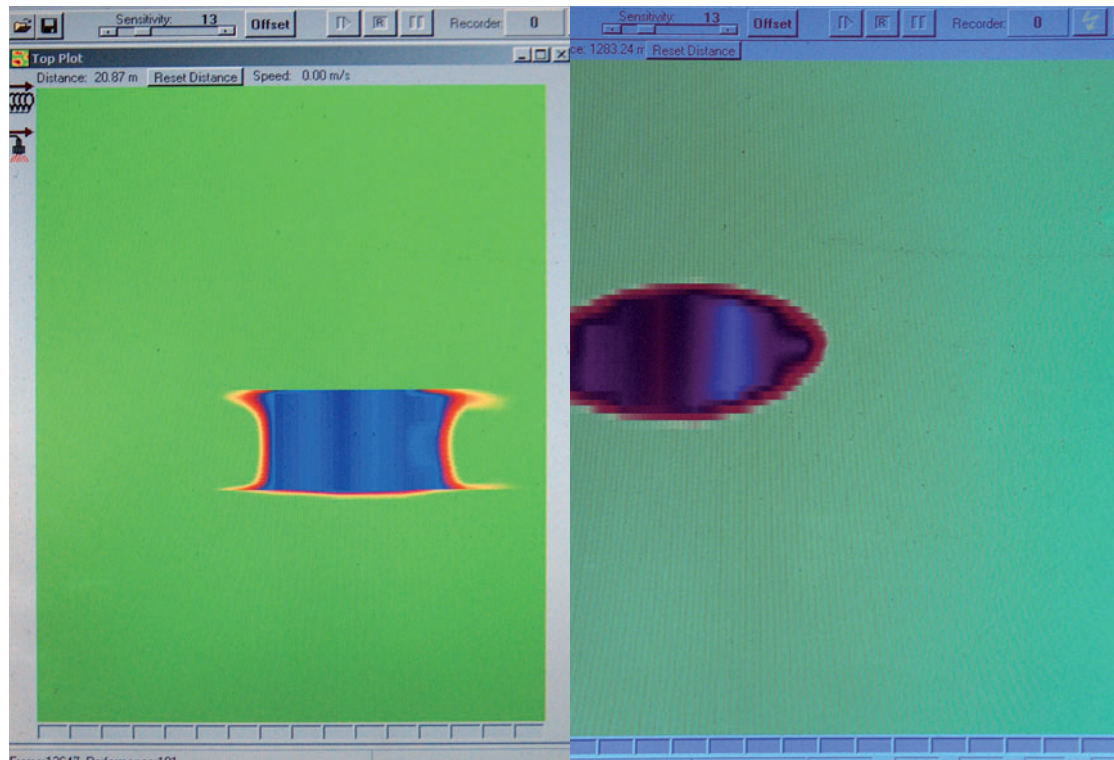
- > All systems are covered by a 12-month, no-cost warranty and operator / maintenance training is provided (on site or at the factory as requested) as part of the procurement package. Further training can be provided for a fee.
- > Spare parts are available for a period of 10 years after purchase. These can be obtained directly from the factory or from the worldwide network of Schiebel agents;
- > Operator and maintenance manuals are provided in most major languages (eg English, German, Spanish, etc.);
- > Schiebel factory repairs or technicians are available to provide additional support worldwide whenever required.

MAINTENANCE AND SUPPORT

With its rugged design VAMIDS requires little maintenance and can be upgraded to the latest modification state. Most repairs can be carried out, at field level, by Schiebel-trained personnel. Workshop repairs can be carried out by Schiebel-trained technicians, using the recommended tools and test equipment.



SCHIEBEL VAMIDS in service in Sudan



TM 57 VAMIDS images

MAINTENANCE AND SUPPORT

- > STMR is designed to enable fast and simple replacement of modular components in the field.
- > No special tools are required and Level 2 maintenance is achievable through basic workshop facilities.

TEST AND EVALUATION

The following trials have been conducted on the STMR and are available from the manufacturer on request:

- > Internal Minelab field test reports.
- > Australian Department of Defence, RRAMNS Project.
- > Applied Research Associates, FPDS Project.
- > Various user acceptance trials.

KNOWN LIMITATIONS AND STRENGTHS

No limitations reported to date.

Strengths, according to the manufacturer:

- > Low signal-to-noise ratio.
- > Depth and sensitivity of detection.
- > Ease of use.
- > Simple maintenance.
- > Ability to work in all soils and environmental conditions.

DETECTOR

1. Brand	Schiebel Elektronische Geräte GmbH
2. Model	VAMIDS™ Vehicular Array Mine Detection System
3. Version	2.0
4. Used detection technology	Pulse mode

DIMENSIONAL DATA

5. Working length	
> min. length	Min. 1 m array
> max. length	Max. 6 m array
6. Search head	
> Size	1,168 mm wide; 613 mm long; 150 mm thick per metre array
> Weight	20 kg per metre array
> Shape	Search head is round; array is rectangular
7. Transport case	
> Weight	—
> With equipment (full)	—
> Dimensions	—
> Hard Soft case (material)	—
8. Weight, hand-held unit	—
9. Weight, carrying (operational detection set)	—
10. Weight, additional equipment	—
11. Weight distribution Balance	—
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	—
16. Location of use	Not given

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	No
18. Temperature (limitations)	Virtually none
> Storage	-55° C to +85° C (-67° F to +85° F)
> Operational	-40° C to +55° C (-40° F to +131° F)
19. Water resistant (Yes / No)	Yes
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	Not applicable

DETECTION OPERATION

23. Calibration Set-up	Not applicable
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Depending on soil and properties of target
> Small metal content mines (type of mine)	Type 72A - 18 cm M14 - 14 cm
> Anti-tank mines (type of mine)	Metal anti-vehicle at 1 m; plastic anti-vehicle nearly all types at operational threat depth
> ERW (please specify)	NATO standard 7.62 rounds at 40 cm, AK 47 at 30+ cm all larger items down to 1 m in depth
25. Output indicator	Visual, acoustic, data-based, and electric relay-based galvanically separated output
26. Pinpointing feature	No
27. Adjustment of search head angle	–
28. Soil influence	Can operate in light magnetic soil with reduced but normally acceptable performance
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	No
30. Optimal sweep speed	Vehicle velocity 0-15 km/h
31. Search coil Antenna	8 coils per metre up to 48 coils
32. Limitations	Medium and heavy magnetic soil
33. Interference (with other detectors)	None at distance above 2 m separation

POWER

34. Power supply Source	Standard vehicle battery
35. Operating time	–
36. Power supply	12 up to 36V DC

COSTS

37. Price	
> for one detector on request	US\$ 3,000 - US\$ 4,000
> reduction for higher quantity	Yes
38. System price	
> with training	Included
> spare parts	As required
> extended warranty	Available
39. Total	To be determined
40. Possibility to rent/lease	Yes

OTHERS

41. Duration of warranty	12 months
42. Additional equipment	–
43. Additional technical data information	Available
44. Compliant standards	MIL-D-0023359G; ISO 9001

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon VMV8 metal detector* has been designed to be mounted on a vehicle to locate metal objects in the ground, eg metal mines, plastic mines with a bigger metal part and ERW. Quality control is considered to be one of its most suitable applications.

The unit consists of a search head, waterproof detection and evaluation electronics, and a laptop with Vallon EVA2000 software to display metal parts, to operate the unit and for documentation.

The search head is customer tailored and can be mounted on the front or side of the vehicle or on a trailer or on a drag mat. The VMV8 is very robust and can operate in all weather, soil and climate conditions.

This unit is also highly suitable for the integration of multi-sensor-platforms, using gradient magnetometers, infrared, ground penetration radar, or microwaves for detection.



VMV8 mounted on a jeep



Laptop Display

Main components of the VMV8 are

- > Central electronics in a weatherproof housing:
 - > with eight EMI-detection channels based on the pulse induction method with eight voltage stabilisations, eight transmitters and eight receivers, eight digital-analog converters as well as eight interfaces for data transfer
 - > Server electronics with output for Fast Ethernet to PC; with connectors for 1 x DGPS, eight x active (EMI) sensors
 - > DC input voltage: 12-30V;
 - > Relay box, 16 channels, provided for:
- > Rugged portable laptop with Vallon EVA2000 2.X software for data recording and evaluation;
- > Search head made from glass fibre, dimensions approx. 200-300 x 46 cm with eight ea. integrated detection coil systems (other dimensions on request);
- > Mounting kit (glass fibre bars) and protective spoiler.

WORKING METHODOLOGY

The search head has eight electromagnetic sensors emitting pulses. There is a short pause between each magnetic pulse. The electromagnetic reaction of metal objects is registered during these pauses and led to the central control unit.

The detector automatically adjusts itself to the natural conditions of the ground. Detection can be carried out even in adverse soil conditions, such as magnetite, and in soils with changing conductivities. The sensitivity level of the detector is adjustable but remains constant even under changing ground or water conditions.

Data are transferred to the laptop which provides complete system operation and data evaluation, which is displayed in real time as colour maps, bargraphs or measuring curves.

DETECTORS IN USE

The detectors are in service with several armed forces and commercial mine clearance organisations.

POWER SUPPLY

- > The power supply accepts car batteries with 12 or 24V DC. The internal controls stabilise voltage fluctuations between 10-32V DC.
- > Safety fuse: 4 amps.
- > DC converter from 12V to 30V is included.

FACTORY SUPPORT

- > The manufacturer has several service stations around the world with current spare parts on stock. Spare parts and related maintenance manual excerpts can be provided directly to the customer for repair at site.
- > The manufacturer offers operation and maintenance training at their facilities or on site worldwide.
- > Operation and maintenance manuals are available in different languages.
- > Warranty for 24 months.

MAINTENANCE AND SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The maintenance manual has step-by-step explanations for repairs.

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

No information available.

DETECTOR

1. Brand	VALLON
2. Model	VMV8
3. Version	Vehicle mounted metal detector
4. Used detection technology	Metal detector Pulse induction

DIMENSIONAL DATA

5. Working length	
> min. length	150 cm (distance to vehicle)
> max. length	208 cm (distance to vehicle)
6. Search head	
> Size	200 - 300 x 46 cm (other sizes on request)
> Weight	35 kg
> Shape	Rectangle
Protective spoiler	
> Size	205 - 305 x 74 cm
> Weight	15 kg
> Shape	U form
7. Transport case	
> Weight	85 kg
> With equipment (full)	160 kg
> Dimensions	310 x 78 x 50 cm
> Hard Soft case (material)	Wooden case
8. Weight, hand-held unit	Not applicable
9. Weight, carrying (operational detection set)	Not applicable
10. Weight, additional equipment	Not applicable
11. Weight distribution Balance	Not applicable
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	VMXV4 for combined metal and UXO detection
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIL STD 810F
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes up to 1.5 m (search head)
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	Works with vehicle's battery

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment
> Small metal content mines (type of mine)	Not recommended by the manufacturer
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Sound and notebook display
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Manual
28. Soil influence	Automatic and adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.2 to 2 m/s
31. Search coil Antenna	Rectangle 200 - 300 x 46 cm and on request
32. Limitations	
33. Interference (with other detectors)	Distance of 16 m

POWER

34. Power supply Source	Car battery
35. Operating time	Unlimited
36. Power supply	
> weight	–
> no. of batteries size type	Car battery 12 or 24V
> rechargeable	Yes
> other	Works from 12 to 30V

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Upon request
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Colour marking system upon request
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1

Vallon | Germany

GENERAL DESCRIPTION

Vallon's vehicle-mounted multi-sensor systems can be customised for time-saving detection of unexploded ordnance, metallic mines or other metal-residue waste over large areas on land or in water. Such combinations of metal detectors and difference magnetometers (fluxgate) have been available from Vallon since 1999.

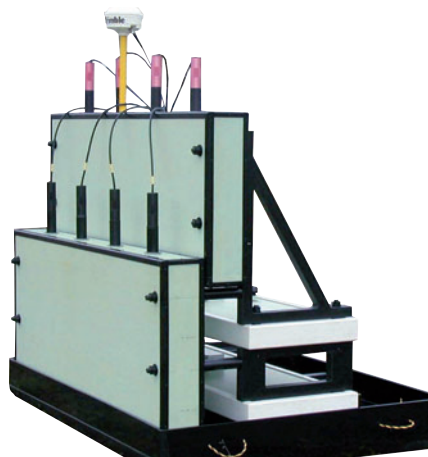
The VMXV8 can be customised for several specifications but its operation is based on its standard electronics unit for the multi-sensor applications. The search head and the sensors are customised platforms with a maximum 16 channels. The measured values are transferred to a rugged laptop which serves as an operation panel and data acquisition unit.

To achieve data recording true to scale it is recommended to keep the driving speed absolutely constant or to use a Digital Global Positioning System (DGPS) navigation system which allows the driver to examine the complete area without any blind spots.

The laptop is provided with the Vallon EVA2000 2.X evaluation software which not only allows data recording and navigation but also subsequent evaluation of survey data and control of a relay box to connect, for example, colour marking systems.



The multisensor operates in the water



The VMXV 3D Sensorsystem

Main components of the VMXV8

- > Multisensor electronics in a weatherproof housing
- > Customised sensor platform for EMI and fluxgate sensors for land and/or underwater application
- > Relay box with 8-16 channels, potential free contacts
- > USB Memory Stick
- > Portable laptop with USB memory stick, data transfer cable and and 12V DC-adapter
- > Vallon EVA2000 2.X software

WORKING METHODOLOGY

The complete version comprises a multi-sensor platform with fluxgate sensors and/or EMI-sensors. Several differential magnetometers are arranged in one array across the walking/driving direction on a metal-free frame. The sensors detect interferences of the normally homogenous magnetic field of the earth. Steel and iron objects in the ground or in the water affect the earth's magnetic field.

Metal detectors transmit pulses and produce information if they meet metallic objects. In practice, these sensors consist of round or oval search heads, which are arranged side by side and/or one on top of the other. Active sensors are well suited for the detection of metallic objects close to the ground surface or large objects at greater depth.

Data recording is made directly by connecting the sensor electronics to a laptop (using MS Windows 2000/XP/Vista and the VALLON EVA2000 2.X software. The software can simultaneously record data from up to 16 sensors and GPS. During data survey, the measured values are displayed in real time and the covered distance is displayed in real time for navigation.

DETECTORS IN USE

The system is in operation worldwide with commercial mine clearance organisations and border surveillance.

POWER SUPPLY

The detection system accepts input voltages between 12 and 30V DC.

FACTORY SUPPORT

The manufacturer offers operation and maintenance training at their facilities or on site worldwide. Spare parts can be supplied in very short time. Warranty is for 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The maintenance manual has step-by-step explanations for repairs.

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

No information is available.

DETECTOR

1. Brand	VALLON
2. Model	VMXV
3. Version	Vehicle mounted multi sensor system (customized solutions)
4. Used detection technology	Metal detector (EMI) and/or difference magnetometer (fluxgate)

DIMENSIONAL DATA

5. Working length	
> min. length	Depending on the customer’s requirements
> max. length	Depending on the customer’s requirements
6. Search head	
> Size	Customized from 1 to 4 m detection width
> Weight	Depending on construction
> Shape	Rectangle
Protective spoiler	
> Size	Depending on search head size
> Weight	Depending on search head size
> Shape	Depending on search head size
7. Transport case	
> Weight	Depending on the customer’s requirements
> With equipment (full)	Depending on the customer’s requirements
> Dimensions	Depending on the customer’s requirements
> Hard Soft case (material)	Wooden case
8. Weight, hand-held unit	Not applicable
9. Weight, carrying (operational detection set)	Not applicable
10. Weight, additional equipment	Not applicable
11. Weight distribution Balance	Not applicable
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development In production)	In production
14. Detectors Systems in use to date	Not given
15. Other types Models	VXV4 for UXO detection only or VMV8 for mine detection only
16. Location of use	Worldwide land and/or underwater

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIL STD 810F
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Depending on the customer’s requirements
20. Shock Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours Operating endurance	Depending on the customer’s requirements

DETECTION OPERATION

23. Calibration Set-up	
> Auto Manual	Automatic
> Duration	A few seconds
24. Detection range Sensitivity details Detection performance Working depth	
> Control of working depth	Sensitivity adjustment
> Small metal content mines (type of mine)	Depends on the construction
> Anti-tank mines (type of mine)	Depends on the construction
> ERW (please specify)	Depends on the construction
25. Output indicator	Alarm sound and visual display on PC screen
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Manual
28. Soil influence	Automatic and adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	EMI: yes; Fluxgate: limited
30. Optimal sweep speed	Depending on used sensors up to 10 km/h
31. Search coil Antenna	EMI and/or fluxgate
32. Limitations	
33. Interference (with other detectors)	EMI: distance of 16 m

POWER

34. Power supply Source	Car/truck battery
35. Operating time	Unlimited
36. Power supply	
> weight	Not applicable
> no. of batteries size type	Car/truck battery
> rechargeable	Yes
> other	Works from 12 to 30V DC

COSTS

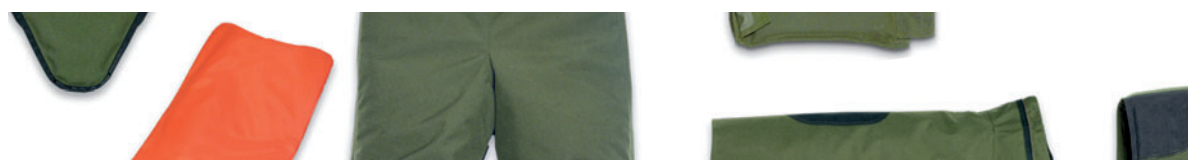
37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Upon request
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Max 24 months
39. Total	Upon request
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Depending on the customer's requirements
43. Additional technical data information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1

PERSONAL PROTECTIVE EQUIPMENT

PROTECTIVE CLOTHING



ADVANCED CLEARANCE ENSEMBLE ACE

Allen-Vanguard Corporation | Canada

GENERAL DESCRIPTION

The newest of Med-Eng (now under Allen Vanguard) personal protective equipment (PPE), the *Advanced Clearance Ensemble* provides full body protection. The modular component design allows for the addition of trousers, sleeves and blast or ballistic plates without assistance. The equipment offers easy assembly with fasteners and pull cords for emergency extraction with minimal movement.

Primary features are

- > Scalable, modular components.
- > Multi-purpose protective platform.
- > Suitable for multi-threat environments.
- > Lightweight, comfortable fit.
- > Continuous fragmentation protection.
- > Ballistic protection to the torso.

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL	MATERIAL SPECIFICATIONS	MASS
V50 level according to NATO STANAG 2920	Layered Aramid fibre	15.5 kg (vest, blast plates and pouch, sleeves and trousers) based on medium size

COLOUR OPTIONS AND SIZE

The standard colour is olive and the kit is available in small, medium small, medium and large sizes. Med-Eng's PPE for deminers and ERW technicians is comprised of soft and rigid ballistic inserts. All equipment is machine washable once inserts are removed and has a seven-year life expectancy. Details can be provided by the manufacturer on request.



MED-ENG demining apron in operation

TEST AND EVALUATION

All Med-Eng PPE products have been tested in live blast testing at DRES (Defense Research Establishment Suffield) using the NATO STANAG 2920 and IMAS 10.30 PPE standards. Internal test reports can be provided by the manufacturer on request.

COST

Not given.

LIGHTWEIGHT DEMINING ENSEMBLE (LDE)

Allen-Vanguard Corporation | Canada

GENERAL DESCRIPTION

The *Lightweight Demining Ensemble (LDE)* has been in production since 1999 and provides continuous frontal protection. The modular system allows for additional full body protection when combined with protective sleeves, back protector and breast and groin steel add-ons. The kit is lightweight and flexible and can be worn in all climates without body cooling equipment.



LDE in service



LDE gray apron



LDE ballistics add-ons



Primary features are

- > The apron's chest plate integrates with the VBS-250 Visor Band System or LDH Helmet for continuous protection of the upper body, neck and head.
- > Lightweight design reduces heat stress and fatigue.
- > Retractable groin plate for easier kneeling.
- > Trousers include thigh and shin plates for greater protection.
- > Scalable protection platform to provide more balanced, full-body protection.

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL	MATERIAL SPECIFICATIONS	MASS
V50 level according to NATO STANAG 2920	Layered Aramid fibre	8.56 kg (apron and trousers), based on medium size

COLOUR OPTIONS AND SIZE

The standard colours are olive, but also available in gray, each with black trim and the kit is available in extra small, small, medium small, medium and large sizes. Med-Eng (now under Allen Vanguard) PPE is comprised of soft and rigid ballistic inserts. All equipment is machine washable once inserts are removed and has a seven-year life expectancy. Details can be provided by the manufacturer on request.

TEST AND EVALUATION

All Med-Eng PPE products have been tested in live blast testing at DRES (Defense Research Establishment Suffield) using the NATO STANAG 2920 and IMAS 10.30 PPE standards. Internal test reports can be provided by the manufacturer on request.

COST

Not given.

SRS-5 SUIT & HELMET ENSEMBLE

Allen-Vanguard Corporation | Canada

GENERAL DESCRIPTION

Since 1999, Med-Eng (now under Allen Vanguard) has been providing high demining protection levels with the *SRS-5 Suit & Helmet Ensemble*. The ensemble is the only head-to-toe protective system of Allen Vanguard that allows mine clearance personnel to operate on the widest range of blast-type anti-personnel mines. A built-in fan allows for ventilation and cooling in the helmet along with an anti-fog appliqué on the visor to reduce misting. The manufacturer offers the BCS-4 cooling system and mentions that it is recommended for use with the SRS-5. Details will be given by the manufacturer on request.

SRS 5 Suit | Primary features are

- > Additional frontal chest and groin protection, including an integrated groin protector.
- > Retractable groin plate for easier kneeling.
- > Break away zippers, fasteners and pull cords for quick emergency extraction.

SRS 5 Helmet | Primary features are

- > Provides full face, neck and head protection.
- > Wide field of view.
- > Advanced retention system for stability.
- > Three visor options | VB-250, VBE-580 and VBC-250.
- > Visors integrate with SRS-5 Suit collar for continuous protection.
- > Optional communication connections for select radios and mine detectors.



The SRS-5 suit in use

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL	MATERIAL SPECIFICATIONS	MASS
V50 level according to NATO STANAG 2920	Layered Aramid fibre	19.59 kg (jacket with chest and & groin plates, trousers and back protector and integrated groin protector); 3.2 kg (helmet with visor) based on medium size

COLOUR OPTIONS AND SIZE

The standard colour of the SRS-5 ensemble and the helmet is olive and the ensemble is available in small, medium small, medium and large sizes; the helmet is available in medium and extra large sizes. Med-Eng PPE is comprised of soft and rigid ballistic inserts. All equipment is machine washable once inserts are removed and has a seven-year life expectancy. Details can be provided by the manufacturer on request.

TEST AND EVALUATION

All Med-Eng PPE products have been tested in live blast testing at DRES (Defense Research Establishment Suffield) using the NATO STANAG 2920 and IMAS 10.30 PPE standards. Internal test reports can be provided by the manufacturer on request.

COST

Not given.



The SRS-5 suit prodding in kneeling position

DEMINEING APRON

Allen Vanguard Corporation | Canada



A deminer wears the Demining Apron

GENERAL DESCRIPTION

Since 2001, the Med-Eng (now under Allen Vanguard) *demining apron* has addressed the need for comfort and flexibility while providing basic protection against threats from blast-type anti-personnel mines. While providing frontal protection, the apron is lightweight with an open back to provide necessary ventilation and allow heat to disperse in hot, humid climates.

Primary features are

- > A one-piece garment easily put on and removed.
- > Frontal protection from the shoulders to the upper thighs.
- > Rigid chest plate for fragmentation, overpressure and impact protection.
- > Chest plate integrates with the VBS-250 Visor Band System or LDH Helmet for continuous protection of the upper body, neck and head.
- > Apron weight is distributed around the hips to reduce risk of neck strain.

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL	MATERIAL SPECIFICATIONS	MASS
V50 level according to NATO STANAG 2920	Layered Aramid fibre	3.41 kg (apron only) based on regular size

COLOUR OPTIONS AND SIZE

The standard colour of the apron is charcoal grey and the kit is available in regular or large sizes. Med-Eng PPE is comprised of soft and rigid ballistic inserts. All equipment is machine washable once inserts are removed and has a seven-year life expectancy. Details can be provided by the manufacturer on request.



Demining Apron



Demining Apron in operation

TEST AND EVALUATION

All Med-Eng PPE products have been tested in live blast testing at DRES (Defense Research Establishment Suffield) using the NATO STANAG 2920 and IMAS 10.30 PPE standards. Internal test reports can be provided by the manufacturer on request.

COST

Not given.

DC PROTECTION VEST

Dachring Advanced Material Co. Ltd | China

GENERAL DESCRIPTION

The internal layer of the *DC bulletproof protection vest* is made of ultra high molecular weight polyethylene (UHMWPE) material, an advanced material which is light weight, soft, comfortable, UV resistant and waterproof. It provides high energy absorption and fast shock wave dissipation, so it is suitable for ballistic/blast field.

The outer shell of the vest is made of polycarbonate components, which allows ventilation. It is water resistant and there are several pockets on the surface, including those for the reinforced plates. The outer cover can be adjusted freely, with Velcro tapes on the shoulder and waist, The outer cover is washable at 40°C but can not be dry cleaned. A trauma pad inside the outer cover provides extra protection. The protection area of different models varies from 0.25 m² to 0.4 m².

The bulletproof jacket has a protection area of 0.4 m² to 0.6 m². It is composed of polyethylene unidirectional fabric only. High molecular polyethylene fabric can absorb the heat and striking of bullets. The body armour is attached to the body with Velcro straps and is easily put on and removed. The outer cover is washable but can not be dry cleaned.



Protection Vest DC2-3B

Protection Jacket DC2-4

Protection Jacket DC2-5

PROTECTIVE PERFORMANCE | MASS

MODE	PROTECTION LEVEL	MATERIAL SPECIFICATIONS	MASS
DC2-3	Protection vest, NIJ IIIA level, to protect against 44 Magnum, lead semi-wadcutter bullets with gas checks, nominal masses of 15.55 g (240 gr) and impacting at a velocity of 426 m (1,400 ft) per second or less, and 9 mm full-metal jacketed bullets, with nominal masses of 8.0 g (124 gr) impacting at 426 m (1,400 ft) per second or less. It also provides protection against most handgun threats and all kinds of fragment.	UHMWPE material fiber with high tenacity and high modulus, and ceramic composite plate	2 to 4 kg
DC2-4 & DC2-5	Protection jacket, NIJ IV level, with insert plate on front/back to protect against 30 calibre armour-piercing bullets (U.S. military designation APM2), with nominal masses of 10.8 g (166 gr) impacting at 868 m (2,850 ft) per second or less.	UHMWPE material, and Ceramic composite plate	5 to 8 kg

The body armour is available in white, black, blue and all kinds of camouflage, and in small, medium, large, extra large and extra extra large sizes.

Product life expectation: five years.

EQUIPMENT IN USE TO DATE

The protection vest has been used by the police forces of Henan Yunnan and Zhejian in China, and by other clients in France, Greece, Iran, Iraq, Israel, Korea, Nigeria, Russia, Saudi Arabia, United Arab Emirates, U.K, and USA.

TEST AND EVALUATION

Tests are conducted using the standard NIJ STAND 0101.04, and by the test agency, Quality Supervision and Test Center of Bulletproof Products of the China Ordnance Industry. Test reports can be provided by the manufacturer on request.

COST

Protective vest: US\$ 320

Protective jackets: no information provided by the manufacturer

ENVOSTAR DEMINING BODY ARMOUR

ENVOSTAR Co Ltd | Cambodia

GENERAL DESCRIPTION

The *Envostar demining body armour* provides frontal protection from the shoulders to the upper thighs. Specially fixed extensions protect the vulnerable armpit areas. The modular system consists of a backless apron – a back panel can be mounted – and backless trousers. The front ruff is designed to overlap the visor to ensure continuous protection for both the upper body and face.

The lightweight design helps to minimise hazards caused by heat stress and fatigue. The apron is well suited for hot and humid climates.

The outer cover is washable and can be replaced if worn out. According to the manufacturer, the apron design is most suitable for the kneeling position.

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL

V50-450 m/sec according to standards MIL-STD-622F and NATO/STANAG 2920 using calibre 0.22, 17 grain fragment simulating projectiles conforming to MIL-P-46593A and UNMAS IMAS 10.30.

MATERIAL SPECIFICATIONS

Protective panels are water-repellent treated, and manufactured by the Twaron company. The outside cover is made of cotton and can be easily replaced. On request the manufacturer offers fire-resistant fabrics Tecasafe or Normex for the cover.

MASS

Apron: 2 kg (medium size)
Trousers: 1.8 kg



Demining body armour

COLOUR OPTIONS

The demining body armour is available in several colours.

TEST AND EVALUATION

Test reports can be provided by the manufacturer on request. According to the manufacturer, the equipment has been regularly tested by H.P. White Laboratories, Maryland, USA.

EQUIPMENT IN USE TO DATE

ENVOSTAR have exported the demining body armour to 41 countries, and approximately 15,000 vests have been produced over the last 10 years.

COST

US\$ 210 for the apron, up to US\$ 1,200 for the whole demining body armour.

GARANT HOLDFAST DEMINING APRON WITH SHIN GUARDS TYPE HDA-1

GARANT Sicherheitstechnik | Germany and Switzerland

GENERAL DESCRIPTION

The *HDA-1 demining apron* was developed and field tested in conjunction with demining operators working in difficult and harsh environments. The apron provides a large area of frontal protection together with the helmet type HDH-1, helmet type LSH-4 or the demining visor DVH-1.

The apron is durable, has a rugged design and can be serviced in the field. It is well suited for hot and humid climates, has a washable outer and parts can be replaced if worn. It is suitable for kneeling and upright positions and can be put on and taken off conveniently. It is easily removed in case of injury and can be equipped with special pouches for tools.

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL	MATERIAL SPECIFICATIONS	MASS
Manufactured according to IMAS 10.30 STANAG 2920 MIL-STD-662F	Outer cover: Cordura (other materials are available on request) Inner part: Aramid	Approx. 4 kg (depending on size)

COLOUR OPTIONS AND SIZE

The HDA-1 is available in several colours, eg navy blue, black, green, desert sand. Other colours are available on customer specification. Available sizes are small, medium, large and extra large. Other sizes available on request.

EQUIPMENT IN USE TO DATE

Garant clients include militaries, police forces, special forces, bomb squads, customs authorities, the United Nations and NGOs. The product range comprises body armour, vehicle and aircraft armouring, semi-finished products and components. The company is specialised in this field and offers state-of-the-art solutions, products, services and training to a demanding clientele.

TEST AND EVALUATION

Test reports can be provided by the manufacturer on request. According to the manufacturer, the equipment has been regularly tested by independent test laboratories.

All products are manufactured according to the ISO 9001:2000 quality assurance standard.

COST

Prices available on request.

COMPATIBILITY OF COMPONENTS

	GARANT Holdfast demining visor DVH-1	GARANT Holdfast demining helmet HDH-1	GARANT Holdfast search suit helmet LSH-4	Other equipment eg "Bfr Boots"
GARANT Holdfast search suit LSA-4	X	X	X	X
GARANT Holdfast demining vest HDV-1	X	X	X	X
HDA-1	X	X	X	X



A deminer wears the Demining Apron



Demining Apron kneeling

GARANT HOLDFAST DEMINING VEST TYPE HV-1

GARANT Sicherheitstechnik | Germany and Switzerland

GENERAL DESCRIPTION

The *GARANT demining vest HDV-1* is designed for maximum comfort and as little hindrance as possible for the user, while still providing protection to all vital parts of the body. The HDV-1 optimizes protection when worn with, for example, the HDH-1 or LSH-4 helmets or with the DVH-1 demining visor.

The main features of the demining vest HDV-1 are

- > Durability, with a rugged design and can be serviced in the field;
- > Well suited for hot and humid climates;
- > Washable outer and parts can be replaced if worn out;
- > Suitable for kneeling and upright positions;
- > Easily put on and taken off;
- > Easy to remove in case of injury; and
- > Can be equipped with special pouches for tools.

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL	MATERIAL SPECIFICATIONS	MASS
Frontal protection against anti-personnel mines. Groin flap standard. Manufactured according to IMAS 10.30 STANAG 2920 MIL-STD-662F	Outer cover: Cordura (other materials are available upon request) Inner part: Aramid	Approx. 2 kg (depending on size)



Demining vest

COLOUR OPTIONS

- > The HDV-1 is available in navy blue, black, green, desert sand with other colours available on customer specification.
- > Available in small, medium, large and extra large with other sizes available on request.

TEST AND EVALUATION

Test reports can be provided by the manufacturer on request. According to the manufacturer, the equipment has been regularly tested by independent test laboratories. All products are manufactured according to the ISO 9001:2000 quality assurance standard.

COST

Prices available on request.

COMPATIBILITY OF COMPONENTS

The compatibility of all GARANT protective products are given (see article on GARANT Demining Apron).

GARANT HOLDFAST SEARCH SUIT TYPE LSA-4

GARANT Sicherheitstechnik | Germany and Switzerland



Search suit

GENERAL DESCRIPTION

The *GARANT search suit LSA-4* is a compromise between a high level of protection and maximum mobility. It can be used in any sweep search for possible improvised explosive devices or where hostile ballistic threats might exist. The protection type or level can be altered to suit on the operational situation. This is done by either inserting ceramic tiles in the front and back or by attaching blast plates to the front of the suit. It is designed to work as part of the entire demining system including, for example, with the HDH-1 or LSH-4 helmets or with the DVH-1 demining visor.

The main features of the search suit LSA-4 are

- > Durability, with a rugged design and can be serviced in the field;
- > Well suited for hot and humid climates;
- > Washable outer, and parts can be replaced if worn out;
- > Suitable for kneeling and upright positions;
- > Easily put on and taken off;
- > Easy to remove in case of injury; and
- > Can be equipped with special pouches for tools.

The suit consists of trousers, jacket and ballistic helmet with visor

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL

Manufactured according to
IMAS 10.30
STANAG 2920
MIL-STD-662F
Suit: V50 450 m/s
Helmet: V50 450 m/s
Visor: V50 450 m/s
Suit with ceramic plates:
V50 1,200 m/s
Suit with blast plates:
V50 1,000 m/s

Other levels of protection available on customer specification

MATERIAL SPECIFICATIONS

Outer cover:
fire-retardant treated polyester
ripstop (other materials are
available on request)
Inner part: Aramid

MASS

Approx. 16 kg including helmet
and visor (depending on size)



Detailed view of the helmet

COLOUR OPTIONS AND SIZE

- > The LSA-4 is available in navy blue, black, green, desert sand with other colours available on customer specification.
- > Available in small, medium, large and extra large sizes with others available on request.

TEST AND EVALUATION

Test reports can be provided by the manufacturer on request. According to the manufacturer, the equipment has been regularly tested by independent test laboratories. All products are manufactured according to the ISO 9001:2000 Quality Assurance Standard.

COST Prices available on request.

COMPATIBILITY OF COMPONENTS

The compatibility of all GARANT protective products are given (see article on GARANT Demining Apron).

FBF210 EXPLOSION-PROOF OUTFIT

Research Institute of Surgery, Chongqing | China

GENERAL DESCRIPTION

The *FBF210 explosion-proof outfit (EPO)* composed of helmet and visor, protective suit and footwear, and was invented in 1998 to meet the demands of minesweeping on the border of China and Vietnam. It can protect against fragments and secondary projectiles of the explosion, while attenuating and alleviating the blast waves.

The protective suit protects the head, face, chest, abdomen, crotch and legs against explosive devices. The protective footwear protects the lower limbs and feet.

It is light weight, soft and comfortable to wear. The outfit can be put on and taken off conveniently. The jacket should be put on first, then the trousers. The protective jacket is open-backed which facilitates ventilation. The protective footwear can be put on without taking off the shoes.

The tool pockets on the jacket do not hamper protective performance. The size and number of the pockets can be changed on request.

The protective outfit can be used on slopes below 45° and is also suitable for use in jungles, coasts and deserts. It provides effective protection in the standing, kneeling or prone positions.

The outfit can be used in rainy conditions and in temperatures between -40° C up to + 65° C. Product life is estimated at 10 years, but the equipment can not be used again after being hit by fragments or bullets, whether the material is penetrated or not.

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL	MATERIAL SPECIFICATIONS	MASS
Helmet and protective suit protect against the injuries of prefabricated flinders from fragmentation mines within 650 TNT package at the 35 m from the explosion centre		
Helmet and visor V ≤ 550 m/s 0.72 g steel ball.	Helmet: Kevlar	
Protected area of the visor: 690 cm ²	Visor: carbonised fibre	
Protective suit V ≤ 630 m/s 0.72 g steel ball	Dyneema Fraglight	Jacket 2.6 kg Trousers 4.1 kg
Protective footwear No amputation should occur within the package of 210 g TNT explosion. ¹	Dyneema Fraglight	< 6.0kg

¹ According to the manufacturer.



EPO suit

COLOUR OPTIONS AND SIZE

- > The standard colour is camouflage but other colours are available on request.
- > The protective suit and footwear are available in small, medium and large, with other sizes available on request.

The EPO is in service in the demining missions in Yunnan and Guangxi provinces of China. Other clients are in Afghanistan, Congo, Eritrea, Lebanon, Pakistan, Thailand and Turkey.

TEST AND EVALUATION

The outfit was tested by the Research Institute of Engineer Equipment Test and Verification of the General Equipment Department in China. Results are available from the manufacturer on request.

IN USE TO DATE

The EPO is in service with demining missions in Yunnan and Guangxi Provinces of China, and in Afghanistan, Congo, Eritrea, Lebanon, Pakistan, Thailand and Turkey.

COST

- > The whole outfit: 11,800 yuan (US\$ 1,731);
- > Helmet and visor: 2,200 yuan (US\$ 322);
- > Protective clothes (jacket and trousers): 6,000 yuan (US\$ 880);
- > Footwear: 3,600 yuan (US\$ 528).

(Currency conversion as of 1 December 2008.)

ROFI ARMADILLO DEMINING VEST

ROFI Industrier | Norway

GENERAL DESCRIPTION

The *ROFI Armadillo demining vest* is the company's next generation of demining equipment with a focus on user comfort for higher efficiency in field operations. The Armadillo has been developed in close cooperation with Norwegian People's Aid and Kode design bureau, over four years of design, development and testing. The product won awards from the Norwegian Design Council in 2008.

With its features for mobility, ergonomics, ventilation and comfort, the Armadillo reduces the risk of fatigue, overheating and stress, all factors influencing work performance. This helps to achieve higher clearance speeds and a lower risk of accidents.

Combined with the ROFI Facemask, the vest provides the excellent protection combined with high comfort and flexibility to work. It can be used in the upright position when operating a metal detector and in both squatting and kneeling positions while prodding.

Also a Armadillo panty¹ is available and can be worn in combination with the vest and face mask.

The vest unit covers the front, abdomen, sides and shoulders, including a collar which connects the clothing and the face protection. It can also be combined with a demining apron or pants.

The vest's ballistic inserts can easily be removed, and the outer cover can be washed in a washing machine in 40° C.

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL	MATERIAL SPECIFICATIONS	MASS
V50-450 m/s According to STANAG 2920	Aramid fibre	3.4 kg (large size)

¹ For more information see: <http://www.rofi.no/Modules/Page/ViewPage.asp?modid=7067&level=7067>



ROFI ARMADILLO and face mask

COLOUR OPTIONS AND SIZE

- > Outer cover (vest) | Cordura, 1,000 denier, UN blue, sand or red. Other colours on request.
- > The vest is available in small, medium, large and extra large sizes. Other sizes on request.

TEST AND EVALUATION

ROFI Armadillo is tested in accordance with the new CEN Workshop Agreement on testing of PPE used in mine action. Test results available on request.

COST

Not given.

EQUIPMENT IN USE TO DATE

Used or purchased by following organisations: Handicap International, Landmine Action, Mine Detection and Dog Center, Norwegian People's Aid, Omar and RONCO. The vest is currently used in demining programmes in Afghanistan, Lebanon and Sudan.

ROFI FENDER HALF PROTECTED BACK (HPB) DEMINING APRON

ROFI Industrier | Norway

GENERAL DESCRIPTION

The *Fender HPB demining apron* was designed in cooperation with demining organisations working in Afghanistan to meet the specific requirements for demining in that environment. The apron protects deminers when operating metal detectors in the upright position, as well as in both squatting and kneeling positions during prodding. The protective ensemble consists of a vest unit covering the front, sides, shoulders, neck and upper part of the back, including a second collar to protect between the vest and the visor. The lower part consists of a detachable apron with straps to provide comfortable and functional protective clothing.

The ballistic inserts of the vest can be easily removed, and the outer cover can be washed in a washing machine at temperatures up to 40° C. The apron can be cleaned using a brush and wet cloth.

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL	MATERIAL SPECIFICATIONS	MASS
V-50-450 m/s according to STANAG 2920	Aramid fibre	4.9 kg (large size)

COLOUR OPTIONS AND SIZE

- > Outer cover (vest) | Cordure, 1000 denier, UN blue.
- > Cover, lower part | PVC-coated polyester, 900 denier, 600 g/sqm, dark blue.
- > The demining ensemble is available in small, medium, large and extra large sizes.



The ROFI FENDER HPB DEMINING APRON in use in Sri Lanka

TEST AND EVALUATION

The Fender HPB was tested in Afghanistan by the UNMACA. Internal test reports are available through the UNMACA Programme Manager.

COST

Not given.

ROFI RAVELIN DEMINING VEST

ROFI Industrier | Norway



ROFI Ravelin Vest

GENERAL DESCRIPTION

The *RAVELIN demining vest* was designed in cooperation with Norwegian People's Aid and Danish Church Aid to meet the specific requirements for demining in tropical climates. The vest protects deminers operating metal detectors in an upright position, as well as in both squatting and kneeling positions during prodding.

The vest unit covers the front, abdomen, sides, shoulders and neck, and includes a second collar to protect between the vest and the visor. ROFI offers three different versions of the vest: OB (open back strap system), HPB (half-protected back) and PB (protected back).

The ballistic inserts of the vest can easily be removed, and the outer cover can be washed in a washing machine at temperatures up to 40° C.

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL	MATERIAL SPECIFICATIONS	MASS
V50-450 m/s optionally 600 m/sec according to STANAG 2920	Aramid fibre	2.2 kg (large size)

COLOUR OPTIONS AND SIZE

- > Outer cover (vest): Cordura, 1,000 denier, UN blue or red.
- > The demining vest is available in small, medium, large and extra large sizes.

TEST AND EVALUATION

Test reports can be provided by the manufacturer on request.

COST Not given.

EQUIPMENT IN USE TO DATE

Used or purchased by many organisations, including Danish Church Aid, Danish Demining Organisation, Norwegian People's Aid, RONCO, Swiss Federation for Demining and the US State Department. The vest is currently used in demining projects in Afghanistan, Angola, Bosnia and Herzegovina, Croatia, Eritrea, Ethiopia, Iraq, Iran, Mozambique, Oman, Sri Lanka, Sudan and Yemen.



SD RAPTOR APRON AND SD450 APRON

Apron Security Devices (PVT) Ltd. | Zimbabwe

GENERAL DESCRIPTION

Both aprons cover the deminer's body from the shoulder to mid-thigh, including the crotch. They are light weight and their open-back design allows body heat to disperse when performing demining activities in hot climates, as well as the free movement of the arms. An optional evaporative cooling system is available. Tool pockets can be provided as an option.

Performance ensures basic protection against threats from blast anti-personnel mines. One of the main features is the one-piece design which aims to maintain integrity during a blast. The outer cover is washable and can easily be replaced.

PROTECTIVE PERFORMANCE | MASS

PROTECTION LEVEL	MATERIAL SPECIFICATIONS	MASS
V50 = 450 m/s according to STANAG 2920	Core: Raptor apron ballistic polyamide SD450 Apron – Kevlar Cover: Cordura textured nylon	3.7 kg 3.5 kg

EQUIPMENT IN USE TO DATE

Security Devices armour has been supplied to more than 65 humanitarian demining organisations, government departments and international agencies around the world. (References available on request.)

COLOUR OPTIONS AND SIZE

The demining aprons can be delivered in orange and royal blue. The aprons are suitable for all normal positions when used with a visor.

TEST AND EVALUATION

In-house testing is done for quality assurance and research and development by the manufacturers in their own laboratory using a firing rig built in accordance with STANAG 2920. Independent tests have been carried out by organisations such as The Mine Action Centre of the Southern African Development Community. Test reports can be provided by the manufacturer on request.



The SADAC 450 apron

COST

Price on request.

PERSONAL PROTECTIVE EQUIPMENT

HELMETS, VISORS AND MASKS



ALLEN VANGUARD | MED-ENG LDH VISOR | MED-ENG VBS-250 AND VBS-450

PROTECTION LEVEL

V-50 (250 m/s) in accordance with NATO STANAG 2920; Test results are available from the manufacturer on request to show the protective performance of the LDH against simulated blast-type anti-personnel mines of up to 200 g of C4 at a nose-mine distance of 0.80 m.¹

MATERIAL

6 mm polycarbonate

WEIGHT

1.67 kg | Helmet with visor (medium size)

VISOR PROTECTION AREA

Not given

FEATURES

- > The Lightweight Demining Helmet (LDH) provides head and face protection against blast-type anti-personnel mines.
- > Ventilated holes help reduce physiological heat stress while the full-face visor provides a high degree of protection.
- > An anti-fog self-adhesive appliqué can be added to the visor to increase the level of scratch resistance and reduce misting.
- > Integrates with the LDE Demining Ensemble or the Demining Apron to provide continuous frontal protection.

OPTIONS

Standard colour is grey and the visor is available in small and large size. The helmet in one size.

¹ See: www.med-eng.com/products/uxo/helmets/helm-ldh.html



The ALLEN VANGUARD LDH visor

PROTECTION LEVEL

- > VBS-250 for protection against blast-type anti-personnel mines: V-50 (250 m/s) rating in accordance with NATO STANAG 2920, and IMAS 10.30
- > VBS-450 for protection against fragments from blast-type anti-personnel mines.

MATERIAL

Not given

WEIGHT

VBS-250 | 1.20 kg, visor (medium size)

VBS-450 | 1.65 kg, visor (medium size)

VISOR PROTECTION AREA

Not given

FEATURES

- > The VBS-250, with its adjustable band system, fits select combat helmets for protection against blast-type anti-personnel (AP) mines. This visor provides enhanced protection for UXO, mine clearance, and demining personnel.
- > The VBS-450 visors, with its adjustable band system, fits select combat helmets to provide enhanced demining protection against fragments from blast-type anti-personnel (AP) mines.
- > The visors can be locked in the lowered position during operations or in the raised position during rest periods.
- > Visor integrates with chest plate of LDE and ACE (see Protective Clothing) to provide continuous frontal protection over the upper body, neck and head.
- > Can be easily attached to or removed from helmet.

OPTIONS

Optional self-adhesive anti-fog appliqués available.



The VBS-250 and 450 models

ENVOSTAR CO., LTD | CMAC VISOR AND LO VISOR

PROTECTION LEVEL

Related to IMAS 10.30

MATERIAL

6 mm polycarbonate (LEXAN)

WEIGHT

900 g to 1,400 g depending on the design

VISOR PROTECTION AREA

CMAC visor: 10 cm²; Long(LO) visor: 12 cm²

FEATURES

- > CMAC visor is mounted on a workman's helmet (no protection for the head is given).
- > LO visor is mounted on a standard head harness.
- > The visors are supplied in protective bags and visor covers.

OPTIONS

- > Visors can be mounted on a protective helmet.
- > Cost: US\$ 74, both models



CMAC visor

GARANT

GARANT | DEMINING VISOR DVH-1 | HOLDFAST DEMINING HELMET HDH-1



The GARANT demining visor

PROTECTION LEVEL

Manufactured according to
IMAS 10.30,
STANAG 2920,
MIL-STD-662F.

MATERIAL

Untreated polycarbonate visor with cradle;
Protective anti-scratch cover.

WEIGHT

Approx. 1 kg

VISOR PROTECTION AREA

Not given

FEATURES

- > Comes with an adjustable cradle for individual fit as well as an interchangeable brow pad for comfort and hygiene;
- > It is available as standard with a unique ventilation slot which provides a demisting and ventilation feature, much needed in harsher environments;
- > Durability;
- > Well suited for hot and humid climates;
- > Washable and inner parts can be replaced if worn out;
- > Suitable for kneeling and upright positions;
- > Easily can be put on and taken off;
- > Easy to remove in case of injury;
- > Allows natural ventilation;
- > Helmet and visor are manufactured according to the ISO 9001:2000 quality assurance standard.

OPTIONS

- > Demisting paste, demisting spray and a demisting visor cover are available to prevent misting;
- > Compatibility is given with all GARANT PPE products.



The GARANT demining helmet

PROTECTION LEVEL

Manufactured according to
IMAS 10.30,
STANAG 2920,
MIL-STD-662F.

MATERIAL

GRP-moulded shell with cradle.
Untreated polycarbonate visor

WEIGHT

Approx. 2 kg (depending on the size)

VISOR PROTECTION AREA

Not given

FEATURES

- > Helmet with visor provides full fragment and blast protection from anti-personnel mines for the entire head;
- > Durability;
- > Well suited for hot and humid climates;
- > Washable and inner parts can be replaced if worn out;
- > Suitable for kneeling and upright positions;
- > Easily can be put on and taken off;
- > Easy to remove in case of injury;
- > Allows natural ventilation;
- > Helmet and visor are manufactured according to the ISO 9001:2000 quality assurance standard.

OPTIONS

- > Demisting paste, demisting spray and a demisting visor cover are available to prevent misting;
- > The HDH-1 is available in navy blue, black, green and desert sand. Other colours are available on customer specification;
- > The helmet is adjustable to different sizes;
- > Compatibility is given with all GARANT PPE products.

ROFI INDUSTRIER | ROFI FACE MASK | VISOR

PROTECTION LEVEL

- > Face protection: V-50 330 m/s
 - > Eye protection: V50 250 m/s
- According to STANAG 2920.

MATERIAL

Polypropylene composite material

WEIGHT

550 g

VISOR PROTECTION AREA

The mask protects the whole face

FEATURES

- > Focuses on ventilation and comfort.
- > Reduces the risk of fatigue, overheating and stress.
- > The mask, developed in cooperation with NPA and Code Design, has won several design awards.
- > The mask has been tested in accordance with the new CEN Workshop Agreement on testing of PPE used in mine action. Test results available on request.
- > Used or purchased by: Handicap International, Landmine Action, Norwegian People's Aid, UNMIS and Ronco.

OPTIONS

White, one size, with padding for individual fitting.



The ROFI Face Mask

PROTECTION LEVEL

V-50 (250 m/s)

MATERIAL

5 mm polycarbonate

WEIGHT

1 kg including bag and visor band

VISOR PROTECTION AREA

1,250 cm²

FEATURES

- > Soft headbands for maximum comfort and durability.
- > Supplied with a protective bag.
- > Removable and washable sweatband.
- > The visor has a replaceable 0.7 mm polycarbonate scratch shield.
- > The scratch shield is of low cost and can easily be replaced.
- > Visor can be mounted on a fragmentation helmet.

OPTIONS

- > Scratch shield
- > Cotton sun hat



The ROFI visor

PERSONAL PROTECTIVE EQUIPMENT

MINE PROTECTIVE BOOTS



AIGIS PPE100 MINE BOOTS

AIGIS Blast Protection Ltd. | United Kingdom

GENERAL DESCRIPTION

The *AIGIS blast-protected PPE100 mine boots* are specifically designed to prevent traumatic amputation and to help reduce limb damage to a recoverable minimum, using the company's blast-attenuating technology "TABREshield". Certified by an orthopaedic surgeon, the PPE100 Mine Boots currently hold the best Mine Trauma Score in the industry.

The boots have been designed with the wearer in mind to maintain maximum mobility, durability and comfort in all climates.



The different impacts of an AP mine detonation on a combat boot and the PPE100, and an uninjured foot

The key components are

- > Soft inner boot;
- > TABREshield-protected outer boot; and
- > Ballistic gaiter.

Boot features are

- > Based on military standard mountain climbing boot;
- > 'Toe-curl' shape and good ankle articulation make walking and kneeling/standing transitions easy;
- > Low weight and sturdy build enable stable walking over all ground conditions;
- > Blast protection in the sole to help keep the upper boot intact and inner sole un-penetrated; and
- > Waterproof and suitable for all climates

The soft inner provides comfort, ventilation in hot climates and insulation in cold climates. The soft tissue helps mitigate trauma mitigation. The boots are easily put on and removed, and can be worn for light duties.

The ballistic gaiter helps prevent flash burns and limits fragment ingress into both legs. It is water repellent and easily cleaned.

PROTECTIVE PERFORMANCE | MASS

PPE TYPE	WEIGHT	COMMENTS
PPE100 mine boots	Weight per boot is 3 kg including fragmentation protection gaiter.	



The PPE100 Mine Boots

COLOUR OPTIONS AND SIZE

- > All boots and gaiters are supplied in black.
- > Available in EU sizes 7-11. Other sizes can also be made.

EQUIPMENT IN USE TO DATE

The PPE100 Mine Boots are currently used in UN and NATO countries for military and humanitarian demining operations.

TEST AND EVALUATION

The PPE100 Mine Boot system has been tested at the Cranfield University Ordnance Test and Evaluation Centre, run under the auspices of the British Army's Royal Military College of Science at Shrivenham. The test report can be provided on request. The Aegis Blast Protection quality system has been approved by ISO 9001.

The PPE100 mine boot has been tested against simulant AP mines using amputated human limbs. The resultant conditions of the limbs were evaluated by an orthopaedic surgeon for injury classification and likely recovery outcome: the boot provided protection leading to no traumatic amputation and full recovery outcomes. This was achieved by the blast-protected sole absorbing blast energy, the boot and gaiters limiting fragment ingress and the boot supporting and containing the foot and ankle until surgical intervention.

COST

Prices available on request.

SPIDER BOOT FOOT PROTECTION SYSTEM

Allen Vanguard Corporation | Canada

GENERAL DESCRIPTION

The Allen Vanguard *Spider Boot*, or foot protection system, is designed to protect a deminer's feet and legs against blast-type anti-personnel mines. It can be worn in difficult terrains during reconnaissance, detection and victim assistance operations.

The boot offers a high level of protection by maximising the stand-off distance between the foot and a blast-type anti-personnel mine. In the event of a blast, the boot is engineered to deflect and absorb the residual energy transmitted to the foot. The design represents four years of research and development in cooperation with Canadian and international military research establishments.

Residual blast energy and fragments are absorbed by the hull. The equipment secures the user's combat boot to a platform with four pods: two forward and two rear, and all four extended slightly to the sides.



The Spider boot

PROTECTIVE PERFORMANCE | MASS

Provides significant protection for the full range (M14 to PMN) of blast-type anti-personnel mines.

Proven through extensive live blast testing to provide four to five times the protection of conventional mine boots when the source of blast is in almost direct contact with the foot.

For greatest safety the spider boot should be worn in combination with well-proven PPE and combat boots.



Spider Boots in use

COLOUR OPTIONS AND SIZE

- > Adjustable to all common sizes of combat boots.
- > Secure binding system with quick adjustment/release mechanism
- > Detachable Sand Pods are available for operations in soft terrain.
- > Live hinge system allows natural walking motion.

EQUIPMENT IN USE TO DATE

Several thousand pairs have been sold for use in demining theatres worldwide.

TEST AND EVALUATION

Three test reports are available on the ITEP website. www.itep.ws

1. J.P. Dionne, A. Makris, J. Nerenberg, Blast Evaluation of Spider Boot Foot Protection System Employing Surrogates and Biological Specimens, by EUDEM2-SCOT, published 2003.
2. J. Nerenberg, J-P. Dionne, A. Makris, Blast Evaluation of Spider Boot Foot Protection System Employing Surrogates and biological Specimens by Med-Eng Systems Inc., published 2003.
3. R. Harris, M. Rountree, L. Griffin, R. Hayda, T. Bice, S. Mannion, Volume II-Final Report of the Lower Extremity Assessment Program (LEAP 99-2), by U.S. Army, CECOM, Night Vision and Electronic Sensors Directorate - Humanitarian Demining Research and Development Program, published 2000.

COST

Price from the manufacturer on request.

BFR COMBAT BOOTS

BfR Holdings Ltd. | Hong Kong | China

GENERAL DESCRIPTION

The *blast and fragment resistant (BfR) Combat Boot V-50* was developed as a military combat boot that provides soldiers with a measure of protection against anti-personnel landmines. With its advanced technology, it is designed to mitigate soft tissue and skeletal damage to the feet by deflecting blast from anti-personnel landmines. Since 1991 it has been manufactured in Singapore.

The key to the BfR boot's deflection capability is its protective sole system. Developed with patented technologies, the sole system is based on specially woven fabric bonded together with a specially constructed sole and heel plates and heel plug. It is very flexible and manoeuvrable.



Cross section

Specifications

- > Outer shell: 1.4 to 1.6 mm full grain, waterproof leather (with polypropylene woven fabric for some models).
- > Intermediate protection system, woven Aramid: specific density – 1.44g/m^3 , tenacity – 230 mN/dtex^1 , modulus of elasticity – 90 Giga Pascal elongation at break – 3.3%, water resistant laminate and seams – polyurethane materials, waterproof membrane lining
- > Protective sole system.
- > Lightweight dual density rubber sole.
- > Chevron or Panama outsole tread pattern.
- > Eyelets, loop-hole hooks and rivets for quick release.

¹ for mN see: <http://en.wikipedia.org/wiki/Newton>: "...a force of 1 N exerted over a distance of 1 m is $1\text{ N}\cdot\text{m} = 1\text{ joule}$..." for dtex see: <http://en.wikipedia.org/wiki/Dtex#Tex>: "...Tex is a unit of measure for the linear mass density of fibers and is defined as the mass in grams per 1000 meters. ... The unit code is "tex". The most commonly used unit is actually the decitex, abbreviated dtex, which is the mass in grams per 10,000 meters."

PROTECTIVE PERFORMANCE | MASS

PPE TYPE	WEIGHT	COMMENTS
BfR combat boots	950 g for US size 8.5	+/- 50/100 g for larger/smaller sizes

COLOUR OPTIONS AND SIZE

The BfR Combat Boot is available in several options:

- > V50128 (10-inch polypropylene and leather);
- > V50138 (10-inch polypropylene and sand suede leather);
- > V50168 (10-inch leather); and
- > V50188 (10-inch sand suede leather).



Combat Boots V-50

EQUIPMENT IN USE TO DATE

Customers include China's Ministry of Public Security, demining organisations in India(Horizon), UNDP in the Middle East, the armies of Korea, Pakistan, U.A.E., U.K. and the U.S., and the Malaysian Navy.

TEST AND EVALUATION

The BfR V50 combat boots were independently tested by the Royal Military College of Science in the United Kingdom against certain common types of anti-personnel landmine of different explosive charge sizes. The report can be seen at the manufacturer's website: www.bfrboots.com/english/html/blast_tests.html.

COST

The BfR boots retail online for US\$ 288 per pair.

Wellco | USA

GENERAL DESCRIPTION

Wellco has manufactured anti-personnel mine blast protective footwear since 1969. It produces both mine protective boots and over boots, either with solid rubber soles or – as in its latest development, the Anti Mine (AMine) Bogglers A – with a combination of polyurethane (towards the foot) and rubber (towards the ground). These products are designed to reduce injury from activation of anti-personnel mines which, all too frequently, results in amputation.

All Wellco's protective boots are designed to be functional in mud, sand and rocks. The protective over boot can be worn over a standard combat boot or over a Wellco protective boot, which can be worn all day in all terrains while protecting against anti-personnel mine detonation.

The AMine Bogglers and boots are comfortable to wear all day. Their weight is equal to or less than most standard combat boots.

Wearing both the blast protective boot and the blast protective over boot doubles the protection, and is used mostly when mapping or clearing mine fields.



Wellco's over boot | Wellco's mine boot | Mine boot exploded

PROTECTIVE PERFORMANCE | MASS

Inside the polyurethane sole is a wedge-shaped attenuator constructed from stainless steel and aluminum honeycomb. The upward force of a detonation makes the stainless steel compress the honeycomb and thereby absorb energy that otherwise would continue into the foot. The thick polyurethane sole between the upper and the rubber cleats is of a special blend which can also absorb large amounts of force before being ripped apart. This contributes to the hard force resistance in Wellco's protective boots and over boots. The use of polyurethane allows the sole to be thicker without adding weight. Because there is more distance between the blast and the foot, the blast's force has more area to dissipate before reaching the foot and leg.

The boot upper can be of any type that is desirable, such as all leather, insulated, hot weather, desert type, etc. All boots have protective insoles made from several layers of Kevlar 7. The over boot also has Kevlar 7 in the upper side panels. Kevlar 7 in the side panels of the boot has been tested extensively, but was never liked by operators as it substantially reduces comfort in the boot, which is designed for all-day wear.

Even with protective footwear, injury to an operator's foot and leg when stepping on a mine is in many cases unavoidable. Wellco products are designed to protect against the severity of the injury, which in the worst cases results in amputation. The original

mine protective boot, produced in 1969, was designed to prevent amputation if exposed to detonation of anti-personnel mines with up to 28 g of C-4 explosive. Improvements over the years have increased the level of protection and usability.

There are many variables that affect the level of injury from anti-personnel mine activation and Wellco cannot guarantee a level of protection. Perhaps the best indicator of the protection provided by these products is the significant number of re-orders received by Wellco.

The picture below is from testing at Aberdeen Proving Grounds. The charge for each blast was 25 g of C-4.

PROTECTIVE PERFORMANCE | MASS

PPE TYPE	WEIGHT	COMMENTS
Mine Boggler boots	5 lbs per pair	Shipping weight
Over boot	4 lbs per pair	Shipping weight

COLOUR OPTIONS AND SIZE

Wellco blast mitigation products are available in black or desert tan.

EQUIPMENT IN USE TO DATE

Products are currently in use in Colombia, Egypt, India, Jordan, Nicaragua, South Korea and Turkey. They are also procured by the Organization of American States for use in humanitarian demining.

The US Army has purchased the rubber-bottomed over boot since 1970. Some 20 other countries have bought the boots and over boots, either with all-rubber bottoms or the new polyurethane/rubber combination.

Wellco protective footwear is being used by NATO Human Factors and Medicine Task Group for its ATest Methodologies for Personal Protective Equipment Against Anti-Personnel Mine Blast programme. This programme intends to publish a description of available protective measures against anti-personnel mines.

TEST AND EVALUATION

Wellco has performed blast tests at Fort Benning and the Aberdeen Proving Grounds. These tests compare new materials and constructions with earlier models. Changes are only made when results equal or better those of earlier models. The incorporation of Kevlar 7 and polyurethane was a result of such testing.

Comfort has always been a factor. Latest products are light weight and comfortable with more protection than ever and can be worn all day, especially in mine-affected areas.

COST

- > Boots: US\$ 299.95 per pair (Dec.2008);
- > Over boots: US\$ 339.95 per pair (Dec.2008).

INTERNATIONAL TEST AND EVALUATION PROGRAMME FOR HUMANITARIAN DEMINING (ITEP)

Test reports available on Personal Protective Equipment

There are relatively few independent performance tests on PPE but those interested in PPE that have undergone tests should either contact manufacturers directly, or refer to the ITEP website: www.itep.ws.

Below you will find a non exhaustive list on test reports on PPE currently available at the ITEP website:

1. E. Liden, Aluminium fragment simulators for testing the effect of stone ejecta on PPE for deminers, FOI, by Swedish Defence Research Agency; published in 2008.
2. D. M. Bergeron, G. C. Coley, R. W. Fall, I. B. Anderson, Assessment of Lower leg Injury from Land Mine Blast - Phase 2. Follow up Test with a Modified Frangible Surrogate Lower Leg and Comparison with Cadaver Test Data, by Defence Research and Development Canada (DRDC); published in 2007.
3. CEN Workshop, CEN Workshop Agreement, Test and Evaluation of Personal Protective Equipment (CWA 15756), by CEN; published in 2007.
4. A. Bredelius, R. Andren, Report on tests of the ROFI face mask and body armour Armadillo according to the CWA on testing PPE for HMA, by Swedish Rescue Service Agency (SRSA); published in 2007.
5. D. M. Bergeron, G. C. Coley, R. W. Fall, I. B. Anderson, Assessment of Lower leg Injury from Land Mine Blast - Phase 1. Test results using a Frangible Leg with assorted Protective Footwear and Comparison with Cadaver Test Data, by Defence Research and Development Canada (DRDC); published in 2006.
6. J. Mah, B. Anctil, M. Keown, Damage caused by soil debris ejected from buried anti-personnel mines, by CCMAT (Defense Research and Development Suffield (DRDC - Suffield)); published in 2006.
7. J. M. L. Mah, M. P. Braid, R. W. Fall, I. B. Anderson, Blast Performance of Commercially Available Demining Footwear. A Summary of Experimental Trials with Frangible Surrogate Lower Leg, by Defence Research and Development - Suffield (DRDC-Suffield); published in 2005.
8. P. Wambua, M. Pirlot, S. Lomov, I. Verpoes, Protection against Secondary Fragmentation from AP Mines based on Natural Fibre Composites, Journal of Mine Action (JMA); published in 2005.
9. M. W. J. Ceh, R. W. Fall, D. M. Bergeron, I. EI-Maach, F. X. Jette, J. P. Dionne, Protocols to test upper body PPE against AP Blast Mines, by DRDC-Suffield; published in 2005.

10. G. Coley, Boot Platform Report, by CCMAT; published in 2004.
11. S. L. Hlady, Effect of soil parameters on land mine blast, by 2004 MABS Conference, Bad Reichenhall, Germany; published in 2004.
12. NATO RTO Human Factors and Medicine Panel (HFM) Task Group TG-024, Test Methodologies for Personal Protective Equipment Against Anti-Personnel Mine Blast, by NATO Research and Technology Organisation (RTO-TR-HFM-089); published in 2004.
13. J.P. Dionne, A. Makris, J. Nerenberg, Blast Evaluation of Spider Boot Foot Protection System Employing Surrogates and biological Specimens, by EUDEM2-SCOT; published in 2003.
14. D.S. Cronin, Numerical Modeling of a Simplified human Leg to Characterize Landmine Threats, by EUDEM2-SCOT; published in 2003.
15. J. Nerenberg, J-P. Dionne, A. Makris, PPE: Effective Protection for Deminers, by Med-Eng Systems Inc.; published in 2003.
16. D.S. Cronin, K. Williams, C.R. (Dale) Bass, P. Magnan, F. Dosquet, D.M. Bergeron, J.L.M.J. Bree, Test Methods for Protective Footwear Against AP Mine Blast, by EUDEM2-SCOT; published in 2003.
17. D. Guelle, T. Laurenco, Summary Report: Protective Equipment Field Trial, by Accelerated Demining Programme; published in 2002.
18. C.R. Bass , B. Boggess , M. Davis , C. Chichester, E. Sanderson, G. Di Marco, D.M. Bergeron, A Methodology for Evaluating Demining Personal Protective Equipment for Antipersonnel Landmines, by U.S. Army, CECOM, Night Vision and Electronic Sensors Directorate (NVESD) - Humanitarian Demining Research and Development Program; published in 2001.
19. D. M. Bergeron, G. C. Coley, M. S. Rountree, I. B. Anderson, R. M. Harris, Assessment of Foot Protection against Anti-Personnel Landmine Blast using a Frangible Surrogate Leg, by UXO Countermining Conference, New Orleans, USA, April 2001; published in 2001.
20. J. Nerenberg , S. Islam, A. Makris, J.P. Dionne, C. Chichester, Comparative Study of Different Lightweight Head Protection Systems with Full-Face Visors for Humanitarian Deminers, by Med-Eng Systems Inc., U.S. Army, CECOM, Night Vision and Electronic Sensors Directorate (NVESD) - Humanitarian Demining Research and Development Program; published in 2001.

INTERNATIONAL TEST AND EVALUATION PROGRAMME FOR HUMANITARIAN DEMINING (ITEP)

Test reports available on Personal Protective Equipment

21. C. Chichester, C.R. Bass, B. Boggess, M. Davis, D. M. Bergeron, E. Sanderson, G. Di Marco, Effectiveness of Personal Protective Equipment (PPE) for Use in Demining AP Landmines, by UXO Countermine Conference, New Orleans, USA, April 2001; published in 2001.
22. A. Makris, J. Nerenberg, J.P. Dionne, C.R. Bass, C. Chichester, Reduction of Blast Induced Head Acceleration in the Field of Anti-Personnel Mine clearance, by Med-Eng Systems Inc., University of Virginia, US Army Communications and Electronic Command (CECOM); published in 2001.
23. D. Guelle, Summary Report: Personal Protective Equipment Blast Test – UNADP, by Accelerated Demining Programme; published in 2001.
24. D. Bergeron, H. Kleine, R. Walker, C. Milner, Experimental Testing of the Med-Eng Systems Foot Protection System, Data Report for Test Series 1, by Defence Research Establishment Suffield (DRES - DRDC); published in 2000.
25. A. Makris, J. Nerenberg, C. Chichester, Full Scale Evaluation of Lightweight Personal Protective Ensembles for Demining, by Med-Eng Systems Inc., U.S. Army, CECOM, Night Vision and Electronic Sensors Directorate (NVESD) - Humanitarian Demining Research and Development Program; published in 2000.
- 26.A. Wilkinson, International Mine Action Standards - Future Development of Personal Protective Equipment (PPE) Standards, by GICHD; published in 2000.
- 27.J. Nerenberg, A. Makris, H. Kleine, C. Chichester, The Effectiveness of Different Personal Protective Ensembles in Preventing Blast Injury to the Thorax, by Med-Eng Systems Inc., U.S. Army, CECOM, Night Vision and Electronic Sensors Directorate (NVESD) - Humanitarian Demining Research and Development Program; published in 2000.
- 28.R. Harris, M. Rountree, L. Griffin, R. Hayda, T. Bice, S. Mannion, Volume II-Final Report of the Lower Extremity Assessment Program (LEAP 99-2), by U.S. Army, CECOM, Night Vision and Electronic Sensors Directorate (NVESD) - Humanitarian Demining Research and Development Program; published in 2000.

LIST OF MANUFACTURERS



AIGIS BLAST PROTECTION

> **BOOTS**

UK Headquarters 9 Davy Court | Central Park | Rugby, Warwickshire
CV23 0UZ | United Kingdom | T. + 44 (0) 1788 557 180 | F. + 44 (0) 1788 557 181

US Office Aigis Blast Protection Inc. | 11710 Plaza America Drive | Suite 2000
Reston | VA 20190 | USA | T. + 1 703 871 5173

Middle East Office Aigis Blast Protection | Suite 706, D Wing | Headquarter Building
Dubai Silicon Oasis | PO Box 341001 | Dubai | UAE | T. + 971 (4) 501 5485
blast-protection@aigis.co.uk | <http://www.aigis.co.uk/anti-mine-boots.asp>

ALLEN VANGUARD CORPORATION

> **ACE**

> **LDE**

> **SRS-5**

> **DEMINEING APRON**

> **LDH**

> **VBS-250-450**

> **SPIDER BOOTS**

ALLEN VANGUARD CORPORATION Canada Sales (& Corporate HQ)
2400 St Laurent Boulevard | Ottawa, ON K1G 6C4 | Canada
Toll Free: 1 800 644 9078 | T. + 001 613 739 9646 | F. + 001 613 739 4536
Contact: Sarah West, Marketing Communications Coordinator
T. + 001 613 288 5440 | sarah.west@allenvanguard.com | www.allenvanguard.com

North American Sales Office Allen-Vanguard Inc. | Ashburn Technology Park
21720 Red Rum Drive, Suite 187 | Ashburn, VA 20147 | USA
Toll Free: + 1 866 747 3590 | T. + 001 571 291 7660 | F. + 001 571 291 7679
sales@allenvanguard.com

International Sales Office Allen-Vanguard Ltd. | Allen House, Alexandra Way
Ashchurch Business Centre | Tewkesbury, GL20 8TD | UK
Sales T. + 44 (0) 1684 851 111 | Sales F. + 0044 (0) 1684 851 112
sales@allen-vanguard.co.uk

BEIJING

- > **CCT-2**
- > **GTL 115-2**

Beijing Geological Instrument Factory, Beijing, P.R.China

Office Building 3, No. 1 | Jiuxianqiaodong Street | Chaoyang District
Beijing, P.R.China | T. + 8610 64361270 | F. + 8610 64358663
Contact: Mr. Han Xiaoshen | demine_help@126.com

Franchise Dealer | Oriental Demining Technical Service

A65-601 Fuxing Lu | Beijing, P.R.China | Post code: 100036
T. / F. + 8610 51953495
Contact: demine_help@126.com | marywly328@163.com
www.orientaldemining.com.cn

- > **FBF 210 Explosion-Proof Outfit**

Research Institute of Surgery, Daping, China

No.10 Changjiang Lu Daping | Yuzhong district Chongqing P.R.C | P.R.China
Contact: demine_help@126.com

Franchise Dealer | Oriental Demining Technical Service

A65-601 Fuxing Lu | Beijing, P.R.China | Post code: 100036
T. / F. + 8610 51953495
Contact: demine_help@126.com | marywly328@163.com
www.orientaldemining.com.cn

- > **Protection Vest**

Dachrng Advanced Material Co. Ltd., China

West of Haitong Road | Huchong Highway | Zhejiang | P.R.China
Contact: demine_help@126.com

Franchise Dealer | Oriental Demining Technical Service

A65-601 Fuxing Lu | Beijing, P.R.China | Post code: 100036
T. / F. + 8610 51953495
Contact: demine_help@126.com | marywly328@163.com
www.orientaldemining.com.cn

BfR BOOTS

- > **V-50**

701 St.George's Building | 2 Ice House Street | Hong Kong
T. + (852) 2890 9000 | F. + (852) 2805 6821 | info@bfrboots.com

Singapore Office 33 Senoko Road | Singapore 758105

T. + (65) 6752 2830 | F. + (65) 6752 8802 | <http://www.bfrboots.com/>

CEIA

- > **MIL-D1**
- > **MIL-D1-DS**

CEIA Zona Industriale 54 / G52040 | Viciomaggio, Arezzo | Italy
T. + 0039 0575 418 319 | F. + 0039 0575 418 276
Contact: Giovanni Giustino | infound@ceia-spa.com

For U.S.A., Canada, and Mexico 9155 Dutton Drive | Twinsburg, Ohio 44087 | USA
T. + 001 330 405 3190 | F. + 001 330 405 3196 (INTL)
Contact: Mr. John Zlocki | infound@ceia-usa.com
www.ceia.net/underground/index.htm

EBINGER

- > **EBEX® 421 GC**
- > **EBEX® 420 PBD**
- > **EBEX® 420 H-Solar**
- > **UPEX® 740 M**
- > **MAGNEX 120 LW**

Ebinger Prüf- und Ortungstechnik GmbH Management / world-wide sales
Hansestrasse 13 | D - 51149 Köln | T. + 22 03 97 71 00 | F. + 22 03 36 062
Contact: Mr. T. Steinbüchel | Dir. Sales and Marketing
steinbuechel@ebingergmbh.com
Contact: Mr. O. Bartsch | Sales Manager | bartsch@ebingergmbh.de
T. + 49 2203 97710-11 | F. + 49 2203 36062
www.ebingergmbh.com

ENVOSTAR CO LTD.

- > **DEMINING BODY ARMOUR**
- > **VISOR**

Envotech Co., Ltd Cambodia
#248, National Road 6A | PO BOX 931 | Phnom Penh | Cambodia
T. + 855 23 430 748/9 | H/P. + 855 12 802 437 | F. + 855 23 430 236
www.envotech.org
Contact: Finn Viggo Gundersen, General Manager | finn@envotech.org

Envotech Co., Ltd Thailand
71/223 Parichat Estate Soi A6 | Pratum Bang Bua Thong Road | Bang Cu Wat
Pratumthani 1200 | Bangkok | Thailand

GARANT SICHERHEITSTECHNIK AG

- > **DEMINING APRON**
- > **DEMINING VEST**
- > **SEARCH SUIT**
- > **DEMINING VISOR**
- > **DEMINING HELMET**

International Chlaffental 106 | CH-8212 Neuhausen am Rheinfall | Switzerland
T. + 41-(0) 52 - 672 31 59 | F. + 41-(0) 52 - 672 31 80 | info@garant-ag.ch

Germany GARANT Schutztechnik GmbH

Industriepark 310 | D-78244 Gottmadingen | Germany
T. +49-(0) 77 31 - 97 84 88 | F. +49-(0) 77 31 - 97 61 89
info@garant-schutztechnik.de | <http://www.garant-schutztechnik.de/index.php>

GEOINSTRUMENTS

- > **GI EXPLORER TM D**

Roztylske namesti 35 | 141 00 PRAHA 4 | Czech Republic
T. + 420 257 215 223 | F. + 420 251 817 964 | www.geoinstruments.cz
Mr. Karel Prihoda | mobile +420 604251420 | gi-prihoda@volny.cz

GEOMETRICS INC.

- > **G-858**

Geometrics, Inc. 2190 Fortune Dr. | San Jose, Ca. 95131 | USA
T. + 1 408 954 0522 | F. + 1 408 954 0902 | www.geometrics.com
Contact: Mr. Ross Johnson, VP Sales Magnetics | ross@geometrics.com

INSTITUT DR. FOERSTER GmbH & Co. KG

- > **MINEX 2FD 4.530**
- > **FEREX 4.032**
- > **FEREX DATALINE 4.800**
- > **MULTICAT 4.850**

Division S - Search and measuring instruments

In Laisen 70 | D-72766 Reutlingen | Germany
T. + 49 7121 140428 | F. + 49 7121 140855 | www.foerstergroup.de
Contact: Bernhard Domes, Technical + Marketing Support
domes.bernhard@foerstergroup.de

L-3 CYTERRA

> AN/PSS-14

7558 Southland Boulevard, Suite 130 | Orlando, Florida 32809 | USA
T. + 407-926-1900 | F. + 407-859-5131

or

10 Commerce Way | Woburn, Massachusetts 01801 | USA
T. + 781-697-2500 | F. + 781-890-6396 | info.cytterra@L-3Com.com

Contact: Ms. Sarah Farmer | sarah.farmer@L-3com.com

<http://www.cytterra.com/products/handheld-cm.html>

MINELAB

> F1A4

> F3

> STMR MK II ARRAY

Minelab Electronics Pty Ltd

PO Box 537 | Torrensville Plaza | SA 5031 | Australia

T. + 61 8 8238 0888 | F. + 61 8 8238 0890 | countermine@minelab.com.au

USA Marketing & Distribution Minelab USA Inc.

871 Grier Dr., Suite B1 | Las Vegas, NV 89119 | USA

T. + 1 702 891 8809 | F. + 1 702 891 8810 | countermine@minelab.com

Europe - Manufacturing & Distribution Minelab International Ltd

Laragh, Bandon | Co. Cork | Ireland

T. + 353 23 52101 | F. + 353 23 52106 | countermine@minelab.com

ROFI INDUSTRIER

> ARMADILLO VEST

> FENDER HPB DEMINING APRON

> RAVELIN DEMINING VEST

> FACE MASK

> VISOR

Rofi Industrier as

Årøsetervegen 5 | NO-6422 Molde | Norway | T. + 47 7120 3333

www.rofi.com

Contact: Mr. Roald Løseth, Sales Manager

T. + 47 9075 9788 | F. + 47 7120 3334

SCHIEBEL ELEKTRONISCHE GERATE GmbH

- > **AN-19/2**
- > **ATMID™**
- > **MIMID™**
- > **VAMIDS™**

Margaretenstrasse 112 | A-1050 Vienna | Austria | T. + 43 (1) 546 26-0
F. + 43 (1) 545 2339 | info@schiebel.net | www.schiebel.com

Contact: Gerd Kellermann, Marketing Manager, Mine Detection
gerd.kellermann@schiebel.net | T. + 43 (1) 54 626-54 | F. + 43 (1) 545 2339
M. + 43 (676) 581 50 35

Schiebel Technology, Inc. 7081 Lineweaver Road | P.O. Box 861527
Warrenton, VA 20187-1527 | U.S.A. | T. + 1 (540) 351-1731 | F. + 1 (540) 351-1736

Schiebel SE Asia House 14, Street 47 | P.O. Box 96 | Phnom Penh
Kingdom of Cambodia | T. & F. + 855 (23) 430131

SCHONSTEDT INSTRUMENT COMPANY

- > **GA-52 CX**
- > **GA-72 CD/ML**

100 Edmond Road | Kearneysville, WV 25430 | USA
T. + 1 304-725-1050 | Toll Free USA: 800-999-8280 | F. +1 304-725-1095
info@schonstedt.com | <http://www.schonstedt.com/>

SECURITY DEVICES (PVT) LTD

- > **SADEC APRON**
- > **SADEC 450 APRON**

Security Devices (Pvt) Limited 14 George Avenue | Msasa | Harare | Zimbabwe
T. + 263 4 480900/899 | F. + 263 4 486885 | secdev@mweb.co.zw
or multiman@ecoweb.co.zw | www.secdevinc.com
Contact: Ms. Oddia Mabika | oddia@trevorthomsen.com
T. + 263 4 487064 / 5 or 480899 | F. + 263 4 486885

TOHOKU UNIVERSITY CENTRE FOR NORTHEAST ASIAN STUDIES

- > **ALIS**
- > **ALIS-EMI**

41 Kawauchi | Sendai, 980 | 8576 Japan
Contact: Motoyuki Sato, Professor | T. + 81 (22) 795 6075 | F. + 81 (22) 795 6075
sato@cneas.tohoku.ac.jp | <http://cobalt.cneas.tohoku.ac.jp/users/sato/>

LIST OF MANUFACTURERS PRESENTED WITHIN THE CATALOGUE

TP GEOLOGICAL PROSPECTING RUS. LTD.

> GEOLOGICAL PROSPECTING MIRADOR

T. + 74956197894 | F. + 74956185069 | inter@trgeo.ru

Contact: Mr. Izyumov S.V. | General director

Mr. Druchinin S.V. | Deputy on science

VALLON GmbH

> MW1630B

> VMC1

> VMH3

> VMM3

> VMH3CS

> VMW1

> VMXC1

> VMX3

> EL 1302-D2

> EL 1303-D2

> VXC1

> VET2

> VXV4

> VMR2

> VMV8

> VMXV

Vallon GmbH

Im Grund 3 | D-72800 Eningen | Germany | T. + 49-7121-9855-0

F. + 49-7121-836 43 | info@vallon.de | www.vallon.de

WELLCO ENTERPRISES INC.

> BOOTS

150 Westwood Circle | Waynesville, NC 28786

1-828-456-3545 or 1-800-840-3155

Customer Service | customerservice@wellco.com | sales@wellco.com

http://www.wellco.com/html/blast_protective_boot.html

ADAMS ELECTRONICS INTERNATIONAL LTD.

Unit 10 Forest Row Business Park | Forest Row, East Sussex RH18 5DW
United Kingdom | T. + (0) 1342-823856 | F. + (0) 1342-826100
sales@adamselec.demon.co.uk | <http://www.adamsinc.com/site/index.html>

ARLI SPETSTECHNIKA

109428, Moscow | Russia | Ryazansky prospekt, 8a
T. + (095) 171-87-51, 171-94-54 | F. + (095) 171-87-58, 171-99-85
info@arli-st.ru | <http://www.arli-st.com/>

ARMOURSHIELD LTD.

PO Box 456 | Manchester, M60 2LL | United Kingdom
T. + 44 (0)161 925 1550 | F. + 44 (0)161 925 0077
info@armourshield.com | <http://www.armourshield.com/home.html>

BAE SYSTEMS

6500 Tracor Lane | Austin, TX 78725 | USA
T. + (512) 929-4371 | F. + (512) 929-2381
idsmarketing@baesystems.com | www.baesystems.com

BOROVO-GUMITRADE D.O.O.

Dr. Ante Stareviabb | HR - 32000 Vukovar
T. + 385 (0)32/422630 | F. + 385 (0)32/422630
Ms. Husnija Buri, CEO | Mr. Mijo Mandari, Export Manager
borovo.gumitrade@vk.t-com.hr | www.borovo-vukovar.com

COMBATBOOTS.COM

845 Brenkman Drive | Pekin | IL 61554 | USA
T. + 1-800-336-5225 | F. + 1-309-346-1142
op@militaryclothing.com | <http://www.combatboots.com/default.asp>

CORTEX ENGINEERING LTD.

8 Emek Zvulun St. Kfar-Saba 44623 | Israël
T. + 972-9-7660059 | F. + 972-9-7679585
sales@cortex.co.il | <http://www.cortex.co.il/pages/vests.html>

DEFENCE ELECTRONICS DEPARTMENT OF CEIEC

Electronics Building | A23 Fuxing Road | Beijing | China P.C | Post Code 100036
T. + 86-10-68296510 | Support T. + 86-10-68296510
F. + 86-10-68212361; + 86-10-68212352
Ms Wu | defence@ceiec.com.cn

ENVOTECH CO.

Envotech Co., Ltd Cambodia

N° 152, Tonle Mekong Road | Prey Leap | Phnom Penh | Kingdom of Cambodia
T. + (855 23) 430 748/9 | F. + (855 23) 430 236 | finn@envotech.org
<http://www.envostar.com/>

EODPARTNER

Ulmenstr. 22 | 72813 St. Johann | Deutschland
T. + 49 - 7122 - 82 03 40 | F. + 49 - 7122 - 82 02 27
info@eodpartner.com | <http://www.eodpartner.com/eng/01company/company.htm>

FORCE WARE GmbH

Im Grund 3 | 72800 Eningen | Germany
T. + 49 (0) 71 21 / 42 03 18 | F. + 49 (0) 71 21 / 42 03 19
info@forceware.de | <http://www.forceware.de/products.lasso>
Contact: Mr. Markus Sautter | markus.sautter@forceware.de

FUJI TECOM INC.

1-3-1, Kanda Izumi-cho | Chiyoda-ku | Tokyo 101-0024 | Japan
T. + 81-3-3862-3196 | F. + 81-3-3866-1979
kaigai@fujitecom.co.jp | http://www.fujitecom.com/en_top.html

GENERAL DYNAMICS CANADA

1020-68th Avenue N.E. | Calgary, Alberta, T2E 8P2 | Canada
T. + 1 403 295-6700 | F. + 1 403 730-1197
Business development
T. + 1 403-295-5414 | F. + 1 403-730-1096
busdev.calgary@gdcanada.com | www.gdcanada.com

GEONICS LIMITED

1745 Meyerside Dr., Unit 8 | Mississauga, Ontario | Canada L5T 1C6
T. + 1 (905) 670 9580 | F. + 1 (905) 670 9204
geonics@geonics.com | <http://www.geonics.com/index.html>

GEOPHEX, Ltd.

605 Mercury Street | Raleigh, North Carolina 27603 | USA
T. +1 (919) 839-8515 | F. + 1(919) 839-8528
sales@geophex.com | <http://www.geophex.com/>

GUARTEL TECHNOLOGIES LIMITED

Unit 8-9 New Forest Enterprise Centre | Rushington Business Park
Chapel Lane Totton | SO40 9LA | United Kingdom
T. + 44 (0)207 384 3001 | F. + 44 (0)207 610 6856
info@guartel.com | <http://www.guartel.com/>

IAI ELTA ELECTRONICS INDUSTRIES LIMITED

100 Yitzchak Hanasi Blvd. | P.O.B. 330 | Ashdod 77102 | Israel
market@elta.co.il | corpmkg@iai.co.il | <http://www.iai.co.il/ELTA>

INTERNATIONAL INTELLIGENCE LIMITED

Operations Centre Eastington Bridge | Stonehouse | Gloucestershire
GL10 3SQ | United Kingdom
T. + 44 (0)1453791444 | F. + 44(0)1453791550 | info@int-int.co.uk
Franco-Swiss Operations 37, rue d'Amsterdam | 75008 Paris | France
T. + 00 331 53 32 50 04 | F. + 00 331 45 26 81 35
france@int-int.co.uk | <http://www.int-int.biz/>

LBA INTERNATIONAL LIMITED

2 Omega Business Centre | Caxton Close | Drayton Fields
Daventry, Northants | NN11 5RT | England | United Kingdom
T. + 44 (0) 1327 311020 | F. + 44 (0) 1327 311030
info@lbainternational.com | <http://www.lbainternational.com/home.htm>

NO.50 RESEARCH INSTITUTE OF CHINA ELECTRONICS TECHNOLOGY GRO

423 Wuning Rd. | Shanghai | Shanghai | China 200063
T. + (86 21) 62547600 Ext: 6403 | F. + (86 21) 62433766
<http://www.globalsources.com/srimt.co>
Contact: Mr Duke TANCE DEPARTMENT

OMNIPOL AS

Nekázanka 11 | 112 21 Praha 1 | Czech Republic
T. + (420) 224 011 111 | F. + (420) 224 012 241
omnipol@omnipol.cz | <http://www.omnipol.com>

PETRIS S.R.O.

S.P.V. a.s. | Jana Krusinky 1723 | 500 02 Hradec Kralove | Czech Republic
T. + 420 495 532 555; + 420 495 537 088; + 420 495 532 279; + 420 495 521 445
F. + 420 495 532 555 | info@petris.cz | petris@mbox.vol.cz | <http://www.petris.cz>
Contact: Business department: Jana Kubcová, Irena Hajnová, Dis.
Director, production manager: Petra Bartáková

PINNACLE ARMOR INC.

5425 E. Home Avenue, Ste. 104 | Fresno, CA 93727 | USA
T. + 1-800-200-0915 | sales@pinnaclearmor.com
<http://www.pinnaclearmor.com/body-armor/dragon-skin.php>

3D-RADAR AS

Klæbuveien 196B | 7037 Trondheim | Norway
T. + 47 72 89 32 00 | F. + 47 72 89 32 01 | sales@3d-radar.com
Contact: Director of Sales & Marketing | Thomas Örnevik | M. + 47 48 88 23 98
Field Application Engineer | Jacopo Sala | M. + 47 46 62 65 50
Managing Director | Dr. Egil Eide

SAIC

Headquarters 10260 Campus Point Dr. | San Diego, CA 92121 | USA
SAIC Business Solutions T. + 1-800-430-7629/US
Safety and Security Products
T. + 1-866-SAF-TRAN (1-866-723-8726) | Intl. 858-826-6202
F. + 858-826-4523 | <https://www.saic.com/>

SAMAD RUBBER WORKS (PVT) LTD.

sales@samadrubber.com | <http://www.allproducts.com/sup005/srw/ams.html>

SDMS SECURITY PRODUCTS UK LTD.

Elysium House | 126-128, New King's Road | London, SW6 4LZ | United Kingdom
T. + 44 (0) 20 7731 8417 | F. + 44 (0) 20 7610 9927
info@sdms.co.uk | <http://www.sdms.co.uk/Products.html>

ŠESTAN-BUSCH

društvo za proizvodnju i trgovinu d.o.o.
40323 Prelog, Croatia | Industrijska zona 3
T. +385 40 646 330 | +385 40 646 426 | F. + 385 40 646 300
sestan-busch@ck.htnet.hr | <http://www.sestan-busch.hr>

STOLAR RESEARCH CORPORATION

848 Clayton Highway | Raton | NM 87740 | USA
T. + 1-505-445-3607 | F. + 1-505-445-2038 | <http://www.stolarhorizon.com/>
Contact: Lauren Trice lat@stolarresearch.com

T&A SURVEY BV

Dynamostraat 42, 1014 BK | Postbus 20670, 1001 NR | Amsterdam | Netherlands
T. + 020 6651368 | F. + 020 6685486
info@ta-survey.nl | <http://www.ta-survey.nl/>

TOMSK MEASURING APPARATUS FACTORY

51 Voikova Street | Tomsk 634009 | Russia
T. + 7 3822 72 2245 | F. + 7 3822 72 2476
postmaster@tzia.tomsk.su | <http://www.tzia.com>

VERSEIDAG BALLISTIC PROTECTION GMBH

Neuer Weg 24 | D-47803 Krefeld | Deutschland
T. + 49-2151 / 876-400 | F. + 49-2151 / 876-491
info@verseidagprotection.de | www.verseidagprotection.de

WHITE'S WORLDWIDE

White's Electronics Factory, U.K.
Sales area, Europe, Eastern Europe, Africa, and the Middle East
35 Harbour Road | Inverness, Scotland | IV1 1UA
T. + (01463) 223456 | F. + (01463) 224048
sales@whelects.demon.co.uk | www.whites.co.uk

ZEMAN

687 42 Osvetimany | 385 | The Czech Republic
F. + 420-573-902-055 | info@zeman.cz | www.zeman.cz
<http://www.zeman.cz/work-boots-zeman.php>



GLOSSARY OF ABBREVIATIONS AND ACRONYMS



GLOSSARY OF ABBREVIATIONS AND ACRONYMS

A	Ampere	MIMID	Miniature Mine Detector
ATMID	All Terrain Mine Detector	NATO	North Atlantic Treaty Organization
BAC	battle area clearance	nT	nano-Tesla
CIMMD	Close-In Man-Portable Mine Detector	nT/m	nano-Tesla per metre
CMAC	Cambodian Mine Action Centre	NGO	non-governmental organisation
cm	centimetre	PC	personal computer
CROMAC	Croatian Mine Action Centre	PDA	personal digital assistant
CWA	CEN Workshop Agreement	PPE	personal protective equipment
DRES	Defence Research Establishment, Suffield	Q	quadrature
EDIT	Electromagnetic wave Detection and Imaging Transceiver	RMPA	Resonant Microstrip Patch Antenna
EMIS	Electromagnetic Induction Spectroscopy	s	second
EOC	explosive ordnance clearance	S/N	signal-to-geologic noise
EOD	explosive ordnance disposal	STANAG NATO	Standardization Agreement
ERW	explosive remnants of war	TDEM	time domain electromagnetics
GPS	Global Positioning System	UNADP	United Nations Accelerated Demining Programme
h	hour	UNAVEM	United Nations Angola Verification Mission
Hz	Hertz	UNDP	United Nations Development Programme
I	inphase	UNMAC	United Nations Mine Action Centre
IPPTC	International Pilot Project for Technology Cooperation	UNMACA	United Nations Mine Action Center Afghanistan
JRC	Joint Research Centre (European Commission)	UNMAS	United Nations Mine Action Service
ITEP	International Test and Evaluation Programme	UNOCHA	United Nations Office for the Coordination of Humanitarian Assistance to Afghanistan
kg	kilogram	UNOPS	United Nations Office for Project Services
LCD	liquid crystal display	UXO	unexploded ordnance
LED	light-emitting diode	V	Volt
m	metre	w	watt
mA	milliAmpere		
MAG	Mines Advisory Group		
MEMS	MicroElectroMechanical Systems		





Geneva International Centre for Humanitarian Demining
Centre International de Déminage Humanitaire | Genève

7bis, av. de la Paix | P.O. Box 1300 | 1211 Geneva 1 | Switzerland
t. + 41 (0)22 906 16 60 | f. + 41 (0)22 906 16 90
info@gichd.org | www.gichd.org