



# ALIS-RT

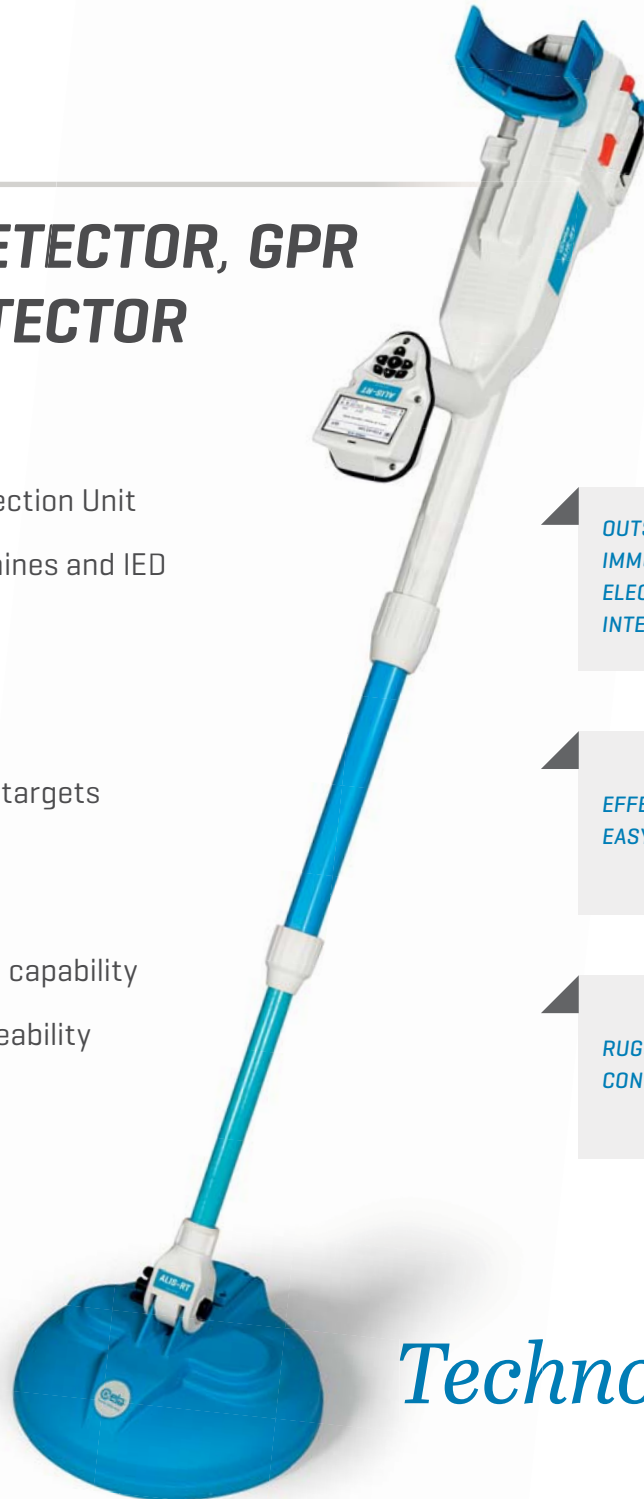
## INTEGRATED METAL DETECTOR, GPR AND CARBON ROD DETECTOR

- Single Piece Lightweight Broadband Detection Unit
- Detection of metallic and non-metallic mines and IED
- Very High Precision:
  - Dual-Tone Metal Pinpointing
  - Matched GPR localization
- High capability of separation of adjacent targets
- Very high detection stability Vs temperature and mechanical stresses
- Enhanced mineralized soil compensation capability
- Embedded GPS and Data Logger for traceability and Quality Control
- Proven CEIA Reliability

OUTSTANDING  
IMMUNITY AGAINST  
ELECTROMAGNETIC  
INTERFERENCES

EFFECTIVE AND  
EASY-TO-OPERATE

RUGGEDIZED  
CONSTRUCTION



*Triple Sensor*

*Technology*



[www.ceia.net](http://www.ceia.net)



*Threat Detection through Electromagnetics*

**ALIS-RT** is an integrated, lightweight, portable detector which incorporates three detection technologies, Metal Detection (**MD**), Carbon Rod Detection (**CRD**) and Ground Penetrating Radar (**GPR**), which can be used individually or in combination.

## INTRODUCTION

**MINE CLEARING OPERATIONS** are traditionally based on the use of metal detectors designed for underground inspections. They are an indispensable detection instrument for personnel engaged in mine clearing operations, which have seen a constant development, especially with regard to sensitivity, ability to operate in mineralised or conductive terrains and in the maintaining of these characteristics over time and under harsh ambient conditions.

Starting from the first decade of this century the diversification of explosive devices used for mining areas, which are often improvised and, for this reason, cannot be foreseen and are even more dangerous, has generated interest in the detection of new types of targets, such as, for example, non-metallic conductive contacts present in pressure plates (**carbon rods**), cables for remote activation of explosive charges (**command wires**) and connection conductors between components of a local explosive system (**short wires**).

CEIA has answered this need with a family of metal detectors, each equipped with specialised multiple sensors, which allow the individual operator to control and signal different types of targets in a selective and unambiguous manner.

**CEIA ALIS-RT** is a component of this new family which incorporates three detection technologies, which can be used individually or in combination:

- MD** METAL DETECTION
- CRD** CARBON ROD DETECTION
- GPR** GROUND PENETRATING RADAR

**ALIS-RT** is the Real Time version of the **ALIS** detector, which has been developed since 2003. **ALIS-RT** generates real-time alarms on the targets detected, in a similar way to Metal Detector devices, whilst **ALIS** provides synthetic images, using an Android app and SAR [Synthetic Aperture Radar] processing software designed by **ALISys Ltd** – Tokyo, Japan.

## TRIPLE SENSOR TECHNOLOGY

### SENSOR 1 (MD)

- Low metallic targets
- High metallic targets



### SENSOR 2 (CRD)

- Carbon Rods based IEDs
- Non-Metallic Conductive Devices of IEDs
- Short, Single and Multi-Strand Wires



### SENSOR 3 (GPR)

- Dielectric anomalies, soil discontinuities such as: explosive charges, plastic mines, tanks, crates, cavities





## ALIS-RT DESCRIPTION

**THE EQUIPMENT CONSISTS OF THREE MAIN PARTS:** an electronic control unit, with an integrated battery compartment, an adjustable two-piece telescopic pole and a compact detection sensor, housing the inductive and high frequency antennas. All the connecting cables between the component parts are installed inside the equipment, to protect against accidental damage.

**The electronic control unit** is fitted with an operating handle, equipped with an intuitive control keypad and an extremely high contrast transfective display, which is clearly visible even under strong external lighting conditions.

**The search head**, the inclination of which can be adjusted, is supported by a ball joint in a central position, thereby guaranteeing a high level of stability during detection operations. The equipment has been carefully designed to reduce the weight, thickness and surface area of the sensor, which are usually complex parameters to obtain in a GPR system.

The polymers used guarantee **higher mechanical characteristics and dimensional stability** over a wide range of operating temperatures and ambient humidity values.

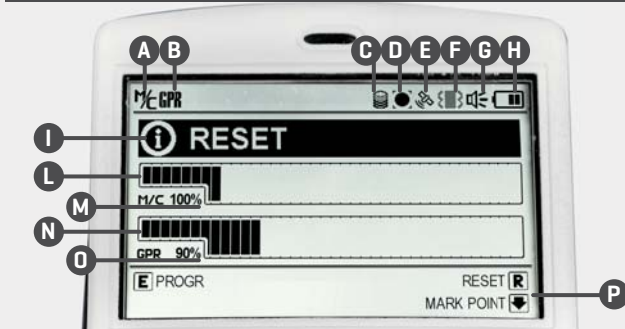
## OPERATING MODE

**The SUPERVISOR can manage and assign the desired operating mode and the sensitivity of the individual sensor units** by means of a setting on the control keypad:

- **MD** [Metal Detector]
- **MD+CRD** [Metal Detector & Carbon Rod Detector]
- **GPR** [Ground Penetrating radar]
- **MD+GPR** [Metal Detector & Ground Penetrating Radar]
- **MD+CRD+GPR** [Metal Detector, Carbon Rod Detector & Ground Penetrating Radar]

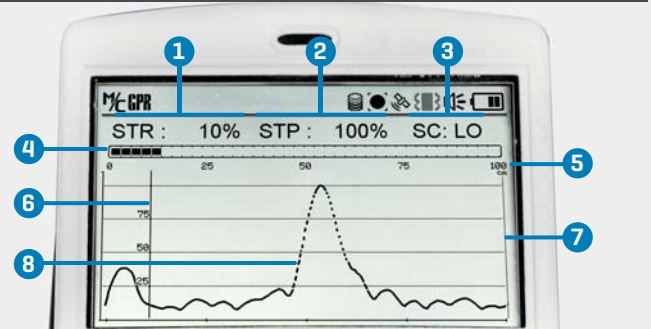
**The intensity of the detection signal is indicated to the OPERATOR visually**, by means of a specific bar graph, and acoustically, by means of specific tones for each type of target: metallic, non-metallic conductive, plastic and voids. **The acoustic alarms** are emitted by an internal loudspeaker, with a high psophometric pressure, or by means of a monaural earphone with a high robustness and a high level sealing. **The alarm signalling** of the **MD** sensor is static, with a change of tone when passing above the metallic target, whilst the **CRD** and **GPR** signalling are dynamic. The two-tone signalling system allows precision pin-pointing, regardless of the actual operator. **The unit is equipped with a comprehensive self-test system.**

## STANDARD AND EXPERT MODE VISUALISATION



### STANDARD MODE

- |                                 |  |
|---------------------------------|--|
| <b>A</b> Enabled MD/CRD sensors | <b>H</b> Battery charge level                            |
| <b>B</b> Enabled GPR sensor     | <b>I</b> Diagnosis messages area                         |
| <b>C</b> Free memory amount     | <b>L</b> Bar-graph for real time MD/CRD detector readout |
| <b>D</b> Recording status       | <b>M</b> MD/CRD sensitivity setting                      |
| <b>E</b> GPS signal presence    | <b>N</b> Bar-graph for GPR signal readout                |
| <b>F</b> Vibration alarm status | <b>O</b> GPR sensitivity setting                         |
| <b>G</b> Audio alarm status     | <b>P</b> Buttons HELP area                               |



### EXPERT MODE

- |  |                                 |
|--|---------------------------------|
| <b>1</b> GPR signal analysis Start depth (STR)   | <b>6</b> START depth indication |
| <b>2</b> GPR signal analysis Stop depth (STP)  | <b>7</b> STOP depth indication  |
| <b>3</b> Waveform scale indication (SC).<br>If GPR Scale is set to AUT, this area is empty | <b>8</b> GPR signal echos       |
| <b>4</b> Metal and Carbon Rod Sensor bar-graph   |                                 |
| <b>5</b> DEPTH indication (according to GPR Scale)   |                                 |

**The GPR sensor offers two special functionalities:**

**TARGET ENHANCEMENT:** signalling on anomalies of particular intensity such as cavities or buried insulating containers, becomes static.

**EXPERT MODE:** it provides a display of the GPR target echos in a graph of "depth" Vs "size" on a normalised scale [A-Scan].

## THE ALIS-RT GPR SENSOR

The range of the GPR exploration depth can be selected by the operator, by entering the programming menu, using the **START Depth** and **STOP Depth** parameters, which identify, respectively, the minimum and maximum depths of interest, or simply by using the control panel, shifting the START and STOP cursors by means of the "Right" and "Left" arrows.

This functionality is particularly useful for concentrating the sensitivity of the GPR on the particular depth of interest and for eliminating the spurious reflections from the ground surface or those due to irregular rocky structures at depth.

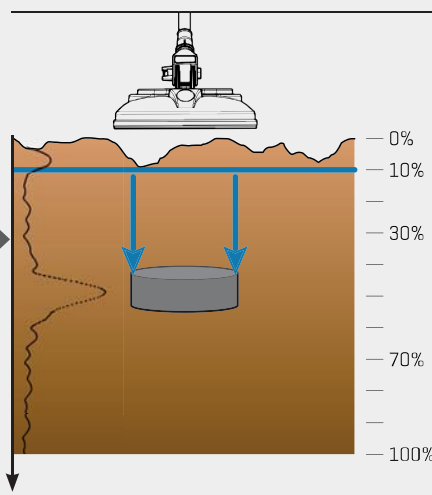
The modern digital signal analysis algorithms implemented by the ALIS-RT enable the sensitivity of the MD and CRD section to be optimised even on heavily mineralized and conductive terrains and provide an interpretation of the reflections of the radar signals of the GPR section which automatically determines the acoustic alarm condition and simplifies the use for the operator, who can concentrate exclusively on the visual inspection of the terrain.

In the case of an alarm, the operator can examine the signal by means of the **A-Scan [Expert Mode] display, which enables the position, depth and dimension of the target of interest to be estimated.**

The GPR physics is not able to determine whether the reflections come from targets made of insulating, conductive or metallic material but cross-referencing with information provided by the MD and CRD sensors enables the situation to be defined and to characterise with greater precision the nature of the detected object.

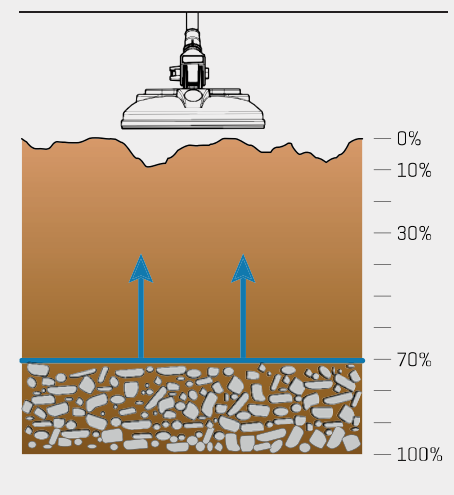


The graphic shows in real time the intensity of the GPR signal [vertical scale] as a function of depth [horizontal scale].



### GPR START DEPTH

- ▶ The setting of the analysis **START DEPTH** allows to exclude unwanted echoes caused by shallow terrain level variations.
- ▶ The optimum value is proportional to the depth of the soil ripples.

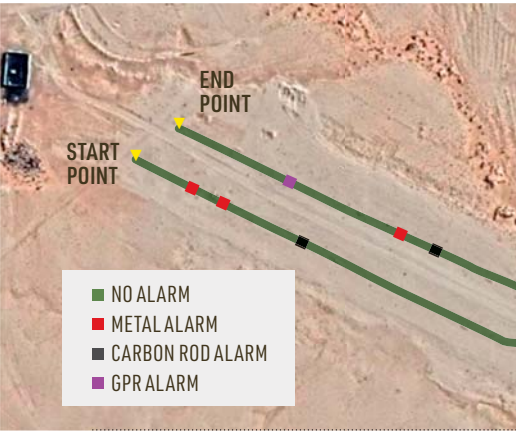


### GPR STOP DEPTH

- ▶ This selection allows to set the **STOP DEPTH** of the analysis and the maximum depth of prospection.
- ▶ The setting of this parameter must be higher than the current value of the GPR Start Depth.

### INTEGRATED GPS

An integrated GPS receiver and a flash memory recording system **allow the storage of position data** (date, time, latitude and longitude) **and detection data** (type of target and signal intensity) in real time, during the operations.



### INTERFACE CAPABILITIES

#### SERIAL INTERFACE

The serial interface is used for **firmware updating operations**, for example in the case of modification or implementation of new functionalities

#### BT INTERFACE

The Bluetooth interface is used for remote signal reading and maintenance operations assisted by PC.

#### WI-FI INTERFACE

The Wi-Fi interface is used for exporting measurement data towards external processing and display devices, as in the case of the ALIS (ALISys Ltd – Tokyo, Japan) system.

### FPK-SETTING KEY

This key allows the programming of the unit only while connected to the detector socket. Once the key is unplugged, the equipment programming is disabled and only a reduced set of parameters can be performed by the operator.



The equipment is supplied by the **factory unlocked** (full access to programming functions). After the first use the detector turns once and for all to a dual level mode:

- **Operator level**, with not allowed or limited programming;
- **Supervisor level**, having a full access, available only while the setting key is plugged in.

## ALIS – DUAL SENSOR MD & GPR DETECTOR WITH SYNTHETIC APERTURE RADAR [SAR]

The CEIA ALIS-RT detectors can be converted into ALIS systems by means of a conversion kit available from ALISys Ltd ([www.alisys.co.jp](http://www.alisys.co.jp)).

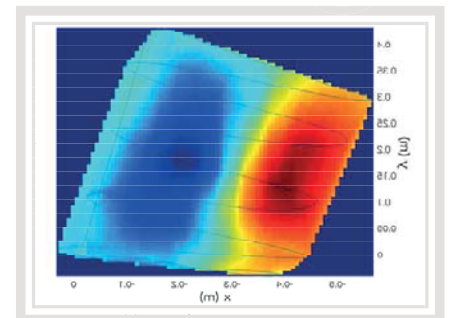
The most unique feature of ALIS is its visualization function of the metal detector and GPR. Operators can easily identify buried mines on the visualized image. The hand held PC color LCD display provides the survey results both from the metal detector and the GPR as images. The Dual-Tone Metal Detector Audio alert is also available as indication. The dual sensor technology using metal detector and GPR provides discrimination capability of mines from metal clutters. 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 mine are visible. Operator can find those shapes in resulting images of the GPR, which are horizontal slices of the underground at different depths, and can compare with the image from the metal detector.



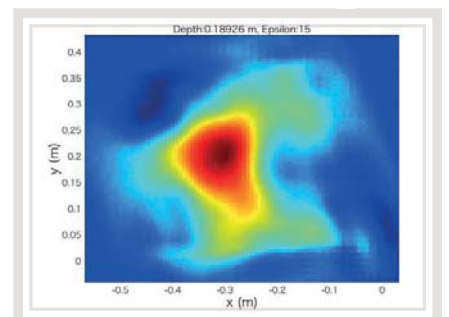
THE **COLOR LCD DISPLAY** PROVIDES THE SURVEY RESULTS BOTH FROM THE **METAL DETECTOR** AND THE **GPR AS IMAGES**

### SENSOR 1 (MD)



Mine can be seen at the boundary of red and blue signal.

### SENSOR 2 (GPR)



The shape of the mine can be seen as shown.

## ALIS-RT SPECIFICATIONS

### MAIN FEATURES

TRIPLE SENSOR TECHNOLOGY: Metal Detection (MD); Carbon Rod Detection (CRD); Ground Penetrating Radar (GPR)	Built-in speaker and external earphone with adjustable volume
Very high sensitivity	Distinct alarm signals for each Detector
Very high detection distance, even for objects with a small content of metal	High precision pin-pointing of the target
Adjustable sensitivity, independent for the MD/CRD Detectors and the GPR	Self-diagnosis system with audible signal in the case of malfunction or low battery
Automated Soil Compensation	Built-in vibration signaling device
Very high contrast LCD transreflective graphical Display	Battery level indicator
Working channel selection for simultaneous use of several units	Built-in battery charger
Static and dynamic detection, independent of the speed	Long battery operating time
Usable in standing, kneeling and prone position	Light weight detection head for maximum comfort during use
	Light Weight construction
	Extremely compact, robust and reliable

### TECHNICAL DATA

START-UP TIME: 10 s / SOIL COMPENSATION TIME: 21 s / RESET TIME: 3 s	
BATTERIES: 2 rechargeable Ni-MH 1.2V cells, ANSI standard size D or IEC size HR20 (recommended CEIA supplied batteries)	Operational time (after reset, at 68°F / 20°C): ≥8 hrs, continuous use, operating mode MD+CRD+GPR (CEIA supplied batteries)
	Battery self-discharging: residual charge of 65% when stored for 28 days at 68°F / 20°C
	Battery cycle life: 2-years of daily use (500 cycles, IEC standard)
BATTERY CHARGER	Acoustic/visual Low Battery warning: about 1 h of operation (during this time the detection capability and all the other performances of the unit are not affected)
	Charging time: ≤ 5 hrs
POWER SUPPLY	GSMD-ACPSA1 AC/DC Power Supply for the built-in battery charger. Input: 100-240V- 50/60Hz, 25W. Dimension and weight: 3.86 in x 1.65 in x 1.26 in (98mm x 42mm x 32mm); 0.86 lbs (390g)
	GSMD-DCPSA1 DC Power Supply Cable with cigarette lighter plug. Input voltage 10...35Vdc
INTERNAL SPEAKER: acoustic pressure 84dBA @30cm (volume set to maximum)	
PROTECTION DEGREE (IEC 60529): IP 68 (water proof to 6.5 ft (2 m) for 24 h)	
STORAGE TEMPERATURE: -67°F to 185°F (-55°C to +85°C)	
OPERATING TEMPERATURE: -51°F to 158°F (-46°C to +70°C)	
Complies with the international standards on radio interference and safety for human exposure to electromagnetic fields	
DIMENSIONS	Detection head: Ø 10.4 in x 3 in (265mm x 75mm)
	Detector maximum length: 61 in (1550 mm)
	Telescopic pole length adjustment: 28.7 in (730 mm)
	Folded detector: 33.5 in x 13.6 in x 4.7 in (850 mm x 345 mm x 120 mm)
	Carry bag: 33.5 in x 13.8 in x 6.3 in (850 mm x 350 mm x 160 mm)
WEIGHTS	Transport case: 46.5 in x 17.3 in x 6.3 in (1180 mm x 440 mm x 160 mm)
	Metal detector, batteries included: 3100 g (6.95 lbs)
	Earphone: 0,38 lbs (170 g)
	Carry bag: 2.2 lbs (985 g)
	Transport case (equipment included): 31.3 lbs (14.2 kg)

### ALIS-RT DETECTING SET

- ALIS-RT DETECTOR
- DIELECTRIC TEST SAMPLE
- METALLIC TEST SAMPLE (ORANGE)
- CONDUCTIVE NON METALLIC TEST SAMPLE (BLACK)
- INSTRUCTIONS FOR USE, FIELD INSTRUCTIONS & PARTS LIST
- 1.2 V NI-MH RECHARGEABLE BATTERIES, SIZE ANSI D OR IEC HR20
- CARRY BAG
- EARPHONE WITH CONNECTING CABLE
- HOOK/CLIP FOR EARPHONE
- AC POWER SUPPLY FOR THE BUILT-IN BATTERY CHARGER, WITH POWER CORDS (UL AND CEE PLUG)
- DC POWER SUPPLY CABLE FOR THE BUILT-IN BATTERY CHARGER FITTED WITH A CAR CIGARETTE LIGHTER PLUG
- USB CABLE
- SHOULDER STRAP
- TRANSPORT / STORAGE CASE

### ACCESSORIES

- FPK-SETTING: SUPERVISOR SETTING KEY
- GSMD-FPK: FIELD PROGRAMMING KEY



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