Introducing the smart CBD ANTENNA
Triple frequency 200/400/800 MHz
Outstanding 50-1400 MHz bandwidth
Replaces several conventional antennas
WIRELESS OPERATION — No need for cables

PATENT PENDING CBD ANTENNAS

CBD ANTENNA TRANSMITS TRIPLE FREQUENCIES — 200, 400 and 800 MHz

ULTRA WIDE BAND PERFORMANCE — 50 to 1400 MHz (1350 MHz bandwidth)

REPLACES SEVERAL CONVENTIONAL ANTENNAS

WITHOUT “DEAD ZONES” OR BLIND SPOTS

BLENDED FREQUENCY DATA — Optimal frequency automatically selected for all depths

UNIQUE RELATION FREQUENCY/VELOCITY — Proprietary formula

AIR COUPLED OPERATION — No need for ground coupling

COMPLETE GPR SYSTEM — 2 channel GPR, CBD-antennas, CU, Cart, Transport case

WIDE SELECTION OF CONTROL UNITS — Rugged PC with bundled software

SMART CART — Quick release wheels for push and pull operation

COMPACT AND FLEXIBLE SYSTEM — Only 15 kg

OPTIONAL REAL TIME SAMPLING
THE SMART GPR

The **COBRA CBD WIRELESS GPR** collects data from hundred thousands of pulse reflections each second to help researchers identify objects below ground. It works in a multi frequency band from 50 to 1400 MHz, thus replacing several antennas with different frequencies used by other and older GPR systems.

**HOW IT WORKS**

The unique CBD antenna transmits pulses with triple frequencies in a blended pulse form.

The CBD antenna selects the optimal frequency needed for all layers and targets at different depths.

The CBD antenna data received can then be used for accurate velocity/RDP values for layers and targets via frequency analysis (using a proprietary formula - with linear relation between reflected frequency and velocity).

**3-D RADAR DEPTH SLICE, HORIZONTAL VIEW**

A 3-D software translates several 2-D radar profiles into a 3-D map, depth slice, at different depths. For full 3-D, the spacing between 2-D survey lines must be very close (λ/4).

The depth slice below shows a buried Roman building wall remains, at Carnuntum, Austria.

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Buried remains of a building at 2 m depth shown as a 20 cm depth slice. Survey map: 40 square meters, based on 40 m long GPR-profiles separated by 50 cm.
APPLICATIONS & USES

Just like X-Ray and ultrasound can image the inside of your body, the COBRA CBD WIRELESS GPR can be used to see the inside of different materials and structures in numerous applications.

INFRASTRUCTURE & UTILITY MAPPING
- Inspect internal structures and identify voids.
- Works with roads, airports, bridges, tunnels, railways, dams, and buildings.
- Locate plastic-, concrete-, clay- or metal pipes.
- Map concrete before drilling, cutting, or coring.
- Detect obstacles in front of directional drilling operations.
- Find water leaks and illegal connections.

SNOW & ICE
- Airborne mapping of snow- and ice thickness.
- Find crevasses and avalanche victims.
- Profile ice roads.

ENVIRONMENTAL
- Locate hazardous waste, UST-location.
- Delineation of contaminant plumes and product spills.
- Map shallow lakes and rivers.

APPLICATIONS & USES

Just like X-Ray and ultrasound can image the inside of your body, the COBRA CBD WIRELESS GPR can be used to see the inside of different materials and structures in numerous applications.
**GEOLOGY & MINING**
Locate gemstone pockets in pegmatite.
Find kimberlite, lateritic nickel.
Map internal structures and voids in soil.
Locate cracks in bedrock and building stones.

**AGRICULTURE & FORESTRY**
Locate agricultural and golf-green drainage tiles.
Determine soil water content and conductivity.
Map tree roots and rot in wood.

**ARCHEOLOGY & FORENSICS**
Pre-excavation mapping of buried structures, foundations, burial sites and chambers.
One of Radarteams most famous projects was when we located a 20,000 year old woolly mammoth, well preserved in the permafrost ground of Siberia.
The project was shown on Discovery Channel and can be found on Youtube with the search term “Raising the Mammoth pt. 2”

**MILITARY & SECURITY**
Locate tunnels, bunkers, hidden weapons and drugs.
Find land mines and unexploded ordnance (UXO).
Through wall imaging.
Rescue operations; locate trapped victims under collapsed buildings and landslides.
COBRA CBD GPR uses a patent pending unique triple frequency antenna design (200, 400 and 800 MHz nominal frequencies). Because the CBD-antennas emits three ultra wide band pulses (150% of nominal frequencies compared to 100% for conventional antennas), that overlap and blend together it can replace multiple antennas with nominal frequencies between 200 and 800 MHz. (See frequency spectrum below)

• Mixed/blended data with automatic optimum frequency selected through all depths in one single file.
• Near surface data with high resolution/frequency and deep targets with lower required frequencies.
• No need to set frequency filters. The smart CBD antenna filters by itself.
• No “dead zones” or blind spots in data due to blended frequencies.
• Calculate velocity directly from frequency content with proprietary formula.
• Real Time Sampling technology option
• Air coupled operation without ringing. (Other antennas must be ground coupled to avoid ringing)

UNPARALLELED
With an unparalleled bandwidth of 1350 MHz the CBD ANTENNA has several advantages and features.

CUTTING EDGE
Cutting edge technology and state of the art in GPR gives the ultimate GPR-system
HEAD TO HEAD
COMPARING
SAMPLE DATA
Conventional Dipole antenna versus CBD FREQUENCY

CONVENTIONAL DIPOLE ANTENNA (RAW DATA)
- Limited Bandwidth
- Low resolution
- Ringing/banding when air launched

CBD MULTI FREQUENCY ANTENNA (RAW DATA)
- Tripled Bandwidth
- High resolution
- No ringing/banding when air launched

A conventional single frequency antenna to the left compared with the CBD MULTI FREQUENCY ANTENNA on the right.
The test was made the same day, on the same site, with both antennas air-coupled 3 cm above ground.
Samples show the Raw data.
It is obvious that our CBD data is superior compared with a conventional single frequency antenna. The ringing that is seen in conventional dipoles, even at this minor air-coupling, can not be found in the CBD data. A tripled bandwidth gives improved data quality with better resolution, target detection and penetration.

DETAILS
Detail from the CBD Multi Frequency antenna sample, clearly shows the high resolution capacity of our CBD Multi antenna (see green outlined box in top right image). Raw data as collected with the antenna air-coupled, 3 cm above ground.
In the above magnified, colour scaled sample, the spacing between surface tiles (see photo), are seen already in the direct pulse. Each individual shallow 4 mm rebar is also easy detectable.
## COBRA CBD WIRELESS GPR – TECHNICAL SPECIFICATIONS

### ANTENNA / GPR
- **2 channel Ground Penetrating Radar system with shielded antennas**
- **Antenna type**: CBD* Multi Frequency Antenna (* Patent pending)
- **Nominal frequencies**: 200/400/800 MHz
- **Operating bandwidth**: 50-1400 MHz
- **Applied voltage**: 200 V
- **Sample rate**: 100,000 samples/second
- **Scan rate**: 1-100 scans/s per channel @ 512 samples/scan
- **Sample output**: 16 bit digital raw data

### CONTROL UNIT / CU
- **Selectable PC/PDA, Rugged, MIL-STD-81F/G, water- and dust resistant, IP-65 or IP-67 with bundled data acquisition. DAQ-software for control, display, processing and storage of GPR-data.**
- **Data format**: Standard Geophysical SEG Y Data Format (.sgy)
- **Data channels**: 1 or 2 with individual settings for depth, filter and gain
- **Vertical filters**: Off, Digital
- **Horizontal filters**: Stacking, Background removal
- **Gain points**: 1- 10 Linear gain
- **Gain levels**: 0 to +60 dB
- **Data storage**: Raw data storage with memory for Gain used
- **Data file size**: Limited only by available HDD-space

### SURVEY CART
- **Push and Pull non-metallic handle and support, tactical RAM-mount, crade for recommended and purchased rugged PDA/PC 12" quick release non-inflatable wheels. High resolution SW-encoder.**

### ENVIRONMENTAL
- **Temperature**: -20°C to 40°C internal temperature
- **Humidity**: 96% non-condensing
- **Ingress protection**: IP68 connectors

### MECHANICAL
- **Size (L x W x H)**: 60 x 52 x 29 cm
- **Weight**: 15 kg

### OPERATING
- **Operating platforms**: Airborne operation, high speed air-coupled operation, ground-coupled operation
- **Battery**: Integrated 73 Wh Li-Ion
- **Operating time**: 8 hours
- **Operating mode**: Manual [1-100 scans/s], Distance [SW-encoder] with or without GPS
- **GPS positions**: GPS positions integrated with GPR-data for every scan in both time- and distance mode
- **Operating depth**: 0-2000 ns selectable. Typical 0-500 ns. Depth range 0 - 10 m depending on ground properties.

### ACCESSORIES
- **Hardware**: Helicopter survey kit, Road/Railway kit, Transport case. High accuracy GPS, Harness
- **Software**: GPR Data Acquisition software included [COBRA DAQ] for Cobra Wireless GPR and Cobra Plug-In GPR. PRISM Post processing software with 3d export module (Voxler, Reflex 3d, GPRSlice).