# T-VLF

VLF SYSTEM FOR GROUNDWATER AND MINING

- LIGHTWEIGHT
- EASE OF USE

The **VLF** receiver is specially designed for high productivity surveys, in ground water and mining exploration.
The capabilities of the previous **SYSCAL VLF** receiver have been greatly improved thanks to the use of new technology components.
The major benefits of **T-VLF** include:

## LIGHTWEIGHT

The system weighs less than 6 kg. It consists in a back-mounted part (sensor unit) and a hand-held part (controller unit).

## EASE TO OPERATE

No orientation of the operator with respect to the direction of the transmitter is required since three magnetic sensors measure the components of the **VLF** field. Tilt or horizontality of the sensor unit is neither required since two inclinometers correct for tilted position.

## AUTOMATIC MEASUREMENT

The microprocessor makes the measurement fully automatically: frequency is keyboard-selectable, two frequencies can be measured at the same time.

## ACCURACY AND SENSITIVITY

Low noise magnetic sensors and digital filtering allow to carry out good measurements even in areas where primary fields are weak. Besides, a quality factor is given at each measurement to control the data quality.

## VERSATILITY

The receiver can be operated in two modes:
- The classical tilt angle mode, based on the measurement of magnetic-only components, and used to prospect conductive dyke-like structures that generally correspond to weathered or mineralized zones.
- The resistivity mode based on the measurement of magnetic and electric components. In this mode, a short electric line and two metallic electrodes are used. Applications concern the prospecting of resistive dyke-like structures and geological mapping (structural studies).

## COMPLETE INFORMATION

A large graphic display gives the operator complete information about the measurement: tilt angle and ellipticity, with their Fraser derivative values (mode 1); resistivity and phase (mode 2). The tilt or resistivity curve is automatically plotted after each station to enable the operator to make a first analysis of the measurements.

## INTERNAL MEMORY

All measured parameters, with frequency value, station and line number can be stored in the solid state memory which can contain over four thousand measuring stations. At the end of the day, or of the field work, data can be transferred to a printer or to a microcomputer.

## T-VLF SPECIFICATIONS

- VLF radio waves receiver with frequency range from 10 to 30kHz
- Fully automatic measurement through microprocessor control
- Keyboard-selectable Frequency by step of 100 Hz. Two frequencies can be measured at the same time.
- Two measurement modes:
  - Tilt angle mode: three magnetic sensors, with two inclinometers (+/- 45°)
  - Resistivity mode: one magnetic sensor, with one electric line
- Large graphic display (240 x 64 points) showing:
  - frequency, station and line numbers
  - ellipticity and tilt angle (mode 1) or resistivity and phase (mode 2)
  - quality factor for each measurement
  - automatic curve plot for raw or Fraser derivative values
- Data storage in solid state memory
- Serial link for data transfer to microcomputer or printer

## THE VLF METHOD

The **VLF** method (very low frequency) is an electromagnetic geophysical method that aims at detecting conductive zones located at depths of several dozen meters. It uses the waves produced by military transmitters in the frequency range of 10 to 30 kHz. These primary field waves induce secondary fields when they intersect conductive bodies. Thus, the measurement of the total field (primary + secondary) at the surface of the earth can help detecting underground structures.

In the **tilt angle mode**, it is convenient to operate with a transmitter located in the supposed strike of the prospected structure. In-phase and out-of-phase components of the vertical magnetic field with respect to the horizontal one are measured and the tilt angle and ellipticity of the magnetic ellipse are computed from these components; then, Fraser derivative values of previous parameters are also computed in order to have anomalies centered on the corresponding bodies. This mode is adapted to prospect for conductive elongated structures and geological contacts like altered zones, faults and conductive dykes.

In the **resistivity mode**, it is convenient to operate with a transmitter located in perpendicular direction to the supposed strike of the prospected structure. The electric field in the antenna direction and the horizontal magnetic field perpendicular to it are measured and an apparent resistivity value is determined from the ration of those fields. This mode is adapted, on one hand, to prospect for resistive dyke and, on the other hand, to delineate geological units through resistivity mapping.