

T-VLF

VLF SYSTEM FOR GROUNDWATER ENVIRONMENT AND MINING

- Easy to use
- Fast and automatic



The T-VLF is a radiowave receiver specially designed for high productivity surveys in groundwater, environmental and mineral exploration.

T-VLF MAJOR BENEFITS

- ease of use, lightweight and automatic measurement, through microprocessor control
- fast reading (no need of orientation, nor horizontal reference)
- large graphic display, for in-the-field data analysis
- electric line option, for resistivity measurements

T-VLF is an ideal field survey instrument for searching conductive or resistive structures a few tens meters deep.

T-VLF OUTSTANDING FEATURES

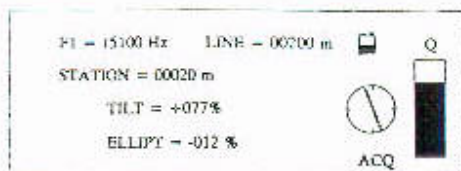
- T-VLF is an electromagnetic receiver which measures the magnetic transmitter in the frequency range of 10 to 30 kHz.
- T-VLF can be operated in two modes:
 - ❖ the classical tilt angle mode based on the measurement of magnetic only components; this mode is used to prospect for conductive structures which may correspond to clayey or weathered zones, or to mineralized dyke-like structures.
 - ❖ the resistivity mode based on the measurement of magnetic and electric components. In this mode, a short electric line and two metallic electrodes permit to measure the electric field; this mode is used for mapping conductive and resistive zones and for prospecting resistive dyke-like structures.

- T-VLF consists in two parts,

- ❖ a back mounted unit including the magnetic sensors and the measuring system,
- ❖ a hand held field micro computer unit.

- T-VLF is controlled by a microprocessor for:

- ❖ Frequency selection: two frequencies can be introduced for analysing simultaneously the waves coming from two transmitters.
- ❖ Automatic filtering and ranging; digital stacking for signal enhancement, and computation of a quality coefficient
- ❖ Computation of geophysical parameters from magnetic / electric fields measurements : tilt, ellipticity, Fraser derivative, resistivity, phase.



T-VLF DISPLAYS

HOW TO TAKE A READING WITH T-VLF ?

- At the beginning of the survey: SET UP key for selecting the transmitter frequencies, and the line and station numbers.
- At each new reading: START key for starting and stopping the measurement, NEXT key for storing the data and updating the station number for next reading.

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T-VLF

EASY TO OPERATE

In the tilt mode, no orientation of the operator with respect to the direction of the transmitting antenna is required, since the three components of the magnetic field are measured by T-VLF.

No tilt or horizontality of the sensor unit is either required, since two inclinometers correct for tilted positions of the instrument.

● T-VLF plots the data curves on the graphic display of the T-unit, so that the operator can visually analyse the data after each reading.

● T-VLF stores the data in its internal memory (up to 4000 readings); each reading includes the geophysical parameters (tilt ellipticity or resistivity, phase) the amplitude of the magnetic / electric fields, and the station and line numbers.

● T-VLF features a serial link for data transfer to a microcomputer or to a printer for further plotting and interpretation.

MEASUREMENT SPECIFICATIONS

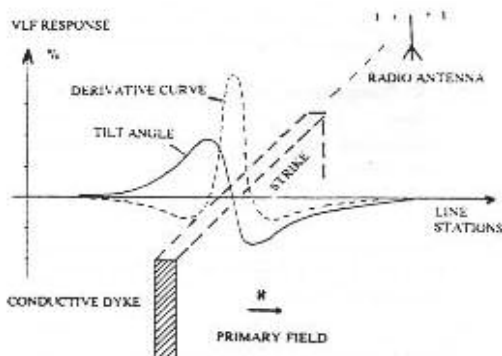
● Measurement of VLF radio waves in the frequency range 10 to 30 kHz.

● Selection of the frequency, through the keyboard, by step of 100 Hz; simultaneous measurement of two frequencies.

● Automatic gain ranging. Automatic stacking through weight coefficients depending on the coherency between the various components.

● Measurement of the three components of the magnetic field (in the tilt mode), or of one electric and one magnetic components (resistivity mode).

● Correction of tilted positions of the magnetic sensors, through two inclinometers ($\pm 45^\circ$).



MEASURED PARAMETERS

● In the "tilt mode": measurement and display of the tilt, ellipticity, Fraser derivative of tilt, in %, of the amplitudes of the horizontal and vertical magnetic components (in $\mu A/m$); graphic display of the tilt, ellipticity, Fraser derivative of tilt curves, for the profile in acquisition.

● In the "resistivity mode": measurement and display of the apparent resistivity (in Ωm), phase between electric and magnetic components (in degrees), the amplitudes of the electric field (in $\mu V/m$) and of the magnetic field (in $\mu A/m$); graphic display of the apparent resistivity curve, for the profile in acquisition.

● In both modes: graphic indication of the direction of the transmitter, quality coefficient of the measurement, voltage of the dry cells, overload indicator.

● Solid state memory for data (4 000 readings corresponding to one frequency, 2 000 readings for two frequencies).

● Serial link for data transfer of data to printer or computer.

GENERAL SPECIFICATIONS

● Splashed proof sensor unit:
Dimensions: 43 x 24 x 24 cm (17 x 9.5 x 9.5 inches) with straps.
Weight: 6 kg (13 lb) including dry cells.
Back mounted case, through strap system.

● Control and visualization T-shape unit:
Dimensions: 27 x 20 x 4 cm (11 x 8 x 1.5 inches).
Weight: 0.85 kg (2 lb) with dry cell.
Keyboard: 16 keys (function and numeric modes).
Graphic display : 240 x 64 dots.

● Operating temperature range: $-20^\circ C$ to $+50^\circ C$ ($-4^\circ F$ to $122^\circ F$).

● Storage temperature range: $-40^\circ C$ to $+80^\circ C$ ($-40^\circ F$ to $176^\circ F$).

● Power supply for sensor unit: six 1.5V (D size) dry cells, or rechargeable batteries.

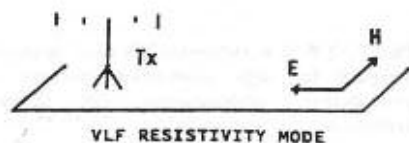
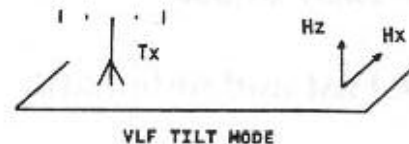
● Power supply for control unit: one 9V (6LR61 type) dry cell.

THE VLF METHOD

The VLF method (Very Low Frequency) is an electromagnetic geophysical method that aims at detecting conductive zones located at depths of a few tens meters. It uses the waves produced by military transmitters in the frequency range 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 in detecting underground structures.

MAJOR BENEFITS OF THE VLF METHOD:

- Pre-existing radio wave transmitters
- One man only operation (two men in the resistivity mode)
- High productivity survey for profiling and mapping
- Easy qualitative interpretation
- Investigation depth of a few tens meters



PC SOFTWARE

A PC software for data transfer and editing is available. Data plotting on profiles is also available through this software for most plotters.

WHAT CAN YOU DETECT WITH T-VLF ?

- Fractured zones
- Clay occurrences
- Water or air filled cavities
- Buried waste sites
- Utility pipes
- Mineralized dykes
- Variation of depth-to-bedrock
- Lateral change in resistivity

