

NuTEM™ Airborne Electromagnetic System

Welcome to the next generation of helicopter EM systems designed for Very High Resolution (VHR) and Intermediate Depth.



Image of Loop Transmitter System with Helicopter. Features on-board power generation and ease-of-flight for low noise and high signal quality

OVERVIEW

Nu-TEM is a versatile, novel time-domain helicopter electromagnetic system well suited for mineral exploration. The system is a special Slingram configuration which provides results that are largely free of the transmitter dipole moment – remaining effects are ideally removed in software.

FEATURES

NUVIA Dynamics' NuTEM™ system features:

- Powerful, compact transmitter with smooth-fly characteristics for low noise
- Three axis receiver with X, Y and Z components fully resolved and noise-free
- Digital data acquisition via the NUVIA Dynamics' IMPAC system with full system control
- Lightweight for easy transport and operation with streamlined vertical lift
- Full wavelength recorded data for custom extraction and processing
- Windows configurable for different geologic targets

BENEFITS -- GENERAL

This powerful form of Electromagnetic prospecting delivers a number of unique benefits:

- Enhanced geologic resolution for finely detailed conductors and structure
- Intermediate depth penetration suitable for many prospective exploration sites
- Light weight and low-noise profile in flight and in measurement of X, Y and Z responses
- Comprehensive software capabilities for data extraction and initial windowing

BENEFITS – RUGGED TERRAIN

- Compact footprint for better defined anomaly positioning
- Stable, rigid platform for noise reduction in X, Y and Z data
- Optimal loop size for exploring in rugged terrain

NuTEM™ SYSTEM DESCRIPTION

Transmitter

The transmitter delivers a half-sine wave pulse of a quarter duty cycle (25% pulse length) with a peak magnetic dipole moment to 220,000 NIA. The system can support two base frequencies, for example, 30 Hz and 90 Hz for a 60 Hz environment or 25 Hz and 75 Hz for 50 Hz environment. The transmitter current is fully monitored at all times.

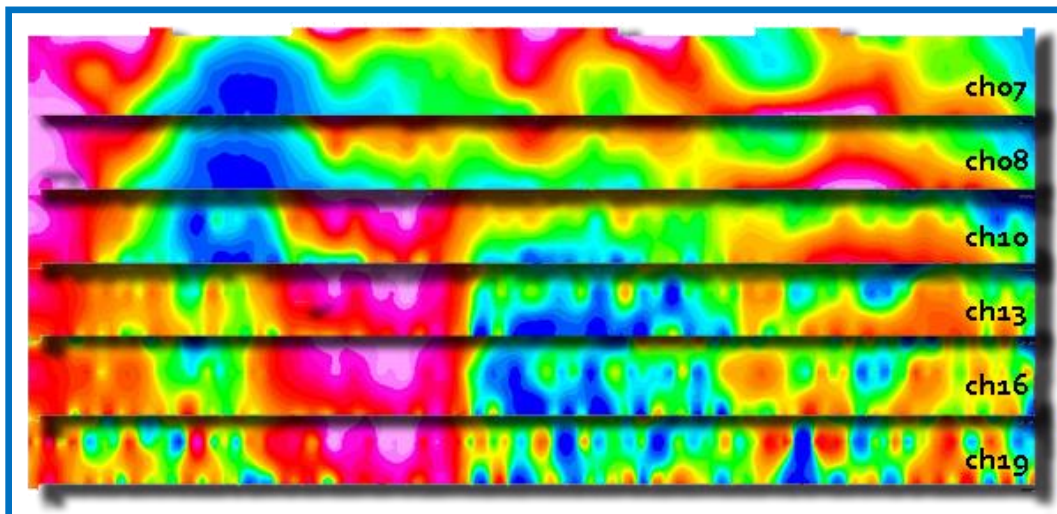
Receiver

Nu-TEM features a powerful and compact three-axis receiver that records in X, Y and Z channels for effective mapping of anomalies (Z channel) as well as mapping of structure (X channel). Data are clean and well-behaved for transmitter off times.

System Characteristics

Transmitter		Receiver	
Loop Surface [m ²]	54.00	Coil Surface [m ²]	0.0720
Number of Turns	4	Number of Turns	480
Current [A]	1000	Preamp Gain	168

The NuTEM™ system has been fully tested at the Reed Mahaffey test site in northern Ontario – a well-known area flown by all major airborne contractors. NUVIA Dynamics' flights in 2019 established new milestones for very high resolution (VHR) and mapping of individual conductors.



Comparison of NuTEM™ Z channel responses for a range of windows.

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NuTEM™ Specifications

Technical Specifications

Description

Type	NuTEM
Standard Survey Speed	55 to 60 Knots
Sensor Configuration	Slingram
Surface Area	55 sq m
Weight	300 kg
Structure	Rigid Loop with Aluminum Frame
Estimated Resistance	15 mOhm
Transmitter Power	Generation in Centre of Loop
Suspension	Single Point
Integrated Systems	Magnetics (Radiometrics – Optional)
Aircraft Type	Bell 206 Ranger, MD 500, AS350 or Similar
Sampling Rate	90 kHz, Each Sample ~10 μ s

Transmitter

Description	4 Turn Nonagon
Diameter	8.6 m
Current	1000 A Peak
Dipole Moment	220,000 NIA
Waveform Type	Half Sine; Vertical Dipole
Pulse Length	25 % of Full Cycle
Base Frequency	25 / 75 Hz in 50 Hz Environment; 30 / 90 Hz in 60 Hz Environment
Waveform	On Time from 451.1 to 1655.4 Microseconds
Power Source	Onboard generator
DC Power Generation	400 Hz 125VAC Helicopter Generation
Mean Ground Clearance	30 m

Receiver

Axes	X, Y and Z component measurements
Position	Offset to TX
Diameter	28.5 cm
Number of Turns	240 Turns on Each Component
Orientation	Z Axis
Preamplifier	3 Channel
Configuration	Offset to TX (Front and Above TX)
Sampling	90 Hz
Time Gates	Configurable with text file - 52 gates
Measurements	dB/dT & integrated B field
Mean Ground Clearance	60 m



NuTEM™ Specifications

Acquisition System

Type	NUVIA Dynamics' IMPAC
CPU	I7 Generation 2 Quad Core
Operation Temperature	Degrees Celsius (-35 to 45)
Standard Sampling Rate	20 Hz

Magnetometer Counter

Magnetometer	NUVIA Dynamics' MMS8
ADC inputs	0.707 V Peak to Peak - 2 Second Polarization
Magnetometer Inputs	8 Inputs
Recording Rate	Up to 100 Hz
Analog to Digital Conversion	24 Bit
Noise Envelope	0.002 nT peak-to-peak and 0.1 to 1 Hz bandwidth

Base Station Magnetometer

Type	CS-3
Manufacturer	Scintrex
Range	15,000 nT to 105,000 nT
Sensitivity Recording Rate	0.0006 nT Root(Hz) RMS @ 1 Hz

GPS

Type	Hemisphere R330
Differential Correction	Real Time
Number of Satellites	25+
Recording Rate	10 Hz

Temperature

Type	NUVIA Dynamics P-DES
Full Scale	-20 to 85 Degrees C
Resolution	0.036 Degrees C
Recording Rate	1 Hz

Barometer

Type	NUVIA Dynamics P-DES
Full Scale	0.1600 hPa
Temperature Compensated Range	10.90%
Accuracy	+/- 0.25%
Resolution	0.39 hPa
Recording Rate	1 Hz

Radar Altimeter

Type	FreeFlight Systems' RA-4000 mounted on aircraft
Operating Range	0 to 2500 feet
Accuracy (0 to 100 ft)	3%
Accuracy (100 to 500 ft)	+/- 3%

NuTEM™ Specifications

Radar Altimeter (Cont.)

Accuracy (500 to 2500 ft)	+/- 5%
Recording Rate	1 Hz

Laser Altimeter

Type	LDM302A
Range	0.5 m to 200 m for low reflectance targets; otherwise up to 3 km
Resolution	1 mm
Recording Rate	1 Hz

Humidity

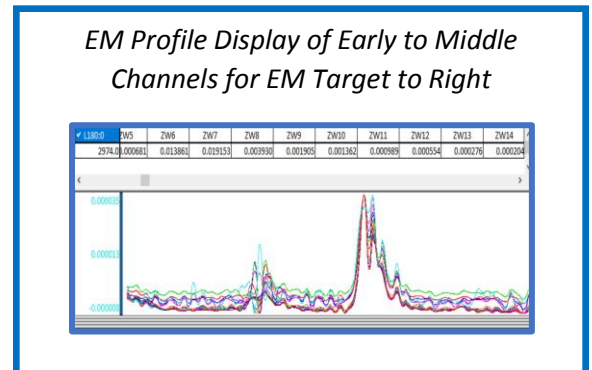
Full Scale	0 to 100%
Temperature Compensated Range	10.90%
Accuracy	+/- 1.7% RH
Resolution	0.04%
Operating Temperature	-40 to 125 Degrees C
Unit of Measure	%

Software

Data Acquisition	NuTEM™ Console
Survey Control & Data Storage	NUVIA Dynamics' IMPAC Data Acquisition Unit
Windowing & TX Loop Removal	EMDATAView (proprietary)
Processing and Display	Geosoft

Deliverables

- Map of Z- and X-Component B-field profiles with Magnetics
- Map of Z- and X-Component dB/dt profiles with Magnetics
- Map of selected B-Field Time Gate images and contours
- Map with TAU, contours and calculated magnetic vertical derivative
- Image of Power Line Monitor (new feature 2019)
- Total field magnetic map with contours
- Maps of dB/dt with early, middle and late time windows
- Digital Terrain Model



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