

Assessment Report  
For The  
2012 Geophysical Program  
On The  
Moebius Mineral Claims

BC Geological Survey  
Assessment Report  
33657

Omineca Mining Division

NTS 93L/07

Latitude: 54 degrees, 21 minutes, 11 seconds N

Longitude: 126 degrees, 53 minutes, 13 seconds W

Owned by S. Bell

Operator S. Bell

Report By: S. Bell

November 2012

Tenure	Name	Area	Good To Date
933830	Moebius	169.58	2018/mar/22
933840		169.58	2018/mar/22

GEOLOGICAL SURVEY BRANCH  
ASSESSMENT REPORT

33,657

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## Introduction

**1.0** Between June 15 and October 15, 2012 the author completed a geophysical survey on the Moebius mineral claims. A reconnaissance style induced polarization survey was conducted on the property to investigate Minfile prospect 093L 328 Stardust. The following details the exploration performed on the Moebius claims during the 2012 season and reports the results of the geophysical survey.

## **2.0 Summary**

There are distinct induced polarization chargeability anomalies associated with the Stardust prospect and a broad zone of highly chargeable material was detected 200 meters south-east of the known mineralization.

## **2.1 Location, Access and Ownership**

The Moebius property consists of two claims.

Moebius Tenure:

<b>Tenure</b>	<b>Name</b>	<b>Area</b>	<b>Good To Date</b>
<b>933830</b>	<b>Moebius</b>	<b>169.58</b>	<b>2018/mar/22</b>
<b>933840</b>		<b>169.58</b>	<b>2018/mar/22</b>

The Moebius Tenures are located in west central British Columbia approximately 16.5 km south west of Houston B.C. in the Omineca Mining Division and are owned by S. Bell the author of this report. On the Moebius claim near the top of a small hill overlooking an easterly flowing tributary of the Morice River called Gold Creek there is a Minfile mineral prospect named 93L-328 Stardust located at 54 degrees 21 minutes 11 seconds latitude, 126 degrees 53 minutes 13 seconds longitude. A logging road that passes through the center of the claim group and over the mineral occurrence provides access from Houston B.C.

## **2.2 Physiography, Vegetation and Climate**

The claims are located on gently rolling topography typical of the Nechako plateau at an elevation of about 1000 meters. Slopes and tops of hills are heavily forested with

# British Columbia UTM Zone 9 Moebius Claim Location

**BC Administrative Area Layers**

- ● Cities

**Topographic Layers**

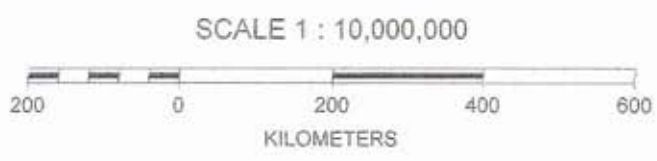
- Lakes 1:6M
- Rivers 1:6M

**Grid Layers**

- Grid 1:250K maps - outline

**BC Border Layers**

- BC Border 1:6M



Map 1



# British Columbia UTM Zone 9 Moebius Claim Location

## File Download Layers

 Mineral Titles PDF 1:20K Grid

## BC Administrative Area Layers

-   Cities
-   BC Communities
  -  City
  -  Town
  -  Village
  -  Resort Municipality
  -  Settlement
  -  Community
  -  District Municipality


## Topographic Layers

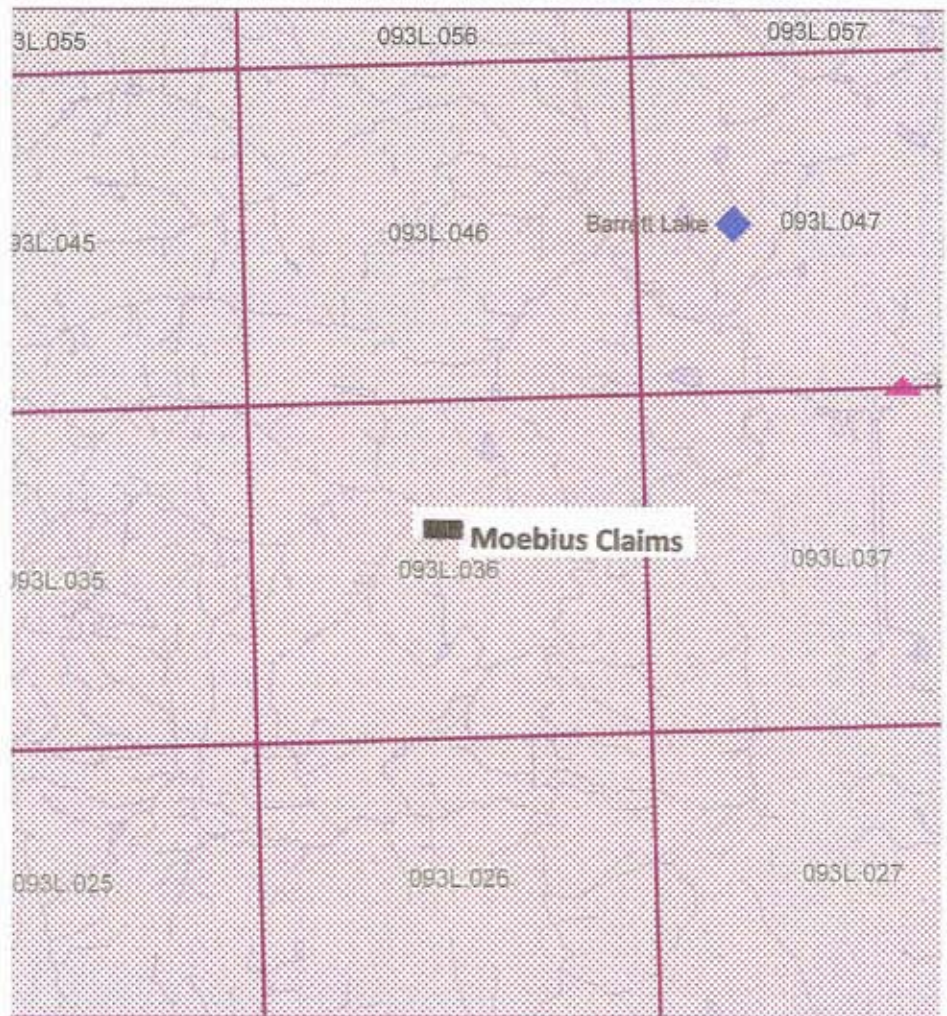
-  Lakes 1:50K (<300K)
-  Rivers 1:50K (<300K)

## Grid Layers

-  Grid 1:250K maps - outline

## BC Border Layers

-  BC Border 1:50K (<300K)

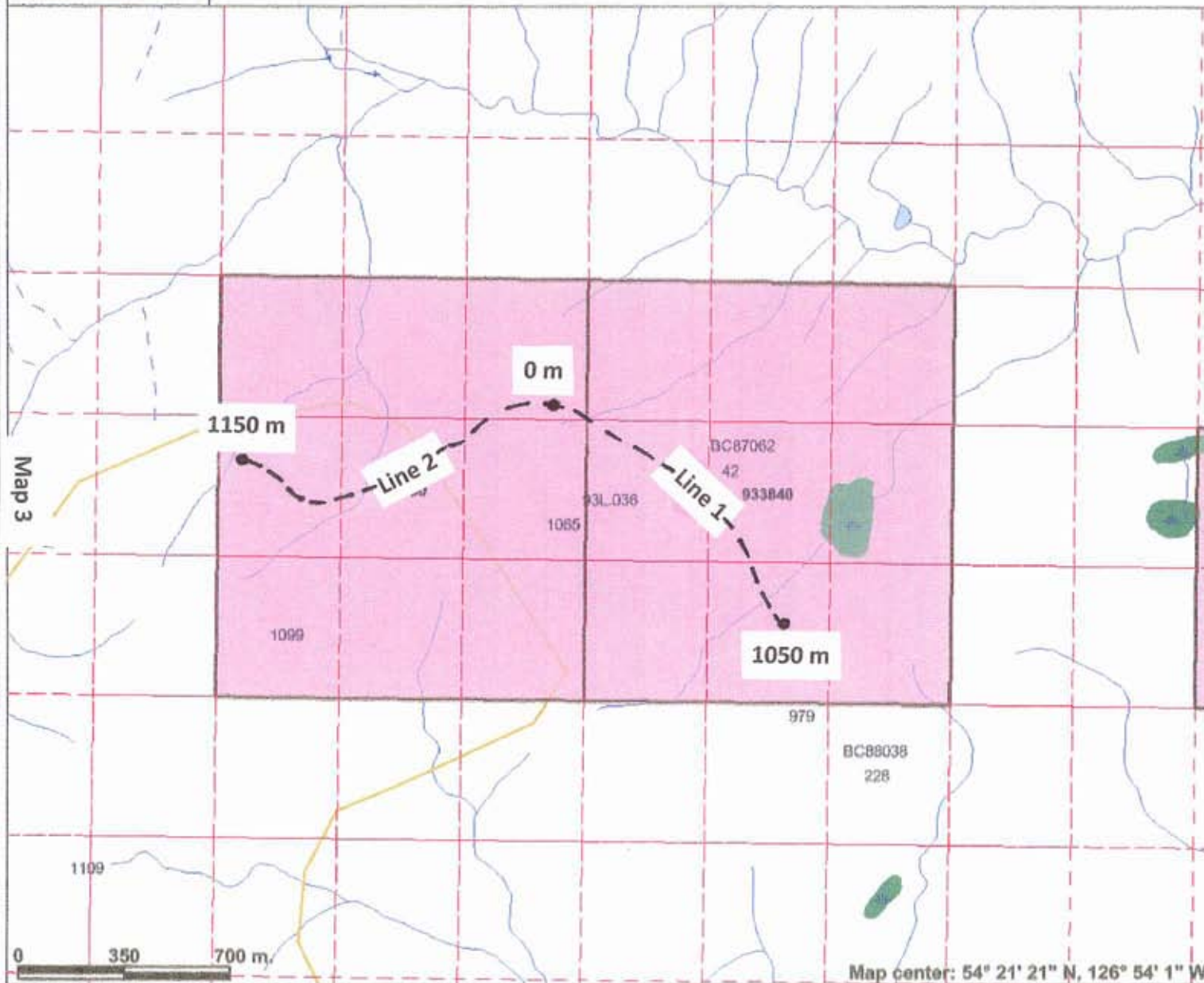


SCALE 1 : 250,000





# Moebius Claims



### Legend

- Indian Reserves
- National Parks
- Conservancy Areas
- Parks
- Federal Transfer Lands
- MTO Grid (MTO)
- Mineral Tenure (current)
- Mineral Claim
- Mineral Lease
- Mineral Reserves (current)
- Placer Claim Designation
- Placer Lease Designation
- No Staking Reserve
- Conditional Reserve
- Release Required Reserve
- Surface Restriction
- Recreation Area
- Others
- First Nations Treaty Related Lands
- First Nations Treaty Lands
- Integrated Cadastral Fabric
- Survey Parcels
- BCGS Grid
- Contours (1:250K)
- Contour - Index
- Contour - Intermediate
- Area of Exclusion
- Area of Indefinite Contours
- Annotation (1:20K)
- Transportation - Points (TRIM)

Map center: 54° 21' 21" N, 126° 54' 1" W

Scale: 1:20,000



This map is a user generated static output from an internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

1c

spruce, balsam, hemlock, poplar and alder. Small intermittent streams active during the freshet flow in steep gullies that drain north and east sloping side hills. These drainages often form seeps at the base of slopes where the flow becomes less energetic. The dominant down slope direction is toward the north east where a well defined easterly flowing tributary of the Morice River drains the entire area. Exposures of bedrock occur on high ground where cover is thin however local streams have not cut through overburden which, elsewhere conceals the bedrock and consists of glacial deposits that vary from less than a meter to tens of meters in thickness in low lying areas. Glacial ice has over road the entire area and modified the topography. Grooving of the local bedrock indicates a north easterly to south westerly ice direction. Winters are moderate to cold with typical snow accumulations of approximately 1-2 meters and the area is generally free from snow pack between May and October.

### **2.3 History of work**

In 1999 the author identified fracture controlled pyrite/quartz mineralization sub cropping under tree roots in a ditch next to the Gold West F.S.R and the Stardust claims were staked to cover the showing. Fresh bedrock samples taken from two short holes drilled into the mineralized outcrop contained copper. Overlying soils were also tested and found to be enriched in base metals and path finder elements. The following season soil samples were collected over a larger area and during the course of this program three base metal and pathfinder element in soil geochemical anomalies were detailed. This prospect was designated as Minfile occurrence 093L 328 Stardust. The claims were allowed to lapse and another party staked the property. Over the course of their tenure no work was recorded. In 2011 the property became open and the author re-staked the prospect. A reconnaissance induced polarization survey was completed by the author in 2012 over the area of interest which is the subject of this report.

### **2.4 Regional Geology**

The area south west of Houston is located within the Intermontane tectonic belt where the transverse Skeena arch trends through the south end of the Babine Porphyry belt and the Houston area. The arch is a positive tectonic feature that in places has preserved older Triassic and Jurassic Stikina terrain rocks. In early Cretaceous time the Skeena arch was intruded by numerous intrusive stocks and plugs that are localized along north-west and north-east trending faults. Important porphyry style mineralization is associated with some of these intrusions and a setting favorable to mineral exploration was created after erosion exposed them. The Telkwa formation, the lowest unit of the Jurassic Hazelton group is also host to structurally controlled precious metals and volcanogenetic massive sulphide prospects.



## 2.5 Property Geology

The property is largely covered by Quaternary age glacial till and locally derived colluviums. On hills the soil is generally thin and poorly developed with little accumulation of organic matter. In gullies and drainages the soil is well developed and includes a rich organic layer. Outcropping rock is rare and bedrock is largely concealed by the undulating till blanket, soil and organic veneer. The terrain slopes toward the north-east and north-west forming a small hill and one side of a broad valley occupied by Gold Creek and its tributary which flow east to the Morice River. The bedrock stratigraphy underlying the Moebius claim is mapped as Jurassic age Telkwa formation and is comprised of phyrlic to aphyric andesitic to basaltic flows and flow top breccias, ash tuff, volcanic breccia, volcanoclastic sedimentary rocks, argillite, limestone, rhyolite and granite. Immediately to the east and south in fault contact with the Telkwa formation are sedimentary rocks of the Lower Cretaceous Red Rose formation. Cuts along north-east and north-west facing slopes made during construction of the Gold West forest service road that traverses through the claim have exposed bedrock. Minfile 093L-328 Stardust is a bedrock mineral prospect located on the north-east facing slope near the junction of the north-west facing slope and subcrops in the bank next to the forest service road. Sulphide mineralization at the Stardust prospect consists of fracture controlled and disseminated pyrite with minor quartz in an altered greenish colored volcanoclastic host rock of intermediate composition. Samples of semi-massive pyrite taken from the exposure assay 0.27% copper and contain anomalous amounts of Au (108 ppb), As (205) ppm and Co (225) ppm. South-east of this location road work has exposed a thick sequence of black argillaceous sulphidic crystal tuff and inter bedded black limestone. The tuff is a soft friable rock subject to ground water circulation and breaks easily along a multitude of loose fractures. The fracture planes are coated with limonite with jarosite the dominant limonite constituent on the most intensively oxidized surfaces. On less altered faces the color of the limonite changes from yellow to orange-brown to the dark brown of goethite which exhibits a characteristic iridescent luster. A poly metallic soil anomaly is associated with the oxidized zone which may signal the presence of primary sulphides at depth. The limestone contains trace amounts of disseminated pyrite and forms hard competent impervious beds not subject to sulphide leaching. In contact with the limestone is a tan to buff weathered greenish grey cherty quartz eye rhyolite which may be in the hanging wall of a mafic volcanic-sedimentary-felsic volcanic sequence. Intrusive rocks exposed by the road work at one location on the north-west facing slope appear to be an un-mineralized plug or dyke of granitic

composition the margins of which are not exposed. Local intrusions are mapped as Nanika of Tertiary age.

### **3.0 2012 Geophysical Program**

The following is a record of the geophysical survey performed on the Moebius claim during the period June 15 and October 15, 2012.

#### **3.1 Summary**

A reconnaissance induced polarization survey was carried out on the Moebius claims to assess the potential of the terrain in the vicinity of Minfile prospect 93L-328 Stardust. The work was performed by the author and included 3.385 line kilo-meters of reconnaissance style induced polarization geophysical survey.

#### **3.2 Geophysical Survey Design and Orientation**

A base station was established on the Gold Creek West forest service road at a point in the road where it turns from the south-east to the south-west at GPS coordinates Nad 83 zone 9 (636205 E x 6025427 N). Two lines following the road in each direction were chained and flagged establishing stations at 25 meter intervals. Both lines begin at 0 meters at the base station. Map 4 shows the position of the two lines relative to Gold Creek F.S.R. road and the local topography. The first line (Line 1) heads south-east parallel to the north-east facing slope past the Stardust prospect and over the oxidized zone ending at station +1050 meters. The second line (Line 2) heads south-west parallel to the north-west facing slope over the granitic outcrop and ends at station +1150 m. This line was selected in order detect any chargeable material related to the granitic intrusion and its contacts and to provide background data in a non-anomalous area. Three configurations of the dipole-dipole array were used during the course of the survey to collect both induced polarization and resistivity data.

Gold Creek

N

Map 4 Scale 1 : 20000

North >>> ^

0 Meters

Minfile 093L-328

Gold-West F.S.R.

4a

Line 2

Line 1

Moebius Claim

Geophysical Survey Traverse Lines

Red Line 1 Blue Line 2

Google earth

Imagery Date: 12/31/2002 2003

54°21'25.27" N 126°54'00.17" W elev 993 m

Eye alt 5.35 km



The following table lists the bedrock occurrences and topographic features encountered their respective GPS coordinates and location in meters from the base station on each line.

Line 1	Nad 83 Zone 9 GPS Location	Bedrock Description
0	636205 E x 6025427 N	dark green chloritic basalt
165	636336 E x 6025344 N	minfile prospect 093L 328 Stardust
175	636345 E x 6025344 N	edge of gulley
210	636383 E x 6025323 N	light green highly fractured crystal ash tuff
230	636396 E x 6025317 N	similar to minfile discovery showing
240	636401 E x 6025330 N	light green blocky slightly pyritic ash tuff
245		gulley
250		black argillite with calcite and trace pyrite
260		gulley
275	636431 E x 6025283 N	sub-crop, loose pieces of weathered argillite
295	636455 E x 6025278 N	pyritic ferricrete float
395		black limy argillite
400	636546 E x 6025231 N	edge of deep gulley
450	636576 E x 6025203 N	light tan cherty slightly pyritic rhyolite
455		massive slightly pyritic black limestone
465	636597 E x 6025202 N	greenish grey pyritic quartz eye rhyolite

Line 2	Nad 83 Zone 9 GPS Location	Bedrock Description
0	636205 E x 6025427 N	dark green chloritic basalt
200-400	635987 E x 6025281 N	pinkish grey medium grained granite

### 3.3 Discussion

Geophysical data collected for each line and dipole-dipole configuration was inverted using the RESDINV program and corresponding models of the subsurface created. These chargeability and resistivity model sections are displayed in the appendix of this report. To improve the quality of the data and resolution of the survey the number of electrodes and their spacing was varied providing overlapping data points. The effect of more noisy data points is reduced by redundant measurements when the data is combined. Closer electrode spacing can resolve smaller causative bodies but with reduced depth capability.



### Line 1

Line 1 was initially surveyed with an electrode spacing of 25 meters ( $a = 25\text{m}$ ) and six potential dipoles ( $n = 6$ ) providing six layers of data and a 45 meter median depth of exploration. A strong chargeability anomaly (1) with limited depth extent centered at 175 meters on line 1 was detected. This anomaly is at the location of the out cropping sulphide mineralization previously described as Minfile 093L-328 Stardust. A second anomaly (2) centered at 275 meters has greater depth extent with reduced chargeability. Pyritic ferricrete float found in overburden at 295 meters may be related since the ferricrete is very friable suggesting a nearby bedrock source. Both anomalous zones are associated with moderate to low resistivity. A third chargeability anomaly (3) open at depth is a broad zone of chargeable material between 365 meters and 525 meters. The moderately resistive causative body is flanked by more conductive material.

The line was surveyed again using a 50 meter electrode spacing ( $a = 50\text{m}$ ) increasing the median depth of exploration to 60 meters. At this spacing anomaly (2) is highlighted, anomaly (1) becomes less apparent and anomaly (3) remains open at depth. At 800 meters a low order chargeability anomaly (4) of moderate resistivity appears at depth.

Using an electrode spacing of 5 meters the top of anomaly (3) appears to be covered to a depth of about 3.5 meters by non chargeable material except possibly for a shallow projection between 435 meters and 445 meters. The near surface pattern of low to moderate resistivity is complex.

### Line 2

Line 2 was surveyed with an electrode spacing of 25 meters providing adequate depth of exploration and resolution to investigate the granitic intrusion and its contacts. No chargeability anomaly was detected along this line.

## 4.0 Recommendations

Further work at this site is recommended to determine the extent of the chargeable material detected on line 2. This can be achieved by surveying lines established north and south of the anomalous zones with the induced polarization method. Line 2 could also be surveyed using electromagnetic methods to detect narrow conductive sulphide

bearing faults or shears within the broader chargeability anomaly. Bedrock occurrences should be carefully prospected, mapped and correlated to the geophysical results.

## 5.0 Conclusions

Sulphide mineralization (pyrite) associated with anomaly (1) Minfile prospect Stardust is chargeable and can be detected by the induced polarization method using a low powered transmitter and sensitive receiver. The nature of the causative body that gives rise to anomaly (3) is unknown. Overlying rocks are thought to be black tuffaceous argillites, black sulphidic tuff, black limestone and rhyolite. Carbonaceous rocks containing graphite can produce strong IP anomalies. Near surface material above anomaly (3) however is not chargeable. Furthermore dry samples of argillite, tuff and limestone are quite resistive when tested with an ohm meter suggesting the absence of conductive graphite. Perhaps sulphides have been completely leached from the near surface and the chargeable material at anomaly (3) at depth is un-oxidized fracture controlled sulphides. Anomaly (3) is of interest since Anomaly (1) contains appreciable amounts of copper. No firm conclusions can be made at this point regarding the geometry of anomaly (3) since the causative body is three dimensional and the topographical effect has not been taken into account.

## Geophysical Equipment Design and Theory

### Survey Parameters

- Survey type = Reconnaissance Time Domain Induced Polarization and Resistivity
- Survey Station Spacing = 50, 25 and 5 Meters
- Line Direction: South-East and South-West along Gold West F.S.R.

### Survey Totals

- 3.385 line kilometers

### Specifications

The survey was performed by deploying a dipole-dipole array using dipole spacing's of 5, 25 and 50 meters with  $n=4$  to 6.

Current was injected to the ground through stainless steel stakes used as current electrodes in the time domain at 0.125 Hz (8 second period) by a 160 watt battery powered Hunttec Mark 3 transmitter. Data was recorded using a Zonge GDP-32 broad band electrical methods receiver connected to non-polarizing potential electrodes.

The equation used for calculating the time domain is the equation used by swift (1973).

Reference: Swift, C.M., Jr. 1973, The L/M parameter of time domain IP measurements, a computational analysis, *Geophysics*, v 38, p 61-67.

After cessation of the current pulse the off time or secondary voltage was sampled and averaged to arrive at the chargeability, reported in milliseconds or millivolt-seconds per volt. With 1024 points sampled per cycle the secondary voltage is summed over 83 counts out of 256 per quarter cycle. 13 windows define the off time decay wave form at 150 millisecond intervals at 0.125 Hz. The combination of windows used to arrive at the total chargeability is a sum of windows 4, 5, 6 and 7. This effectively integrates the secondary voltage from 500 milliseconds to 1100 milliseconds. These values along with grid coordinates, primary voltage, current, and self potential gradient were recorded.

## Appendix

**Expenses**

1)	\$10,308	Geophysical Survey (all inclusive)
2)	\$1,500	Report
<b>Total</b>	<b>\$11,808</b>	

**Qualifications**

This is to certify that I am a graduate of Queen's University at Kingston, Ontario, with a Bachelor of Science degree in Mining Engineering (1985).

Steve Bell



November 2012



Appendix

RES2DINV Model Sections

## RES2DINV Model and Inversion Parameters

Model and Pseudosection horizontal and vertical scale in meters.

Resistivity in ohm meters

Chargeability in milliseconds

Initial damping factor is 0.1600.  
Minimum damping factor is 0.0150.  
Line search is always used.  
Convergence limit is 5.0000.  
Minimum change in RMS error is 0.5000.  
Number of iterations is 5.  
Vertical to horizontal flatness filter ratio is 1.0000.  
User defined increase in layer thickness.  
Number of nodes between adjacent electrodes is 2.  
Smoothness constrain is only used directly on model resistivity values.  
Number of topographical datum points is not reduced.  
Topographical modeling is to be carried out.  
Least-squares linear topographical trend to be removed.  
Jacobian matrix is recalculated after each iteration.  
Increase of damping factor with depth is 1.0500.  
Topographic modeling is not carried out.  
Robust data inversion constrain is used with cutoff factor 0.0500.  
Robust model inversion constrain is used with cutoff factor 0.0050.  
Extended model is not used.  
Effect of side blocks is severely reduced.  
Normal mesh is used.  
Damping factor is optimised at each iteration.  
Robust smoothness constrain is used in time-lapse inversion.  
Simultaneous time-lapse inversion is used.  
Thickness of first layer is 0.3410.  
Factor to increase thickness layer with depth is 1.1000.  
Finite difference method is used  
Width of blocks used is 1 times the unit electrode spacing  
All models blocks must have the same width  
RMS convergence limit is 1.0 percent  
Logarithm of apparent resistivity values are used for the inversion  
Resistivity/IP data are inverted sequentially  
Do not proceed automatically in sequential IP inversion  
IP damping factor is 0.1000  
Automatic IP damping factor is not used  
Cutoff factor for borehole data is 0.00300  
Upper resistivity cutoff limit is 50.00000  
Lower resistivity cutoff limit is 0.02000  
Average resistivity used.  
Model refinement used.

Figure 1.

Line 1 Chargeability

a = 25 meters

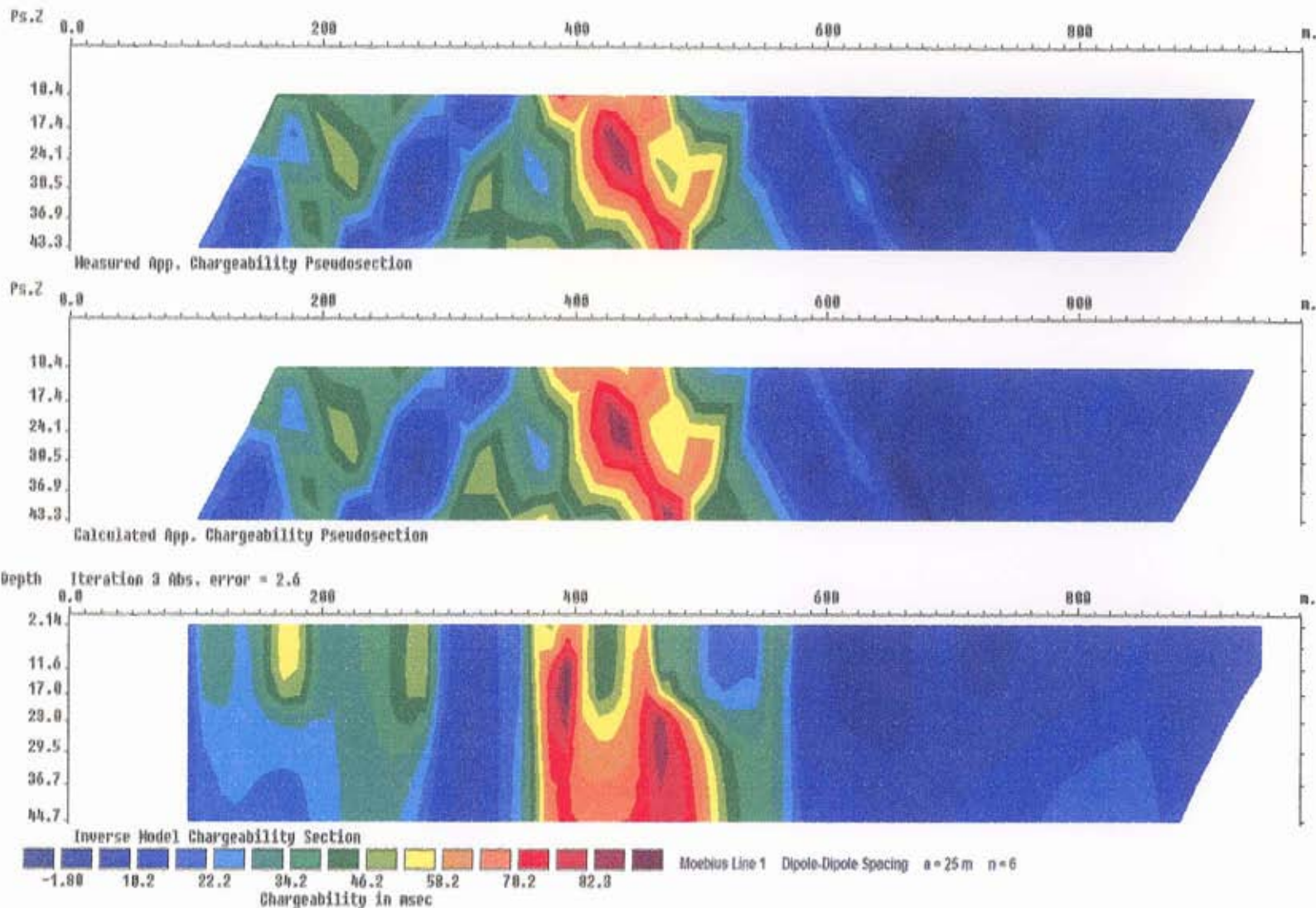


Figure 2.

Line 1 Resistivity

a = 25 meters

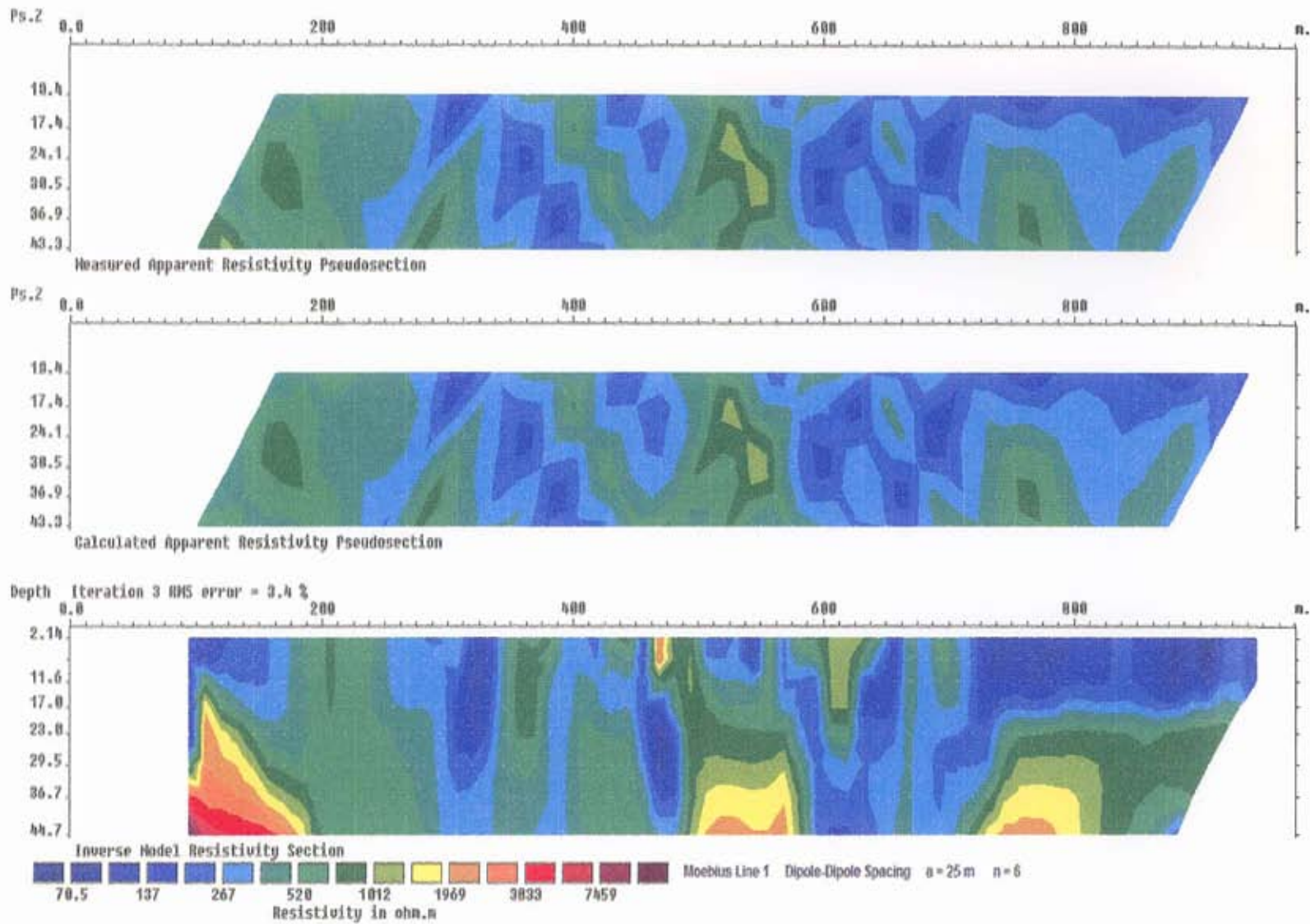




Figure 3.

Line 1 Chargeability  $a = 50$  meters

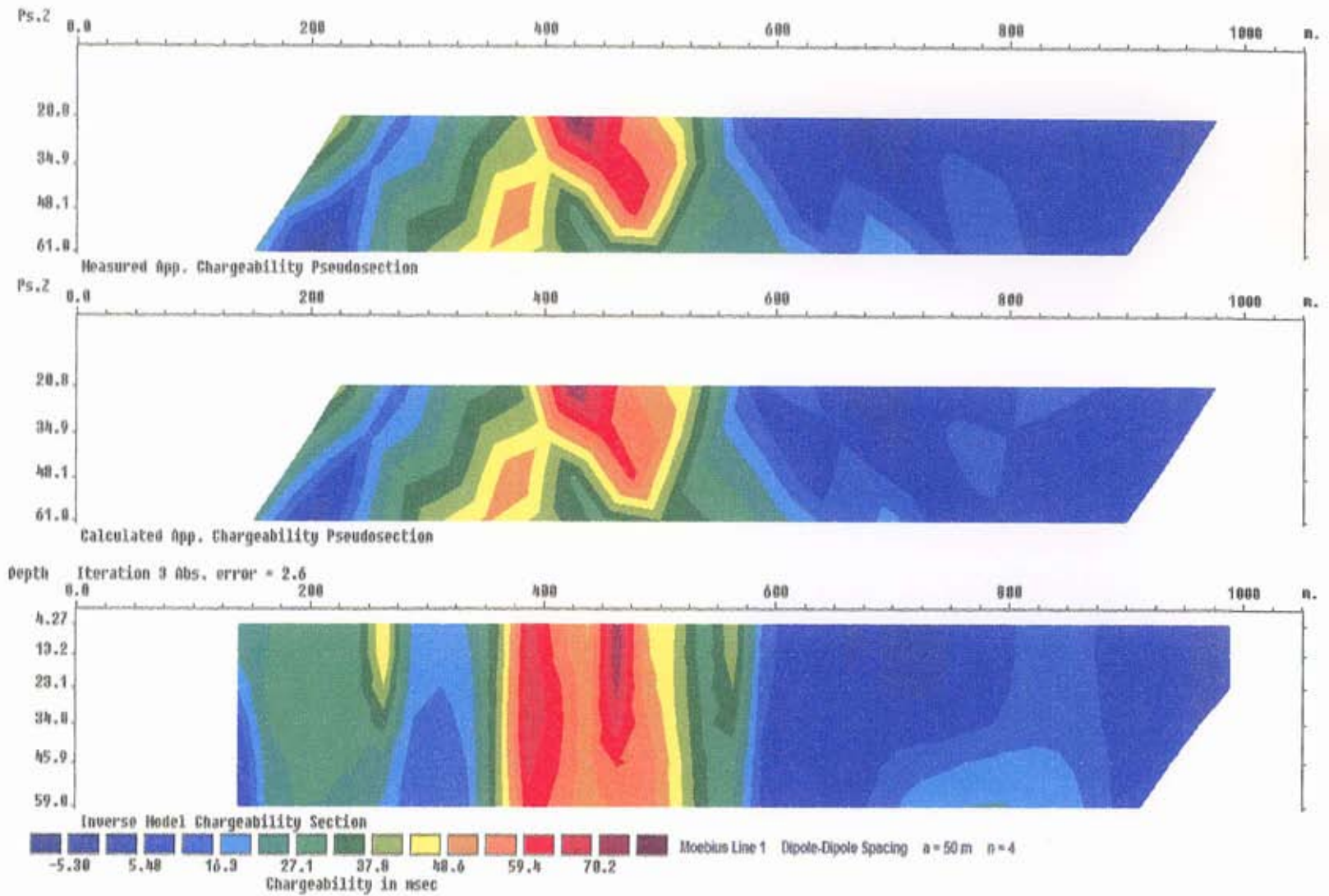


Figure 4.  
Line 1 Resistivity  
a = 50 meters

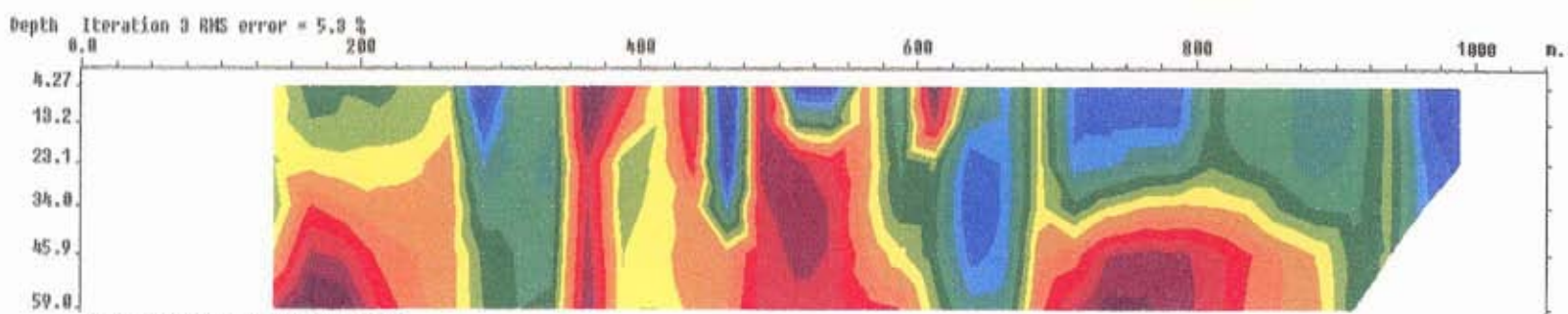
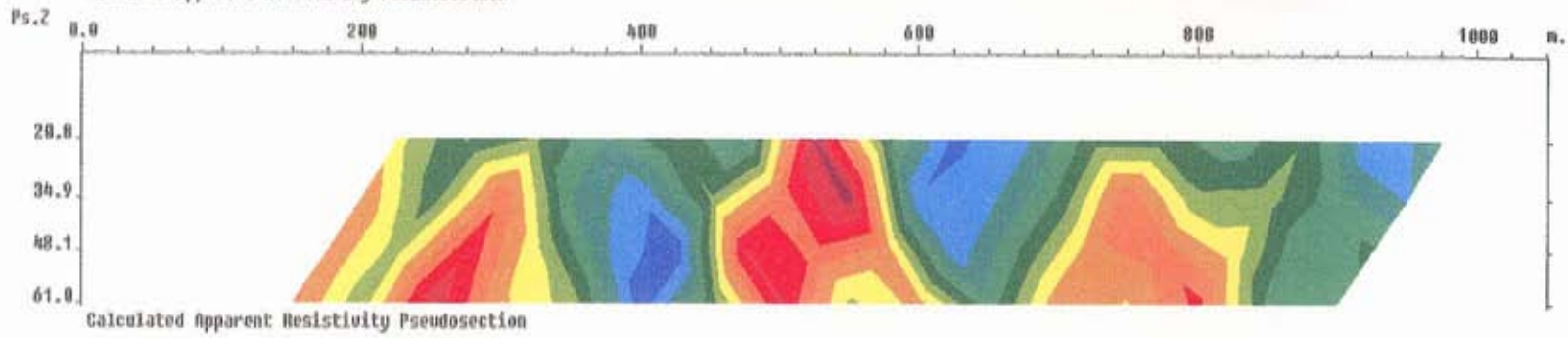
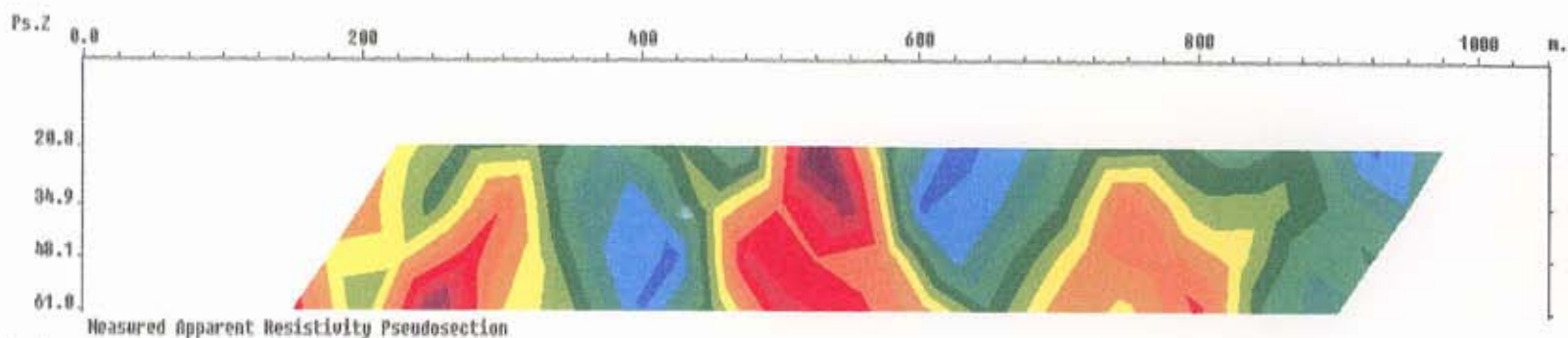


Figure 5.

Line 1 Chargeability  
a = 5 meter

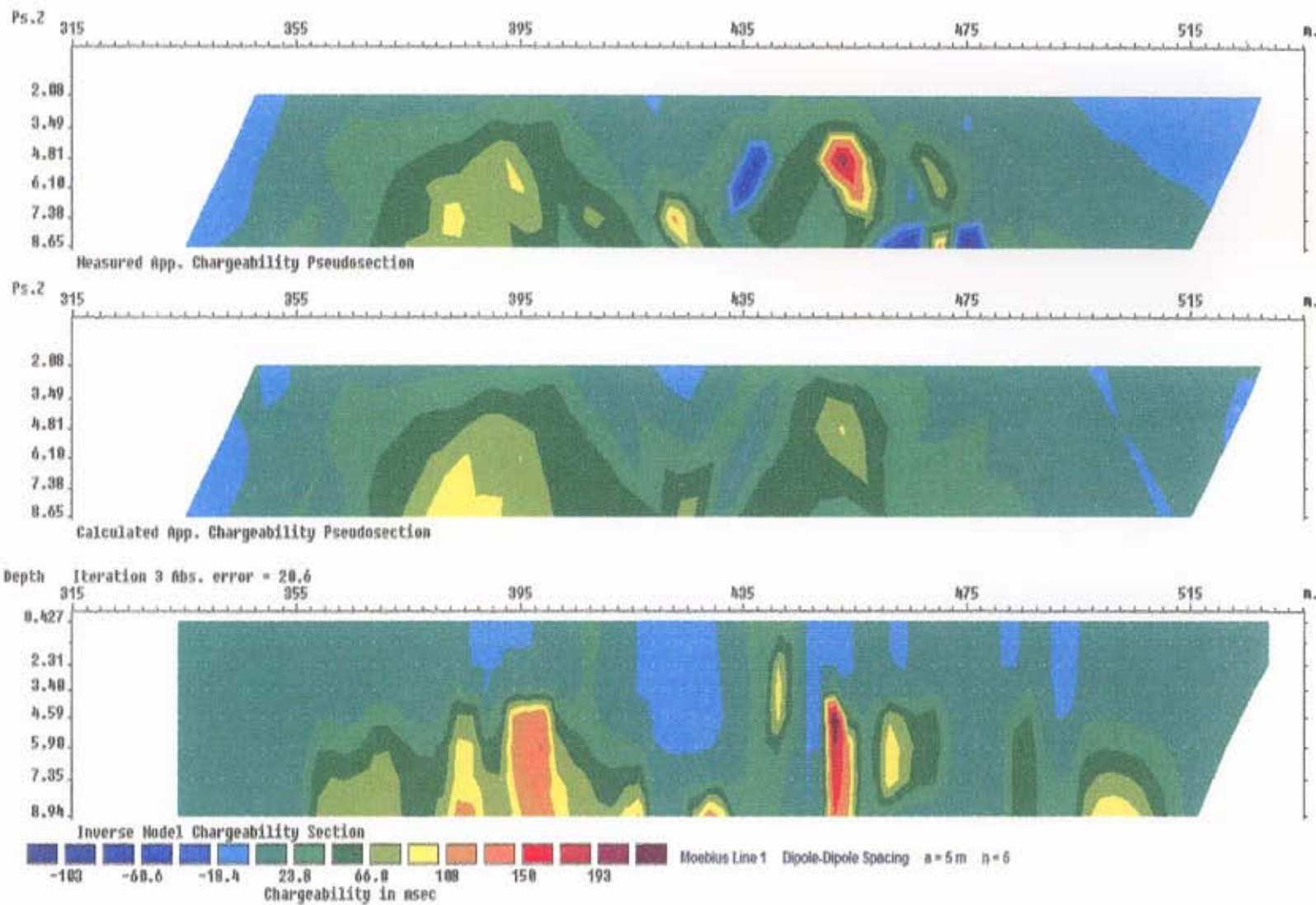




Figure 6.

Line 1 Resistivity

a = 5 meters

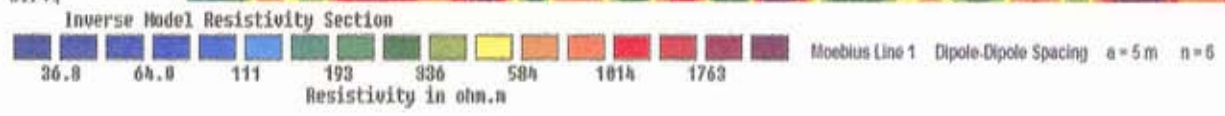
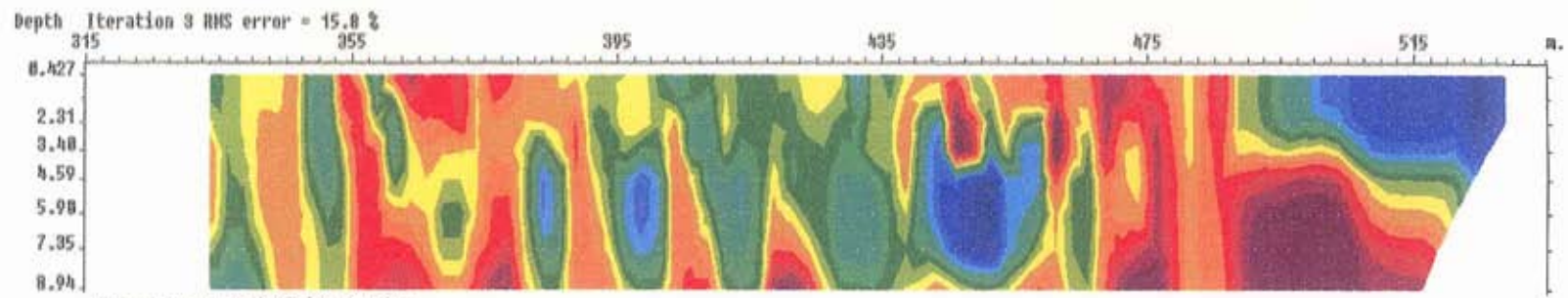
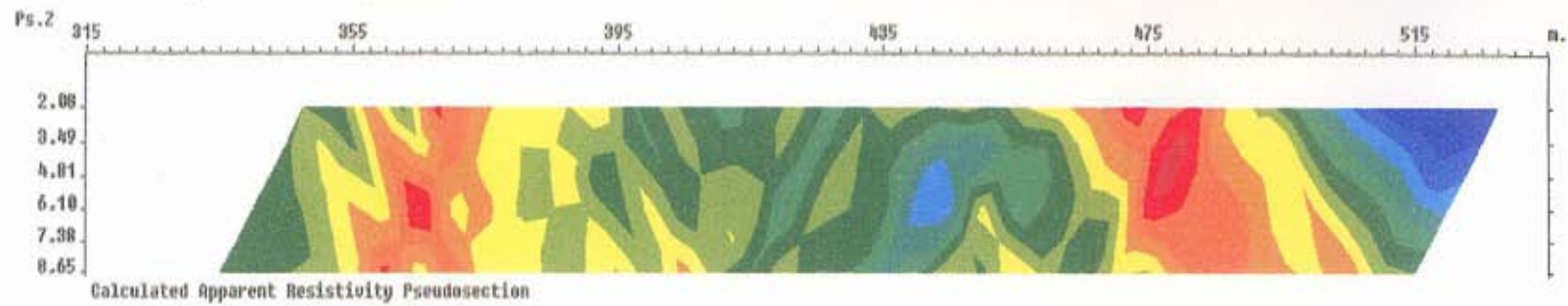
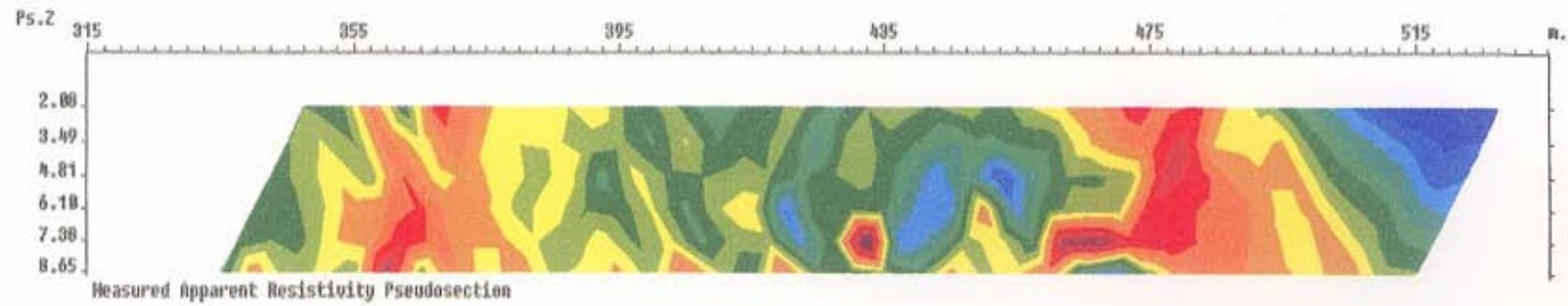


Figure 7.

Line 1 Chargeability a = 5, 25, 50 meters

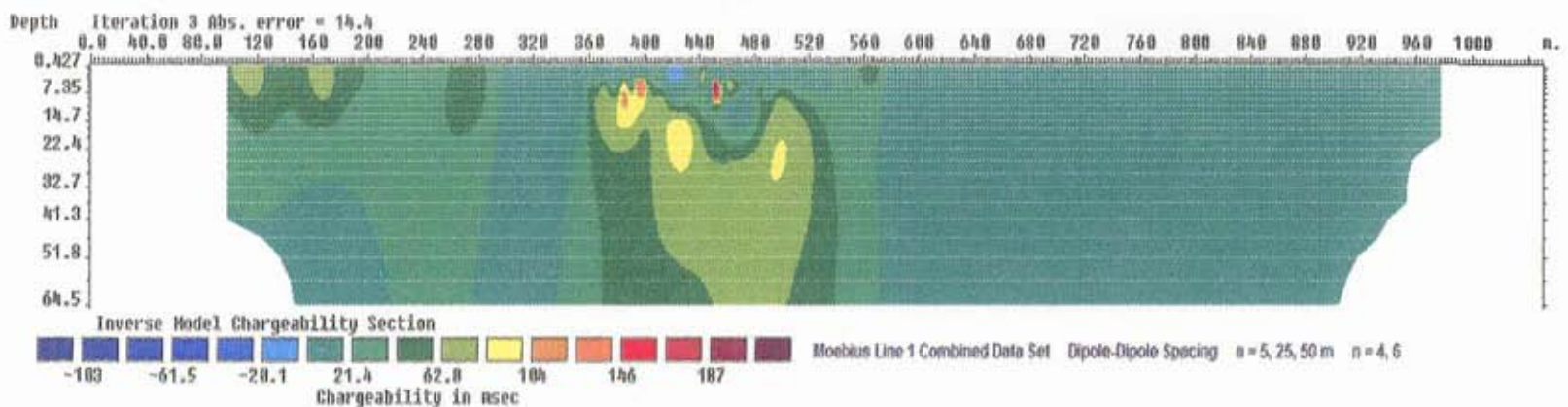
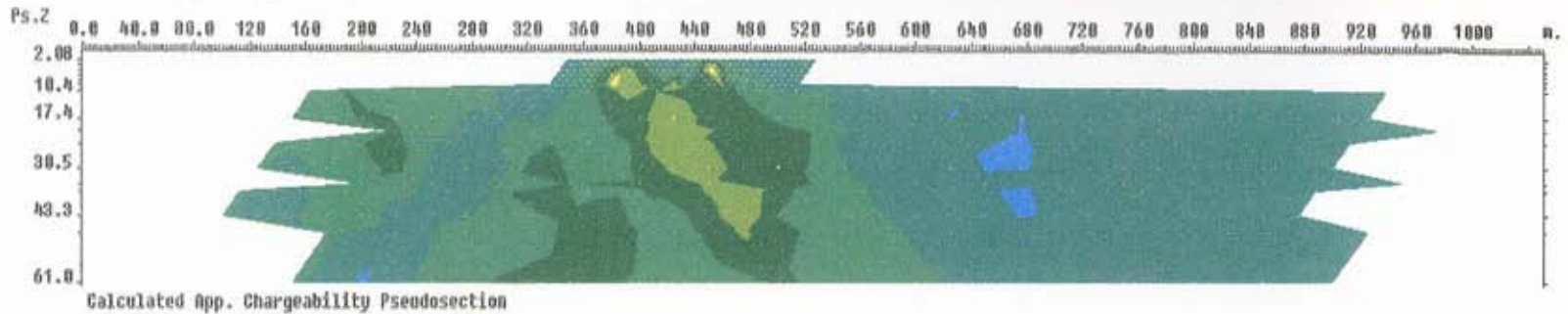
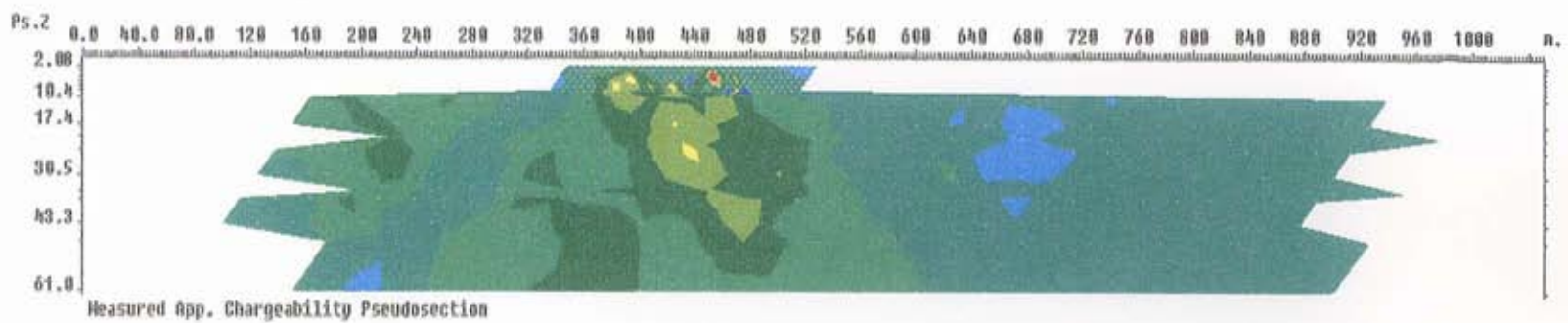




Figure 8.  
Line 1 Resistivity  
a = 5, 25, 50 meters

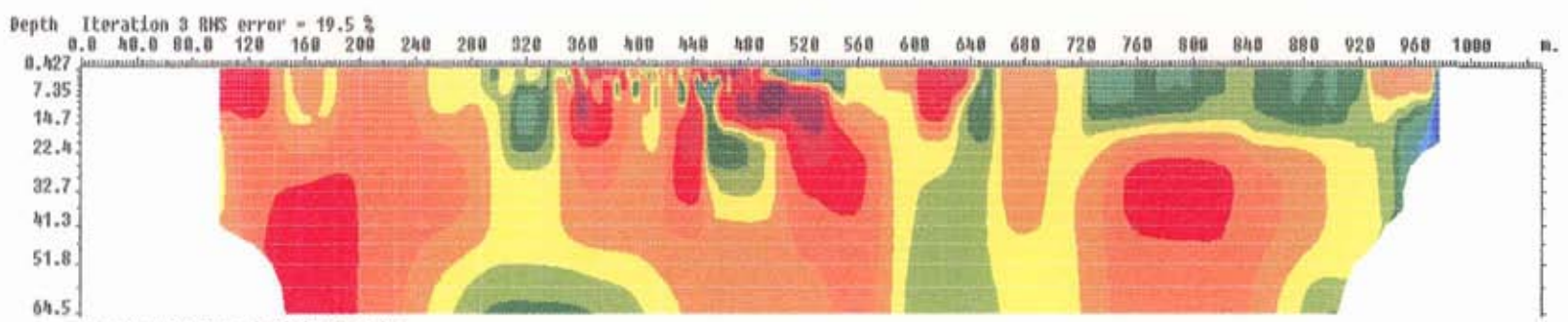
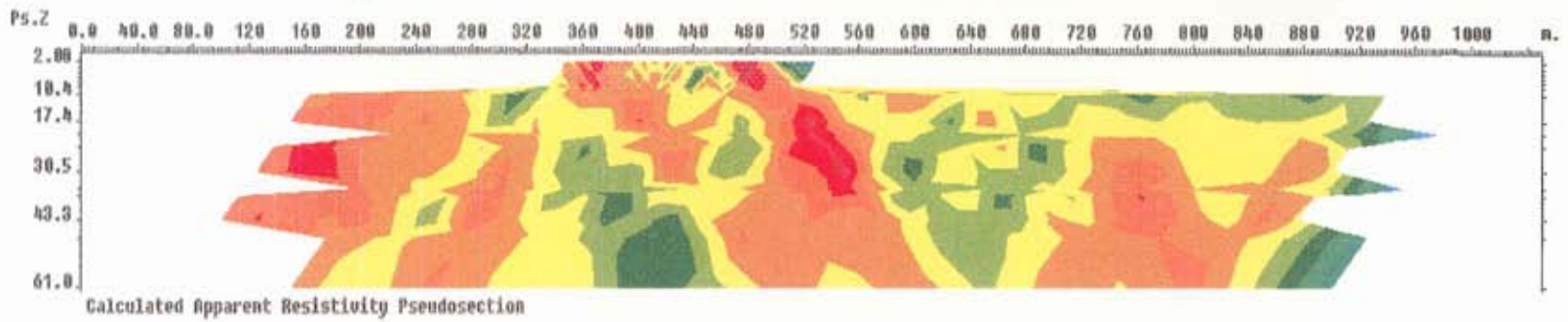
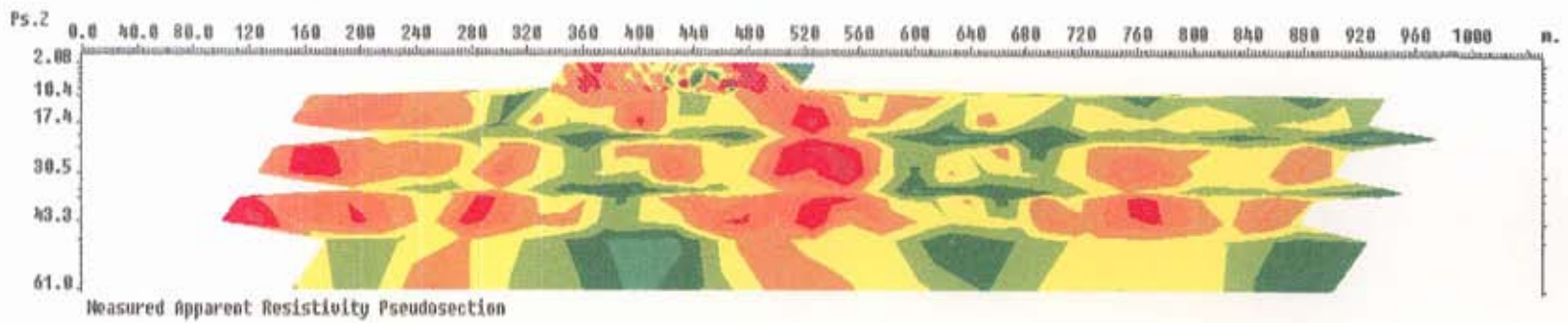




Figure 9.

Line 2 Chargeability  $a = 25$  meters

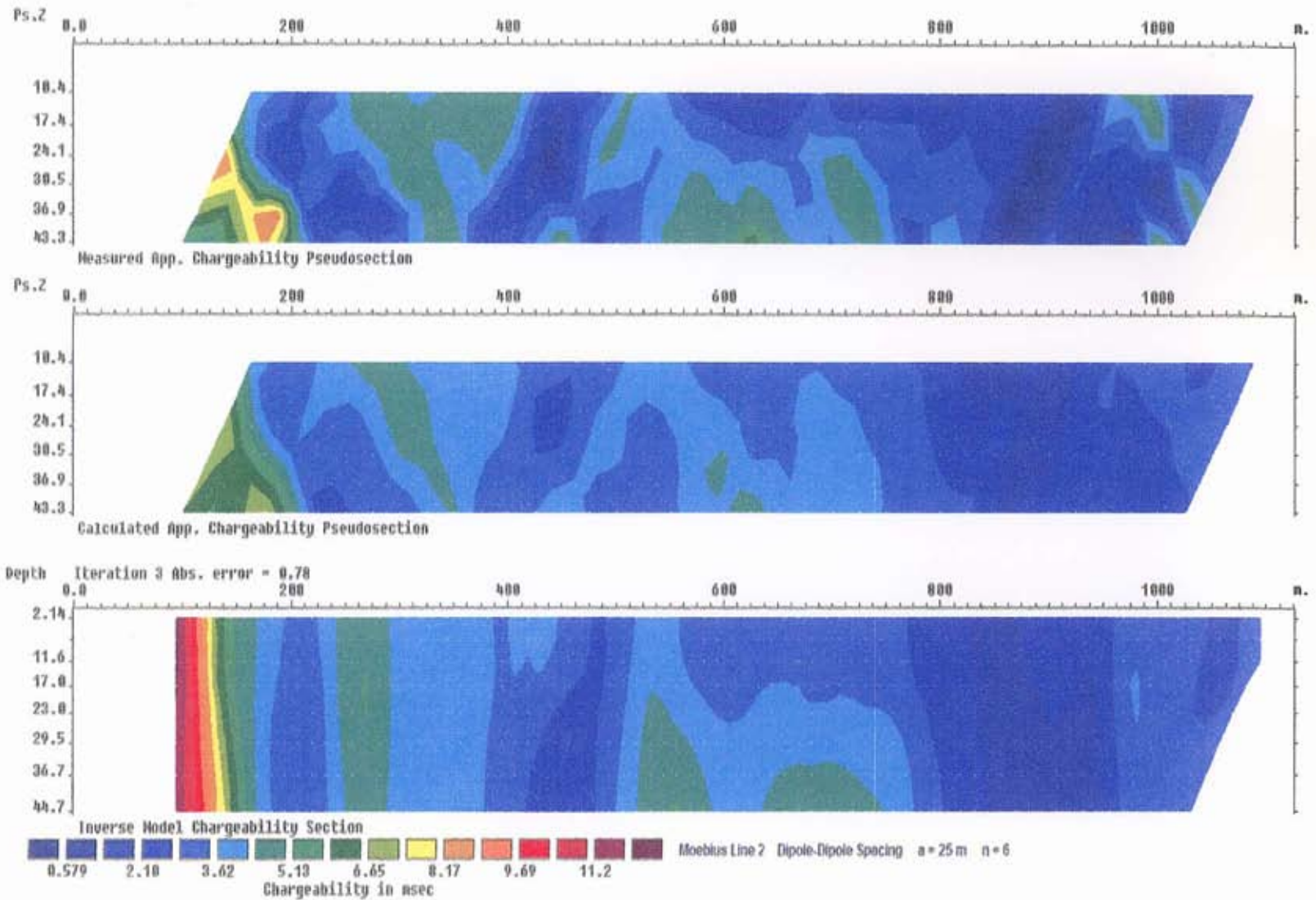
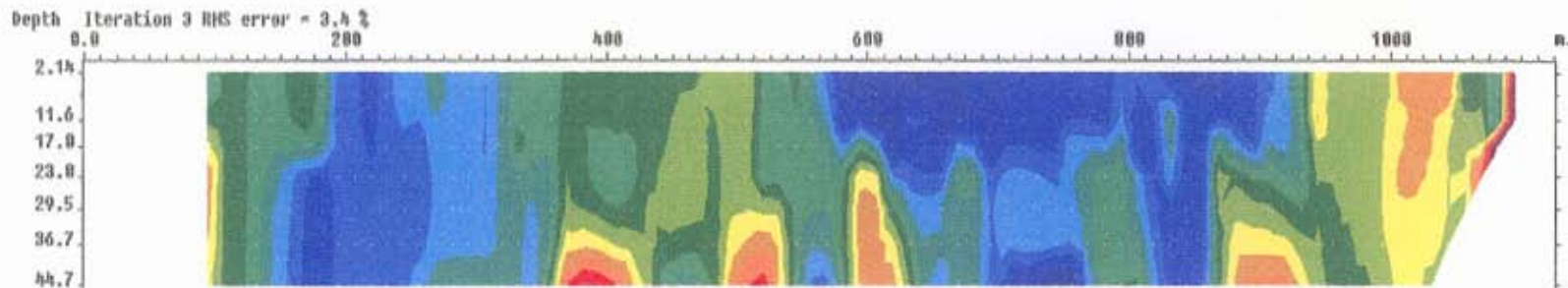
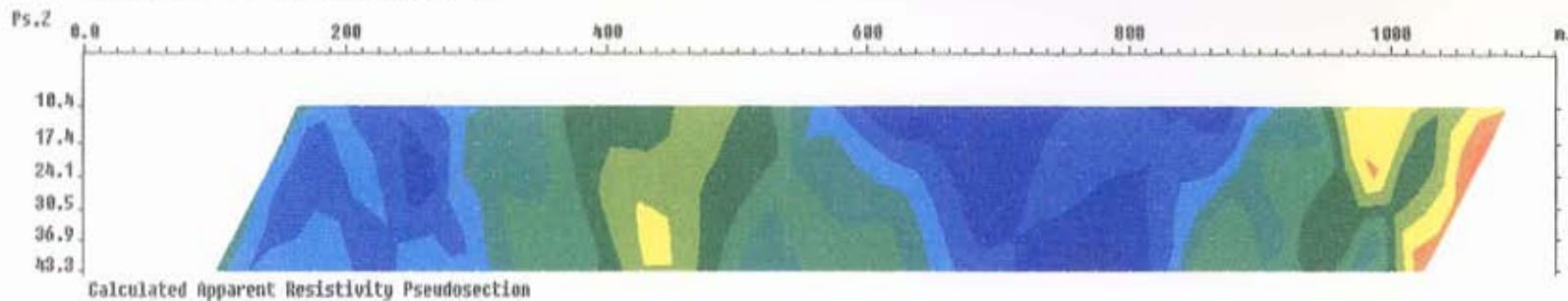
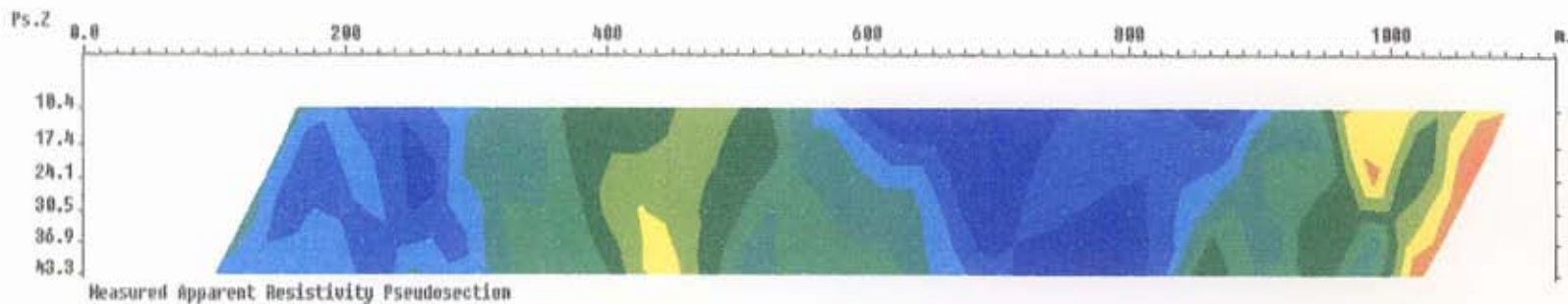


Figure 10.

Line 2 Resistivity

a = 25 meters

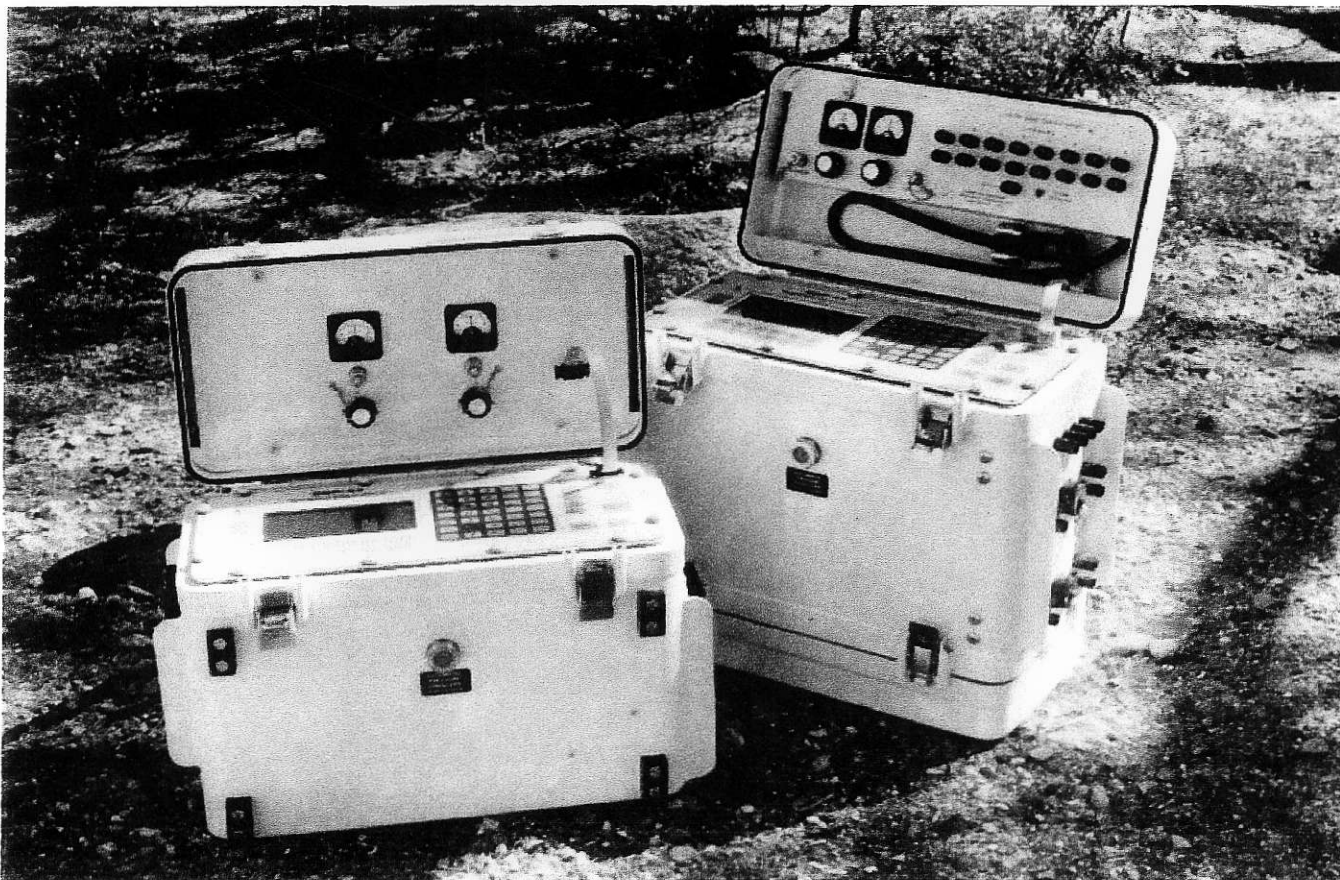


Appendix

Equipment Specifications

# THE GDP-32

## *Broadband Electrical Methods Receiver*



### FEATURES

- 1 to 16 channels, user expandable
- Alphanumeric keypad
- 386SX MPU, 387SL math coprocessor
- Easy to use menu-driven software
- All programs resident in memory
- Resistivity, Time/Frequency Domain IP, CR, CSAMT, Harmonic Analysis CSAMT (HACSAMT), AMT, MT, TEM & NanoTEM®
- Screen graphics: plots of time-domain decay, resistivity and phase, complex plane plots, etc., on a 256 x 128 pixel LCD
- Internal humidity and temperature sensors
- Time schedule program for remote operation with the XMT-32 transmitter controller
- Use as a data logger for analog data, borehole data, etc.
- Full compatibility with GDP-16 series receivers
- Lighter, smaller and faster than the GDP-16
- 0.015625 Hz to 8 kHz frequency range standard, 0.0007 Hz minimum for MT
- One 16 bit A/D per channel for maximum for speed and phase accuracy
- 1.5 MB ROM, up to 15 MB RAM for program execution
- 1 MB SRAM for data storage standard, stores several days' worth of data, expansion up to 4 MB plus optional hard disk
- Real-time data and statistics display
- Anti-alias, powerline notch and telluric filtering
- Automatic SP buckout, gain setting and calibration
- Rugged, portable and environmentally sealed
- Modular design for upgrades and board replacement
- Complete support: field peripherals, service network, software, training

**Zonge Engineering and Research Organization, Inc.**

*Specialists in Electrical Geophysics · Field Surveys · Geophysical Consulting · Instrumentation Sales and Lease*



# SPECIFICATIONS: GDP-32 MULTIPURPOSE RECEIVER

## General

Description: Broadband, multichannel, multifunction, digital receiver  
Frequency range: 0.015625 to 8 kHz standard  
0.0007 Hz to 8 kHz for MT  
Number of channels:  
Large case, 1 to 16 (user expandable)  
Small case, 1 to 6 (user expandable)  
Standard Survey capabilities:  
Resistivity  
Time domain IP  
Frequency/phase domain IP  
Roving vector and tensor IP  
Complex resistivity (CR)  
CSAMT (scalar, vector, tensor)  
Harmonic analysis CSAMT (HACSAMT)  
Frequency domain EM (FEM)  
Transient electromagnetics (TEM)  
MMR, Magnetic IP  
Magnetotellurics (MT; AMT)  
NanoTEM®  
Downhole logging  
Software language: C and assembly  
Size: Large case 43x41x22 cm, Small case 43x31x22 cm.  
Weight: (including batteries and meter/connection panel):  
Small case 13.7 kg (29 lb.)  
Large case:  
8 channel, 10 amp-hr batteries, 16.6 kg (36.5 lb.)  
8 channel, 20 amp-hr batteries, 20.5 kg (45 lb.)  
16 channel, disk, 10 amp-hr batteries, 19.1 kg (42 lb.)  
Enclosure: Heavy-duty, environmentally sealed aluminum case  
Power: 12 V rechargeable batteries in removable battery pack  
Over 10 hours nominal operation at 20°C with 8 channel unit and 20 amp-hr battery pack; external battery input for extended operation in cold climates, or for more than 8 channels.  
Temperature range: -40° to +60°C (-40° to +140°F)  
Humidity range: 5% to 100%; operable in direct rain  
Internal temperature and humidity sensors  
Time base: Oven-controlled crystal oscillator; aging rate <math>< 5 \times 10^{-10}</math> per 24 hours

## Displays & Controls

LCD alphanumeric/graphics display, 41 characters by 16 lines, with continuous view-angle adjustment, optional heater for use down to -40°C  
IR/UV filter for LCD operation in direct sunlight  
Sealed alphanumeric keyboard  
Analog signal meters and analog outputs  
Power on-off

## Analog

Input impedance: 10 MW at DC  
Dynamic range: 190 db  
Minimum detectable signal: .03μV  
Maximum input voltage: ±32V  
SP offset adjustment: ±2.25 V in 69μV steps (automatic)  
Automatic gain setting in binary steps from 1/8 to 65,536  
Common-mode rejection at 1000 Hz: > 80 db  
Phase accuracy, ±0.1 milliradians (0.006 degree)  
Adjacent channel isolation at 100 Hz: > 90 db

## Filter Section

Four-pole Bessel anti-alias filter (software-controlled)  
Quadruple-notch, specified by user (e.g. 50/150/250/450 Hz, 50/150/60/180 Hz, 60/180/300/540 Hz, etc.)  
Digital telluric filter

## Analog to Digital Converter

Resolution: 16 bits ± ½ LSB  
Conversion time: 17 μsec  
Continuous self calibration  
One A/D per channel for maximum speed and phase accuracy

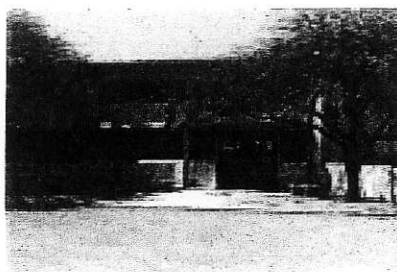
## Digital Section

Microprocessor: 386SX with 387SL math coprocessor  
Memory: 1.5 MB ROM, 3 MB RAM for program use standard; program memory expansion to 15 MB  
Data Storage: 1 MB SRAM (standard), expandable to 4 MB  
Crystal adjust  
Serial ports: One RS-232 port, standard, additional RS-232 port optional  
Parallel port: One IBM/Centronics compatible printer port  
VGA optional

## Additional Options

Number of channels (between 1 and 16 large case, 1 and 6 small case)  
420 MB Hard Disk for extended data storage  
External battery and LCD heater for -40°C operation

*Specifications subject to change without notice*  
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## DESCRIPTION

The Huntec M-4 LOPO Transmitter is a time domain, battery operated transmitter weighing 18 . 2 kg with battery pack. It delivers over 160 watts of DC power into loads from 100 ohms to 6000 ohms. It operates at reduced power into all loads from a short circuit to an open circuit.

It may be used with any time domain receiver, and special timing options are available if the standard 16 combinations are insufficient.

Output current is automatically controlled to within 1%, of a current set point chosen by the operator, and is affected neither by battery voltage, nor by load variations.

The battery pack is detachable and rechargeable. Typically, when used a full day's operation may be obtained between charges. The LOPO is a highly portable, rapid field system, comparable in performance to other systems of several times the weight and power.

Available for rental from:

Fugro Ground Geophysics  
Phone: 61 2 9418 8077  
Fax: 61 2 9418 8581  
email: ground.dept@fugroground.com



## M-4 "LOPO" Induced Polarization and Resistivity Transmitter

### FEATURES

- One man portable, operates from rechargeable battery pack.
- Automatic regulation of output current, eliminates errors due to changing polarization potential, battery voltage and load resistance.
- Adjustable timing cycle to suit all geologic conditions.
- Precision control of timing by crystal clock.
- Precision calibrated signal output for receiver testing.
- Operates into a short circuit without damage at 1.5 amps maximum.
- Maximum of 1800 volts output for high resistivity areas.
- Delivers full power in both arctic and tropical regions.



LOAD RANGE SELECTION	RESISTANCE, Ohms	CURRENT Amperes	
		Min	Max
1	0	0.100	1.50
	50	0.080	1.20
	100	0.068	1.02
	100	0.068	1.02
MATCHED LOAD RANGE	160	0.063	0.95
	220	0.050	0.75
	220	0.050	0.75
	370	0.040	0.60
	520	0.033	0.50
	520	0.033	0.50
	835	0.026	0.40
	1150	0.022	0.33
	1150	0.022	0.33
	1925	0.016	0.24
2700	0.015	0.22	
5	2700	0.015	0.22
	4450	0.011	0.16
	6200	0.009	0.14
	10,000	0.008	0.100
	20,000	0.007	0.055
	40,000	0.003	0.030
	80,000	0.002	0.017

## SPECIFICATIONS

### OUTPUT

<b>Maximum Current</b>	1.5A DC
<b>Maximum Voltage</b>	1.800V DC
<b>Load Range</b>	Zero to infinity in five ranges.
<b>Maximum Load Power</b>	In excess of 160 watts at 75% efficiency into following load resistances: Range 1 = 100 to 230 ohms Range 2 = 230 to 520 ohms Range 3 = 520 to 1200 ohms Range 4 = 1200 to 2700 ohms Range 5 = 2700 to 6100 ohms
<b>Load Current</b>	Continuously adjustable, Max. Current/Min. Current = 15/1 When the transmitter is operated at half its available output current, it will hold this current constant to within 1% while the load resistance changes by $\pm 100\%$ , or when the input voltage changes by $\pm 20\%$ of its original value.
<b>Turn On Time</b>	less than $10^{-3}$ seconds.
<b>Turn Off Time</b>	Less than $10^{-3}$ seconds.
<b>Cycle Time</b>	2, 4, 8, or 16 seconds. Cycle time is defined as 2 x (current on time + current off time).
<b>Duty Ratio</b>	1:1, 1.28:1, 1.67:1, 2.2:1 Duty ratio is defined as: (current on time) / (current off time).
<b>Timing Accuracy</b>	$\pm 0.01\%$ Additional timing programmes including square wave output are available as options.

## INPUT REQUIREMENTS

**Voltages**  
**Maximum Current**  
**Batteries**

24 and 36 volts DC  
12 amperes  
Six CC-680-1 lead-acid Gel/Cel, 7.5 amp-hour. The input power source can be, batteries or any unregulated DC source between 30-40 volts supplying 10 to 15 amperes, and 24V at 2A.

## FRONT PANEL

### Switches and Controls

- Load resistance selector switch.
- Current adjustment continuous control.
- Function Switch: (a) C<sub>1</sub>-C<sub>2</sub>, ohms, (b) STBY, (c) DC Input Volts, (d) 1-5A, (e) 0.5A
- Battery ON/OFF master switch (magnetically tripped circuit breaker).
- High voltage ON/OFF (Standby/Operate) switch.
- Fuses: one 25A Slo-Blo for main power, one 2A Slo-Blo for control circuits.

### Connections

- Output terminals to current stakes.
- Receiver calibration signal output:
- V<sub>p</sub> = 500 millivolts
- V<sub>s</sub>/V<sub>p</sub> = 20%, 2%
- Panel grounding terminal.

### Indicators

- Standby/Overheat light: Steady green when set is on Standby (High Voltage off). Flashing green when maximum temperature being approached.
- Low-volt/Hi-volt: Steady amber when input voltage greater than 40 volts. Flashing amber when input voltage drops below 30 volts. Normally off.

## ENVIRONMENTAL

<b>Ambient Temperatures</b>	-25°C to +50°C
<b>Altitude</b>	-9150 to +6100 m. Note: if the upper limit is exceeded, high voltage breakdown during operation may occur.
<b>Humidity</b>	The set may be operated in saturated air, and in rain without damage or risk of malfunction.

## MECHANICAL

<b>Instrument Package</b>	31.8 cm x 17.8 cm x 17.8 cm 6.8 kg
<b>Battery Package</b>	31.8 cm x 17.8 cm x 17.8 cm 11.4 kg
<b>Total Package</b>	31.8 cm x 17.8 cm x 30.5 cm 18.2 kg