Report on
IP/Resistivity, HLEM, Magnetic and VLF Surveys
Grouse Grid, Grid 3600 and Reconnaissance Lines
Fawcett Property
Fawcett Township, Ontario

for 2.31232

Goldeye Explorations Ltd.
27 Blue Spruce Lane
Thornhill, Ontario
L3T 3W8
Tel: (905) 731-9367
Fax: (905) 731-9312
www.pathcom.com/~goldeye/

by

JVX Ltd.
60 West Wilmot Street, Unit 22
Richmond Hill, Ontario L4B 1M6
Tel: (905) 731-0972
Fax: (905) 731-9312

Ref. 5-33 and 5-57
January, 2006

Table of Contents

Figures

Attachments

Maps

The results of the survey are presented in a series of plan maps and stacked pseudosections at 1:5,000 or 1:10,000. All plan maps show the survey grid, a UTM grid, latitude/longitude coordinates, lakes/rivers, claim boundaries and claim numbers. Plan map types are

Grid 3600 : Lines 500N, 700N, 900N to1300N, 1500N. Scale 1:5,000
n=2 chargeability, colour contours
n=2 apparent resistivity, colour contours
Compilation

Grouse Grid – Lines 10300E to 110000E. Scale 1:5,000
n=2 chargeability, colour contours
n=2 apparent resistivity, colour contours
HLEM offset profiles, 440 Hz
HLEM offset profiles, 1760 Hz
Magnetics (TMI), offset profiles
Magnetics (TMI), colour contours
VLF (25.2 kHz) offset profiles
Compilation

Reconnaissance Lines – lines 0N, 200N to 700N and 11600E. Scale 1:10,000
HLEM offset profiles, 440 Hz
HLEM offset profiles, 1760 Hz
Magnetics (TMI) offset profiles

Stacked, colour contoured pseudosections show the TMI, apparent resistivity, Mx chargeability, spectral MIP, tau and c. There is one plate of stacked pseudosections for each of the 16 lines surveyed with IP.

IP/Resistivity, HLEM, Magnetic and VLF Surveys
Grouse Grid, Grid 3600 and Reconnaissance Lines
Fawcett Property, Fawcett Township, Ontario
Goldeye Explorations Ltd.

IP/resistivity, HLEM (MaxMin), magnetic and VLF surveys were run on two grids (Grouse and 3600) and 8 reconnaissance lines within the Fawcett Township property of Goldeye Explorations Ltd. The work was done at various times from August 24 to December 6, 2005 by JVX Ltd. under JVX project numbers 5-33 and 5-57. Total production was 9,300 m (IP/resistivity), 7,900 m (HLEM), 13,600 m (magnetics) and 2,950 m (VLF). Production totals by grid and method are given in Table 1. Production by grid, claim numbers, method and survey dates are listed in Table 2.

Grid	IP/Resistivity	HLEM	Mag	VLF
Grouse	4300	1575	2950	2950
3600	4450			
Reconnaissance Lines	550	6325	10650	
Totals	**9,300 m**	**7,900 m**	**13,600 m**	**2,950 m**

Table 1. Production Summary

Grid	Claims	Method	Production	Dates
Grouse	1246451	IP/resistivity	4,300 m	August 24-27, October 12
	1246454	HLEM	1,575 m	December 2
		Magnetics	2,950 m	September 30, October 1
		VLF	2,950 m	September 30, October 1
3600	1246468	IP/resistivity	4,450 m	August 29-31, September 1,2,30
	1246469			
Reconnaissance Lines	1246451	IP/resistivity	550 m	October 26
	1246453	HLEM	6,325 m	December 3,5,6
	1246454	Magnetics	10,650 m	September 30, October 1
	1246456			
	1246457			
	1246458			
	1246462			
	1246463			
	1246464			
	1246465			

Table 2. Production by Grid, Claim Number, Method and Date.

The surveys, data processing, presentation and archives are described. The results are reviewed in light of the regional and local geology, a basic understanding of the exploration target and experience with the results from other profile IP surveys. Important geophysical features are extracted from various map products and transferred to compilation maps. Promising IP anomalies are highlighted.

1. Survey

The regional setting of the Fawcett Township Property is shown in figure 1. The grids and reconnaissance lines and their relationship to local topography and claims are shown in figure 2. The property is in the northwest corner of Fawcett Township.

The IP/resistivity survey was done with the Scintrex IPR12 time domain receiver and a pole-dipole array with a = 50 m, n=1,6. The HLEM survey was done with a coil separation of 200 m at 440 and 1760 Hz. Readings were taken every 25 m. Total magnetic intensity and VLF readings were taken every 12.5 m. VLF readings were taken at one frequency (25.2 kHz). The results are presented at 1:5,000 (Grouse grid and Grid 3600) or 1:10,000 (reconnaissance lines). IP/resistivity pseudosections are drawn at 1:5,000.

Survey coverage, methods, personnel, instrumentation, data processing and presentation are described in Appendix 1.

2. Final Products

The results of the survey are presented in a series of plan maps and stacked pseudosections at 1:5000 or 1:10,000. All plan maps show the survey grid, a UTM grid, latitude/longitude coordinates, lakes/rivers, claim boundaries and claim numbers. Plan map types are

Grid 3600 : Lines 500N, 700N, 900N to1300N, 1500N. Scale 1:5,000

n=2 chargeability, colour contours
n=2 apparent resistivity, colour contours
Compilation

Grouse Grid : Lines 10300E to 110000E. Scale 1:5,000

n=2 chargeability, colour contours
n=2 apparent resistivity, colour contours
HLEM offset profiles, 440 Hz
HLEM offset profiles, 1760 Hz
Magnetics (TMI), offset profiles
Magnetics (TMI), colour contours
VLF (25.2 kHz) offset profiles
Compilation

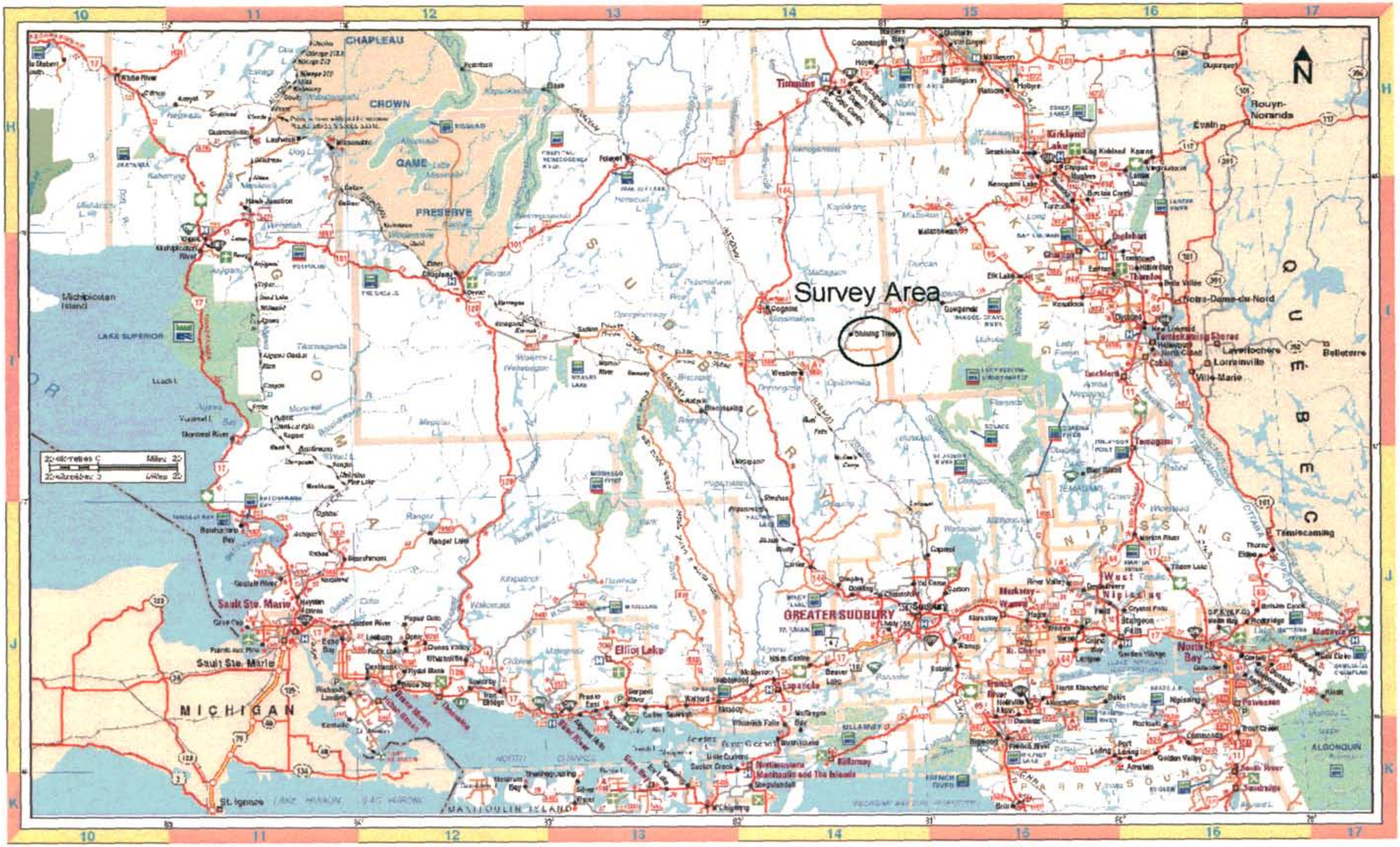


FIGURE 1

Surveyed by: JVX LTD.
August - December 2005
Ref no. 5-33 & 5-57

LOCATION MAP
GOLDEYE EXPLORATIONS LTD.
FAWCETT TWP. - SHINING TREE
NTS: 41 P/11
IP / RESISTIVITY, MAGNETOMETER / VLF & HLEM SURVEYS

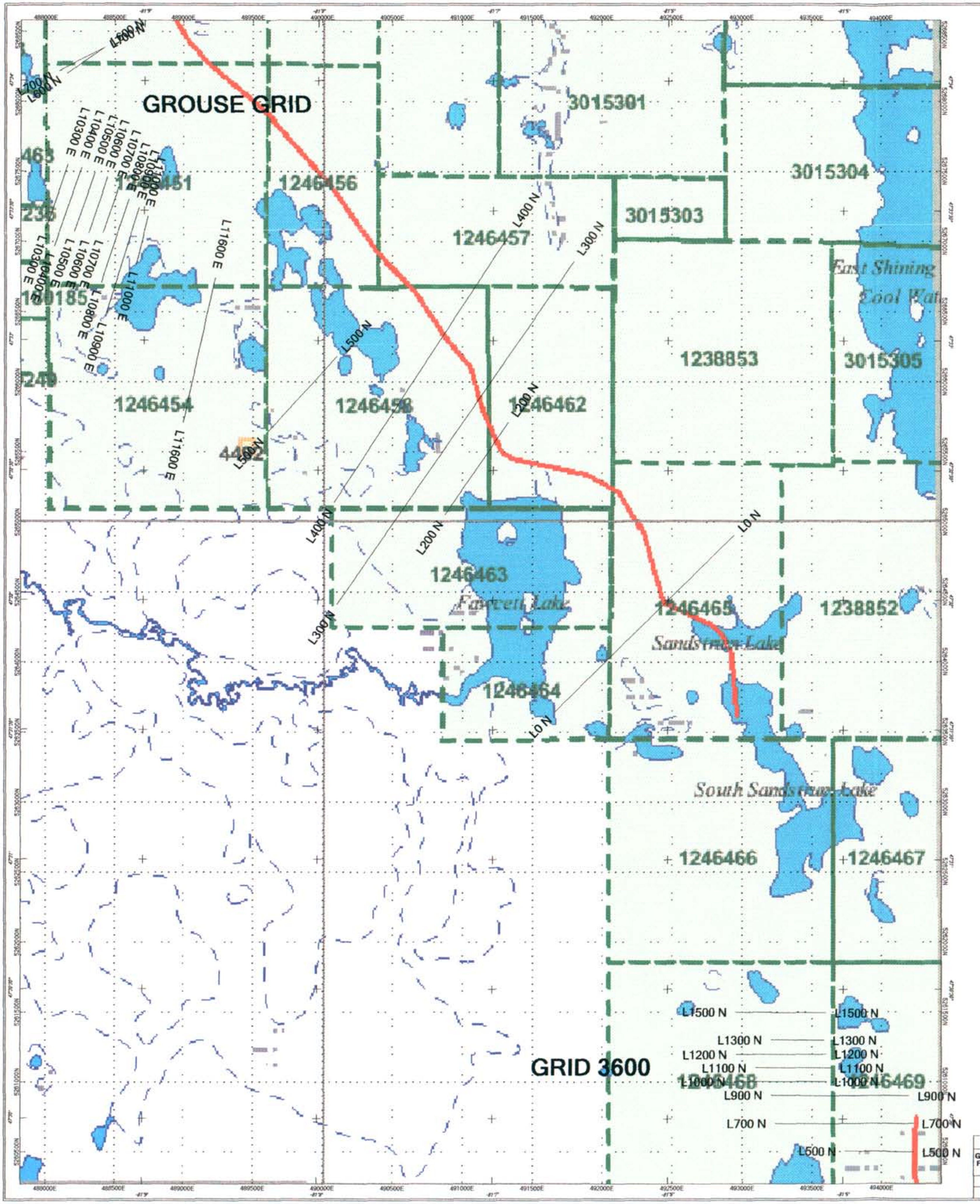


FIGURE 2

GOLDEYE EXPLORATIONS LIMITED

GROUSE GRID, RECONNAISSANCE LINES & GRID 3600
FAWCETT TWP. - SHINING TREE AREA, NE ONTARIO
NTS: 41 P/11

PLAN MAP

JVX LTD., Ref. no. 5-33 & 5-57, January 2006

Reconnaissance Lines – lines 0N, 200N to 700N and 11600E. Scale 1:10,000
HLEM offset profiles, 440 Hz
HLEM offset profiles, 1760 Hz
Magnetics (TMI) offset profiles

Stacked, colour contoured pseudosections show the TMI, apparent resistivity, Mx chargeability, spectral MIP, tau and c. There is one plate of stacked pseudosections for each of the 16 lines surveyed with IP. This is made up of Grouse Grid – Lines 10300E, 10400E, 10500E, 10600E, 10700E, 10800E and 11000E, Grid 3600 – Lines 500N, 700N, 900N, 1000N, 1100N, 1200N, 1300N and 1500N and reconnaissance line 500N.

Digital results (this report, raw and processed ASCII data files, Geosoft and AutoCAD map or drawing files) are archived on CD.

3. Geology

The following comments have been taken from the 2004 Qualifying Report on the Fawcett Property, Fawcett Township, Larder Lake M. D., Ontario by G. A Harron for Goldeye Explorations Ltd.

> Goldeye holds a 100% interest in a contiguous group of unpatented mining claims in Fawcett Township, Ontario. The property is made up of 20 claims consisting of 205 claim units and covering 3,280 hectares.
>
> Fawcett Township is situated in the southern part of the Abitibi Greenstone belt. Both Archean and Proterozoic age rocks are present on the property. Northwest striking Archean age Deloro assemblage ultramafic and mafic volcanic rocks with intercalated sedimentary rocks underlie most of the property.
>
> Three types of mineral deposits are relevant to this property, based on historical exploration results. Lode gold occurrences are known in the extreme northwestern part of the property, magmatic Ni-Cu-(PGE) mineralization occurs on the adjacent Ft. Knox property and Cu-Zn-Pb-Ag mineralization occurs in the southeastern part of the Goldeye property and on the Ft. Knox claims.
>
> At the district scale, exploration for quartz-carbonate lode gold deposits focuses on broad shear zones located along terrane boundaries or adjacent to felsic intrusions. At a more local scale mapping of alteration mineral assemblages can delineate favourable portions of shear zones. The low sulphides content of the quartz veins and the associated wall rock alteration is detectable by IP/resistivity methods. Carbonatization causes destruction of magnetic minerals in mafic rocks, creating a negative magnetic feature coincident with alteration surrounding the lode deposit.

The Ni-Cu-(PGE) mineralization on the Ft. Knox property occurs within a complex tecto-magmatic breccia zone developed within a gabbroic-anorthositic intrusion. The mineralized zone is a pipe-shaped body having dimensions of approximately 30 m wide, about 100 m in strike length and a known depth of about 500 m. The core of the zone commonly consists of disseminated pyrite with low Ni and Cu values. The margins of the zone contain the highest grade mineralization, which typically occurs as net-textured or nearly massive sulphides 2 to 5 m thick. The deposit model indicates that IP/resistivity in conjunction with magnetics are suitable geophysical methods for the discovery of additional mineralization.

The base metal occurrences in the southeastern part of the property and on the adjacent Ft. Knox property may not be base metal volcanogenic massive sulphide type mineralization. There is a greater potential to discover "Five Element (Ni-Co-As-Ag-Bi) Vein" mineralization similar to the silver deposits in the Cobalt, Ontario area.

Grouse grid is on regional magnetic strike with the Ft. Knox deposits, just to the northwest. Grid 3600 is centered over the base metal showings in the southeastern part of the property. Grid 3600 is also in an area of work (HLEM, magnetics and drilling) by Raylloyd Mines and Exploration Limited in 1967. The exploration target is gold (with disseminated metallic sulphides) and/or base metals. In either case, the best IP anomalies are of greatest interest.

4. IP/Resistivity Anomalies

IP anomalies are picked from the pseudosections of Mx and MIP. The interpreted tops of the chargeable bodies that are presumed to have caused the anomalies are sketched on the IP pseudosections for later transfer to the compilation map. The interpretation of these 'tops' is based on an understanding of pole-dipole anomaly forms from simple target shapes.

Based primarily on amplitude, IP anomalies are ranked as weak, moderate and strong. Rough Mx peak amplitudes for these rankings are up to 10 mV/V (weak), 10 to 20 mV/V (moderate) and more than 20 mV/V (strong). The minimum amplitude for weak IP anomalies is set to reject what appear to be no more than modest lateral changes in bedrock chargeability and/or resistivity.

Characteristic features are added to IP 'tops'. These include the spectral MIP peak amplitude, the spectral time constant and the 'n' value that might best represent the top of the chargeable body. MIP is the IP anomaly amplitude after correction for grain size variations. The time constant is characterised as short (S; $\tau \leq 0.3$ sec), medium or mixed (M; $0.1 \leq \tau \leq 1$ sec) or long (L; $3 \leq \tau$). In many Archean lode gold projects, a short time constant is preferred.

Picking IP anomalies is without serious risk where there is a resistive and non chargeable host, thin and resistive overburden and flat to moderate terrain. It is a strategy that yields a meaningful representation of the top of chargeable bodies that are well within the depth range of the array used. There may be some indication of depth extent but little about dip. Uncertainties in the location, extent and depth of burial of the interpreted IP 'top' are at least ± ½ the 'a' spacing.

Surficial resistivity lows are identified on the pseudosections for later transfer to the compilation map. These are line segments where the resistivity results indicate a significant thickness of conductive overburden. The IP anomaly from any underlying chargeable body will be suppressed. In extreme cases, it may be extinguished.

5. General Comments

Grouse Grid

The average n=2 grid apparent resistivity is around 10,000 ohm.m. Other than a few short segments, surficial resistivities are moderate to high with no indication of any thickness of conductive overburden.

The average n=2 grid Mx chargeability is around 5 mV/V. Background values are in the range of 2.5 to 5 mV/V. These are normal values for this type of setting.

A total of 8 IP anomalies have been picked. They are graded as weak (4), moderate (2) and strong (2). The two strong IP anomalies are clear and well-formed. They are on neighbouring lines and in the center of a northwest trending IP zone defined by 5 of the 8 IP anomalies picked and with a total strike length of 500 m. Ground follow up might start with the strongest IP anomalies within this zone.

The IP and resistivity results for the northern half of lines 10600E and 11000E are identical. The IP/resistivity data for one of these line segments is probably incorrect and the inference of a 500 m long IP zone is optimistic.

There are no clear HLEM anomalies that might indicate a bedrock conductor. There is no HLEM data over or near the strongest part of the IP zone.

The magnetic results are dominated by sharp magnetic highs that appear to define near-vertical to steeply dipping tabular magnetic bodies. Overall trends may be northwest – connections are hard to make over this small grid. The strongest part of the IP zone has no clear magnetic expression.

There are no clear VLF anomalies over the Grouse grid and no support for a VLF conductor. The transmitter is west southwest of the grid however and is poorly suited to northwest trending conductors. The question of whether or not the main IP zone is also a conductor remains open.

Grid 3600

The average n=2 apparent resistivity is around 1500 ohm.m. Surficial apparent resistivities over much of the southern part of the grid are less than 1000 ohm.m and this indicates thick and conductive overburden. Resistivities are higher in the northwest and this means better access to bedrock.

The average n=2 grid Mx chargeability is around 1.5 mV/V. Low background values of 1.5 to 3 mV/V are the result of a thickness of non-chargeable overburden. Background values in crystalline rock are normally higher.

A total of 7 IP anomalies have been picked. They are graded as weak (5) and moderate (2). Most are outside the region of low surficial resistivities. 5 of the 7 IP anomalies, including the two of moderate strength, define a north – south trending IP zone with a strike length of 400 m.

Reconnaissance Lines

Surficial apparent resistivities over the one reconnaissance line of IP/resistivity are in the range of 500 to 1500 ohm.m and these values imply thick and conductive overburden. This will suppress the IP response from any underlying charbeable body. A weak IP anomaly at station 1100E shows moderate Mx amplitudes at depth. Follow up would be speculative.

There are no compelling HLEM anomalies on the reconnaissance lines. The HLEM results on lines 300N and 400N are of uncertain quality.

6. Compilation Map

Selected features have been extracted from the pseudosections and plan maps and drafted onto compilation maps. Features shown are

- IP anomalies. Tops of chargeable bodies as picked from the pseudosections. Shown as a bar parallel to the survey line. Bar thickness is an indicator of anomaly strength. Bar symbols and approximate peak anomaly amplitudes are

  Strong, Mx ≥ 20 mV/v

  Moderate, 10 ≤ Mx ≤ 20 mV/V

  Weak, Mx ≤10 mV/V

In general, weak IP anomalies are picked only if there is evidence that the cause is a discrete chargeable body that has at least some chance of being an anomalous mass of disseminated metallic sulphides. Weak IP anomalies can be caused by a change in resistivities alone.

Attached to the IP anomaly symbol are the M-IP peak value, the time constant range (Short, Medium or Mixed, Long) and the 'n' value that best characterizes the top of the IP anomaly.

- IP Zones. Connects IP anomalies that may be joined into one continuous chargeable body. Shown as

- Lines segments of low surficial resistivities. Shown as –

  $\rho \leq 500$ ohm.m

  $500 < \rho \leq 2500$ ohm.m

- Suggested IP targets. Labeled T1 (Grouse grid) and T2 (Grid 3600).

7. Suggested Targets

The two suggested targets are moderate to strong and well defined IP anomalies with shallow tops. T1 is on the Grouse grid. T2 is on Grid 3600. These two targets are central to two IP zones that include most of the IP anomalies picked. All other IP anomalies are weak and uncertain affaires of limited interest.

Despite the bias of pole-dipole IP anomaly forms, profile IP gives little indication of dip and only a weak indication of depth extent. If drilling, inclinations should not be based on IP anomaly forms.

T1 : Grouse Grid : Line 10700E at 10350N
Line 10800E at 10350N

These locations define the center point of the two strong IP anomalies in the middle of a 500 m long IP zone that trends northwest – southeast. Mx peak amplitudes are just over 20 mV/V or at least 4 times background levels. The IP anomalies at these locations are clear and well formed with shallow, sharply defined tops. Both IP anomalies are on a resistivity contact that may reflect a change in bedrock porosity. If the IP zone has a magnetic response, it is less than 100 nT.

There is little to choose between these two IP anomalies. Moderately higher surficial resistivities over the IP anomaly on Line 10800E suggests thinner overburden.

T2 : Grid 3600 : Line 1100N at 3250E

This is the best IP anomaly on the grid; peak Mx amplitudes are over 15 mV/V. The IP anomaly is clear and well-formed with a shallow top. There is some support for a dip to the east. The target is in the center of an IP zone that is 400 m long. Low surficial resistivities over and east of the target add value but may confuse the interpretation.

8. Conclusions

16 IP anomalies have been picked from results over two grids and one reconnaissance line. Of these, 2 are rated as strong, 4 are moderate and 10 are weak. The bulk and the best of the IP anomalies define 400 to 500 m long IP zones; one on the Grouse grid and one on Grid 3600. The best IP anomalies within each zone are suggested for follow up. The two highlighted targets are based on IP anomalies of high quality and clarity.

Ian Johnson Ph.D., P.Eng.
January 12, 2006

Blaine Webster, B.Sc., P. Geo.

Appendix 1

Surveys, Data Processing, Presentation and Archives

IP/resistivity, HLEM (MaxMin), magnetic and VLF surveys were run over all or parts of the Grouse grid, Grid 3600 and eight reconnaissance lines on the Fawcett Township Property of Goldeye Explorations Ltd. The work was done at various times in the period August 24 to December 6, 2005. Total production was 9,300 m (IP/resistivity), 7,900 m (HLEM), 13,600 m (magnetics) and 2,950 m (VLF). The work was done for Goldeye Explorations Ltd. by JVX Ltd. under JVX job numbers 5-33 and 5-57. Production totals by grid are listed in Table 1.

Grid	IP/Resistivity	HLEM	Mag	VLF
Grouse	4300	1575	2950	2950
3600	4450			
Reconnaissance Lines	550	6325	10650	
Totals	**9,300 m**	**7,900 m**	**13,600 m**	**2,950 m**

Table 1. Production Summary

Coverage by survey line for each grid and the reconnaissance lines are listed in Tables 2 to 5. The only line/method not listed in these tables is reconnaissance line 500N - IP/resistivity (550 m). Shown are the lines surveyed, stations of the first (P1start) and last (P1end) P1 potential electrode positions and their separation (P1sep), stations of the first HLEM reading (EMstart) and the last HLEM reading (EMend) and their separation (EMsep), stations of the first total magnetic field + VLF reading (M/VLFstart) and the last total magnetic field + VLF reading (M/VLFend), and their separation (M/VLFsep). All distances are in metres.

Line	P1start	P1end	P1sep
10300E	10050N	10650N	600
10400E	9950N	10650N	700
10500E	10200N	10600N	400
10600E	9900N	10500N	600
10700E	9950N	10550N	600
10800E	9850N	10500N	650
11000E	9750N	10500N	750
Total			**4300 m**

Table 2. IP/resistivity coverage, Grouse Grid

Line	EMstart	EMend	EMsep	M/VLFstart	M/VLFend	M/VLFsep
10300E	10100N	10600N	500			
10400E	10000N	10600N	600			
10500E	10125N	10600N	475	10025N	10500N	475
10600E				10100N	10500N	400
10700E				10150N	10500N	350
10800E				9850N	10450N	600
10900E				9675N	10450N	775
11000E				10100N	10450N	350
Totals			**1575 m**			**2950 m**

Table 3. HLEM and Magnetic/VLF Coverage, Grouse Grid

Line	P1start	P1end	P1sep
500N	3750E	4250E	500
700N	3250E	4250E	1000
900N	3250E	4200E	750
1000N	3050E	3400E	350
1100N	3150E	3650E	500
1200N	3050E	3550E	500
1300N	3250E	3600E	350
1500N	3050E	3550E	500
Total			**4450m**

Table 4. IP/Resistivity Coverage, Grid 3600

Line	EMstart	EMend	EMsep	Mstart	Mend	Msep
0N	850E	2500E	1650	750E	2600E	1850
200N	100E	700E	600	0E	800E	800
300N	75E	1275E	1200	0E	3000E	3000
400N	675E	2125E	1450	600E	2950E	2350
500N	825E	1325E	500	700E	1500E	800
600N				550E	900E	450
700N				500E	900E	400
11600E	9300N	10225N	925	9300N	10300N	1000
Totals			**6325 m**			**10650 m**

Table 5. HLEM and Magnetic Coverage, Reconnaissance Lines

Grids

The Grouse grid is made up of 8 lines oriented 20° east of north (10300E to 11000E) and a base line. Grouse Lake is some 3 km to the southwest. The grid is slope chained and was put in and surveyed by JVX.

Grid 3600 is made up of 8 lines oriented east-west (500N, 700N, 900N to 1300N, 1500N) and a base line (3600E). The grid is slope chained and was put in and surveyed by JVX.

UTM coordinates (NAD83, Zone 17) of selected GPS surveyed control points on the Grouse grid, Grid 3600 and the reconnaissance lines are as listed in Tables 6, 7 and 8.

Line	Station	UTMe	UTMn
10300E	10000N	488005	5267096
	10300N	488097	5267369
	10700N	488230	5267745
10400E	9900N	488061	5266968
	10300N	488193	5267343
	10700N	488329	5267712
10500E	10025N	488197	5267046
	10300N	488289	5267306
	10700N	488417	5267683
10800E	10300N	488550	5267152
11000E	10300N	488706	5267037

Table 6. UTM coordinates of selected grid points (Grouse Grid).

Line	Station	UTMe	UTMn
500N	3600E	493600	526505
	4250E	494246	5260497
700N	3600E	493600	5260701
	4250E	494245	5260702
900N	2950E	492953	5260908
	3600E	493600	5260902
	4250E	494246	5260889
1000N	2950E	492946	5261001
	3600E	493600	5261002
1100N	2950E	492951	5261102
	3600E	493600	5261099
1200N	2950E	492955	5261196
	3600E	493600	5261198
1300N	2950E	492953	5261300
	3600E	493600	5261298
1500N	2950E	492953	5261499
	3600E	493600	5261495

Table 7. UTM coordinates of selected grid points (Grid 3600)

There are 8 reconnaissance lines. They are numbered 0N, 200N to 700N and 11600E. Orientations are primarily northeast – southwest. Most are between the Grouse grid and Grid 3600. Lines 0N, 200N to 500N are slope chained. Lines 600N, 700N and 11600E are compass and pace lines.

Line	Station	UTMe	UTMn
0N	750E	491660	5263646
	2600E	492943	5264903
200N	0E	490875	5265053
300N	0E	490100	5264411
	3000E	491800	5266860
400N	600E	490080	5265139
	2925E	481343	5267063
500N	700E	489600	5265637
	1500E	490104	5266183
600N	500E	488150	5268200
	900E	488416	5268382
700N	500E	488095	5268219
	900E	488410	5268381
11600E	9300N	488998	5265711
	10300N	489228	5266743

Table 8. UTM coordinates of selected grid points (Reconnaissance Lines)

Personnel

Denis Palos, geophysicist from JVX, acted as party chief. He operated the IP receiver and was responsible for all technical aspects of the field survey. Tim Charlebois and Cliff Chute acted as operators. Assistants were Louise Chute, Dave Lukey and Scott Mortson. Data processing and presentation was handled by JVX staff at their office in Toronto, Canada.

Instrumentation

Scintrex IPR12 time domain receiver.

For each potential electrode pair, the IPR12 measures the primary voltage (Vp) and the ratio of secondary to primary voltages (Vs/Vp) at 11 points on the IP decay (2 second current pulse). These 11 points (slices or windows) are labeled M0 to M10. There is the option for an additional user defined slice (Mx). Units of measurement are millivolts for Vp and milliVolts/Volt (mV/V) for M0 to M10 and Mx. Time settings are

Vp : 200 to 1600 msec
M0 centered at 60 msec (50 to 70)
M1 centered at 90 msec (70 to 110)
M2 centered at 130 msec (110 to 150)
M3 centered at 190 msec (150 to 230)

M4 centered at 270 msec (230 to 310)
M5 centered at 380 msec (310 to 450)
M6 centered at 520 msec (450 to 590)
M7 centered at 705 msec (590 to 820)
M8 centered at 935 msec (820 to 1050)
M9 centered at 1230 msec (1050 to 1410)
M10 centered at 1590 msec (1410 to 1770)
Mx centered at 870 msec (690 to 1050)

The apparent resistivity is calculated from Vp, the transmitted current and the appropriate geometric or K factors. M0 to M10 define the IP decay curve. The M8 or Mx slice is commonly presented in contoured pseudosections.

JVX has chosen the above settings for Mx in order to better reflect an IP measurement (M7) from the older Scintrex IPR11 time domain receiver. In IPR11 surveys from the 1980s, this chargeability window was most often plotted and experience gained is based in part on this measurement.

The IPR12 also calculates the theoretical decay that best fits the measured decay. The theoretical decay is based on the Cole-Cole impedance model developed in the 1970s. The fit is based on a set of theoretical master curves with restrictions that limit the value of the calculation. JVX uses a different method to calculate impedance parameters (see below).

Scintrex IPC-7 2.5 kW time domain transmitter

This transmitter is powered by an 8 hp motor generator and produces a commutated square wave current output with current on times of 2, 4, 8, or 16 seconds. A 2 second current pulse was used (base frequency of .125 Hz). Output current is stabilized to within ±0.1% for up to 50% external load or ± 10% input voltage variations. Voltage, current and circuit resistance are displayed in analog and digital form.

Apex Parametrics I-10 EM System (Max-Min)

The Max-Min HLEM system is made up of receiver, transmitter and data acquisition computer. The receiver is a one-piece unit with two ferrite-cored receiver coils. The transmitter consists of three separate parts: console, air cored coil and battery pack. The receiver and transmitter are connected by means of a reference cable. Survey data are recorded by the data acquisition computer (MMC) attached to the receiver.

The I-10 system can operate at any or all of 8 frequencies – 110 Hz, 220 Hz, 440 Hz, 880 Hz, 1760 Hz, 3520 Hz, 7040 Hz, and 14080 Hz with coil separations of 12.5 to 200 m. 880 and 1760 Hz and a 200 m coil separation were used in this survey. Output consists of the in-phase and quadrature components of the secondary magnetic field as a percentage of the primary field as would be seen at the receiver if coils were horizontal coplanar at the separation specified.

There are a number of options to deal with any amount of terrain and this depends on the grid - slope or secant chained. If slope chained, HLEM coil separation as measured along track is fixed. If secant chained, coil separation as measured horizontally is fixed. Coil separation as measured along track is then equal to or greater than the specified coil separation. In either case, the operator records the slope between transmitter and receiver. The receiver then corrects the measured in-phase and quadrature data to an idealized HLEM system of horizontal coplanar coils at a fixed separation.

In areas of very low topographic relief, the slope % option is turned off. The coils are held horizontal and coplanar at a fixed separation. No slope corrections are applied.

The MMC calculates the electrical conductivity for a homogeneous half-space at each operating frequency. The calculation is based on sounding curves stored in the MMC. The quadrature response is used to determine conductivity. The inphase (or amplitude) response is used to decide on the right conductivity of the two that fit the quadrature response. Output is in Siemens/m. The inverse of conductivity in Siemens/m is resistivity in ohm.m.

The MMCPRO program calculates a 'best fit' conductivity by matching measured to theoretical sounding curves using all frequencies. The goodness of fit is reported as 'error'.

Scintrex ENVI MAG/VLF receiver

The ENVI system can be configured to carry any or all of a ground proton precession magnetometer, vertical magnetic gradiometer and/or VLF-EM receiver. In stop and measure mode, total magnetic intensities and VLF fields are measured and recorded with line, station, date and time in digital memory. Total magnetic intensity is measured to 0.1 nT. VLF total field, vertical in-phase and vertical quadrature components are measured at two frequencies selected by the operator. The ENVI unit can also operate as a base station.

For this region (81.12° west, 47.53° north), the geomagnetic field (IGRF) has an amplitude of 57,295 nT. Inclination and declination are 74° and 11° west of north.

Survey Specifications

The pole-dipole array was used with an 'a' spacing of 50 m. Six dipoles were read at every station. This was reduced in sequence at end of line. Array orientation is shown in the array sketch map on each pseudosection.

HLEM readings were taken at 440 and 1760 Hz with a coil separation of 200 m. Readings were taken every 25 m. The HLEM coils were held horizontal; readings were corrected for a true 200 m horizontal separation of transmitter and receiver coils.

Total magnetic intensity and VLF readings were taken every 12.5 m. VLF readings of total field, vertical in-phase and vertical quadrature components were made at one frequency - 25.2 kHz - NML4 - LaMoure, North Dakota at 46° 22' n, 98° 20' w. NML4 is west southwest of the area. Direction to the VLF station is important. EM coupling is optimum when the conductor points to the VLF station. A conductor that trends west southwest for example will give a stronger VLF anomaly from LaMoure than from Cutler.

Data Processing and Presentation

At the end of every survey day, the IP/resistivity, HLEM, survey magnetic, VLF and base station magnetic data are dumped to a PC. The data are checked for quality and quantity. Base station corrections are applied. Preliminary contour and profile maps may be prepared. The data are archived for transfer to JVX Ltd. in Toronto.

In the office, data processing and plotting are based in large part on the Geosoft Sushi (IP pseudosections) and Oasis Montaj geophysical data processing systems (see www.geosoft.com). Impedance modelling software (see below) is based on a suite of programs, originally developed by Scintrex and later modified by JVX. The compilation map was prepared using AutoCAD drafting software (see www.autodesk.com).

A topographic base map has been downloaded from the CLAIMaps III website of the Ontario Ministry of Northern Development and Mines. These maps show drainage, elevation contours, claim boundaries and claim numbers. See www.mndm.gov.on.ca/MNDM/MINES/lands/claimap3/

Plan maps show the true grid layout (GPS surveyed), a UTM grid (NAD83, Z17), latitude/longitude coordinates, lakes and rivers, claim boundaries and claim numbers. All maps and pseudosections are drawn at a scale of 1:5,000 (Grouse Grid and Grid 3600) or 1:10,000 (Reconnaissance Lines).

The n=2 chargeability and n=2 apparent resistivity have been gridded / contoured and results displayed as posted values plus colour and line contours. The HLEM data are shown as offset profiles at 5% / cm. The magnetic data are shown as offset profiles and contours (colour plus superimposed line). The minimum line contour interval is 10 nT.

Pseudosections

The pseudosections are plotted using standard depth and position conventions. The plot position for any measured quantity for the n^{th} potential dipole pair is (n+½)a/2 m forward of and below the current electrode. Pole-dipole anomaly shapes depend on array orientation. The array sketch shown with each pseudosection shows the correct array orientation.

These plot forms have been found to give a reasonable image of target location, width and depth where 1) the anomalously chargeable and/or resistive body is an isolated, near-vertical tabular body, 2) where background chargeabilities and resistivities (overburden and host rock) are uniform and 3) where the terrain is relatively flat. They are more difficult to interpret for irregular or nearby chargeable bodies and where there is any amount of conductive cover or topographic relief. Forward or inverse modelling may be useful in such cases.

For Mx and M-IP chargeability and for apparent resistivity, colour contours in the pseudosections are assigned by equal area distribution for each individual pseudosection. Line to line changes in colour assignment will occur. Colour assignments for the spectral 'c' and 'tau' are fixed.

Impedance Modelling

The Cole-Cole impedance model was developed in the 1970s after it became clear that chargeability is a complex property that includes amplitude (volume percent electronic conductors), grain size and grain size uniformity. In this model, the low frequency electrical impedance Z(ω) of rocks and soils is defined by 4 parameters. They are

r_0 : DC resistivity in ohm.m
m : true chargeability amplitude in V/V

τ : tau - time constant in seconds
c : exponent

The form of the model is

$$Z(\omega) = r_0 \{1 - m [1 - (1+(i\omega\tau)^c)^{-1}]\} \text{ ohm.m}$$

where ω is the angular frequency ($2\pi f$).

The true chargeability is a better measure of the volume percent electronic conductors (some metallic sulphides, magnetite, graphite). The time constant is a measure of the square of the average grain size. The exponent is a measure of the uniformity of the grain size. Common or possible ranges are 0 to 1 (m), .001 to 1000 seconds (tau) and .1 to .5 (c).

In time domain IP surveys, impedance model parameters may be estimated using a best fit between theoretical and measured decays. (Johnson, I.M., 1984, Spectral induced polarization parameters as determined through time-domain measurements: Geophysics, 49, 1993-2004). Software to affect this best fit was developed by Scintrex for the IPR11 in the 1980s. In order to use this software, the IPR11 decay is interpolated from the IPR12 decays.

The extraction of impedance model parameters may fail if the measured decay is too noisy. In this case, the pseudosections are left blank. Impedance model parameters are only apparent. Resistivity and chargeability amplitude are subject to the effects of array geometry, target shape, size and attitude, geometric and physical attenuation. The time constant and c values are less affected by geometric effects.

Archives

The results of the survey are archived on CD. Included on the CD are Oasis Montaj and ACAD viewers. File types include

ASCII *.xyz - line/station IP, HLEM, Magnetic and VLF data with UTMs
Geosoft databases - for all the data
Geosoft *.map – maps included with this report
AutoCAD *.dxf – compilation maps
MS WORD *.doc – report
Image files*.jpg - figures in the report
Raw data - original instrument dumps.

SCINTREX

IPR-12 Time Domain Induced Polarization/Resistivity Receiver

Brief Description

The IPR-12 Time Domain IP/Resistivity Receiver is principally used in exploration for precious and base metal mineral deposits. In addition, it is used in geoelectrical surveying for groundwater or geothermal resources, often to great depths. For these latter targets, the induced polarization measurements may be as useful as the high accuracy resistivity results since it often happens that geological materials have IP contrasts when resistivity differences are absent.

Due to its integrated, lightweight, microprocessor based design and its large, 16 line display screen, the IPR-12 is a remarkably powerful, yet easy to use instrument. A wide variety of alphanumeric and graphical information can be viewed by the operator during and after the taking of readings. Signals from up to eight potential dipoles can be measured simultaneously and recorded in solid-state memory along with automatically calculated parameters. Later, data can be output to a printer or a PC (direct or via modem) for processing into profiles and maps.

The IPR-12 is compatible with Scintrex IPC and TSQ Transmitters, or others which output square waves with equal on and off periods and polarity changes each half cycle. The IPR-12 measures the primary voltage (Vp), self potential (SP) and time domain induced polarization (Mi) characteristics of the received waveform. Resistivity, statistical and Cole-Cole parameters are calculated and recorded in memory with the measured data and time.

Scintrex has been active in induced polarization research, development, manufacturing, consulting and surveying for over thirty years. We offer a full range of instrumentation, accessories and training.

The IPR-12 Receiver measures spectral IP signals from eight dipoles simultaneously then records measured and calculated parameters in memory.

Benefits

Speed Up Surveys

The IPR-12 saves you time and money in carrying out field surveys. Its capacity to measure up to eight dipoles simultaneously is far more efficient than older receivers measuring a single dipole. This advantage is particularly valuable in drillhole logging where electrode movement time is minimal.

The built-in, solid-state memory records all information associated with a reading, dispensing with the need for any hand written notes. PC compatibility means rapid electronic transfer of data from the receiver to a computer for rapid data processing.

Taking a reading is simple and fast. Only a few keystrokes are virtually needed since the IPR-12 features automatic circuit resistance checks, SP buckout and gain setting.

High Quality Data

One of the most important features of the IPR-12 in permitting high quality data to be acquired, is the large display screen which allows the operator easy real time access to graphic and alphanumeric displays of instrument status and measured data. The IPR-12 ensures that the operator obtains accurate data from field work.

The number and relative widths of the IP decay curve windows have been carefully chosen to yield the transient information required for proper interpretation of spectral IP data. Timings are selectable to permit a very wide range of responses to be measured.

Benefits

The IPR-12 stacks the information for each cycle and calculates a running average for Vp, SP and each transient window. This enhancement is equivalent to a noise decrease of $\sqrt{N}$ or a transmitter power increase of N where N is the number of values averaged. Since values are measured each few seconds, it does not take long for this signal enhancement technique to have great effect.

The IPR-12 is fully portable and easy to use.

The automatic SP program bucks out and corrects completely for linear SP drift. Data are also kept noise free by: radio-frequency (RF) filters, low pass filters and statistical spheric noise spike rejection. To prevent mistriggering, the IPR-12 does not accept trigger-line signals at inappropriate times.

Eight Dipoles Simultaneously. The analog input section of the IPR-12 contains eight identical differential inputs to accept signals from up to eight individual potential dipoles. Any dipole can be disabled. The amplified analog signals are converted to digital form by a high resolution A/D converter and recorded with other pertinent information identifying each group of dipoles.

Features

Large Backlit Display. The 16 line by 42 character backlit Liquid Crystal Display (LCD) enhances the operator's understanding of the status and the accuracy of the measured data. Any one of thirteen different display screens are used for entering information, monitoring the progress of a reading and checking data before and after recording. An LCD heater is provided for low temperature operations.

Keyboard. Seventeen large keys control the instrument and permit input of alphanumeric information.

Solid State Memory. All instrument parameters as well as; entered, measured and calculated quantities are stored in the large capacity, fail-safe memory.

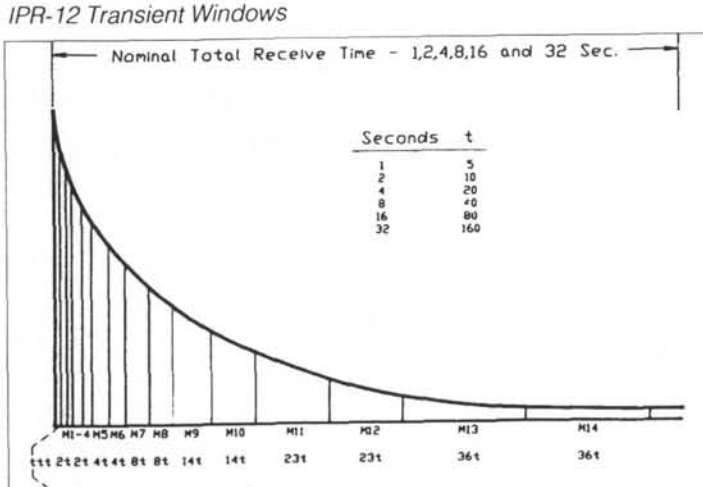
Memory Recall. Any observation recorded in memory can be recalled, by simple keypad entry, for inspection on the display.

Printed Data Listings. A simple digital printer can be connected to the IPR-12 to print out listings of data recorded in memory.

PC Compatibility. The IPR-12 uses an RS-232C, 7 or 8 bit ASCII high baud rate interface, compatible with most lap-tops or PC's. This permits data to be dumped on a line by line basis or all at once from the receiver's memory for archiving or processing.

Spectral Quality IP. Depending on receive time, 10 to 14 windows are measured simultaneously for each dipole. Selectable total receive times are 1, 2, 4, 8, 16 and 32 seconds. After the current is shut off, there is a delay of t milliseconds. Then, the width of each window in the seven following pairs of windows is, respectively: t, 2t, 4t, 8t, 14t, 23t and 36t. This format provides a high density of information at early times where the decay of the curve is steepest.

IPR-12 Transient Windows



Variable Chargeability Summing. By keyboard selection, you can choose an additional, summed transient window. This value, Mx, is recorded in memory along with the value for each of the measured transient windows. Summing can be done for the purpose of obtaining a parameter close to that measured with earlier receivers. The width of the Mx window ranges upwards from 10 milliseconds in 10 millisecond steps.

Signal Enhancement. Primary voltage, self potential and individual transient windows are continuously averaged and the display is updated every cycle so the operator is fully aware of signal improvement.

Calculates Cole-Cole Parameters. The IPR-12 calculates the Cole-Cole parameters; true chargeability (M) and time constant (Tau) for a fixed C of 0.25. These parameters, which are recorded in memory may be used to assist interpretation by distinguishing between different chargeable sources, based mainly on textural differences.

Features

Noise Rejection. Individual samples contaminated by noise can be automatically rejected.

Statistical Parameters. The IPR-12 calculates statistical error parameters for Mx. The RMS error of the deviation between the measured data and best fit of the Cole-Cole caculation is also derived.

Selectable Reading Termination. By keyboard selection the receiver can be set up to terminate readings by either a manual key press or when a preset number of cycles have been measured.

Normalizes for Time and Vp. The value recorded for each M window is in millivolt/volt, that is to say that normalization is automatically done for the width of each window and for the primary voltage, Vp is also normalized for time of integration.

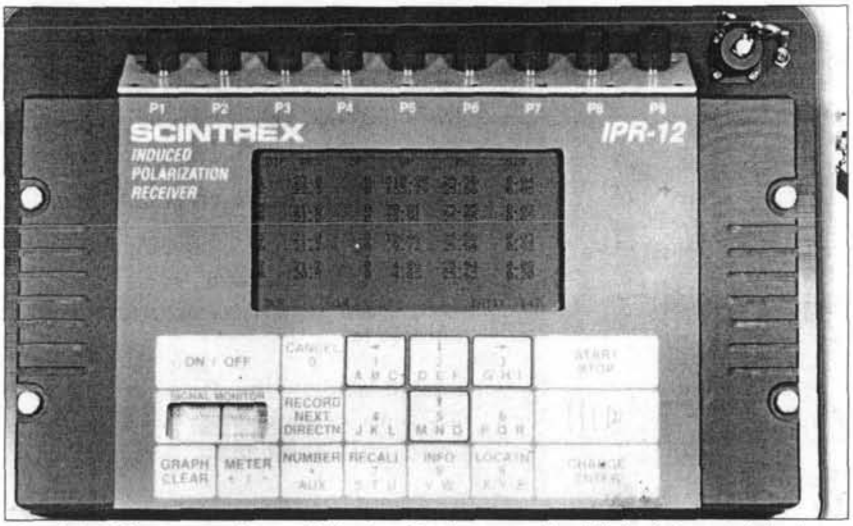
Automatic Resistivity Calculations. The IPR-12 calculates the geometrical (K) factors for standard arrays shown in the Info display based on electrode positions given in the Locations display. This feature is particularly helpful for arrays like the Gradient or Schlumberger in which the K-Factors change for every station. Then, using measured primary voltages with operator entered current values, the receiver calculates and records apparent resistivity values.

Automatic Vp Self Ranging. There is no manual adjustment for different primary voltages since the IPR-12 automatically adjusts the gain of its signal conditioning amplifiers for any Vp signal in the range of 50 microvolts to 14 volts full scale.

Automatic SP Correction. Self potential buckout is entirely automatic, both initially and throughout the measurement.

Synchronization. In normal operation, the IPR-12 synchronizes itself on the received waveform, and triggering is disabled until to within about 60 milliseconds before a signal transition. This reduces to a negligible level the possibility of false triggering.

A bulit-in AC ohmmeter avoids electrode polarization, while checking the ground resistance of electrodes and the continuity of field cables. The circuit resistance values are displayed and are automatically recorded in memory.



The IPR-12 features a large 16 line by 42 character, backlit liquid crystal display.

Self-Check Program. Each time the instrument is turned on, a verification of the program memory is automatically performed.

Out of Limit Checks. Messages appear on the display if any of the following errors occur: out of calibration or failed memory test, incorrect signal amplitude or excessive noise, signal input with respect to the reference electrode in excess of the permitted range, synchronization failure, previous station's data not filed and data memory full.

Analog Meter. While signals on up to eight dipoles are presented simultaneously on the digital display, one analog meter, easily switchable from dipole to dipole, has been provided for monitoring particularly noisy conditions.

Internal Test Generator. An internal signal generator is used to test the instrument periodically, to ensure that it is functioning properly.

Overload Detection. All analog signal levels are monitored to prevent measurements on individual dipoles for which limits are exceeded and appropriate messages are displayed. The affected samples are not added to the previous average.

Noise Filters. Radio frequency and 10Hz, 6 pole low pass filters enhance signal quality. The low cut off frequency and steep roll-off of the latter filters provide better powerline noise rejection than notch filters.

Noise Monitor. This monitor allows the display of noise and/or the received signal for any selected dipole in a similar manner to that of a digital oscilloscope.

Input Protection. If signals in excess of 14V and up to 60V are accidentally applied at the input, zener diode protection ensures that no damage will occur. For higher voltages fuse protection is used.

Binding Posts. To avoid inter-electrode leakage which may occur in humid conditions with small, multipin connectors, the IPR-12 has been designed with widely spaced binding posts.

Mueller Cable. The "Mueller IP/Resistivity Snake" is a potential cable set that has been designed by a geophysical field operator with several years of practical experience in conducting surveys in all types of terrain. Designed to be easily and quickly moved along the survey line to increase your survey efficiency results in significant cost savings made possible by the "Snake"

Software

A complete range of data processing, plotting and interpretation software is available to meet all requirements.

Specifications

Inputs
1 to 8 dipoles are measured simultaneously.

Input Impedance
16 Megohms

SP Bucking
±10 volt range. Automatic linear correction operating on a cycle by cycle basis.

Input Voltage (Vp) Range
50 μvolt to 14 volt

Chargeability (M) Range
0 to 300millivolt

Tau Range
1 millisecond to 1000 seconds

Reading Resolution of Vp, SP and M
Vp, 10 microvolt; SP, 1 millivolt; M, 0.01 millivolt/volt

Absolute Accuracy of Vp, SP and M
Better than 1%

Common Mode Rejection
At input more than 100db

Vp Integration Time
10% to 80% of the current on time.

IP Transient Program
Total measuring time keyboard selectable at 1, 2, 4, 8, 16 or 32 seconds. Normally 14 windows except that the first four are not measured on the 1 second timing, the first three are not measured on the 2 second timing and the first is not measured on the 4 second timing. (See diagram on page 2.) An additional transient slice of minimum 10 ms width, and 10ms steps, with delay of at least 40 ms is keyboard selectable.

Transmitter Timing
Equal on and off times with polarity change each half cycle. On/off times of 1, 2, 4, 8, 16 or 32 seconds. Timing accuracy of ±100 ppm or better is required.

External Circuit Test
All dipoles are measured individually in sequence, using a 10 Hz square wave. The range is 0 to 2 Mohm with 0.1kohm resolution. Circuit resistances are displayed and recorded.

Synchronization
Self synchronization on the signal received at a keyboard selectable dipole. Limited to avoid mistriggering.

Filtering
RF filter, 10 Hz 6 pole low pass filter, statistical noise spike removal.

Internal Test Generator
1200 mV of SP; 807 mV of Vp and 30.28 mV/V of M.

Analog Meter
For monitoring input signals; switchable to any dipole via keyboard.

Keyboard
17 key keypad with direct one key access to the most frequently used functions.

Display
16 lines by 42 characters, 128 x 256 dots, Backlit Liquid Crystal Display. Displays instrument status and data during and after reading. Alphanumeric and graphic displays.

Display Heater
Available for below -15°C operation.

Memory Capacity
Stores approximately 400 dipoles of information when 8 dipoles are measured simultaneously.

Real Time Clock
Data is recorded with year, month, day, hour, minute and second.

Digital Data Output
Formatted serial data output for printer and PC etc. Data output in 7 or 8 bit ASCII, one start, one stop bit, no parity format. Baud rate is keyboard selectable for standard rates between 300 baud and 51.6 kBaud. Selectable carriage return delay to accommodate slow peripherals. Handshaking is done by X-on/X-off.

Standard Rechargeable Batteries
Eight rechargeable Ni-Cad D cells. Supplied with a charger, suitable for 110/230V, 50 to 60 Hz, 10W. More than 20 hours service at +25°C, more than 8 hours at -30°C.

Ancillary Rechargeable Batteries
An additional eight rechargeable Ni-Cad D cells may be installed in the console along with the Standard Rechargeable Batteries. Used to power the Display Heater or as back up power. Supplied with a second charger. More than 6 hours service at -30°C.

Use of Non-Rechargeable Batteries
Can be powered by D size Alkaline batteries, but rechargeable batteries are recommended for longer life and lower cost over time.

Operating Temperature Range
-30°C to +50°C

Storage Temperature Range
-30°C to +50°C

Dimensions
Console: 355 x 270 x 165 mm
Charger: 120 x 95 x 55mm

Weights
Console: 5.8 kg
Standard or Ancillary Rechargeable Batteries: 1.3 kg
Charger: 1.1 kg

Transmitters available

IPC-9	200 W
TSQ-2E	750 W
TSQ-3	3 kW
TSQ-4	10 kW

SCINTREX

In Canada

222 Snidercroft Rd.
Concord, Ontario
Canada, L4K 1B5

Tel.: (905) 669-2280
Fax: (905) 669-6403
Telex: (905) 06-964570

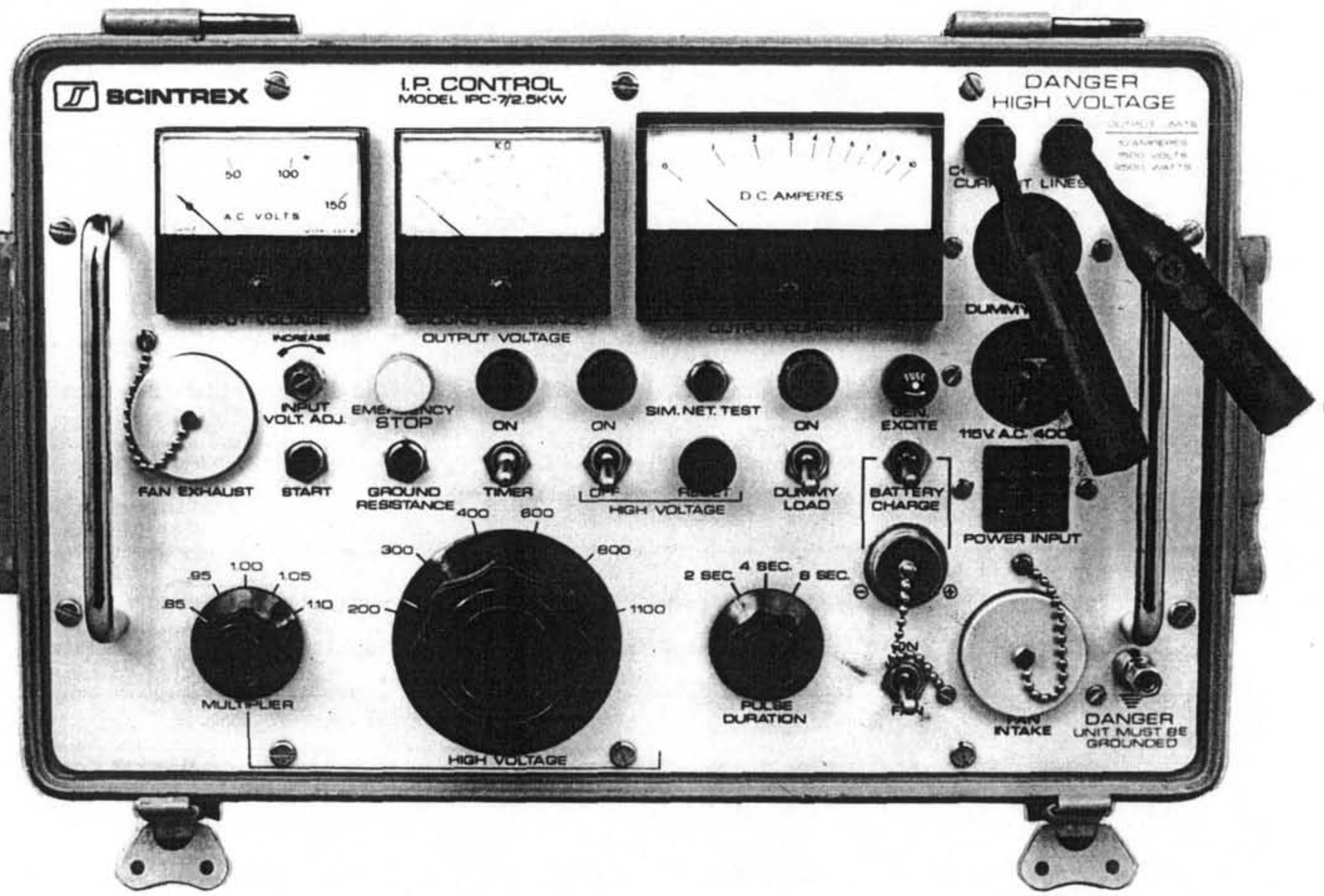
In the U.S.A.

85 River Rock Drive
Unit # 202
Buffalo, N.Y.
U.S.A. 14207

Tel.: (716) 298-1219
Fax: (716) 298-1317

IPR-12/94

SCINTREX IPC-7/2.5kW Induced Polarization and Commutated DC Resistivity Transmitter System



Function

The IPC-7/2.5 kW is a medium power transmitter system designed for time domain induced polarization or commutated DC resistivity work. It is the standard power transmitting system used on most surveys under a wide variety of geophysical, topographical and climatic conditions.

The system consists of three modules: A Transmitter Console containing a transformer and electronics, a Motor Generator and a Dummy Load mounted in the Transmitter Console cover. The purpose of the Dummy Load is to accept the Motor Generator output during those parts of the cycle when current is not transmitted into the ground, in order to improve power output and prolong engine life.

The favourable power-weight ratio and compact design of this system make it portable and highly versatile for use with a wide variety of electrode arrays.

Features

Maximum motor generator output, 2.5 kW; maximum power output, 1.85 kW; maximum current output, 10 amperes; maximum voltage output, 1210 volts DC.

Removable circuit boards for ease in servicing.

Automatic on-off and polarity cycling with selectable cycling rates so that the optimum pulse time (frequency) can be selected for each survey.

The overload protection circuit protects the instrument from damage in case of an overload or short in the current dipole circuit.

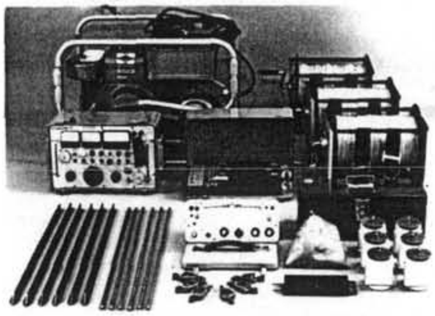
The open loop circuit protects workers by automatically cutting off the high voltage in case of a break in the current dipole circuit.

Both the primary and secondary of the transformer are switch selectable for power matching to the ground load. This ensures maximum power efficiency.

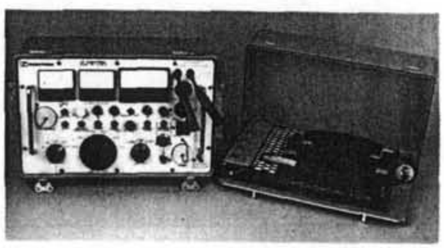
The built-in ohmmeter is used for checking the external circuit resistance to ensure that the current dipole circuit is grounded properly before the high voltage is turned on. This is a safety feature and also allows the operator to select the proper output voltage required to give an adequate current for a proper signal at the receiver.

The programmer is crystal controlled for the very high stability required for broadband (spectral) induced polarization measurements using the Scintrex IPR-11 Broadband Time Domain Receiver.

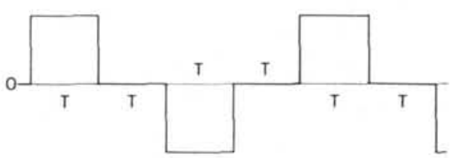
Technical Description of IPC-7/2.5 kW Transmitter System



Complete 2.5kW induced polarization system including motor-generator, reels with wire, tool kit, porous pots, simulator circuit, copper sulphate. IPR-8 receiver, dummy load, transmitter, electrodes and clips.



IPC-7 / 2.5kW transmitter console with lid and dummy load.



Time Domain Waveform

Transmitter Console	
Maximum Output Power	1.85 kW maximum, defined as VI when current is on, into a resistive load
Output Current	10 amperes maximum
Output Voltage	Switch selectable up to 1210 volts DC
Automatic Cycle Timing	T:T:T:T; on:off:on:off
Automatic Polarity Change	Each 2T
Pulse Durations	Standard: T = 2,4 or 8 seconds, switch selectable Optional: T = 1,2,4 or 8 seconds, switch selectable Optional: T = 8,16,32 or 64 seconds, switch selectable
Voltage Meter	1500 volts full scale logarithmic
Current Meter	Standard: 10.0 A full scale logarithmic Optional: 0.3, 1.0, 3.0 or 10.0 A full scale linear, switch selectable
Period Time Stability	Crystal controlled to better than .01%
Operating Temperature Range	-30°C to +55°C
Overload Protection	Automatic shut-off at output current above 10.0 A
Open Loop Protection	Automatic shut-off at current below 100 mA
Undervoltage Protection	Automatic shut-off at output voltage less than 95 V
Dimensions	280 mm x 460 mm x 310 mm
Weight	30 kg
Shipping Weight	41 kg includes reusable wooden crate
Motor Generator	
Maximum Output Power	2.5 kVA, single phase
Output Voltage	110 V AC
Output Frequency	400 Hz
Motor	4 stroke, 8 HP Briggs & Stratton
Weight	59 kg
Shipping Weight	90 kg includes reusable wooden crate

SCINTREX

222 Snidercroft Road
Concord Ontario Canada
L4K 1B5

Telephone: (416) 669-2280
Cable: Geoscint Toronto
Telex: 06-964570

Geophysical and Geochemical Instrumentation and Services

APEX MAXMIN I-10 EM SYSTEM

- ❐ Designed for geoengineering applications and groundwater and mineral exploration, continuing and expanding the concepts of the earlier and highly popular MaxMin models.

- ❐ Frequency span is extended to ten octavely spaced frequencies from 110 to 56320 Hz, with increased range and number of coil separations. These and other developments result in greater performance, with more applications and enhanced interpretation.

- ❐ Advanced spheric and powerline interference rejection is still further improved, resulting in faster and more accurate surveys, particularly at the larger coil separations.

- ❐ MaxMin Computer or MMC, which is described in a separate data sheet, is offered for digital data processing, display, storage and transfer. The MMC displays and stores the in-phase and quadrature readings, their standard deviations, and the corresponding apparent ground conductivity values. Rough terrain surveys are also simplified with the MMC.

- ❐ Data interpretation and presentation programs are available for layered earth parametric soundings and discrete conductor surveys done with MaxMin EM.

TRANSMITTER

RECEIVER + MMC

MAXMIN I-10 EM SYSTEM SPECIFICATIONS:

FREQUENCIES: 110, 220, 440, 880, 1760, 3520, 7040, 14080, 28160 and 56320 Hz.

COIL SEPARATIONS: SET 1: 12.5, 25, 50, 75, 100, 125, 150, 200, 250, 300 and 400 metres (the standard set).
SET 2: 10, 20, 40, 60, 80, 100, 120, 160, 200, 240 and 320 metres (selected with grid switch in receiver).
SET 3: 50, 100, 200, 300, 400, 500, 600, 800, 1000, 1200 and 1600 feet (selected with grid switch in receiver).

TRANSMITTER DIPOLE MOMENTS:

110 Hz:	200 Atm^2	3520 Hz:	80 Atm^2
220 Hz:	190 Atm^2	7040 Hz:	40 Atm^2
440 Hz:	170 Atm^2	14080 Hz:	20 Atm^2
880 Hz:	140 Atm^2	28160 Hz:	10 Atm^2
1760 Hz:	110 Atm^2	56320 Hz:	5 Atm^2

MODES OF OPERATION: MAX 1: Horizontal loop or slingram - transmitter and receiver coil planes horizontal and coplanar.
MAX 2: Vertical coplanar loop mode transmitter and receiver coil planes vertical and coplanar.
MIN 1: Perpendicular mode 1 - transmitter coil plane horizontal and receiver coil plane vertical.
MIN 2: Perpendicular mode 2 - transmitter coil plane vertical and receiver coil plane horizontal.

PARAMETERS MEASURED: In-phase and quadrature componets of the secondary magnetic field, in % of primary field.

READOUTS: Analog direct edgewise meter readouts for in-phase, quadrature and tilt. Additional digital LCD readouts provided in the optional MMC computer. Interfacing and controls are provided for ready plug-in of the MMC.

RANGES OF READOUTS: Switch activated analog in-phase and quadrature scales: 0±4 %, 0±20 % and 0±100 %, and digital 0±199.9 % autorange with optional MMC. Analog tilt 0±75 % and 0±99 % grade with MMC.

RESOLUTION: Analog in-phase and quadrature 0.1 to 1 % of primary field, depending on scale used, digital 0.01 % with autoranging MMC; tilt 1 % grade.

REPEATABILITY: 0.01 to 1 % of primary field, typical, depending on frequency, coil separation and conditions.

SIGNAL FILTERING: Powerline comb filter, continuous spheric noise clipping, autoadjusting time constant, and more.

WARNING LIGHTS: Receiver signal and reference warning lights to indicate potential error conditions.

SURVEY DEPTH PENETRATION: From surface down to 1.5 times coil separation for large horizontal target and 0.75 times coil separation for large vertical target, values typical.

REFERENCE CABLE: Lightweight unshielded 4/2 conductor teflon cable for maximum operating temperature range and for minimum pulling friction.

INTERCOM: Voice communication link provided for operators via the reference cable.

TEMP. RANGE: Minus 30 to plus 60 degrees Celsius, operating.

RECEIVER BATTERIES: Four standard 9 V - 0.6 Ah alkaline batteries. Life 25 hours continuous duty, less in cold weather. Optional 1.2 Ah extended life lithium batteries available (recommended for very cold weather).

TRANSMITTER BATTERIES: Standard rechargeable gel-type lead-acid 6 V -26 Ah batteries (4 x 6 V - 6.5 Ah) in nylon belt pack. Optionally rechargeable long life 6 V - 28 Ah ni-cad batteries (20 x 1.2 V - 7 Ah) with ni-cad chargers - best choice for cold climates.

TRANSMITTER BATTERY CHARGERS: Lead acid battery charger: 7.3 V @ 2.8 A, Ni-cad battery charger: 2.8 A @ 8 V nominal output. Operation from 110 - 120 and 220 - 240 VAC, 50 -60 Hz, and 12 - 15 VDC supplies.

RECEIVER WEIGHT: 8 Kg carrying weight (including the two ferrite cored antenna coils), 9 Kg with MMC computer.

TRANSMITTER WT: 16 Kg carrying weight.

SHIPPING WEIGHT: 60 Kg plus weight of reference cables at 2.8 Kg per 100 metre, plus optional items if any. Shipped in two aluminum lined field / shipping cases.

STANDARD SPARES: Spare transmitter battery pack, spare transmitter battery charger, two spare transmitter retractile connecting cords, spare set of receiver batteries.

OPTIONS AND ACCESSORIES, PLEASE SPECIFY:

- MMC, MaxMin Computer option
- Data interpretation and presentation programs
- Reference cables, lengths as required
- Reference cable extension adapter
- Handheld inclinometer for rough terrain
- Receiver extended life lithium batteries
- Transmitter ni-cad battery & charger option
- Minimal, regular or extended spare parts kit

Specifications subject to changes without notification

92 - 11 - 02 - Fax

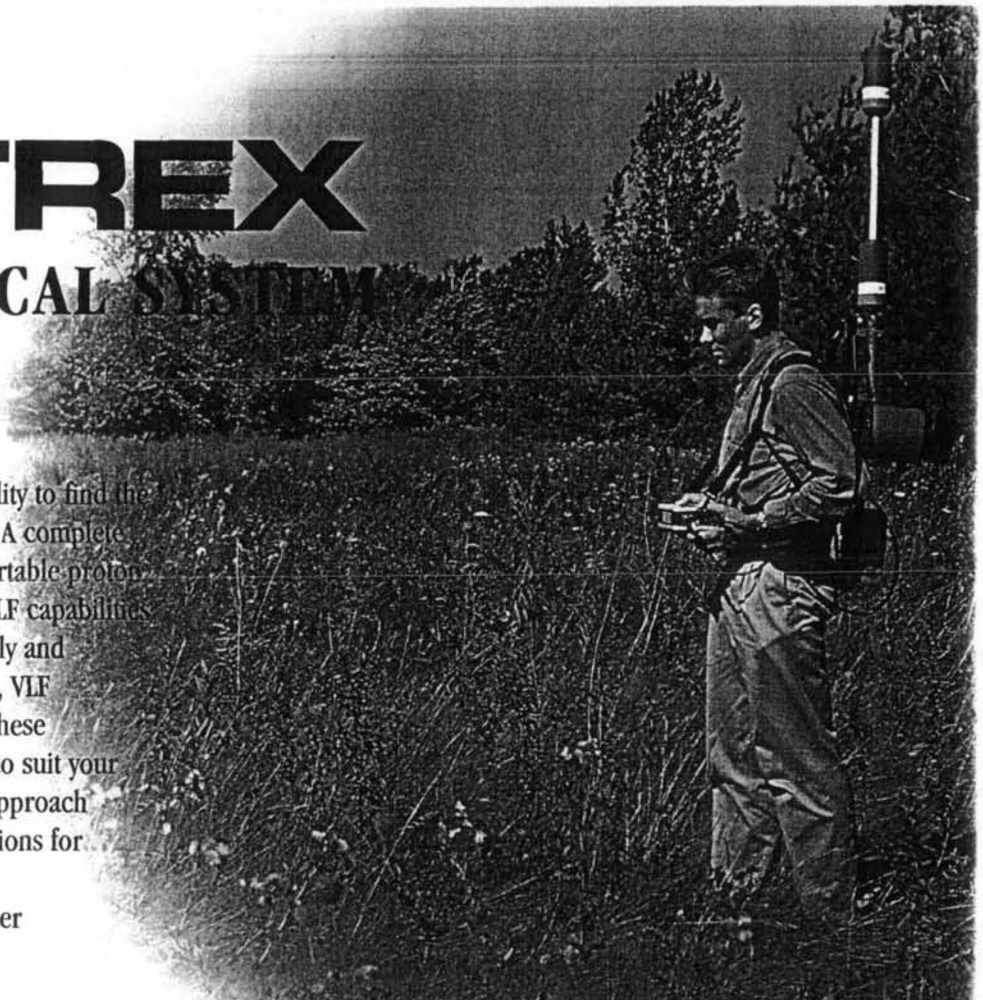
Telephone: (1) 416 852 5875
after Oct.3, 1993: 905 852 5875
Facsimile: (1) 416 852 9688
after Oct.3, 1993: 905 852 9688
P. O. Box 818, Uxbridge, Ontario, Canada L9P 1N2

APEX PARAMETRICS LIMITED

Cables: Apexpara Toronto
Airport: Toronto International

SCINTREX

ENVI GEOPHYSICAL SYSTEM



The Scintrex ENVI System gives you the flexibility to find the increasingly more elusive anomalous targets. A complete ENVI system is an inexpensive, lightweight, portable proton precession magnetometer/gradiometer with VLF capabilities which enables you to survey large areas quickly and accurately. Whether it is for Magnetic surveys, VLF electromagnetic surveys or a combination of these techniques, the ENVI system can be designed to suit your own unique requirements. This customized approach gives you the ability to select the following options for your instrument:

- Portable Field and Base Station Magnetometer
- True Simultaneous Gradiometer
- VLF Electromagnetic Receiver
- VLF Resistivity Option

Applications

Since the ENVI capabilities are so versatile, it can be used in a variety of applications including:

- Environmental Site Characterization
- Groundwater Exploration
- Mineral Exploration
- Archaeology
- Geological Mapping
- Groundwater Studies
- Geotechnical Studies
- Civil Engineering

BENEFITS

Customize Your System

At the heart of the ENVI system is a lightweight console with a large screen alphanumeric display and high capacity memory which is common to all configurations. Included with each system are the appropriate sensors, sensor staff and/or backpack, a rechargeable battery, battery charger, an RS-232 cable and a transit case.

Increase Productivity

For magnetic surveys you can select sampling rates of 0.5 second, 1 second and 2 seconds.

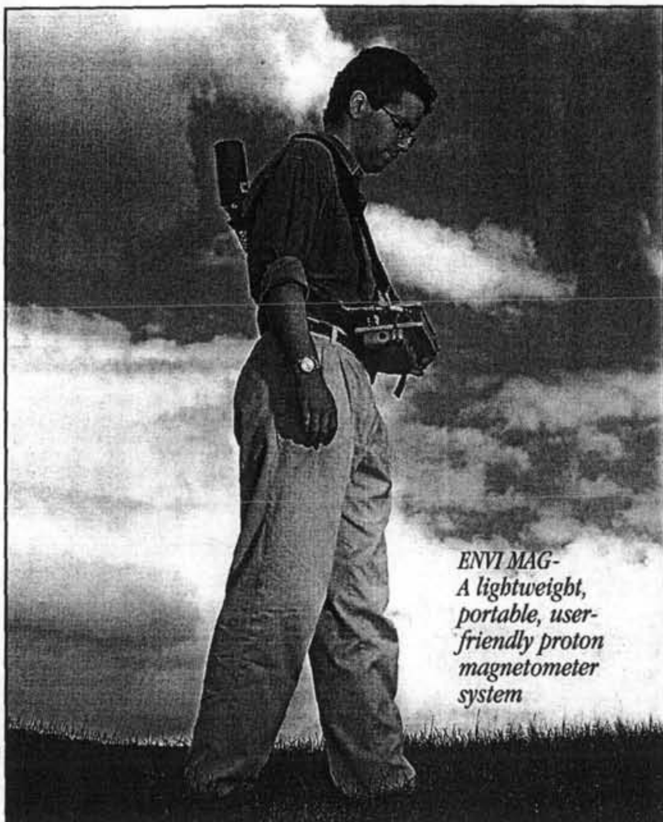
Rapidly Recall Data

For quality of data and for rapid analysis of the magnetic characteristics of the survey line, several modes of review are possible. These include the measurements at the last four stations, the ability to scroll through any or all previous readings in memory and a graphic display of the previous data as profiles, line by line.

Simplify Fieldwork

The ENVI makes surveys easier to conduct as the system:

- provides simple operator menus
- presents the data both numerically and graphically on the large LCD screen
- eliminates the need to write down field data as it simultaneously stores time, field measurements and grid coordinates
- clears unwanted last readings if selected
- calculates statistical error for each measurement
- automatically calculates the difference between the current reading and the previous one (base station)
- provides the ability to remove the coarse magnetic field value or data from the field data to simplify plotting of the field results
- automatically calculates diurnal corrections
- allows for hands free operation with the backpack sensor option



ENVI MAG- A lightweight, portable, user-friendly proton magnetometer system

Saves You Time

Only one instrument is needed for magnetometer, gradiometer, VLF and VLF resistivity surveying. A complete ENVI System can calculate and record 4 VLF magnetic field parameters from 3 different transmitters, a magnetic total field reading and a simultaneous magnetic gradient reading. It can also measure and record 2 VLF electric field parameters from 3 different transmitters with the VLF Resistivity option.

Upgrade Your Unit at any Time

The ENVI is based on a modular design, you can upgrade your system at any time. This built-in flexibility allows you to purchase an ENVI system with only the surveying equipment that you need for now but does not limit you to one application. When your surveying needs grow, so can your ENVI system. Existing users of OMNI systems can also upgrade their consoles.

SYSTEM CONFIGURATIONS

- ENVI MAG
- ENVI GRAD
- ENVI VLF
- ENVI MAG/VLF
- ENVI GRAD/VLF

ENVI MAG

The ENVI system when configured as a total field magnetometer is referred to as the ENVI MAG. In this set up the ENVI system can be operated a traditional stop and measure mode, thus providing the full sensitivity obtainable with a proton magnetometer, ideally suited for mineral exploration. Alternatively the ENVI MAG can be operated in the "WALKMAG" mode, where readings may be made continuously at a user selectable rate of up to 2 readings per second. Although this reduces the accuracy marginally, it does allow the user to collect increased volumes of data and cover more area in a shorter period of time. This is particularly important for large signal near surface targets as typically found in environmental surveys. This makes the ENVI a very cost effective tool for environmental surveys. The ENVI MAG provides the following information:

- Total Magnetic Field
- Time/Date of Reading
- Co-ordinates of Reading
- Statistical Error of the Reading
- Signal Strength and Decay Rate of the Reading

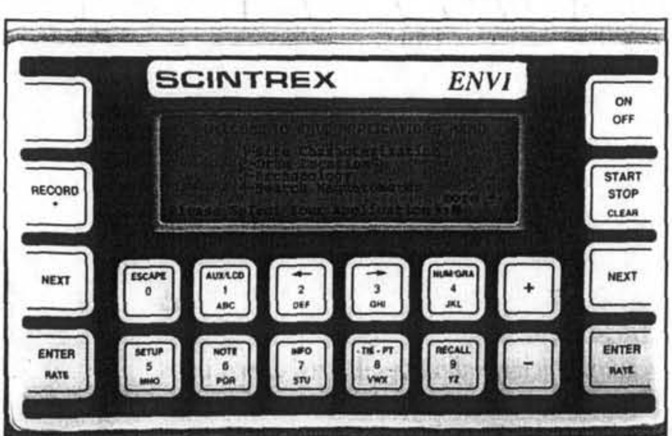
As a magnetic base station instrument the ENVI can be set up to record variations of the earth's magnetic field. Using this information from a stationary ENVI MAG the total field readings obtained with other roving magnetometers can be corrected for these fluctuations thus improving the accuracy of your magnetic data. All ENVI MAG systems can be operated as either field of base station instruments. The optional base station accessories kit is recommended for base station applications.

ENVI GRAD

The ENVI System configured as an ENVI GRAD enables true simultaneous gradiometer measurements to be obtained.

The ENVI GRAD provides you with an accurate means of measuring both the total field and the gradient of the total field. It reads the measurements of both sensors simultaneously to calculate the true gradient measurement.

In the gradient mode, the ENVI sharply defines the magnetic responses determined by total field data. It individually delineates closely spaced anomalies rather than collectively identifying them under one broad magnetic response. The ENVI GRAD is well suited for geotechnical and archaeological surveys where small near surface magnetic targets are the object of the survey. In addition to what the ENVI MAG provides the ENVI GRAD also provides the gradient of the total magnetic field.



Left: Application oriented menus provide the user with the utmost flexibility

Below: Large screen graphics capability allows for rapid data analysis.

ENVI VLF is the ideal groundwater exploration tool.

With the gradiometer option there is no lost survey time as the ENVI enables you to conduct gradient surveys during magnetic storms. The technique of simultaneously measuring the two sensors cancels the effects of diurnal magnetic variations.

ENVI VLF

The ENVI VLF is ideal for environmental, geotechnical and mineral/water exploration application.

The ENVI VLF unit allows you to read the vertical in-phase, vertical quadrature, total field strength, dip angle, primary field direction, apparent resistivity, phase angle, time, grid coordinates, direction of travel along grid lines and natural and cultural features. The ability to obtain data from as many as 3 VLF transmitting stations provides complete coverage of an anomaly regardless of the orientation of the survey grid of of the anomaly itself.

The unique, 3-coil sensor does not require orientation of the VLF sensor head toward the transmitter station. This simplifies VLF field procedures and saves considerable survey time.

The ENVI VLF can measure up to three VLF frequencies. The display indicates the signal to noise ratio which provides you with an immediate indication of how usable a frequency is. The ENVI also enables you to automatically scan the entire VLF spectrum for the most usable stations between 15 kHz to 30 kHz. Using up to three frequencies optimizes conductor coupling even in the most complex geological environments. The ENVI VLF system's ability to obtain repeatable readings from weak signals offers a number of benefits:

- extends the use of VLF to countries where its use was previously marginal
- increases the number of frequencies with which you can operate

VLF Resistivity Option

The ENVI also offers a non-orientation VLF resistivity option.

ENVI MAG/VLF

The ENVI MAG/VLF has the features of both the ENVI MAG and ENVI VLF combined in one instrument.

ENVI GRAD/VLF

The ENVI GRAD/VLF has the features of both the ENVI GRAD and ENVI VLF combined in one instrument.

ENVI MAP Software

Supplied with the ENVI MAG and ENVI GRAD and custom designed for this purpose, is an easy to use, menu-driven data processing and mapping software for magnetic data called ENVI MAP. The software enables you to:

- read the ENVI MAG/GRAD data and reformat it into a standard, compatible with the ENVI MAP software
- grid the data into a standard grid format
- create a vector file of posted values with line and baseline identification that allows the user to add some title information and build a suitable map surround
- contour the grided data
- autoscale the combined results of the posting/surround step and the contouring step to fit on a standard 8.5 inch wide dot-matrix printer
- rasterize and output the results of the autoscaling to the printer

The ENVI MAP software is fully compatible with Geosoft programs. More advanced data processing, modeling and interpretation software is also available.

The ENVI MAG/VLF with backpack option is a highly productive and efficient geophysical system.

Total Field Operating Range
20,000 to 100,000 nT (gammas)

Total Field Absolute Accuracy:
±1 nT

Sensitivity:
0.1 nT at 2 second sampling rate

Tuning
Fully solid state. Manual or automatic, keyboard selectable

Cycling (Reading) Rates
0.5, 1 or 2 seconds

Gradiometer Option
Includes a second sensor, 1/2m (20 inch) staff extender and processor module.

VLF Option
Includes a VLF sensor and harness assembly

'WALKMAG' Mode
continuous reading, cycling as fast as 0.5 seconds

Digital Display
LCD "Super Twist", 240 x 64 dots graphics, 8 line x 40 characters alphanumerics

Display Heater
Thermostatically controlled, for cold weather operations

Keyboard Input
17 keys, dual function, membrane type

Notebook Function
32 characters, 5 user-defined MACRO's for quick entry

Standard Memory
Total Field Measurements: 28,000 readings
Gradiometer Measurements: 21,000 readings
Base Station Measurements: 151,000 readings
VLF Measurements: 4,500 readings for 3 frequencies

Expanded Memory
Total Field Measurements: 140,000 readings
Gradiometer Measurements: 109,000 readings
Base Station Measurements: 750,000 readings
VLF Measurements: 24,000 readings for 3 frequencies

Real-Time Clock
Records full date, hours, minutes and seconds with 1 second resolution, ±1 second stability over 24 hours

Digital Data Output
RS-232C interface, 600 to 57,600 Baud, 7 or 8 data bits, 1 start, 1 stop bit, no parity format. Selectable carriage return delay (0-999 ms) to accommodate slow peripherals. Handshaking is done by X-on/X-off. High speed Binary Dump. Selectable formats for easy interfacing to commercial software packages.

Analog Output
0-999 mV full scale output voltage with keyboard selectable range of 1, 10, 100, 1000 or 10,000 full scale

Power Supply
Rechargeable 'Camcorder' type, 2.3 Ah, Lead-acid battery
12 Volts at 0.65 Amp for magnetometer, 1.2 Amp for gradiometer
External 12 Volt input for base station operations
Optional external battery pouch for cold weather operations

Battery Charger
110 Volt-230 Volt, 50/60 Hz

Operating Temperature Range
Standard: -40° to 60°C

Dimensions & Weight

Console:	250mm x 152mm x 55mm (10" x 6" x 2.25") 2.45 kg (5.4 lbs) with rechargeable battery
Magnetic Sensor:	70mm x 175mm (2.75"d x 7") 1 kg (2.2 lbs)
Gradiometer Sensor: (with staff extender)	70mm x 675mm (2.75"d x 26.5") 1.15 kg (2.5 lbs)
Sensor Staff:	25mm x 2m (1"d x 76") .8 kg (1.75 lbs)
VLF Sensor Head:	140mm x 130mm (5.5"d x 5.1") .9 kg (2 lbs)
VLF Sensor:	280mm x 190mm x 75mm (11" x 7.5" x 3") 1.7 kg (3.7 lbs)

Options
Base Station Accessories Kit
GPS
Software Packages
Training Programs

SCINTREX

Head Office
222 Snidercroft Road, Concord, Ontario L4K 1B5 Canada
Telephone: (905) 669-2280 • Fax: (905) 669-6403

In the U.S.A.
10816 East Newton Street, Suite 110, Tulsa, Oklahoma 74116
Telephone: (918) 438-9255 • Fax: (918) 438-9226

In Australia
1031 Wellington Street, West Perth, West Australia, 6005
Telephone: 61(9) 321-6934 • Fax: 61(9) 481-1201

Internet: www.scintrexltd.com

REGISTERED COMPANY ISO 9001 SGS

CE