COMINCO LTD.

Exploration | Eastern District

N.T.S: 42-A-7

GEOTERREX AIRBORNE MAGNETIC SURVEY

RADISSON PROJECT

THOMAS AND SHERATON TWPS., ONTARIO

February 14, 1973 | E. O. Andersen

The airborne magnetic survey was flown by Geoterrex Ltd. of Ottawa in March of 1972. This survey was flown at the same time as a previously filed airborne EM survey. The flight procedure, equipment description, and flight path recovery method are fully described in the attached appendix.

The magnetic high on Lines 1B to 4B probably represents a magnetic diabase dike. Other magnetic responses are weak and cannot be correlated to the underlying Precambrian geology at this time.

Submitted by: Eric Andersen

E. O. Andersen, P. Eng.

Following is a description of equipment and procedures used during this airborne geophysical survey.

A. EQUIPMENT

1) Aircraft:

The aircraft is a deHavilland Otter DHC-3 with Canadian registration CF-AYR. This aircraft is a single engine, slow speed, high performance type with a gross weight of 8,000 lbs. The aircraft may be equipped with wheels, skis, or floats, as required. Normal survey speed is 100 miles per hour.

2) Electromagnetometer:

The electromagnetic unit is a Rio Tinto type, measuring In-Phase and Out-of-Phase components of the secondary field at a frequency of 320 cycles per second. The unit was designed and built by Geoterrex, and carries Serial #1.

A transmitter generates a closely controlled sine wave of 320 cps which is amplified and fed to a transmitting coil mounted on the starboard wing-tip. This coil is iron cored and has vertical windings, with coil axis in the direction of flight. The circulating coil power is some 5000 volt amperes.

A receiving coil is mounted on the port wing, co-planar with, and 62 feet from, the transmitting coil. The voltage developed in the receiver coil due to the transmitted field is some 300 millivolts. In the absence of external conductors, this voltage is cancelled by a reference voltage derived directly from the transmitter voltage.

When the aircraft comes within range of a conductor, the normal (or primary) field is changed by a secondary field and the resultant voltage at the receiver coil is amplified and passed on to the EM receiver in the aircraft. This signal is filtered and split into one component in-phase and one component out-of-phase with reference to the transmitter voltage. The signals are then passed through phase-sensitive detectors where their amplitudes may be read on meters, or

recorded on a chart. A system of calibration is included so that amplitude of responses (anomalies) may be determined in "parts per million" of the primary receiver coil voltage prior to cancellation. Noise level of the system due to movement of the metal aircraft within the EM field is normally 50 parts per million or less. Significant conductors depending on distance and size, will produce anomalies of more than 50 parts per million.

The system is also equipped with a receiver noise channel operation at a frequency of 268 cps. This channel is not susceptible to the electromagnetic response, and is affected only by radiated noise such as power and telephone lines, and atmospheric discharges. It is frequently useful in determining the validity of electromagnetic anomalies.

An accelerometer is also installed and the output recorded on the 8-channel recorder. This indicates flexure on the aircraft and enables discarding of false anomalies which could result from the aircraft motion.

Calibration marks are displayed on the eight-channel chart, and are approximately 15 millimeters for 200 parts per million.

Any anomalies noted are listed in Appendix A of this report, indicating position, (fiducial number on the path recovery camera), amplitudes, aircraft altitude, magnetic relationship if any, relative anomaly rating, and comments which may be of significance.

The anomalies are then plotted on the base map in coded form, according to the legend accompanying this Appendix. Anomaly groups which reflect probable ground conductors are circled and numbered. These are described and discussed in the report in the context of geophysical and where possible, geological significance.

3) Magnetometer:

The magnetometer used is a Geometrics Model G-803 Proton Resonance type incorporating a High Performance option. Recording times are variable, from three times per second to once per 2 seconds, with respective sensitivities of 2 gammas to 0.5 gamma. In normal use readings are obtained

once per second with a sensitivity of 1 gamma.

The sensing head is a torvidal coil immersed in a special hydrocarbon fluid and mounted beneath the port wing.

The magnetometer is a digital readout unit and output is used to drive a paper recorder (Hewlett Packard Model 5050-B). In addition analogue outputs are fed to the 8-channel recorder for direct comparison with the electromagnetic results, and to a Hewlett-Packard Model 680 - six inch rectalinear strip recorder.

Full scale deflection usually used in mineral surveys is 1000 gammas although other sensitivities are available. Automatic stepping of the full scale analogue deflection is incorporated. Recordings made on the paper tape are the values of the total field intensity.

Contouring of results is accomplished as desired.

4) Spectrometer:

An Exploranium DGRS-1000 spectrometer is normally carried on the Otter, along with a sensing head containing three 6" x 4" Sodium Iodide crystals.

This is a four channel differential gamma-ray unit measuring energy levels of potassium 40, bismuth 214 thallium 208 plus total count.

Time constants and full scale ranges are variable and are selected to suit the conditions and background of the survey area.

Depending on requirements of the survey, one or more channels may be recorded on the eight channel recorder.

Data presentation, if required, is usually in the form of plotted anomalies showing channel intensities and aircraft altitude. Contour maps of one or more channels may be produced in special circumstances.

5) Altimeter:

The altimeter is a GAR Model 10 wide band radar type.

One unit is carried on each wing. The output from the altimeter recorded on the eight channel recorder. The recording is linear and normally covers from 50 feet to 300 feet, or 25 feet per major division.

6) Camera:

The camera used for path recovery is a Hulcher continuous strip 35 millimeter type. It can accommodate 400 ft. lengths of film, good for some 250 line miles of survey. It is fitted with a special wide angle lens for low level work.

Fiducial numbers and markers are impressed on the film and controlled by the intervalometer.

7) Intervalometer:

This is a Geoterrex Model X-1 solid state unit which derives triggering from the magnetometer. Basic fiducial pulses are provided once for each two magnetometer readings, so that in usual operation one fiducial is recorded every two seconds. A long pulse is produced once for every ten normal fiducials.

These fiducial marks are impressed on the path recovery film, the eight channel recorder, the Hewlett Packard Model 680 recorder and the digital printer in order to identify and locate geophysical records with ground positions.

8) Eight Channel Recorder:

This recorder is a Gulton Industries Model TR-888. Records are made on heat sensitive paper of 16 inch width. Each channel has a width of 1.6 inches. Individual signal processors are included for each channel, selected according to requirements for each channel to be recorded.

Normal chart speed is 5.0 inches per minute giving a horizontal scale of approximately 1000 feet per inch.

A typical chart record is included with this appendix.

B. PROCEDURES

1) Photo Laydowns:

Prior to undertaking of the survey, air photos of the area are obtained from which a photo laydown is produced, to an appropriate scale, usually 1" = 1320 feet. Proposed lines are drawn on the laydown, in the appropriate direction and line spacing. These "flight-strips" are then used by the air crew for navigating the airplane visually along the proposed lines. This photo laydown is also used to produce the subsequent base maps.

2) Aircraft Operation:

The air crew consists of pilot, co-pilot (or navigator) and equipment operator. The aircraft is flown along the proposed lines at an altitude of some 200 feet, using the flight strips for navigation. Altitudes in excess of 300 feet are generally considered too high for effective penetration.

The operator records lines, direction of flight and starting and finishing fiducial numbers on a flight log. Equipment is normally left on during the whole of the survey flight, while the intervalometer is turned on only for the actual survey line. Thus, the appearance of fiducial marks on the charts indicates the extent of the survey line.

3) Field Reduction:

Upon completion of the flight, the film is developed and the actual path of the aircraft is plotted on the photo laydown. This is accomplished by comparing film points with the photo. For any given point, the appropriate fiducial number is placed on the photo laydown and the points joined to produce the actual flight path.

When field results are desired, anomalies are chosen and assigned appropriate fiducial numbers. The anomalies are then transferred to their correct position on the photo laydown.

4) Office Reduction:

On completion of the survey, base maps are drawn using the photo laydown as a base. Flight lines and fiducial numbers are shown on this base map.

In the case of EM or radiometric results the anomalies are then plotted on the base map as boxes with symbols representing anomaly grade or amplitude (as noted on the legend accompanying each map). Anomaly "systems" are then outlined as conductive zones at which stage geological comparison and interpretation may be made.

In the case of magnetic results, the values noted on the Moseley chart are transcribed to a work sheet (overlay of the base map) after levelling or correcting for heading error, diurnal, etc. The values are then contoured on the work sheet and then drafted on a copy of the base map.

Since base maps use the photo laydown as a base, all geophysical results portrayed may be compared as overlays, and all features of interest may be identified on the appropriate photo for subsequent ground location.

5 4 3 2 FIDUCIALS

POWER LINE
MON. TAPE

Altimeter

175'

100'

In-Phase
.6 sec.

Out-of-Phase

IN-Phase
2 sec.

X_F

A

Magnetometer
1000 γ Full Scale

020

COMINCO

Exploration
N.T.S. 42-A-7

Eastern District

Geoterrex Airborne E.M. Survey

Radisson Project

Thomas and Sheraton Twps., Ontario

July 26, 1972

E.O. Andersen

The airborne E.M. survey herein reported on was flown by Geoterrex Ltd. of Ottawa in March 1972 using their in-phase/out-of-phase Rio-Mullard type system. This system, aircraft, flight procedure and flight path recovery method is fully described in the attached appendix.

The results of the survey revealed two interesting conductive zones, indicated 1 and 2 on the accompanying map. Anomaly 1 is a two line anomaly showing fair to moderate strength and fair conductivity. Anomaly 2 is a one line weak anomaly showing good conductivity. Both anomalies show only possible weak magnetic correlation. The other responses shown on the map are probably overburden type responses.

Submitted by: Erik Andersen

E.O. Andersen, P. Eng.

Following is a description of equipment and procedures used during this airborne geophysical survey.

A. EQUIPMENT

1) Aircraft:

The aircraft is a deHavilland Otter DHC-3 with Canadian registration CF-AYR. This aircraft is a single engine, slow speed, high performance type with a gross weight of 8,000 lbs. The aircraft may be equipped with wheels, skis, or floats, as required. Normal survey speed is 100 miles per hour.

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File 2,961

GEOPHYSICAL TECHN

42A07NW0116 2.961 THOMAS

900 ED JUL 21 1972 PROJECTS SECTION

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey: Airborne EM

Township or Area: Thomas and Sheraton Twps.

Claim holder(s): Cominco Ltd.

Author of Report: E. O. ANDERSEN

Address: c/o Cominco Ltd., 335 Bay St., Toronto

Covering Dates of Survey: March 1972
(linecutting to office)

Total Miles of Line cut:

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
—Electromagnetic	
—Magnetometer	
—Radiometric	
—Other	
Geological	
Geochemical	

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer ____ Electromagnetic 20 Radiometric ____
(enter days per claim)

DATE: 25 July 72 SIGNATURE: Erik Andersen
Author of Report or Agent

MINING CLAIMS TRAVERSED
List numerically

(prefix) (number)

See ~~attached~~ list.
on following pink sheet

If space insufficient, attach list

TOTAL CLAIMS 26

OFFICE USE ONLY

PROJECTS SECTION

Res. Geol. ____ Qualifications 2.259

Previous Surveys 2.410 Air (mag) in 1971
East - Barrington AM-104

Checked by ____ date ____

GEOLOGICAL BRANCH ____

Approved by ____ date ____

GEOLOGICAL BRANCH ____

Approved by ____ date ____

Show instrument technical data in each space for type of survey submitted or indicate "not applicable"

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS

Number of Stations _____ Number of Readings _____

Station interval _____

Line spacing _____

Profile scale or Contour intervals _____

(specify for each type of survey)

MAGNETIC

Instrument _____

Accuracy - Scale constant _____

Diurnal correction method _____

Base station location _____

_____

ELECTROMAGNETIC

Instrument _____

Coil configuration _____

Coil separation _____

Accuracy _____

Method: ☐ Fixed transmitter ☐ Shoot back ☐ In line ☐ Parallel line

Frequency _____

(specify V.L.F. station)

Parameters measured _____

GRAVITY

Instrument _____

Scale constant _____

Corrections made _____

_____

Base station value and location _____

_____

Elevation accuracy _____

INDUCED POLARIZATION – RESISTIVITY

Instrument _____

Time domain _____ Frequency domain _____

Frequency _____ Range _____

Power _____

Electrode array _____

Electrode spacing _____

Type of electrode _____

SELF POTENTIAL

Instrument _____ Range _____

Survey Method _____

_____

Corrections made _____

_____

RADIOMETRIC

Instrument _____

Values measured _____

Energy windows (levels) _____

Height of instrument _____ Background Count _____

Size of detector _____

Overburden _____

(type, depth – include outcrop map)

OTHERS (SEISMIC, DRILL WELL LOGGING ETC.)

Type of survey _____

Instrument _____

Accuracy _____

Parameters measured _____

_____

Additional information (for understanding results) _____

_____

_____

AIRBORNE SURVEYS

Type of survey(s) Airborne EM

Instrument(s) See Appendix to Report (Geoterrex in-phase/out-of-phase system)

(specify for each type of survey)

Accuracy See Appendix to Report.

(specify for each type of survey)

Aircraft used DeHavilland Otter DHC-3 CF-AYR based in Timmins

Sensor altitude 150 ft.

Navigation and flight path recovery method See Appendix to Report.

_____

Aircraft altitude 150 ft. Line Spacing 1/8 mile.

Miles flown over total area 34.5 Over claims only 11.3

11.3 × 40 = 452 ÷ 26 = 17.4 days per claim

GEOCHEMICAL SURVEY – PROCEDURE RECORD

Numbers of claims from which samples taken _____

_____

_____

Total Number of Samples _____

Type of Sample _____
(Nature of Material)

Average Sample Weight _____

Method of Collection _____

_____

Soil Horizon Sampled _____

Horizon Development _____

Sample Depth _____

Terrain _____

_____

Drainage Development _____

Estimated Range of Overburden Thickness _____

_____

_____

SAMPLE PREPARATION
(Includes drying, screening, crushing, ashing)

Mesh size of fraction used for analysis _____

_____

_____

_____

General _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

ANALYTICAL METHODS

Values expressed in: per cent ☐
p. p. m. ☐
p. p. b. ☐

Cu, Pb, Zn, Ni, Co, Ag, Mo, As,-(circle)

Others _____

Field Analysis (_____ tests)

Extraction Method _____

Analytical Method _____

Reagents Used _____

Field Laboratory Analysis

No. (_____ tests)

Extraction Method _____

Analytical Method _____

Reagents Used _____

Commercial Laboratory (_____ tests)

Name of Laboratory _____

Extraction Method _____

Analytical Method _____

Reagents Used _____

General _____

_____

_____

_____

_____

_____

_____

_____

_____

File 2.961

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

RECEIVED
FEB 16 1973
PROJECTS SECTION

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey Airborne Magnetic
Township or Area Thomas and Sheraton Twp.
Claim holder(s) Cominco Ltd.
Suite 1100, 335 Bay St., Toronto, Ont.
Author of Report E. O. Andersen
Address c/o Cominco Ltd., 335 Bay St., Toronto
Covering Dates of Survey March 1972 (linecutting to office)
Total Miles of Line cut

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

DAYS per claim

Geophysical
–Electromagnetic
–Magnetometer
–Radiometric
–Other
Geological
Geochemical

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer 17 / 3 Electromagnetic Radiometric (enter days per claim)

DATE: 14 Feb. 1973 SIGNATURE: Erik Andersen
Author of Report or Agent

PROJECTS SECTION

Res. Geol. Qualifications

Previous Surveys 2.490 Airborne (Mag) 1971
Same type of instrument (Barringer AM-104)

Checked by

GEOLOGICAL BRANCH

Approved by date

GEOLOGICAL BRANCH

Approved by date

OFFICE USE ONLY

* Data on this survey similar to previous survey (File 2.490). Therefore, I am allowing only 3 days per claim.

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
P-255282	P-256282
P-255283	P-256299
P-255286	P-256300
P-255287	P-256307
P-255292	P-256308
P-255293	
P-255296	
P-255297	
P-255302	
P-255303	
P-255305	
P-255306	
P-256243	
P-256244	
P-256253	
P-256254	
P-256255	
P-256256	
P-256283	
P-256284	
P-256285	

TOTAL CLAIMS 26

If space insufficient, attach list

Show instrument technical data in each space for type of survey submitted or indicate "not applicable"

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Line spacing _____

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(specify for each type of survey)

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Accuracy - Scale constant _____

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Base station location _____

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Instrument _____

Scale constant _____

Corrections made _____

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OTHERS (SEISMIC, DRILL WELL LOGGING ETC.)

Type of survey _____

Instrument _____

Accuracy _____

Parameters measured _____

_____

Additional information (for understanding results) _____

_____

_____

AIRBORNE SURVEYS

Type of survey(s) Airborne Magnetic

Instrument(s) Geometrics Model G-803 (Proton Resonance)

(specify for each type of survey)

Accuracy ± 1 Gamma

(specify for each type of survey)

Aircraft used DeHavilland Otter DHC-3 CF-AYR based in Timmins.

Sensor altitude 150 feet

Navigation and flight path recovery method See Appendix of Report

_____

Aircraft altitude 150 feet Line Spacing 1/8 mile

Miles flown over total area 34.5 Over claims only 11.3

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Numbers of claims from which samples taken _____

Total Number of Samples _____

Type of Sample _____
(Nature of Material)

Average Sample Weight _____

Method of Collection _____

Soil Horizon Sampled _____

Horizon Development _____

Sample Depth _____

Terrain _____

Drainage Development _____

Estimated Range of Overburden Thickness _____

SAMPLE PREPARATION
(Includes drying, screening, crushing, ashing)

Mesh size of fraction used for analysis _____

General _____

ANALYTICAL METHODS

Values expressed in: per cent ☐
p. p. m. ☐
p. p. b. ☐

Cu, Pb, Zn, Ni, Co, Ag, Mo, As,-(circle)

Others _____

Field Analysis (_____ tests)

Extraction Method _____

Analytical Method _____

Reagents Used _____

Field Laboratory Analysis

No. (_____ tests)

Extraction Method _____

Analytical Method _____

Reagents Used _____

Commercial Laboratory (_____ tests)

Name of Laboratory _____

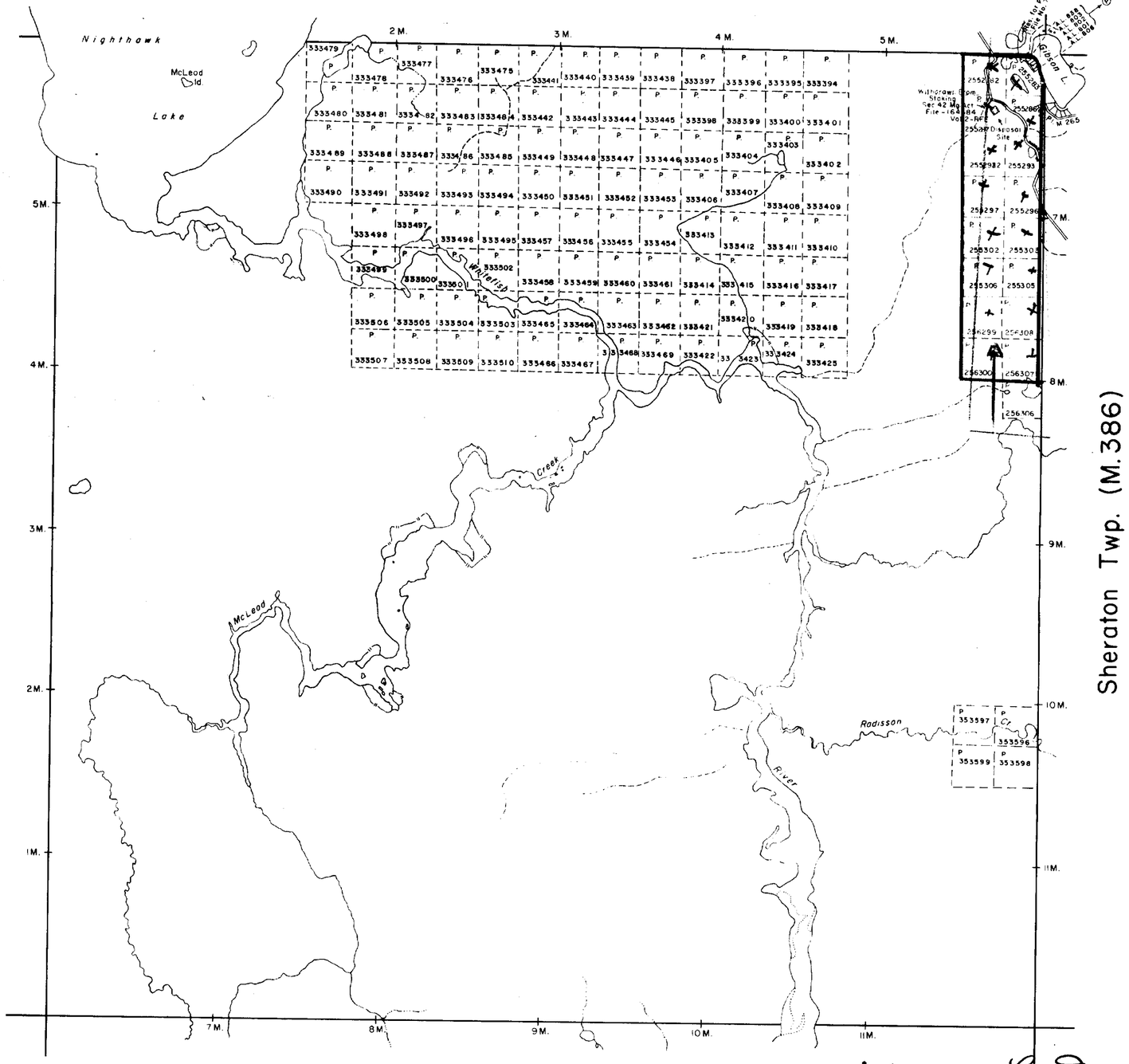
Extraction Method _____

Analytical Method _____

Reagents Used _____

General _____

Macklem Twp. (M.295)



Carman Twp. (M.266)

Sheraton Twp. (M.386)

Blackstock Twp. (M.263)

Airborne E.M.

THE TOWNSHIP
OF

THOMAS

DISTRICT OF
COCHRANE

PORCUPINE
MINING DIVISION

SCALE: 1-INCH 40 CHAINS

LEGEND

PATENTED LAND	(P)
CROWN LAND SALE	C.S
LEASES	(L)
LOCATED LAND	L.C.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	
CANCELLED	C

NOTES

400' Surface Rights Reservation around all lakes and rivers.

Reserve Flooding Rights to H.E.P.C. of [illegible]

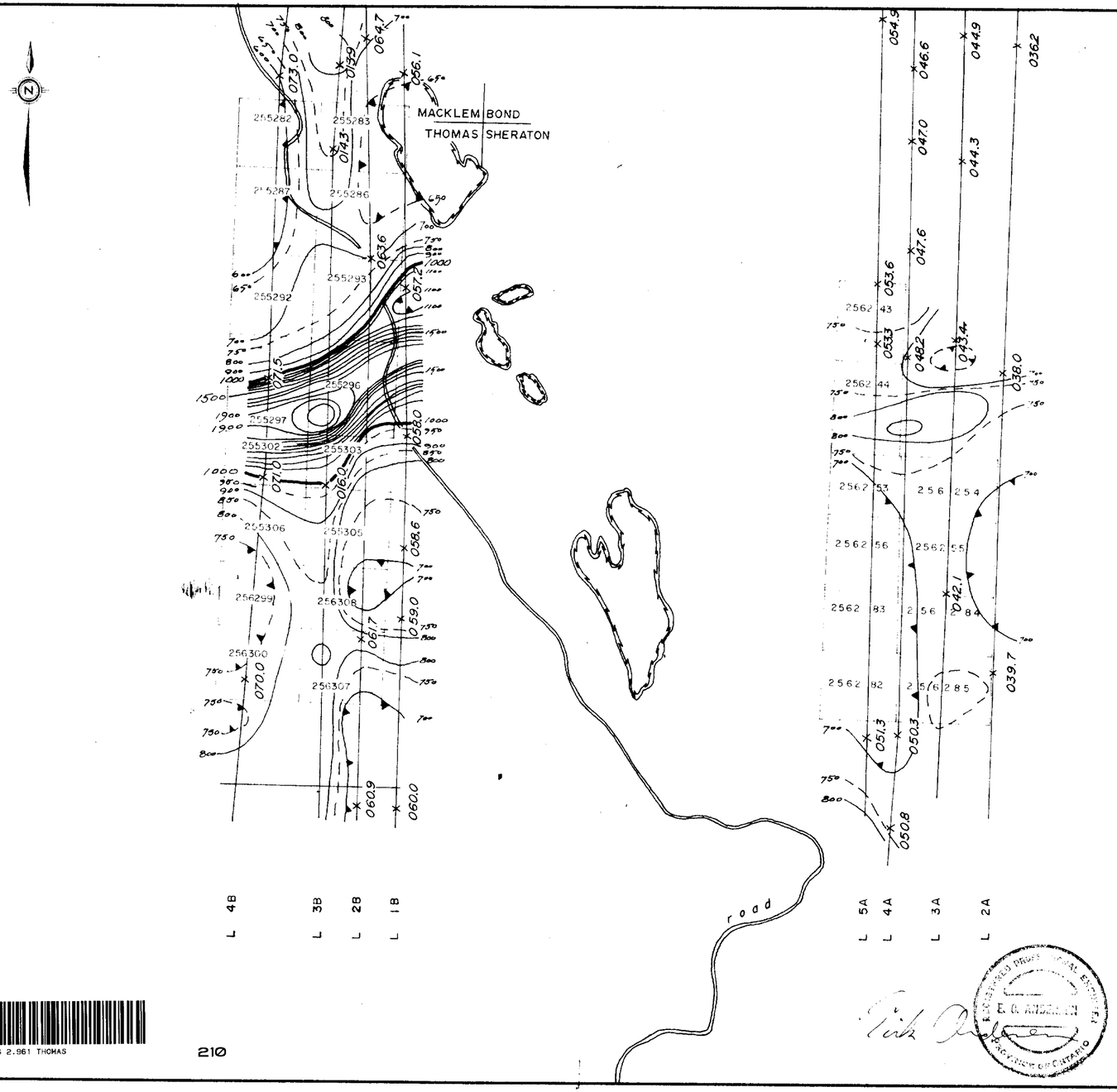
2.961

DATE OF ISSUE
[illegible] 1972

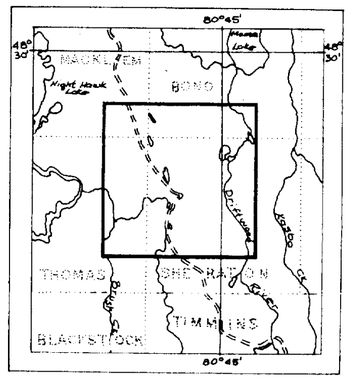
PLAN NO. M-312

ONTARIO
DEPARTMENT OF MINES
AND NORTHERN AFFAIRS

2.961



LOCATION MAP



Scale 1:250,000

Survey by : GEOTERREX Ltd., Ottawa, Ont.

Instrument : GEOMETRICS Model G-803

Magnetometer Type : PROTON RESONANCE

Contour Interval : 50 Gammas

Survey date : March, 1972

0 1/4 1/2 3/4 1 mile

Drawn by: EOA	Traced by: jpr
Revised by / Date	Revised by / Date

COMINCO LTD.

AEROMAGNETIC SURVEY BY GEOTERREX LTD.

Scale: 1" = 1320 feet | Date: Feb./73 | Plate: 1

42A07NW0116 2.961 THOMAS

210

FORM 210-0540

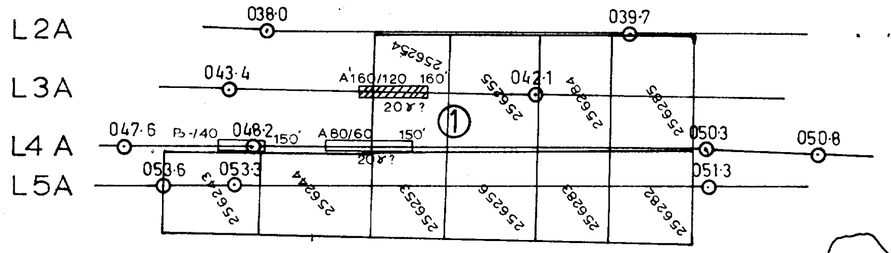
2.961

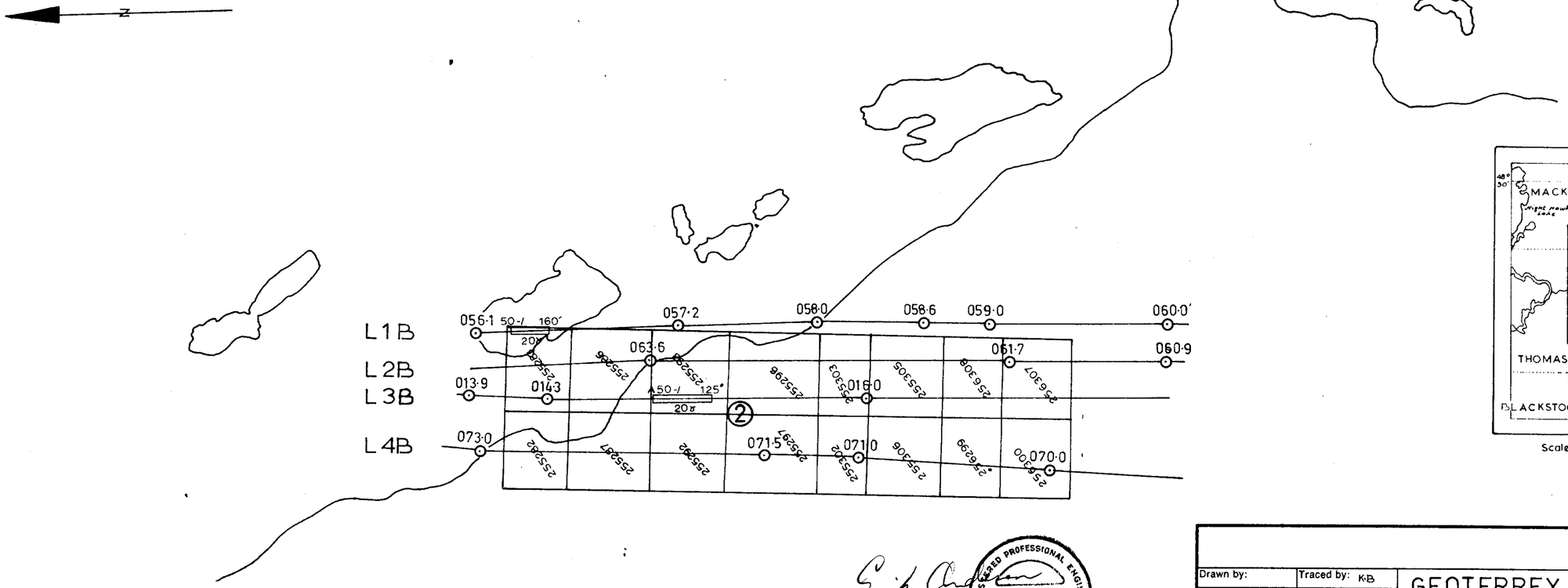
LEGEND

In-Phase (ppm) / Conductivity Indication → 80/50* 120 ← Aircraft Height
Out-of-Phase (ppm)
200γ ← Magnetic Correlation (gammas)
1/2 width

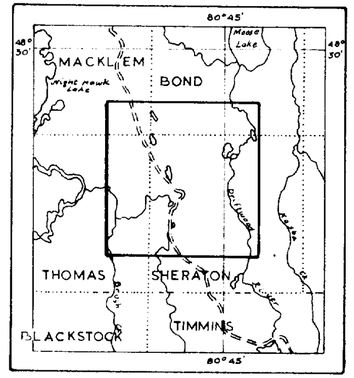
CONDUCTIVITY INDICATIONS :-
Good
Poor

FLIGHT LINES
056·0 ← Fiducial





LOCATION MAP



Scale 1: 250,000

E. O. ANDERSEN
REGISTERED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

Drawn by:		Traced by: K-B	
Revised by	Date	Revised by	Date

GEOTERREX AIRBORNE EM
RADISSON PROJECT
RIO-MULLARD OTTER TYPE IN PHASE/OUT-OF-PHASE

Scale: 1inch = 1320 feet | Date: March 1972 | Plate: 1

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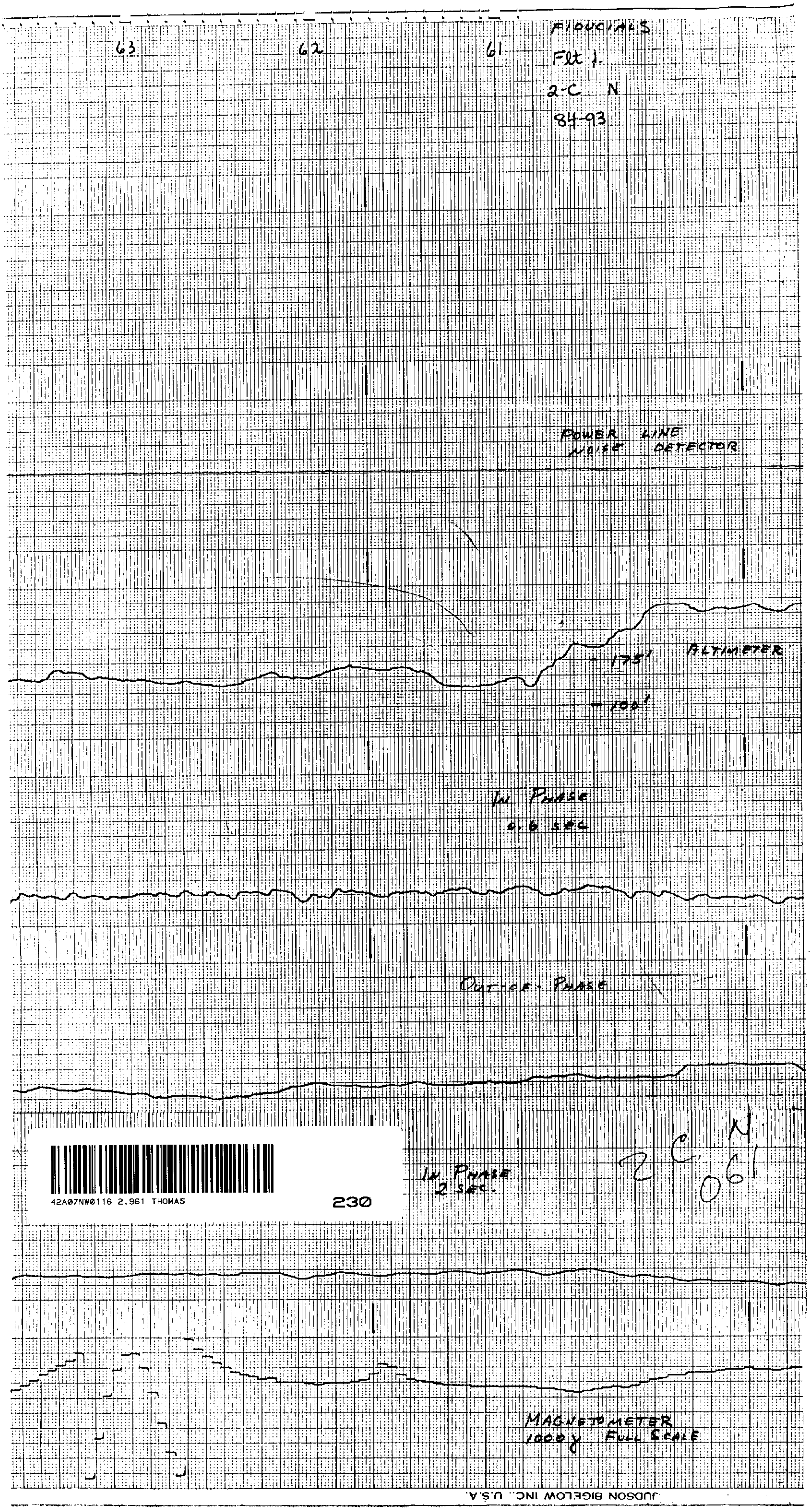

GEOTERREX RIO-MULLARD SYSTEM

TYPICAL RECORD.