2.17506

THE ASTRON BAY PROSPECT

Kenora, Ontario

GEOPHYSICAL REPORT

Prepared For

ARLINGTON RESOURCES INC.

Suite 519, 2275 Lakeshore Blvd., West
Etobicoke, ON
M8V 3Y3

Surveyed By

LANCASTER HOLDINGS INC.

Toronto, ON

LANCASTER HOLDINGS INC.
April 31, 1997

Qual *
2.17506

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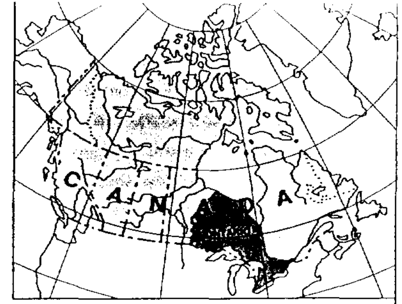
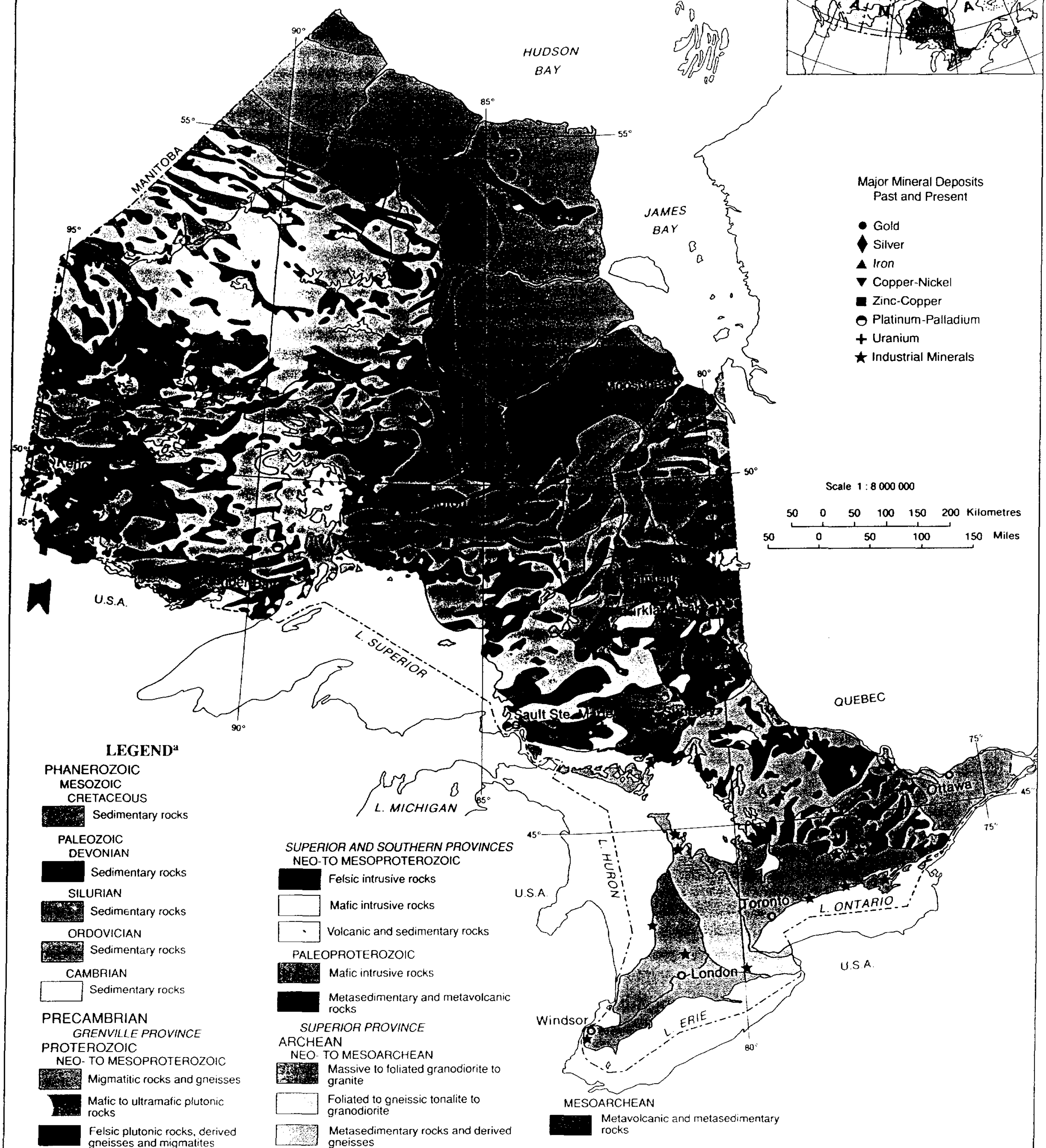
Ontario

GEOLOGY AND PRINCIPAL MINERALS OF ONTARIO





1.0 INTRODUCTION

Lancaster Holdings Inc., of Toronto, Ontario was hired on a contract basis by **Arlington Resources Inc.**, to conduct a geophysical program on the Astron Bay Prospect located in the Townships of Astron Bay and Wiley Bay. The property consists of two (2) unpatented mining claim blocks containing 24 mineral claims in the Kenora Mining Division of northwestern Ontario.

This report describes the 1997 winter geophysical program carried out and consisted of a Magnetometer Survey and a VLF Survey. The results of the program are contained herein, and on the accompanying maps.

The survey took place on the two (2) claim blocks, numbered 1178137 and 1218086 respectively.

1.1 1977 EXPLORATION PERSONNEL

The people directly involved in the program were all contractors employed by Lancaster Holdings Inc., of Toronto, Ontario and they are listed below.

ROBERT J. MAJOR	PROJECT SUPERVISOR & SENIOR TECHNICIAN
BRUCE LAVALLEY	ASSISTANT TECHNICIAN
THOMAS BEAUVAIS	LABOURER

1.2 EXPLORATION SUPPORT & SERVICES

ROBERT J. MAJOR, BRUCE LAVALLEY,

LAKE OF THE WOODS FREIGHT SERVICES INC.

WATER C. MARTIN

2.0 LOCATION

The property, the **ASTRON BAY PROSPECT** is located in the Kenora Mining Division approximately thirty-two (32) kilometres south of the City of Kenora, Ontario. It consists of two (2) 1200 meters by 800 metres contiguous claim blocks that cover approximately 98% of Deadbroke Island and 100% of Red Rock Island.

The property is outlined on the Province of Ontario maps numbered G-2602, G-2657 and on the compilation map provided herein.

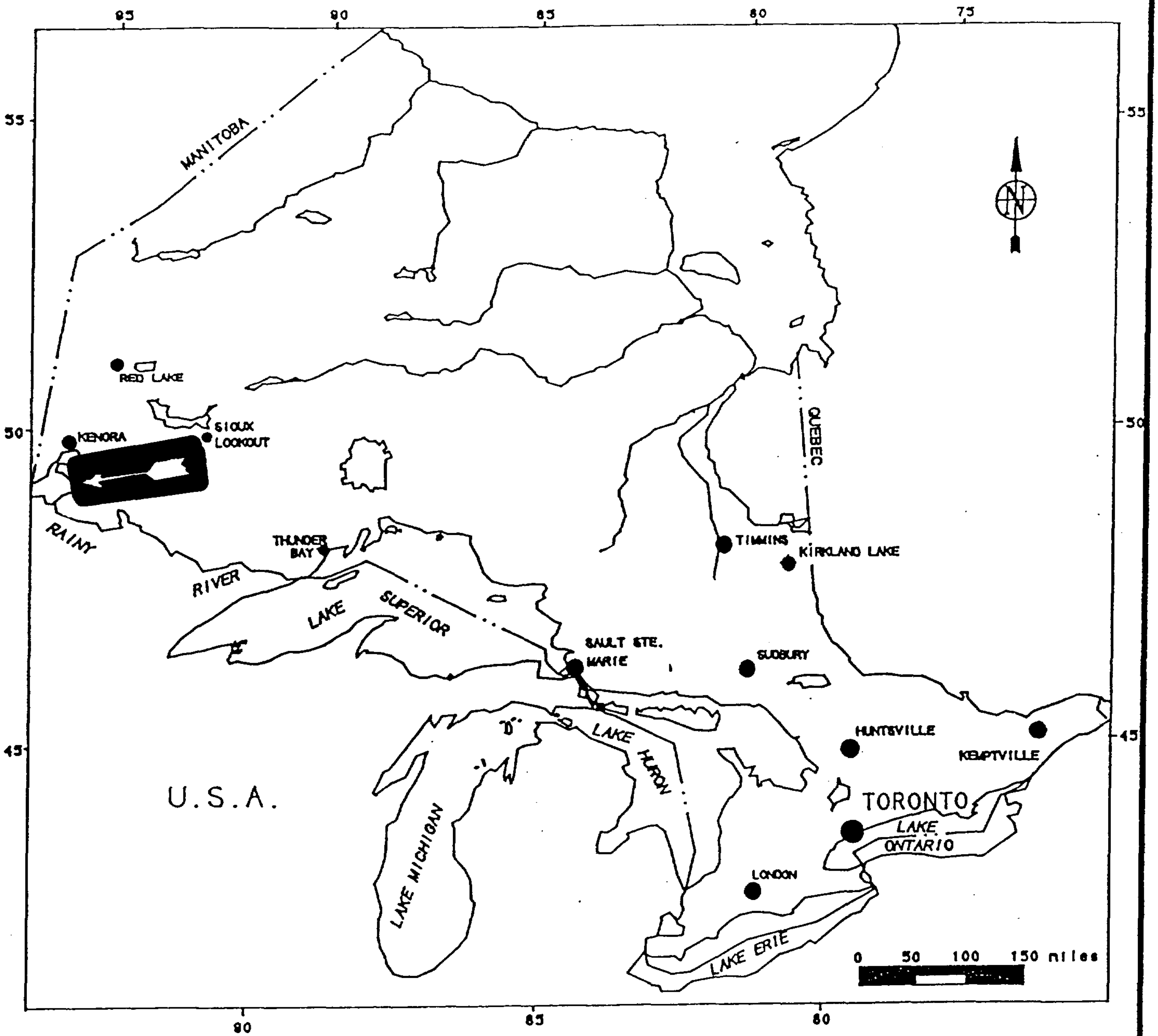
2.1 ACCESS

In the winter access to the property is by means of automobile or snowmobile, preferably a 4X4, on a fully maintained winter ice road from the City of Kenora to within 3 kilometres of the claims. The remaining distance can be reached by plowing an additional ice road close to the property and by snowmobiling the rest of the way to the mineral claims.

In the summer access to the property is obtained by sea plane or watercraft, via the City of Kenora or from Sioux Narrows, Ontario.

3.0 PROPERTY

The property as acquired from Lancaster Holdings Inc., consists of 2 claim blocks totalling 24 mineral claims, located in the Kenora Mining Division. The status of the claims or any underlying royalties associated with them have not been reviewed and accordingly no opinion is expressed.

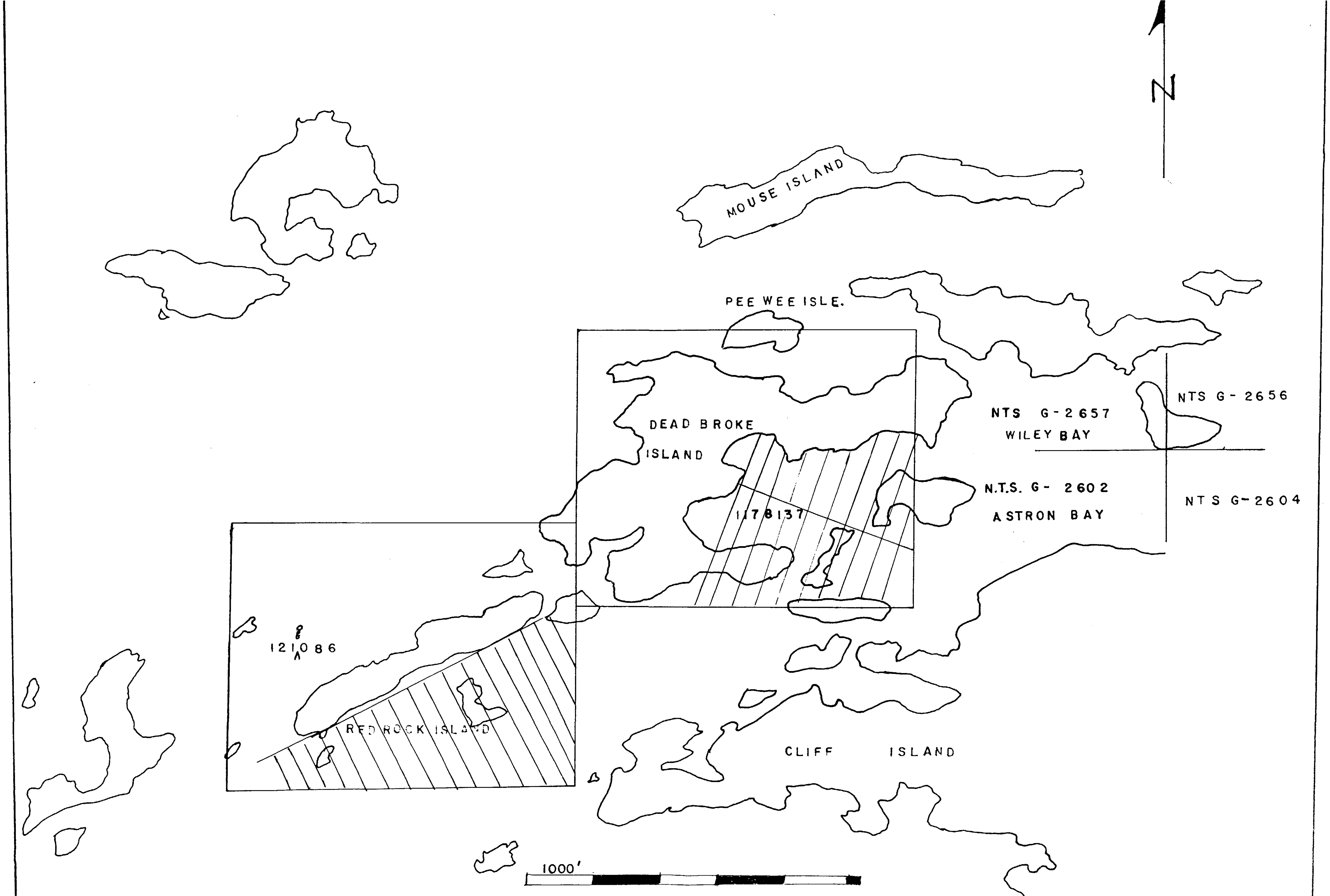


PROVINCE OF ONTARIO

LOCATION MAP

Date:	Scale: 1" = 150 mi	N.T.S.:
Drawn: R.M.	Approved: R.M.	File: LOC.

51°
50°
49°
95°
94°
93°
48°
Red Lake
Balmertown
Trout L.
Woman L.
Confederation L.
Sesikinaga L.
Pakwash L.
Bruce L.
Bluffy
Wenesaga
Whitemud
Otatakan
Sydney L.
Wenasaga
Ear Falls
Warner Lake
Umfreville
Anishinabi
Oak L.
Wabaskang L.
C.N.R.
Wapesi
Separation L.
Maynard
Sand L.
English River
Grassy Narrows
Segise
Big Canyon L.
Perrault Falls
Lac Seul
Camp Robinson
Thaddeus L.
Lost L.
Sioux Lookout
Clay L.
Minaki
Farlane
Redditt
Silver Jones
Canyon L.
Red Lake Road
Vermilion
Ingolf
C.P.R.
Willard
Morgan
Kenora
Keewatin
Kejick
Shoal L.
Vermilion Bay
Eagle River
Dryden
Eagle Lake (I.R.)
Wabigoon
Eagle L.
Beach
Basket L.
Kukukus L.
Press
Barrel L.
Dryberry L.
Atikwa L.
Aulneau Peninsula
Sioux Narrows
Whitefish Bay
Upper Manitou
Kakagi
Crow
Lawrence L.
Lower Manitou
Indian L.
Ignace
Lake of the Woods
Big I
Bigsby I
Morson
Nestor Falls
Caliper Lake
Bergland
Loonhaunt L.
Baudette
Rainy R.
Barwick
Northwest Bay
Emo
Devlin
Crozier
Rainy Lake (I.R.)
Fort Frances
International Falls
Eltrut L.
White Otter L.
Clearwater West L.
Gulliver L.
Marmion
Atikokan
Mine Centre
Seine River Village
Seine
Little Turtle L.
Pipestone R.
Kabetogama L.
Quetico L.
Quetico R.
Pickerel L.
Sturgeon L.
Maligne R.
Lac la Croix
Crooked L.
Agnes L.
Basswood L.
Rainy Lake



SCALE 4" = 1 MILE

3.1 PHYSIOGRAPHY

The Astron Bay group of claims lie almost entirely in Astron Bay Township, with the exception of the northern boundary of Claim 1178137, which extends into Wiley Bay Township.

The property is completely surrounded by water, Lake of the Woods. Ground terrain varies, with forest cover being mainly coniferous. Forest cover in this region consists of Jack Pine, Balsam, Poplar, Birch with a heavy cover of Willows. Lake of the Woods is a well recognized tourist area in the summer months for both Canadians and Americans.

The islands are typical of precambrian terrain, having a broad rolling topography with a general cover of glacial deposit. The topography reflects the underlying bedrock structures.

4.0 GENERAL GEOLOGY

Thompson 1937, Fraser 1945, Ayer 1985
Report File No. 5664 page 109

The area is underlain by archean supracrustal and intrusive rocks.

The supracrustal rocks of east-trending volcanic and sedimentary rocks regionally metamorphosed to greenschist facies and are intruded by the Aluneau Batholith to the south, and the Viola Lake and Red Cliff Bay stocks to the east.

The Dead Broke Island occurrence occurs within intermediate volcanic rock cut by mafic alteration zones and porphyry dikes.

The mineralization occurs as disseminated pyrite within irregular quartz veins in and around two east trending quartz biotite porphyry dikes.

Ontario Bureau of Mines 1893
Volume No. 2 page 232

The Dead Broke Mines

The Dead Broke Mine is located about 22 miles in a southernly direction on from Rat Portage, and is owned by Jeff Heldrith. Work on this mine was commenced in April with 10 men, the vein has been stripped 50 feet in length and nearly the same distance in width.

An open cut has been made 20 feet in length, 12 feet in width and a few feet in depth. About 75 tons have been removed and showing by frequent assay from $7.00 to $133.00 per ton. 25 Tons of the ore have been taken to the Reduction Works to obtain a mill run.

The work was interfered with by inflow of water and a new opening has been made at a distance of 130 feet from the former one, and the tunnel has been driven in 25 feet. It was intended to work the property on an extensive scale.

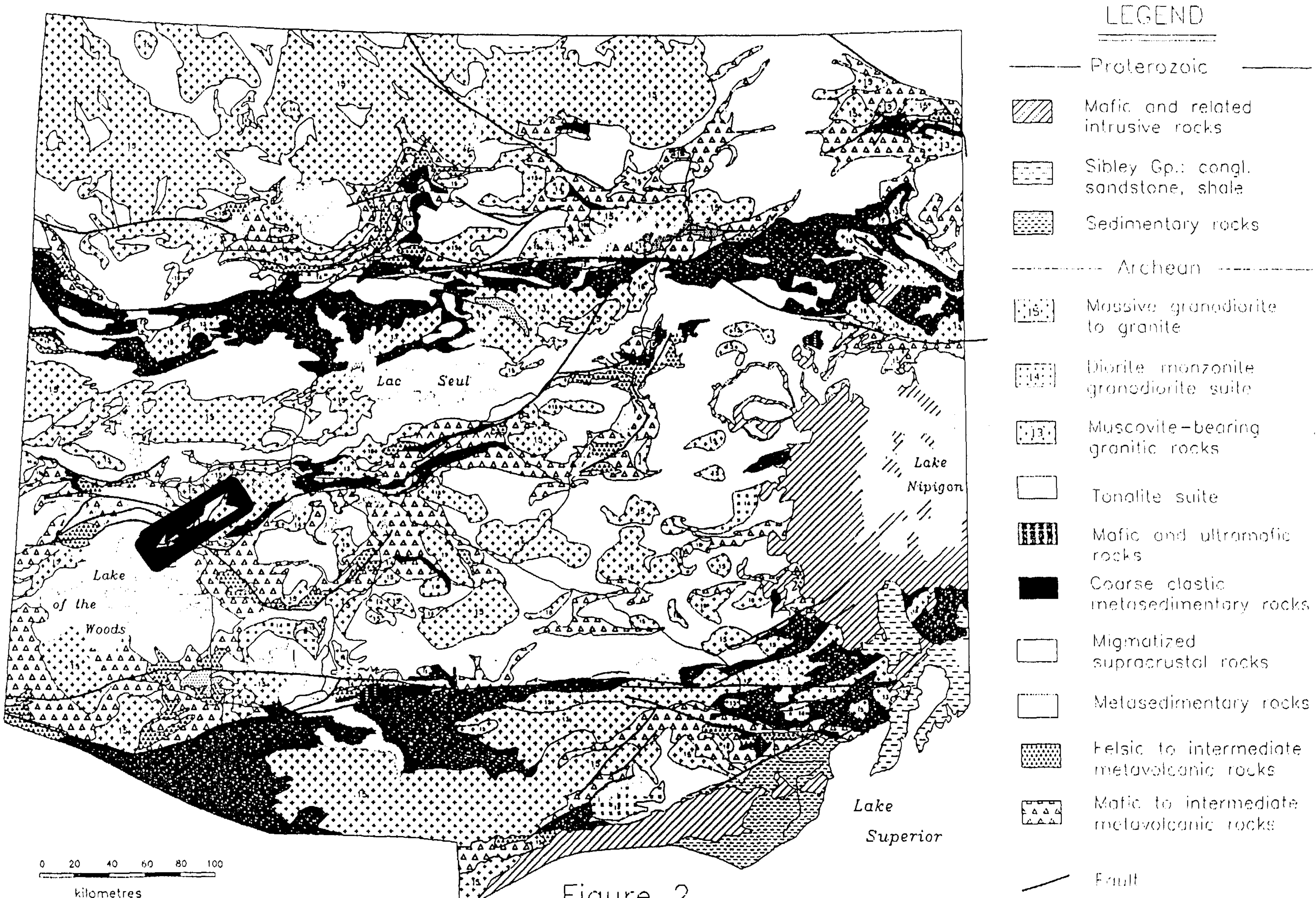

Lac Seul
Lake Nipigon
Lake of the Woods
Lake Superior
0 20 40 60 80 100
kilometres
LEGEND
Proterozoic
Mafic and related intrusive rocks
Sibley Gp.: congl. sandstone, shale
Sedimentary rocks
Archean
Massive granodiorite to granite
Diorite monzonite granodiorite suite
Muscovite-bearing granitic rocks
Tonalite suite
Mafic and ultramafic rocks
Coarse clastic metasedimentary rocks
Migmatized supracrustal rocks
Metasedimentary rocks
Felsic to intermediate metavolcanic rocks
Mafic to intermediate metavolcanic rocks
Fault

Figure 2

"Dead Broke"

R. V. Oja PH.D, P. Eng.
September 1973

In 1982, Slaught, the mining inspector of the area, made the following comments on the property; "The vein has been stripped 50 feet in length and nearly the same in width. The open cut has been made 20 feet in length, 12 feet in width and few feet in depth from which about 75 tons of ore have been removed. Showing by frequent assay ranged from $7.00 to $133.00 per ton."

These assay values represent gold values ranging from 0.35 ounces per ton to 6.6 ounces per ton. The previously mentioned open cut was not recognized during the 1936 investigation for the geological report of the area, nor was it seen during the staking of the island for the Golden Phoenix Consortium. The geological map indicates only one showing on the island that coincides with a short adit driven into a porphyritic intrusive, containing quartz veins but with only very slight sulphide mineralization. Perhaps the open pit mentioned by slaught was located in this area before the adit was driven.

On top of the hill, approximately 150 feet northwest of the adit is a small trench showing a quartz vein accompanied by pyrite and minor sulphides that is covered with overburden.

4.1 GEOPHYSICS

The purpose of the company's geophysical program carried out on the Astron Bay Prospect was threefold:

1. To verify possible mineralization occurrences extending from the land into the lake.

2. To identify possible gold bearing shear zones.

3. To outline possible economic mineral concentrations.

A baseline was established on claim number 1178137 with the 0+00 point of the baseline established at the entrance of the adit to 9+00 east.

Crosslines were established at 50 metre intervals with stations chained at 25 metre spacings. The baseline lies at 110 degrees SE.

A baseline was established on claim number 1218086 with the 0+00 point of origin being on the south west side of Red Rock Island and extending to 17+00 east. The baseline azimuth is 245 degrees SW.

Crosslines were established at 50 metre intervals with stations chained at 25 metre spacings.

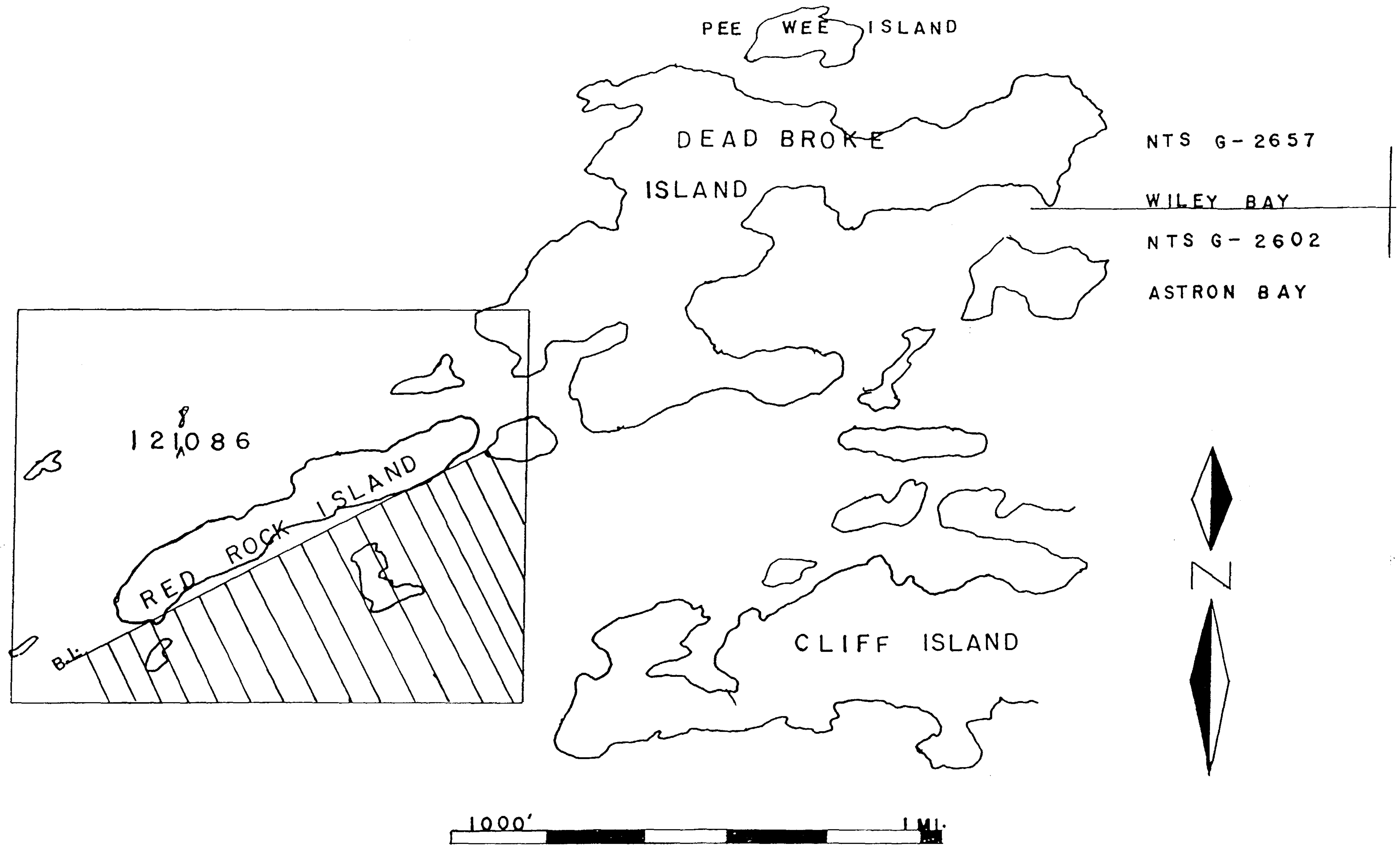
Electromagnetic Survey

The geophysical survey was carried out using a Geonics EM-16 instrument, calibrated to the Cutler Maine transmitting station at 24.0 kilohertz.

Magnetometer Survey

A Barringer Proton Magnetometer, model GM-122 was adapted to a Canadian Mining Geophysics MR-10 to conduct the survey.

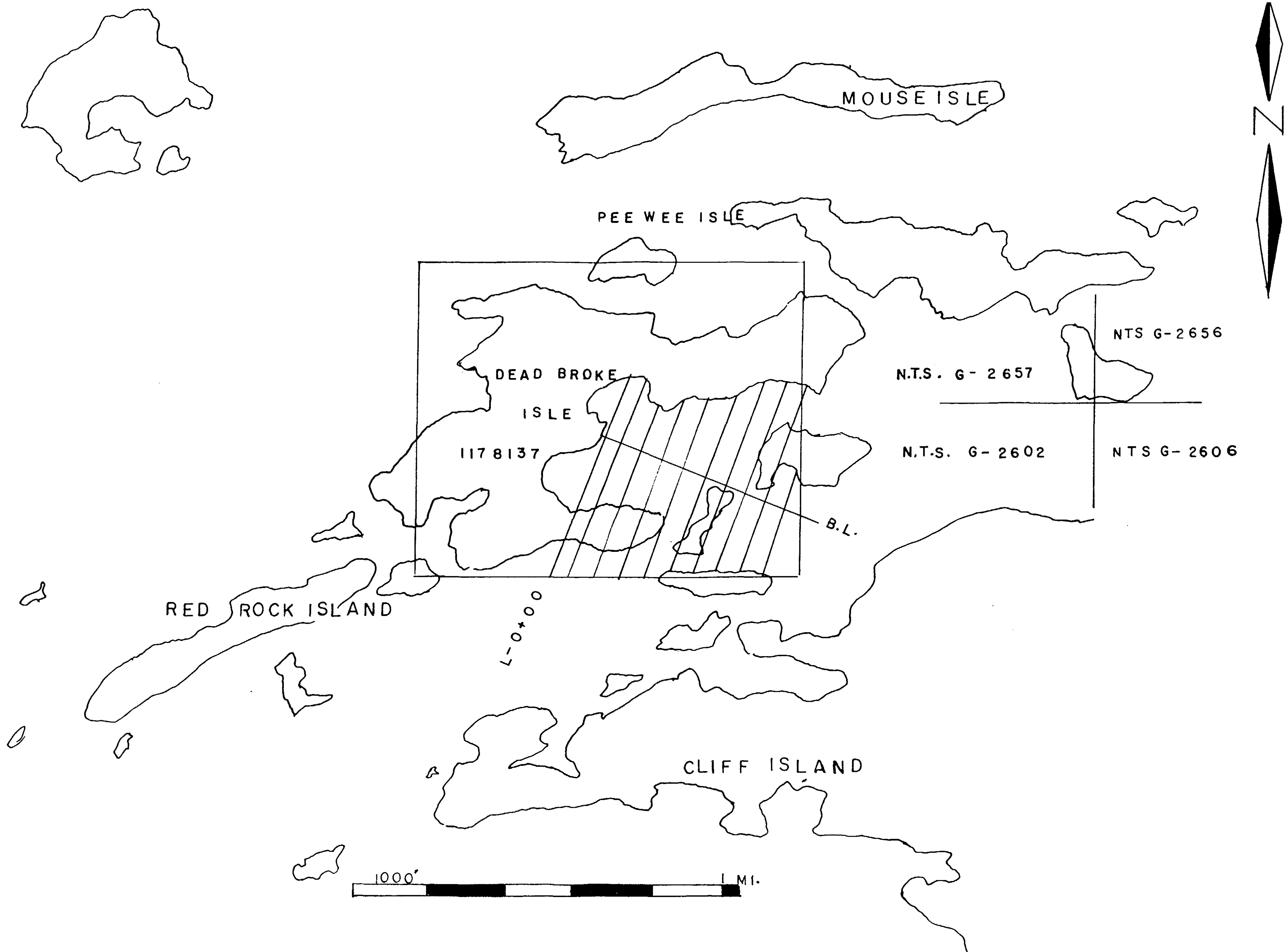
The base magnetometer was adjusted to a 15 second integration time for control of the diurnal corrections. Diurnal corrections were calculated +/- five gammas from each reading conducted in this magnetic survey.



SCALE 4" = 1 MILE

KEY MAP

LAKE OF THE WOODS



LAKE OF THE WOODS

KEY MAP

SCALE 4" = 1 MILE

A Geometrics Proton GS-186 was utilized for the field survey calibrated in conjunction with the base unit, Barringer Proton magnetometer.

The MR-10 Magnetometer Recorder is a micro processor contoured instrument designed to be connected to virtually any of the proton precision magnetometers presently available. The MR-10 does not contain a magnetometer itself. An additional connector is added to a Goemetrics, Urtec or Scintrex portable magneometer, while the Barringer GM-12 or the GSM-8 from Gem Systems comes from the factory with the necessary connector installed.

The concept behind the MR-10 is related to the nature of magnetic noise. The magnetic field of the earth, although essentially a stable DC field, like that of a small bar magnet, occasionally has fluctuations in strength (called noise) which can be traced from a fraction up to several times the magnitude of the real anomalies that are being mapped.

One way to set the true difference in magnetic field strength between two adjacent survey stations, expressed in gammas as measured by a portable magnetometer, is to make simultaneous measurements with two magnetometers with one instrument located at each station.

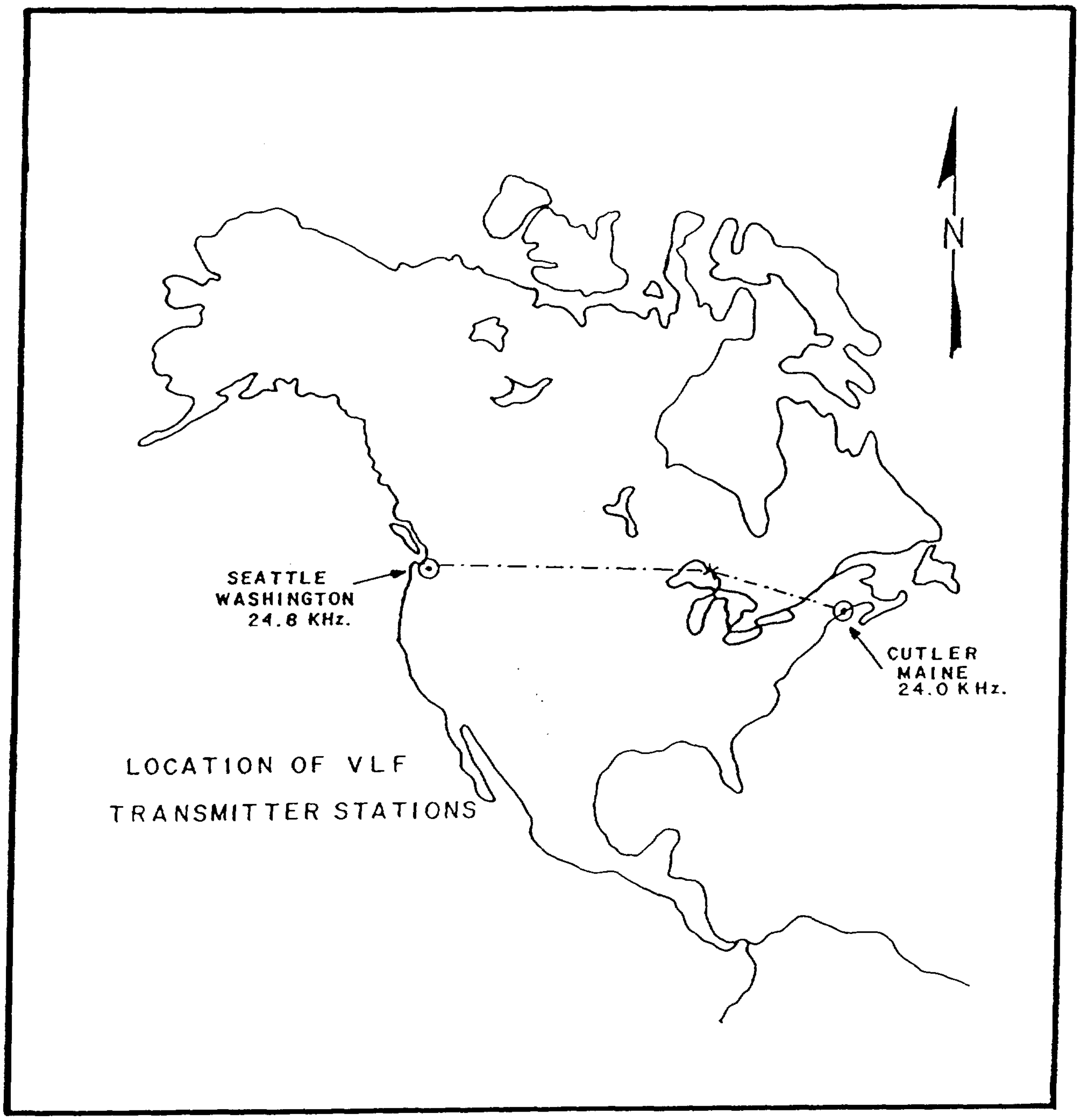
Claim #1178137

A strong response was obtained by both electromagnetic and magnetic surveys on baseline 0+00 on the lakeshore starting from the east edge of the adit for a distance of approximately 200 metres in length, with a width of up to 40 metres.

Claim # 1218086

No geophysical response of any consequence was obtained by the geophysical survey carried out on the lake south of Red Rock Island.

LANCASTER HOLDINGS INC.



Head Office: Suite 519, 2275 Lakeshore Blvd., West, ON M8V 3Y3
Field Office: Pinewood Court, Wawa, Ontario, P0S 1K0

4.2 RECOMMENDATIONS

Claim No. 1178137

Due to the positive responses of the electromagnetic and magnetic surveys carried out on the ice east of the known mineralized adit. Further exploration is warranted, it is suggested that a baseline be established on the east side of the adit to the west side of the island. Crosslines are recommended to be cut to the north and south shores at 50 metre spacings, and all stations chained at 25 metre intervals.

A detailed geophysical survey should be carried out with both electromagnetic and magnetic instruments.

Claim No. 1218086

Due to the weak or practically negative response on the electromagnetic and magnetic surveys on the grid, no further exploration is recommended at this time in the immediate area of the survey.

An exploration program, consisting mainly of geophysical mapping, prospecting and ground geophysics, is recommended in the fall on Red Rock Island itself.

4.3 EXPENDITURES

Claim No. 1178137

Magnetometer & VLF surveys, establishing grids	$7,095

Claim No. 1218086

Magnetometer & VLF surveys, establishing grids	$7,678
Ice Road plowing and maintenance	$1.150
Accommodations & Meals (3 men) 21 days	$6,300
Mobilization and demobilization	$1,200
Truck rental 21 days @ $75 day	$1,575
Ski-doo rental 21 days @ $50 per day	$1,050
Fuel and oil	$ 750
Labour 21 days @ $125 per day	$2,625
Drafting & report writing	$1,250
Contingency 10%	$3,067
Total	**$33,740**

5.0 CERTIFICATION

I ROBERT J. MAJOR of Wawa, Ontario hereby certify that:

1. I have been practising in my profession for over 40 years in Ontario, Quebec, Saskatchewan, British Columbia, New Brunswick, North West Territories and the United States of America.

2. I have been employed directly with Noranda Mines Ltd., Mattagami Lake Mines, Claude Resources Inc., Shane Resources Inc., Arista resources Inc., Eldorado Nuclear Limited, Patricia Mines Inc., Gulf Minerals, Corona Corporation, and self employed with Major Management Exploration Services and currently with Lancaster Holdings Inc.

3. I have based my recommendations contained in this report on knowledge of the area, my previous experience and on the results of the exploration program conducted on the property during 1995, 1996 and 1997.

4. I hold no interest in this property, nor do I expect to receive any consideration from the same.

Dated this day of April, 1997.
at Wawa, Ontario.

ROBERT J. MAJOR

PORTFOLIO OF

ROBERT J. MAJOR

ROBERT (BOB) MAJOR has been involved with many different aspects of the mining industry for the past forty years. Numerous accomplishments and successes have followed him throughout his entire career. During this period of time, he has gained invaluable experience in many different phases of the mining industry. Experiences varying from prospecting, claim staking, geochemical surveys, overseeing exploration field crews, mill operating, mill foreman, assay laboratory foreman to spending four years in a laboratory with Noranda Mines Ltd.

In 1979, Bob Major formed and still operates his own company, Major Geophysics Ltd., which carries out contract exploration programs across Canada.

Included below are the different Corporations that Bob has been involved with, plus some of his duties and various accomplishments.

1952 -- Geo-Technical Development of Canada

-- Geophysical Instrument Technician
-- Legal surveying
-- working with Nick Nichols from England who is a Doctor of Geophysics and specialized in magnetic fields. Dr. Nichols was brought to Canada specifically to teach magnetometer.
-- Dr. Nichols was involved in research on the Rock of Gibraltar. He also researched in Egypt for buried sphinx and tombs.
-- Since such learning, Bob has taught Magnetic work.

1953 -- McPhar Geophysics

-- Geophysical contracting firm
-- forty chief field services and instructor
-- Magnetometer work, a newly developed field in Geophysical science.
-- From his teachings from Dr. Nichols, he now instructed other technicians.
-- Researched on Electro Magnetic Deep Penetration
-- Bob was the first person to use this technology and introduced it to the mining industry in Canada. Bob's fist major find was Geco Mines, a major copper discovery; which is still owned and operated by Noranda Mines Ltd.

1954 -- Cremac Surveys

1955
-- Field supervisor and instructor
-- Research only
-- No discoveries.

1956 -- Mining Corporation of Canada (Noranda)

1962
-- Field supervision in geophysics
-- Research
-- Land acquisition
-- Evaluating properties for options across Canada
-- Assistant Chief Geophysicist for Canada
-- Assistant to Jack Britton, Chief Geophysicist.

1962 -- Noranda Lab Chemistry

1966
-- Assayer for all base metals
-- Instructor on X-ray instruments for assaying
-- did metallurgical reports for a smelter
-- Research.

1966 -- Mattagami Lake Mines

1968
-- Field Supervisor and instructor in charge of complete program
-- Evaluating and acquiring properties
-- Totally responsible for the Matabi Lake Mine discovery (Ignace, Ontario); still operating today
-- Also spotted the first drill holes.

1968 -- Canadian Superior
(U.S. Oil Company, Mineral Branch)

1971

-- Field Supervisor in Geophysics
-- Evaluating and acquiring properties
-- Researched in Northern B.C., North West Territories and Iron Caps in Idaho
-- Gulf Minerals.

1977

-- In charge of organizing and setting up and carrying out integrated exploration programs, diamond drill programs, land acquisition, administration and supervision of large exploration camps, air transportation contractors, geophysical contractors and drilling contractors.
-- Hired as trouble shooter for Canada (axeman)
-- In charge of geophysics, geological field parties
-- Designating areas for prospecting parties
-- Overseeing 12 drill crews
-- Also in charge of 24 technical out-camps in Saskatchewan
-- In charge of Ennedai Lake, N.W.T., a major exploration camp for base metals.
-- Had major uranium discoveries in Northern Saskatchewan for Gulf Minerals:

1. Raven
2. Horseshoe
3. West Bear
4. Eagle Point

-- Promoted to Gulf Minerals' head office in Toronto - after a brief stay, he resigned.

1978 -- Eldorado Nuclear Limited (Ottawa)

-- Field Supervisor of Canada
-- General exploration in all fields
-- Resigned Spring of 1979.

Robert J. Major
Portfolio
Cont'd

1979 -- Major Geophysics Ltd.

-- formed and still operates this company
-- Serves as an exploration consultant for Corona Corporation in their gold and diamond exploration programs in Manitoba, Saskatchewan and North West territories
-- Contracts out for other major mining Corporations; consulting in geophysics and permafrost drilling (diamond drilling)
-- Contracted out for Canoxy Petroleum (uranium), at which time he discovered the Moffat Lake and Candy Lake finds in Northern Saskatchewan, which is now owned by Minatco Corporation and other joint ventures.

1991

-- Bob did the geophysics and spotted the first drill hole for the Prince Albert find (diamond mine for Corona Corporation)
-- This past summer, Bob completed the geophysical surveys and evaluated properties for diamond exploration across the Arctic Coast for Corona Corporation.

1995

-- Ongoing consulting geophysics and property management for several resource based Canadian private and public companies.
-- Recently he assisted the President of Patricia Mines Inc., formerly Arista Resources Inc., with the acquisition of the Island Gold Project formerly the Kremzar Property and Gold Mine.

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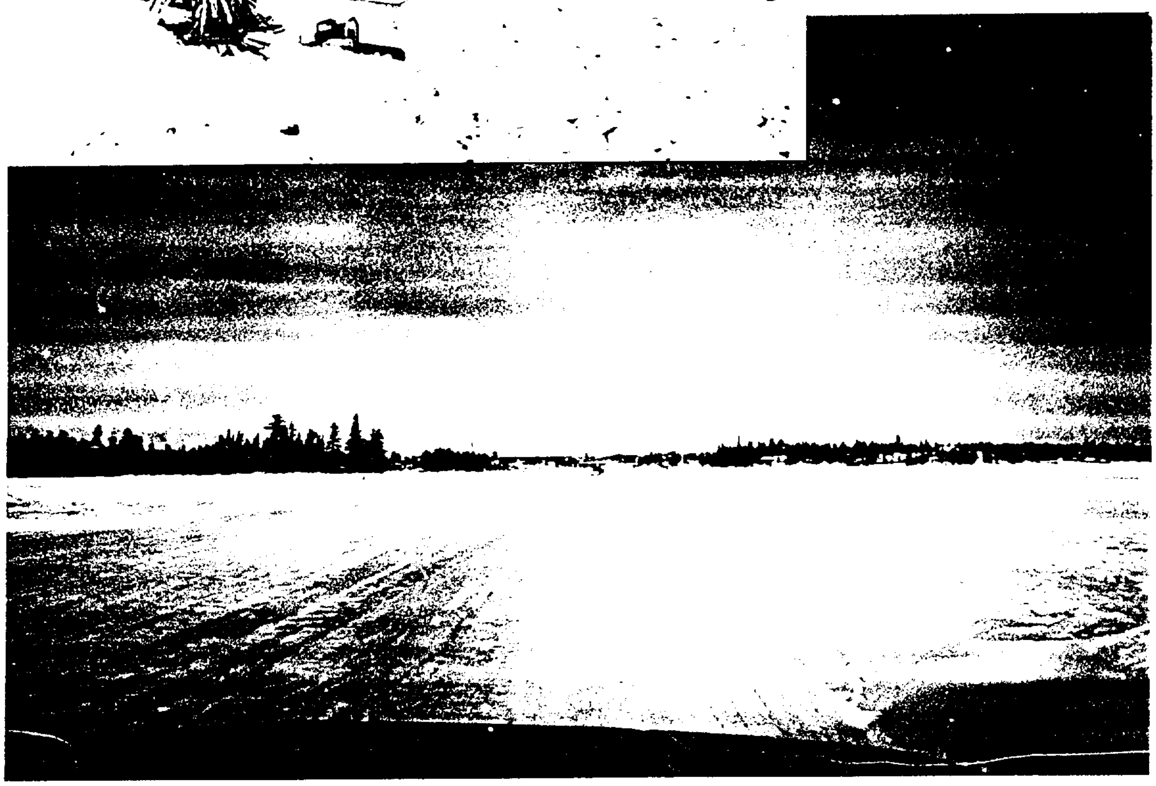
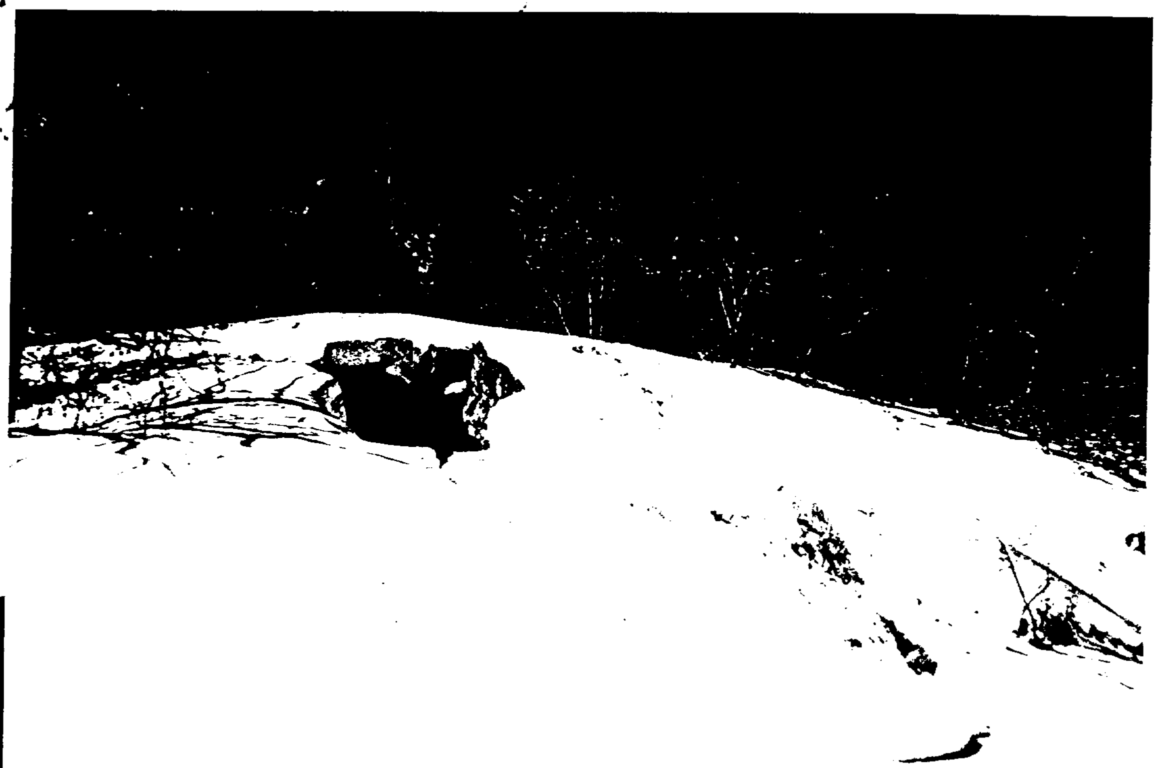
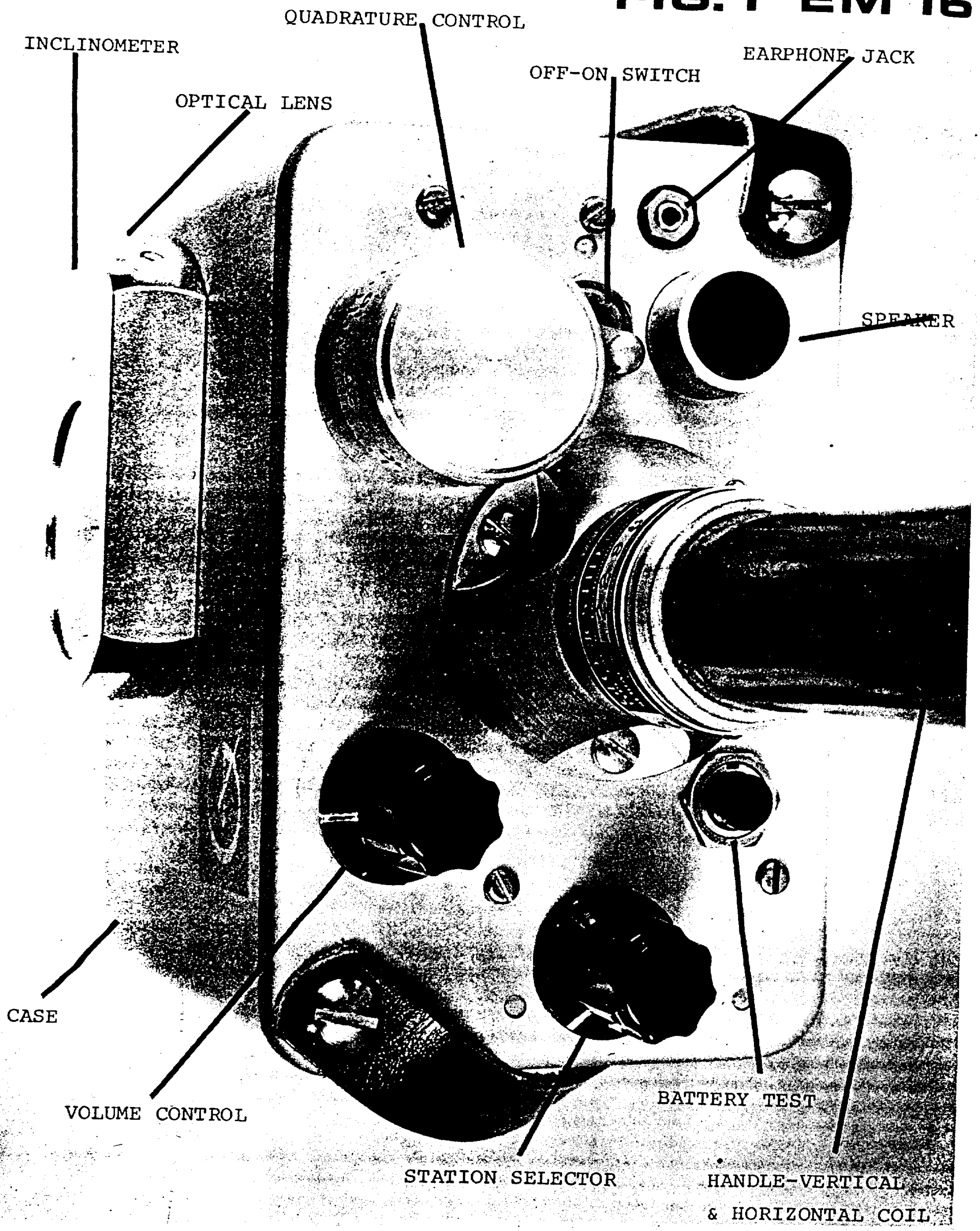
Saskatoon, Saskatchewan
S7J 4J6





APPENDIX A

FIG. I EM 16


QUADRATURE CONTROL
INCLINOMETER
OFF-ON SWITCH
EARPHONE JACK
OPTICAL LENS
SPEAKER
CASE
VOLUME CONTROL
BATTERY TEST
STATION SELECTOR
HANDLE-VERTICAL
& HORIZONTAL COIL

PRINCIPLES OF OPERATION

The VLF-transmitting stations operating for communications with submarines have a vertical antenna. The Antenna current is thus vertical, creating a concentric horizontal magnetic field around them. When these magnetic fields meet conductive bodies in the ground, there will be secondary fields radiating from these bodies. (See Figures 3 & 4). This equipment measures the vertical components of these secondary fields.

The EM16 is simply a sensitive receiver covering the frequency band of the VLF-transmitting stations with means of measuring the vertical field components.

The receiver has two inputs, with two receiving coils built into the instrument. One coil has normally vertical axis and the other is horizontal.

The signal from one of the coils (vertical axis) is first minimized by tilting the instrument. The tilt-angle is calibrated in percentage. The remaining signal in this coil is finally balanced out by a measured percentage of a signal from the other coil, after being shifted by 90°. This coil is normally parallel to the primary field,(See instrument Block Diagram - Figure 2).

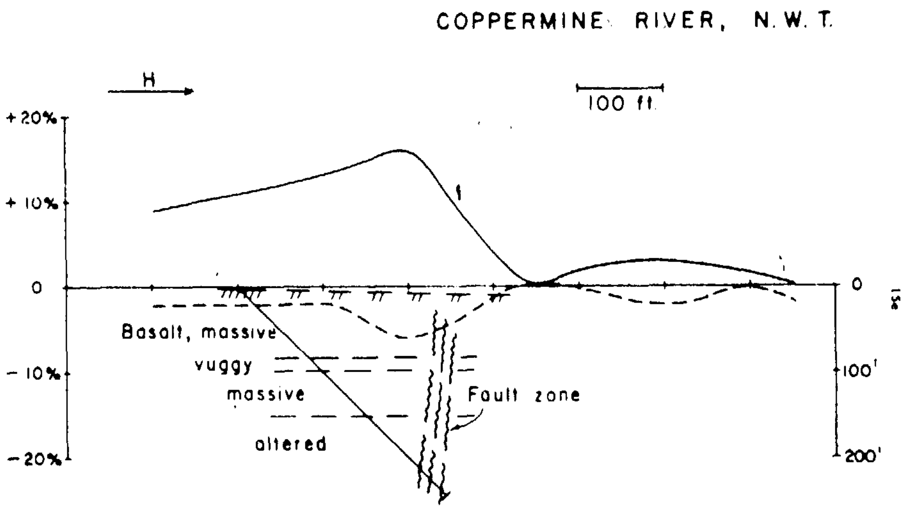
Thus, if the secondary signals are small compared to the primary horizontal field, the mechanical tilt-angle is an accurate measure of the vertical real-component, and the compensation $\pi/2$-signal from the horizontal coil is a measure of the quadrature vertical signal.

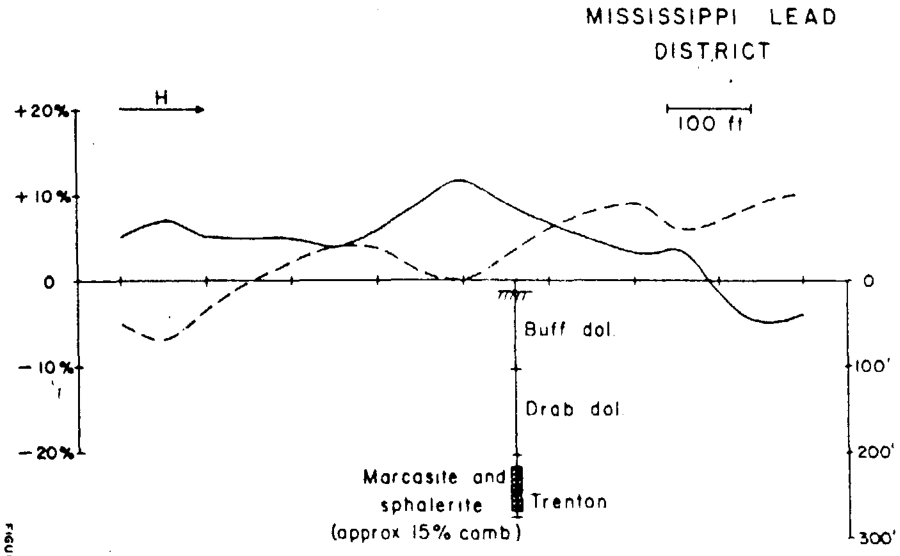
Some of the properties of the VLF radio wave in the ground are outlined by Figures 4 thru 9.

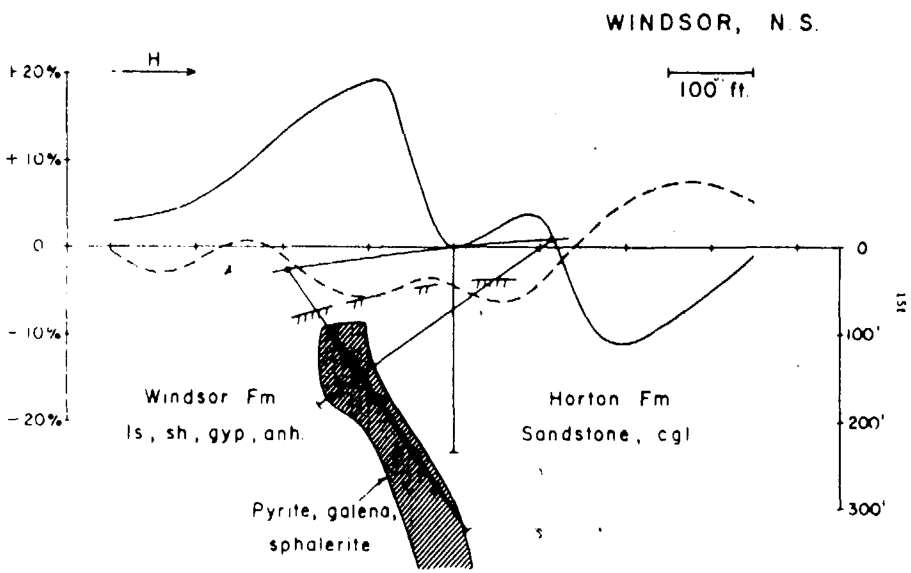
ACCOMPANYING NOTES FOR FIGURES 2 - 9

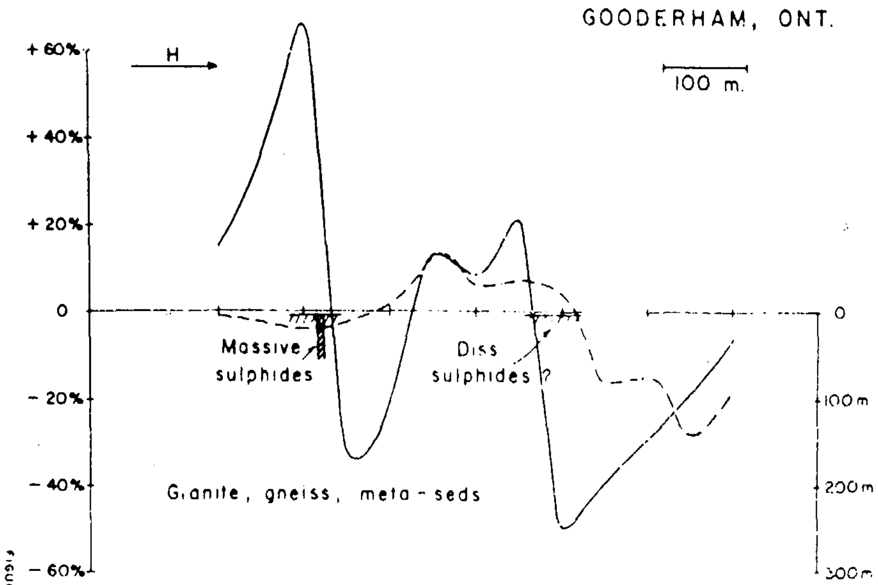
FIGURE 2 is the block diagram of the EM16. The diagram is self-explanatory. Both the coils (reference and signal coil) are housed in the lower part of the handle. The directions of the axis of the coils are as follows: The reference coil axis is basically horizontal and is kept more or less parallel to the primary field during measurement. The signal coil is at right angles to the reference coil and its axis is, of course, vertical.

The signal amplifier has the two inputs, one connected to the signal coil and one to the reference channel. By tilting the coils, the operator minimizes the signal from the signal (vertical axis) coil. Any remaining signal is reduced to zero by the quadrature control in the reference channel. The signal amplifier has zero output


COPPERMINE RIVER, N.W.T.
H
100 ft
+20%
+10%
0
-10%
-20%
0
100'
200'
Basalt, massive
vuggy
massive
altered
Fault zone


MISSISSIPPI LEAD DISTRICT
H
100 ft
+20%
+10%
0
-10%
-20%
0
100'
200'
300'
Buff dol.
Drab dol.
Marcasite and sphalerite (approx 15% comb)
Trenton


WINDSOR, N.S.
H
100 ft.
+20%
+10%
0
-10%
-20%
0
100'
200'
300'
Windsor Fm
ls, sh, gyp, anh.
Horton Fm
Sandstone, cgl
Pyrite, galena, sphalerite


GOODERHAM, ONT.
H
100 m.
+60%
+40%
+20%
0
-20%
-40%
-60%
0
100m
200m
300m
Massive sulphides
Diss sulphides ?
Granite, gneiss, meta-seds

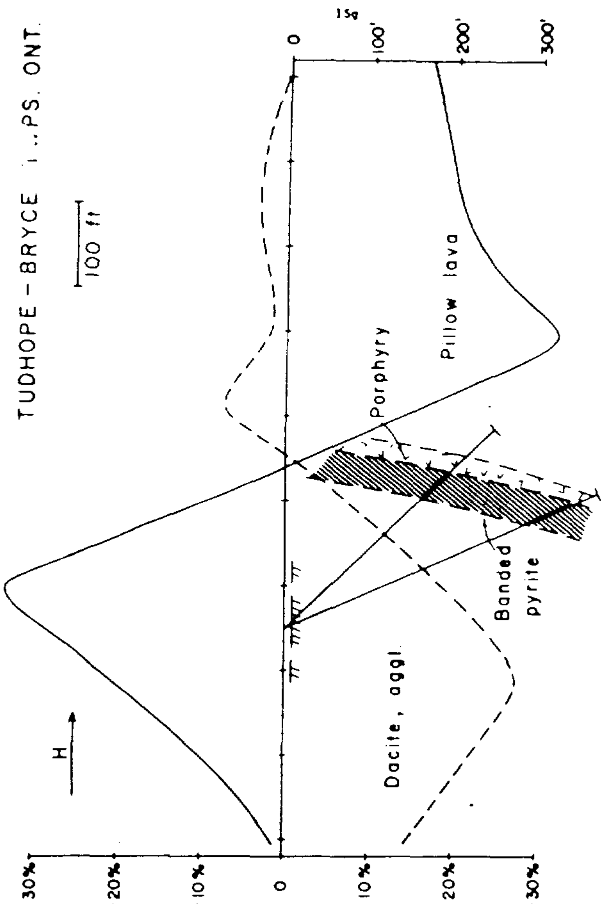
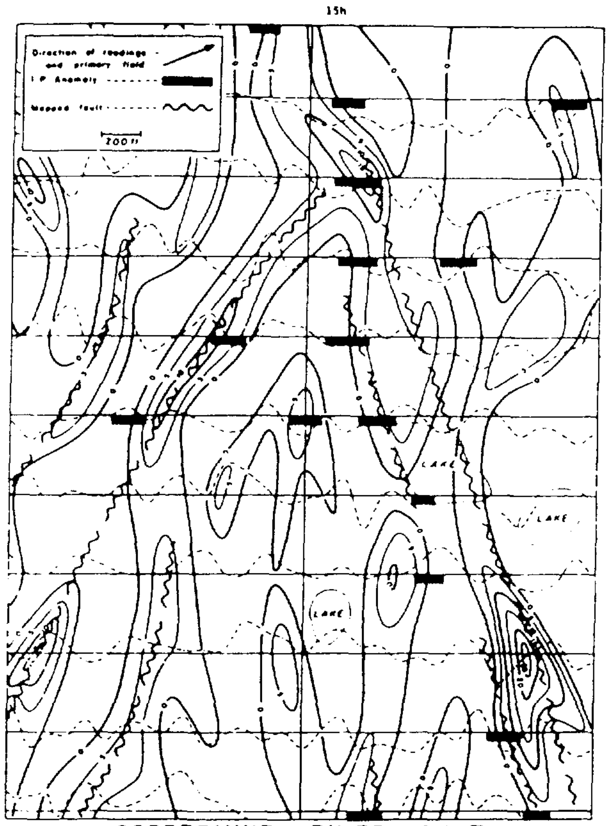


FIGURE 12 (7)



COPPERMINE RIVER, N.W.T.

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APPENDIX B

II.
MAGNETOMETERS

Instrument Use

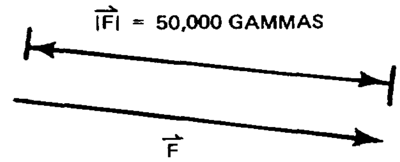
The common types of portable magnetometers in use today are fluxgate, proton precession, Schmidt field balance, dip needle and other special purpose instruments. Field balances and dip needles are mechanical devices comprised of pivoted magnets measuring vertical or horizontal intensity or field direction, and are not much used today being replaced by the more sensitive and less cumbersome fluxgate and proton magnetometers. Portable fluxgate magnetometers employ a saturable core sensor held in a vertical direction to measure vertical intensity with an effective sensitivity on the order of several gammas. Fluxgate magnetometers, too, are slowly being replaced by the proton magnetometer which has greater sensitivity (1 gamma or better), absolute accuracy, no moving parts, and measures total field intensity with freedom from orientation errors. For reasons of its increasing utilization and because many applications require these features, the proton magnetometer will be the principal instrument under discussion in the Manual. Much of the Manual from Chapters III through IX nevertheless applies to vertical component flux gate magnetometers as well. Anomaly signatures at high latitudes (magnetic dip 70° or greater) are practically identical for the two instruments; at other latitudes they differ significantly.

Proton Magnetometer

The proton precession magnetometer is so named because it utilizes the precession of spinning protons or nuclei of the hydrogen atom in a sample of hydrocarbon fluid to measure the total magnetic intensity. The spinning protons in a sample of water, kerosene, alcohol, etc., behave as small, spinning magnetic dipoles. These magnets are temporarily aligned or polarized by application of a uniform magnetic field generated by a current in a coil of wire. When the current is removed, the spin of the protons causes them to precess about the direction of the ambient or earth's magnetic field, much as a spinning top precesses about the gravity field. The precessing protons then generate a small signal in the same coil used to polarize them, a signal whose frequency is precisely proportional to the total magnetic field intensity and independent of the orientation of the coil, i.e., sensor of the magnetometer. The proportionality constant which relates frequency to field intensity is a well known atomic constant: the gyromagnetic ratio of the proton. The precession frequency, typically 2000 Hz, is measured by modern digital counters as the absolute value of the total magnetic field intensity with an accuracy of 1 gamma, and in special cases 0.1 gamma, in the earth's field of approximately 50,000 gammas.

Total Field Measurement

The total magnetic field intensity, as measured by a proton magnetometer, is a scalar measurement, or simply the magnitude of the earth's field vector independent of its direction. The measurement can be expressed as in *Figure 1a* as simply the length of the earth's field vector, F, shown here to be 50,000 gammas. A local perturba-



TOTAL FIELD

Figure 1a.

tion, T, of 10 gammas, as might be measured in any of the applications discussed herein, is shown in *Figure 1b* as a vector of arbitrary direction. This disturbance vector adds to the undisturbed field in the usual manner of vector addition as shown in *Figure 1b*, paying special notice to how the figure would actually appear if both the 50,000 and 10 gamma vectors were drawn to scale. It is clear from the figure, then, that since the proton magnetometer measures only the *magnitude* of the resultant vector whose direction is almost exactly parallel

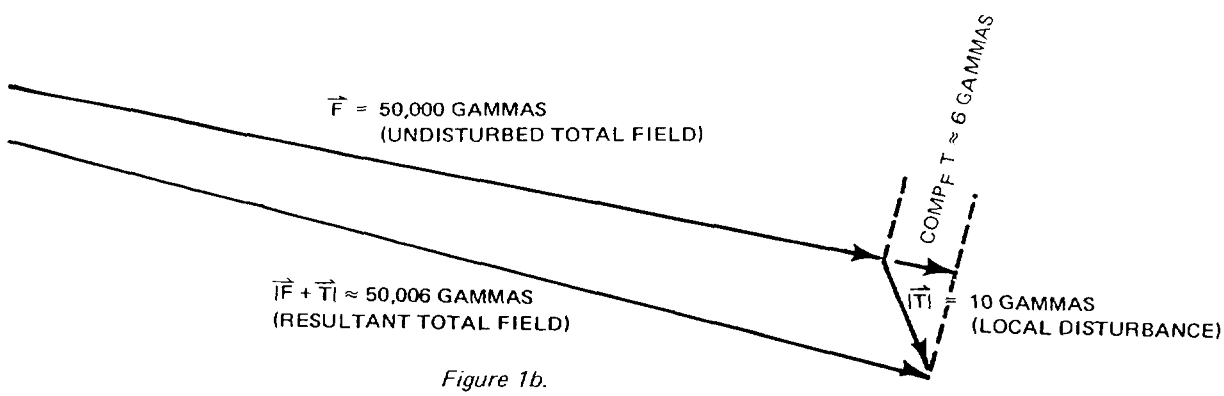


Figure 1b.

to the undisturbed total field vector, that which is measured is very nearly the component of the disturbance vector in the direction of the original undisturbed total field, or where

$$|\vec{F} + \vec{T}| \approx F + \text{comp}_F T$$

where $$|\vec{F}| \gg |\vec{T}|.$$

Such conditions are almost always valid except in the near field of large steel objects or in the vicinity of iron ore deposits or certain ultrabasic rocks which produce anomalies larger than 10,000 gammas. Thus, the change in total field, $\Delta F = \text{comp}_F T$, i.e., the component of the anomalous field, T, in the direction of F. (Except where noted, $\text{comp}_F T$ will be referred to simply as the anomaly T.) The proton precession magnetometer, for small perturbations, can therefore be considered to be an *earth's-field-determined component magnetometer.*

This property of measuring this scalar magnitude of the field, otherwise called total field intensity, is very significant with respect to the asymmetric signatures of anomalies, interpretation of anomalies, and in various special applications. Furthermore, the fact that what is measured is independent of the orientation of the sensor, allows the magnetometer to be operated without attention to orientation or leveling such as would be the case with a fluxgate magnetometer on the mobile platform of a person, vehicle, or aircraft. The only limitation of such a scalar measurement, albeit a minor one, is the fact that the component of the anomalous field which is measured is not normally under the control of the observer, but rather at the whim of the local direction of the earth's magnetic field.

Limitations of a Proton Magnetometer

The proton magnetometer has no moving parts, produces an absolute and relatively high resolution measurement of the field and usually displays the measurement in the form of an unambiguous digital lighted readout. Several operational restrictions exist, however, which may be of concern under special field conditions. First, the proton precession signal is sharply degraded in the presence of a large magnetic field gradient greater than 200 gammas per foot (approximately 600 gammas per meter). Also, the signal amplitude from the sensor is on the order of microvolts and must be measured to an accuracy of 0.04 Hz of the precession frequency of several thousand Hz. This small signal can be rendered immeasurable by the effects of nearby alternating current electrical power sources. For these two reasons, *a proton magnetometer cannot usually be operated within the confines of a typical building.* Developments and procedures are presented which minimize these effects for the applications to be described in the Manual.

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MADE IN CANADA

Table I — Radii, Ordinates and Deflections

Deg.	Rad.	Mid. Ord.	Tang. Def.	Chord Deft.	Def. for 1 foot	Deg.	Rad.	Mid. Ord.	Tang. Def.	Chord Deft.	Def. for 1 foot
00°10′	34377.0	0.036	0.145	0.291	0.05	7°	819.0	1.528	6.105	12.21	2.10
20′	17189.0	0.073	0.291	0.582	0.10	15′	790.8	1.582	6.323	12.64	2.18
30′	11459.0	0.109	0.436	0.873	0.15	30′	764.5	1.637	6.540	13.08	2.25
40′	8594.4	0.145	0.582	1.164	0.20	45′	739.9	1.691	6.758	13.50	2.33
50′	6875.5	0.182	0.727	1.454	0.25	8°	716.8	1.746	6.976	13.95	2.40
1°	5729.6	0.218	0.873	1.745	0.30	15′	695.1	1.801	7.193	14.38	2.48
10′	4911.2	0.255	1.018	2.036	0.35	30′	674.7	1.855	7.411	14.82	2.55
20′	4297.3	0.291	1.164	2.327	0.40	45′	655.4	1.910	7.628	15.25	2.63
30′	3819.8	0.327	1.309	2.618	0.45	9°	637.3	1.965	7.846	15.69	2.70
40′	3437.9	0.364	1.454	2.909	0.50	15′	620.1	2.019	8.063	16.13	2.78
50′	3125.4	0.400	1.600	3.200	0.55	30′	603.8	2.074	8.281	16.56	2.85
2°	2864.9	0.436	1.745	3.490	0.60	45′	588.4	2.128	8.498	17.00	2.93
10′	2644.6	0.473	1.891	3.781	0.65	10°	573.7	2.183	8.716	17.43	3.00
20′	2455.7	0.509	2.036	4.072	0.70	30′	546.4	2.293	9.150	18.30	3.15
30′	2292.0	0.545	2.181	4.363	0.75	11°	521.7	2.402	9.585	19.17	3.30
40′	2148.8	0.582	2.327	4.654	0.80	30′	499.1	2.511	10.019	20.04	3.45
50′	2022.4	0.618	2.472	4.945	0.85	12°	478.3	2.620	10.453	20.92	3.60
3°	1910.1	0.655	2.618	5.235	0.90	30′	459.3	2.730	10.887	21.77	3.75
10′	1809.6	0.691	2.763	5.526	0.95	13°	441.7	2.839	11.320	22.64	3.90
20′	1719.1	0.727	2.908	5.817	1.00	30′	425.4	2.949	11.754	23.51	4.05
30′	1637.3	0.764	3.054	6.108	1.05	14°	410.3	3.058	12.187	24.37	4.20
40′	1562.9	0.800	3.199	6.398	1.10	30′	396.2	3.168	12.620	25.24	4.35
50′	1495.0	0.836	3.345	6.689	1.15	15°	383.1	3.277	13.053	26.11	4.50
4°	1432.7	0.873	3.490	6.980	1.20	30′	370.8	3.387	13.485	26.97	4.65
10′	1375.4	0.909	3.635	7.271	1.25	16°	359.3	3.496	13.917	27.83	4.80
20′	1322.5	0.945	3.718	7.561	1.30	30′	348.5	3.606	14.349	28.70	4.95
30′	1273.6	0.982	3.926	7.852	1.35	17°	338.3	3.716	14.781	29.56	5.10
40′	1228.1	1.018	4.071	8.143	1.40	18°	319.6	3.935	15.643	31.29	5.40
50′	1185.8	1.055	4.217	8.433	1.45	19°	302.9	4.155	16.505	33.01	5.70
5′	1146.3	1.091	4.362	8.724	1.50	20°	287.9	4.374	17.365	34.73	6.00
10′	1109.3	1.127	4.507	9.014	1.55	21°	274.4	4.594	18.224	36.45	6.30
20′	1074.7	1.164	4.653	9.305	1.60	22°	262.0	4.814	19.081	38.16	6.60
30′	1042.1	1.200	4.798	9.596	1.65	23°	250.8	5.035	19.937	39.87	6.90
40′	1011.5	1.237	4.943	9.886	1.70	24°	240.5	5.255	20.791	41.58	7.20
50′	982.6	1.273	5.088	10.18	1.75	25°	231.0	5.476	21.644	43.29	7.50
6°	955.4	1.309	5.234	10.47	1.80	26°	222.3	5.697	22.495	44.99	7.80
10′	929.6	1.346	5.379	10.76	1.85	27°	214.2	5.918	23.345	46.69	8.10
20′	905.1	1.382	5.524	11.05	1.90	28°	206.7	6.139	24.192	48.38	8.40
30′	881.9	1.418	5.669	11.34	1.95	29°	199.7	6.360	25.038	50.08	8.70
40′	859.9	1.455	5.814	11.63	2.00	30°	193.2	6.583	25.882	51.76	9.00

Table II — Minutes in Decimals of a Degree

1′	.0167	11′	.1833	21′	.3500	31′	.5167	41′	.6833	51′	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

Table III — Tangents, Externals and Chords to a 1° Curve

Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord
1°	50.00	.22	100.00	11°	551.70	26.50	1098.4	21°	1061.9	97.57	2088.5
10′	58.34	.30	116.67	10′	560.11	27.31	1115.0	10′	1070.6	99.16	2104.9
20′	66.67	.39	133.34	20′	568.53	28.14	1131.6	20′	1079.2	100.75	2121.2
30′	75.01	.49	150.00	30′	576.95	28.97	1148.1	30′	1087.8	102.35	2137.6
40′	83.34	.61	166.67	40′	585.36	29.82	1164.7	40′	1096.4	103.97	2153.9
50′	91.68	.73	183.34	50′	593.79	30.68	1181.3	50′	1105.1	105.60	2170.5
2°	100.01	.87	199.98	12°	602.21	31.56	1197.9	22°	1113.7	107.24	2186.7
10′	108.35	1.02	216.64	10′	610.64	32.45	1214.5	10′	1122.4	108.90	2203.0
20′	116.68	1.19	233.30	20′	619.07	33.35	1231.0	20′	1131.0	110.57	2219.4
30′	125.02	1.36	249.96	30′	627.50	34.26	1247.6	30′	1139.7	112.25	2235.7
40′	133.36	1.55	266.62	40′	635.93	35.18	1264.2	40′	1148.4	113.95	2252.1
50′	141.70	1.75	283.29	50′	644.37	36.12	1280.7	50′	1157.0	115.66	2268.4
3°	150.04	1.96	299.96	13°	652.81	37.07	1297.3	23°	1165.7	117.38	2284.8
10′	158.38	2.19	316.62	10′	661.25	38.03	1313.8	10′	1174.4	119.12	2301.1
20′	166.72	2.43	333.28	20′	669.70	39.01	1330.4	20′	1183.1	120.87	2317.4
30′	175.06	2.67	349.94	30′	678.15	39.99	1346.9	30′	1191.8	122.63	2333.7
40′	183.40	2.93	366.60	40′	686.60	40.99	1363.5	40′	1200.5	124.41	2350.0
50′	191.74	3.21	383.27	50′	695.06	42.00	1380.0	50′	1209.2	126.20	2366.3
4°	200.08	3.49	399.95	14°	703.51	43.03	1396.6	24°	1217.9	128.00	2382.6
10′	208.43	3.79	416.60	10′	711.97	44.07	1413.1	10′	1226.6	129.82	2398.9
20′	216.77	4.10	433.26	20′	720.44	45.12	1429.7	20′	1235.3	131.65	2415.2
30′	225.12	4.42	449.91	30′	728.90	46.18	1446.2	30′	1244.0	133.50	2431.5
40′	233.47	4.76	466.56	40′	737.37	47.25	1462.8	40′	1252.8	135.35	2447.8
50′	241.81	5.10	483.22	50′	745.85	48.34	1479.3	50′	1261.5	137.23	2464.1
5°	250.16	5.46	499.88	15°	754.32	49.44	1495.8	25°	1270.2	139.11	2480.4
10′	258.51	5.83	516.53	10′	762.80	50.55	1512.4	10′	1279.0	141.01	2496.7
20′	266.86	6.21	533.18	20′	771.29	51.68	1528.9	20′	1287.7	142.93	2512.9
30′	275.21	6.61	549.83	30′	779.77	52.89	1545.4	30′	1296.5	144.85	2529.2
40′	283.57	7.01	566.48	40′	788.26	53.97	1561.9	40′	1305.3	146.79	2545.4
50′	291.92	7.43	583.12	50′	796.75	55.13	1578.4	50′	1314.0	148.75	2561.7
6°	300.28	7.86	599.77	16°	805.25	56.31	1594.9	26°	1322.8	150.71	2577.9
10′	308.64	8.31	616.41	10′	813.75	57.50	1611.4	10′	1331.6	152.69	2594.2
20′	316.99	8.76	633.06	20′	822.25	58.70	1627.9	20′	1340.4	154.69	2610.4
30′	325.35	9.23	649.70	30′	830.76	59.91	1644.4	30′	1349.2	156.70	2626.6
40′	333.71	9.71	666.34	40′	839.27	61.14	1660.9	40′	1358.0	158.72	2642.9
50′	342.08	10.20	682.98	50′	847.78	62.38	1677.4	50′	1366.8	160.76	2659.1
7°	350.44	10.71	699.62	17°	856.30	63.63	1693.9	27°	1375.6	162.81	2675.3
10′	358.81	11.22	716.25	10′	864.82	64.90	1710.4	10′	1384.4	164.86	2691.5
20′	367.17	11.75	732.89	20′	873.35	66.18	1726.9	20′	1393.2	166.95	2707.7
30′	375.54	12.29	749.52	30′	881.88	67.47	1743.3	30′	1402.0	169.04	2723.9
40′	383.91	12.85	766.15	40′	890.41	68.77	1759.8	40′	1410.9	171.15	2740.0
50′	392.28	13.41	782.78	50′	898.95	70.09	1776.2	50′	1419.7	173.27	2756.2
8°	400.66	13.99	799.41	18°	907.49	71.42	1792.7	28°	1428.6	175.41	2772.4
10′	409.03	14.58	816.01	10′	916.03	72.76	1809.2	10′	1437.4	175.55	2788.6
20′	417.41	15.18	832.63	20′	924.58	74.12	1825.7	20′	1446.3	179.72	2804.8
30′	425.79	15.80	849.25	30′	933.13	75.49	1842.1	30′	1455.1	181.89	2820.9
40′	434.17	16.43	865.86	40′	941.69	76.86	1858.6	40′	1464.0	184.08	2837.1
50′	442.55	17.07	882.48	50′	950.25	78.26	1875.0	50′	1472.9	186.29	2853.2
9°	450.93	17.72	899.10	19°	958.81	79.67	1891.5	29°	1481.8	188.51	2869.4
10′	459.32	18.38	915.71	10′	967.38	81.09	1907.9	10′	1490.7	190.74	2885.5
20′	467.71	19.06	932.33	20′	975.96	82.53	1924.3	20′	1499.6	192.99	2901.6
30′	476.10	19.75	948.95	30′	984.53	83.97	1940.8	30′	1508.5	195.25	2917.7
40′	484.49	20.45	965.56	40′	993.12	85.43	1957.2	40′	1517.4	197.53	2933.8
50′	492.88	21.16	982.18	50′	1001.7	86.90	1973.6	50′	1526.3	199.82	2950.0
10°	501.28	21.89	998.80	20°	1010.3	88.39	1990.0	30°	1535.3	202.12	2966.0
10′	509.68	22.62	1015.4	10′	1018.9	89.89	2006.4	10′	1544.2	204.44	2982.1
20′	518.08	23.38	1032.0	20′	1027.5	91.40	2022.8	20′	1553.1	206.77	2998.2
30′	526.48	24.14	1048.6	30′	1036.1	92.92	2039.2	30′	1562.1	209.12	3014.3
40′	534.89	24.91	1065.2	40′	1044.7	94.46	2055.7	40′	1571.0	211.48	3030.4
50′	543.29	25.70	1081.8	50′	1053.3	96.01	2072.1	50′	1580.0	213.86	3046.5

Table III — Tangents, Externals and Chords to a 1° Curve

Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord
31°	1589.0	216.3	3062.5	41	2142.2	387.4	4013.4	51	2732.9	618.4	4933.7
10′	1598.0	218.7	3078.6	10′	2151.7	390.7	4029.0	10′	2743.1	622.8	4948.7
20′	1606.9	221.1	3094.7	20′	2161.2	394.1	4044.6	20′	2753.4	627.2	4963.7
30′	1615.9	223.5	3110.7	30′	2170.8	397.4	4060.2	30′	2763.7	631.7	4978.7
40′	1624.9	226.0	3126.7	40′	2180.3	400.8	4075.8	40′	2773.9	636.2	4993.7
50′	1633.9	228.4	3142.8	50′	2189.9	404.2	4091.3	50′	2784.2	640.7	5008.7
32°	1643.0	230.9	3158.8	42	2199.4	407.6	4106.9	52	2794.5	645.2	5023.7
10′	1652.0	233.4	3174.8	10′	2209.0	411.1	4122.4	10′	2804.9	649.7	5038.7
20′	1661.0	235.9	3190.8	20′	2218.6	414.5	4138.0	20′	2815.2	654.3	5053.7
30′	1670.0	238.4	3206.8	30′	2228.1	418.0	4153.5	30′	2825.6	658.8	5068.6
40′	1679.1	241.0	3222.8	40′	2237.7	421.4	4169.1	40′	2835.9	663.4	5083.6
50′	1688.1	243.5	3238.9	50′	2247.3	425.0	4184.6	50′	2846.3	668.0	5098.5
33	1697.2	246.1	3254.9	43	2257.0	428.5	4200.1	53	2856.7	672.7	5113.4
10′	1706.3	248.7	3270.8	10′	2266.6	432.0	4215.6	10′	2867.1	677.3	5128.3
20′	1715.3	251.3	3286.8	20′	2276.2	435.6	4231.1	20′	2877.5	682.0	5143.2
30′	1724.4	253.9	3302.7	30′	2285.9	439.2	4246.6	30′	2888.0	686.7	5158.1
40′	1733.5	256.5	3318.7	40′	2295.6	442.8	4262.0	40′	2898.4	691.4	5173.0
50′	1742.6	259.1	3334.6	50′	2305.2	446.4	4277.5	50′	2908.9	696.1	5187.6
34	1751.7	261.8	3350.6	44	2314.9	450.0	4293.0	54	2919.4	700.9	5202.7
10′	1760.8	264.5	3366.5	10′	2324.6	453.6	4308.4	10′	2929.9	705.7	5217.6
20′	1770.0	267.2	3382.4	20′	2334.3	457.3	4323.9	20′	2940.4	710.5	5232.4
30′	1779.1	269.9	3398.4	30′	2344.1	461.0	4339.3	30′	2951.0	715.3	5247.2
40′	1788.2	272.6	3414.3	40′	2353.8	464.6	4354.7	40′	2961.5	720.1	5262.0
50′	1797.4	275.3	3430.2	50′	2363.5	468.4	4370.2	50′	2972.1	725.0	5276.8
35°	1806.6	278.1	3446.1	45	2373.3	472.1	4385.6	55	2982.7	729.9	5291.6
10′	1815.7	280.8	3462.0	10′	2383.1	475.8	4401.0	10′	2993.3	734.8	5306.4
20′	1824.9	283.6	3477.9	20′	2392.8	479.6	4416.3	20′	3003.9	739.7	5321.1
30′	1834.1	286.4	3493.7	30′	2402.6	483.8	4431.7	30′	3014.5	744.6	5335.9
40′	1843.3	289.2	3509.6	40′	2412.4	487.2	4447.1	40′	3025.2	749.6	5350.7
50′	1852.3	292.0	3525.5	50′	2422.3	491.0	4462.4	50′	3035.8	754.6	5365.4
36°	1861.7	294.9	3541.3	46	2432.1	494.8	4477.8	56	3046.5	759.6	5380.1
10′	1870.9	297.7	3557.2	10′	2441.9	498.7	4493.1	10′	3057.2	764.6	5394.9
20′	1880.1	300.6	3573.0	20′	2451.8	502.5	4508.4	20′	3067.9	769.7	5409.6
30′	1889.4	303.5	3588.8	30′	2461.7	506.4	4523.8	30′	3078.7	774.7	5424.2
40′	1898.6	306.4	3604.7	40′	2471.5	510.3	4539.1	40′	3089.4	779.8	5438.9
50′	1907.9	309.3	3620.5	50′	2481.4	514.3	4554.4	50′	3100.2	784.9	5453.6
37°	1917.1	312.2	3636.3	47	2491.3	518.2	4569.7	57	3110.9	790.1	5468.2
10′	1926.4	315.2	3652.1	10′	2501.2	522.2	4585.0	10′	3121.7	795.2	5482.9
20′	1935.7	318.1	3667.9	20′	2511.2	526.1	4600.2	20′	3132.6	800.4	5497.5
30′	1945.0	321.1	3683.7	30′	2521.1	530.1	4615.5	30′	3143.4	805.6	5512.1
40′	1954.3	324.1	3699.5	40′	2531.1	534.2	4630.7	40′	3154.2	810.9	5526.7
50′	1963.6	327.1	3715.3	50′	2541.0	538.2	4646.0	50′	3165.1	816.1	5541.3
38	1972.9	330.2	3731.0	48	2551.0	542.2	4661.2	58°	3176.0	821.4	5555.9
10′	1982.2	333.2	3746.8	10′	2561.0	546.3	4676.4	10′	3186.9	826.7	5570.5
20′	1991.5	336.3	3762.5	20′	2571.0	550.4	4691.6	20′	3197.8	832.0	5585.0
30′	2000.9	339.3	3778.3	30′	2581.0	554.5	4706.8	30′	3208.8	837.3	5599.6
40′	2010.2	342.4	3794.0	40′	2591.0	558.6	4722.0	40′	3219.7	842.7	5614.1
50′	2019.6	345.5	3809.7	50′	2601.1	562.8	4737.2	50′	3230.7	848.1	5628.7
39°	2029.0	348.6	3825.4	49°	2611.2	566.9	4752.4	59°	3241.7	853.5	5643.2
10′	2038.4	351.8	3841.1	10′	2621.2	571.1	4767.5	10′	3252.7	858.9	5657.7
20′	2047.8	354.9	3856.8	20′	2631.3	575.3	4782.7	20′	3263.7	864.3	5672.2
30′	2057.2	358.1	3872.5	30′	2641.4	579.5	4797.8	30′	3274.8	869.8	5686.6
40′	2066.6	361.3	3888.2	40′	2651.5	583.8	4813.0	40′	3285.8	875.3	5701.1
50′	2076.0	364.5	3903.9	50′	2661.6	588.0	4828.1	50′	3296.9	880.8	5715.6
40°	2085.4	367.7	3919.6	50°	2671.8	592.3	4843.2	60°	3308.0	886.4	5730.0
10′	2094.9	371.0	3935.2	10′	2681.9	596.6	4858.3	10′	3319.1	892.0	5744.4
20′	2104.3	374.2	3950.9	20′	2692.1	600.9	4873.4	20′	3330.3	897.5	5758.8
30′	2113.8	377.5	3966.5	30′	2702.3	605.3	4888.5	30′	3341.4	903.2	5773.2
40′	2123.3	380.8	3982.1	40′	2712.5	609.6	4903.5	40′	3352.6	908.8	5787.6
50′	2132.7	384.1	3997.8	50′	2722.7	614.0	4918.6	50′	3363.8	914.5	5802.0

Table III — Tangents, Externals and Chords to a 1° Curve

Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord
61°	3375.0	920.2	5816.4	71°	4086.9	1308.2	6654.9	81°	4893.6	1805.3	7442.7
10′	3386.3	925.9	5830.7	10′	4099.5	1315.2	6668.4	10′	4908.0	1814.7	7455.4
20′	3397.5	931.6	5845.1	20′	4112.1	1322.6	6682.0	20′	4922.5	1824.1	7468.0
30′	3408.8	937.3	5859.4	30′	4124.8	1330.3	6695.5	30′	4937.0	1833.6	7480.6
40′	3420.1	943.1	5873.7	40′	4137.4	1337.7	6709.0	40′	4951.5	1843.1	7493.2
50′	3431.4	948.9	5888.0	50′	4150.1	1345.1	6722.5	50′	4966.1	1852.6	7505.8
62°	3442.7	954.8	5902.3	72°	4162.8	1352.6	6736.0	82°	4980.7	1862.2	7518.4
10′	3454.1	960.6	5916.6	10′	4175.6	1360.1	6749.5	10′	4995.4	1871.8	7531.0
20′	3465.4	966.5	5930.9	20′	4188.5	1367.6	6763.0	20′	5010.0	1881.5	7543.6
30′	3476.8	972.4	5945.1	30′	4201.2	1375.2	6776.4	30′	5024.8	1891.2	7556.1
40′	3488.3	978.3	5959.4	40′	4214.0	1382.8	6789.8	40′	5039.5	1900.9	7568.6
50′	3499.7	984.3	5973.6	50′	4226.8	1390.4	6803.3	50′	5054.3	1910.7	7581.1
63°	3511.1	990.2	5987.8	73°	4239.7	1398.0	6816.7	83°	5069.2	1920.5	7593.6
10′	3522.6	996.2	6002.0	10′	4252.6	1405.7	6830.0	10′	5084.0	1930.4	7606.1
20′	3534.1	1002.3	6016.2	20′	4265.6	1413.5	6843.4	20′	5099.0	1940.3	7618.6
30′	3545.6	1008.3	6030.4	30′	4278.5	1421.2	6856.8	30′	5113.9	1950.3	7631.0
40′	3557.2	1014.4	6044.6	40′	4291.5	1429.0	6870.2	40′	5128.9	1960.2	7643.4
50′	3568.7	1020.5	6058.7	50′	4304.6	1436.6	6883.5	50′	5143.9	1970.3	7655.8
64°	3580.3	1026.6	6072.9	74°	4317.6	1444.6	6896.8	84°	5159.0	1980.4	7668.2
10′	3591.9	1032.8	6087.0	10′	4330.7	1452.5	6910.1	10′	5174.1	1990.5	7680.6
20′	3603.5	1039.0	6101.1	20′	4343.8	1460.4	6923.4	20′	5189.3	2000.6	7693.0
30′	3615.1	1045.2	6115.2	30′	4356.9	1468.4	6936.7	30′	5204.4	2010.8	7705.3
40′	3626.8	1051.4	6129.3	40′	4370.1	1476.4	6950.0	40′	5219.7	2021.1	7717.6
50′	3638.5	1057.7	6143.4	50′	4383.3	1484.4	6963.2	50′	5234.9	2031.4	7730.0
65°	3650.2	1063.9	6157.5	75°	4396.5	1492.4	6976.4	85°	5250.3	2041.7	7742.3
10′	3661.9	1070.2	6171.5	10′	4409.8	1500.5	6989.6	10′	5265.6	2052.1	7754.5
20′	3673.7	1076.6	6185.5	20′	4423.1	1508.6	7002.8	20′	5281.0	2062.5	7766.8
30′	3685.4	1082.9	6199.6	30′	4436.4	1516.7	7016.0	30′	5296.4	2073.0	7779.0
40′	3697.2	1089.3	6213.6	40′	4449.7	1524.9	7029.2	40′	5311.9	2083.5	7791.3
50′	3709.0	1095.7	6227.6	50′	4463.1	1533.1	7042.3	50′	5327.4	2094.1	7803.5
66°	3720.9	1102.2	6241.6	76°	4476.5	1541.4	7055.5	86°	5343.0	2104.7	7815.7
10′	3732.7	1108.6	6255.5	10′	4489.9	1549.7	7068.6	10′	5358.6	2115.3	7827.9
20′	3744.6	1115.1	6269.5	20′	4503.4	1558.0	7081.7	20′	5374.2	2126.0	7840.1
30′	3756.5	1121.7	6283.4	30′	4516.9	1566.3	7094.8	30′	5389.9	2136.7	7852.2
40′	3768.5	1128.2	6297.4	40′	4530.4	1574.7	7107.9	40′	5405.6	2147.5	7864.3
50′	3780.4	1134.8	6311.3	50′	4544.0	1583.1	7121.0	50′	5421.4	2158.4	7876.4
67°	3792.4	1141.4	6325.2	77°	4557.6	1591.6	7134.0	87°	5437.2	2169.2	7888.5
10′	3804.4	1148.0	6339.1	10′	4571.2	1600.1	7147.0	10′	5453.1	2180.2	7900.6
20′	3816.4	1154.7	6353.0	20′	4584.8	1608.6	7160.0	20′	5469.0	2191.1	7912.7
30′	3828.4	1161.3	6366.8	30′	4598.5	1617.1	7173.0	30′	5484.9	2202.2	7924.7
40′	3840.5	1168.1	6380.7	40′	4612.2	1625.7	7186.0	40′	5500.9	2213.2	7936.8
50′	3852.6	1174.8	6394.5	50′	4626.0	1634.4	7199.0	50′	5517.0	2224.3	7948.8
68°	3864.7	1181.6	6408.4	78°	4639.8	1643.0	7212.0	88°	5533.1	2235.5	7960.8
10′	3876.8	1188.4	6422.2	10′	4653.6	1651.7	7225.0	10′	5549.2	2246.7	7972.8
20′	3889.0	1195.2	6436.0	20′	4667.4	1660.5	7237.9	20′	5565.4	2258.0	7984.7
30′	3901.2	1202.0	6449.7	30′	4681.3	1669.2	7250.8	30′	5581.6	2269.3	7996.7
40′	3913.4	1208.9	6463.5	40′	4695.2	1678.1	7263.7	40′	5597.8	2280.6	8008.6
50′	3925.6	1215.8	6477.3	50′	4709.2	1686.9	7276.6	50′	5614.2	2292.0	8020.5
69°	3937.9	1222.9	6491.0	79°	4723.2	1695.8	7289.5	89°	5630.5	2303.5	8032.4
10′	3950.2	1229.7	6504.7	10′	4737.2	1704.7	7302.3	10′	5646.9	2315.0	8044.3
20′	3962.5	1236.7	6518.5	20′	4751.2	1713.7	7315.1	20′	5663.4	2326.6	8056.2
30′	3974.8	1243.7	6532.2	30′	4765.3	1722.7	7328.0	30′	5679.9	2338.2	8068.0
40′	3987.2	1250.8	6545.8	40′	4779.4	1731.7	7340.8	40′	5696.4	2349.8	8079.8
50′	3999.5	1257.9	6559.5	50′	4793.6	1740.8	7353.6	50′	5713.0	2361.5	8091.6
70°	4011.9	1265.0	6573.2	80°	4807.7	1749.9	7366.3	90°	5729.7	2373.3	8103.4
10′	4024.4	1272.1	6586.8	10′	4822.0	1759.0	7379.1	10′	5746.3	2385.1	8115.2
20′	4036.8	1279.3	6600.5	20′	4836.2	1768.2	7391.9	20′	5763.1	2397.0	8127.0
30′	4049.3	1286.5	6614.1	30′	4850.5	1777.4	7404.6	30′	5779.9	2408.9	8138.7
40′	4061.8	1293.6	6627.7	40′	4864.8	1786.7	7417.3	40′	5796.7	2420.9	8150.4
50′	4074.4	1300.9	6641.3	50′	4879.2	1796.0	7430.0	50′	5813.6	2432.9	8162.2

Table III — Tangents, Externals and Chords to a 1° Curve

Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord
91°	5830.5	2444.9	8173.9	**96°**	6363.4	2833.2	8516.4	**101°**	6950.6	3278.1	8842.8
10′	5847.5	2457.1	8185.5	10′	6382.1	2847.0	8527.6	10′	6971.3	3294.1	8853.4
20′	5864.6	2469.3	8197.2	20′	6400.8	2861.0	8538.7	20′	6992.0	3310.1	8864.0
30′	5881.7	2481.5	8208.8	30′	6419.5	2875.0	8549.8	30′	7012.7	3326.1	8874.5
40′	5898.8	2493.8	8220.4	40′	6438.4	2889.0	8560.9	40′	7033.6	3342.3	8885.1
50′	5916.0	2506.1	8232.0	50′	6457.3	2903.1	8572.0	50′	7054.5	3358.5	8895.6
92°	5933.2	2518.5	8243.6	**97°**	6476.2	2917.3	8583.0	**102°**	7075.5	3374.9	8906.1
10′	5950.5	2531.0	8255.2	10′	6495.2	2931.6	8594.1	10′	7096.6	3391.2	8916.6
20′	5967.9	2543.5	8266.8	20′	6514.3	2945.9	8605.1	20′	7117.8	3407.7	8927.0
30′	5985.3	2556.0	8278.3	30′	6533.4	2960.3	8616.1	30′	7139.0	3424.3	8937.5
40′	6002.7	2568.6	8289.8	40′	6552.6	2974.7	8627.1	40′	7160.3	3440.9	8947.9
50′	6020.2	2581.3	8301.3	50′	6571.9	2989.2	8638.0	50′	7181.7	3457.6	8958.3
93°	6037.8	2594.0	8312.8	**98°**	6591.2	3003.8	8649.0	**103°**	7203.2	3474.4	8968.7
10′	6055.4	2606.8	8324.3	10′	6610.6	3018.4	8659.9	10′	7224.7	3491.3	8979.1
20′	6073.1	2619.7	8335.6	20′	6630.1	3033.1	8670.8	20′	7246.3	3508.2	8989.4
30′	6090.8	2632.6	8347.1	30′	6649.6	3047.9	8681.7	30′	7268.0	3525.2	8999.7
40′	6108.6	2645.5	8358.5	40′	6669.2	3062.8	8692.6	40′	7289.8	3542.4	9010.0
50′	6126.4	2658.5	8369.9	50′	6688.8	3077.7	8703.4	50′	7311.7	3559.6	9020.3
94°	6144.3	2671.6	8381.3	**99°**	6708.6	3092.7	8714.3	**104°**	7333.6	3576.8	9030.6
10′	6162.6	2684.7	8392.7	10′	6728.4	3107.7	8725.1	10′	7355.6	3594.2	9040.9
20′	6180.2	2697.9	8404.0	20′	6748.2	3122.9	8735.9	20′	7377.8	3611.7	9051.1
30′	6198.3	2711.2	8415.3	30′	6768.1	3138.1	8746.6	30′	7399.9	3629.2	9061.3
40′	6216.4	2724.5	8426.6	40′	6788.1	3153.3	8757.4	40′	7422.2	3646.8	9071.5
50′	6234.6	2737.9	8437.9	50′	6808.2	3168.7	8768.1	50′	7444.6	3664.5	9081.7
95°	6252.8	2751.3	8449.2	**100°**	6828.3	3184.1	8778.9	**105°**	7467.0	3682.3	9091.8
10′	6271.1	2764.8	8460.4	10′	6848.5	3199.6	8789.6	10′	7489.6	3700.2	9102.0
20′	6289.4	2778.3	8471.7	20′	6868.8	3215.1	8800.3	20′	7512.2	3718.2	9112.1
30′	6307.9	2792.0	8482.9	30′	6889.2	3230.8	8810.9	30′	7534.9	3736.2	9122.2
40′	6326.3	2805.6	8494.1	40′	6909.6	3246.5	8821.6	40′	7557.7	3754.4	9132.3
50′	6344.8	2819.4	8505.3	50′	6930.1	3262.3	8832.2	50′	7580.5	3772.6	9142.3

Corrections to be added to Table III

I	TANGENTS				EXTERNALS				CHORDS				I
	Cve.5°	10°	15°	20°	5°	10°	15°	20°	5°	10°	15°	20°Cve.	
10°	.03	.06	.09	.13	.00	.00	.00	.01	.06	.12	.19	.24	10°
15°	.04	.10	.14	.19	.00	.01	.01	.01	.08	.18	.28	.37	15°
20°	.06	.13	.19	.26	.01	.01	.02	.02	.10	.24	.38	.49	20°
25°	.08	.16	.24	.33	.01	.02	.03	.04	.12	.30	.48	.61	25°
30°	.10	.19	.29	.39	.01	.03	.04	.05	.14	.36	.58	.73	30°
35°	.11	.22	.34	.47	.02	.04	.05	.07	.17	.41	.66	.84	35°
40°	.13	.26	.40	.53	.02	.05	.07	.09	.20	.46	.75	.95	40
45°	.15	.30	.44	.60	.03	.06	.09	.12	.23	.52	.84	1.06	45°
50°	.17	.34	.51	.68	.04	.08	.12	.15	.26	.58	.93	1.18	50°
55°	.19	.38	.57	.76	.05	.09	.14	.19	.28	.64	1.02	1.30	55°
60°	.21	.42	.63	.84	.06	.11	.17	.23	.30	.68	1.10	1.40	60°
65°	.23	.46	.69	.93	.07	.14	.20	.27	.32	.73	1.18	1.50	65°
70°	.25	.51	.76	1.02	.08	.16	.24	.32	.34	.78	1.26	1.60	70°
75°	.27	.56	.83	1.12	.10	.18	.29	.38	.36	.84	1.34	1.70	75°
80°	.30	.61	.91	1.22	.11	.22	.33	.45	.38	.89	1.42	1.80	80°
85°	.33	.66	1.00	1.33	.13	.26	.39	.52	.40	.93	1.49	1.90	85°
90°	.36	.72	1.09	1.45	.15	.30	.45	.60	.42	.98	1.56	1.98	90°
95°	.39	.79	1.19	1.55	.17	.35	.52	.71	.44	1.04	1.64	2.06	95°
100°	.43	.86	1.30	1.74	.20	.40	.60	.81	.46	1.07	1.69	2.14	100°
105°	.47	.94	1.43	1.88	.23	.46	.69	.92	.48	1.10	1.74	2.22	105°

To find tangent, external or chord for any degree of curve under 21° take same for a 1° curve from table III, divide by given degree of curve and add correction taken from correction table. For curves sharper than 20° figure tangents etc., by formulae for simple curves. Page 11.

Table IV — Natural Sines, Cosines, Tangents and Cotangents

Deg.	Sine	Cos.	Tan.	Cot.	Deg.
0°	.0000	1	.0000	Inf.	**90°**
10′	.0029	1	.0029	343.77	50′
20′	.0058	1	.0058	171.88	40′
30′	.0087	.9999	.0087	114.59	30′
40′	.0116	.9999	.0116	85.949	20′
50′	.0145	.9999	.0145	68.750	10′
1°	.0175	.9998	.0175	57.290	**89°**
10′	.0204	.9998	.0204	49.104	50′
20′	.0233	.9997	.0233	42.964	40′
30′	.0262	.9997	.0262	38.188	30′
40′	.0291	.9996	.0291	34.368	20′
50′	.0320	.9995	.0320	31.242	10′
2°	.0349	.9994	.0349	28.636	**88°**
10′	.0378	.9993	.0378	26.432	50′
20′	.0407	.9992	.0407	24.542	40′
30′	.0436	.9990	.0437	22.904	30′
40′	.0465	.9989	.0466	21.470	20′
50′	.0494	.9988	.0495	20.206	10′
3°	.0523	.9986	.0524	19.081	**87°**
10′	.0552	.9985	.0553	18.075	50′
20′	.0581	.9983	.0582	17.169	40′
30′	.0610	.9981	.0612	16.350	30′
40′	.0640	.9980	.0641	15.605	20′
50′	.0668	.9978	.0670	14.924	10′
4°	.0698	.9976	.0699	14.300	**86°**
10′	.0727	.9974	.0728	13.727	50′
20′	.0756	.9971	.0758	13.197	40′
30′	.0785	.9969	.0787	12.706	30′
40′	.0814	.9967	.0816	12.250	20′
50′	.0843	.9964	.0846	11.826	10′
5°	.0872	.9962	.0875	11.430	**85°**
10′	.0900	.9960	.0904	11.024	50′
20′	.0930	.9957	.0934	10.712	40′
30′	.0959	.9954	.0963	10.385	30′
40′	.0987	.9951	.0992	10.078	20′
50′	.1016	.9948	.1022	9.7782	10′
6°	.1045	.9945	.1051	9.5144	**84°**
10′	.1074	.9942	.1080	9.2553	50′
20′	.1103	.9939	.1110	9.0098	40′
30′	.1132	.9936	.1139	8.7769	30′
40′	.1161	.9932	.1169	8.5555	20′
50′	.1190	.9929	.1198	8.3450	10′
7°	.1219	.9925	.1228	8.1443	**83°**
10′	.1248	.9922	.1257	7.9530	50′
20′	.1276	.9918	.1287	7.7704	40′
30′	.1305	.9914	.1316	7.5958	30′
40′	.1334	.9910	.1346	7.4287	20′
50′	.1363	.9907	.1376	7.2687	10′
8°	.1392	.9903	.1405	7.1154	**82°**
10′	.1420	.9899	.1435	6.9682	50′
20′	.1449	.9894	.1465	6.8269	40′
30′	.1478	.9890	.1495	6.6912	30′
40′	.1507	.9886	.1524	6.5605	20′
50′	.1536	.9881	.1554	6.4348	10′
9°	.1564	.9877	.1584	6.3138	**81°**
10′	.1593	.9872	.1614	6.1970	50′
20′	.1622	.9868	.1644	6.0844	40′
30′	.1650	.9863	.1673	5.9758	30′
40′	.1679	.9858	.1703	5.8708	20′
50′	.1708	.9853	.1733	5.7694	10′
10°	.1736	.9848	.1763	5.6713	**80°**
Deg.	Cos.	Sine	Cot.	Tan.	Deg.

Deg.	Sine	Cos.	Tan.	Cot.	Deg.
10°	.1736	.9848	.1763	5.6713	**80°**
10′	.1765	.9843	.1793	5.5764	50′
20′	.1794	.9838	.1823	5.4845	40′
30′	.1822	.9832	.1853	5.3955	30′
40′	.1851	.9827	.1884	5.3093	20′
50′	.1880	.9822	.1914	5.2257	10′
11°	.1908	.9816	.1944	5.1445	**79°**
10′	.1937	.9811	.1974	5.0658	50′
20′	.1965	.9805	.2004	4.9894	40′
30′	.1994	.9799	.2035	4.9152	30′
40′	.2022	.9793	.2065	4.8430	20′
50′	.2051	.9788	.2095	4.7729	10′
12°	.2079	.9782	.2126	4.7046	**78°**
10′	.2110	.9775	.2156	4.6382	50′
20′	.2136	.9769	.2186	4.5736	40′
30′	.2164	.9763	.2217	4.5107	30′
40′	.2193	.9757	.2248	4.4494	20′
50′	.2221	.9750	.2278	4.3897	10′
13°	.2250	.9744	.2309	4.3315	**77°**
10′	.2278	.9737	.2339	4.2747	50′
20′	.2306	.9730	.2370	4.2193	40′
30′	.2334	.9724	.2400	4.1653	30′
40′	.2363	.9717	.2432	4.1126	20′
50′	.2391	.9710	.2462	4.0611	10′
14°	.2419	.9703	.2493	4.0108	**76°**
10′	.2450	.9695	.2524	3.9616	50′
20′	.2476	.9689	.2555	3.9136	40′
30′	.2504	.9682	.2586	3.8667	30′
40′	.2532	.9674	.2617	3.8208	20′
50′	.2560	.9667	.2648	3.7760	10′
15°	.2588	.9660	.2680	3.7320	**75°**
10′	.2616	.9652	.2711	3.6891	50′
20′	.2644	.9644	.2742	3.6471	40′
30′	.2672	.9636	.2773	3.6059	30′
40′	.2700	.9628	.2805	3.5656	20′
50′	.2728	.9620	.2836	3.5261	10′
16°	.2756	.9613	.2868	3.4874	**74°**
10′	.2787	.9604	.2899	3.4495	50′
20′	.2812	.9596	.2931	3.4124	40′
30′	.2840	.9588	.2962	3.3759	30′
40′	.2868	.9580	.2994	3.3402	20′
50′	.2896	.9572	.3025	3.3052	10′
17°	.2924	.9563	.3057	3.2708	**73°**
10′	.2954	.9554	.3089	3.2371	50′
20′	.2980	.9546	.3121	3.2041	40′
30′	.3007	.9537	.3153	3.1716	30′
40′	.3035	.9528	.3185	3.1397	20′
50′	.3062	.9520	.3217	3.1084	10′
18°	.3090	.9511	.3249	3.0777	**72°**
10′	.3121	.9500	.3281	3.0475	50′
20′	.3145	.9492	.3314	3.0178	40′
30′	.3173	.9483	.3346	2.9887	30′
40′	.3200	.9474	.3378	2.9600	20′
50′	.3228	.9464	.3411	2.9319	10′
19°	.3256	.9455	.3443	2.9042	**71°**
10′	.3283	.9446	.3476	2.8770	50′
20′	.3311	.9436	.3508	2.8502	40′
30′	.3338	.9426	.3541	2.8239	30′
40′	.3366	.9417	.3574	2.7980	20′
50′	.3393	.9407	.3607	2.7725	10′
20°	.3420	.9397	.3640	2.7475	**70°**
Deg.	Cos.	Sine	Cot.	Tan.	Deg.

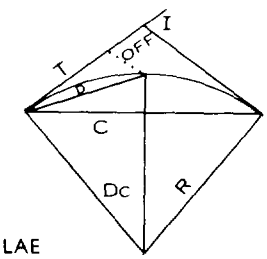
Table IV— Natural Sines, Cosines, Tangents and Cotangents

Deg.	Sine	Cos.	Tan.	Cot.	Deg.
20°	.3420	.9397	.3640	2.7475	70°
10′	.3448	.9387	.3673	2.7228	50′
20′	.3475	.9377	.3706	2.6975	40′
30′	.3502	.9367	.3739	2.6746	30′
40′	.3529	.9356	.3772	2.6511	20′
50′	.3556	.9346	.3805	2.6279	10′
21°	.3584	.9336	.3839	2.6051	69°
10′	.3614	.9325	.3872	2.5826	50′
20′	.3638	.9315	.3906	2.5605	40′
30′	.3665	.9304	.3939	2.5386	30′
40′	.3692	.9293	.3973	2.5172	20′
50′	.3719	.9283	.4006	2.4960	10′
22°	.3746	.9272	.4040	2.4751	68°
10′	.3776	.9261	.4074	2.4545	50′
20′	.3800	.9250	.4108	2.4342	40′
30′	.3827	.9239	.4142	2.4142	30′
40′	.3854	.9228	.4176	2.3945	20′
50′	.3880	.9216	.4210	2.3750	10′
23°	.3907	.9205	.4245	2.3558	67°
10′	.3934	.9194	.4279	2.3369	50′
20′	.3961	.9182	.4314	2.3183	40′
30′	.3988	.9171	.4348	2.2998	30′
40′	.4014	.9159	.4383	2.2817	20′
50′	.4041	.9147	.4418	2.2637	10′
24°	.4067	.9136	.4452	2.2460	66°
10′	.4094	.9124	.4487	2.2286	50′
20′	.4120	.9111	.4522	2.2113	40′
30′	.4147	.9100	.4557	2.1943	30′
40′	.4173	.9088	.4592	2.1775	20′
50′	.4200	.9075	.4628	2.1609	10′
25°	.4226	.9063	.4663	2.1445	65°
10′	.4252	.9050	.4698	2.1283	50′
20′	.4279	.9038	.4734	2.1123	40′
30′	.4305	.9026	.4770	2.0965	30′
40′	.4331	.9013	.4806	2.0809	20′
50′	.4358	.9000	.4841	2.0655	10′
26°	.4384	.8988	.4877	2.0503	64°
10′	.4410	.8975	.4913	2.0353	50′
20′	.4436	.8962	.4950	2.0204	40′
30′	.4462	.8949	.4986	2.0057	30′
40′	.4488	.8936	.5022	1.9912	20′
50′	.4514	.8923	.5059	1.9768	10′
27°	.4540	.8910	.5095	1.9626	63°
10′	.4566	.8897	.5132	1.9486	50′
20′	.4592	.8884	.5169	1.9347	40′
30′	.4618	.8870	.5206	1.9210	30′
40′	.4643	.8857	.5243	1.9074	20′
50′	.4669	.8843	.5280	1.8940	10′
28°	.4695	.8830	.5317	1.8807	62°
10′	.4720	.8816	.5355	1.8676	50′
20′	.4746	.8802	.5392	1.8546	40′
30′	.4772	.8788	.5430	1.8418	30′
40′	.4797	.8774	.5467	1.8291	20′
50′	.4823	.8760	.5505	1.8165	10′
29°	.4848	.8746	.5543	1.8040	61°
10′	.4874	.8732	.5581	1.7917	50′
20′	.4899	.8718	.5619	1.7796	40′
30′	.4924	.8704	.5658	1.7675	30′
40	.4950	.8689	.5696	1.7556	20′
50′	.4975	.8675	.5735	1.7438	10′
30°	.5000	.8660	.5774	1.7320	60°
Deg.	Cos.	Sine.	Cot.	Tan.	Deg.

Deg.	Sine	Cos.	Tan.	Cot.	Deg.
30°	.5000	.8660	.5774	1.7320	60°
10′	.5025	.8646	.5812	1.7205	50′
20′	.5050	.8631	.5851	1.7090	40′
30′	.5075	.8616	.5891	1.6977	30′
40′	.5100	.8602	.5930	1.6864	20′
50′	.5125	.8587	.5969	1.6753	10′
31°	.5150	.8572	.6009	1.6643	59°
10′	.5175	.8557	.6048	1.6534	50′
20′	.5200	.8542	.6088	1.6426	40′
30′	.5225	.8526	.6128	1.6318	30′
40′	.5250	.8511	.6168	1.6212	20′
50′	.5275	.8495	.6208	1.6107	10′
32°	.5299	.8480	.6249	1.6002	58°
10′	.5326	.8463	.6289	1.5900	50′
20′	.5350	.8448	.6330	1.5798	40′
30′	.5373	.8434	.6371	1.5697	30′
40′	.5397	.8418	.6412	1.5597	20′
50′	.5422	.8402	.6453	1.5497	10′
33°	.5446	.8387	.6494	1.5399	57°
10′	.5471	.8371	.6536	1.5301	50′
20′	.5495	.8355	.6577	1.5204	40′
30′	.5519	.8339	.6619	1.5108	30′
40′	.5544	.8323	.6661	1.5013	20′
50′	.5568	.8307	.6703	1.4919	10′
34°	.5592	.8290	.6745	1.4826	56°
10′	.5616	.8274	.6788	1.4733	50′
20′	.5640	.8258	.6830	1.4641	40′
30′	.5664	.8241	.6873	1.4550	30′
40′	.5688	.8225	.6916	1.4460	20′
50′	.5712	.8208	.6959	1.4370	10′
35°	.5736	.8192	.7002	1.4281	55°
10′	.5760	.8175	.7046	1.4193	50′
20′	.5783	.8158	.7089	1.4106	40′
30′	.5807	.8141	.7133	1.4020	30′
40′	.5831	.8124	.7177	1.3934	20′
50′	.5854	.8107	.7221	1.3848	10′
36°	.5878	.8090	.7265	1.3764	54°
10′	.5901	.8073	.7310	1.3680	50′
20′	.5925	.8056	.7355	1.3597	40′
30′	.5948	.8039	.7400	1.3514	30′
40′	.5972	.8021	.7445	1.3432	20′
50′	.5995	.8004	.7490	1.3351	10′
37°	.6018	.7986	.7536	1.3270	53°
10′	.6041	.7969	.7581	1.3190	50′
20′	.6065	.7951	.7627	1.3111	40′
30′	.6088	.7935	.7673	1.3032	30′
40′	.6111	.7916	.7720	1.2954	20′
50′	.6134	.7898	.7766	1.2876	10′
38°	.6157	.7880	.7813	1.2799	52°
10′	.6180	.7862	.7860	1.2723	50′
20′	.6202	.7844	.7907	1.2647	40′
30′	.6225	.7826	.7954	1.2572	30′
40′	.6248	.7808	.8002	1.2497	20′
50′	.6271	.7790	.8050	1.2423	10′
39°	.6293	.7772	.8098	1.2349	51°
10′	.6316	.7753	.8146	1.2276	50′
20′	.6338	.7735	.8195	1.2203	40′
30′	.6361	.7716	.8243	1.2131	30′
40′	.6383	.7698	.8292	1.2059	20′
50′	.6406	.7679	.8341	1.1988	10′
40°	.6428	.7660	.8391	1.1918	50°
Deg.	Cos.	Sine.	Cot.	Tan.	Deg.

Table IV

Deg.	Sine	Cos.	Tan.	Cot.	Deg.
40°	.6428	.7660	.8391	1.1918	50°
10′	.6450	.7642	.8441	1.1847	50′
20′	.6472	.7623	.8491	1.1778	40′
30′	.6494	.7604	.8541	1.1708	30′
40′	.6517	.7585	.8591	1.1640	20′
50′	.6539	.7566	.8642	1.1572	10′
41°	.6561	.7547	.8693	1.1504	49°
10′	.6582	.7528	.8744	1.1436	50′
20′	.6604	.7509	.8795	1.1369	40′
30′	.6626	.7490	.8847	1.1303	30′
40′	.6648	.7470	.8899	1.1237	20′
50′	.6670	.7451	.8952	1.1171	10′
42°	.6691	.7431	.9004	1.1106	48
10′	.6713	.7412	.9057	1.1041	50′
20′	.6734	.7392	.9110	1.0977	40′
30′	.6756	.7373	.9163	1.0913	30′
40′	.6773	.7353	.9217	1.0850	20′
50′	.6799	.7333	.9271	1.0786	10′
43°	.6820	.7313	.9325	1 0724	47°
10′	6841	.7293	.9380	1.0661	50′
20′	.6862	.7273	.9435	1.0600	40′
30′	.6884	.7253	.9490	1.0538	30′
40′	.6905	.7233	.9545	1.0477	20′
50′	.6926	.7213	.9600	1.0416	10′
44°	.6947	.7193	.9657	1.0355	46°
10′	.6968	.7173	.9713	1.0295	50′
20′	.6988	.7153	.9770	1.0235	40′
30′	.7009	.7132	.9827	1.0176	30′
40′	.7030	.7112	.9884	1.0117	20′
50′	.7050	.7092	.9942	1.0058	10′
45°	.7071	.7071	1.0000	1.0000	45
Deg.	Cos.	Sine	Cot.	Tan.	Deg.



CURVE FORMULAE

Let:— R — Radius. T — Tangent. I — Intersection Angle. E — External.
C — Long chord for Total I.

Then $R = \frac{50}{\text{Sin. D}}$

$R = \text{T x. Cot. } \frac{1}{2}$

$T = \text{R x. tan, } \frac{1}{2}$

$T = \frac{50 \text{ x Tan. } \frac{1}{2}}{\text{Sin. D}}$

$\text{Sin. D} = \frac{50}{R}$

$E = \text{R x. Exsec } \frac{1}{2}$

$E = \text{T x. tan, } \frac{I}{4}$

$C = 2 \text{ R Sin. } \frac{1}{2}$

For approximate check on transit work and to run simple curves in roughl by tangent or chord deflection:—

Sine 1° for 1 ft. = .0175 = 1.75 per 100′

Given degree of curve and line of tangent

Offset from tan produced to any given point on curve

$\text{Offset} = \frac{1.75 \text{ x degree of curve x (distance in stations)}_2}{2}$

Given degree of curve and line of chord

Offset from chord produced to any given point on curve

$= \frac{.0175 \text{ x degree x (length of chord} \cdot \text{given distance)}}{2}$

To find Middle ordinate for any curve

Middle ordinate of 1° curve for 100 ft. = .22′

Middle ordinate for any given degree of curve for 100 ft. = .22 x gi degree of curve.

Middle ordinate for any given length of chord varies as the sq. of the leng Rt angle offset may be obtained from any point on a line, remembering that sides of a rt. angle triangle are in the ratio of 3, 4 and 5.

STEEL TAPE CORRECTION CHART

Table V

TEMP. CORRECTION = 0.00000640 (t±68°) X MEASURED DISTANCE

SUBTRACT FROM MEASURED DISTANCE — ADD TO LAID OFF DISTANCE (temperatures −20° to +68°, left column)

ADD TO MEASURED DISTANCE — SUBTRACT FROM LAID OFF DISTANCE (temperatures +68° to +110°, right column)

TEMP. \ DIST.	100′	200′	300′	400′	500′	600′	700′	800′	900′	DIST. / TEMP.
− 20°	.056	.11	.17	.23	.28	.34	.39	.45	.51	
18	.055	.11	.17	.22	.28	.33	.39	.44	.50	
16	.054	.11	.16	.22	.27	.32	.38	.43	.48	
14	.052	.10	.16	.21	.26	.31	.37	.42	.47	
12	.051	.10	.15	.20	.26	.31	.36	.41	.46	
10	.050	.10	.15	.20	.25	.30	.35	.40	.45	
− 8°	.048	.10	.15	.19	.24	.29	.34	.39	.44	
6	.047	.09	.14	.19	.24	.28	.33	.38	.43	
4	.046	.09	.14	.18	.23	.28	.32	.37	.41	
2	.045	.09	.13	.18	.22	.27	.31	.36	.40	
0	.044	.09	.13	.17	.22	.26	.30	.35	.39	
+ 2°	.042	.08	.13	.17	.21	.25	.30	.34	.38	
4	.041	.08	.12	.16	.20	.25	.29	.33	.37	
6	.040	.08	.12	.16	.20	.24	.28	.32	.36	
8	.038	.08	.12	.15	.19	.23	.27	.31	.35	
10	.037	.07	.11	.15	.19	.22	.26	.30	.33	
+ 12°	.036	.07	.11	.14	.18	.22	.25	.29	.32	
14	.035	.07	.10	.14	.17	.21	.24	.28	.31	
16	.033	.07	.10	.13	.17	.20	.23	.27	.30	
18	.032	.06	.10	.13	.16	.19	.22	.26	.29	
20	.031	.06	.09	.12	.15	.18	.22	.25	.28	
+ 22°	.029	.06	.09	.12	.15	.18	.21	.24	.26	
24	.028	.06	.08	.11	.14	.17	.20	.23	.25	
26	.027	.05	.08	.11	.13	.16	.19	.22	.24	+ 110°
28	.026	.05	.08	.10	.13	.15	.18	.20	.23	108
30	.024	.05	.07	.10	.12	.15	.17	.19	.22	106
+ 32°	.023	.05	.07	.09	.12	.14	.16	.18	.21	104
34	.022	.04	.07	.09	.11	.13	.15	.17	.20	102
36	.020	.04	.06	.08	.10	.12	.14	.16	.18	+ 100°
38	.019	.04	.06	.08	.10	.12	.13	.15	.17	98
40	.018	.04	.05	.07	.09	.11	.13	.14	.16	96
+ 42°	.017	.03	.05	.07	.08	.10	.12	.13	.15	94
44	.015	.03	.05	.06	.08	.09	.11	.12	.14	92
46	.014	.03	.04	.06	.07	.08	.10	.11	.13	+ 90°
48	.013	.03	.04	.05	.06	.08	.09	.10	.12	88
50	.012	.02	.03	.05	.06	.07	.08	.09	.10	86
+ 52°	.010	.02	.03	.04	.05	.06	.07	.08	.09	84
54	.009	.02	.03	.04	.04	.05	.06	.07	.08	82
56	.008	.02	.02	.03	.04	.05	.05	.06	.07	+ 80°
58	.006	.01	.02	.03	.03	.04	.04	.05	.06	78
60	.005	.01	.02	.02	.03	.03	.04	.04	.05	76
+ 62°	.004	.01	.01	.02	.02	.02	.03	.03	.03	74
64	.003	.01	.01	.01	.01	.02	.02	.02	.02	72
66	.001	.00	.00	.01	.01	.01	.01	.01	.01	70
+ 68°	.000	.00	.00	.00	.00	.00	.00	.00	.00	+ 68°
TEMP. / DIST.	100′	200′	300′	400′	500′	600′	700′	800′	900′	TEMP. / DIST.

The Metric System

LINEAR

Metric System

10 millimetres (mm.) = 1 centimetre (cm.)
100 centimetres = 1 metre (m.)
1000 metres = 1 kilometre (km.)

Imperial System

12 inches = 1 foot
3 feet = 1 yard.
1760 yards = 1 mile

Metric and Imperial Equivalents

1 millimetre	0.03937 inches	1 inch	25.4 millimetres
1 centimetre	0.3937 inches	1 inch	2 54 centimetres
1 metre	39.37 inches	1 inch	0.0254 metres
1 metre	3.2808 feet	1 yard	0 0009144 kilometres
1 metre	1.0936 yards	1 mile	1 609344 kilometres
1 kilometre	1093.61 yards	1 foot	0.3048 metres
1 kilometre	0.621371 miles	1 yard	0 9144 metres

Metric and Imperial Conversion Factors

Millimetres	X	0.03937	Inches	Inches	X	25 4	Millimetres
Centimetres	X	0 3937	Inches	Inches	X	2 54	Centimetres
Metres	X	39.37	Inches	Inches	X	0.0254	Metres
Metres	X	3.2808	Feet	Feet	X	0 3048	Metres
Metres	X	1 0936	Yards	Yards	X	0 9144	Metres
Kilometres	X	1093 61	Yards	Yards	X	0 0009144	Kilometres
Kilometres	X	0 62137	Miles	Miles	X	1 609344	Kilometres

WEIGHT

Metric System

1000 gram (g.) 1 kilogram (kg.)
1000 kilogram 1 tonne (t.)

Imperial System

16 oz 1 lb
2000 lb 1 ton
2240 lb 1 long ton

Metric and Imperial Equivalents

1 Gram	0 035 Ounces		
1 Kilogram	2 2 Pounds	1 Ounce	= 28 35 Grams
1 Tonne	1 102 Tons (2000 lb.)	1 Pound	= 453 6 Grams
1 Tonne	0.984 Long Tons(2240lb.)	1 Ton (2000 lb.)	= 0 907 Tonnes
		1 Long Ton (2240 lb.)	= 1 016 Tonnes

Metric and Imperial Conversion Factors

g	X	0 035	oz				
kg	X	2 2	lb	oz	X	28 35	g
t	X	1 102	tons (2000 lb.)	lb	X	0 454	kg
t	X	0 984	long tons(2240lb.)	tons (2000 lb.)	X	0 907	t
				long tons (2240 lb.)	X	1 016	t

AREA

Metric and Imperial Equivalents

1 Square Millimetre	0 00155 Square Inches		
1 Square Centimetre	0.155 Square Inches	1 Square Inch	645 16 Square Millimetres
1 Square Metre	10 76 Square Feet	1 Square Foot	929 Square Centimetres
1 Square Metre	1 196 Square Yards	1 Square Yard	0 836 Square Metres
1 Square Kilometre	0 386 Square Miles	1 Square Mile	2 59 Square Kilometres

Metric and Imperial Conversion Factors

sq. mm	X	0 00155	sq ins	sq ins	X	645 16	sq mm
sq. cm	X	0 155	sq ins	sq ins	X	6 452	sq cm
sq. m	X	10 76	sq ft	sq ft	X	929 0	sq cm
sq m	X	1 196	sq yards	sq yards	X	0 836	sq m
sq. km.	X	0.386	sq miles	sq miles	X	2 59	sq km

VOLUME

Metric and Imperial Equivalents

1 Cubic Centimetre	0 061 Cubic Inches	1 Cubic Inch	16 4 Cubic Centimetres
1 Cubic Metre	1 31 Cubic Yards	1 Cubic Foot	0 028 Cubic Metres
1 Cubic Metre	35 31 Cubic Feet	1 Cubic Yard	0 76 Cubic Metres
1 Litre	1 76 Pints	1 Pint	0 57 Litres
1 Litre	0 22 Gallons (Imperial)	1 gallon (Imperial)	4 55 Litres

Metric and Imperial Conversion Factors

Cubic cm	X	0 061	Cubic ins	Cubic ins	X	16 4	Cubic cm
Cubic m	X	1 31	Cubic yards	Cubic yards	X	0 764	Cubic m
Cubic m	X	35 31	Cubic ft	Cubic ft	X	0 0283	Cubic m
1 litre	X	1 76	pts	pts	X	0 57	1 litre
1 litre	X	0 22	gallons (Imperial)	gallons	X	4 55	1 litre

Calibration of a Level

Automatic Levels

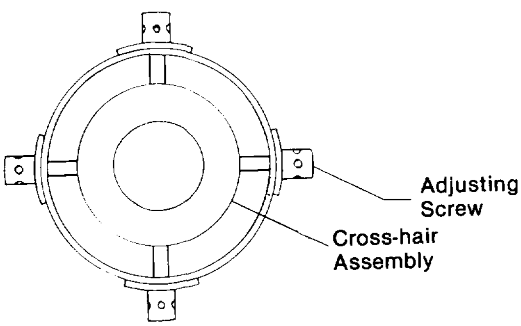
The cross-hair adjustment screws on most automatic levels are under a threaded cover adjacent to the eyepiece. Adjustment is accomplished by slightly tightening or loosening one of the top or bottom screws with the adjusting pin supplied in the instrument case.

The hair is moved up by turning the top screw clock-wise or the bottom screw counter clock-wise. To move the cross-hair down, the motions are reversed. Very slight adjustment of these screws will move the cross-hair significantly. On most European levels; the adjustment is the reverse of this procedure. The adjusting screws should always be under some tension at all times.

Dumpy Levels

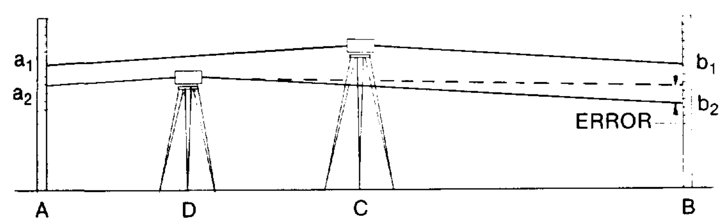
On Dumpy Levels, the cross-hair adjustment screws are generally exposed, capstan-head type on the telescope body near the eye-piece end. Adjustment is identical to European automatic levels. To move the cross-hair up, the bottom screw is tightened clock-wise or the top screw loosened counter-clockwise.

If more than one or two inches per 100ft. error is observed when checking the level, there has likely been some damage to the instrument and it should be examined by a qualified service shop.

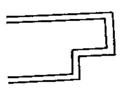


Checking a Level

Establish two firm points, A and B, about 50m apart and set up a scale at each location. Set up the level at, C, midway between A and B. Level the instrument ensuring that the bubble is centered in all positions. Record elevation readings from scale A and B thus a_1 and b_1 respectively. Set up the instrument again at a point D, about 4m from A. After levelling the instrument, record elevation readings from scale A and B, thus a_2 and b_2 respectively. If the elevation difference at A and at B are the same ($a_1 - a_2 = b_1 - b_2$) then the instrument is in perfect adjustment and calibration is not needed. If the elevation difference is not the same ($a_1 - a_2 \neq b_1 - b_2$) then calibration is required. Half of the elevation difference must be removed by sighting scale B and adjusting the instrument cross hair in the direction that tends towards the correct elevation reading from b_2.



NOTE KEEPING

B.S.	Backsight.
b.b.	Base-board of fence.
BM.	Bench-mark.
C.B.	Catch basin.
C.	Center.
¢	Center line.
-x-x-x	Chainline fence.
cb.	Curb.
cf	Crow-foot (mark like this [ ] or [ ]).
C.C.	Cut cross (+).
c c f	Cut crow-foot (cut into wood or stone).
dh.	Drill-hole.
-.-.-	Fence.
	Fence, showing on which side the posts are.
F.S.	Foresight.
I.B.	Iron Bar.
	Line of building; the outside line is the base-board, the cross-hatched part is the line of the stone or brick under-pinning.
M.H.	Manhole.
Mon.	Monument.
na.	Nail.
□	Stadia Station.
Spk.	Spike.
Stk.	Stake.
S.I.B.	Standard Iron Bar.
SB	Stone bound.
tk.	Tack.
Tel.	Telephone pole.
O	Transit Traverse Point.
△	Triangulation Station.
T.P.	Turning point.

No. L 0+00

Date 58,000 GAMMAS subtracted on MAP For all Mag Rdgs. Plotted.

Page

STA.	RDG.	
2+75N	58	760
—		754
—		763
2N		731
—		740
—		847
—		991
1N	57	204
—		340
—		325
—		384
BL		309
—		348
—	58	981
—		948
1S		945
—		935
—		934
—		931
2S		948
—		952
—		954
—		944
3S		894
—		871

No. L 0+00

Date .... Page ....

STA.	RDG.				
—	58	767			
—		734			
4S		744			
–		754			
–		786			
–		765			
5S		756			
–		745			
–		732			
–		716			
6S		754			
–		714			
–		754			
6+75.S		733.			

No. L 0+50E

Date .... Page ....

STA.	RDG.				
2+75N	58	720			
–		764			
–		789			
2N		764			
–		760			
–		760			
–	59	010			
1N		221			
–		370			
–		343			
–		351			
BL		362			
–		231			
–	58	978			
–		910			
1S		965			
–		943			
–		918			
–		912			
2S		954			
–		976			
–		913			
–		870			
3S		876			
–		877			

No. L0+50E

Date Page

STA.	RDG.				
–	58	764			
–		762			
4S		745			
–		754			
–		761			
–		756			
5S		765			
–		754			
–		742			
–		701			
6S		733			
6+25S		763			

No. L1+00E

Date Page

STA.	RDG.				
2+75N	58	722			
–		742			
–		730			
2N		722			
–		716			
–		765			
–	59	034			
1N		367			
–		235			
–		114			
–		025			
BL	58	949			
–		929			
–		905			
–		895			
1S		885			
–		892			
–		840			
–		864			
2S		834			
–		785			
–		875			
–		867			
3S		874			
–		887			

No. L1+00E

Date .... Page ....

STA.	RDG	
–	58	759
–		779
4S		789
–		767
–		756
–		765
5S		750
–		764
–		754
5+75S.		780

No. L1+50E

Date .... Page ....

STA	RDG.	
2+25N	58	720
2N		712
–		732
–		895
–	59	010
1N		340
–		215
–		232
–	58	970
BL		930
–		924
–		874
–		842
1S		874
–		812
–		870
–		812
2S		808
–		761
–		744
–		750
3S		767
–		742
–		714
–		767

No. L1+50E

Date .... Page ....

STA.	RDG.				
4S	58	765			
–		786			
–		743			
–		723			
5S		760			
–		765			
–		758			
5+75S		764			

No. L2+00E

Date .... Page ....

STA.	RDG				
2N	58	776			
–		798			
–		866			
–		912			
1N		901			
–		888			
–		866			
–		853			
BL		844			
–		854			
–		837			
–		822			
1S		813			
–		791			
–		743			
–		765			
2S		735			
–		754			
–		741			
–		713			
3S		701			
–		720			
–		767			
–		777			
4S		778			

No. L2+00E

Date .... Page ....

STA.	RDG.	
–	58	767
–		752
–		752
5S		739
–		732
5+50S.		766

No. L2+50E

Date .... Page ....

STA.	RDG.	
2+25N	58	754
2N		765
–		743
–		767
–		767
1N		702
–		787
–		775
–		764
BL		760
–		764
–		769
–		754
1S		742
–		770
–		754
–		743
2S		754
–		739
–		765
–		754
3S		760
–		754
–		756
–		742

No. L2+50E
Date .... Page ....

STA.	RDG.	
4S	58	730
-		744
-		729
-		766
5S		744
5+25.S.		755

No. L3+00E
Date .... Page ....

STA.	RDG	
3N	58	775
-		754
-		765
-		788
2N		786
-		790
-		781
-		782
1N		778
-		787
-		783
-		787
BL		780
-		785
-		778
-		769
1S		768
-		728
-		754
-		763
2S		761
-		756
-		743
-		753
3S		754

No. L3+00E
Date .... Page ....

STA.	RDG.	
-	58	762
-		775
-		760
4S		741
-		742
-		717
-		710
5S		733
5+25.S		739

No. L3+50E
Date .... Page ....

STA.	RDG	
3+25.N	58	719
3N		736
-		733
-		732
-		744
2N		780
-		766
-		722
-		745
1N		764
-		762
-		755
-		743
BL		7[illegible]2
-		733
-		730
-		736
1S		755
-		719
-		701
-		721
2S		743
-		750
-		766
-		714

No. L5+50E

Date .... Page ....

STA.	RDG.	
3S	58	385
–		745
–		760
–		753
4S		718
–		744
–		735
4+75S,		723

No. L4+00E

Date .... Page ....

STA.	RDG	
3+25N,	58	722
3N		744
–		787
–		755
–		776
2N		758
–		743
–		766
–		752
1N		765
–		739
–		765
–		733
BL		744
–		750
–		761
–		739
1S		767
–		732
–		735
–		743
2S		764
–		678
–		211
–		366

No. L 4+00E

Date .... Page ....

STA.	RDG.	
3S	58	750
-		777
-		712
-		764
4S		766
-		733
4+50.S,		754

No. L 4+50E

Date .... Page ....

STA.	RDG	
3+50.N,	58	755
-		760
3N		730
-		755
-		712
-		744
2N		761
-		741
-		753
-		733
1N		743
-		720
-		744
-		732
BL		744
-		759
-		765
-		727
1S		744
-		730
-		760
-		744
2S		710
-		326
-		390

No. L4+50E

Date .... Page ....

STA.	RDG.	
-	58	675
3S		742
-		764
-		713
-		710
4S		733
4+25.S,		732

No. L5+00E

Date .... Page ....

STA.	RDG.	
3+50 N	58	740
-		751
3N		789
-		792
-		810
-		776
2N		754
-		765
-		745
-		764
1N		743
-		755
-		720
-		753
BL		742
-		777
-		710
-		722
1S		741
-		732
-		755
-		766
2S		697
-		420
-		690

No. L5+00E

Date .... Page ....

STA.	RDG.	
-	58	776
3S		714
-		732
-		719
-		744
4S		752

No. L5+50E

Date .... Page ....

STA.	RDG.	
4N	58	812
-		865
-		864
-		874
3N	59	031
-	58	790
-		788
-		776
2N		742
-		756
-		782
-		766
1N		774
-		754
-		733
-		720
BL		755
-		764
-		786
-		777
1S		765
-		749
-		890
-		891
[illegible]S		879

No. L5+50E

Date .... Page ....

STA.	RDG.	
-	58	910
-		897
-		842
3S		877
-		869
-		842
3+75.S,		878

No. L6+00E

Date .... Page ....

STA.	RDG.	
5N	58	787
-		764
-		765
-		764
4N		760
-		711
-	59	020
-		010
3N	58	788
-		791
-		779
-		762
2N		739
-		766
-		760
-		755
1N		764
-		752
-		763
-		790
BL		765
-		789
-		772
-		768
1S		760

No. L6+00E

Date .... Page ....

STA.	RDG.	
-	58	754
-		761
-		788
2S		756
-		789
-		714
-		720
3S		778
-		742
-		784
3+75.S.		767

No. L6+50E

Date .... Page ....

STA.	RDG	
5N	58	723
-		754
-		766
-		787
4N		810
-	59	018
-	58	840
-		777
3N		764
-		785
-		713
-		756
2N		782
-		744
-		720
-		765
1N		750
-		761
-		756
-		744
BL		733
-		754
-		765
-		743
1S		770

No. L6+50E

Date .... Page ....

STA.	RDG.				
–	58	765			
–		787			
–		764			
2S		765			
–		743			
–		769			
–		753			
3S		746			
–		730			
3+50.S.		745			

No. L7+00E

Date .... Page ....

STA.	RDG				
5+25.N.	58	724			
5N		710			
–		750			
–		756			
–		740			
4N		894			
–		821			
–		811			
–		767			
3N		754			
–		763			
–		776			
–		712			
2N		753			
–		755			
–		765			
–		710			
1N		722			
–		753			
–		764			
–		754			
BL		789			
–		740			
–		756			
–		764			

No. L7+00E

Date .... Page ....

STA.	RDG.				
1S	58	754			
-		765			
-		740			
-		765			
2S		744			
-		739			
-		752			
-		719			
3S		723			
-		742			
3+50.S.		767			

No. L7+50E

Date .... Page ....

STA.	RDG				
5+25.N.	58	713			
5N		767			
-		788			
-		775			
-		755			
4N		790			
-		741			
-		755			
-		733			
3N		754			
-		725			
-		730			
-		730			
2N		711			
-		709			
-		679			
-		687			
1N		666			
-		656			
-		644			
-		657			
BL		668			
-		676			
-		655			
-		675			

No. L7+50E
Date .... Page ....

STA.	RDG				
1S	58	665			
-		644			
-		639			
-		654			
2S		656			
-		632			
-		646			
-		632			
3S		670			
3+25.S.		644			

No. L8+00E
Date .... Page ....

STA.	RDG.				
5+25.N.	58	701			
5N		750			
-		744			
-		750			
-		731			
4N		712			
-		729			
-		714			
-		702			
3N		670			
-		678			
-		657			
-		673			
2N		649			
-		654			
-		643			
-		675			
1N		654			
-		643			
-		670			
-		651			
BL		642			
-		654			
-		643			
-		654			

No. L8+00E

Date .... Page ....

STA.	RDG.	
1S	58	651
-		655
-		634
-		629
2S		655
-		639
-		621
-		644
3S.		622

No. L8+50E

Date .... Page ....

STA.	RDG.	
2+75N,	58	668
-		676
-		651
2N		643
-		654
-		632
-		645
1N		632
-		644
-		633
-		650
BL		670
-		653
-		651
-		656
1S		642
-		641
-		653
-		623
2S		677
-		654
-		650
-		632
3S		631

No. L9+00E

Date .... Page ....

STA.	RDG.				
2N	58	678			
-		657			
-		654			
-		643			
1N		644			
-		653			
-		650			
-		641			
BL		673			
-		643			
-		659			
-		643			
1S		623			
-		655			
-		671			
-		655			
2S		684			
-		620			
-		654			
-		644			
3S		632			

No. ....

Date .... Page ....

No. L0+00

Date .... Page ....

STA.	RDG.				
BL	59	110			
–		132			
–		210			
–		232			
1S		336			
1+25.S,		377			

No. L0+50E

Date .... Page ....

STA.	RDG.				
BL	59	145			
–		218			
–		233			
–		270			
1S		360			
–		340			
1+50.S,		339			

No. L1+00E

Date .... Page ....

STA.	RDG.				
BL	59	241			
-		233			
-		271			
-		360			
1S		340			
-		318			
1+50.S,		439			

No. L1+50E

Date .... Page ....

STA.	RDG.				
BL	59	172			
-		235			
-		280			
-		323			
1S		316			
-		325			
-		414			
1+75.S,		465			

No. L2+00E
Date Page

STA.	RDG.	
BL	59	258
-		262
-		237
-		334
1S		360
-		471
-		470
-		485
2S.		490

No. L2+50E
Date Page

STA.	RDG.	
BL	59	211
-		224
-		339
-		335
1S		344
-		441
-		401
-		470
2S		461
2+25.S,		455

No. L3+00E

Date Page

STA.	RDG.				
BL	59	171			
-		236			
-		310			
-		[illegible]			
1S		450			
-		460			
-		555			
-		501			
2S		411			
-		422			
2+50.S,		313			

No. L3+50E

Date Page

STA.	RDG.				
BL	59	201			
-		230			
-		319			
-		371			
1S		416			
-		415			
-		530			
-		561			
2S		537			
-		410			
-		380			
2+75.S,		361			

No. L4+00E

Date .... Page ....

STA.	RDG.	
BL	59	118
-		207
-		232
-		317
1S		429
-		437
-		560
-		677
2S		540
-		421
-		337
-		360
3S		351

No. L4+50E

Date .... Page ....

STA.	RDG.	
BL	59	201
-		220
-		351
-		344
1S		451
-		452
-		516
-		680
2S		570
-		410
-		358
-		367
3S		375
3+25.S,		381

No. L5+00E

Date .... Page ....

STA.	RDG.	
BL	59	270
-		311
-		301
-		416
1S		422
-		430
-		556
-		613
2S		558
-		437
-		466
-		330
3S		370
3+25.S,		251

No. L5+50E

Date .... Page ....

STA.	RDG.	
BL	59	336
-		370
-		361
-		422
1S		413
-		580
-		677
-		612
2S		510
-		470
-		333
-		361
3S		351
-		210
3+50.S,		116

No. L6+00E
Date .... Page ....

STA.	RDG.	
BL	59	140
-		214
-		321
-		432
1S		411
-		510
-		620
-		530
2S		410
-		454
-		339
-		324
3S		310
-		120
-		021
3+75.S		019

No. L6+50E
Date .... Page ....

STA.	RDG.	
BL	59	140
-		231
-		316
-		433
1S		528
-		555
-		612
-		539
2S		410
-		477
-		451
-		352
3S		310
-		180
-		060
-		019
4S		022

No. L7+00E

Date .... Page ....

STA.	RDG	
BL	59	219
-		230
-		341
-		433
1S		501
-		539
-		561
-		570
2S		461
-		439
-		435
-		329
3S		271
-		160
-		054
-	58	968
4S		972
4+25.S.		961

No. L7+50E

Date .... Page ....

STA.	RDG.	
BL	59	137
-		210
-		343
-		361
1S		470
-		535
-		560
-		433
2S		441
-		410
-		422
-		380
3S		270
-		061
-		072
-	58	941
4S		910
-		980
4+50.S,		912

No. L8+00E

Date .... Page ....

STA.	RDG.	
BL	59	211
-		201
-		371
-		339
1S		360
-		351
-		413
-		450
2S		402
-		370
-		361
-		370
3S		261
-		040
-		036
-	58	966
4S		936
-		932
4+50.S.		940

No. L8+50E

Date .... Page ....

STA.	RDG.	
BL	59	213
-		240
-		360
-		310
1S		340
-		316
-		371
-		324
2S		316
-		302
-		310
-		321
3S		224
-		174
-		060
-	58	979
4S		978
-		920
-		841
4+75S		871

No. L9+00E

Date .... Page ....

STA.	RDG.	
BL	59	210
-		270
-		366
-		341
1S		360
-		312
-		311
-		341
2S		321
-		320
-		301
-		260
3S		210
-		110
-		021
-	58	941
4S		960
-		911
-		932
-		900
5S		870

No. L9+50E

Date .... Page ....

STA.	RDG.	
BL	59	220
-		248
-		344
-		370
1S		377
-		127
-		030
-		021
2S		001
-		012
-		031
-		080
3S		062
-		120
-		014
-		011
4S	58	920
-		950
-		812
-		801
5S		816
5+25.S,		810

No. L10+00E

Date .... Page ....

STA.	RDG.	
BL	59	232
-		310
-		336
-		328
1S		224
-		136
-		060
-		032
2S	58	870
-		840
-	59	030
-		180
3S		160
-		070
-	58	970
-		816
4S		824
-		836
-		840
-		833
5S		820
-		816
5+50.S,		815

No. L10+50E

Date .... Page ....

STA.	RDG.	
BL	59	216
-		241
-		230
-		140
1S		040
-		033
-		016
-		009
2S	58	970
-		811
-		814
-		810
3S		812
-		816
-		801
-		790
4S		777
-		770
-		762
-		735
5S		736
-		713
5+50		737
5+75.S,		761

No. L11+00E
Date Page

STA.	RDG.				
BL	59	016			
-		021			
-		030			
-		012			
1S	58	970			
-		916			
-		912			
-		910			
2S		860			
-		812			
-		801			
-		814			
3S		712			
-		721			
-		716			
-		710			
4S		708			
-		716			
-		715			
-		710			
5S		711			
-		721			
-		716			
-		731			
6S		739			

No. L11+50E
Date Page

STA.	RDG.				
BL	58	902			
-		914			
-		921			
-		913			
1S		916			
-		912			
-		917			
-		901			
2S		870			
-		844			
-		813			
-		811			
3S		777			
-		761			
-		742			
-		740			
4S		751			
-		737			
-		717			
-		716			
5S		715			
-		710			
-		701			
-		734			
6S		760			

No. L12+00E

Date .... Page ....

STA.	RDG.	
BL	58	812
-		818
-		790
-		787
1S		792
-		764
-		760
-		751
2S		757
-		761
-		732
-		736
3S		733
-		751
-		759
-		747
4S		737
-		742
-		761
-		733
5S		321
-		724
-		720
-		721

No. L12+00E

Date .... Page ....

STA.	RDG.	
6S	58	732
6+25S		739

No. L12+50E

Date Page

STA.	RDG.	
BL	58	777
-		782
-		761
-		760
1S		766
-		762
-		732
-		730
2S		731
-		720
-		711
-		702
3S		704
-		712
-		730
-		731
4S		718
-		716
-		704
-		706
5S		718
-		714
-		721
-		732

No. L12+50E

Date Page

STA.	RDG.	
6S	58	739
-		724
6+50S,		717

No. L13+00E

Date .... Page ....

STA.	RDG.	
BL	58	790
-		792
-		769
-		754
1S		766
-		740
-		716
-		715
2S		680
-		674
-		703
-		711
3S		713
-		741
-		744
-		752
4S		738
-		732
-		724
-		721
5S		730
-		733
-		724
-		707

No. L13+00E

Date .... Page ....

STA.	RDG.	
6S	58	709
-		711
-		710
6+75S,		711

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Date .... Page ....

STA.	RDG.	
BL	58	716
-		710
-		702
-		760
1S		713
-		714
-		702
-		698
2S		690
-		702
-		714
-		720
3S		716
-		730
-		721
-		736
4S		712
-		716
-		713
-		710
5S		704
-		711
-		721
-		720

No. L13+50E
Date .... Page ....

STA.	RDG.	
6S	58	731
-		722
-		717
-		713
7S.		709

No. L14+00E

Date Page

STA.	RDG.				
BL	58	702			
-		690			
-		694			
-		692			
1S		684			
-		679			
-		680			
-		701			
2S		704			
-		709			
-		707			
-		713			
3S		719			
-		712			
-		710			
-		702			
4S		716			
-		713			
-		702			
-		706			
5S		721			
-		729			
-		730			
-		731			

No. L14+00E

Date Page

STA.	RDG.				
6S	58	721			
-		702			
-		713			
-		716			
7S		720			
7+25.S,		724			

No. L14+50E
Date Page

STA.	RDG.	
BL	58	704
-		717
-		773
-		760
1S		744
-		742
-		743
-		760
2S		761
-		730
-		731
-		733
3S		712
-		713
-		716
-		713
4S		712
-		716
-		713
-		719
5S		728
-		730
-		733
-		766

No. L14+50E
Date Page

STA.	RDG.	
6S	58	754
-		777
-		784
-		764
7S		755
7+25.S,		744

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Date .... Page ....

STA.	RDG	
BL	58	681
-		651
-		670
-		674
1S		676
-		684
-		680
-		681
2S		681
-		680
-		684
-		692
3S		690
-		712
-		701
-		712
4S		713
-		714
-		712
-		710
5S		708
-		684
-		700
-		712

No. L15+00E

Date .... Page ....

STA.	RDG.	
6S	58	713
-		720
-		724
-		733
7S		731
-		739
7+50.S.		727

No. L15+50E

Date .... Page ....

STA.	RDG.				
BL	58	702			
-		700			
-		714			
-		711			
1S		721			
-		718			
-		714			
-		716			
2S		715			
-		735			
-		732			
-		736			
3S		732			
-		714			
-		702			
-		716			
4S		720			
-		719			
-		720			
-		734			
5S		739			
-		719			
-		733			
-		733			

No. L15+50E

Date .... Page ....

STA.	RDG.				
6S	58	729			
-		719			
-		714			
-		702			
7S		701			
7+25.S,		732			
-					

No. L16+00E

Date .... Page ....

STA.	RDG.	
BL	58	690
–		684
–		688
–		690
1S		692
–		702
–		718
–		712
2S		713.
–		701
–		711
–		714
3S		712
–		704
–		690
–		694
4S		710
–		718
–		721
–		733
5S		731
–		717
–		714
–		712
6S		711

No. L16+50E

Date .... Page ....

STA.	RDG.	
BL	58	710
–		720
–		727
–		733
1S		756
–		729
–		717
–		724
2S		721
–		718
–		704
–		706
3S		717
–		712
–		718
–		716
4S		713
–		690
–		694
4+75.S		639

No. L17+00E

Date .... Page ....

No. ....

Date .... Page ....

STA.	RDG.	
BL	58	670
-		780
-		712
-		713
1S		714
-		709
-		706
-		724
2S		733
-		739
-		744
-		741
3S		730
-		716
-		739
3+75.S,		742

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CONTENTS

PAGE NO.	LOCATION	DATE

	MADE IN CANADA	

Table I — Radii, Ordinates and Deflections

Deg.	Rad.	Mid. Ord.	Tang. Def.	Chord Deft.	Def. for 1 foot	Deg.	Rad.	Mid. Ord.	Tang. Def.	Chord Deft.	Def. for 1 foot
00°10′	34377.0	0.036	0.145	0.291	0.05	7°	819.0	1.528	6.105	12.21	2.10
20′	17189.0	0.073	0.291	0.582	0.10	15′	790.8	1.582	6.323	12.64	2.18
30′	11459.0	0.109	0.436	0.873	0.15	30′	764.5	1.637	6.540	13.08	2.25
40′	8594.4	0.145	0.582	1.164	0.20	45′	739.9	1.691	6.758	13.50	2.33
50′	6875.5	0.182	0.727	1.454	0.25	8°	716.8	1.746	6.976	13.95	2.40
1°	5729.6	0.218	0.873	1.745	0.30	15′	695.1	1.801	7.193	14.38	2.48
10′	4911.2	0.255	1.018	2.036	0.35	30′	674.7	1.855	7.411	14.82	2.55
20′	4297.3	0.291	1.164	2.327	0.40	45′	655.4	1.910	7.628	15.25	2.63
30′	3819.8	0.327	1.309	2.618	0.45	9°	637.3	1.965	7.846	15.69	2.70
40′	3437.9	0.364	1.454	2.909	0.50	15′	620.1	2.019	8.063	16.13	2.78
50′	3125.4	0.400	1.600	3.200	0.55	30′	603.8	2.074	8.281	16.56	2.85
2°	2864.9	0.436	1.745	3.490	0.60	45′	588.4	2.128	8.498	17.00	2.93
10′	2644.6	0.473	1.891	3.781	0.65	10°	573.7	2.183	8.716	17.43	3.00
20′	2455.7	0.509	2.036	4.072	0.70	30′	546.4	2.293	9.150	18.30	3.15
30′	2292.0	0.545	2.181	4.363	0.75	11°	521.7	2.402	9.585	19.17	3.30
40′	2148.8	0.582	2.327	4.654	0.80	30′	499.1	2.511	10.019	20.04	3.45
50′	2022.4	0.618	2.472	4.945	0.85	12°	478.3	2.620	10.453	20.92	3.60
3°	1910.1	0.655	2.618	5.235	0.90	30′	459.3	2.730	10.887	21.77	3.75
10′	1809.6	0.691	2.763	5.526	0.95	13°	441.7	2.839	11.320	22.64	3.90
20′	1719.1	0.727	2.908	5.817	1.00	30′	425.4	2.949	11.754	23.51	4.05
30′	1637.3	0.764	3.054	6.108	1.05	14°	410.3	3.058	12.187	24.37	4.20
40′	1562.9	0.800	3.199	6.398	1.10	30′	396.2	3.168	12.620	25.24	4.35
50′	1495.0	0.836	3.345	6.689	1.15	15°	383.1	3.277	13.053	26.11	4.50
4°	1432.7	0.873	3.490	6.980	1.20	30′	370.8	3.387	13.485	26.97	4.65
10′	1375.4	0.909	3.635	7.271	1.25	16°	359.3	3.496	13.917	27.83	4.80
20′	1322.5	0.945	3.718	7.561	1.30	30′	348.5	3.606	14.349	28.70	4.95
30′	1273.6	0.982	3.926	7.852	1.35	17°	338.3	3.716	14.781	29.56	5.10
40′	1228.1	1.018	4.071	8.143	1.40	18°	319.6	3.935	15.643	31.29	5.40
50′	1185.8	1.055	4.217	8.433	1.45	19°	302.9	4.155	16.505	33.01	5.70
5°	1146.3	1.091	4.362	8.724	1.50	20°	287.9	4.374	17.365	34.73	6.00
10′	1109.3	1.127	4.507	9.014	1.55	21°	274.4	4.594	18.224	36.45	6.30
20′	1074.7	1.164	4.653	9.305	1.60	22°	262.0	4.814	19.081	38.16	6.60
30′	1042.1	1.200	4.798	9.596	1.65	23°	250.8	5.035	19.937	39.87	6.90
40′	1011.5	1.237	4.943	9.886	1.70	24°	240.5	5.255	20.791	41.58	7.20
50′	982.6	1.273	5.088	10.18	1.75	25°	231.0	5.476	21.644	43.29	7.50
6°	955.4	1.309	5.234	10.47	1.80	26°	222.3	5.697	22.495	44.99	7.80
10′	929.6	1.346	5.379	10.76	1.85	27°	214.2	5.918	23.345	46.69	8.10
20′	905.1	1.382	5.524	11.05	1.90	28°	206.7	6.139	24.192	48.38	8.40
30′	881.9	1.418	5.669	11.34	1.95	29°	199.7	6.360	25.038	50.08	8.70
40′	859.9	1.455	5.814	11.63	2.00	30°	193.2	6.583	25.882	51.76	9.00

Table II — Minutes in Decimals of a Degree

1′	.0167	11′	.1833	21′	.3500	31′	.5167	41′	.6833	51′	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

Table III — Tangents, Externals and Chords to a 1° Curve

Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chor
1°	50.00	.22	100.00	11°	551.70	26.50	1098.4	21°	1061.9	97.57	2088.
10′	58.34	.30	116.67	10′	560.11	27.31	1115.0	10′	1070.6	99.16	2104.
20′	66.67	.39	133.34	20′	568.53	28.14	1131.6	20′	1079.2	100.75	2121.
30′	75.01	.49	150.00	30′	576.95	28.97	1148.1	30′	1087.8	102.35	2137.
40′	83.34	.61	166.67	40′	585.36	29.82	1164.7	40′	1096.4	103.97	2153.
50′	91.68	.73	183.34	50′	593.79	30.68	1181.3	50′	1105.1	105.60	2170.
2°	100.01	.87	199.98	12°	602.21	31.56	1197.9	22°	1113.7	107.24	2186.
10′	108.35	1.02	216.64	10′	610.64	32.45	1214.5	10′	1122.4	108.90	2203.
20′	116.68	1.19	233.30	20′	619.07	33.35	1231.0	20′	1131.0	110.57	2219.
30′	125.02	1.36	249.96	30′	627.50	34.26	1247.6	30′	1139.7	112.25	2235.
40′	133.36	1.55	266.62	40′	635.93	35.18	1264.2	40′	1148.4	113.95	2252.
50′	141.70	1.75	283.29	50′	644.37	36.12	1280.7	50′	1157.0	115.66	2268.
3°	150.04	1.96	299.96	13°	652.81	37.07	1297.3	23°	1165.7	117.38	2284.
10′	158.38	2.19	316.62	10′	661.25	38.03	1313.8	10′	1174.4	119.12	2301.
20′	166.72	2.43	333.28	20′	669.70	39.01	1330.4	20′	1183.1	120.87	2317.
30′	175.06	2.67	349.94	30′	678.15	39.99	1346.9	30′	1191.8	122.63	2333.
40′	183.40	2.93	366.60	40′	686.60	40.99	1363.5	40′	1200.5	124.41	2350.
50′	191.74	3.21	383.27	50′	695.06	42.00	1380.0	50′	1209.2	126.20	2366.
4°	200.08	3.49	399.95	14°	703.51	43.03	1396.6	24°	1217.9	128.00	2382.
10′	208.43	3.79	416.60	10′	711.97	44.07	1413.1	10′	1226.6	129.82	2398.
20′	216.77	4.10	433.26	20′	720.44	45.12	1429.7	20′	1235.3	131.65	2415.
30′	225.12	4.42	449.91	30′	728.90	46.18	1446.2	30′	1244.0	133.50	2431.
40′	233.47	4.76	466.56	40′	737.37	47.25	1462.8	40′	1252.8	135.35	2447.
50′	241.81	5.10	483.22	50′	745.85	48.34	1479.3	50′	1261.5	137.23	2464.
5°	250.16	5.46	499.88	15°	754.32	49.44	1495.8	25°	1270.2	139.11	2480.
10′	258.51	5.83	516.53	10′	762.80	50.55	1512.4	10′	1279.0	141.01	2496.
20′	266.86	6.21	533.18	20′	771.29	51.68	1528.9	20′	1287.7	142.93	2512.
30′	275.21	6.61	549.83	30′	779.77	52.89	1545.4	30′	1296.5	144.85	2529.
40′	283.57	7.01	566.48	40′	788.26	53.97	1561.9	40′	1305.3	146.79	2545.
50′	291.92	7.43	583.12	50′	796.75	55.13	1578.4	50′	1314.0	148.75	2561.
6°	300.28	7.86	599.77	16°	805.25	56.31	1594.9	26°	1322.8	150.71	2577.
10′	308.64	8.31	616.41	10′	813.75	57.50	1611.4	10′	1331.6	152.69	2594.
20′	316.99	8.76	633.06	20′	822.25	58.70	1627.9	20′	1340.4	154.69	2610.
30′	325.35	9.23	649.70	30′	830.76	59.91	1644.4	30′	1349.2	156.70	2626.
40′	333.71	9.71	666.34	40′	839.27	61.14	1660.9	40′	1358.0	158.72	2642.
50′	342.08	10.20	682.98	50′	847.78	62.38	1677.4	50′	1366.8	160.76	2659.
7°	350.44	10.71	699.62	17°	856.30	63.63	1693.9	27°	1375.6	162.81	2675.
10′	358.81	11.22	716.25	10′	864.82	64.90	1710.4	10′	1384.4	164.86	2691.
20′	367.17	11.75	732.89	20′	873.35	66.18	1726.9	20′	1393.2	166.95	2707.
30′	375.54	12.29	749.52	30′	881.88	67.47	1743.3	30′	1402.0	169.04	2723.
40′	383.91	12.85	766.15	40′	890.41	68.77	1759.8	40′	1410.9	171.15	2740.
50′	392.28	13.41	782.78	50′	898.95	70.09	1776.2	50′	1419.7	173.27	2756.
8°	400.66	13.99	799.41	18°	907.49	71.42	1792.7	28°	1428.6	175.41	2772.
10′	409.03	14.58	816.01	10′	916.03	72.76	1809.2	10′	1437.4	175.55	2788.
20′	417.41	15.18	832.63	20′	924.58	74.12	1825.7	20′	1446.3	179.72	2804.
30′	425.79	15.80	849.25	30′	933.13	75.49	1842.1	30′	1455.1	181.89	2820.
40′	434.17	16.43	865.86	40′	941.69	76.86	1858.6	40′	1464.0	184.08	2837.
50′	442.55	17.07	882.48	50′	950.25	78.26	1875.0	50′	1472.9	186.29	2853.
9°	450.93	17.72	899.10	19°	958.81	79.67	1891.5	29°	1481.8	188.51	2869.
10′	459.32	18.38	915.71	10′	967.38	81.09	1907.9	10′	1490.7	190.74	2885.
20′	467.71	19.06	932.33	20′	975.96	82.53	1924.3	20′	1499.6	192.99	2901.
30′	476.10	19.75	948.95	30′	984.53	83.97	1940.8	30′	1508.5	195.25	2917.
40′	484.49	20.45	965.56	40′	993.12	85.43	1957.2	40′	1517.4	197.53	2933.
50′	492.88	21.16	982.18	50′	1001.7	86.90	1973.6	50′	1526.3	199.82	2950.
10°	501.28	21.89	998.80	20°	1010.3	88.39	1990.0	30°	1535.3	202.12	2966.
10′	509.68	22.62	1015.4	10′	1018.9	89.89	2006.4	10′	1544.2	204.44	2982.
20′	518.08	23.38	1032.0	20′	1027.5	91.40	2022.8	20′	1553.1	206.77	2998.
30′	526.48	24.14	1048.6	30′	1036.1	92.92	2039.2	30′	1562.1	209.12	3014.
40′	534.89	24.91	1065.2	40′	1044.7	94.46	2055.7	40′	1571.0	211.48	3030.
50′	543.29	25.70	1081.8	50′	1053.3	96.01	2072.1	50′	1580.0	213.86	3046.

Table III — Tangents, Externals and Chords to a 1° Curve

Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord
31°	1589.0	216.3	3062.5	**41**	2142.2	387.4	4013.4	**51**	2732.9	618.4	4933.7
10′	1598.0	218.7	3078.6	10′	2151.7	390.7	4029.0	10′	2743.1	622.8	4948.7
20′	1606.9	221.1	3094.7	20′	2161.2	394.1	4044.6	20′	2753.4	627.2	4963.7
30′	1615.9	223.5	3110.7	30′	2170.8	397.4	4060.2	30′	2763.7	631.7	4978.7
40′	1624.9	226.0	3126.7	40′	2180.3	400.8	4075.8	40′	2773.9	636.2	4993.7
50′	1633.9	228.4	3142.8	50′	2189.9	404.2	4091.3	50′	2784.2	640.7	5008.7
32°	1643.0	230.9	3158.8	**42**	2199.4	407.6	4106.9	**52°**	2794.5	645.2	5023.7
10′	1652.0	233.4	3174.8	10′	2209.0	411.1	4122.4	10′	2804.9	649.7	5038.7
20′	1661.0	235.9	3190.8	20′	2218.6	414.5	4138.0	20′	2815.2	654.3	5053.7
30′	1670.0	238.4	3206.8	30′	2228.1	418.0	4153.5	30′	2825.6	658.8	5068.6
40′	1679.1	241.0	3222.8	40′	2237.7	421.4	4169.1	40′	2835.9	663.4	5083.6
50′	1688.1	243.5	3238.9	50′	2247.3	425.0	4184.6	50′	2846.3	668.0	5098.5
33	1697.2	246.1	3254.9	**43**	2257.0	428.5	4200.1	**53°**	2856.7	672.7	5113.4
10′	1706.3	248.7	3270.8	10′	2266.6	432.0	4215.6	10′	2867.1	677.3	5128.3
20′	1715.3	251.3	3286.8	20′	2276.2	435.6	4231.1	20′	2877.5	682.0	5143.2
30′	1724.4	253.9	3302.7	30′	2285.9	439.2	4246.6	30′	2888.0	686.7	5158.1
40′	1733.5	256.5	3318.7	40′	2295.6	442.8	4262.0	40′	2898.4	691.4	5173.0
50′	1742.6	259.1	3334.6	50′	2305.2	446.4	4277.5	50′	2908.9	696.1	5187.6
34	1751.7	261.8	3350.6	**44**	2314.9	450.0	4293.0	**54°**	2919.4	700.9	5202.7
10′	1760.8	264.5	3366.5	10′	2324.6	453.6	4308.4	10′	2929.9	705.7	5217.6
20′	1770.0	267.2	3382.4	20′	2334.3	457.3	4323.9	20′	2940.4	710.5	5232.4
30′	1779.1	269.9	3398.4	30′	2344.1	461.0	4339.3	30′	2951.0	715.3	5247.2
40′	1788.2	272.6	3414.3	40′	2353.8	464.6	4354.7	40′	2961.5	720.1	5262.0
50′	1797.4	275.3	3430.2	50′	2363.5	468.4	4370.2	50′	2972.1	725.0	5276.8
35°	1806.6	278.1	3446.1	**45°**	2373.3	472.1	4385.6	**55**	2982.7	729.9	5291.6
10′	1815.7	280.8	3462.0	10′	2383.1	475.8	4401.0	10′	2993.3	734.8	5306.4
20′	1824.9	283.6	3477.9	20′	2392.8	479.6	4416.3	20′	3003.9	739.7	5321.1
30′	1834.1	286.4	3493.7	30′	2402.6	483.8	4431.7	30′	3014.5	744.6	5335.9
40′	1843.3	289.2	3509.6	40′	2412.4	487.2	4447.1	40′	3025.2	749.6	5350.7
50′	1852.3	292.0	3525.5	50′	2422.3	491.0	4462.4	50′	3035.8	754.6	5365.4
36°	1861.7	294.9	3541.3	**46°**	2432.1	494.8	4477.8	**56°**	3046.5	759.6	5380.1
10′	1870.9	297.7	3557.2	10′	2441.9	498.7	4493.1	10′	3057.2	764.6	5394.9
20′	1880.1	300.6	3573.0	20′	2451.8	502.5	4508.4	20′	3067.9	769.7	5409.6
30′	1889.4	303.5	3588.8	30′	2461.7	506.4	4523.8	30′	3078.7	774.7	5424.2
40′	1898.6	306.4	3604.7	40′	2471.5	510.3	4539.1	40′	3089.4	779.8	5438.9
50′	1907.9	309.3	3620.5	50′	2481.4	514.3	4554.4	50′	3100.2	784.9	5453.6
37°	1917.1	312.2	3636.3	**47°**	2491.3	518.2	4569.7	**57°**	3110.9	790.1	5468.2
10′	1926.4	315.2	3652.1	10′	2501.2	522.2	4585.0	10′	3121.7	795.2	5482.9
20′	1935.7	318.1	3667.9	20′	2511.2	526.1	4600.2	20′	3132.6	800.4	5497.5
30′	1945.0	321.1	3683.7	30′	2521.1	530.1	4615.5	30′	3143.4	805.6	5512.1
40′	1954.3	324.1	3699.5	40′	2531.1	534.2	4630.7	40′	3154.2	810.9	5526.7
50′	1963.6	327.1	3715.3	50′	2541.0	538.2	4646.0	50′	3165.1	816.1	5541.3
38	1972.9	330.2	3731.0	**48°**	2551.0	542.2	4661.2	**58°**	3176.0	821.4	5555.9
10′	1982.2	333.2	3746.8	10′	2561.0	546.3	4676.4	10′	3186.9	826.7	5570.5
20′	1991.5	336.3	3762.5	20′	2571.0	550.4	4691.6	20′	3197.8	832.0	5585.0
30′	2000.9	339.3	3778.3	30′	2581.0	554.5	4706.8	30′	3208.8	837.3	5599.6
40′	2010.2	342.4	3794.0	40′	2591.0	558.6	4722.0	40′	3219.7	842.7	5614.1
50′	2019.6	345.5	3809.7	50′	2601.1	562.8	4737.2	50′	3230.7	848.1	5628.7
39°	2029.0	348.6	3825.4	**49°**	2611.2	566.9	4752.4	**59°**	3241.7	853.5	5643.2
10′	2038.4	351.8	3841.1	10′	2621.2	571.1	4767.5	10′	3252.7	858.9	5657.7
20′	2047.8	354.9	3856.8	20′	2631.3	575.3	4782.7	20′	3263.7	864.3	5672.2
30′	2057.2	358.1	3872.5	30′	2641.4	579.5	4797.8	30′	3274.8	869.8	5686.6
40′	2066.6	361.3	3888.2	40′	2651.5	583.8	4813.0	40′	3285.8	875.3	5701.1
50′	2076.0	364.5	3903.9	50′	2661.6	588.0	4828.1	50′	3296.9	880.8	5715.6
40°	2085.4	367.7	3919.6	**50°**	2671.8	592.3	4843.2	**60°**	3308.0	886.4	5730.0
10′	2094.9	371.0	3935.2	10′	2681.9	596.6	4858.3	10′	3319.1	892.0	5744.4
20′	2104.3	374.2	3950.9	20′	2692.1	600.9	4873.4	20′	3330.3	897.5	5758.8
30′	2113.8	377.5	3966.5	30′	2702.3	605.3	4888.5	30′	3341.4	903.2	5773.2
40′	2123.3	380.8	3982.1	40′	2712.5	609.6	4903.5	40′	3352.6	908.8	5787.6
50′	2132.7	384.1	3997.8	50′	2722.7	614.0	4918.6	50′	3363.8	914.5	5802.0

Table III — Tangents, Externals and Chords to a 1° Curv

Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Ch
61°	3375.0	920.2	5816.4	**71°**	4086.9	1308.2	6654.9	**81°**	4893.6	1805.3	74
10′	3386.3	925.9	5830.7	10′	4099.5	1315.2	6668.4	10′	4908.0	1814.7	74
20′	3397.5	931.6	5845.1	20′	4112.1	1322.6	6682.0	20′	4922.5	1824.1	74
30′	3408.8	937.3	5859.4	30′	4124.8	1330.3	6695.5	30′	4937.0	1833.6	74
40′	3420.1	943.1	5873.7	40′	4137.4	1337.7	6709.0	40′	4951.5	1843.1	74
50′	3431.4	948.9	5888.0	50′	4150.1	1345.1	6722.5	50′	4966.1	1852.6	75
62°	3442.7	954.8	5902.3	**72°**	4162.8	1352.6	6736.0	**82°**	4980.7	1862.2	75
10′	3454.1	960.6	5916.6	10′	4175.6	1360.1	6749.5	10′	4995.4	1871.8	75
20′	3465.4	966.5	5930.9	20′	4188.5	1367.6	6763.0	20′	5010.0	1881.5	75
30′	3476.8	972.4	5945.1	30′	4201.2	1375.2	6776.4	30′	5024.8	1891.2	75
40′	3488.3	978.3	5959.4	40′	4214.0	1382.8	6789.8	40′	5039.5	1900.9	75
50′	3499.7	984.3	5973.6	50′	4226.8	1390.4	6803.3	50′	5054.3	1910.7	75
63°	3511.1	990.2	5987.8	**73°**	4239.7	1398.0	6816.7	**83°**	5069.2	1920.5	75
10′	3522.6	996.2	6002.0	10′	4252.6	1405.7	6830.0	10′	5084.0	1930.4	76
20′	3534.1	1002.3	6016.2	20′	4265.6	1413.5	6843.4	20′	5099.0	1940.3	761
30′	3545.6	1008.3	6030.4	30′	4278.5	1421.2	6856.8	30′	5113.9	1950.3	76
40′	3557.2	1014.4	6044.6	40′	4291.5	1429.0	6870.2	40′	5128.9	1960.2	76
50′	3568.7	1020.5	6058.7	50′	4304.6	1436.6	6883.5	50′	5143.9	1970.3	76
64°	3580.3	1026.6	6072.9	**74°**	4317.6	1444.6	6896.8	**84°**	5159.0	1980.4	76
10′	3591.9	1032.8	6087.0	10′	4330.7	1452.5	6910.1	10′	5174.1	1990.5	76
20′	3603.5	1039.0	6101.1	20′	4343.8	1460.4	6923.4	20′	5189.3	2000.6	76
30′	3615.1	1045.2	6115.2	30′	4356.9	1468.4	6936.7	30′	5204.4	2010.8	770
40′	3626.8	1051.4	6129.3	40′	4370.1	1476.4	6950.0	40′	5219.7	2021.1	771
50′	3638.5	1057.7	6143.4	50′	4383.3	1484.4	6963.2	50′	5234.9	2031.4	773
65°	3650.2	1063.9	6157.5	**75°**	4396.5	1492.4	6976.4	**85°**	5250.3	2041.7	774
10′	3661.9	1070.2	6171.5	10′	4409.8	1500.5	6989.6	10′	5265.6	2052.1	775
20′	3673.7	1076.6	6185.5	20′	4423.1	1508.6	7002.8	20′	5281.0	2062.5	776
30′	3685.4	1082.9	6199.6	30′	4436.4	1516.7	7016.0	30′	5296.4	2073.0	777
40′	3697.2	1089.3	6213.6	40′	4449.7	1524.9	7029.2	40′	5311.9	2083.5	779
50′	3709.0	1095.7	6227.6	50′	4463.1	1533.1	7042.3	50′	5327.4	2094.1	780
66°	3720.9	1102.2	6241.6	**76°**	4476.5	1541.4	7055.5	**86°**	5343.0	2104.7	781
10′	3732.7	1108.6	6255.5	10′	4489.9	1549.7	7068.6	10′	5358.6	2115.3	782
20′	3744.6	1115.1	6269.5	20′	4503.4	1558.0	7081.7	20′	5374.2	2126.0	784
30′	3756.5	1121.7	6283.4	30′	4516.9	1566.3	7094.8	30′	5389.9	2136.7	785
40′	3768.5	1128.2	6297.4	40′	4530.4	1574.7	7107.9	40′	5405.6	2147.5	786
50′	3780.4	1134.8	6311.3	50′	4544.0	1583.1	7121.0	50′	5421.4	2158.4	787
67°	3792.4	1141.4	6325.2	**77°**	4557.6	1591.6	7134.0	**87°**	5437.2	2169.2	788
10′	3804.4	1148.0	6339.1	10′	4571.2	1600.1	7147.0	10′	5453.1	2180.2	790
20′	3816.4	1154.7	6353.0	20′	4584.8	1608.6	7160.0	20′	5469.0	2191.1	791
30′	3828.4	1161.3	6366.8	30′	4598.5	1617.1	7173.0	30′	5484.9	2202.2	792
40′	3840.5	1168.1	6380.7	40′	4612.2	1625.7	7186.0	40′	5500.9	2213.2	793
50′	3852.6	1174.8	6394.5	50′	4626.0	1634.4	7199.0	50′	5517.0	2224.3	794
68°	3864.7	1181.6	6408.4	**78°**	4639.8	1643.0	7212.0	**88°**	5533.1	2235.5	796
10′	3876.8	1188.4	6422.2	10′	4653.6	1651.7	7225.0	10′	5549.2	2246.7	797
20′	3889.0	1195.2	6436.0	20′	4667.4	1660.5	7237.9	20′	5565.4	2258.0	798
30′	3901.2	1202.0	6449.7	30′	4681.3	1669.2	7250.8	30′	5581.6	2269.3	799
40′	3913.4	1208.9	6463.5	40′	4695.2	1678.1	7263.7	40′	5597.8	2280.6	800
50′	3925.6	1215.8	6477.3	50′	4709.2	1686.9	7276.6	50′	5614.2	2292.0	802
69°	3937.9	1222.9	6491.0	**79°**	4723.2	1695.8	7289.5	**89°**	5630.5	2303.5	803
10′	3950.2	1229.7	6504.7	10′	4737.2	1704.7	7302.3	10′	5646.9	2315.0	804
20′	3962.5	1236.7	6518.5	20′	4751.2	1713.7	7315.1	20′	5663.4	2326.6	805
30′	3974.8	1243.7	6532.2	30′	4765.3	1722.7	7328.0	30′	5679.9	2338.2	806
40′	3987.2	1250.8	6545.8	40′	4779.4	1731.7	7340.8	40′	5696.4	2349.8	807
50′	3999.5	1257.9	6559.5	50′	4793.6	1740.8	7353.6	50′	5713.0	2361.5	809
70°	4011.9	1265.0	6573.2	**80°**	4807.7	1749.9	7366.3	**90°**	5729.7	2373.3	810
10′	4024.4	1272.1	6586.8	10′	4822.0	1759.0	7379.1	10′	5746.3	2385.1	811
20′	4036.8	1279.3	6600.5	20′	4836.2	1768.2	7391.9	20′	5763.1	2397.0	812
30′	4049.3	1286.5	6614.1	30′	4850.5	1777.4	7404.6	30′	5779.9	2408.9	813
40′	4061.8	1293.6	6627.7	40′	4864.8	1786.7	7417.3	40′	5796.7	2420.9	815
50′	4074.4	1300.9	6641.3	50′	4879.2	1796.0	7430.0	50′	5813.6	2432.9	816

Table III — Tangents, Externals and Chords to a 1° Curve

Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord	Deg.	Tan.	Ext.	Chord
91°	5830.5	2444.9	8173.9	**96°**	6363.4	2833.2	8516.4	**101°**	6950.6	3278.1	8842.8
10′	5847.5	2457.1	8185.5	10′	6382.1	2847.0	8527.6	10′	6971.3	3294.1	8853.4
20′	5864.6	2469.3	8197.2	20′	6400.8	2861.0	8538.7	20′	6992.0	3310.1	8864.0
30′	5881.7	2481.5	8208.8	30′	6419.5	2875.0	8549.8	30′	7012.7	3326.1	8874.5
40′	5898.8	2493.8	8220.4	40′	6438.4	2889.0	8560.9	40′	7033.6	3342.3	8885.1
50′	5916.0	2506.1	8232.0	50′	6457.3	2903.1	8572.0	50′	7054.5	3358.5	8895.6
92°	5933.2	2518.5	8243.6	**97°**	6476.2	2917.3	8583.0	**102°**	7075.5	3374.9	8906.1
10′	5950.5	2531.0	8255.2	10′	6495.2	2931.6	8594.1	10′	7096.6	3391.2	8916.6
20′	5967.9	2543.5	8266.8	20′	6514.3	2945.9	8605.1	20′	7117.8	3407.7	8927.0
30′	5985.3	2556.0	8278.3	30′	6533.4	2960.3	8616.1	30′	7139.0	3424.3	8937.5
40′	6002.7	2568.6	8289.8	40′	6552.6	2974.7	8627.1	40′	7160.3	3440.9	8947.9
50′	6020.2	2581.3	8301.3	50′	6571.9	2989.2	8638.0	50′	7181.7	3457.6	8958.3
93°	6037.8	2594.0	8312.8	**98°**	6591.2	3003.8	8649.0	**103°**	7203.2	3474.4	8968.7
10′	6055.4	2606.8	8324.3	10′	6610.6	3018.4	8659.9	10′	7224.7	3491.3	8979.1
20′	6073.1	2619.7	8335.6	20′	6630.1	3033.1	8670.8	20′	7246.3	3508.2	8989.4
30′	6090.8	2632.6	8347.1	30′	6649.6	3047.9	8681.7	30′	7268.0	3525.2	8999.7
40′	6108.6	2645.5	8358.5	40′	6669.2	3062.8	8692.6	40′	7289.8	3542.4	9010.0
50′	6126.4	2658.5	8369.9	50′	6688.8	3077.7	8703.4	50′	7311.7	3559.6	9020.3
94°	6144.3	2671.6	8381.3	**99°**	6708.6	3092.7	8714.3	**104°**	7333.6	3576.8	9030.6
10′	6162.6	2684.7	8392.7	10′	6728.4	3107.7	8725.1	10′	7355.6	3594.2	9040.9
20′	6180.2	2697.9	8404.0	20′	6748.2	3122.9	8735.9	20′	7377.8	3611.7	9051.1
30′	6198.3	2711.2	8415.3	30′	6768.1	3138.1	8746.6	30′	7399.9	3629.2	9061.3
40′	6216.4	2724.5	8426.6	40′	6788.1	3153.3	8757.4	40′	7422.2	3646.8	9071.5
50′	6234.6	2737.9	8437.9	50′	6808.2	3168.7	8768.1	50′	7444.6	3664.5	9081.7
95°	6252.8	2751.3	8449.2	**100°**	6828.3	3184.1	8778.9	**105°**	7467.0	3682.3	9091.8
10′	6271.1	2764.8	8460.4	10′	6848.5	3199.6	8789.6	10′	7489.6	3700.2	9102.0
20′	6289.4	2778.3	8471.7	20′	6868.8	3215.1	8800.3	20′	7512.2	3718.2	9112.1
30′	6307.9	2792.0	8482.9	30′	6889.2	3230.8	8810.9	30′	7534.9	3736.2	9122.2
40′	6326.3	2805.6	8494.1	40′	6909.6	3246.5	8821.6	40′	7557.7	3754.4	9132.3
50′	6344.8	2819.4	8505.3	50′	6930.1	3262.3	8832.2	50′	7580.5	3772.6	9142.3

Corrections to be added to Table III

I	TANGENTS				EXTERNALS				CHORDS				I
	Cve.5°	10°	15°	20°	5°	10°	15°	20°	5°	10°	15°	20°Cve.	
10°	.03	.06	.09	.13	.00	.00	.00	.01	.06	.12	.19	.24	10°
15°	.04	.10	.14	.19	.00	.01	.01	.01	.08	.18	.28	.37	15°
20°	.06	.13	.19	.26	.01	.01	.02	.02	.10	.24	.38	.49	20°
25°	.08	.16	.24	.33	.01	.02	.03	.04	.12	.30	.48	.61	25°
30°	.10	.19	.29	.39	.01	.03	.04	.05	.14	.36	.58	.73	30°
35°	.11	.22	.34	.47	.02	.04	.05	.07	.17	.41	.66	.84	35°
40°	.13	.26	.40	.53	.02	.05	.07	.09	.20	.46	.75	.95	40°
45°	.15	.30	.44	.60	.03	.06	.09	.12	.23	.52	.84	1.06	45°
50°	.17	.34	.51	.68	.04	.08	.12	.15	.26	.58	.93	1.18	50°
55°	.19	.38	.57	.76	.05	.09	.14	.19	.28	.64	1.02	1.30	55°
60°	.21	.42	.63	.84	.06	.11	.17	.23	.30	.68	1.10	1.40	60°
65°	.23	.46	.69	.93	.07	.14	.20	.27	.32	.73	1.18	1.50	65°
70°	.25	.51	.76	1.02	.08	.16	.24	.32	.34	.78	1.26	1.60	70°
75°	.27	.56	.83	1.12	.10	.18	.29	.38	.36	.84	1.34	1.70	75°
80°	.30	.61	.91	1.22	.11	.22	.33	.45	.38	.89	1.42	1.80	80°
85°	.33	.66	1.00	1.33	.13	.26	.39	.52	.40	.93	1.49	1.90	85°
90°	.36	.72	1.09	1.45	.15	.30	.45	.60	.42	.98	1.56	1.98	90°
95°	.39	.79	1.19	1.55	.17	.35	.52	.71	.44	1.04	1.64	2.06	95°
100°	.43	.86	1.30	1.74	.20	.40	.60	.81	.46	1.07	1.69	2.14	100°
105°	.47	.94	1.43	1.88	.23	.46	.69	.92	.48	1.10	1.74	2.22	105°

To find tangent, external or chord for any degree of curve under 21° take same for a 1° curve from table III, divide by given degree of curve and add correction taken from correction table.

For curves sharper than 20° figure tangents etc., by formulae for simple curves. Page 11.

Table IV — Natural Sines, Cosines, Tangents and Cotangents

Deg.	Sine	Cos.	Tan.	Cot.	Deg.	Deg.	Sine	Cos.	Tan.	Cot.	Deg.
0°	.0000	1	.0000	Inf.	**90°**	**10°**	.1736	.9848	.1763	5.6713	**80°**
10′	.0029	1	.0029	343.77	50′	10′	.1765	.9843	.1793	5.5764	50′
20′	.0058	1	.0058	171.88	40′	20′	.1794	.9838	.1823	5.4845	40′
30′	.0087	.9999	.0087	114.59	30′	30′	.1822	.9832	.1853	5.3955	30′
40′	.0116	.9999	.0116	85.949	20′	40′	.1851	.9827	.1884	5.3093	20′
50′	.0145	.9999	.0145	68.750	10′	50′	.1880	.9822	.1914	5.2257	10′
1°	.0175	.9998	.0175	57.290	**89°**	**11°**	.1908	.9816	.1944	5.1445	**79°**
10′	.0204	.9998	.0204	49.104	50′	10′	.1937	.9811	.1974	5.0658	50′
20′	.0233	.9997	.0233	42.964	40′	20′	.1965	.9805	.2004	4.9894	40′
30′	.0262	.9997	.0262	38.188	30′	30′	.1994	.9799	.2035	4.9152	30′
40′	.0291	.9996	.0291	34.368	20′	40′	.2022	.9793	.2065	4.8430	20′
50′	.0320	.9995	.0320	31.242	10′	50′	.2051	.9788	.2095	4.7729	10′
2°	.0349	.9994	.0349	28.636	**88°**	**12°**	.2079	.9782	.2126	4.7046	**78°**
10′	.0378	.9993	.0378	26.432	50′	10′	.2110	.9775	.2156	4.6382	50′
20′	.0407	.9992	.0407	24.542	40′	20′	.2136	.9769	.2186	4.5736	40′
30′	.0436	.9990	.0437	22.904	30′	30′	.2164	.9763	.2217	4.5107	30′
40′	.0465	.9989	.0466	21.470	20′	40′	.2193	.9757	.2248	4.4494	20′
50′	.0494	.9988	.0495	20.206	10′	50′	.2221	.9750	.2278	4.3897	10′
3°	.0523	.9986	.0524	19.081	**87°**	**13°**	.2250	.9744	.2309	4.3315	**77°**
10′	.0552	.9985	.0553	18.075	50′	10′	.2278	.9737	.2339	4.2747	50′
20′	.0581	.9983	.0582	17.169	40′	20′	.2306	.9730	.2370	4.2193	40′
30′	.0610	.9981	.0612	16.350	30′	30′	.2334	.9724	.2400	4.1653	30′
40′	.0640	.9980	.0641	15.605	20′	40′	.2363	.9717	.2432	4.1126	20′
50′	.0668	.9978	.0670	14.924	10′	50′	.2391	.9710	.2462	4.0611	10′
4°	.0698	.9976	.0699	14.300	**86°**	**14°**	.2419	.9703	.2493	4.0108	**76°**
10′	.0727	.9974	.0728	13.727	50′	10′	.2450	.9695	.2524	3.9616	50′
20′	.0756	.9971	.0758	13.197	40′	20′	.2476	.9689	.2555	3.9136	40′
30′	.0785	.9969	.0787	12.706	30′	30′	.2504	.9682	.2586	3.8667	30′
40′	.0814	.9967	.0816	12.250	20′	40′	.2532	.9674	.2617	3.8208	20′
50′	.0843	.9964	.0846	11.826	10′	50′	.2560	.9667	.2648	3.7760	10′
5°	.0872	.9962	.0875	11.430	**85°**	**15°**	.2588	.9660	.2680	3.7320	**75°**
10′	.0900	.9960	.0904	11.024	50′	10′	.2616	.9652	.2711	3.6891	50′
20′	.0930	.9957	.0934	10.712	40′	20′	.2644	.9644	.2742	3.6471	40′
30′	.0959	.9954	.0963	10.385	30′	30′	.2672	.9636	.2773	3.6059	30′
40′	.0987	.9951	.0992	10.078	20′	40′	.2700	.9628	.2805	3.5656	20′
50′	.1016	.9948	.1022	9.7782	10′	50′	.2728	.9620	.2836	3.5261	10′
6°	.1045	.9945	.1051	9.5144	**84°**	**16°**	.2756	.9613	.2868	3.4874	**74°**
10′	.1074	.9942	.1080	9.2553	50′	10′	.2787	.9604	.2899	3.4495	50′
20′	.1103	.9939	.1110	9.0098	40′	20′	.2812	.9596	.2931	3.4124	40′
30′	.1132	.9936	.1139	8.7769	30′	30′	.2840	.9588	.2962	3.3759	30′
40′	.1161	.9932	.1169	8.5555	20′	40′	.2868	.9580	.2994	3.3402	20′
50′	.1190	.9929	.1198	8.3450	10′	50′	.2896	.9572	.3025	3.3052	10′
7°	.1219	.9925	.1228	8.1443	**83°**	**17°**	.2924	.9563	.3057	3.2708	**73°**
10′	.1248	.9922	.1257	7.9530	50′	10′	.2954	.9554	.3089	3.2371	50′
20′	.1276	.9918	.1287	7.7704	40′	20′	.2980	.9546	.3121	3.2041	40′
30′	.1305	.9914	.1316	7.5958	30′	30′	.3007	.9537	.3153	3.1716	30′
40′	.1334	.9910	.1346	7.4287	20′	40′	.3035	.9528	.3185	3.1397	20′
50′	.1363	.9907	.1376	7.2687	10′	50′	.3062	.9520	.3217	3.1084	10′
8°	.1392	.9903	.1405	7.1154	**82°**	**18°**	.3090	.9511	.3249	3.0777	**72°**
10′	.1420	.9899	.1435	6.9682	50′	10′	.3121	.9500	.3281	3.0475	50′
20′	.1449	.9894	.1465	6.8269	40′	20′	.3145	.9492	.3314	3.0178	40′
30′	.1478	.9890	.1495	6.6912	30′	30′	.3173	.9483	.3346	2.9887	30′
40′	.1507	.9886	.1524	6.5605	20′	40′	.3200	.9474	.3378	2.9600	20′
50′	.1536	.9881	.1554	6.4348	10′	50′	.3228	.9464	.3411	2.9319	10′
9°	.1564	.9877	.1584	6.3138	**81°**	**19°**	.3256	.9455	.3443	2.9042	**71°**
10′	.1593	.9872	.1614	6.1970	50′	10′	.3283	.9446	.3476	2.8770	50′
20′	.1622	.9868	.1644	6.0844	40′	20′	.3311	.9436	.3508	2.8502	40′
30′	.1650	.9863	.1673	5.9758	30′	30′	.3338	.9426	.3541	2.8239	30′
40′	.1679	.9858	.1703	5.8708	20′	40′	.3366	.9417	.3574	2.7980	20′
50′	.1708	.9853	.1733	5.7694	10′	50′	.3393	.9407	.3607	2.7725	10′
10°	.1736	.9848	.1763	5.6713	**80°**	**20°**	.3420	.9397	.3640	2.7475	**70°**
Deg.	Cos.	Sine	Cot.	Tan.	Deg.	Deg.	Cos.	Sine	Cot.	Tan.	Deg.

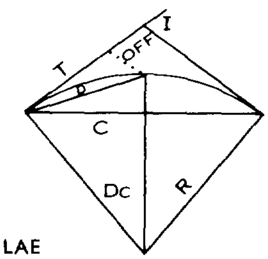
Table IV— Natural Sines, Cosines, Tangents and Cotangents

Deg.	Sine	Cos.	Tan.	Cot.	Deg.
20°	.3420	.9397	.3640	2.7475	70°
10′	.3448	.9387	.3673	2.7228	50′
20′	.3475	.9377	.3706	2.6975	40′
30′	.3502	.9367	.3739	2.6746	30′
40′	.3529	.9356	.3772	2.6511	20′
50′	.3556	.9346	.3805	2.6279	10′
21°	.3584	.9336	.3839	2.6051	69°
10′	.3614	.9325	.3872	2.5826	50′
20′	.3638	.9315	.3906	2.5605	40′
30′	.3665	.9304	.3939	2.5386	30′
40′	.3692	.9293	.3973	2.5172	20′
50′	.3719	.9283	.4006	2.4960	10′
22°	.3746	.9272	.4040	2.4751	68°
10′	.3776	.9261	.4074	2.4545	50′
20′	.3800	.9250	.4108	2.4342	40′
30′	.3827	.9239	.4142	2.4142	30′
40′	.3854	.9228	.4176	2.3945	20′
50′	.3880	.9216	.4210	2.3750	10′
23°	.3907	.9205	.4245	2.3558	67°
10′	.3934	.9194	.4279	2.3369	50′
20′	.3961	.9182	.4314	2.3183	40′
30′	.3988	.9171	.4348	2.2998	30′
40′	.4014	.9159	.4383	2.2817	20′
50′	.4041	.9147	.4418	2.2637	10′
24°	.4067	.9136	.4452	2.2460	66°
10′	.4094	.9124	.4487	2.2286	50′
20′	.4120	.9111	.4522	2.2113	40′
30′	.4147	.9100	.4557	2.1943	30′
40′	.4173	.9088	.4592	2.1775	20′
50′	.4200	.9075	.4628	2.1609	10′
25°	.4226	.9063	.4663	2.1445	65°
10′	.4252	.9050	.4698	2.1283	50′
20′	.4279	.9038	.4734	2.1123	40′
30′	.4305	.9026	.4770	2.0965	30′
40′	.4331	.9013	.4806	2.0809	20′
50′	.4358	.9000	.4841	2.0655	10′
26°	.4384	.8988	.4877	2.0503	64°
10′	.4410	.8975	.4913	2.0353	50′
20′	.4436	.8962	.4950	2.0204	40′
30′	.4462	.8949	.4986	2.0057	30′
40′	.4488	.8936	.5022	1.9912	20′
50′	.4514	.8923	.5059	1.9768	10′
27°	.4540	.8910	.5095	1.9626	63°
10′	.4566	.8897	.5132	1.9486	50′
20′	.4592	.8884	.5169	1.9347	40′
30′	.4618	.8870	.5206	1.9210	30′
40′	.4643	.8857	.5243	1.9074	20′
50′	.4669	.8843	.5280	1.8940	10′
28°	.4695	.8830	.5317	1.8807	62°
10′	.4720	.8816	.5355	1.8676	50′
20′	.4746	.8802	.5392	1.8546	40′
30′	.4772	.8788	.5430	1.8418	30′
40′	.4797	.8774	.5467	1.8291	20′
50′	.4823	.8760	.5505	1.8165	10′
29°	.4848	.8746	.5543	1.8040	61°
10′	.4874	.8732	.5581	1.7917	50′
20′	.4899	.8718	.5619	1.7796	40′
30′	.4924	.8704	.5658	1.7675	30′
40	.4950	.8689	.5696	1.7556	20′
50′	.4975	.8675	.5735	1.7438	10′
30°	.5000	.8660	.5774	1.7320	60°
Deg.	Cos.	Sine.	Cot.	Tan.	Deg.

Deg.	Sine	Cos.	Tan.	Cot.	Deg.
30°	.5000	.8660	.5774	1.7320	60°
10′	.5025	.8646	.5812	1.7205	50′
20′	.5050	.8631	.5851	1.7090	40′
30′	.5075	.8616	.5891	1.6977	30′
40′	.5100	.8602	.5930	1.6864	20′
50′	.5125	.8587	.5969	1.6753	10′
31°	.5150	.8572	.6009	1.6643	59°
10′	.5175	.8557	.6048	1.6534	50′
20′	.5200	.8542	.6088	1.6426	40′
30′	.5225	.8526	.6128	1.6318	30′
40′	.5250	.8511	.6168	1.6212	20′
50′	.5275	.8495	.6208	1.6107	10′
32°	.5299	.8480	.6249	1.6002	58°
10′	.5326	.8463	.6289	1.5900	50′
20′	.5350	.8448	.6330	1.5798	40′
30′	.5373	.8434	.6371	1.5697	30′
40′	.5397	.8418	.6412	1.5597	20′
50′	.5422	.8402	.6453	1.5497	10′
33°	.5446	.8387	.6494	1.5399	57°
10′	.5471	.8371	.6536	1.5301	50′
20′	.5495	.8355	.6577	1.5204	40′
30′	.5519	.8339	.6619	1.5108	30′
40′	.5544	.8323	.6661	1.5013	20′
50′	.5568	.8307	.6703	1.4919	10′
34°	.5592	.8290	.6745	1.4826	56°
10′	.5616	.8274	.6788	1.4733	50′
20′	.5640	.8258	.6830	1.4641	40′
30′	.5664	.8241	.6873	1.4550	30′
40′	.5688	.8225	.6916	1.4460	20′
50′	.5712	.8208	.6959	1.4370	10′
35°	.5736	.8192	.7002	1.4281	55°
10′	.5760	.8175	.7046	1.4193	50′
20′	.5783	.8158	.7089	1.4106	40′
30′	.5807	.8141	.7133	1.4020	30′
40′	.5831	.8124	.7177	1.3934	20′
50′	.5854	.8107	.7221	1.3848	10′
36°	.5878	.8090	.7265	1.3764	54°
10′	.5901	.8073	.7310	1.3680	50′
20′	.5925	.8056	.7355	1.3597	40′
30′	.5948	.8039	.7400	1.3514	30′
40′	.5972	.8021	.7445	1.3432	20′
50′	.5995	.8004	.7490	1.3351	10′
37°	.6018	.7986	.7536	1.3270	53°
10′	.6041	.7969	.7581	1.3190	50′
20′	.6065	.7951	.7627	1.3111	40′
30′	.6088	.7935	.7673	1.3032	30′
40′	.6111	.7916	.7720	1.2954	20′
50′	.6134	.7898	.7766	1.2876	10′
38°	.6157	.7880	.7813	1.2799	52°
10′	.6180	.7862	.7860	1.2723	50′
20′	.6202	.7844	.7907	1.2647	40′
30′	.6225	.7826	.7954	1.2572	30′
40′	.6248	.7808	.8002	1.2497	20′
50′	.6271	.7790	.8050	1.2423	10′
39°	.6293	.7772	.8098	1.2349	51°
10′	.6316	.7753	.8146	1.2276	50′
20′	.6338	.7735	.8195	1.2203	40′
30′	.6361	.7716	.8243	1.2131	30′
40′	.6383	.7698	.8292	1.2059	20′
50′	.6406	.7679	.8341	1.1988	10′
40°	.6428	.7660	.8391	1.1918	50°
Deg.	Cos.	Sine.	Cot.	Tan.	Deg.

Table IV

Deg.	Sine	Cos.	Tan.	Cot.	Deg.
40°	.6428	.7660	.8391	1.1918	50°
10′	.6450	.7642	.8441	1.1847	50′
20′	.6472	.7623	.8491	1.1778	40′
30′	.6494	.7604	.8541	1.1708	30′
40′	.6517	.7585	.8591	1.1640	20′
50′	.6539	.7566	.8642	1.1572	10′
41°	.6561	.7547	.8693	1.1504	49°
10′	.6582	.7528	.8744	1.1436	50′
20′	.6604	.7509	.8795	1.1369	40′
30′	.6626	.7490	.8847	1.1303	30′
40′	.6648	.7470	.8899	1.1237	20′
50′	.6670	.7451	.8952	1.1171	10′
42°	.6691	.7431	.9004	1.1106	48°
10′	.6713	.7412	.9057	1.1041	50′
20′	.6734	.7392	.9110	1.0977	40′
30′	.6756	.7373	.9163	1.0913	30′
40′	.6773	.7353	.9217	1.0850	20′
50′	.6799	.7333	.9271	1.0786	10′
43°	.6820	.7313	.9325	1 0724	47°
10′	6841	.7293	.9380	1.0661	50′
20′	.6862	.7273	.9435	1.0600	40′
30′	.6884	.7253	.9490	1.0538	30′
40′	.6905	.7233	.9545	1.0477	20′
50′	.6926	.7213	.9600	1.0416	10′
44°	.6947	.7193	.9657	1.0355	46°
10′	.6968	.7173	.9713	1.0295	50′
20′	.6988	.7153	.9770	1.0235	40′
30′	.7009	.7132	.9827	1.0176	30′
40′	.7030	.7112	.9884	1.0117	20′
50′	.7050	.7092	.9942	1.0058	10′
45°	.7071	.7071	1.0000	1.0000	45°
Deg.	Cos.	Sine	Cot.	Tan.	Deg.



CURVE FORMULAE

Let:— R — Radius. T — Tangent. I — Intersection Angle. E — External.
C — Long chord for Total I.

Then $R = \frac{50}{\text{Sin. D}}$

$R = Tx.\ \text{Cot.}\ \frac{1}{2}$

$T = Rx.\ \tan,\ \frac{1}{2}$

$T = \frac{50 \times \text{Tan.}\ \frac{1}{2}}{\text{Sin. D}}$

$\text{Sin. D} = \frac{50}{R}$

$E = Rx.\ \text{Exsec}\ \frac{1}{2}$

$E = Tx.\ \tan,\ \frac{1}{4}$

$C = 2\ R\ \text{Sin.}\ \frac{1}{2}$

For approximate check on transit work and to run simple curves in roughly by tangent or chord deflection:—

Sine 1° for 1 ft. = .0175 = 1.75 per 100′

Given degree of curve and line of tangent

Offset from tan produced to any given point on curve

$\text{Offset} = \frac{1.75 \times \text{degree of curve} \times (\text{distance in stations})_2}{2}$

Given degree of curve and line of chord

Offset from chord produced to any given point on curve

$= \frac{.0175 \times \text{degree} \times (\text{length of chord} + \text{given distance})}{2}$

To find Middle ordinate for any curve

Middle ordinate of 1° curve for 100 ft. = .22′

Middle ordinate for any given degree of curve for 100 ft. = .22 x give degree of curve.

Middle ordinate for any given length of chord varies as the sq. of the length Rt angle offset may be obtained from any point on a line, remembering that th sides of a rt. angle triangle are in the ratio of 3, 4 and 5.

Table V

TEMP. CORRECTION = 0.00000640 (t°68°) X MEASURED DISTANCE

STEEL TAPE CORRECTION CHART

SUBTRACT FROM MEASURED DISTANCE — ADD TO LAID OFF DISTANCE

ADD TO MEASURED DISTANCE — SUBTRACT FROM LAID OFF DISTANCE

TEMP. \ DIST.	100′	200′	300′	400′	500′	600′	700′	800′	900′	DIST. \ TEMP.
− 20°	.056	.11	.17	.23	.28	.34	.39	.45	.51	
18	.055	.11	.17	.22	.28	.33	.39	.44	.50	
16	.054	.11	.16	.22	.27	.32	.38	.43	.48	
14	.052	.10	.16	.21	.26	.31	.37	.42	.47	
12	.051	.10	.15	.20	.26	.31	.36	.41	.46	
10	.050	.10	.15	.20	.25	.30	.35	.40	.45	
− 8°	.048	.10	.15	.19	.24	.29	.34	.39	.44	
6	.047	.09	.14	.19	.24	.28	.33	.38	.43	
4	.046	.09	.14	.18	.23	.28	.32	.37	.41	
2	.045	.09	.13	.18	.22	.27	.31	.36	.40	
0	.044	.09	.13	.17	.22	.26	.30	.35	.39	
+ 2°	.042	.08	.13	.17	.21	.25	.30	.34	.38	
4	.041	.08	.12	.16	.20	.25	.29	.33	.37	
6	.040	.08	.12	.16	.20	.24	.28	.32	.36	
8	.038	.08	.12	.15	.19	.23	.27	.31	.35	
10	.037	.07	.11	.15	.19	.22	.26	.30	.33	
+ 12°	.036	.07	.11	.14	.18	.22	.25	.29	.32	
14	.035	.07	.10	.14	.17	.21	.24	.28	.31	
16	.033	.07	.10	.13	.17	.20	.23	.27	.30	
18	.032	.06	.10	.13	.16	.19	.22	.26	.29	
20	.031	.06	.09	.12	.15	.18	.22	.25	.28	
+ 22°	.029	.06	.09	.12	.15	.18	.21	.24	.26	
24	.028	.06	.08	.11	.14	.17	.20	.23	.25	
26	.027	.05	.08	.11	.13	.16	.19	.22	.24	+ 110°
28	.026	.05	.08	.10	.13	.15	.18	.20	.23	108
30	.024	.05	.07	.10	.12	.15	.17	.19	.22	106
+ 32°	.023	.05	.07	.09	.12	.14	.16	.18	.21	104
34	.022	.04	.07	.09	.11	.13	.15	.17	.20	102
36	.020	.04	.06	.08	.10	.12	.14	.16	.18	+ 100°
38	.019	.04	.06	.08	.10	.12	.13	.15	.17	98
40	.018	.04	.05	.07	.09	.11	.13	.14	.16	96
+ 42°	.017	.03	.05	.07	.08	.10	.12	.13	.15	94
44	.015	.03	.05	.06	.08	.09	.11	.12	.14	92
46	.014	.03	.04	.06	.07	.08	.10	.11	.13	+ 90°
48	.013	.03	.04	.05	.06	.08	.09	.10	.12	88
50	.012	.02	.03	.05	.06	.07	.08	.09	.10	86
+ 52°	.010	.02	.03	.04	.05	.06	.07	.08	.09	84
54	.009	.02	.03	.04	.04	.05	.06	.07	.08	82
56	.008	.02	.02	.03	.04	.05	.05	.06	.07	+ 80°
58	.006	.01	.02	.03	.03	.04	.04	.05	.06	78
60	.005	.01	.02	.02	.03	.03	.04	.04	.05	76
+ 62°	.004	.01	.01	.02	.02	.02	.03	.03	.03	74
64	.003	.01	.01	.01	.01	.02	.02	.02	.02	72
66	.001	.00	.00	.01	.01	.01	.01	.01	.01	70
+ 68°	.000	.00	.00	.00	.00	.00	.00	.00	.00	+ 68°
TEMP. \ DIST.	100′	200′	300′	400′	500′	600′	700′	800′	900′	TEMP. \ DIST.

The Metric System

LINEAR

Metric System

10 millimetres (mm.)	= 1 centimetre (cm.)
100 centimetres	= 1 metre (m.)
1000 metres	= 1 kilometre (km.)

Imperial System

12 inches	= 1 foot
3 feet	= 1 yard.
1760 yards	= 1 mile

Metric and Imperial Equivalents

1 millimetre	= 0.03937 inches	1 inch	= 25.4 millimetres
1 centimetre	= 0.3937 inches	1 inch	= 2.54 centimetres
1 metre	= 39.37 inches	1 inch	= 0.0254 metres
1 metre	= 3.2808 feet	1 yard	= 0.0009144 kilometres
1 metre	= 1.0936 yards	1 mile	= 1.609344 kilometres
1 kilometre	= 1093.61 yards	1 foot	0.3048 metres
1 kilometre	= 0.621371 miles	1 yard	0.9144 metres

Metric and Imperial Conversion Factors

Millimetres	X	0.03937	= Inches	Inches	X	25.4	= Millimetres
Centimetres	X	0.3937	= Inches	Inches	X	2.54	= Centimetres
Metres	X	39.37	= Inches	Inches	X	0.0254	= Metres
Metres	X	3.2808	= Feet	Feet	X	0.3048	Metres
Metres	X	1.0936	= Yards	Yards	X	0.9144	Metres
Kilometres	X	1093.61	Yards	Yards	X	0.0009144	= Kilometres
Kilometres	X	0.62137	= Miles	Miles	X	1.609344	Kilometres

WEIGHT

Metric System

1000 gram (g.)	= 1 kilogram (kg.)
1000 kilogram	= 1 tonne (t.)

Imperial System

16 oz	1 lb
2000 lb	1 ton
2240 lb	1 long ton

Metric and Imperial Equivalents

1 Gram	0.035 Ounces		
1 Kilogram	2.2 Pounds	1 Ounce	= 28.35 Grams
1 Tonne	1.102 Tons (2000 lb.)	1 Pound	= 453.6 Grams
1 Tonne	0.984 Long Tons(2240lb.)	1 Ton (2000 lb.)	= 0.907 Tonnes
		1 Long Ton (2240 lb.)	= 1.016 Tonnes

Metric and Imperial Conversion Factors

g	X	0.035	= oz.	oz	X	28.35	= g
kg	X	2.2	= lb.	lb	X	0.454	= kg
t	X	1.102	= tons (2000 lb.)	tons (2000 lb.)	X	0.907	= t
t	X	0.984	long tons(2240lb.)	long tons (2240 lb.)	X	1.016	t

AREA

Metric and Imperial Equivalents

1 Square Millimetre	= 0.00155 Square Inches	1 Square Inch	645.16 Square Millimetres
1 Square Centimetre	= 0.155 Square Inches	1 Square Foot	= 929 Square Centimetres
1 Square Metre	10.76 Square Feet	1 Square Yard	0.836 Square Metres
1 Square Metre	= 1.196 Square Yards	1 Square Mile	2.59 Square Kilometres
1 Square Kilometre	= 0.386 Square Miles		

Metric and Imperial Conversion Factors

sq. mm	X 0.00155	sq. ins.	sq. ins	X 645.16	sq. mm.
sq. cm.	X 0.155	sq. ins.	sq. ins	X 6.452	= sq. cm
sq. m.	X 10.76	sq. ft	sq. ft	X 929.0	sq. cm
sq. m.	X 1.196	sq. yards	sq. yards	X 0.836	sq. m
sq. km.	X 0.386	sq. miles	sq. miles	X 2.59	= sq. km

VOLUME

Metric and Imperial Equivalents

1 Cubic Centimetre	0.061 Cubic Inches	1 Cubic Inch	= 16.4 Cubic Centimetres
1 Cubic Metre	= 1.31 Cubic Yards	1 Cubic Foot	= 0.028 Cubic Metres
1 Cubic Metre	35.31 Cubic Feet	1 Cubic Yard	= 0.76 Cubic Metres
1 Litre	1.76 Pints	1 Pint	= 0.57 Litres
1 Litre	= 0.22 Gallons (Imperial)	1 gallon (Imperial)	= 4.55 Litres

Metric and Imperial Conversion Factors

Cubic cm	X 0.061	Cubic ins	Cubic ins	X 16.4	= Cubic cm
Cubic m	X 1.31	= Cubic yards	Cubic yards	X 0.764	= Cubic m
Cubic m	X 35.31	Cubic ft	Cubic ft	X 0.0283	Cubic m
1 litre	X 1.76	pts	pts	X 0.57	= 1 litre
1 litre	X 0.22	gallons (Imperial)	gallons	X 4.55	1 litre

Calibration of a Level

Automatic Levels

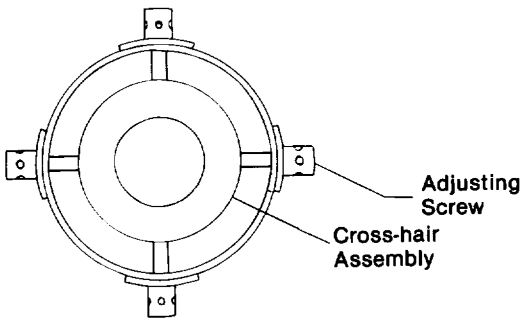
The cross-hair adjustment screws on most automatic levels are under a threaded cover adjacent to the eyepiece. Adjustment is accomplished by slightly tightening or loosening one of the top or bottom screws with the adjusting pin supplied in the instrument case.

The hair is moved up by turning the top screw clock-wise or the bottom screw counter clock-wise. To move the cross-hair down, the motions are reversed. Very slight adjustment of these screws will move the cross-hair significantly. On most European levels; the adjustment is the reverse of this procedure. The adjusting screws should always be under some tension at all times.

Dumpy Levels

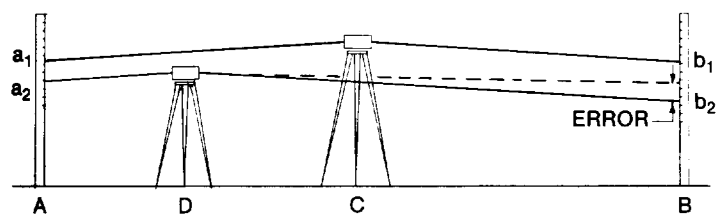
On Dumpy Levels, the cross-hair adjustment screws are generally exposed, capstan-head type on the telescope body near the eye-piece end. Adjustment is identical to European automatic levels. To move the cross-hair up, the bottom screw is tightened clock-wise or the top screw loosened counter-clockwise.

If more than one or two inches per 100ft. error is observed when checking the level, there has likely been some damage to the instrument and it should be examined by a qualified service shop.

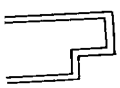


Checking a Level

Establish two firm points, A and B, about 50m apart and set up a scale at each location. Set up the level at, C, midway between A and B. Level the instrument ensuring that the bubble is centered in all positions. Record elevation readings from scale A and B thus a_1 and b_1 respectively. Set up the instrument again at a point D, about 4m from A. After levelling the instrument, record elevation readings from scale A and B, thus a_2 and b_2 respectively. If the elevation difference at A and at B are the same ($a_1 - a_2 = b_1 - b_2$) then the instrument is in perfect adjustment and calibration is not needed. If the elevation difference is not the same ($a_1 - a_2 \neq b_1 - b_2$) then calibration is required. Half of the elevation difference must be removed by sighting scale B and adjusting the instrument cross hair in the direction that tends towards the correct elevation reading from b_2.



NOTE KEEPING

B.S.	Backsight.
b.b.	Base-board of fence.
BM.	Bench-mark.
C.B.	Catch basin.
C.	Center.
₵	Center line.
–x–x–x	Chainline fence.
cb.	Curb.
cf	Crow-foot (mark like this or).
C.C.	Cut cross (+).
c c f	Cut crow-foot (cut into wood or stone).
dh.	Drill-hole.
–.–.–	Fence.
	Fence, showing on which side the posts are.
F.S.	Foresight.
I.B.	Iron Bar.
	Line of building; the outside line is the base-board, the cross-hatched part is the line of the stone or brick under-pinning.
M.H.	Manhole.
Mon.	Monument.
na.	Nail.
□	Stadia Station.
Spk.	Spike.
Stk.	Stake.
S.I.B.	Standard Iron Bar.
SB	Stone bound.
tk.	Tack.
Tel.	Telephone pole.
○	Transit Traverse Point.
△	Triangulation Station.
T.P.	Turning point.

No. LINE 0+00

Date .... Page ....

STA.	iN	out	gnd		
2+50	+6	+4			
–	+7	+4			
2 N	+4	+6			
–	+14	+6			
–	+26	+14			
–	+17	+10			
1 N	+11	+28			
–	-8	+11			
–	-14	+10			
–	-18	+17			
BL	-30	+12			
–	-40	+15			
–	-32	+10			
–	-26	+4			
1S	-20	+16			
–	-11	+14			
–	-8	+9			
–	+3	+6			
2	+4	+2			
–	+5	+3			
–	+6	+10			
–	+15	+6			
3	+23	+5			
–	+10	+4			
–	+10	+3			
–	+5	+3			

No. L 0+00
Date .... Page ....

STA	IN	QUAD
4 S	+4	-3
–	+1	-6
–	+5	-4
–	+5	+12
5 S	+6	+4
–	+4	0
–	+3	+2
–	+6	+4
6 S	+5	+3
–	+7	+5
–	+7	+5
6+75 S,	+4	+2

No. LINE 0+50 E
Date .... Page ....

STA	IN	QUAD
2+75 N,	+7	+4
–	+6	+9
–	+3	+6
2N	+8	+4
–	+10	+7
–	+17	+11
–	+14	+10
1N	+8	+12
–	-6	+9
–	-15	+13
–	-16	+12
BL	-31	+16
–	-34	+13
–	-34	+12
–	-33	+8
1S	-28	+10
–	-26	+6
–	-22	+4
–	+4	+9
2S	+8	+4
–	+14	+7
–	+13	+8
–	+10	+7
3S	+10	+8
–	+10	+6

No. L0+50E

Date .... Page ....

STA.	IN		QUAD		
–	+10		+5		
–	+4		+2		
4S	+5		-3		
–	+8		-4		
–	+7		-4		
–	+6		-4		
5S	+6		-5		
–	+5		-4		
–	+6		-4		
–	+3		-4		
6S	+3		-3		
6+25.S	+7		0		

No. L1+00E

Date .... Page ....

STA.	IN		QUAD		
2+75N	+4		+2		
–	+6		+4		
–	+8		+6		
2N	+17		+8		
–	+8		+12		
–	+5		+8		
–	+4		+11		
1N	+4		+8		
–	-7		+6		
–	-10		+5		
–	-16		+11		
BL	-16		+10		
–	-16		+9		
–	-14		+13		
–	-16		+10		
1S	-12		+10		
–	-6		+8		
–	-4		+8		
–	+4		+8		
2S	+6		+9		
–	+8		+6		
–	+10		+4		
–	+9		+3		
3S	+10		+3		
–	+10		+3		

No. L1+00 E

Date ..... Page .....

STA	IN		QUAD		
–	+10		+5		
–	+12		+5		
4S	+3		+6		
–	+4		+7		
–	-15		+8		
–	+5		+8		
5S	+4		+7		
–	+6		+8		
–	+6		-18		
5+75.5,	+4		+8		

No. L1+50E

Date ..... Page .....

STA.	IN		QUAD		
2+25 N	0		0		
2N	+10		+4		
–	+8		+6		
–	+11		+8		
–	+7		+10		
1N	+10		+14		
–	-8		+8		
–	-10		+12		
–	-12		+10		
BL	-16		+9		
–	-15		+8		
–	-14		+4		
–	-12		+8		
1S	-12		+6		
–	-4		+7		
–	-6		+7		
–	+6		+10		
2S	+8		+6		
–	+10		+7		
–	+5		+9		
–	+6		+9		
3S	+5		+9		
–	+8		+10		
–	+10		+6		
–	+6		+9		

No. L1+50E
Date .... Page ....

STA	IN		QUAD		
4S	+5		+8		
–	+6		+8		
–	+4		+8		
–	+4		+7		
5S	+4		+3		
–	+6		+4		
–	+4		+3		
5+75S,	+8		+3		

No. L2+00E
Date .... Page ....

STA.	IN		QUAD	
2N	+18		+8	
–	+15		+7	
–	+12		+6	
–	+10		+6	
1N	+7		+10	
–	-6		+8	
–	-12		+10	
–	-14		+10	
BL	-14		+8	
–	-14		+6	
–	-14		+5	
–	-14		+5	
1S	-11		+6	
–	-10		+9	
–	-8		+8	
–	-8		+7	
2S	-7		+7	
–	+4		+9	
–	+7		+10	
–	+4		+8	
3S	+4		+8	
–	+6		+9	
–	+8		+5	
–	+10		+6	
4S	+4		+7	

No. L2+00E
Date .... Page ....

STA.	IN	QUAD
–	+4	+9
–	+5	+8
–	+7	+4
5S	+6	+4
–	+5	+3
5+50S.	+3	+1

No. L2+50E
Date .... Page ....

STA.	IN	QUAD
2+25N	+7	+4
2N	+4	+6
–	+6	+8
–	+5	+13
–	+8	+13
1N	+4	+10
–	-8	+13
–	-6	+7
–	-14	+9
BL	-14	+9
–	-16	+6
–	-12	+5
–	-13	+8
1S	-10	+8
–	-14	+6
–	-8	+6
–	-10	+7
2S	-8	+10
–	+9	+12
–	+10	+8
–	+7	+9
3S	+3	+8
–	+9	+6
–	+9	+5
–	+5	+4

No. L 2+50 E

Date .... Page ....

STA.	IN	QUAD
4S	+3	+8
-	+3	+5
-	+3	+5
-	+3	+6
5S	+3	+6
5+25.S,	+8	+5

No. L 3+00 E

Date .... Page ....

STA.	IN	QUAD
3N	-2	+2
-	-4	+3
-	-3	+3
-	-4	+3
2N	-3	+4
-	-4	+4
-	-3	+4
-	-1	+4
1N	-2	+4
-	-3	+4
-	-3	+4
-	0	+6
BL	-5	+4
-	-4	+3
-	-5	+3
-	-4	+3
1S	-5	+3
-	-4	+3
-	-3	+4
-	-4	+4
2S	-1	+3
-	-5	+5
-	-1	+4
-	0	+2
3S	-6	+3

No. L3+00E
Date .... Page ....

STA.	IN	QUAD
–	-4	+4
–	-2	+3
–	-4	+4
4S	-6	+4
–	-4	+4
–	-5	+3
–	-6	+2
5S	-7	+2
5+25.S.	-4	+2

No. L3+50E
Date .... Page ....

STA	IN	QUAD
3+25.N.	+2	+5
3N	+5	+7
–	+3	+2
–	+3	0
–	+3	+1
2N	+3	+6
–	+4	+2
–	+3	+6
–	+2	+7
1N	+1	+6
–	+2	+8
–	+1	+4
–	+3	+9
BL	+2	+6
–	+4	+3
–	+7	+4
–	+4	-3
1S	+2	-4
–	+4	-3
–	+4	+3
–	+4	-3
2S	+4	0
–	+6	+4
–	+5	+4
–	+8	+5

No. L3+50E

Date .... Page ....

STA	IN	QUAD
3S	+5	+3
–	+8	+4
–	+5	+4
–	+4	+3
4S	+3	+2
–	+4	+7
–	+5	+8
4+75S	+4	+7

No. L4+00E

Date .... Page ....

STA.	IN	QUAD
3.25N	+8	+2
3N	+6	+3
–	+4	+2
–	+4	0
–	+4	+2
2N	+5	-3
–	+4	-2
–	+1	-5
–	+6	-3
1N	+4	-7
–	+2	-4
–	+4	-4
–	+4	-4
BL	+2	-2
–	+3	-2
–	+4	+3
–	+4	0
1S	+6	+3
–	+4	+3
–	+4	+7
–	+4	+6
2S	+4	+3
–	+6	+4
–	+6	+4
–	+10	+5

No. L4+00E
Date Page

STA.	IN	QUAD
3S	+4	+6
–	+4	+7
–	+5	+3
–	+4	+7
4S	+5	+7
–	+4	+2
4+50.S,	+7	+3

No. L4+50E
Date Page

STA.	IN	QUAD
3+50.N	+10	+4
–	+8	+4
3N	+6	+4
–	+6	+3
–	+3	+7
–	+3	+7
2N	-3	+10
–	+3	+6
–	+4	+7
–	+4	+6
1N	+6	+4
–	+3	+6
–	+3	+6
–	+1	+4
BL	+4	+2
–	+4	+2
–	+7	+4
–	+4	+3
1S	+5	+8
–	+7	+4
–	+8	+4
–	+7	+4
2S	+5	+8
–	+4	+2
–	+5	+3

No. L4+50E
Date .... Page ....

STA	IN	QUAD
-	+6	0
3S	+4	+2
-	+3	+6
-	+3	+6
-	+7	+5
4S	+13	+8
4+25.S	+9	+8

No. L5+00E
Date .... Page ....

STA.	IN	QUAD
3+50N	+12	+4
-	+8	+4
3N	+8	+5
-	+4	+2
-	+4	+6
-	+2	+5
2N	+1	+6
-	+4	+7
-	+5	+9
-	+7	+4
1N	+4	+3
-	+2	+6
-	+3	+5
-	+1	+4
BL	+4	+7
-	+2	+4
-	+4	+7
-	+6	+3
1S	+4	+2
-	+5	+2
-	+7	0
-	+7	+3
2S	+4	+2
-	+8	+5
-	+5	+3

No. L5+00E

Date ..... Page .....

STA.	IN	QUAD.
–	+7	+3
3S	+6	+2
–	+5	+4
–	+10	+3
–	+12	+6
4S	+10	+6

No. L5+50E

Date ..... Page .....

STA.	IN	QUAD
4N	+8	+4
–	+10	+4
–	+4	+7
–	+4	+9
3N	+12	+4
–	+6	+3
–	+4	+6
–	+4	+3
2N	+7	+4
–	+6	+3
–	+7	+4
–	+4	+2
1N	+6	+4
–	+8	+4
–	+8	+5
–	+8	+6
BL	+6	+2
–	+10	+6
–	+6	+9
–	+6	+4
1S	+4	+3
–	+8	+5
–	+8	+4
–	+7	+4
2S	+6	+9

No. L5+50E

Date Page

STA.	IN		QUAD	
-	+6		+4	
-	+6		+4	
-	+8		+4	
3S	+8		0	
-	+6		+4	
-	+6		+5	
3+75S,	+5		+4	

No. L6+00E

Date Page

STA.	IN		QUAD	
5N	+2		+4	
-	+6		+3	
-	+4		+2	
-	+4		+6	
4N	+4		+7	
-	+4		+8	
-	+4		+2	
-	+6		+3	
3N	+4		+6	
-	+5		+7	
-	+4		+7	
-	0		+3	
2N	+4		+3	
-	+1		+4	
-	+2		+5	
-	-3		+4	
1N	-1		+2	
-	-4		+3	
-	+4		-3	
-	+4		+2	
BL	+4		+1	
-	+5		+2	
-	+3		0	
-	+6		+3	
1S	+6		+3	

No. L6+00E

Date .... Page ....

STA.	IN		QUAD		
-	+5		+3		
-	+6		+2		
-	+6		+9		
2S	+6		+9		
-	+6		+4		
-	+4		+6		
-	+5		+8		
3S	+5		+10		
-	+6		+10		
-	+5		+10		
3+75.S,	+3		+9		

No. L6+50E

Date .... Page ....

STA.	IN	QUAD	
5N	+6	+4	
-	+5	+3	
-	+6	+4	
-	+5	+7	
4N	+3	+6	
-	+6	+2	
-	+6	+2	
-	+4	0	
3N	+7	+3	
-	+6	+4	
-	+4	+2	
-	+3	+5	
2N	+1	+1	
-	+4	+2	
-	+6	+2	
-	+4	+2	
1N	+4	+2	
-	+4	+2	
-	-4	+2	
-	0	+2	
BL	+2	-3	
-	+4	+2	
-	+4	+2	
-	+4	+2	
1S	+6	+4	

No. L6+50E

Date .... Page ....

STA.	IN		QUAD		
–	+6		+3		
–	+4		+3		
–	+6		+4		
2S	+6		+3		
–	+5		+3		
–	+6		+4		
–	+5		+3		
3S	+8		+5		
–	+8		+6		
3+50 S,	+8		+5		

No. L 7+00E

Date .... Page ....

STA.	IN		QUAD		
5+25.N,	+4		+2		
5N	+4		+3		
–	+4		+6		
–	+4		+2		
–	+4		+2		
4N	+4		0		
–	+7		+3		
–	+6		0		
–	+6		+3		
3N	+5		+3		
–	+4		+6		
–	+4		+6		
–	+4		+3		
2N	+3		+5		
–	+7		+3		
–	+5		+3		
–	+6		+4		
1N	+6		+2		
–	+3		+1		
–	0		0		
–	+4		+1		
BL	+3		+1		
–	+6		+2		
–	+8		+4		
–	+5		+3		

No. L7+00E

Date .... Page ....

STA	IN	QUAD.
1S	+6	+4
-	+3	+6
-	+3	+6
-	+4	+3
2S	+4	+3
-	+5	+4
-	+7	+4
-	+6	+10
3S	+5	+9
-	+6	+4
3+50 S,	+7	+3

No. L7+50E

Date .... Page ....

STA.	IN.	QUAD
5+25N,	+2	+2
5N	+3	+2
-	+5	+2
-	+4	-3
-	+7	-5
4N	+8	-3
-	+6	-2
-	+3	-4
-	+2	-3
3N	+2	-3
-	+5	+4
-	+5	+3
-	+6	+4
2N	+4	+2
-	+4	+8
-	+4	+3
-	+4	+3
1N	+4	+2
-	+1	+3
-	+1	+3
-	+4	+3
BL	+2	+6
-	+3	+8
-	+2	+6
-	+6	+3

No. L 7+50E
Date ... Page ...

STA.	IN		QUAD.		
1S	+6		+4		
–	+8		+5		
–	+6		+4		
–	+4		+2		
2S	+6		+4		
–	+7		+3		
–	+5		+2		
–	+8		+3		
3S	+9		+4		
3+25.S.	+10		+3		

No. L8+00E
Date ... Page ...

STA.	IN		QUAD.	
5+25.N.	0		-2	
5N	+4		-6	
–	+3		-6	
–	+2		-8	
–	+4		-9	
4N	+10		-4	
–	+13		-6	
–	+13		-7	
–	+10		-8	
3N	+15		-7	
–	+14		-5	
–	+15		-6	
–	+11		-6	
2N	+6		-6	
–	+5		-5	
–	+8		-3	
–	+4		-3	
1N	+4		-2	
–	+6		0	
–	+8		+4	
–	+7		+4	
BL	+5		+3	
–	+7		+4	
–	+6		+3	
–	+6		+3	

No. L8+00E

Date .... Page ....

STA	IN	QUAD
1S	+4	+7
–	+3	+8
–	+3	+6
–	+2	+4
2S	+4	+6
–	+4	+2
–	+5	+3
–	+8	+4
3S	+9	+6

No. L8+50E

Date .... Page ....

STA.	IN	QUAD
2+75N	+8	-3
–	+12	-8
–	+8	-7
2N	+16	-10
–	+14	-4
–	+15	-6
–	+10	-4
1N	+8	-4
–	+4	-3
–	+5	+2
–	+1	+1
BL	+3	+2
–	+1	+4
–	+4	+7
–	+4	+6
1S	+4	+2
–	+3	+6
–	+4	+2
–	+6	+4
2S	+4	+2
–	+6	+4
–	+7	+2
–	+8	+5
3S	+7	+11

No. L9+00E

Date Page

STA.	IN	QUAD.
2N	+8	-2
-	+12	-4
-	+8	-4
-	+6	-7
1N	+7	-4
-	+5	+1
-	+6	+3
-	+5	+8
BL	+4	+7
-	+6	+3
-	+4	+7
-	+6	+3
1S	+4	+2
-	+4	+8
-	+6	+9
-	+6	+2
2S	+6	+4
-	+6	+3
-	+4	+2
-	+6	+4
3S	+8	+12

No.

Date Page

No. L0+00

Date .... Page ....

STA.	IN		QUAD		
BL	+2		-2		
-	+4		-4		
-	+3		-5		
-	+1		-4		
1S	+4		-6		
1+25.S,	+5		-3		

No. L0+50E

Date .... Page ....

STA.	IN		QUAD		
BL	+4		-2		
-	+2		-4		
-	+4		-3		
-	+3		-3		
1S	+3		-1		
-	+2		-4		
1+50.S,	+2		-2		

No. L 1+00E

Date .... Page ....

STA	IN.		QUAD		
BL	+4		-2		
–	+4		-4		
–	+3		-4		
–	+4		-4		
1S	+3		-4		
–	+3		-4		
1+50 S	+4		-4		

No. L1+50E

Date .... Page ....

STA.	IN		QUAD		
BL	+2		-2		
–	+4		-2		
–	+3		-3		
–	+4		-2		
1S	+4		-3		
–	+5		-4		
–	+3		-3		
1+75 S	+3		-3		

No. L2+00E

Date .... Page ....

STA.	IN	QUAD
BL	+2	-3
–	+4	-4
–	+2	-3
–	+4	-4
1S	+2	-2
–	0	-2
–	+4	-4
–	+1	-3
2S	+3	-3

No. L 2+50E

Date .... Page ....

STA.	IN	QUAD
BL	+3	-2
–	+3	-4
–	+4	-2
–	+4	-3
1S	+6	-4
–	+4	-6
–	+6	-4
–	+5	-3
2S	-3	-5
2+25 S	-4	-6

No. L3+00E

Date .... Page ....

STA.	IN.	QUAD
BL	+2	-2
-	+2	-4
-	+4	-4
-	+2	-4
1S	+3	-4
-	+2	-3
-	+4	-4
-	+4	-4
2S	-4	-6
-	-4	-3
2+50S	-2	-2

No. L3+50E

Date .... Page ....

STA.	IN	QUAD
BL	+2	-4
-	+3	-4
-	+3	-4
-	+3	-4
1S	+3	-6
-	+6	-6
-	+5	-6
-	+4	-4
2S	-4	-6
-	0	-4
-	+3	-4
2+75.S.	+3	-4

No. L4+00E

Date ...... Page ......

STA	IN	QUAD
BL	+3	-2
-	+4	-4
-	+3	-5
-	+4	0
1S	+1	-4
-	+4	-8
-	+5	-4
-	+4	-4
2S	-4	+3
-	+4	-1
-	+4	0
2+75 S,	+2	-5

No. L 4+50E

Date ...... Page ......

STA.	IN.	QUAD
BL	+4	-2
-	+4	-1
-	+2	-4
-	+4	-4
1S	+2	-3
-	0	-6
-	+3	-2
-	+4	-1
2S	-4	-2
-	+2	-4
-	+4	-6
-	+2	-4
3S	0	-4

No. L5+00E

Date .... Page ....

STA.	IN	QUAD.
BL	+2	-4
-	+4	-2
-	+4	-4
-	+4	-6
1S	+4	-4
-	-4	-1
-	+4	-4
-	+6	-6
2S	-4	-2
-	-4	-2
-	-4	-8
-	+3	-4
3S	+4	-3
3+25S,	+4	-6

No. L5+50E

Date .... Page ....

STA.	IN.	QUAD.
BL	+2	-2
-	+4	-4
-	+4	-4
-	+4	-3
1S	+5	-3
-	-2	-6
-	-4	-2
-	+4	-2
2S	-3	-4
-	+4	-3
-	+5	0
-	+3	0
3S	+2	-4
-	+4	-4
3+50S,	+4	-2

No. L6+00E

Date .... Page ....

STA.	IN.	QUAD
BL	+4	-2
-	+4	-3
-	+4	-4
-	+2	-4
1S	+1	-5
-	+2	-4
-	+4	-6
-	+6	0
2S	-5	0
-	-2	-6
-	+4	-4
-	+2	-6
3S	+4	-6
-	+4	-4
-	+4	-4
3+75S.	+3	-1

No. L6+50E.

Date .... Page ....

STA.	IN	QUAD.
BL	+4	-2
-	+4	-4
-	+2	-4
-	+3	-4
1S	+6	-2
-	+3	-4
-	+4	-4
-	+4	-4
2S	+1	-4
-	+4	-4
-	+3	-3
-	+1	-4
3S	+4	-4
-	+5	-4
-	+3	-4
-	+3	-3
4S.	+3	-3

No. L7+00E

Date .... Page ....

STA.	IN.	QUAD.
BL	+4	-2
-	+4	-4
-	+2	-1
-	+3	-4
1S	+6	-2
-	+3	-4
-	+4	-4
-	0	-6
2S	0	-6
-	+3	-4
-	+4	-4
-	+4	-4
3S	+4	-2
-	+12	-4
-	+4	+3
-	+5	+4
4S	+5	+3
4+25.S,	+6	+4

No. L7+50E

Date .... Page ....

STA.	IN	QUAD
BL	+2	-4
-	+6	-4
-	+8	-4
-	+4	-3
1S	+6	0
-	+6	-3
-	+8	-6
-	+6	-4
2S	+4	-4
-	+4	-4
-	+3	-3
-	+6	0
3S	+10	-4
-	+10	-2
-	+8	+4
-	+12	+6
4S	+6	+3
4+25.S,	+4	-2

No. L8+00E
Date .... Page ....

STA	IN.	QUAD
BL	+3	-2
-	+3	-4
-	+4	-2
-	+4	0
1S	+3	-4
-	+2	-6
-	+4	-4
-	+4	-4
2S	+3	-6
-	+4	-4
-	+6	-6
-	+6	-4
3S	+6	-4
-	+4	-4
-	+6	-5
-	+4	-4
4S	+6	-6
-	+6	-5
4+50.S	+4	-1

No. L8+50E
Date .... Page ....

STA.	IN.	QUAD
BL	+3	-3
-	+4	-4
-	+5	-4
-	+3	-1
1S	+4	-4
-	+3	-6
-	+4	-4
-	+5	-6
2S	+4	-3
-	+4	-4
-	+4	-6
-	+7	-4
3S	+8	-4
-	+6	-4
-	+7	-3
-	+9	-4
4S	+4	-4
-	+3	-4
-	+5	-3
4+75.S	+4	-3

No. L9+00E

Date .... Page ....

STA.	IN		QUAD.	
BL	-2		+2	
-	-4		+4	
-	-4		+2	
-	-3		-4	
1S	-2		-6	
-	-3		-5	
-	+2		0	
-	0		-4	
2S	+4		-6	
-	+3		-4	
-	+4		-4	
-	+4		-6	
3S	+6		-4	
-	+7		-6	
-	+8		-4	
-	+4		-6	
4S	+4		-6	
-	+1		-4	
-	+3		-4	
-	+6		-4	
5S	+6		-1	

No. L9+50E

Date .... Page ....

STA.	IN.		QUAD.	
BL	-2		+4	
-	-4		+3	
-	-3		+3	
-	0		-4	
1S	+4		-3	
-	+4		-4	
-	+4		-4	
-	+4		-4	
2S	+5		-3	
-	+4		-2	
-	+4		-3	
-	+6		+3	
3S	+6		-4	
-	+4		-2	
-	+5		-4	
-	+4		-4	
4S	+2		-4	
-	+3		-4	
-	+4		-2	
-	+2		-2	
5S	+2		-2	
5+25.S	+4		-1	

No. L 10+00E
Date .... Page ....

STA.	IN.	QUAD.
BL	0	-1
-	-2	-4
-	-4	-1
-	+4	-2
1S	+4	-4
-	+1	-3
-	+3	-4
-	+4	-4
2S	+4	-4
-	+2	-4
-	0	-3
-	+3	0
3S	+1	0
-	+3	-3
-	0	-4
-	0	-7
4S	0	-4
-	+4	-5
-	+4	-6
-	+3	-4
5S	+5	-4
5+25.S,	+3	-6

No. L 10+50E
Date .... Page ....

STA.	IN.	QUAD.
BL	+2	-3
-	+3	-6
-	+1	-8
-	+2	-4
1S	+4	-6
-	+3	-4
-	+1	-6
-	+3	-4
2S	+4	-4
-	+2	-5
-	+3	-3
-	+5	-3
3S	+2	-6
-	0	-4
-	+4	-4
-	+6	-5
4S	+5	-6
-	+4	-3
-	+3	-3
-	+3	-1
5S	+4	-4
-	+4	-4
5+50.S,	+4	-4

No. L11+00E

Date .... Page ....

STA.	IN.	QUAD.
BL	+2	-4
-	+3	-5
-	+6	-4
-	+8	-9
1S	+6	-10
-	+6	-6
-	+10	-3
-	+10	-6
2S	+7	-4
-	+6	-6
-	+6	-3
-	+4	-2
3S	+1	-6
-	+2	-5
-	+5	-4
-	+6	-4
4S	+4	0
-	+3	0
-	+3	-4
-	+4	-6
5S	+4	-5
-	+4	-4
-	+4	-4
5+75.S,	+4	-6

No. L11+50E

Date .... Page ....

STA.	IN.	QUAD.
BL	+2	-4
-	+3	-3
-	+3	-6
-	+5	-7
1S	+6	-5
-	+8	-3
-	+8	-4
-	+8	-4
2S	+6	-3
-	+4	-6
-	+3	-8
-	+2	-8
3S	+2	-10
-	+1	-5
-	+1	-8
-	+4	-4
4S	+4	-4
-	+4	-3
-	+6	-3
-	+4	-4
5S	+4	-2
-	+6	-5
-	+4	-4
-	+4	-7
6S.	+5	-6

No. L12+00E

Date .... Page ....

STA.	IN.		QUAD.	
BL	+2		-2	
-	+4		-4	
-	+6		-2	
-	+3		0	
1S	+3		-3	
-	+3		-4	
-	+2		-4	
-	+4		-4	
2S	+4		-2	
-	+3		-2	
-	+3		-2	
-	+3		-2	
3S	+3		-4	
-	+4		-3	
-	+4		-3	
-	+6		-2	
4S	+6		-4	
-	+4		-4	
-	+3		-6	
-	+3		-4	
5S	+2		-4	
-	+6		-4	
-	+4		-4	
-	+4		-3	

No. L12+00E

Date .... Page ....

STA	IN.		QUAD.	
6S	+4		-2	
6+25.S	+3		-2	

No. L12+50E

Date .... Page ....

STA.	IN.		QUAD.		
BL	+2		-2		
-	+2		-2		
-	+2		-2		
-	+2		-4		
1S	+1		-4		
-	+2		-4		
-	+2		-6		
-	+2		-4		
2S	+1		-3		
-	+2		-2		
-	+1		-4		
-	+2		-4		
3S	+4		-4		
-	+4		-4		
-	+4		-4		
-	+2		-2		
4S	+2		-2		
-	+2		0		
-	+3		-1		
-	+3		-2		
5S	+3		-2		
-	+4		-2		
-	+3		-4		
-	+2		-2		

No. L12+50E.

Date .... Page ....

STA.	IN		QUAD.		
6S	+2		-4		
-	+2		-4		
6+50.S	+4		-3		

No. L13+00E

Date .... Page ....

STA.	IN		QUAD.	
BL	+4		-2	
-	+6		-4	
-	+6		-6	
-	+8		-2	
1S	+6		-2	
-	+4		-2	
-	+4		-4	
-	+2		-2	
2S	0		-4	
-	+4		-6	
-	+3		-2	
-	+4		-2	
3S	+4		-4	
-	+3		-2	
-	+3		-2	
-	+1		-4	
4S	+3		-2	
-	+4		-2	
-	+4		0	
-	+3		-2	
5S	+4		-3	
-	+4		-4	
-	+3		-4	
-	+2		-2	

No. L13+00E

Date .... Page ....

STA.	IN.		QUAD.	
6S	+2		-2	
-	+2		-2	
-	+4		-3	
6+75S	+3		-4	

No. L13+50E

Date

Page

STA.	IN		QUAD.		
BL	+2		-2		
-	+2		-2		
-	+4		-2		
-	+2		-2		
1S	+3		-2		
-	0		-2		
-	0		-3		
-	+4		-4		
2S	+4		-2		
-	+2		-5		
-	+3		-4		
-	+3		-4		
3S	+3		-4		
-	+4		-4		
-	+2		-4		
-	+2		-4		
4S	+1		-4		
-	+2		-4		
-	+4		-4		
-	+3		-4		
5S	+3		-4		
-	+2		-2		
-	+4		-3		
-	+3		-4		

No. L13+50E

Date

Page

STA.	IN		QUAD.		
6S	+4		-4		
-	+4		-4		
-	+2		-3		
6+75.S	+3		-4		

No. L14+00E
Date .... Page ....

STA.	IN.	QUAD.
BL	+2	-2
-	+3	-2
-	+2	-4
-	+1	-4
1S	+4	-2
-	+4	-2
-	+3	-3
-	+1	+4
2S	+3	+2
-	+1	-2
-	+4	-2
-	+3	-2
3S	+3	-4
-	+4	-2
-	+4	-2
-	+4	-4
4S	+4	-4
-	+4	-2
-	+4	-4
-	+3	-2
5S	+3	-2
-	+3	-4
-	+4	-4
-	+4	-2

No. L14+00E
Date .... Page ....

STA.	IN.	QUAD
6S	+4	-2
-	+4	-4
-	+6	-2
-	+3	-2
7S	+4	-4

No. L14+50E

Date .... Page ....

STA	IN	QUAD
BL	+2	-4
-	+4	-4
-	+3	-2
-	+4	-4
1S	+1	0
-	+4	-2
-	+3	-3
-	+4	+3
2S	+4	+2
-	+2	-2
-	+2	-2
-	+2	-2
3S	+1	-4
-	+2	-2
-	+4	0
-	+3	-2
4S	+2	-4
-	+3	-3
-	+4	-2
-	+2	-4
5S	+4	-4
-	+4	-2
-	+2	-2
-	+4	0

No. L14+50E

Date .... Page ....

STA.	IN.	QUAD.
6S	+4	-3
-	+3	-2
-	+3	-2
-	+3	-4
7S	+2	-4
7+25.S	+2	-2

No. L15+00E

Date Page

STA.	IN.	QUAD
BL	+2	-2
-	+3	-2
-	+4	-2
-	+4	-2
1S	+2	-4
-	+2	-6
-	+2	-2
-	+1	-2
2S	+5	-4
-	+6	-4
-	+3	-2
-	+2	-2
3S	+1	-4
-	+3	0
-	+4	-3
-	+2	-2
4S	+3	-2
-	+3	-4
-	+1	-2
-	+2	-4
5S	+3	-2
-	+4	-2
-	+3	-2
-	+4	-2

No. L15+00E

Date Page

STA.	IN.	QUAD
6S	+2	-4
-	+4	-2
-	+2	-2
-	+2	-4
7S	+4	-2
-	+4	-2
7+50.S	+5	-2

No. L15+50E

Date .... Page ....

STA	IN.	QUAD.
BL	+2	-2
-	+2	-2
-	+4	-2
-	+2	-2
1S	+3	-2
-	+3	0
-	+2	-3
-	0	+3
2S	0	+2
-	+2	-2
-	+2	-2
-	+2	-2
3S	+3	-2
-	+4	-3
-	+2	-2
-	+4	-3
4S	+3	-2
-	+3	-2
-	+3	-2
-	+2	0
5S	0	-3
-	+1	-4
-	+1	-2
-	+1	-3

No. L15+50E

Date .... Page ....

STA.	IN.	QUAD.
6S	+2	-2
-	+1	-3
-	+2	-2
-	+2	-4
7S	0	-4
-	0	-3
7+50 S	0	-3

No. L16+00E
Date .... Page ....

STA.	IN.	QUAD.
BL	+2	-2
-	+2	-2
-	+2	0
-	+3	-3
1S	+2	-4
-	+5	-2
-	+5	-3
-	+2	-4
2S	+2	-2
-	+2	-1
-	+4	-4
-	+3	-5
3S	0	-3
-	+2	-3
-	+3	-3
-	+3	-4
4S	+3	-3
-	+3	-3
-	+4	-3
-	+4	-3
5S	+4	-2
-	+4	-2
-	+4	-2
-	+4	-2
6S	+2	-1

No. L16+50E
Date .... Page ....

STA.	IN.	QUAD.
BL	+5	-2
-	+6	-6
-	+4	-4
-	+4	-4
1S	+4	-2
-	+3	0
-	+4	-2
-	+2	-4
2S	+2	-3
-	+2	-1
-	+1	-3
-	+4	-1
3S	+4	-3
-	+4	-3
-	+3	-4
-	+3	-4
4S	+3	-2
-	+4	-2
-	+2	-2
4+75S	+1	-1

No. L17+00E

Date ...... Page ......

STN.	IN.	QUAD
BL	+2	-2
-	+2	-2
-	+4	-2
-	+2	-4
1S	+2	-2
-	+4	-4
-	+2	-2
-	+4	-1
2S	+4	-4
-	+4	-4
-	+2	-2
-	+2	-2
3S	+4	-2
-	+2	-2
-	+2	-2
3+75.S.	+1	-2

No. ......

Date ...... Page ......

Ontario | Ministry of Northern Development and Mines

Declaration of Assessment Work Performed on Mining Land

Mining Act, Subsection 65(2) and 66(3), R.S.O. 1990

Transaction Number (office use) W9710.00126
Assessment Files Research Imaging

Per
Min
Que
933

52E10SE0002 2.17506 WILEY BAY

900

sections 65(2) and 66(3) of the Mining Act. Under section 8 of the
the assessment work and correspond with the mining land holder.
rder, Ministry of Northern Development and Mines, 6th Floor,

2.17506

2.17506

RECEIVED
JUL 18 1997
MINING LANDS BRANCH

Instructions: - For work performed on Crown Lands before recording a claim, use form 0240.
- Please type or print in ink.

1. Recorded holder(s) (Attach a list if necessary)

Name ARLINGTON RESOURCES INC	Client Number 301972
Address 519, 2275 LAKESHORE BLVD, WEST	Telephone Number (416) 251-2607
ETOBICOKE, ON M8V 3Y3	Fax Number (416) 251-4104
Name	Client Number
Address	Telephone Number
	Fax Number

2. Type of work performed: Check (✓) and report on only ONE of the following groups for this declaration.

[✓] Geotechnical: prospecting, surveys, assays and work under section 18 (regs) ☐ Physical: drilling, stripping, trenching and associated assays ☐ Rehabilitation

		Office Use	
Work Type GEOPHYSICAL MAGNETOMETER & VLF-EM SURVEYS		Commodity	GOLD
		Total $ Value of Work Claimed	33,740
Dates Work Performed From 15 Day 03 Month 97 Year To 27 Day 04 Month 97 Year		NTS Reference	52E/10 SE
Global Positioning System Data (if available) CUTLER, MAINE 24.0 KILOHERTZ	Township/Area ASTRON BAY & WILEY BAY	Mining Division	KENORA
	M or G-Plan Number G 2657 & G 2602	Resident Geologist District	KENORA

Please remember to: - obtain a work permit from the Ministry of Natural Resources as required;
- provide proper notice to surface rights holders before starting work;
- complete and attach a Statement of Costs, form 0212;
- provide a map showing contiguous mining lands that are linked for assigning work;
- include two copies of your technical report.

3. Person or companies who prepared the technical report (Attach a list if necessary)

Name LANCASTER HOLDINGS INC	Telephone Number (416) 251-2607
Address 519, 2275 LAKESHORE BLVD WEST, ETOBICOKE, ON	Fax Number (416) 251-4104
Name ROBERT J. MAJOR	Telephone Number (705) 856-1940
Address P.O. BOX 95 WAWA, ON P0S 1K0	Fax Number (705) 856-1950
Name	Telephone Number
Address	Fax Number

4. Certification by Recorded Holder or Agent

I, WALTER C. MARTIN (Print Name), do hereby certify that I have personal knowledge of the facts set forth in this Declaration of Assessment Work having caused the work to be performed or witnessed the same during or after its completion and, to the best of my knowledge, the annexed report is true.

Signature of ~~Recorded Holder or~~ Agent [illegible] LANCASTER HOLDINGS INC		Date June 7, 1997
Agent's Address 519, 2275 LAKESHORE BLVD, WEST ETOBICOKE, ON	Telephone Number (416) 251-2607	Fax Number (416) 251-4104

0241 (02/96) Deemed Sept. 18/97

5. **Work to be recorded and distributed.** Work can only be assigned to claims that are contiguous (adjoining) to the mining land where work was performed, at the time work was performed. A map showing the contiguous link must accompany this form.

	Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.	**Number of Claim Units.** For other mining land, list hectares.	**Value of work performed** on this claim or other mining land.	**Value of work applied** to this claim.	**Value of work assigned** to other mining claims.	**Bank.** Value of work to be distributed at a future date.
eg	TB 7827	16 ha	$26, 825	N/A	$24,000	$2,825
eg	1234567	12	0	$24,000	0	0
eg	1234568	2	$ 8, 892	$ 4,000	0	$4,892
1	1178137		$16,870	$9,600	0	$7,270
2	1218086		$16,870	$4,800	0	$12,070
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
		Column Totals	$33,740	$14,400	0	$19,340

I, Walter C. Martin (Print Full Name), do hereby certify that the above work credits are eligible under subsection 7 (1) of the Assessment Work Regulation 6/96 for assignment to contiguous claims or for application to the claim where the work was done.

Signature of Recorded Holder or Agent Authorized in Writing [signature] Date June 7, 1997

6. **Instructions for cutting back credits that are not approved.**

Some of the credits claimed in this declaration may be cut back. Please check (✓) in the boxes below to show how you wish to prioritize the deletion of credits:

- ☐ 1. Credits are to be cut back from the Bank first, followed by option 2 or 3 or 4 as indicated.
- ☐ 2. Credits are to be cut back starting with the claims listed last, working backwards; or
- ☐ 3. Credits are to be cut back equally over all claims listed in this declaration; or
- ☐ 4. Credits are to be cut back as prioritized on the attached appendix or as follows (describe):

2.17506

Note: If you have not indicated how your credits are to be deleted, credits will be cut back from the Bank first, followed by option number 2 if necessary.

For Office Use Only

Received Stamp	Deemed Approved Date	Date Notification Sent
KENORA - MINING DIV. RECEIVED JUN 20 1997 AM PM	Sept. 18/97	
	Date Approved	Total Value of Credit Approved
	Approved for Recording by Mining Recorder (Signature) [signature]	

Ontario | Ministry of Northern Development and Mines

Statement of Costs for Assessment Credit

Transaction Number (office use) W9710.00126

Personal information collected on this form is obtained under the authority of subsection 6(1) of the Assessment Work Regulation 6/96. Under section 8 of the Mining Act, the information is a public record. This information will be used to review the assessment work and correspond with the mining land holder. Questions about this collection should be directed to the Chief Mining Recorder, Ministry of Northern Development and Mines, 6th Floor, 933 Ramsey Lake Road, Sudbury, Ontario, P3E 6B5.

Work Type	Units of Work (Depending on the type of work, list the number of hours/days worked, metres of drilling, kilometres of grid line, number of samples, etc.)	Cost Per Unit of work	Total Cost
MAG, VLF-EM	21 days, 3 men & 1	16 km/425.	7,095.
	supply person	17.5 km/425.	7,678.
GRID LINES	21 days, 1 man	125.00	2,625.
DRAFTING & REPORT WRITING	2 men	625.00	1,250.
CONTINGENCY	10%		3,067.
Associated Costs (e.g. supplies, mobilization and demobilization).			
MOB & DEMOB			1,200.
ICE-ROAD MAINTENANCE			1,150.
FUEL & OIL			750.
Transportation Costs			
TRUCK RENTAL 21 DAYS		75.00	1,575.
SKI-DOO RENTAL 21 DAYS		50.00	1,050.
Food and Lodging Costs			
ACCOMMODATIONS & MEALS (3 MEN)		(3x100) 300.00	6,300.
		Total Value of Assessment Work	$33,740.

2.17506

Calculations of Filing Discounts:

1. Work filed within two years of performance is claimed at 100% of the above Total Value of Assessment Work.
2. If work is filed after two years and up to five years after performance, it can only be claimed at 50% of the Total Value of Assessment Work. If this situation applies to your claims, use the calculation below:

TOTAL VALUE OF ASSESSMENT WORK × 0.50 = Total $ value of worked claimed.

Note:
- Work older than 5 years is not eligible for credit.
- A recorded holder may be required to verify expenditures claimed in this statement of costs within 45 days of a request for verification and/or correction/clarification. If verification and/or correction/clarification is not made, the Minister may reject all or part of the assessment work submitted.

Certification verifying costs:

I, WALTER C. MARTIN (please print full name), do hereby certify, that the amounts shown are as accurate as may reasonably be determined and the costs were incurred while conducting assessment work on the lands indicated on the accompanying Declaration of Work form as AGENT (recorded holder, agent, or state company position with signing authority) I am authorized to make this certification.

RECEIVED JUN 20 1997 AM 7 8 9 10 11 12 1 2 3 4 5 6 PM

Signature: [signature] Date: June 7/97

0212 (02/96)

Ministry of
Northern Development
and Mines

Ministère du
Développement du Nord
et des Mines

Ontario

Geoscience Assessment Office
933 Ramsey Lake Road
6th Floor
Sudbury, Ontario
P3E 6B5

Telephone: (888) 415-9846
Fax: (705) 670-5863

November 4, 1997

Walter C. Martin
ARLINGTON RESOURCES INC.
2275 LAKESHORE BLVD.
SUITE 519
ETOBICOKE, ON
M8V-3Y3

Dear Sir or Madam:

Submission Number: 2.17506

		Status
Subject: Transaction Number(s):	W9710.00126	Approval After Notice

We have reviewed your Assessment Work submission with the above noted Transaction Number(s). The attached summary page(s) indicate the results of the review. WE RECOMMEND YOU READ THIS SUMMARY FOR THE DETAILS PERTAINING TO YOUR ASSESSMENT WORK.

If the status for a transaction is a 45 Day Notice, the summary will outline the reasons for the notice, and any steps you can take to remedy deficiencies. The 90-day deemed approval provision, subsection 6(7) of the Assessment Work Regulation, will no longer be in effect for assessment work which has received a 45 Day Notice.

Please note any revisions must be submitted in DUPLICATE to the Geoscience Assessment Office, by the response date on the summary.

If you have any questions regarding this correspondence, please contact Bruce Gates by e-mail at gates_b@torv05.ndm.gov.on.ca or by telephone at (705) 670-5856.

Yours sincerely,

ORIGINAL SIGNED BY
Blair Kite
Supervisor, Geoscience Assessment Office
Mining Lands Section

Correspondence ID: 11528

Copy for: Assessment Library

Work Report Assessment Results

Submission Number: 2.17506

Date Correspondence Sent: November 04, 1997 **Assessor:** Bruce Gates

Transaction Number	First Claim Number	Township(s) / Area(s)	Status	Approval Date
W9710.00126	1178137	ASTRON BAY (LAKE OF THE WOODS), WILEY BAY (LAKE OF THE WOODS)	Approval After Notice	October 30, 1997

Section:
14 Geophysical MAG
14 Geophysical VLF

The revisions outlined in the Notice dated September 15, 1997, have been corrected. Assessment work credit has been approved as outlined on the attached Distribution of Assessment Work Credit sheet.

Correspondence to:
Resident Geologist
Kenora, ON

Assessment Files Library
Sudbury, ON

Recorded Holder(s) and/or Agent(s):
Walter C. Martin
ARLINGTON RESOURCES INC.
ETOBICOKE, ON

Correspondence ID: 11528

Distribution of Assessment Work Credit

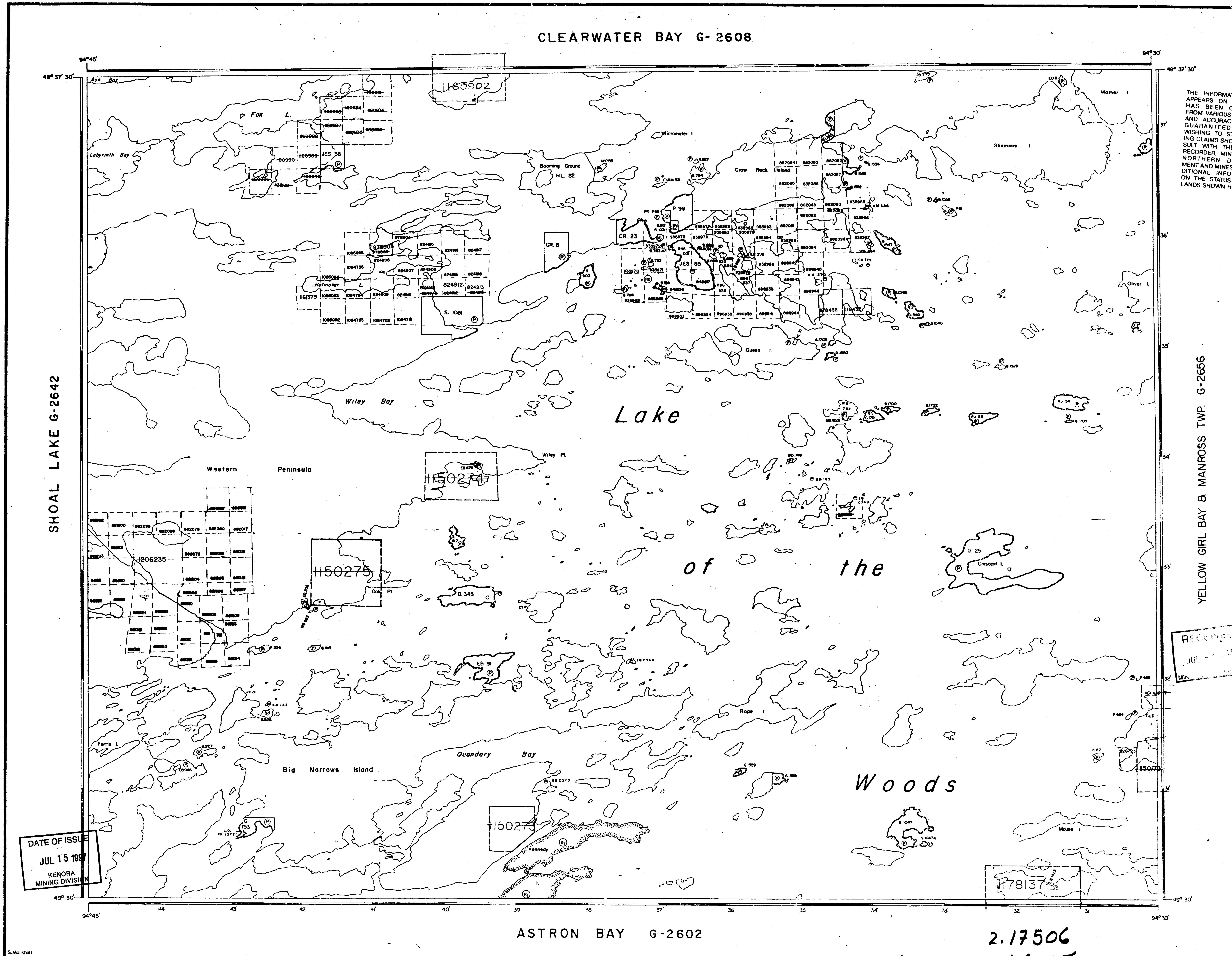
The following credit distribution reflects the value of assessment work performed on the mining land(s).

Date: November 04, 1997

Submission Number: 2.17506

Transaction Number: W9710.00126

Claim Number	Value Of Work Performed
1178137	10,985.00
1218086	10,985.00
Total: $	21,970.00



THE INFORMATION THAT APPEARS ON THIS MAP HAS BEEN COMPILED FROM VARIOUS SOURCES, AND ACCURACY IS NOT GUARANTEED. THOSE WISHING TO STAKE MINING CLAIMS SHOULD CONSULT WITH THE MINING RECORDER, MINISTRY OF NORTHERN DEVELOPMENT AND MINES, FOR ADDITIONAL INFORMATION ON THE STATUS OF THE LANDS SHOWN HEREON.

LEGEND

PATENTED LAND	Ⓟ
CROWN LAND SALE	C.S.
LEASES	Ⓛ
LOCATED LAND	Loc.
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	
PATENTED FOR S.R.O.	
CANCELLED	c.
TOURIST CAMPS	

REFERENCES

AREAS WITHDRAWN FROM DISPOSITION

M.R.O. – MINING RIGHTS ONLY
S.R.O. – SURFACE RIGHTS ONLY
M.+S. – MINING AND SURFACE RIGHTS

SECT.43(R.S.O.1970) 30/8/71 S.R.&M.R.

Reserved for Public Use

FLOODING

Flooding Rights reserved to 1064' mean sea level

SCALE: 1 INCH = 40 CHAINS

AREA **WILEY BAY** (LAKE OF THE WOODS)

M.N.R. ADMINISTRATIVE DISTRICT
KENORA

MINING DIVISION
KENORA

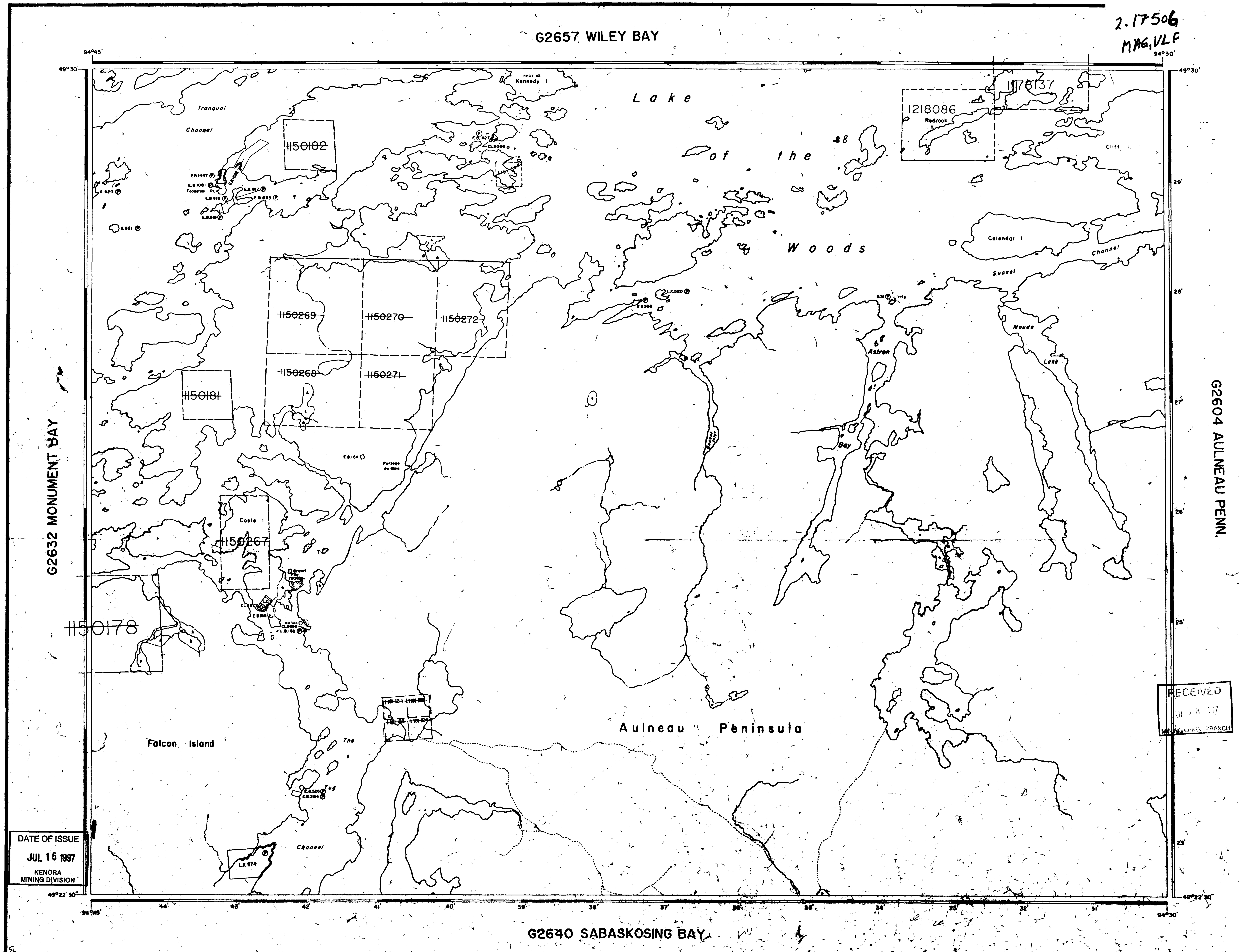
LAND TITLES / REGISTRY DIVISION
KENORA

Ministry of Natural Resources — Land Management Branch — Ontario

Date FEBRUARY, 1984 — Number G-2657

52E10SE0002 2.17506 WILEY BAY

200



THE INFORMATION THAT APPEARS ON THIS MAP HAS BEEN COMPILED FROM VARIOUS SOURCES, AND ACCURACY IS NOT GUARANTEED. THOSE WISHING TO STAKE MINING CLAIMS SHOULD CONSULT WITH THE MINING RECORDER, MINISTRY OF NORTHERN DEVELOPMENT AND MINES, FOR ADDITIONAL INFORMATION ON THE STATUS OF THE LANDS SHOWN HEREON.

LEGEND

PATENTED LAND
CROWN LAND SALE
LEASES
LOCATED LAND
LICENSE OF OCCUPATION
MINING RIGHTS ONLY
SURFACE RIGHTS ONLY
ROADS
IMPROVED ROADS
KING'S HIGHWAYS
RAILWAYS
POWER LINES
MARSH OR MUSKEG
MINES
CANCELLED
TOURIST CAMPS

REFERENCES

AREAS WITHDRAWN FROM DISPOSITION

S.R.O. – SURFACE RIGHTS ONLY

FLOODING

Flooding rights reserved up to 1064' above mean sea level on all lands bordering on Lake of the Woods

SCALE: 1 INCH = 40 CHAINS

AREA

ASTRON BAY

LAKE OF THE WOODS

KENORA

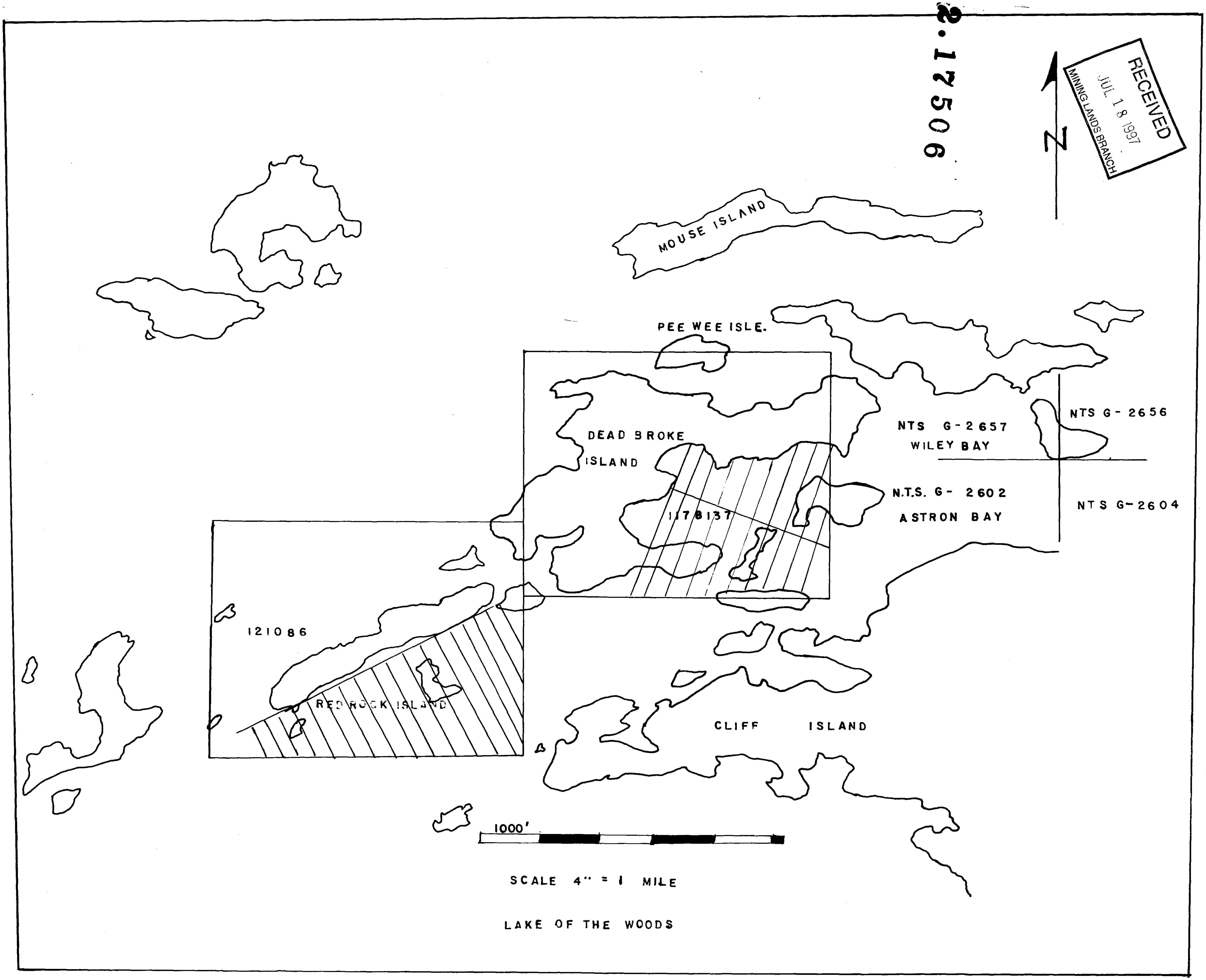
MINING DIVISION

KENORA

KENORA

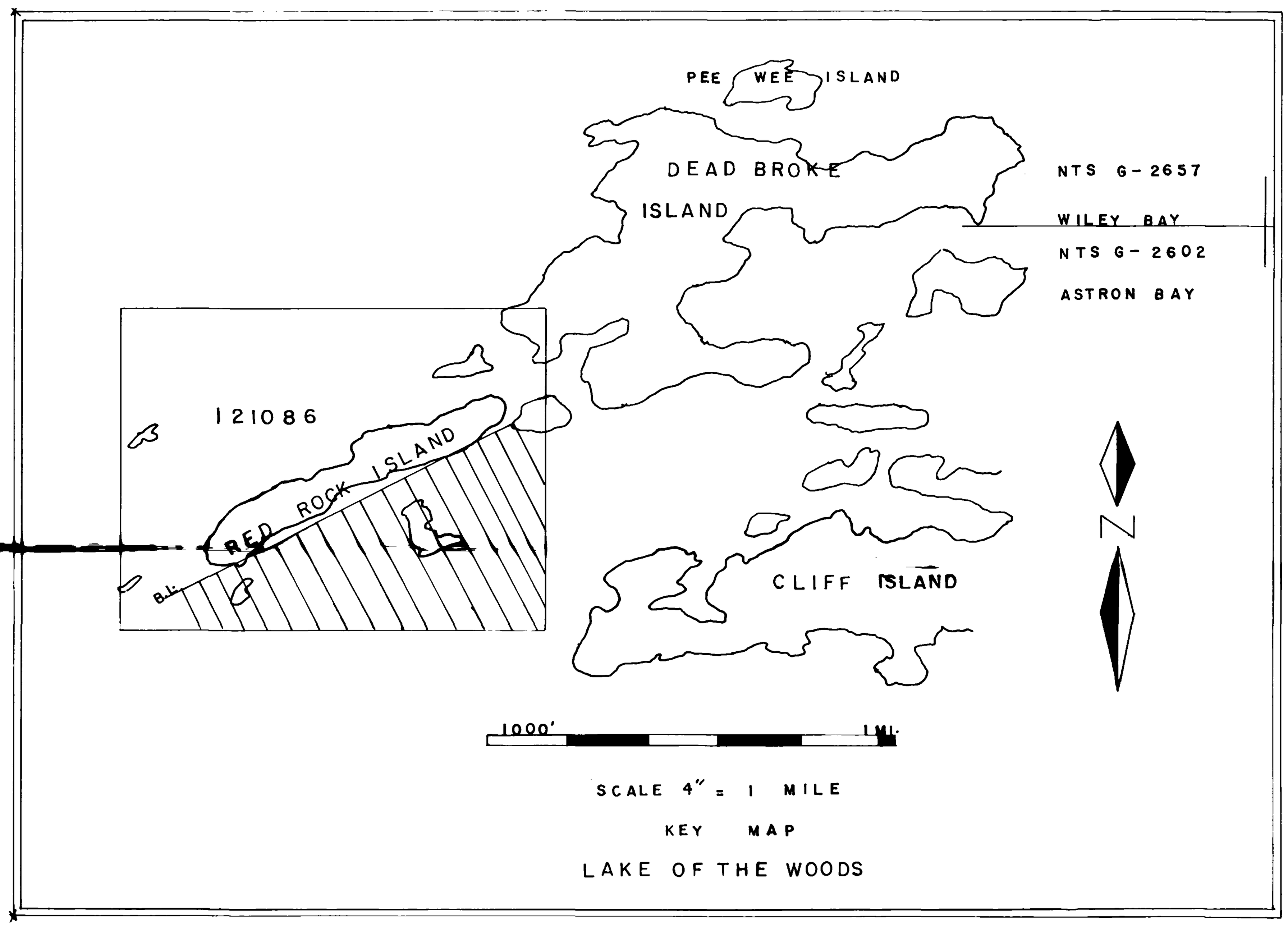
M-2678

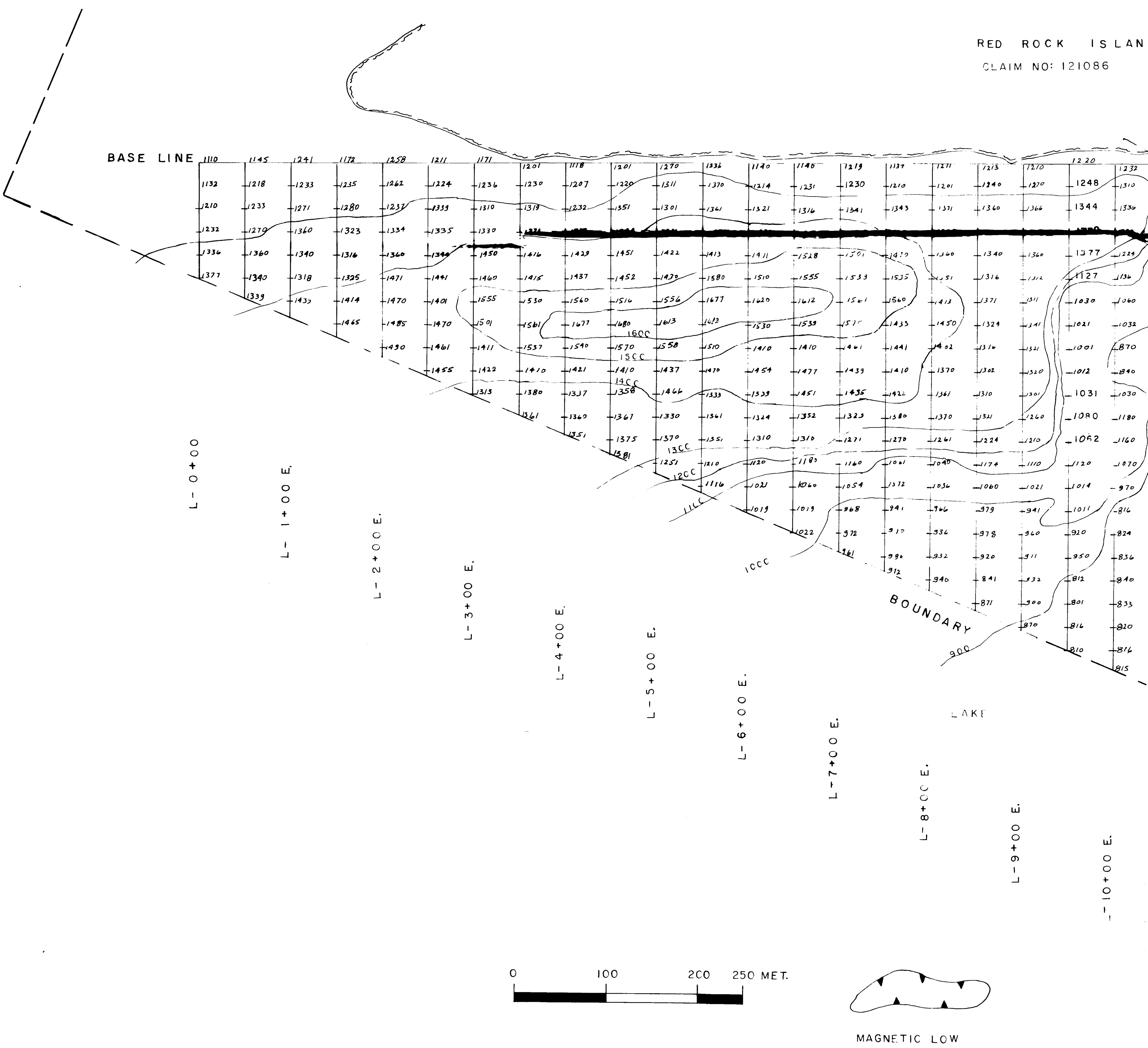
G-2602

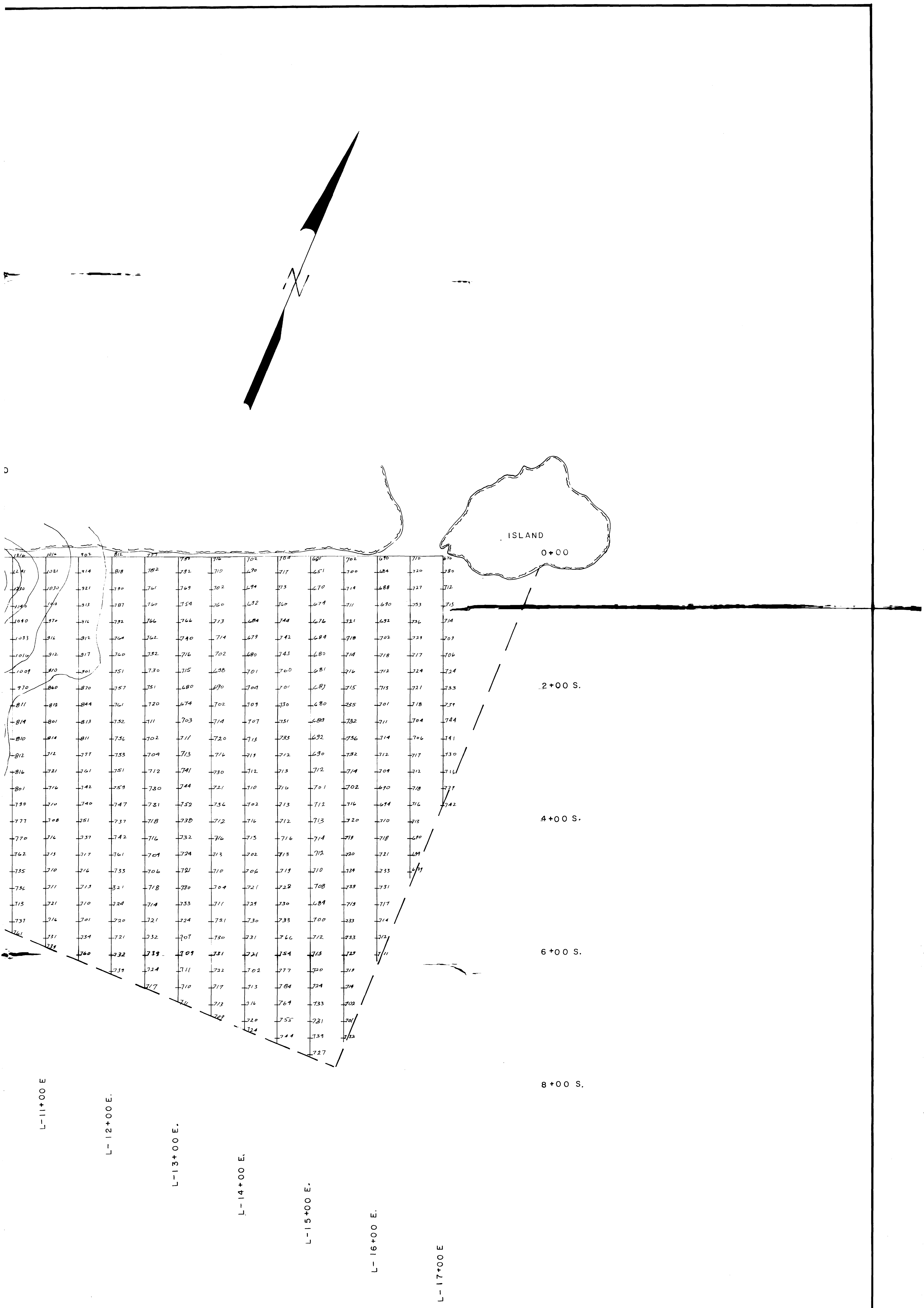

2.17506
RECEIVED
JUL 18 1997
MINING LANDS BRANCH
N
MOUSE ISLAND
PEE WEE ISLE.
DEAD BROKE
ISLAND
1178137
NTS G-2657
WILEY BAY
NTS G-2656
N.T.S. G-2602
ASTRON BAY
NTS G-2604
121086
RED ROCK ISLAND
CLIFF ISLAND
1000'
SCALE 4" = 1 MILE
LAKE OF THE WOODS

52E10SE0002 2.17506 WILEY BAY

230







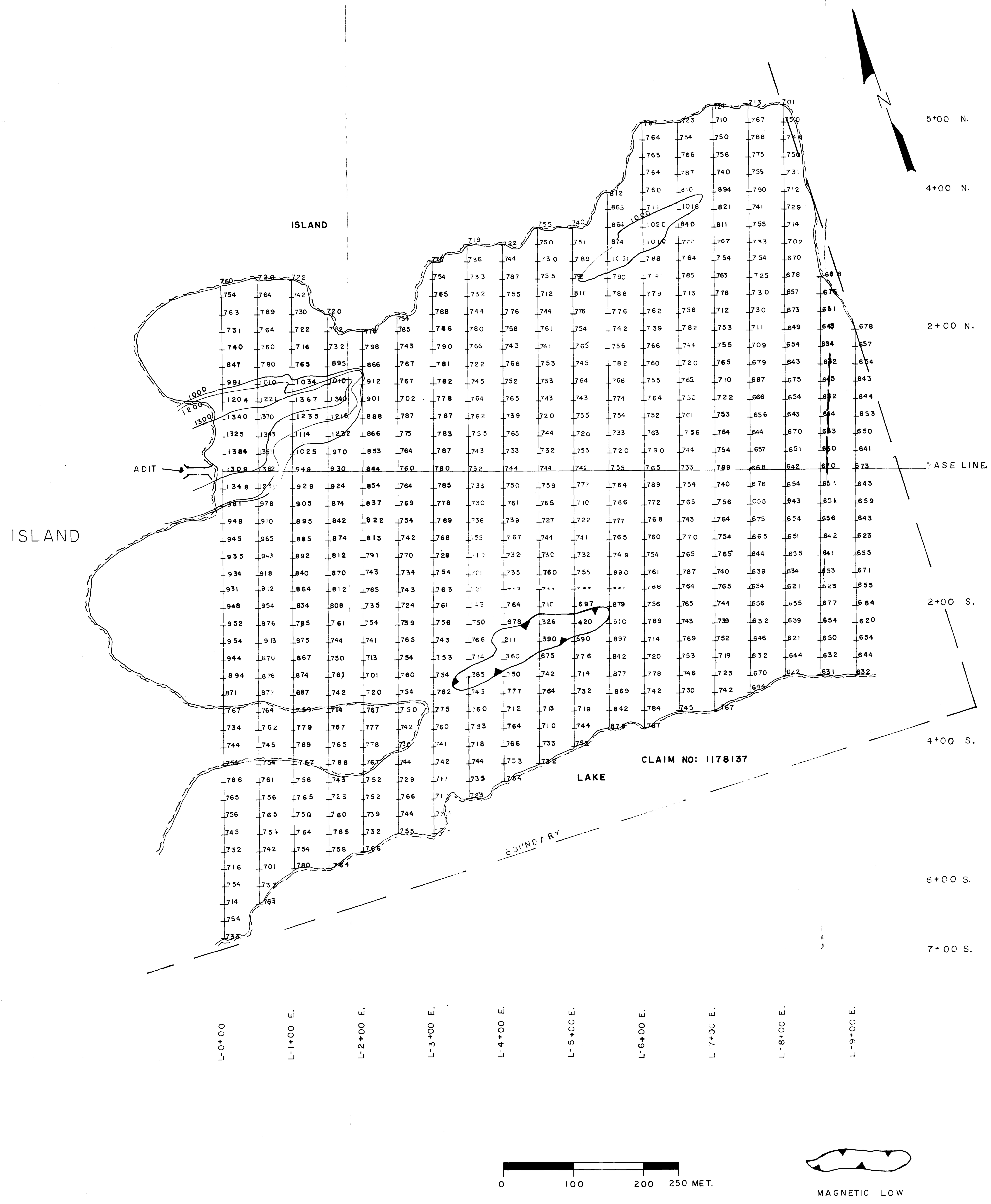
ARLINGTON RESOURCES INC.

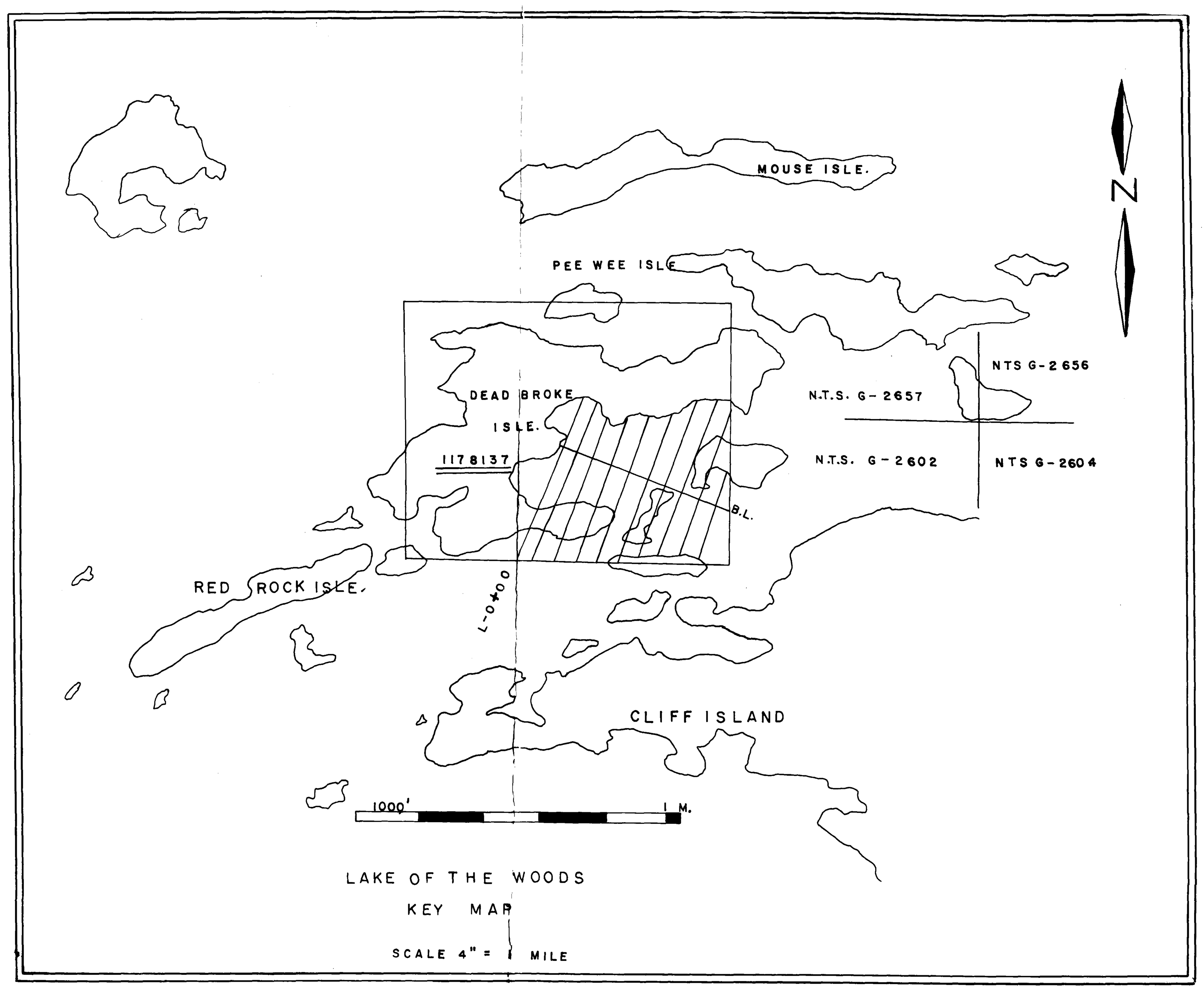
THE ASTRON BAY PROSPECT
KENORA MINING DIVISION
MAGNETOMETER SURVEY

SURVEYED BY

LANCASTER HOLDINGS INC.
DATE - MARCH 1997

SCALE 1 : 250





ARLINGTON RESOURCES INC.

THE ASTRON BAY PROSPECT
KENORA MINING DIVISION
MAGNETOMETER SURVEY

SURVEYED BY

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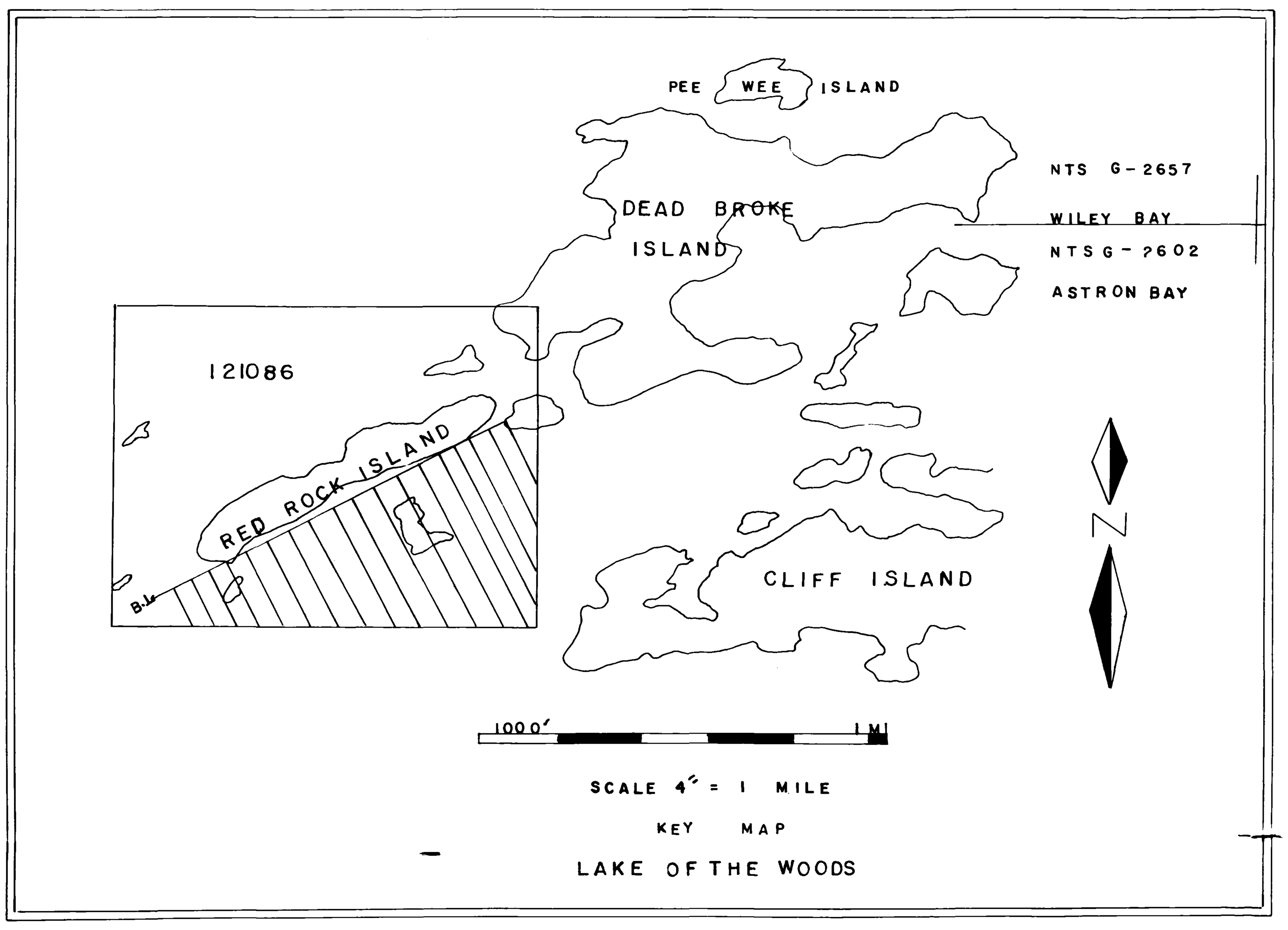
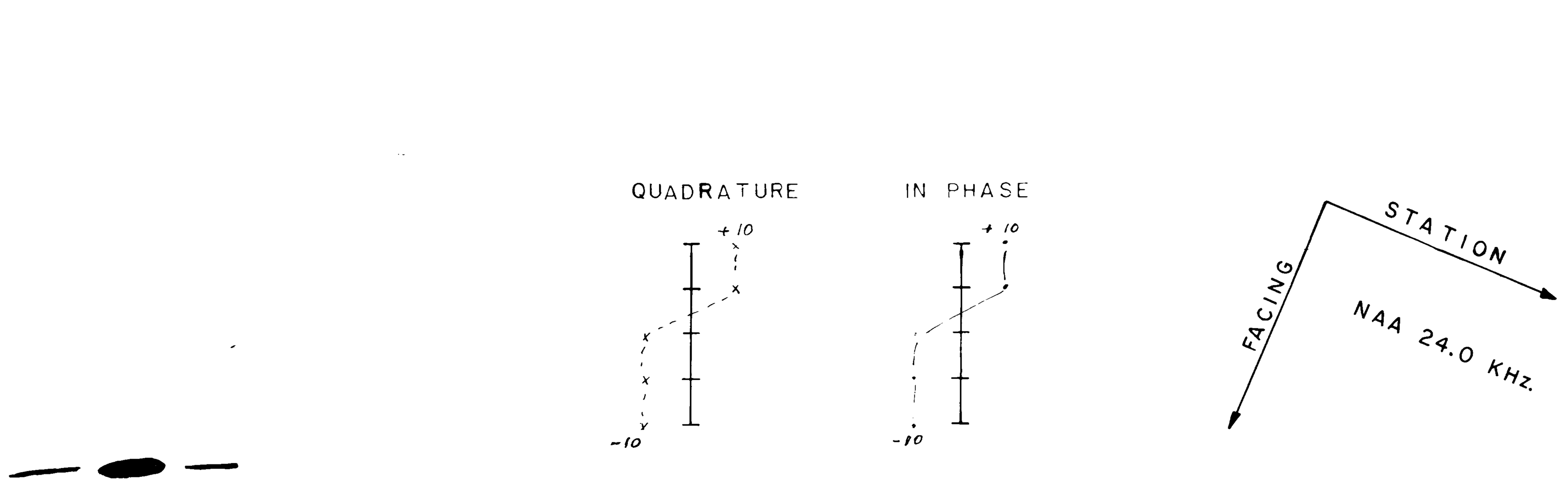
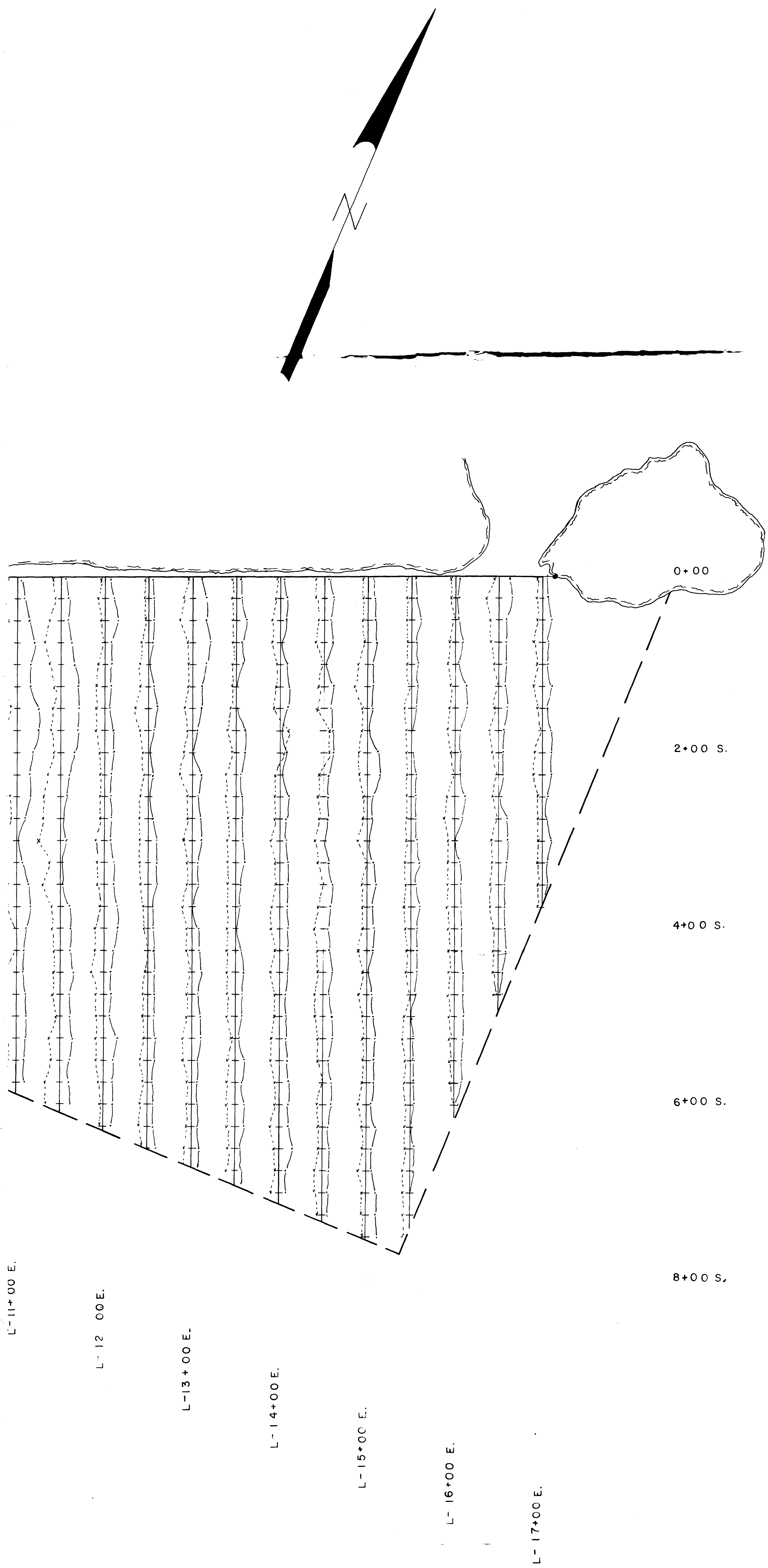
DATE- MARCH 1997

SCALE 1 : 250


PEE WEE ISLAND
DEAD BROKE ISLAND
NTS G-2657
WILEY BAY
NTS G-2602
ASTRON BAY
121086
RED ROCK ISLAND
B.L.
CLIFF ISLAND
N
1000'
1 MI.
SCALE 4" = 1 MILE
KEY MAP
LAKE OF THE WOODS


RED ROCK ISLAND
BASE LINE
BOUNDARY
L- 0+00
L- 1+00 E.
L- 2+00 E.
L- 3+00 E.
L- 4+00 E.
L- 5+00 E.
L- 6+00 E.
L- 7+00 E.
L- 8+00 E.
L- 9+00 E.
L- 10+00 E.
0
100
200
250 MET.


QUADRATURE
IN PHASE
+10
-10
+10
-10
STATION
FACING
NAA 24.0 KHZ.
CONDUCTOR AXIS
GEOPHYSICAL GRAPH - 1:CM=10%



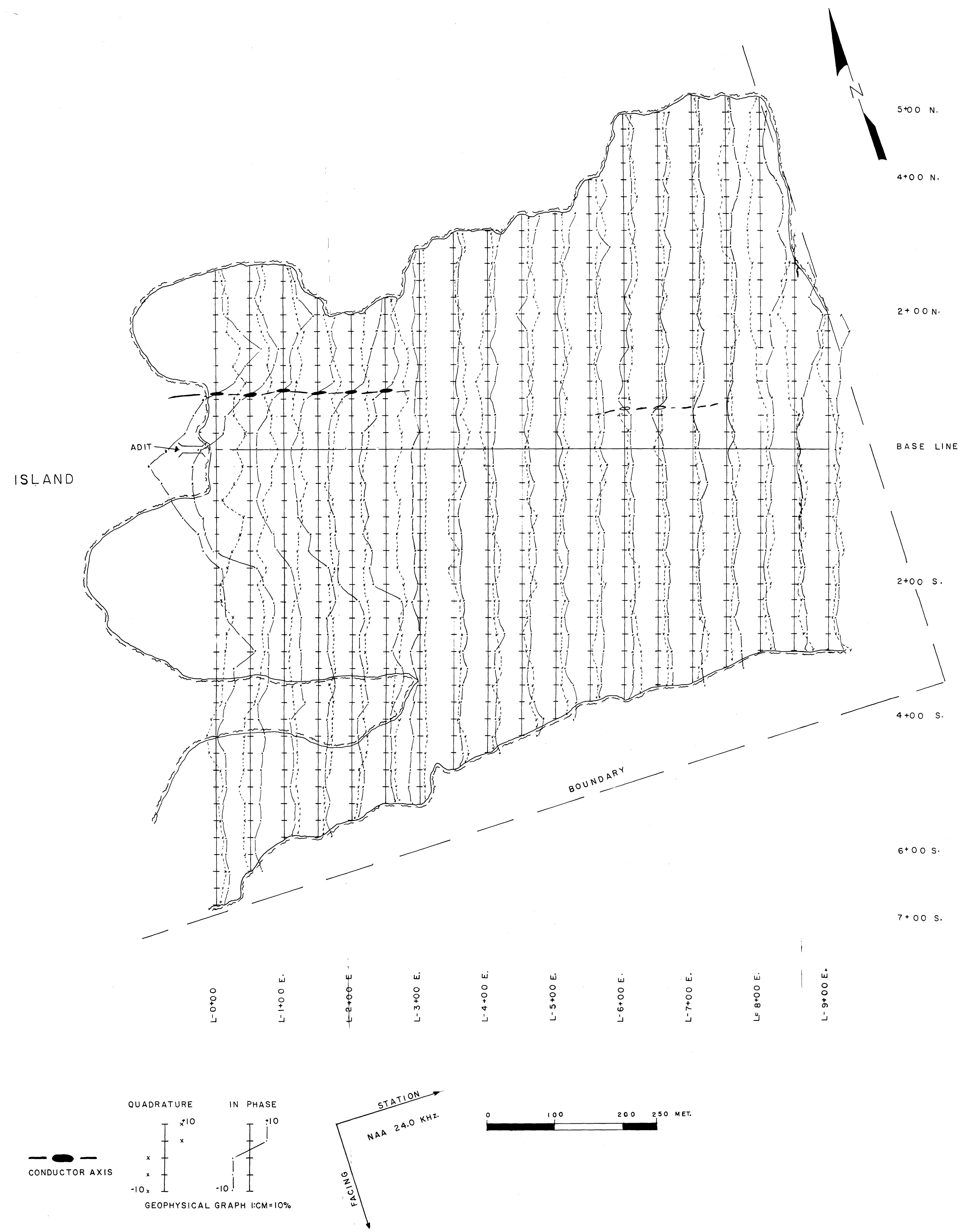
ARLINGTON RESOURCES INC.

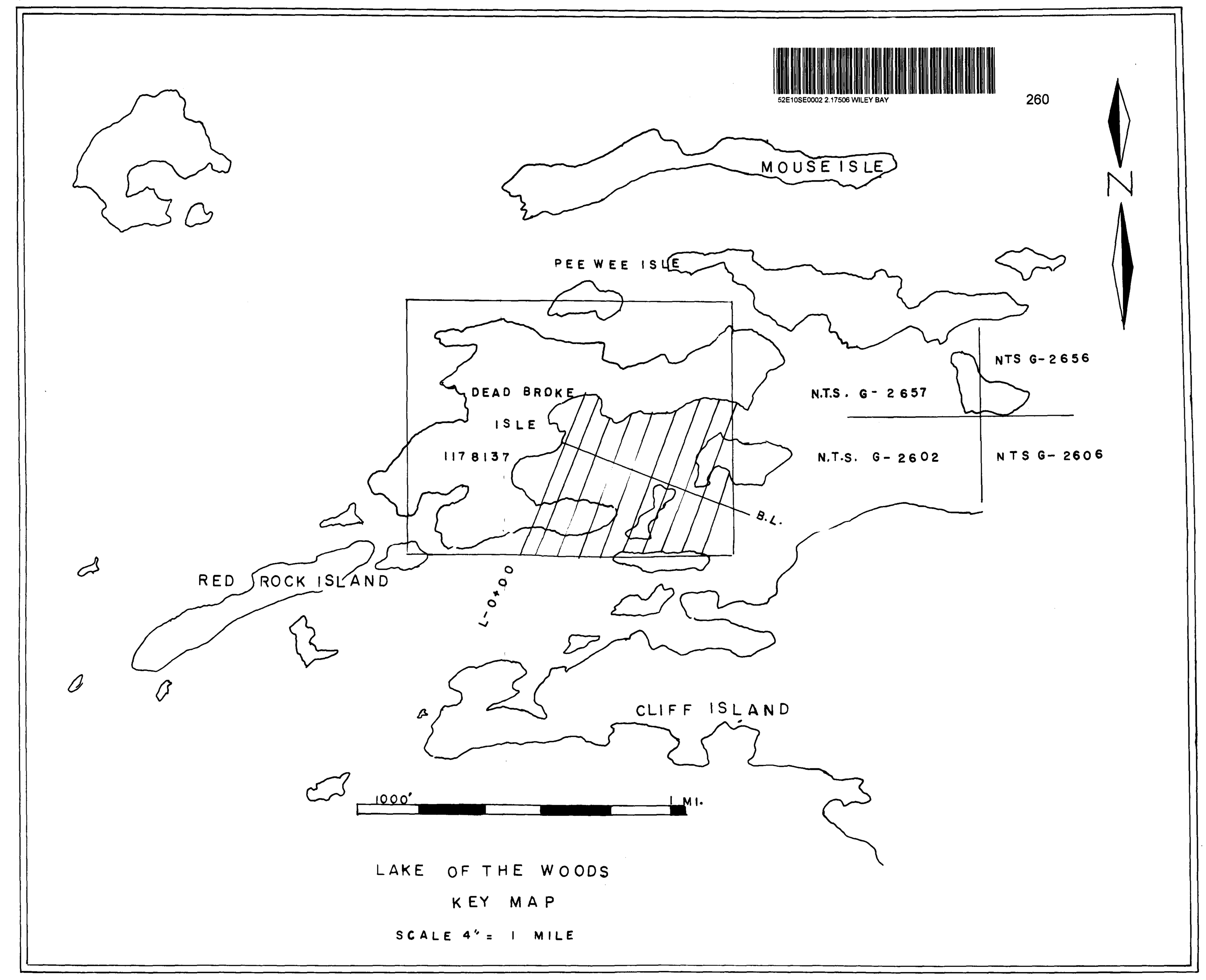
THE ASTRON BAY PROSPECT
KENORA MINING DIVISION
ELECTROMAGNETIC SURVEY
GEONICS E.M.-16

SURVEYED BY
LANCASTER HOLDINGS INC.
DATE MARCH 1997

2.17506

SCALE - 1 : 250





ARLINGTON RESOURCES INC.

THE ASTRON BAY PROSPECT
KENORA MINING DIVISION
ELECTROMAGNETIC SURVEY
GEONICS E.M-16

SURVEYED BY
LANCASTER HOLDINGS INC.
DATE MARCH 1997

SCALE - 1:250

2.17506