85-1079-
14645
9/86

GEOLOGICAL AND GEOPHYSICAL REPORT

ON THE

PERRY 1 AND 2, MASON 1 AND 2,
PICEAN DAVE, DREAM FR., DEAN'S FR.,
AND FAR SIDE FR.
(PERRY MASON GROUP)

TOODOGGONE RIVER AREA

Omineca Mining Division, B.C.

94E-6E

(57° 17' N. Lat., 127° 10' W. Long.)

by

Mohan R. Vulimiri, B.Sc.(Hons.), M.Sc.

and

Grant F. Crooker, B.Sc., F.G.A.C.

for

SEREM INC.
(Owners and Operators)

November 1985

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ILLUSTRATIONS

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INTRODUCTION

General

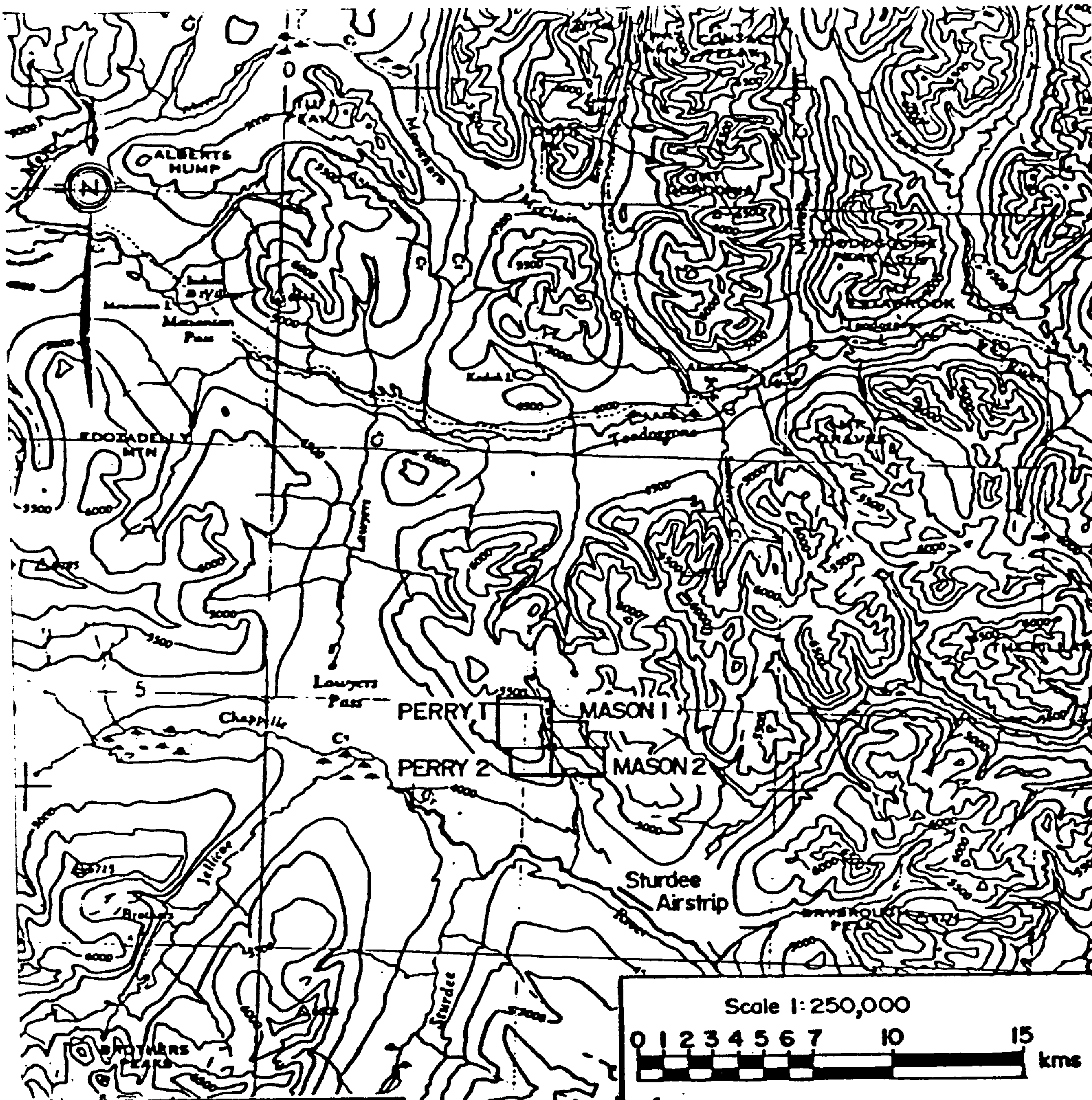
Field work was carried out on the property by Grant Crooker, Mohan Vulimiri and Sheila Keilbach, geologists, from August 2nd through August 9th, 1985.

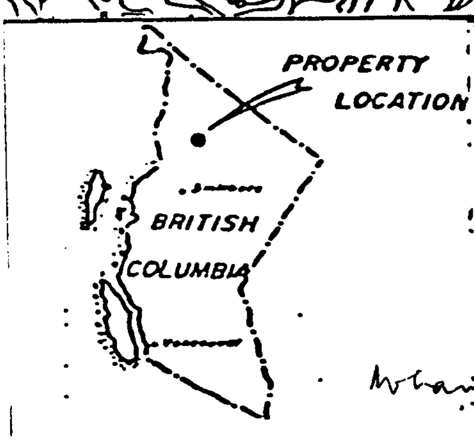
Trenching, rock sampling, geological mapping, prospecting, VLF-EM and VLF-EMR surveying were carried out on the claims.

Location and Access

The Perry Mason Group is located between 57°16′ and 57°17′ N. latitude and between 127°08′ and 127°12′ W. longitude in the Toodoggone River area, Toodoggone River map sheet, 94E-6E, Omineca Mining Division (Figures 1 and 2).

Access to the property is by airplane from Smithers to Sturdee Airstrip, a distance of 280 kilometres, and from Sturdee Airstrip to the property by helicopter, a distance of 3 kilometres. A 3 kilometre long cat trail leads from Baker Mine to the property providing alternate access.





0 5 10 15 KMS.

scale

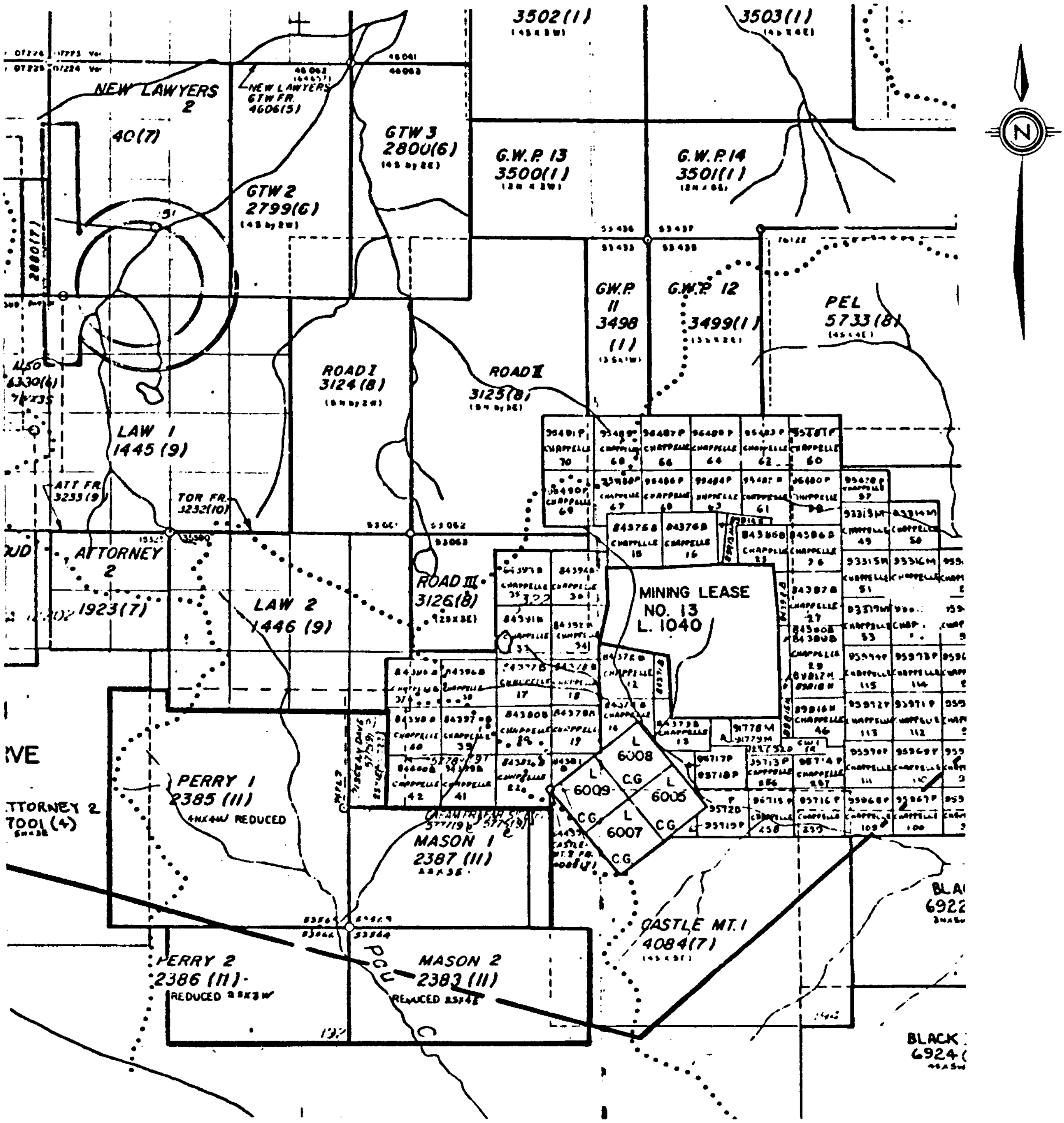
VANCOUVER, B.C.

SEREM INC.

PERRY MASON GROUP

LOCATION MAP

DRAWN BY: G. CROOKER	N.T.S.: 94E/6E
DATE: Nov. 1985	FIGURE Nº. 1



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VANCOUVER, B.C.

SEREM INC.

PERRY MASON GROUP CLAIM MAP

DRAWN BY: G. CROOKER	N.T.S.: 94E/6E
DATE: NOV. 1985	FIGURE Nº. 2

Physiography

Topography is gentle to moderate; elevation ranges from 1480 to 1880 metres above sea level. Outcrop is generally less than 5% on the property.

The property is open, with lichens, moss and a little buck brush.

Property and Claim Status

The claims (Figure 2) are owned and operated by Serem Inc., Box 11175, Royal Centre, 1055 West Georgia Street, Vancouver, B.C. Upon acceptance of this report, all claims will be in good standing until 1987. They consist of the following:

Claim	Units	Record No.	Record Date
Perry 1	16	2365	28 November
Perry 2	6	2386	28 November
Mason 1	6	2387	28 November
Mason 2	8	2388	28 November
Picean Dave	2	5775	6 September
Dean's Fraction	1	5778	6 September
Dream Fraction	1	5777	6 September
Far Side Fraction	1	5776	6 September

Property History

Previous work carried out on the claims by Serem Inc. during 1980, 1981 and 1982 included soil sampling, silt sampling, preliminary geological mapping, prospecting and a proton magnetometer survey. Work during 1983 was carried out on the "Black Pete Zone" showing. This is a quartz-hosted precious metal prospect. Five hand trenches were dug, chip sampled and geologically mapped. A two hectare area around the showing was also geologically mapped. Gold values, across 1 metre, ranged from 0.001 to 0.110 (average 0.084) ounces per ton, while silver values ranged from 0.13 to 8.70 (average 1.16) ounces per ton. For detailed information the previous assessment reports can be referred to.

This property is located about 3 kilometres southwest of the Baker Mine (currently active).

EXPLORATION PROCEDURE

A moderate exploration program was carried out on the property during 1985. The work was carried out to further delineate the mineralized zones.

Work in 1985 consisted of cat and back-hoe trenching, chip sampling, geological mapping, prospecting, and VLF electro-magnetic and electo-magnetic resistivity surveys.

A grid was established on the property. The baseline was run at 0°-180° for 440 metres, and cross lines were run at right angles to the baseline every 40 metres. A total of 8300 metres of cross lines were established with stations every 20 metres, except over the showings where stations were established every 10 metres.

Eight thousand three hundred metres of VLF-EM survey were carried out, with reading taken every 20 metres along lines. A Geonics EM-16 was used as a receiver, with NLK, Seattle, Washington, 24.8 Khz the transmitter. This transmitter was used due to its good signal strength and orientation to the geological structures.

The EM-16 measures In-phase and quadrature components of vertical magnetic field as a percentage of horizontal primary field (that is, tangent of the tiltangle and ellipticity). Both values are given in percentages. Field procedure requires to always face the same direction when taking readings. When appraching a conductor the readings will be positive, and when leaving a conductor the readings will be negative. The EM-16 is rotated in the vertical plane until a minimum signal is obtained. This reading in the "In-phase" and gives the tiltangle in degrees and the tangent of the tiltangle expressed as percent. Once this minimum signal is obtained, the "Quadrature" knob is rotated until the signal minimum is obtained. This reading is approximately the ratio of the vertical secondary field to the horizontal primary field.

The VLF-EM can pick up conductors caused by electrolyte-filled fault or shear zones and porous horizons, graphite, carbonaceous sediments, lithological boundaries as well as sulphide bodies.

The In-phase and Quadrature data were plotted as percentages on Figure 4 at a scale of 1:1250. The Fraser filter method was then applied to the In-phase data, and the results plotted at a scale of 1:1250 on Figure 5.

Eighty thousand three hundred metres of VLF-EMR (electro-magnetic resistivity) surveying were carried out with readings taken every 20 metres, except over the showings where readings were taken every 10 metres. A Geonics EM-16R was used as a receiver, with NLK, Seattle, Washington, at 24.8 Khz transmitter.

The EM-16R measures the horizontal components of the radial electric field and the tangential magnetic field (apparent resistivity), and the phase differences between the radial electric field and the tangential magnetic field (phase angle).

Field procedures require that the instrument be oriented in the direction of the transmitter selected. Two probes are pushed into the ground 10 metres apart, in the direction of the transmitter. The resistivity control is then rotated until a signal minimum is located. The phase angle control is then rotated until a further signal mininmum is obtained. The apparent resistivity in ohm-metres, and phase angle in degrees are then recorded from appropriate control. The apparent resistivity readings give the electrical resistivity of the ground, while the phase angles give conductivity of the overburden.

The apparent resistivity is high for siliceous, non-conductive rocks, and low for altered, kaolinized rocks.

The apparent resistivity and phase angles were plotted at a scale of 1:1250 on Figure 6.

Cat and back-hoe trenching were carried out over the area of showings. A total of 7 trenches were cut, and approximately 1050 cubic metres of material removed. These trenches were systematically chip sampled and geologically mapped at a scale of 1:500 (Figures 3 and 4)

Forty-six chip samples of quartz material taken at 1 metre sampling interval and were fire-assayed for gold and silver. The results are shown on Figure 3 and in Table 1.

GEOLOGY

The Perry Mason Group of claims is underlain by Permian Asitka limestone, Triassic Takla volcanic rocks and Lower Jurassic Toodoggone volcanic rocks and Lower Jurassic intrusive rocks.

For detailed description of the general geology of the area assessment reports of 1982 and 1983 can be referred to.

Intensive trenching with the help of JCB back-hoe and D6 Caterpillar bulldozer was carried out in the "Black Pete Zone" showing area. The showing was hand trenched and sampled in 1983. Detail mapping of the trench area shows the presence of three distinct lithologic units.

1. Lower Jurassic Toodoggone feldspar porphyry unit
2. Epidote-actinolite-garnet skarn
3. Triassic Takla augite porphyry +/- gabbro

Geological mapping (Figure 3) suggests the units are intensively disrupted by steep-dipping northeast-southwest post-mineral faults. From the pattern of conjugate shears and subsidiary faults, the movement on the major faults appear to be right lateral.

Skarn zones consisting of epidote, garnet and actinolite appear to occur within the Takla augite porphyry. The skarns are exposed along the creek between trenches 85-6 and 85-8 and in trench 85-11.

A small outcrop of gabbro is exposed on the road just east of trench 85-12. The gabbro body is probably of same age as the Takla volcanic rocks.

MINERALIZATION AND ALTERATION

Mineralization consisting of galena, tetrahedrite and sphalerite with silver and gold values is associated with silicified and siliceous zones within the Takla augite porphyry and the Toodoggone feldspar porphyry. The silicified and siliceous zones basically contains quartz and minor chalcedony. No banding was observed. Only minor quartz veinlets in association with limonite and manganese oxide fracture fillings are present.

One distinct zone is delineated in trenches 85-8, 83-5, and 85-6 for a distance of approximately 65 metres. The zone carries values upto 13.55 oz/ton gold and 214.5 oz/ton silver.

For detailed trench assays table 1 and Figure 3 can be referred to.

Several patchy zones were traced in trenches 85-6, 85-7 and 85-12 and in trenches dug in field season 1983. The strike of these zones could not be determined due to the intensive nature of post-mineral faulting.

The silicified zones are also associated with manganese oxide and limonite fracture fillings, and intense argillic alteration.

The assays from trench sampling are given in the table below.

TABLE 1

Trench 6

Sample No.	Width	Au (oz/ton)	Ag (oz/ton)	Mineralogy
25402	0 - 1m	<0.01	1.5	
25403	1 - 2m	<0.01	0.5	
25404	2 - 3m	<0.01	0.4	
25405	3 - 4m	<0.01	0.2	
25406	14 -15m	0.04	6.6	Gal, Tet
25407	15 -16m	<0.01	0.9	

25408	16 -17m	<0.01	0.5
25409	17 -18m	<0.01	0.3
25410	18 -19m	0.01	0.8
25411	19 -20m	<0.01	1.3
25412	20 -21m	<0.01	1.1
25441	49 -50m	<0.01	0.1
25442	50 -51m	<0.01	0.2
25443	51 -52m	<0.01	0.4
25444	52 -53m	0.04	4.0
25445	53 -54m	0.06	8.4

Trench 7

Sample No.	Width	Au (oz/ton)	Ag (oz/ton)	Mineralogy
25413	5 - 6m	<0.01	0.5	
25414	6 - 7m	<0.01	0.5	
25415	7 - 8m	<0.01	1.4	
25416	8 - 9m	0.01	0.9	
25417	9 -10m	0.01	2.8	
25418	10 -11m	0.01	3.0	
25419	44 -45m	0.01	0.6	
25420	45 -46m	<0.01	0.5	
25421	46 -47m	<0.01	0.6	
25422	47 -48m	<0.01	1.5	

Trench 8

Sample No.	Width	Au (oz/ton)	Ag (oz/ton)	Mineralogy
25423	23 -24m	0.05	7.0	Gal, Tet, Sph
25424	24 -25m	0.02	2.5	,,
25425	25 -26m	0.01	2.3	,,
25426	26 -27m	13.55	214.7	,,
25427	27 -28m	0.47	14.4	,,
25428	28 -29m	0.41	6.6	,,
25429	29 -30m	0.01	0.4	
25430	30 -31m	0.01	1.4	
25431	31 -32m	0.12	3.1	Gal, Tet
25432	32 -33m	0.04	1.9	,,
25433	33 -34m	0.10	4.1	,,
25434	34 -35m	0.05	2.1	,,
25435	35 -36m	0.04	2.5	,,
25436	36 -37m	0.01	2.5	,,

Trench 12

25437	6 - 7m	<0.01	1.6	
25438	7 - 8m	<0.01	0.5	
25439	8 - 9m	0.01	3.0	
25440	10 -11.5m	<0.01	1.2	

GEOPHYSICS

VLF-EM Survey

The Fraser Filter data was applied to all In-phase readings to allow contouring of the data. The results were contoured at 10 percent intervals on Figure 5.

Two moderate to strong VLF electro-magnetic conductors were delineated. Conductor A extends from 0+80S;2+10W to 3+60S;3+70W. This conductor probably indicates a fault zone. Conductor B is a strong conductor extending from 1+60S;0+10E to 4+80S;1+90E. Fault gouge was seen along this zone, indicating the conductor delineates a fault.

VLF-EMR Survey

A number of resistivity highs and lows were indicated by the survey (Figure 6). Resistivity lows A and B are coincidental with VLF electro-magnetic conductors A and B. These zones probably represent faults.

The resistivity high at 85-11 appears to be caused by a siliceous skarn zone. The resistivity highs around trench 85-6 appear to be caused by silicified zones. The silicified zone uncovered in trenches 85-5 and 85-8 is not delineated by the resistivity survey. This may be due to extensive post-mineral faulting in the area.

Resistivity high A with values upto 11000 ohm-metres was delineated at location 3+60S and 3+50E. No outcrop is exposed in the area. This resistivity high may be due to an extensively silicified zone.

CONCLUSIONS AND RECOMMENDATIONS

The VLF electro-magnetic survey delineated two conductors which appear to indicate fault zones.

The VLF electro-magnetic resistivity survey delineated several resistivity highs. These highs would appear to be caused by extensively silicified zones. Resistivity high A should be trenched by a cat and a back-hoe.

The cat and back-hoe trenching exposed one strongly silicified zone (85-8) and several patchy zones with economically significant precious metal and base metal values (galena, tetrahedrite and sphalerite). Precious metal values ranged upto 214.7 oz/ton silver and 13.55 oz/ton ~~silver~~ Au. These zones should be systematically diamond drilled at close spacing because of intense post-mineral faulting in the area.

Recommendations are to:

1. Geologically map the grid in detail.

2. Back-hoe trench the electro-magnetic resistivity highs.

3. Core drill the silicified zones to delineate grade and tonnage.

Respectfully submitted,

Mohan R. Vulimiri, B.Sc.(Hons.), M.Sc.

Grant F. Crooker, B.Sc., F.G.A.C.

REFERENCES

Crawford, S.A., & Vulimiri, M.R. (1980) - Geochemical & Prospecting Report on the Perry 1, Perry 2, Mason 1 and Mason 2 claims, Omineca Mining Division.

Stammers, M.A. (1983) - Geological Report on the Perry Mason Group, Omineca Mining Division.

Stammers, M.A., Crawford, W.J. and Keilbach, S.A. (1982) - Geological, Geophysical and Trenching Report on the Perry 1, 2 and Mason 1 and 2 claims, Omineca Mining Division

CERTIFICATE OF QUALIFICATIONS

I, Grant F. Crooker, B.Sc., Geology of Upper Bench Road, Keremeos, in the Province of British Columbia, hereby certify as follows:

1. That I graduated from the University of British Columbia in 1972 with a Bachelor of Science degree in Geology.

2. That I have prospected and actively pursued geology prior to my graduation and have practised my profession since 1972.

3. That I am a member of the Canadian Institute of Mining and Metallurgy.

4. That I am a Fellow of the Geological Association of Canada.

5. That I have no direct or indirect interest in the property

Dated at Vancouver, B.C. this 28th day of November, 1985.

Grant Crooker, B.Sc., F.G.A.C.

CERTIFICATE OF QUALIFICATIONS

I, Mohan R. Vulimiri, of 1120 Heywood Street, North Vancouver, B.C., hereby certify that:

1. I am a graduate with a B.Sc. (Hons.) degree form the Indian Institute of Technology, Kharagpur and a M.Sc. (Economic Geology) degree from the University of Washington.

2. I am involved in mineral exploration in British Columbia since 1970 and I have acted in responsible positions since 1974.

3. I have no direct or indirect interest in the property.

Dated at Vancouver, B.C., this 28 th day of November, 1985.

Mohan Vulimiri

Mohan R. Vulimiri

DETAILED COST STATEMENT

Wages

1 Geologist, G. Crooker
12 days at $300.00 per day...............$3600.00
August 2 - 9, 15 - 18, 1985

1 Geologist, M.R. Vulimiri
12 days at $300.00 per day $3600.00
August 2 - 9, 15 - 18, 1985

1 Geologist, S.Keilbach
8 days at $200.00 per day $1600.00
August 2 - 9, 1985

Camp Costs (include groceries, camp supplies, camp equipment, radio, expediting, etc.

G. Crooker, 8 days at $50.00 per day......$400.00
August 2 - 9, 1985

M.R. Vulimiri, 8 days at $50.00 per day...$400.00
August 2 - 9, 1985

S. Keilbach, 8 days at $50.00 per day.....$400.00
August 2 - 9, 1985

Transportation

Vehicle, Chev 4 x 4
8 days at $60.00 per day..................$480.00
August 2 - 9, 1985
Fuel, 20 gallons at $5.00 per gallon......$100.00

Fixed Wing* (Smithers to Sturdee Strip)
8 days at $72.50 per day..................$580.00
August 2 - 9, 1985

Mobilization & Demobilization
8 days at $78.25 per day.................$626.00
August 2 - 9, 1985

Supplies (flagging, topofil thread, etc.)......$50.00

Instrument Rental

Geonics EM-16R............................$200.00
8 days at $25.00 per day
August 2 - 9, 1985

Assays

46 rock samples (Au, Ag) at $22.00........$110.00

Preparation of Report
Secreterial, draughting, reproduction, etc.$1100.00

N.B. Trenching - 1047.3 cubic metres.........$7000.00

	$21,126.00

* Mobilization and demobilization costs, and fixed wing costs are pro-rated over 7 projects in the Toodoggone Area covering 44 days

MIN-EN LABORATORIES LTD.
705 WEST 15TH STREET
NORTH VANCOUVER, B.C.
Phone: 980-5814

Certificate of Assay

TO: Mohan Vulimiri

PROJECT No.

DATE August 12, 1983

File No. SK-3

SAMPLE No.	Ag	Au		
	oz/ton	oz/ton		
25424	2.5	0.02		
25425	2.3	0.01		
25426	214.7	13.55		
25427	14.4	0.47		
25428	6.6	0.41		
25429	0.4	0.01		
25430	1.4	0.01		
25431	3.1	0.12		
25432	1.9	0.04		
25433	4.1	0.10		
25434	2.1	0.05		
25435	2.5	0.04		
25436	2.5	0.01		
25437	1.6	<0.01		
25438	0.5	<0.01		
25439	3.0	0.01		
25440	1.2	<0.01		
25441	0.1	<0.01		
25442	0.2	<0.01		
25443	0.4	<0.01		
25444	4.0	0.04	}	
25445	8.4	0.06	} 6.2	.05

MIN-EN Laboratories Ltd.

CERTIFIED BY [signature]

MIN-EN LABORATORIES LTD.

705 WEST 15TH STREET
NORTH VANCOUVER, B.C.
Phone: 980-5814

Certificate of Assay

TO: Mohan Vulimiri

PROJECT No.

DATE August 9, 1985

File No. SK-2

SAMPLE No.	Ag	Au		
	oz/ton	oz/ton		
25402	1.5	<0.01		
25403	0.5	<0.01		
25404	0.4	<0.01		
25405	0.2	<0.01		
25406	6.6	0.04		
25407	0.9	<0.01		
25408	0.5	<0.01		
25409	0.3	<0.01		
25410	0.8	0.01		
25411	1.3	<0.01		
25412	1.1	<0.01		
25413	0.5	<0.01		
25414	0.5	<0.01		
25415	1.4	<0.01		
25416	0.9	0.01		
25417	2.8	0.01		
25418	3.0	0.01		
25419	0.6	0.01		
25420	0.5	<0.01		
25421	0.6	<0.01		
25422	1.5	<0.01		
25423	7.0	0.05		

MIN-EN Laboratories Ltd.

CERTIFIED BY

GEONICS LIMITED
1745 Meyerside Drive, Unit 8, Mississauga, Ontario, Canada L5T 1C5 Tel. (416) 676-9580 Cables: Geonics

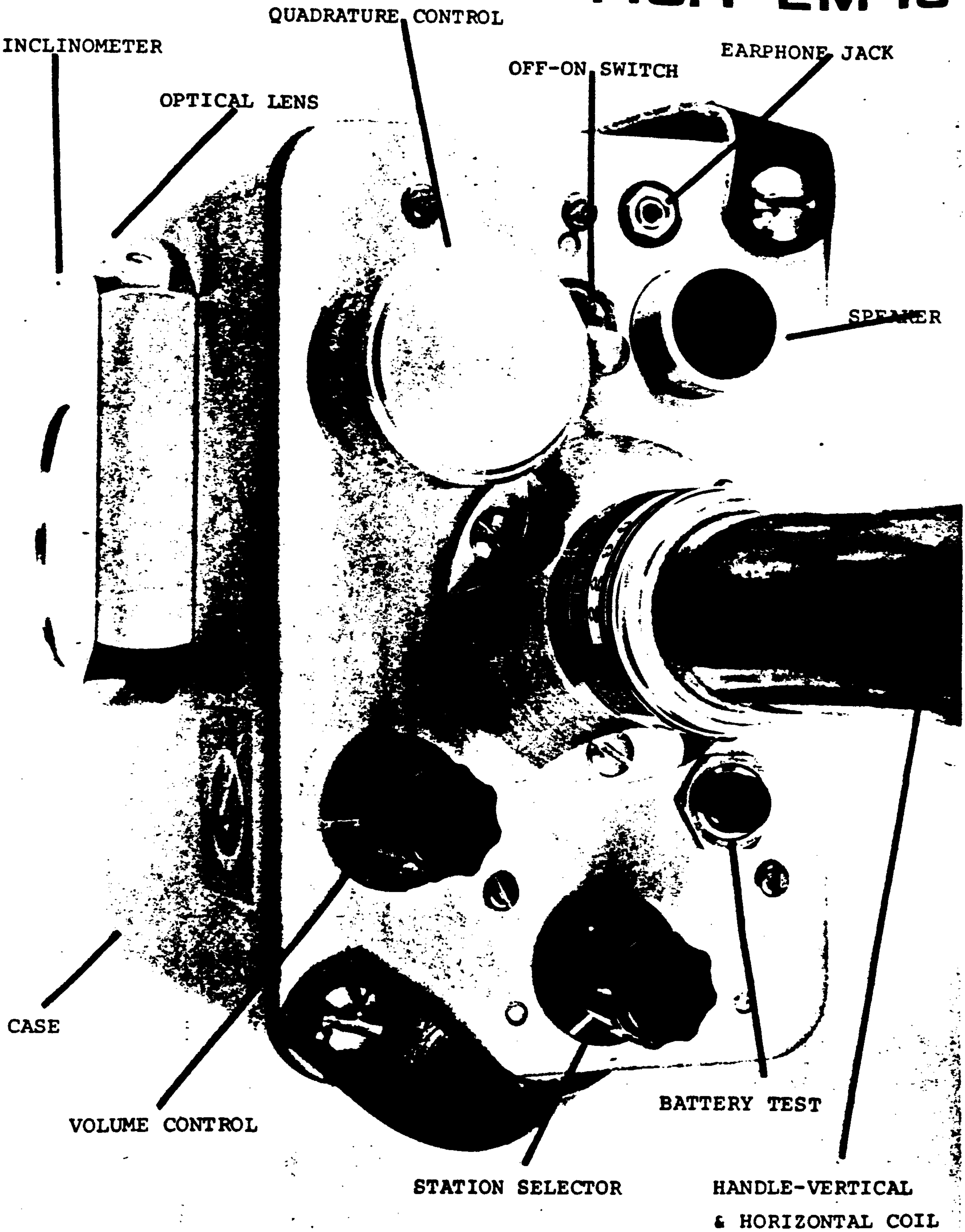
OPERATING MANUAL
for
EM16 VLF-EM

Revised Jan.1979

EM16 SPECIFICATIONS

MEASURED QUANTITY	In-phase and quad-phase components of vertical magnetic field as a percentage of horizontal primary field. (i.e. tangent of the tilt angle and ellipticity).
SENSITIVITY	In-phase :±150% Quad-phase :± 40%
RESOLUTION	±1%
OUTPUT	Nulling by audio tone. In-phase indication from mechanical inclinometer and quad-phase from a graduated dial.
OPERATING FREQUENCY	15-25 kHz VLF Radio Band. Station selection done by means of plug-in units.
OPERATOR CONTROLS	On/Off switch, battery test push button, station selector switch, audio volume control, quadrature dial, inclinometer.
POWER SUPPLY	6 disposable 'AA' cells.
DIMENSIONS	42 x 14 x 9cm
WEIGHT	Instrument: 1.6 kg Shipping : 4.5 kg

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

SELECTION OF THE STATION

The magnetic field lines from the station are at right angles to the direction of the station. Always select a station which gives the field approximately at right angles to the main strike of the ore bodies or geological structure of the area you are presently working on. In other words, the strike of geology should point to the transmitter. (See Figure 3). Of course, ±45^{o} variations are tolerable in practice.

Tuning of the EM16 to the proper transmitting station is done by means of plug-in units inside the receiver. The instrument takes two selector-units simultaneously. A switch is provided for quick switching between these two stations.

To change a plug-in unit, open the cover on top of the instrument, and insert the proper plug. (Figure 10) Close the cover and set the selector switch to the desired plug-in.

On the following pages is a variety of information on the most commonly used (i.e. reliable) VLF Transmitters including transmission frequency, geographical location and their scheduled maintenance periods.

Fig.10

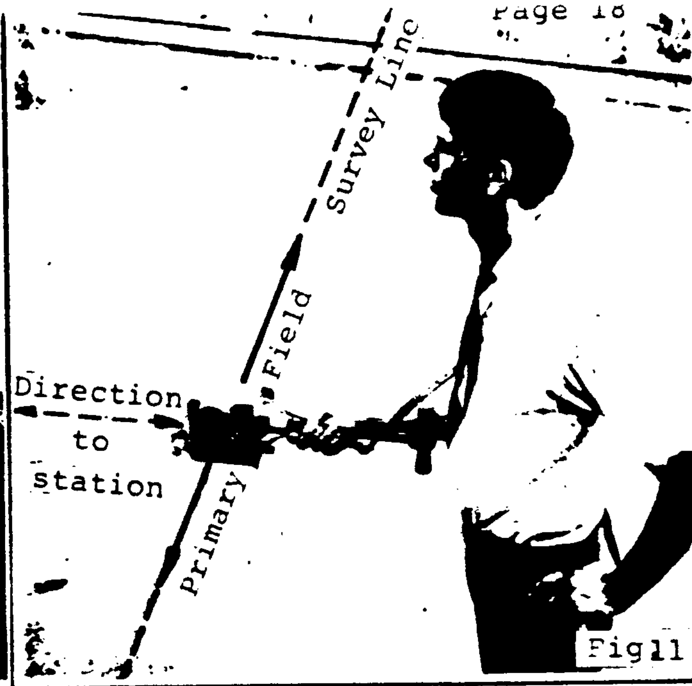


Fig 11

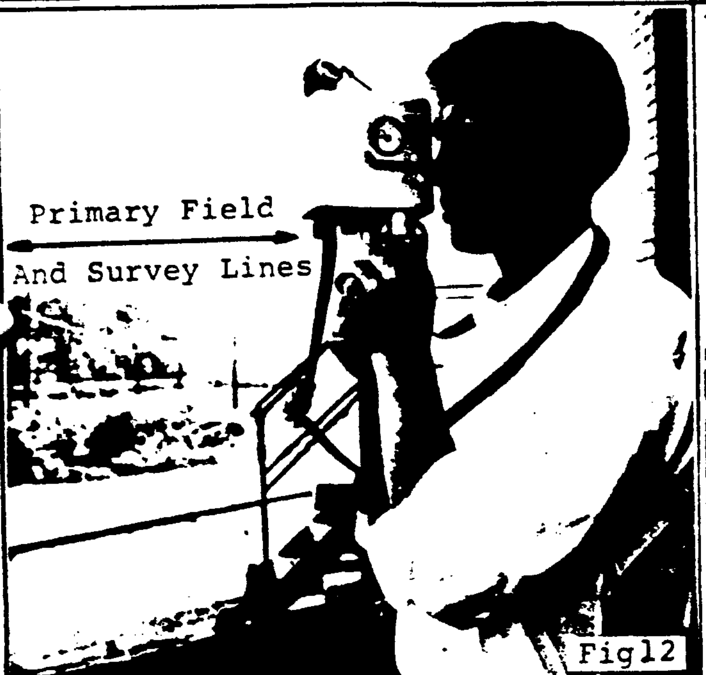
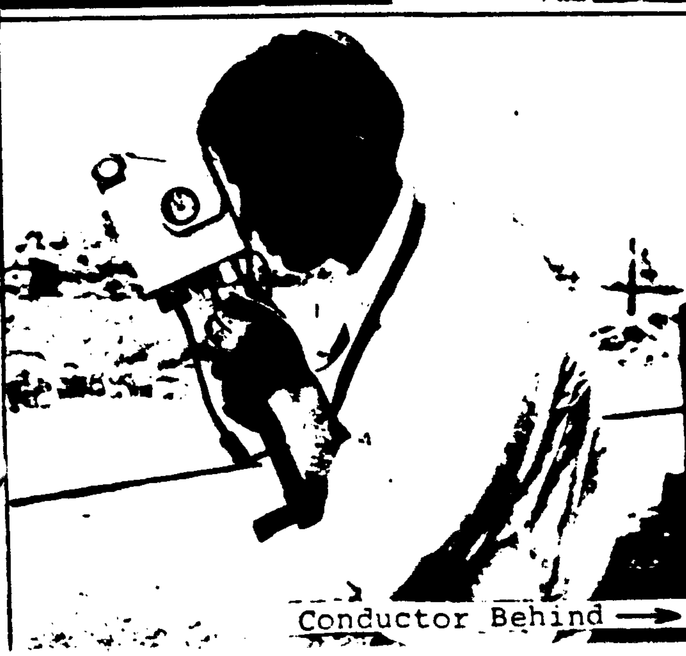
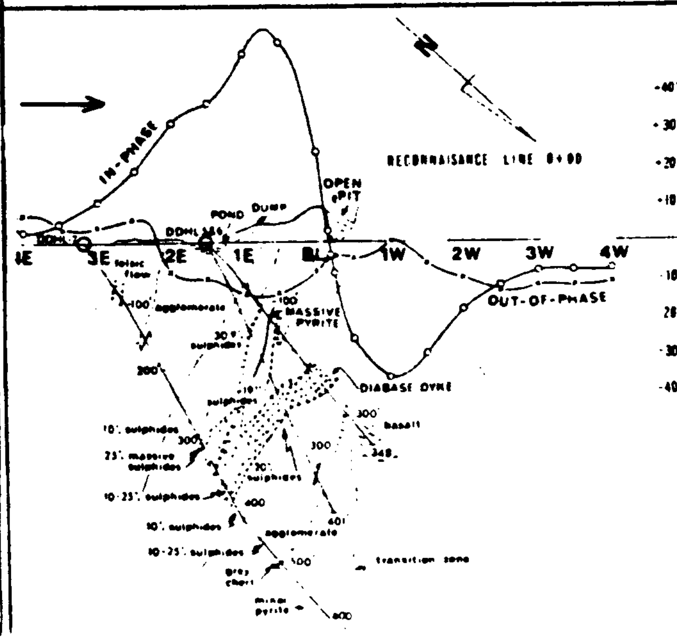


Fig 12

Fig.13





REVISED
April 2, 1982

VLF Transmitter Information

NAVY STATIONS OFF-AIR TIMES:

NAA	Schedule off 1300 to 2300 UT daily 15 Nov. through Nov. 17
NDT	Scheduled off twenty-four hours each day 28 Oct. and 29 Oct. (Local); ten hours each day Mon. through Sat. (Local) Beginning 14 Jan. 1979 at 2300 UT and ending 6 Feb. at 0900 UT; Twenty-four hours each day Mon. 0900 UT; Ten hours each day Mon. through Sat. (Local) Beginning 7 Mar. at 2300 UT and ending 13 Apr. at 0900 UT.
NPM	19 Oct. 1800 to 2158 UT Scheduled off 1800 to 0200 UT Mon. through Fri. (Local) 15 Jan. 1979 to 17 Mar.
NSS	Scheduled off 15 Oct. to 10 Nov. and 1200 to 2400 UT daily 21 Nov. through 24 Nov.
NWC	May be off intermittently untill 24 Nov.

NORMAL MAINTENANCE PERIODS:

Cutler	NAA	Every Mon. 1200 to 2000 UT. If Holiday falls on Mon., maintenance will be preformed on preceding Fri.
	NDT	First Thur./Fri. of month 2300 to 0900 UT, other Thur./Fri. 2300 to 0700 UT
Seattle	NLK	Every Thur. 1600 to 2400 UT. During daylight saving time every Thur. 1500 to 2300 UT.
	NPM	Every Wed./Thur. 1700 to 0500 UT.
	NSS	Every Tues. 1200 to 2000 UT.
	NWC	Every Wed. 0000 to 0800 UT.

For further information the U.S. Naval Observatory, Time Service Division, Washington D.C. may be contacted at (202) 254-4548.

REVISED

Sept. 22, 1982

The frequency of NLK is now 24.8 kHz.

FIELD PROCEDURE

Orientation & Taking a Reading

The direction of the survey lines should be selected approximately along the lines of the primary magnetic field, at right angles to the direction to the station being used. Before starting the survey, the instrument can be used to orient oneself in that respect. By turning the instrument sideways, the signal is minimum when the instrument is pointing towards the station, thus indicating that the magnetic field is at right angles to the receiving coil inside the handle.(Fig.11).

To take a reading, first orient the reference coil (in the lower end of the handle) along the magnetic lines.(Fig.12) Swing the instrument back and forth for minimum sound intensity in the speaker. Use the volume control to set the sound level for comfortable listening. Then use your left hand to adjust the quadrature component dial on the front left corner of the instrument to further minimize the sound. After finding the minimum signal strength on both adjustments, read the inclinometer by looking into the small lens. Also, mark down the quadrature reading.

While travelling to the next location you can, if you wish, keep the instrument in operating position. If fast changes in the readings occur, you might take extra stations to pinpoint accurately the details of anomaly.

The dials inside the inclinometer are calibrated in positive and negative percentages. If the instrument is facing 180° from the original direction of travel, the polarities of the readings will be reversed. Therefore, in the same area take the readings always facing in the same direction even when travelling in opposite way along the lines.

The lower end of the handle, will as a rule, point towards the conductor. (Figs.13 & 14) The instrument is so calibrated that when approaching the conductor, the angles are positive in the in-phase component. Turn always in the same direction for readings and mark all this on your notes, maps, etc.

THE INCLINOMETER DIALS

The right-hand scale is the in-phase percentage(ie.Hs/Hp as a percentage). This percentage is in fact the tangent of the dip angle. To compute the dip angle simply take the arctangent of the percentage reading divided by 100. See the conversion graph on the following page.

The left-hand scale is the secant of the slope of the ground surface. You can use it to "calculate" your distance to the next station along the slope of the terrain.

(1) Open both eyes.

(2) Aim the hairline along the slope to the next station to about your eye level height above ground.

(3) Read on the left scale directly the distance necessary to measure along the slope to advance 100 (ft) horizontally.

We feel that this will make your reconnaissance work easier. The outside scale on the inclinometer is calibrated in degrees just in case you have use for it.

PLOTTING THE RESULTS

For easy interpretation of the results, it is good practice to plot the actual curves directly on the survey line map using suitable scales for the percentage readings. (Fig.15) The horizontal scale should be the same as your other maps on the area for convenience.

A more convenient form of this data is easily achieved by transforming the zero-crossings into peaks by means of a simple numerical filtering technique. This technique is described by D.C. Fraser in his paper "Contouring of VLF-EM Data", Geophysics, Vol. 34, No. 6. (December 1969)pp958-967. A reprint of this paper is included in this manual for the convenience of the user.

This simple data manipulation procedure which can be implemented in the field produces VLF-EM data which can be contoured and as such provides a significant advantage in the evaluation of this data.

GEONICS LIMITED

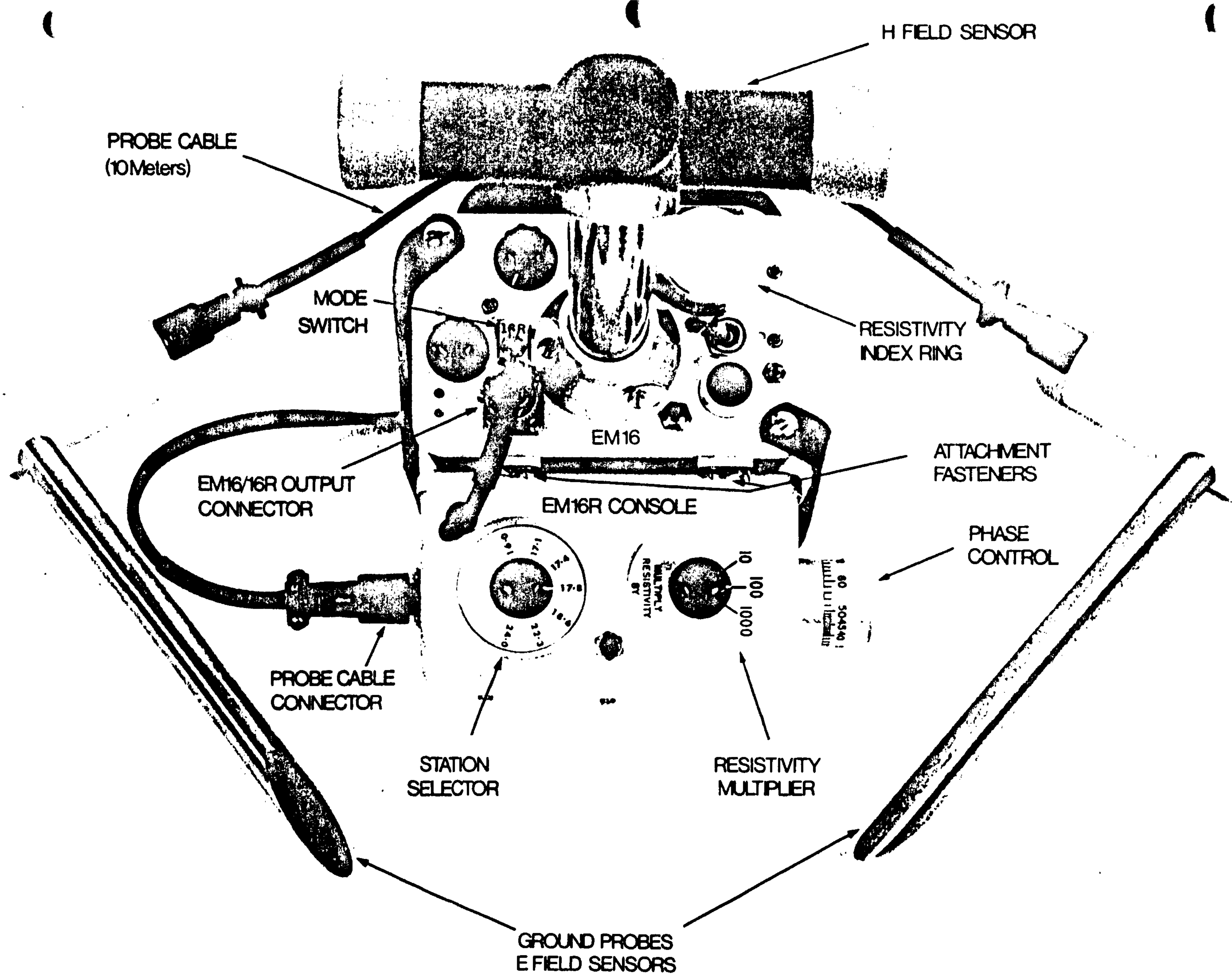
1745 Meyerside Drive, Unit 8, Mississauga, Ontario, Canada L5T 1C5 Tel. (416) 676-9580 Cables: Geonics

OPERATING MANUAL
for
EM16R VLF RESISTIVITY METER
(Attachment to EM16)

Revised Jan. 1979

EM16R SPECIFICATIONS

MEASURED QUANTITY	• Apparent Resistivity of the ground in ohm-meters • Phase angle between E_x and H_y in degrees
RESISTIVITY RANGES	• 10 - 300 ohm-meters • 100 - 3000 ohm-meters • 1000 - 30000 ohm-meters
PHASE RANGE	0-90 degrees
RESOLUTION	• Resistivity: ± 2% full scale • Phase : ± 0.5°
OUTPUT	Null by audio tone. Resistivity and phase angle read from graduated dials.
OPERATING FREQUENCY	15-25 kHz VLF Radio Band. Station selection by means of rotary switch.
INTERPROBE SPACING	10 meters
PROBE INPUT IMPEDANCE	100 MΩ in parallel with 0.5 picofarads
DIMENSIONS	19 x 11.5 x 10 cm. (attached to side of EM16)
WEIGHT	1.5 kg (including probes and cable)



H FIELD SENSOR
PROBE CABLE (10 Meters)
MODE SWITCH
RESISTIVITY INDEX RING
EM16
ATTACHMENT FASTENERS
EM16/16R OUTPUT CONNECTOR
EM16R CONSOLE
PHASE CONTROL
MULTIPLY RESISTIVITY BY
10
100
1000
PROBE CABLE CONNECTOR
STATION SELECTOR
RESISTIVITY MULTIPLIER
GROUND PROBES E FIELD SENSORS

FIELD PROCEDURE

1. Mounting of The EM16R Console To The EM16 Unit

Align the EM16R console, in respect to the EM16 cover, so that the station selector on the console is close to the EM16R output receptacle on the EM16 control plate. See photograph on facing page.

To mount the console on the EM16 use 4 stud fasteners.

To connect the EM16 console with the EM16 electrically, plug the EM16R console output plug in the corresponding receptacle on the EM16 control panel.

2. Orientation

The instrument measures resistivity along a line in the same direction as the station. After a VLF transmitting station has been selected EM16 is used to determine the direction to the transmitter.

The MODE selector switch is thrown to EM16, and the QUADRATURE/RESISTIVITY dial is turned to zero. With the two receiver coils in the handle of the EM16 in a horizontal plane, with the EM16R unit underneath, turn the whole instrument in a horizontal plane until the station signal goes to null. At this time the long axis of the EM16 handle (signal coil) is pointing towards the station, and the short axis (reference coil) is maximum coupled to the magnetic field. Switch mode to EM16R.

The EM16 QUADRATURE Knob zero line is used as a cursor for the EM16R RESISTIVITY Index ring, and the EM16R RESISTIVITY Index ring zero line is the cursor for the EM16R QUADRATURE Knob.

All EM16 calibrations are in black, all EM16R calibrations are in red.

3. Taking a Reading

To take a reading, orient the unit so that the shorter handle arm is at the right angle to the direction of the station and in the horizontal plane, as described in 2.

For convenience and stability the instrument can be laid on the ground during the reading, with the EM16R console beneath. Connect the probes to the EM16R console receptacle through the 10 meters long probe cable.

Ensure that the station selector switch on the EM16 and EM16R are both turned to the desired station frequency.

Push the probes into the ground 10 metres apart in the direction of the station, that is to say aligned with the long axis of the handle. The cable end with a red marker sleeve goes to the probe nearest the top of the EM16 instrument case, the unmarked cable goes to the probe off in the direction of the EM16 coil handle. Set the resistivity multiplier switch to x1000 position, rotate the EM16R RESISTIVITY CONTROL (same knob as for QUADRATURE when using EM16) for minimum sound intensity in the speaker.

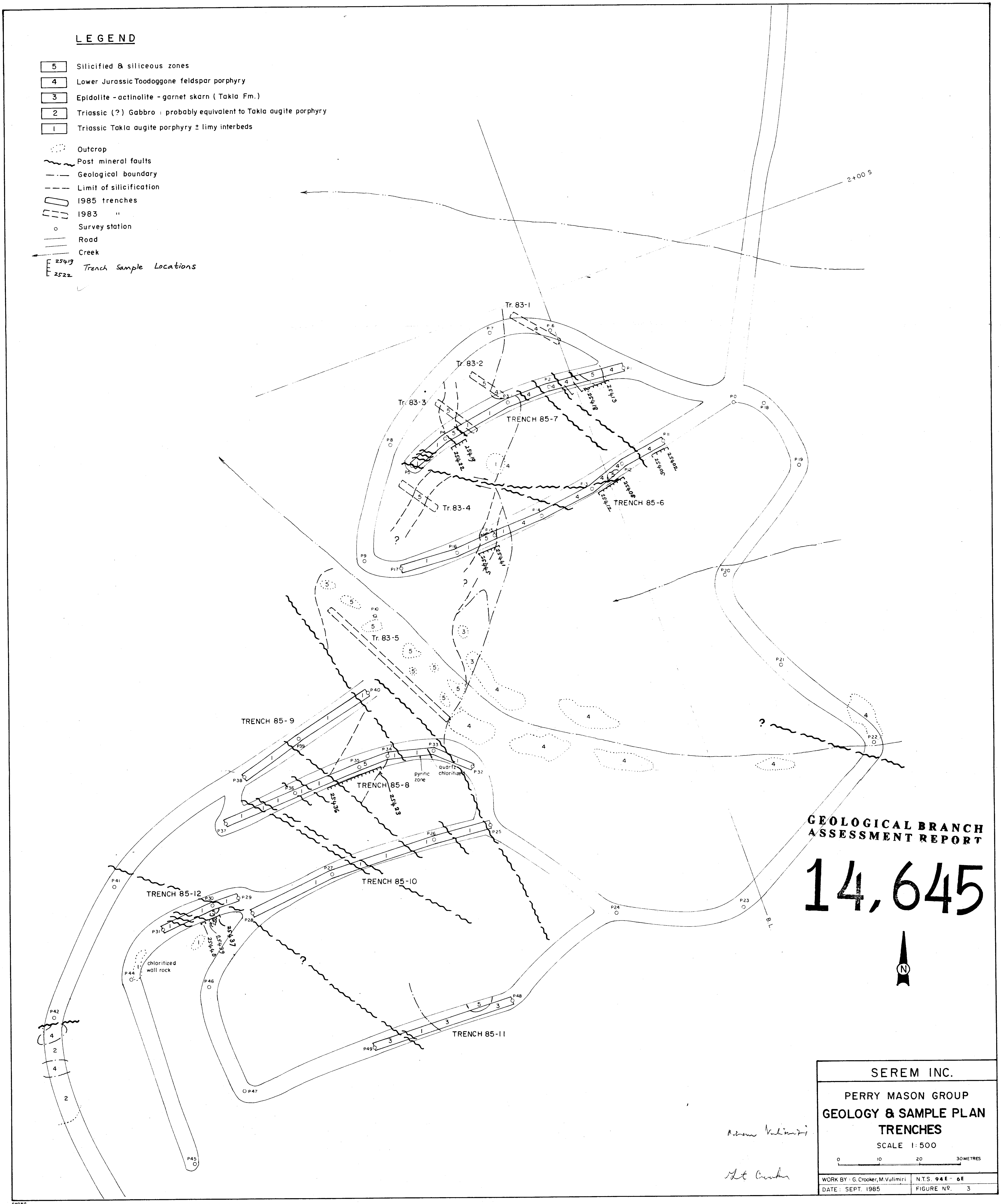
Turn the phase control knob on the EM16R console to further minimize the sound.

Resistivity is read from the position of the red zero line on the quadrature dial against the red numerals on the index ring. Multiply by 1000 in this case to obtain actual resistivity in ohm meters.

If the number on the resistivity index ring is 3 or less, use a lower resistivity multiplier scale and re-do the nulling procedure.

The x10 resistivity multiplier scale should be used in the case of a resistivity reading of 300 ohm meters or less.

Record the phase angle by which the measured electrical field component leads the reference magnetic field component. This is 45^{o} for homogeneous conditions, as when the depth of the layer being measured is more than one or two skin depths. When a lower layer more resistive is present the phase angle will generally decrease, and increases when a more conductive layer is present.


LEGEND
5 Silicified & siliceous zones
4 Lower Jurassic Toodoggone feldspar porphyry
3 Epidolite - actinolite - garnet skarn (Takla Fm.)
2 Triassic (?) Gabbro : probably equivalent to Takla augite porphyry
1 Triassic Takla augite porphyry ± limy interbeds
Outcrop
Post mineral faults
Geological boundary
Limit of silicification
1985 trenches
1983 "
Survey station
Road
Creek
Trench Sample Locations
2+00 S
Tr. 83-1
Tr. 83-2
Tr. 83-3
Tr. 83-4
Tr. 83-5
TRENCH 85-6
TRENCH 85-7
TRENCH 85-8
TRENCH 85-9
TRENCH 85-10
TRENCH 85-11
TRENCH 85-12
pyritic zone
quartz chloritized
chloritized wall rock
B.L.
GEOLOGICAL BRANCH
ASSESSMENT REPORT
14,645
SEREM INC.
PERRY MASON GROUP
GEOLOGY & SAMPLE PLAN
TRENCHES
SCALE 1:500
0 10 20 30 METRES
WORK BY : G. Crooker, M. Vulimiri
N.T.S. 94E - 6E
DATE : SEPT. 1985
FIGURE Nº. 3
CHONG

GEOLOGICAL BRANCH
ASSESSMENT REPORT

14,645

SEREM INC.

PERRY MASON GROUP

VLF - EM SURVEY
IN-PHASE & QUADRATURE DATA

OMINECA M.D., B.C.

SCALE 1:1250

0 25 50 100 METRES

WORK BY : GRANT CROOKER & MOHAN VULMIRI	
DRAWN BY : G. CROOKER	N.T.S. 94 E - 6E
DATE : OCT. 1985	FIGURE Nº. 4

GEOLOGICAL BRANCH
ASSESSMENT REPORT

14,645

SEREM INC.

PERRY MASON GROUP
VLF - EM SURVEY
FRASER FILTER DATA

OMINECA M.D., B.C.
SCALE 1:1250

0 25 50 100 METRES

WORK BY : GRANT CROOKER & MOHAN VULMIRI
DRAWN BY : G. CROOKER | N.T.S. 94E - 6E
DATE : OCT. 1985 | FIGURE Nº. 5

Mohan Vulmiri
G.L. Crooker


MASON CLAIM
I.D. 2N, 1E
I.D. 2N, 2E
340° BASELINE
1+00E
2+00E
3+00E
4+00E
1+00W
2+00W
3+00W
4+00W
0+40S
1+20S
2+00S
2+80S
3+60S
4+40S
LOW
LOW A
LOW B
HIGH
HIGH A
Tr. 6
Tr. 7
Tr. 8
Tr. 9
Tr. 10
Tr. 11
Tr. 12
N
SEATTLE, WASHINGTON
INSTRUMENT : GEONICS EM-16
TRANSMITTER : NLK - 24.8 KHz., SEATTLE, WASHINGTON
STATION
CREEK
CLAIM POST
TRENCH
GEOLOGICAL BRANCH
ASSESSMENT REPORT
14,645
SEREM INC.
PERRY MASON GROUP
VLF - EMR SURVEY
APPARENT RESISTIVITY & PHASE ANGLE
OMINECA M.D., B.C.
SCALE 1:1250
0 25 50 100 METRES
WORK BY : GRANT CROOKER & MOHAN VULMIRI
DRAWN BY : G. CROOKER
N.T.S. 94E - 6E
DATE : OCT. 1985
FIGURE No. 6