ASSESSMENT REPORT

INDUCED POLARIZATION SURVEY

ON THE

MAR CLAIM GROUP

SPENCES BRIDGE AREA
KAMLOOPS MINING DISTRICT
BRITISH COLUMBIA

N. LAT. 50° 34' W. LONG. 121° 21'

FOR

VAT PETROLEUMS LTD.
543 GRANVILLE STREET
VANCOUVER, BRITISH COLUMBIA.

BY

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INDUCED POLARIZATION SURVEY

MAR CLAIM GROUP, SPENCES BRIDGE AREA, B.C.

SUMMARY

This report presents the results of a reconnaisance induced polarization Survey completed over the Mar Claims during June 1981 for Vat Petroleums Ltd. Several anomalous zones were defined, in the vicinity of previously mapped geochemical and magnetic anomalies, that warrant further investigation.

A follow-up detail induced polarization survey is proposed to better define targets for diamond drilling.

Respectfully submitted,
STRATO GEOLOGICAL ENGINEERING LTD.

Ralph J. Englund, B.Sc.
Geophysicist
4 September 1981

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MAPS

LOCATION, DATE OF WORK, CREW

Location: Mar Claim Group
Spences Bridge Area, B.C.
NTS 50°34' N. Latitude by 121°21' W Longitude

Date of Work:

Field Work: 26 May - 10 June 1981
Office Work: 1 August - 4 September 1981

Crew:

R. J. Englund, B. Sc.	- Geophysicist
G. Smith, B. Sc.	- Geophysical Operator
G. Hackett	- Geophysical Operator
R. Throssell	- Field Assistant
J. Bertrand	- Field Assistant
N. Stevenson	- Field Assistant

INTRODUCTION

At the request of Vat Petroleums Ltd. an induced polarization survey was conducted on the Mar Claim group in the Spences Bridge area during the period 26 May to 10 June 1981. Previous geochemical sampling had indicated several anomalous zones on the property and the survey grid was established so as to cover these areas. The reader is referred to Tully et al (1977) for details and references to previous work. The intent of the work was to outline induced polarization anomalies which could indicate the presence of Mo-Cu mineralization within the survey area.

PROPERTY, LOCATION, ACCESS

The property comprises 18 mineral claim units located in the Venables Valley in the Kamloops Mining Division some 22 km north of Spences Bridge, B.C. (Figure 1).

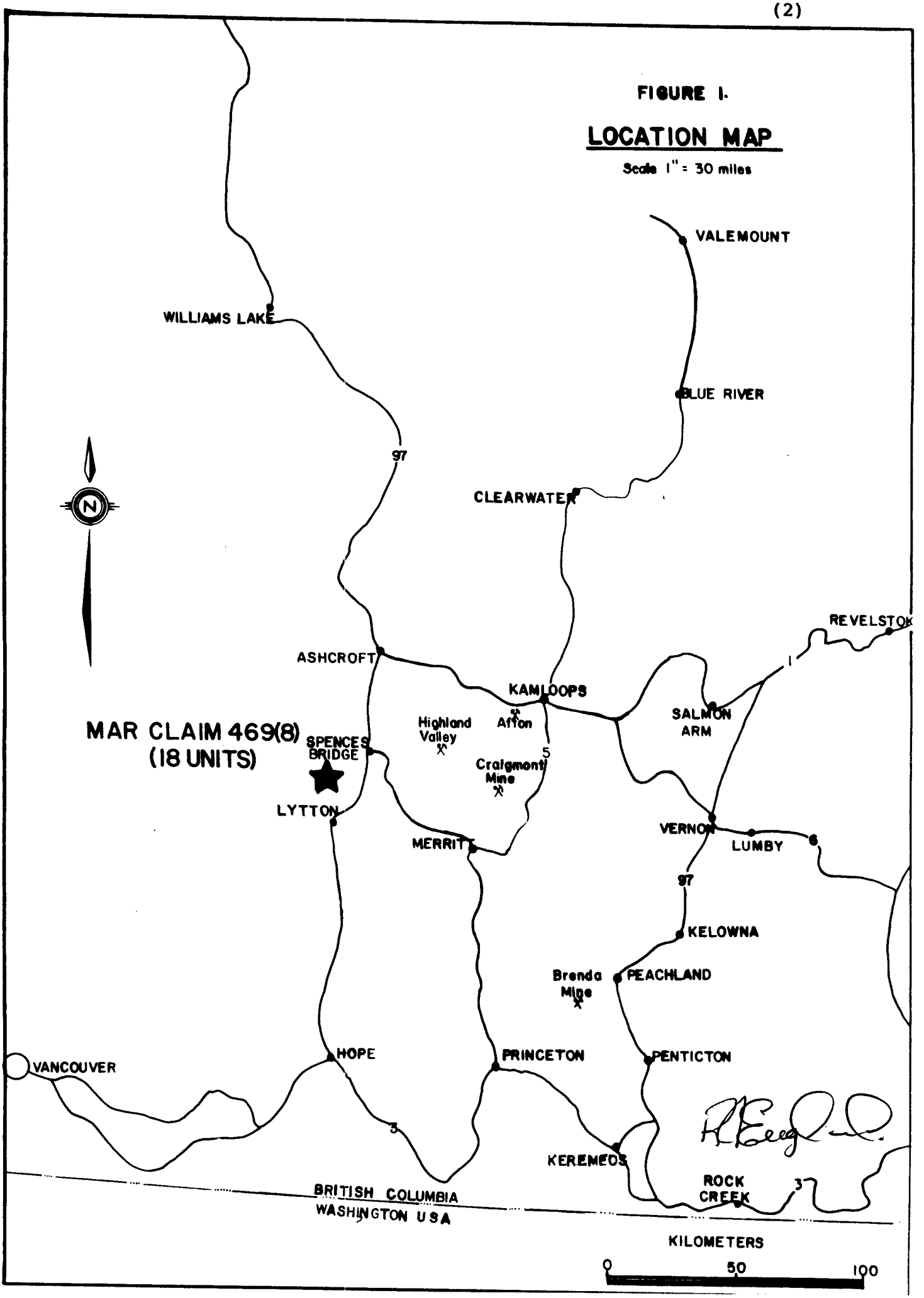
Access to the property is readily available by a 6 km gravel road turning west off Trans-Canada Highway No. 1. (Figure 2).

The country is open and semi-arid with much of the valley floor in the northeast quarter of the claim group being actively farmed. The topography rises some 200 meters in the northwest and some 560 meters in the southwest areas of the property. Steep cliffs in the southwest portion of the claims make it impossible to do accurate survey work in some of this area.

FIGURE 1.

LOCATION MAP

Scale 1" = 30 miles



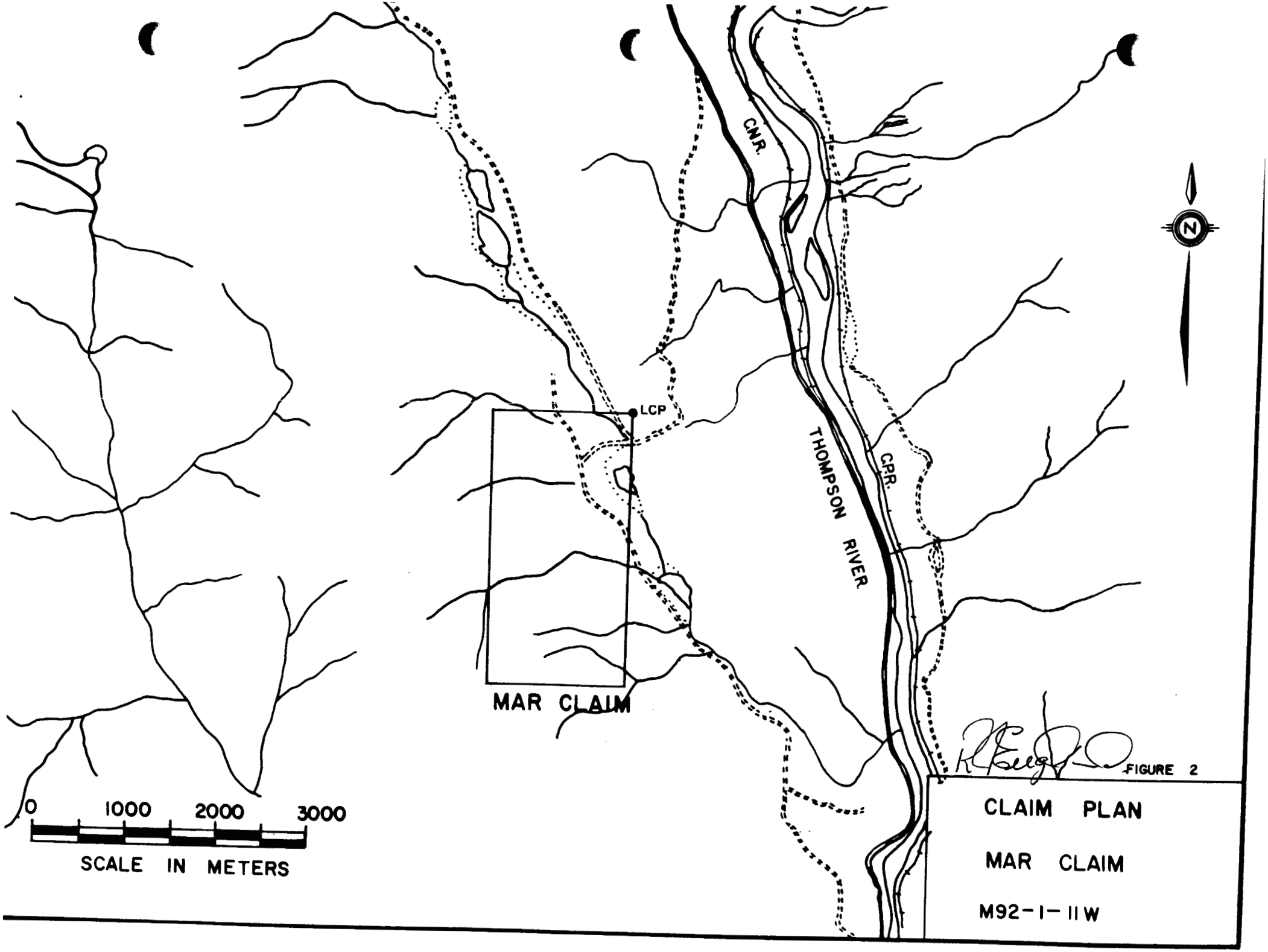


FIGURE 2

CLAIM PLAN

MAR CLAIM

M92-1-11W

CLAIMS

The property consists of 18 mineral claim units located in the Kamloops Mining Division approximately 1.5 km south of Venables lake. The claim is recorded as follows:

CLAIM NAME	RECORD NO.	NO. UNITS	EXPIRY DATE
Mar	649	18	3 August 1981

The claim group is shown on B.C. Department of Mines & Petroleum Resources Mineral Titles Reference Map 92I/11W(M). (Figure 2)

GENERAL GEOLOGY

The area is underlain by the Nicola group of rocks which comprises, argillaceous sediments, limestones, tuffs, and andesitic volcanics. Locally, the rock units trend northwesterly through the claim group. Well developed schistosity and post-schistosity cleavage was noted by D. Tully in 1977.

INSTRUMENTATION AND SURVEY PROCEDURES

The survey grid was established from the legal corner post, 00 west - 00 south, at the northeast corner of the claim. Lines were compassed and chained at generally 200 meter line spacing and 25 meter station intervals. The survey covered generally the higher forested ground in the northwest and southeast areas of the claim group.

The Huntec Mark IV Receiver, Serial No. 1020 and Huntec Lopo Transmitter, Serial No. 1015 were used in a dipole-dipole array, time domain mode. A series of expanding dipole spacing measurements were made near the base of higher topography to establish appropriate parameters for the bulk of the survey. The survey was then carried out using a dipole-dipole array with spacing a=50 meters, n = 1. Chargeability and calculated apparent resistivity values are present as plan maps, Figures 4 and 5. The method is well known and described in the literature; instrument specifications are described in Appendix A.

THE INDUCED POLARIZATION MAPS

The Chargeability Contour Map, Figure 4, gives the general distribution of chargeable rock units within the survey area at a depth of about 30 meters. IP effects are indicative of a "noisy" shale environment (low resistivity and high selfpotential) giving high, noisy chargeability readings over much of the survey area. Chargeability anomalies are generally caused by meltalic sulphides such as pyrite, chalcophyrite, galena, etc. and certain clays and graphite. On the Mar Prospect, chargeability values are generally high over most of the side hill areas (a probable argillite unit) in both the northwest and southeast areas of the claim. Within these large chargeability high zones the values increase to a high chargeability anomaly of greater than 40 milliseconds at approximately 11+50W on lines 6+00S through 9+00S and another chargeability high anomaly of greater than 30 milliseconds near 0+75W on line 24+00S. Two more chargeability highs within the higher resistivity rocks are notable at line 24+00S, 1+25W and line 28+00S, 7+00W.

The Resistivity Map, Figure 5, maps the apparent resistivity of rock units at depth of about 30 meters. Resistivity high readings (values greater than 250 ohm-meters) map a more resistive unit which trends northwesterly through the property from about line 24+00S, 5+00W to line 7+00S, 15+00W. The regions of resistivities less than 100 ohm-meters are likely due to an argillite unit which lies in contact with the higher resistivity unit.

COMPOSITE INTERPRETATION

The chargeability high-resistivity low values map a probable argillite unit in the northwest area of the property from line 12+00S, 9+00W through line 00, 15+00W. Within this zone is a chargeability high anomaly of greater than 40 milliseconds which cannot be fully attributed to the rock unit alone. The possibility of mineralization within this unit must be considered as an additional cause of these results. The contact of this unit with a higher resistivity unit to the west is on strike with molybdenum geochemical anomalies mapped in 1977 and the anomaly is flanked by a broad dipolar magnetic anomaly to the southeast.

The argillite unit shows again the southeastern area from line 30+00S, 00 to 3+00W, through line 20+00S, 2+00W. Here a chargeability anomaly of greater than 30 milliseconds, line 25S, 0+75W, within the argillites is associated with a 25 millisecond anomaly on the contact with the higher resistivity unit at 1+25W, line 24+00S. These anomalies are near a previously mapped molybdenum-copper geochemical anomaly at line 25+00S, 3+00W and flanked by a dipolar magnetic anomaly at line 24+00S, 0+00W.

A third chargeability anomaly within the higher resistivity unit is found at line 28+00S, 7+00W. Here the anomaly is again associated with a copper geochemical and a dipolar magnetic anomaly mapped in 1977.

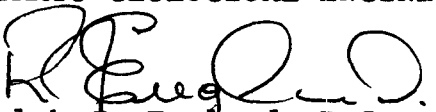
CONCLUSIONS & RECOMMENDATIONS

Three anomalous zones were established with the induced polarization survey. In each case these zones are associated with previous geochemical and dipolar magnetic anomalies making them significant target areas for further exploration. The northwestern anomaly lies within an argillite unit, while the other two anomalies are in close proximity to the apparent contact between the argillites and a higher resistivity unit which crosses the entire property in a near northwesterly direction.

Since outcrop was noted in the areas of interest the argillites in particular should be investigated for mineralization, especially in the north western zone, and the contact should be geologically established.

A detail, expanding array, induced polarization survey is recommended in order to further define the anomalous zones identified. This type of survey would provide lateral and depth information considered necessary to plan an appropriate drilling program to further explore the anomalies.

Respectfully submitted,
STRATO GEOLOGICAL ENGINEERING LTD.



Ralph J. Englund, B.Sc.
Geophysicist
4 September 1981

TIME-COST DISTRIBUTION

The induced polarization field survey work was completed during the period 26 May to 10 June 1981 inclusive. A distribution of costs is as follows:

Labour	$]2,575.00
Room & Board	2,094.57
Transportation	1,887.43
Instrument Rental, I.P.	6,434.25
Filing Fees	1,362.75
Field Supplies	1,241.26
Drafting & Report	2,661.00
TOTAL	$28,256.26

SIGNED: .....

CERTIFICATE OF QUALIFICATIONS

I, Ralph J. Englund, do hereby certify that:

1) I am a practising geophysicist with offices at #103 - 709 Dunsmuir Street, Vancouver, B.C. Canada V6C 1M9

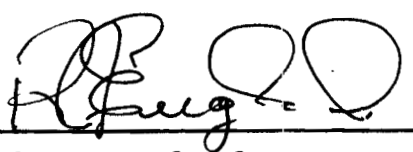
2) I am a graduate of U.B.C. where I obtained my BSc. (Physics) in 1971.

3) I am a member in good standing of the following professional organization:
   a) B.C. Geophysical Society

4) I have been engaged in the study, teaching, and practice of exploration geophysics continously for 9 years. I have worked as a geophysical consultant on numerous projects in Western North America since 1972.

5) The Geophysical field work and the interpretation of the results in this report were done under my direct supervision.

I have no direct, indirect or contingent interest in the MAR Claim or in the shares of Vat Petroleums Ltd., nor do I intend to receive any such interest.



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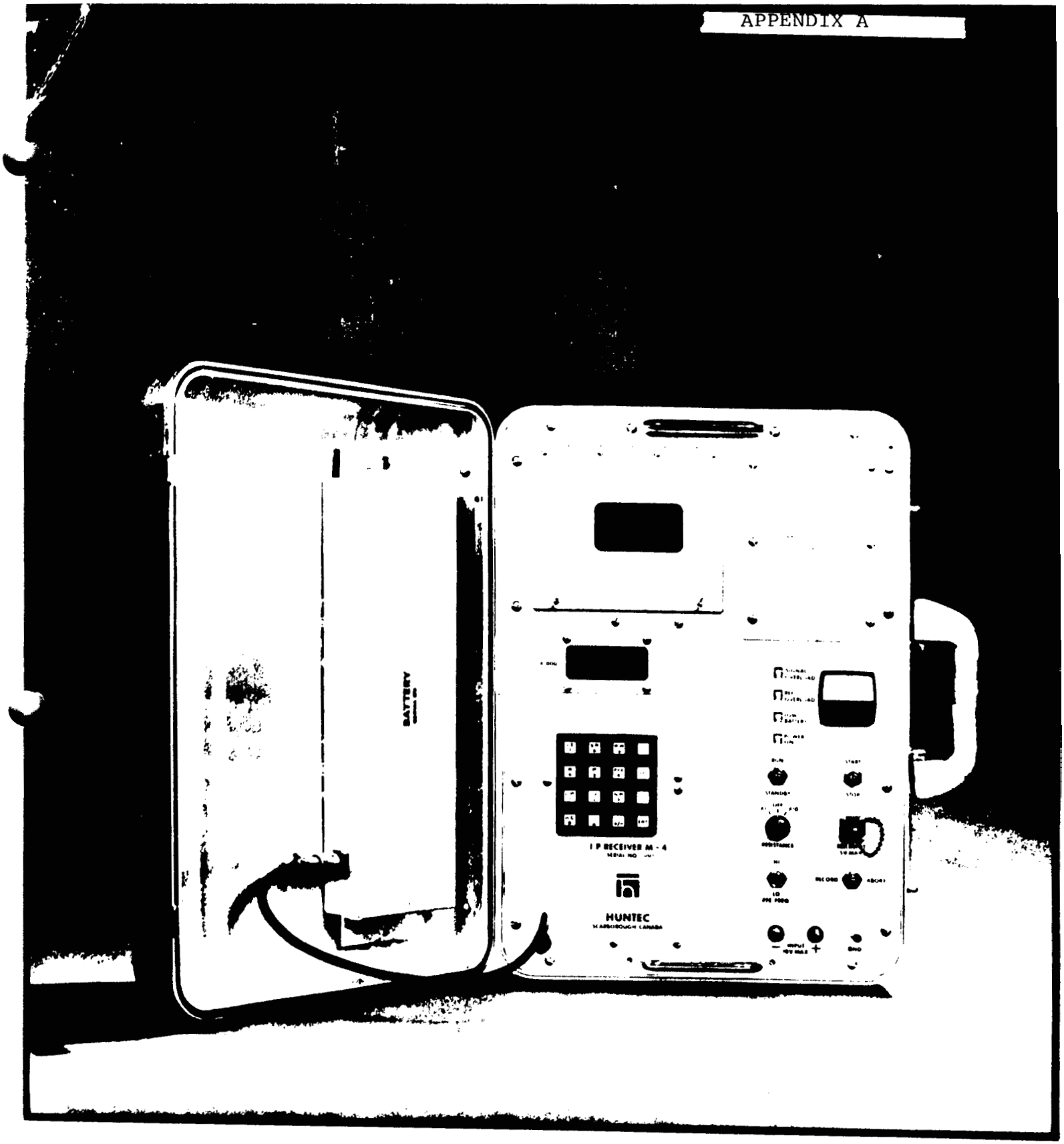

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CABLE: HUNTOR,
TORONTO

M-4 Induced Polarization Receiver

FEATURES

Automatic calibration
- **gain setting**
- **SP cancellation**
- **fault diagnosis**
- **filter tuning**

Digital display of up to 33 quantities via keypad entry

10^9 Ohms differential input resistance

Independent reference channel for drillhole and underground work

Source resistance measurement via analogue meter

Low temperature liquid crystal display for high visibility, low power consumption

8 hours continuous operation with replaceable NiCad battery pack

M-4 console accommodates optional Cassette DataLogger with read-after-write error checking

Selectable bandwidth

Conveniently packaged for backpacking or hand carrying

DESCRIPTION

It is now recognized that the shape of the decay curve in time domain I.P. or equivalently the phase and amplitude spectra in frequency domain I.P. correlates with rock texture. This correlation has potential for the discrimination of I.P. responses from economic and non-economic mineralization.

The M-4 Induced Polarization Receiver is a cost-effective tool for the detailed measurement of all significant I.P. and resistivity phenomena. The set is easily adjusted to perform single measurements of chargeability or percent frequency effect at reduced bandwidth for high speed reconnaissance surveying. Detailed measurements of selected anomalies at expanded bandwidth can be performed with the receiver by selecting switches on the programming sub-panel.

An optional read-after-write Cassette DataLogger, accommodated in the M-4 console records all calculated quantities, programme parameters and the entire averaged waveform. For operations where a reference is available from the transmitter, such as in drill hole or underground mine work, the M-4 has a reference input channel which enables the DataLogger to record the transmitted waveform along with the received waveform.

The M-4 measurement mode is selected by switches on the programming sub-panel. Similarly, the frequency of operation, the delay time, the integration time, and a number of other parameters, may be adjusted in a few seconds by sub-panel switches to accommodate a wide range of geological conditions.

The M-4 takes full advantage of the microprocessor's capabilities. When the instrument is turned on, it automatically tests its analogue and digital circuitry. If a fault is detected, its nature and location are indicated by an error code on the digital display. When it is not receiving a signal the M-4 continuously calibrates itself. During the measurement the instrument automatically adjusts its own gain and corrects for self-potential without operator intervention. For high noise areas, a 50 or 60 Hz rejection filter may be selected through the programming sub-panel. This filter is automatically tuned during the initial calibration cycle, ensuring high rejection at the notch without sacrificing stability. The software automatically corrects for the effect of the rejection filter on the overall frequency response.

Operation of the M-4 is controlled by three front panel switches and a keypad for requesting data on the digital display. Measurements are calculated every four to eight seconds from the averaged waveform which is accumulated in memory at 2 048 sample points.

An analogue meter on the front panel is used for source resistance measurement, ensuring continuity through the input curcuit. During operation, it monitors the output of the signal amplifier giving reassurance that the set is responding correctly, and also provides a qualitative indication of the signal to noise ratio. The input stage is a floating differential configuration. Either terminal may be connected to the chassis ground when single ended operation is required.

Through advanced electron device technology, and careful selection of the microprocessor, the M-4 has a very low component count. It is, thus, a highly reliable, rugged, field instrument, contained in a single compact package, suitable for operation in conditions ranging from Arctic to tropical.

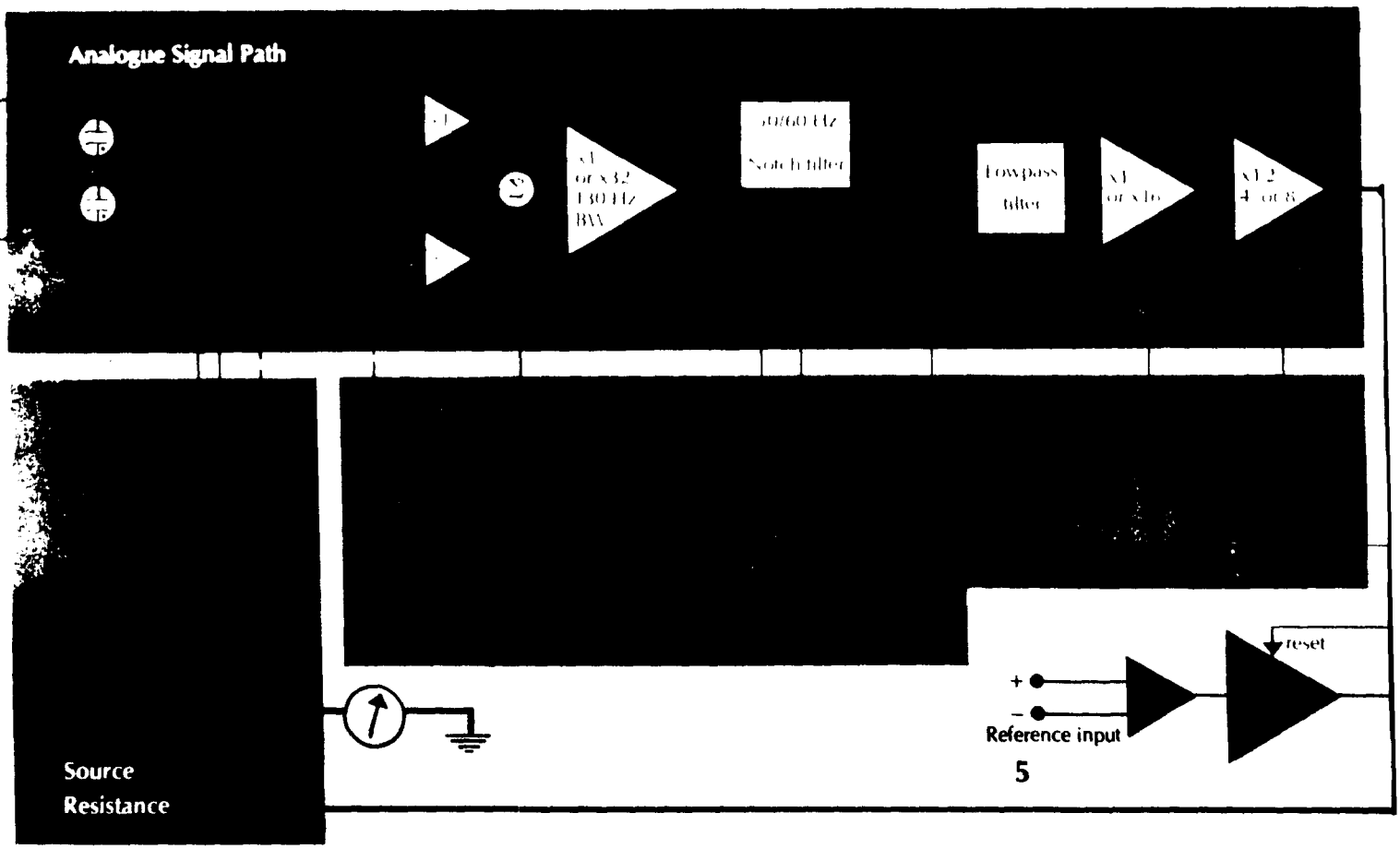


Figure 1 Block diagram of M-4 Receiver.

FUNCTIONAL DESCRIPTION

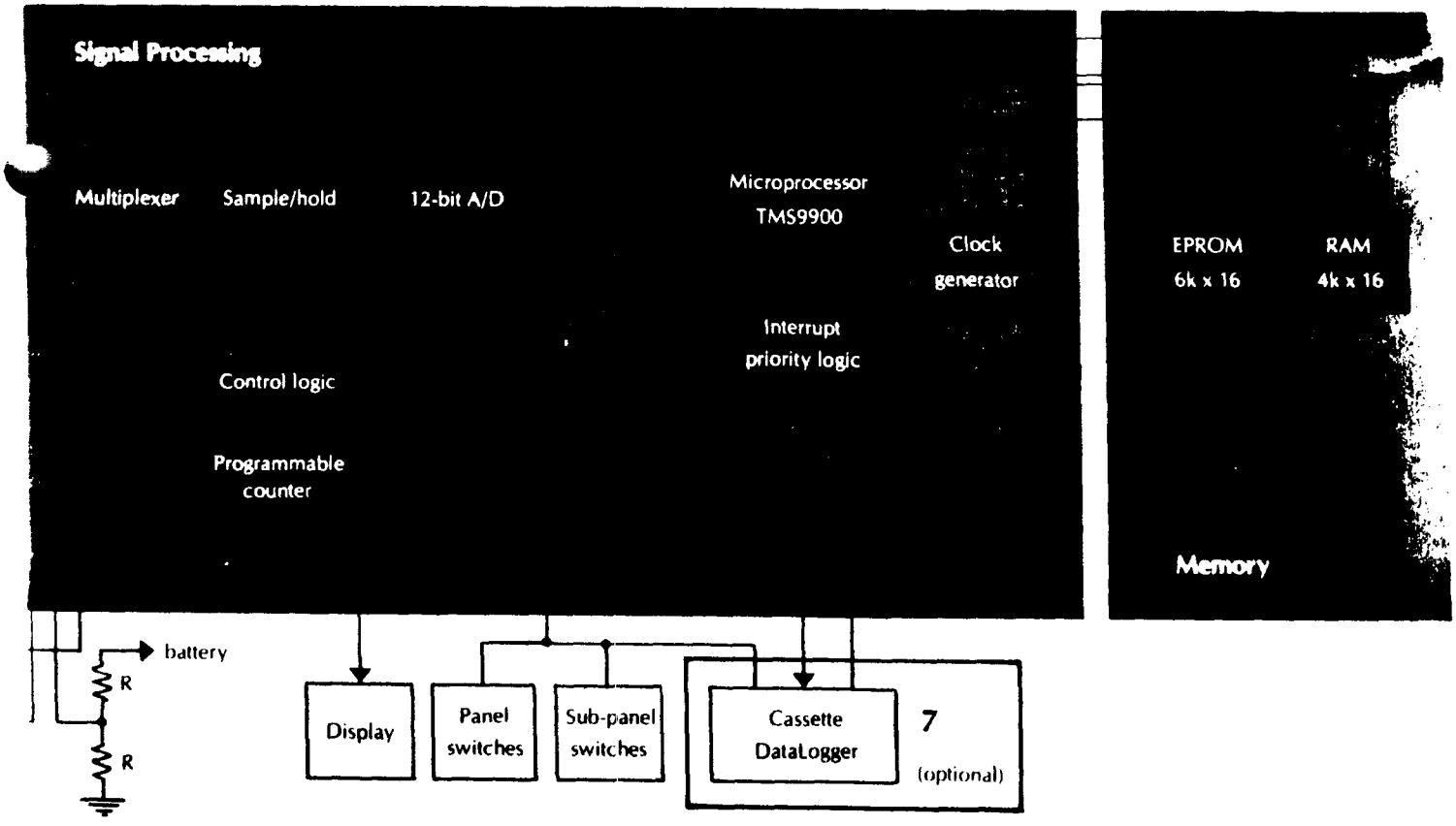
1 Figure 1 is a block diagram of the instrument. The signal path can be seen to consist principally of a differential unity-gain buffer and a series of gain blocks and filters. The composite gain is set automatically in operation to an integral power of two between unity and 4096. Two analogue filters are used. One is a fourth-order lowpass which eliminates noise above 100 Hz and prevents aliasing, that is, it limits the signal bandwidth to 100 Hz to ensure that the signal is unambiguously represented by its samples. The other filter is a notch in the passband at either 50 or 60 Hz, which can be used to reject noise from power lines. The notch filter has a Q of about ten, and the notch frequency is automatically adjusted in the standby mode to compensate for thermal drift. The user sets the center frequency of the notch filter, or disables it, via two toggle switches on the sub-panel. Distortion of the signal due to amplitude and phase response of the filters is automatically corrected for during the calibration cycle.

2 Following amplification and filtering, the signal is sampled at a rate between 256 and 512 Hz, and converted to digital form with a resolution of 12 bits. The sampling and A/D conversion rate is derived from the clock generator, and is under software control. The interval between any two consecutive samples is independently settable to a resolution of twenty microseconds, via a programmable 8-bit counter.

Throughout the instrument, the serial I/O port of the TMS9900 is used for communication with all devices except memory. Serial data transmission greatly simplifies the interconnections between circuit boards.

Two vectored interrupts are used, respectively, by the A/D converter to signify that a conversion cycle is complete, and by the cassette interface to indicate that it is ready to accept a new data byte.

3 Source resistance measurements are made independently of the microprocessor, by connecting a differential 30 Hz squarewave current source to the input terminals, measuring the resulting voltage and displaying the result on an analogue meter. The current source is internally loaded by a series RC combination to distort the meter scale in such a way that a wide range of resistances can be read easily on each of the two ranges.



4 A relay shorts the buffer input to ground during execution of the self-calibration routine. A dc voltage is injected into the buffer to correct for offsets resulting from self potential, polarization of the electrodes, and errors in the analogue portion of the instrument. This dc voltage is derived from a 12-bit digital-to-analogue converter, which is also used to produce calibration waveforms. An attenuator between the D/A and the buffer serves to improve resolution for high gain settings.

5 Provision is made for sampling the battery voltage and a reference input, as well as the signal. The reference channel is pre-filtered by an integrator which is reset at the sampling rate resulting in an aliasing filter which has a trapezoidal step response (linear rise and fall).

6 The instrument memory consists of 4k 16-bit words of random-access memory (expandable to 8k) and 6k 16-bit words of programmable read-only memory (expandable to 8k). The PROM is erasable and re-programmable to facilitate future software enhancements.

The display interface is 32 bits wide, which allows independent control of all display segments, three decimal points, and a range indicator arrow.

The cassette interface uses an 8-bit microprocessor to control the timing and formatting of data on the tape. The microprocessor is also used to control tape motion.

SPECIFICATIONS

INPUTS

SIGNAL CHANNEL

Range	5×10^{-5} to 10 volts. Automatic gain ranging. Overload indication above 10 volts.
Resistance	Greater than 10^9 Ohms differential
Capacitance	Less than 3×10^{-11} Farads
Bias Current	Less than 10^{-8} Amperes
Bandwidth	100 Hz analogue, 12 Hz digital switch (sub-panel) selectable (see Synchronization under Functional Specifications).
SP Cancellation Range	-5 to +5 volts (automatic)
Protection	Low leakage diode clamps, gas discharge surge arresters, field replaceable fuses.
Terminals	Two colour-coded (red and black) signal inputs, plain chassis ground terminal. Push posts: 120 volt insulation, accepts maximum 1.5 mm diameter wire.

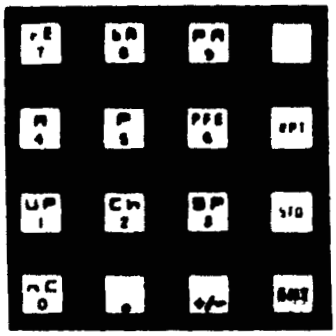
REFERENCE CHANNEL

Maximum	5 volts peak
Overload Indication	Operates above 2.5 volts peak
Resistance	2×10^5 Ohms differential
Capacitance	Less than 3×10^{-11} Farads
Input Connector	Four pin female

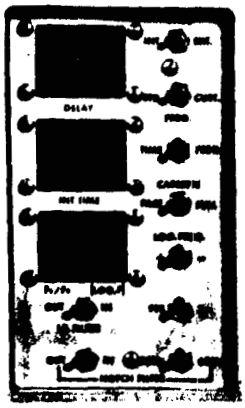
BATTERY

10 Nickel-Cadmium "F" cells in series. Nominal 12.5 volts. 8 hours continuous operation in RUN mode. LOW BATTERY indicator operates at nominal 11.5 volts. Automatic shutdown occurs at approximately 10 volts to prevent battery damage and/or bad data. Battery voltage is available on digital display via keypad.

SWITCHES AND CONTROLS



Keypad configuration



Sub-panel thumbwheels and switches

CONSOLE

Keypad	Digits, decimals and sign arranged in calculator format. The following quantities may be displayed via keypad entry:

TIME DOMAIN MODE

Primary Voltage	UP
Self Potential	SP
Chargeability	Ch 0 to Ch 9 Ten windows of equal width Ch Sum of all ten windows
Phases of Odd Harmonics	P 3 to P 1 5
Amplitudes of Odd Harmonics	A 1 to A 1 5
Cycle Count	nC
Repeat	RPT initiates automatic sequential display of polarization potential (V_p) and total chargeability.

FREQUENCY DOMAIN MODE

Primary Amplitude	A 1
Percent Frequency Effect	PFE
Self Potential	SP
Cycle Count	nC

COMPLEX RESISTIVITY

Phases of Odd Harmonics	P 3 to P 1 5
Amplitudes of Odd Harmonics	A 1 to A 1 5
With Reference Input	Fundamental phase P 1
Cycle Count	nC

OPERATION

Battery Voltage	bA
Frequency Error	FA

CASSETTE DATALOGGING

10 Reference Registers	rE 0 to rE 9 for coded operating data such as station number, line number, time, date, operator, weather, transmitter current, etc.
Storage	STO instructs the storage of keyed data to storage register.

SWITCHES

Designation	Type	Function
START/STOP	*2 position spring loaded toggle*	Main power switch
RUN/STANDBY	*2 position toggle*	RUN: instructs receiver to execute measurement routine. STANDBY: stops measurement cycle, retains data for display or logging.
HI/LO	*2 position toggle*	HI: high frequency measurement LO: low frequency measurement
RECORD/ABORT	*2 position spring loaded toggle*	RECORD: logs data ABORT: arrests data logging
X1/OFF/X10 RESISTANCE	*3 position rotary*	Source resistance measurement scale factor

PROGRAMMING SUB-PANEL CONTROLS

Designation	Position	Function
SYNC	*INT.*	Select when no external reference is available
	EXT.	Select with external reference
FREQ.	*STD.*	Informs receiver that standard frequencies are used
	CUST.	Instructs receiver to interpret frequency thumbwheel setting as a code for customer defined frequencies
	TIME	For time domain mode
	FREQ.	For frequency domain or complex resistivity modes
CASSETTE	*PART*	
	FULL	See cassette description
LOG. FREQ.	+ or –	Informs receiver of sign of LOG F thumbwheel setting
	PFE	Select for frequency domain operation employing dual transmitted frequencies
	Z	Select for complex resistivity
NOTCH FILTER	*OUT*	Select for no line rejection filter
	IN	Select for line rejection filter
	50 Hz	Select for line rejection at 50 Hz
	60 Hz	Select for line rejection at 60 Hz
LP. FILTER	*OUT*	Full 100 Hz bandwidth at input stage
	IN	At input frequencies above 0.125 Hz, restricts bandwidth to 12 Hz for rapid convergence

THUMBWHEEL SWITCHES

Designation	Number	Function
DELAY	*3 digits*	Sets delay (T_D) in milliseconds for time domain measurements (see Fig. 2)
INT. TIME	*3 digits*	Sets chargeability window width (T_p) in milliseconds (see Fig. 2)
LOG.F	*1 digit*	Represents $\log_2$ of programmed frequencies, 1/64 Hz to 16 Hz* or Code representing customer defined frequencies
F_1/F_2	*1 digit*	Represents ratio of 1 to 10 (0 digit represents 10) of the high frequency to the LOG F setting in PFE mode

**In complex resistivity mode maximum input frequency is determined by highest odd harmonics desired:*

Frequency, Hz	Maximum Odd Harmonic
1/64 to 4 Hz	*15 (15/64 to 60 Hz)*
8 Hz	*11 (88 Hz)*
16 Hz	*5 (80 Hz)*

FUNCTIONAL SPECIFICATIONS

ELECTRICAL

MEMORY

Random Access Memory (RAM)	4k, expandable to 8k
Erasable Programmable Read Only Memory (EPROM)	6k, expandable to 8k

SIGNAL CHANNEL

Automatic Gain Ranging Amplifier	x1 to 4 096
Aliasing Filter	100 Hz low pass fourth order MURROMAF polynomial, 24 db/octave roll off.
Sample and Hold A/D Converter	12-bit, signal aperture 125 x 10^{-9} seconds, conversion rate 16.7 kHz
Sampling Rate	Frequency domain mode 512 Hz Time domain mode 256 Hz
Synchronization	Determined by phase locked loop. Frequency of input signal must be within 0.01% of frequency setting on sub-panel.
Rejection filters	Greater than 40 db at rejection frequency, auto tuned at start of reading.
Self calibration	Compensates for drift in analogue circuitry and digital filters to improve accuracy of amplitude and phase measurements.

MECHANICAL

M-4 Receiver (with Battery Pack)	45 cm x 33 cm x 14 cm, 10.0 kg
M-4 Receiver (with Battery Pack and cassette DataLogger)	Same dimensions, 11.0 kg
Replaceable Battery Pack	33 cm x 11 cm x 45 cm, 3 kg

ENVIRONMENTAL

Temperature	Operation –20°C to +55°C Storage –40°C to +70°C
Humidity	Moisture proof, operable in light drizzle. Splash-proof switches, keypad protected by rubber boots, gasket seals on sub-panel cover, main chassis and cassette loader.
Altitude	–1 525 m to +4 775 m
Shock and Vibration	Suitable for transport in bush vehicles.

OUTPUTS

DISPLAYS AND INDICATORS

Analogue Meter	Ohms scale for source resistance measurements and indication of instrument activity which facilitates qualitative judgments of signal and noise levels.
LCD, 3½ digits	Provides the operator with numeric indication of measurement results, and of instrument faults discovered during execution of diagnostic routines. An over-range arrow indicates that the display reading is to be multiplied by 1 000.

FLAG INDICATORS

SIGNAL OVERLOAD	Blinks red when the peak signal is too large (greater than 10 volts), or when an excessive common mode voltage is present.
REF OVERLOAD	Blinks red when the reference input level should be reduced (active only during the reference "ON" time).
LOW BATTERY	Blinks red when the battery voltage falls below 11.5 volts.
POWER	Steady red indicates power is on.

CASSETTE DATALOGGER (OPTIONAL)

The accessory cassette DataLogger is accommodated in the M-4 Receiver mainframe and provides two recording modes:

PART	whereby all sub-panel settings, calculated quantities, and reference numbers are recorded (2 seconds recording cycle).
FULL	whereby all information as in the PART mode is recorded followed by up to 2 048 samples over the entire averaged waveform (28 seconds recording cycle). If external synchronization is used, a single cycle of the reference wave-form is recorded following the averaged waveform (60 seconds recording cycle).

The DataLogger provides read-after-write verification of data. All records are written in ASCII code.

If the cassette DataLogger is not acquired initially with the M-4 Receiver it can be retrofitted at any later time by the user.

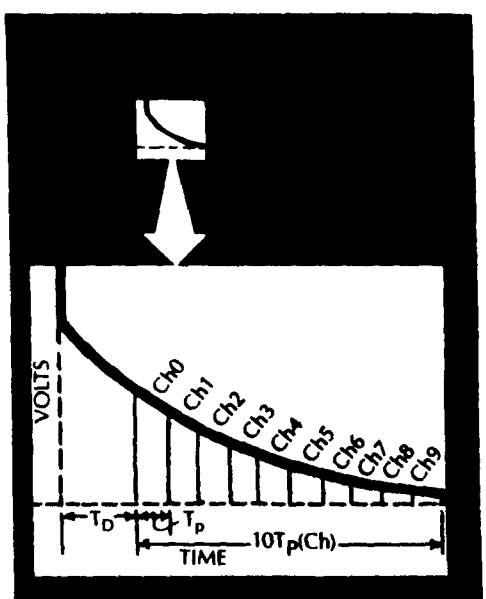


Figure 2 Induced polarization decay curve

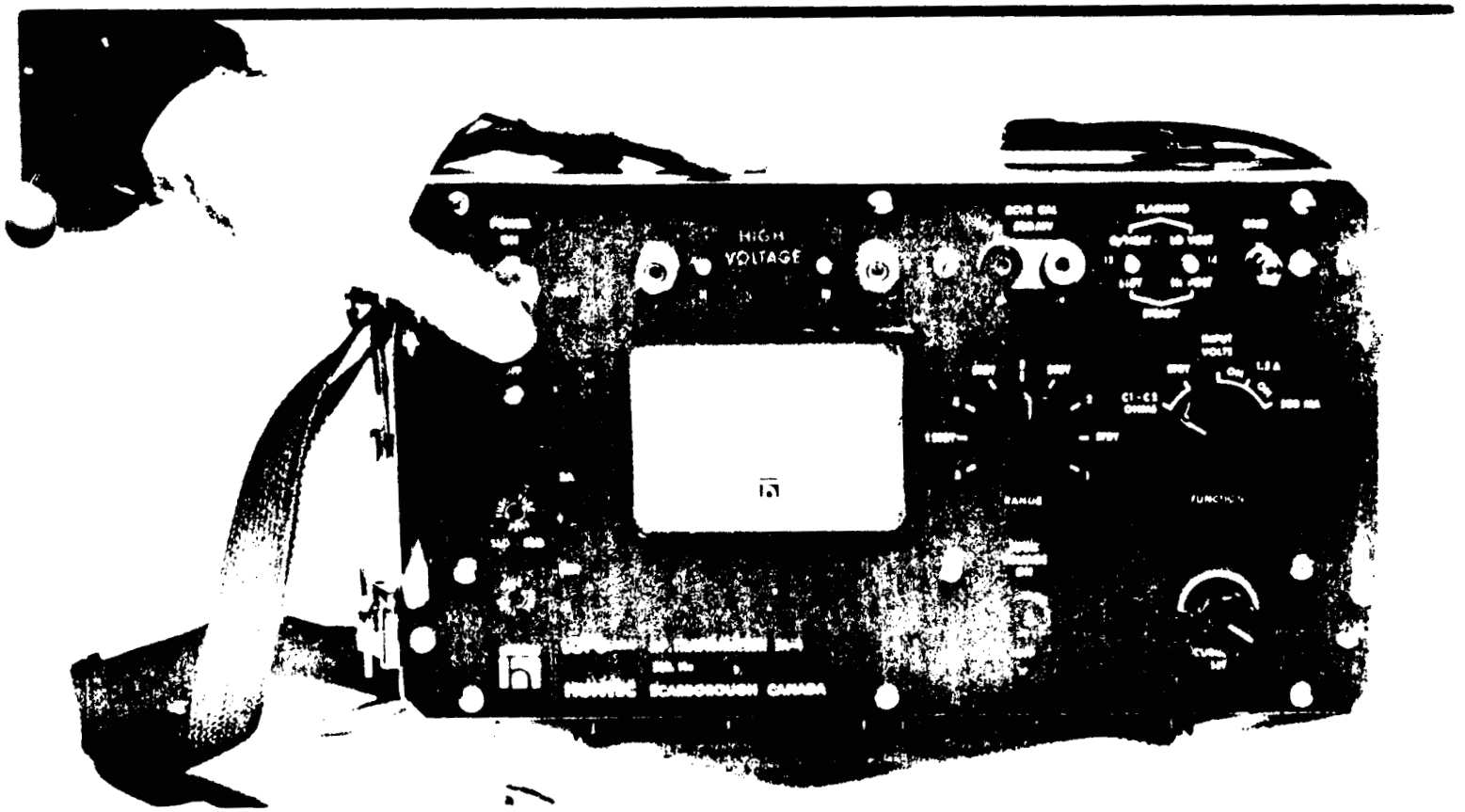
milliradians	volts	volts	volts	seconds	%
2 milli-radians *(1)*	1% 40 Hz 2% to 80 Hz	±1%	±1%	0.1% *(2)*	0.1% *(3)* full scale
0.01 milliradians	10^{-6} volts	10^{-6} volts	10^{-3} volts	10^{-6} seconds	0.001% full scale
	Display 3½ digits *(4)*				

(1) In frequency domain mode: at harmonic frequencies up to 15 Hz, increases to not more than 5 milliradians at 80 Hz. In time domain: at harmonic frequencies up to 7.5 Hz, increases to not more than 5 milliradians at 30 Hz.

(2) Of total OFF time.

(3) Full scale defined as 100% PFE.

(4) Cassette data: format fixed point 5 digits decimal 4 digits.
Resolution of averaged signal waveform limited by A/D converter word length to one part in 4 096 x $\sqrt{n}$C. Resolution of reference waveform (not averaged) limited by available RAM to one part in 256 (additional RAM and averaging software available as option).



M-4 "LOPO"

Induced Polarization and Resistivity Transmitter

DESCRIPTION

The Huntec M-4 LOPO Transmitter is a time domain, battery operated transmitter weighing 18.2 kg with battery pack. It delivers over 160 watts of DC power into loads from 100 ohms to 6000 ohms. It operates at reduced power into all loads from a short circuit to an open circuit.

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

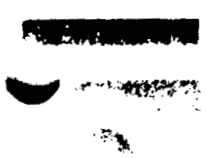
Output current is automatically controlled to within 1% of a current set point chosen by the operator, and is affected neither by battery voltage, nor by load variations.

The battery pack is detachable and rechargeable. Typically, when used with the companion M-4 Receiver, a full day's operation may be obtained between charges.

The high sensitivity and noise immunity of the Huntec I.P. Receiver make the Huntec M-4 system, comprising the LOPO and Receiver together, a highly portable, rapid field system, comparable in performance to other systems of several times the weight and power.

FEATURES

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



huntec
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TORONTO

OUTPUT CHARACTERISTICS

LOAD RANGE SELECTION	RESISTANCE, Ohms	CURRENT, Amperes	
		Min	Max
1	0	0.100	1.50
	50	.08	1.20
	100	.068	1.02
1	100	.068	1.02
	160	.063	0.95
	220	.05	.75
2	220	.05	.75
	370	.04	.60
	520	.033	.50
3	520	.033	.50
	835	.026	.40
	1150	.022	.33
4	1150	.022	.33
	1925	.016	.24
	2700	.015	.22
5	2700	.015	.22
	4450	.011	.16
	6200	.009	.14
5	10,000	.008	.100
	20,000	.007	.055
	40,000	.003	.030
	80,000	.002	.017

SPECIFICATIONS

OUTPUT

Maximum Current 1.5A D.C.

Maximum Voltage 1.800V D.C.

Load Range Zero to infinity in five ranges.

Maximum D.C. Load Power In excess of 160 watts at 75% efficiency into following load resistances.
Range 1 = 100 to 230 ohms
Range 2 = 230 to 520 ohms
Range 3 = 520 to 1200 ohms
Range 4 = 1200 to 2700 ohms
Range 5 = 2700 to 6100 ohms

Load Current Continuously adjustable, Max. Current/Min. Current = 15/1
When the transmitter is operated at half its available output current, it will hold this current constant to within 1% while the load resistance changes by ± 100%, or when the input voltage changes by ± 20% of its original value.

Turn On Time Less than 10^{-3} seconds.

Turn Off Time Less than 10^{-3} seconds.

Cycle Time 2, 4, 8, or 16 seconds.
Cycle time is defined as 2 x (current on time + current off time).

Duty Ratio 1:1, 1.28:1, 1.67:1, 2.2:1
Duty ratio is defined as: (current on time (current off time).

Timing Accuracy ± 0.01%
Additional timing programmes including square wave output are available as option

INPUT REQUIREMENTS

Voltages 24 and 36 volts DC

Maximum Current 12 amperes

Batteries Six GC-680-1 lead-acid Gel/Cel, 7.5 amp-hou
The input power source can be batteries any unregulated DC source between 30 volts supplying 10 to 15 amperes, and 2 at 2A.

FRONT PANEL

Switches and Controls
- Load resistance selector switch.
- Current adjustment continuous control
- Function Switch: (a) C_1-C_5 ohms, (b) SEE (c) DC Input Volts, (d) 1-5A, (e) 0.5A
- Battery ON/OFF master switch (magnetically tripped circuit breaker).
- High voltage ON/OFF (Standby Operate switch.
- Fuses: one 25A Slo-Blo for main powe one 2A Slo-Blo for control circuits

Connections
- Output terminals to current stakes.
- Receiver calibration signal output: V_p = 500 millivolts V_s/V_p = 20%, 2%
- Panel grounding terminal.

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

ENVIRONMENTAL

Ambient Temperatures —25°C to +50°C

Altitude —9150 to +6100 m. Note: if the upper lim is exceeded, high voltage breakdown durin operation may occur.

Humidity The set may be operated in saturated air, an in rain without damage or risk of malfunctio

MECHANICAL

Instrument Package 31.8 cm x 17.8 cm x 17.8 cm
6.8 kg

Battery Package 31.8 cm x 17.8 cm x 17.8 cm
11.4 kg

Total Package 31.8 cm x 17.8 cm x 30.5 cm
18.2 kg

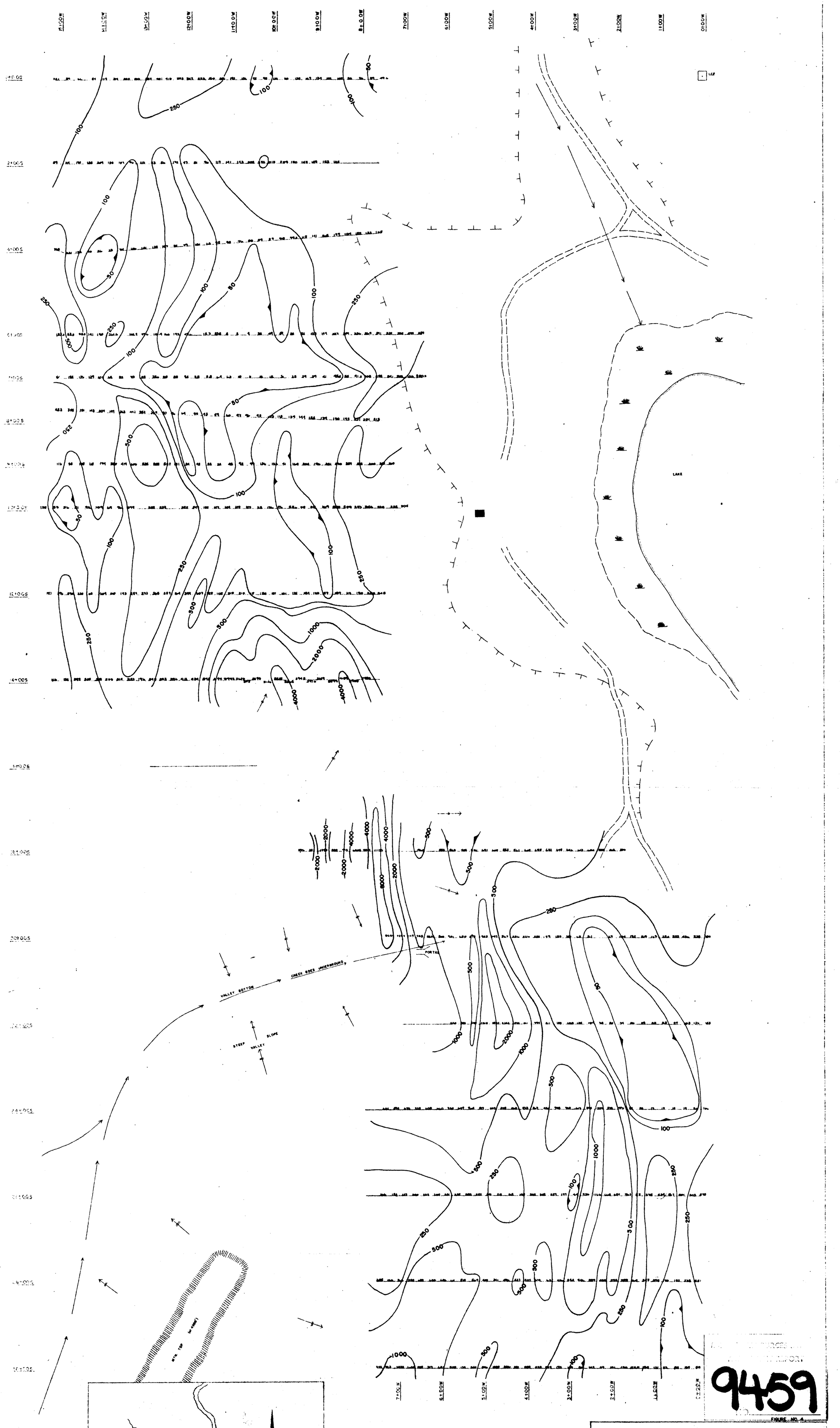

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FIGURE NO. 4

VAT PETROLEUMS LTD

MAR MINERAL CLAIM

KAMLOOPS MINING DIVISION

GEOPHYSICAL SURVEY

RESISTIVITY CONTOUR MAP

0 100 200

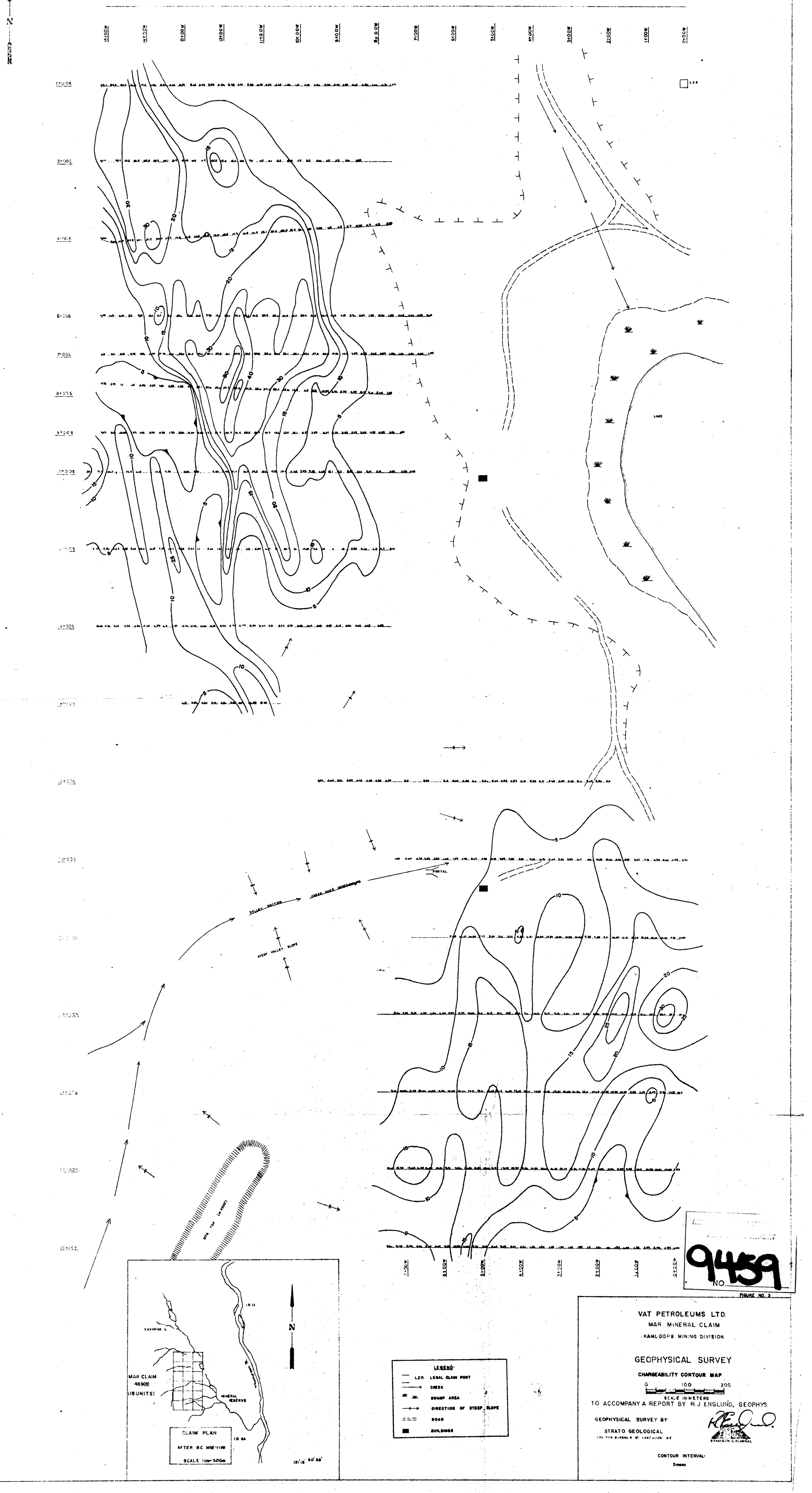
SCALE IN METERS

TO ACCOMPANY A REPORT BY R.J ENGLUND, GEOPHYS

GEOPHYSICAL SURVEY BY:

STRATO GEOLOGICAL

103 768 BUNSMUIR ST. VANCOUVER, B.C.


N
LEGEND
LCP LEGAL CLAIM POST
CREEK
SWAMP AREA
DIRECTION OF STEEP SLOPE
ROAD
BUILDINGS
LAKE
MAR CLAIM
469(8)
(18 UNITS)
MINERAL RESERVE
CLAIM PLAN
AFTER BC MSE-1190
SCALE 1cm=500m
VAT PETROLEUMS LTD.
MAR MINERAL CLAIM
KAMLOOPS MINING DIVISION
GEOPHYSICAL SURVEY
CHARGEABILITY CONTOUR MAP
0 100 200
SCALE IN METERS
TO ACCOMPANY A REPORT BY R.J. ENGLUND, GEOPHYS.
GEOPHYSICAL SURVEY BY
STRATO GEOLOGICAL
CONTOUR INTERVAL
5msec
9459
NO.
FIGURE NO. 3