COMINCO LTD.

EXPLORATION

NTS: 82F/1

SHA SOUTH 1988

UTEM SURVEY

FORT STEELE M.D., B.C.

- ASSESSMENT REPORT -

Latitude : 49°06'N

Longitude : 116°17'W

Field Work Performed by : I. Jackisch & M. A. Price
between August 28 and September 6, 1988

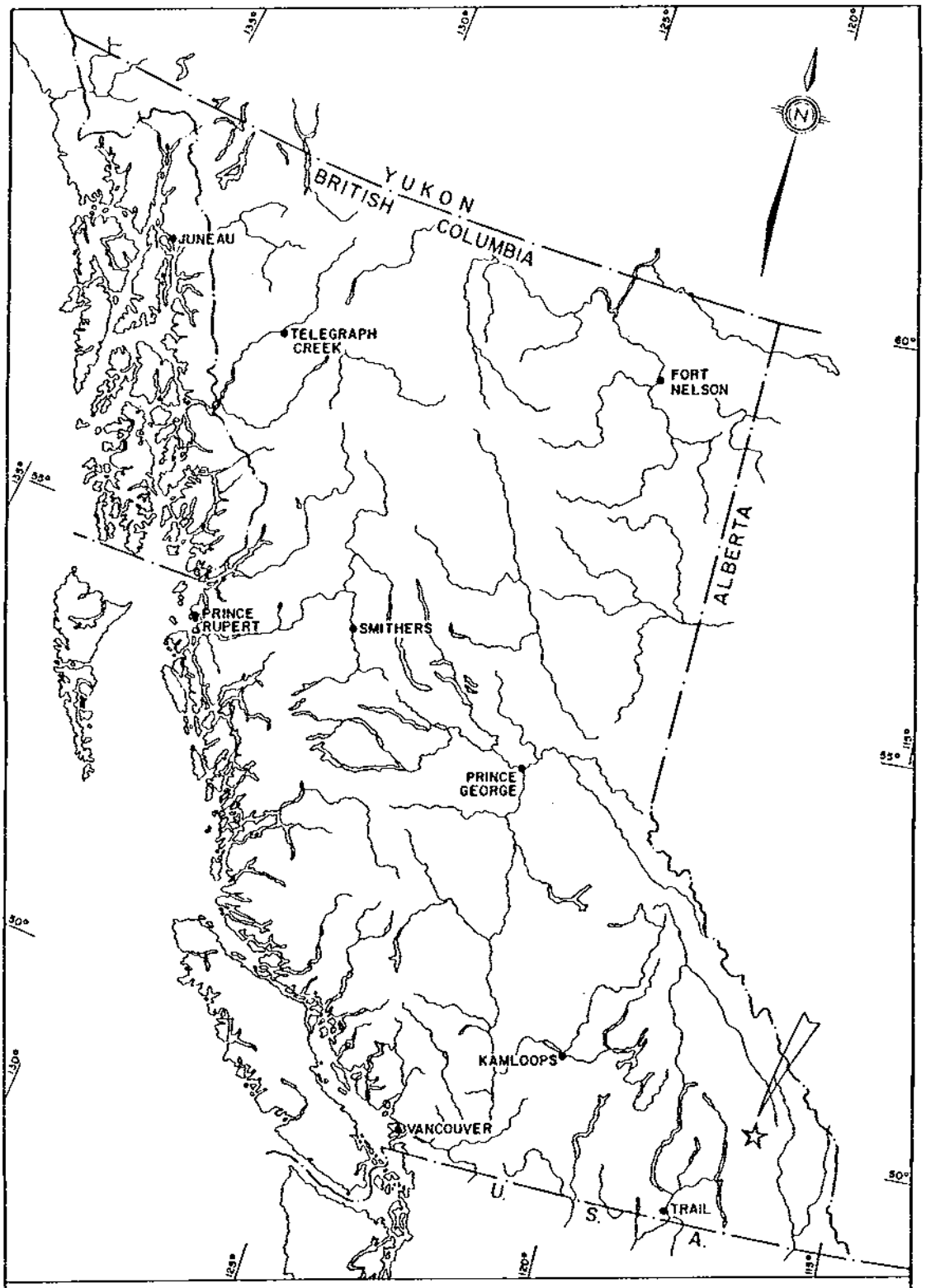
Claim Owner and Operator : COMINCO LTD.

Claims : SUN 12, SHA 9, 10

NOVEMBER 1988

Michael A. Price

TABLE OF CONTENTS



SHA (South) -1988-

NTS 82-F/I

0 100 200 300 400 500 Km.

Drawn by:		Traced by: e.m.s.	
Revised by	Date	Revised by	Date

Property Location Map

Scale: 1 : 6,370,000 | Date: DECEMBER 1988 | Plate: 345-88-1

NCI 112A CL

210-0610

SHA PROPERTY

Comince

Drawn by:		Traced by:	
Revised by	Date	Revised by	Date

CLAIM LOCATION MAP

Scale: 1:250,000 | Date: NOVEMBER 1988 | Plate 345-88-1a

COMINCO LTD.

EXPLORATION WESTERN DISTRICT

NTS: 82F/1

SHA SOUTH 1988
UTEM SURVEY
FORT STEELE M.D., B.C.

- ASSESSMENT REPORT -

INTRODUCTION

During the period of August 28 to September 6, 1988, a 9.35 km UTEM survey was carried out by a Cominco geophysical crew on the SHA SOUTH Property. This property consists of claims SUN 12, SHA 9 and 10.

This region has a favourable geological environment for Pb-Zn sulphides. The region is underlain by rocks of the Aldridge Formation. In particular, there is an interest in the Pb-Zn potential associated with the Lower/Middle Aldridge contact.

LOCATION AND ACCESS

The SHA SOUTH Property is approximately 30 km east of Creston and 20 km west of Yahk, B.C. Access to the property is provided by Caroll Creek road off of Highway 3. then follow Caroll Creek road for about 8 km south until just after the high power lines. Then follow the first road to the west for about 5 km to the property.

GEOPHYSICAL SURVEY

The field work was carried out from August 28 to September 6, 1988. Two loops were used to survey a total of 9.3 km of UTEM data. The surveying was done on a cut grid at 50 metre station intervals along lines that were 200 metres apart.

The SHA SOUTH property was one of the areas chosen for a more detailed geological and geophysical study. The UTEM survey was a follow-up of a previously executed reconnaissance survey in 1987. In particular, the survey was to detail a conductive response that was located in the 1987 survey.

DESCRIPTION OF UTEM SYSTEM

UTEM is an acronym for "University of Toronto ElectroMagnetometer". The system was developed by Dr. Y. Lamontagne (1975) while he was a graduate student of that University.

The field procedure consists of first laying out a large loop of single strand insulated wire and energizing it with current from a transmitter which is powered by a 1.7 kW motor generator. The loop is generally square shaped, wherever possible, with sides between 500 metres and 1,500 metres long. In this survey, the loop dimension was 1,500 m x 1,000 m. Survey lines are generally oriented perpendicular to one side of the loop and surveying can be performed both inside and outside the loop.

The transmitter loop is energized with a triangular current waveform at a carefully controlled frequency (30.9 Hz for this survey). The receiver system includes a sensor coil and backpack portable receiver module which has a digital recording facility on cassette magnetic tape. The time synchronization between transmitter and receiver is achieved through quartz crystal clocks in both units which must be accurate to about one second in 50 years.

The receiver sensor coil measures the vertical magnetic component of the electromagnetic field and responds to its time derivative. Since the transmitter current waveform is triangular, the receiver coil will sense a square wave in the absence of geologic conductors. Deviations from a square wave are caused by electrical conductors which may be geologic or cultural in origin. The receiver stacks any pre-set number of cycles in order to increase the signal to noise ratio.

The UTEM receiver gathers and records 9 channels of data at each station. The higher number channels (7-8-9) correspond to short time or high frequency while the lower number channels (1-2-3) correspond to long time or low frequency. Therefore, poor or weak conductors will respond on channels 9, 8, 7 and 6. Progressively better conductors will give responses on progressively lower number channels as well. For example, massive, highly conducting sulphides or graphite will produce a response on all nine channels.

The UTEM receiver records data digitally on a cassette. This tape is played back into a computer at the base camp. The mini computer processes the data and controls the plotting on a small (11" x 15") graphics plotter. Data are portrayed as profiles of each of the nine channels, shown for each survey line of each transmitter loop. These profiles and an interpretive plan are appended to this report.

The magnetic field amplitudes from both the transmitter loop (primary field) and from the electric currents induced in the ground (secondary field) vary considerably from the beginning of a line near the transmitter loop, to the end of the survey line far from the transmitter loop.

In order to present such data, a normalizing scheme must be used. In this survey, the primary field from the loop is used for normalizing and presenting the data in two ways.

1. Continuously normalized plots.

   This is the standard normalization scheme.

   a) For Channel 1:

   $$\% \text{ Ch.1 anomaly} = \frac{\text{Ch.1} - P}{P} \times 100$$

   where P is the primary field from the loop at the station and Ch.1 is the observed amplitude for Channel 1.

   b) For the remaining channels (n=2 to 9)

   $$\% \text{ Ch.n anomaly} = \frac{\text{Ch.n} - \text{Ch.1}}{\text{Ch.1}} \times 100$$

   where Ch.n is the observed amplitude of Channel n (2 to 9).

2. Point normalized plots.

   These plots display an arrow at the top of the section indicating the station to which all data on the line are normalized. The purpose of point normalized plots is to display only the relative amplitude variation of the secondary field along the line, that is, only that magnetic field from the currents induced in the ground.

   a) For Channel 1:

   $$\% \text{ Ch.1 anomaly} = \frac{\text{Ch.1} - \text{Ppn}}{\text{Ppn}} \times 100$$

   where Ppn is the primary field from the loop at the point norm station and Ch.1 is the observed amplitude for Channel 1.

   b) The remaining channels (n=2 to 9) are Channel 1 reduced and Channel 1 normalized:

   $$\% \text{ Ch.n anomaly} = \frac{\text{Ch.n} - \text{Ch.1pn}}{\text{Ch.1pn}} \times 100$$

   where Ch.n is the observed amplitude of Channel n and Ch.1pn is the observed Channel 1 amplitude at the point norm station

Point normalized plots are usually produced on data sections containing anomalies in order to help interpretation by providing a different perspective to the data. In this survey, all the Data Section numbers containing a "p" are point normalized plots.

INTERPRETATION

Both crossover and contact responses were observed. Plate 345-88-2 is a compilation of the UTEM anomalies depicted on the Data Sections.

The crossover anomalies are of two types. One is the conventional type with the positive lobe on the loop side of the conductor. The second type is a reverse crossover which has a response that is the reverse to the conventional type with the negative lobe on the loop side of the conductor.

The reverse crossover indicates a return current, that is, current flowing in the opposite sense from normal. This usually results when the conductor causing the reverse anomaly is electrically connected to another zone closer to the loop front. The current induced in the conductor which is closer to the loop front comes back along the second conductor which is further from the loop. The result is, the conductor further from the loop has a field in the opposite direction to the conventional conductor response, thereby producing the opposite effect, a reverse crossover.

The crossovers on the SHA SOUTH property clearly define two conductors of length. The intersection of the two crossovers on Line 200S, is a normal and a reversed one at 950E and 1125E respectively. The response indicates that both are shallow and moderately conductive. They extend north to Line 200N and possibly further to Line 600N. The few remaining crossovers appear to be either due to localized conductive features or due to conductors which continue to the south.

The other notable feature is the set of contact responses near the loop front at about 300E and 600E, and extending from 1000N to 0N. These contact responses define a zone of relatively less resistance at o r near-surface, parallel to the loop front.

CONCLUSION

During the 9 km UTEM survey, no conductors of economic interest were found. The results of the survey indicated two (possibly three) shallow and weak to moderate conductors, and one region of relatively less resistance.

Report by: _____
M. A. Price, B.Sc.
Geophysicist, Cominco Ltd.

Endorsed for Release: _____
J. M. Hamilton, P.Eng.
Manager, Exploration
Western Canada
Cominco Ltd.

Distribution:

Mining Recorder	(2)
Western Canada Expl.	(1)
Kootenay Expl.	(1)
Administration	(1)
Geophysics File	(1)

A P P E N D I X I

IN THE MATTER OF THE B.C. MINERAL ACT

AMD THE MATTER OF A GEOPHYSICAL PROGRAMME

CARRIED OUT ON THE SUN 12, SHA 9, 10 CLAIMS

LOCATED 15 KM EAST OF CRESTON, B.C.

IN THE FORT STEELE AND NELSON MINING DIVISIONS OF THE

PROVINCE OF BRITISH COLUMBIA,

MORE PARTICULARLY

N.T.S. 82F/1

S T A T E M E N T

I, Michael A. Price, of the City of North York, in the Province of Ontario, make oath and say:

1. THAT I am employed as a geophysicist by Cominco Ltd. and, as such have a personal knowledge of the facts to which I hereinafter depose;

2. THAT annexed hereto and marked as "Exhibit A" to this statement is a true copy of expenditures incurred on a geophysical survey on the SUN 12, SHA 9, 10 claims;

3. THAT the said expenditures were incurred between August 29th and September 6th, 1988 for the purpose of mineral exploration on the above-noted claims.

Michael A. Price, B.Sc.
Geophysicist, Cominco Ltd.

Dated this 21 day of November, 1988
at Vancouver, B.C.

A P P E N D I X II

E X H I B I T "A"

STATEMENT OF GEOPHYSICAL EXPENDITURES (1988)

SHA SOUTH PROPERTY

August 28 to September 6, 1988

1. STAFF COSTS

a)	A.S. Hagen, supervision 4 days @ $250/day	1,000.00	
b)	I. Jackisch, geophysicist 6.5 days @ $300/day	1,950.00	
c)	M.A. Price, geophysicist 5 days @ $275/day	1,375.00	
d)	N. Murphy, assistant 3 days @ $100/day	300.00	
e)	P. Muir, assistant 5 days @ $100/day	500.00	5,125.00

2. OPERATING DAY CHARGES
Note: This charge is applied for those day on which useful data are acquired, to cover the cost of data compilation, drafting, interpretation and report.

4 days @ $350/day 1,400.00

3. EQUIPMENT RENTAL

UTEM System	6.5 days @ $150/day	975.00

4. EXPENSE ACCOUNTS

I. Jackisch	352.54	
M.A. Price	307.00	
N. Murphy	75.00	
P. Muir	125.00	859.54
	Carried Forward	$ 8,359.54

Carried Forward		$ 8,359.54

5. MISCELLANEOUS

Use of Radio	50.00	
Freight Charges	23.15	
Transportation:		
One 4x4 Truck 5.5 days @ $40/day	220.00	
One 4x4 Truck 5.5 days @ $50/day	275.00	
Domicile : Creston House	150.00	718.15
T O T A L		$ 9,077.69

I certify this to be a true Statement of Expenditures for the geophysical program on the SHA SOUTH claims in 1988.

Michael A. Price, B.Sc.
Geophysicist, Cominco Ltd.

A P P E N D I X III

CERTIFICATE OF QUALIFICATIONS

I, MICHAEL A. PRICE, of 35 Fourwinds Drive, in the City of North York, in the Province of Ontario, do hereby certify:

1. THAT I graduated from the University of Toronto in 1985 with a B.Sc. in Geophysics/Physics.

2. THAT I have been practising my profession for the past three years, and that I have been working with the UTEM system for these three years.

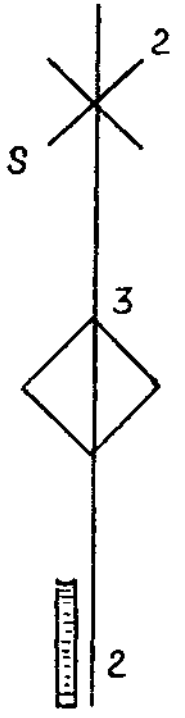
3. THAT I have been employed by Cominco Ltd. for the past four months.

Michael A. Price, B.Sc.
Geophysicist, Cominco Ltd.

NOVEMBER 1988

LEGEND

UTEM COMPILATION MAPS



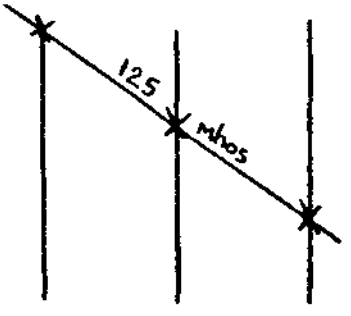
Axis of a crossover anomaly. The number indicates the latest anomalous channel.

Depth indicated by: S - Shallow (< 50 m)
M - Moderate (50-200 m)
D - Deep (> 200 m)

Axis of reversed crossover anomaly produced when a small conductor dips at less than 70° towards the transmitter. In normal crossover the positive response is towards the transmitter; reversed one, it is away from the transmitter.

Indicates a negative anomaly of width shown by the dash. The latest anomalous channel is shown. Can sometimes be confused with the negative part of a crossover anomaly.

Outline of a transmitter loop.



Conductor axis located by crossover anomalies with a conductance determination. The conductance is the interpreted conductivity x thickness of the conductor in mhos (same as Siemens).

Only the principal crossovers are indicated.

LEGEND

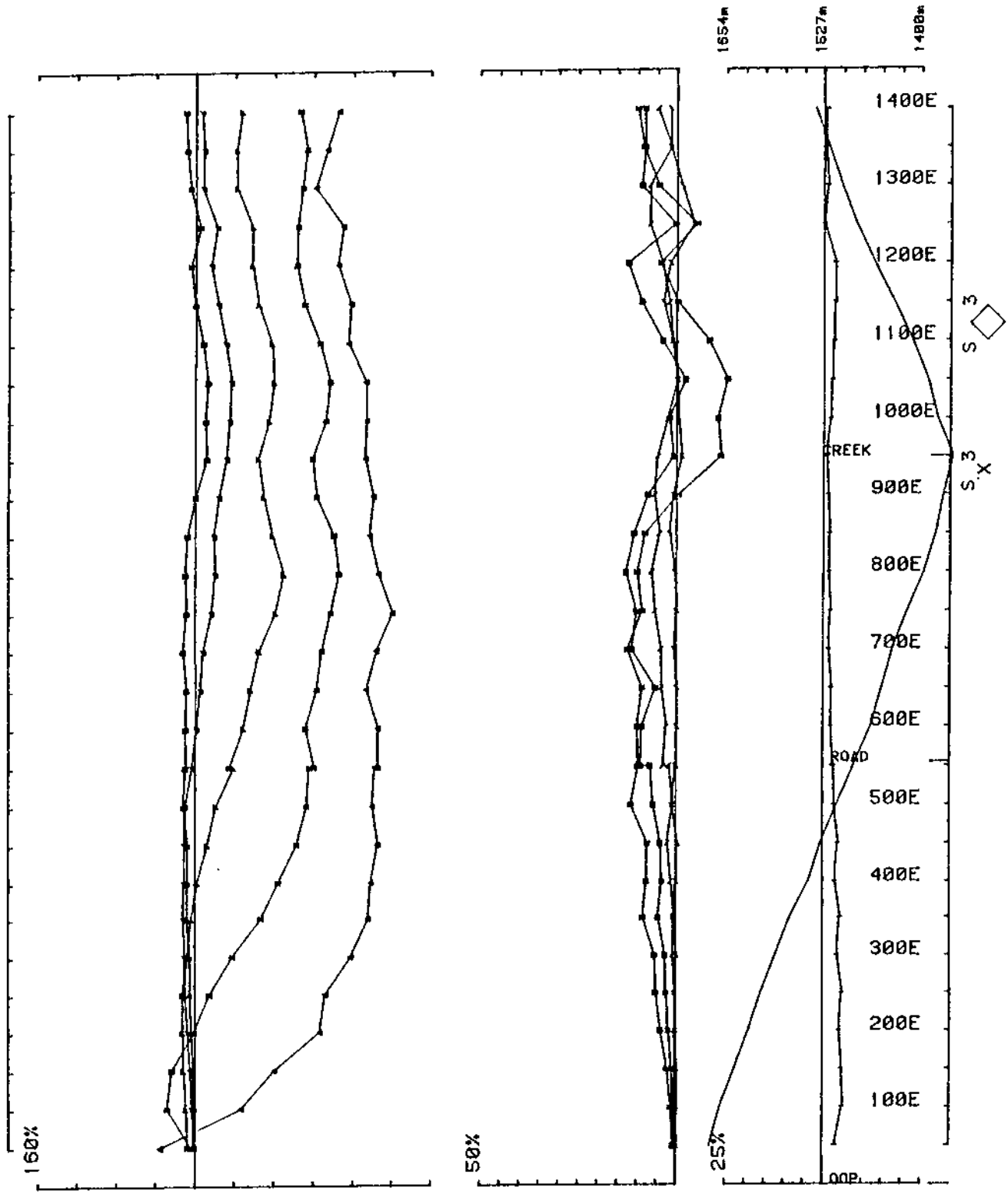
UTEM DATA SECTIONS

ORDINATE: Amplitude scale is given in %

ABSCISSA: Station or Picket Numbers in Hundreds of Meters

SYMBOL	CHANNEL	MEAN DELAY TIME	
		15 Hz	30 Hz
	1	25.6 ms	12.8 ms
	2	12.8	6.4
	3	6.4	3.2
	4	3.2	1.6
	5	1.6	0.8
	6	0.8	0.4
	7	0.4	0.2
	8	0.2	0.1
	9	0.1	0.05
	10	0.05	0.025

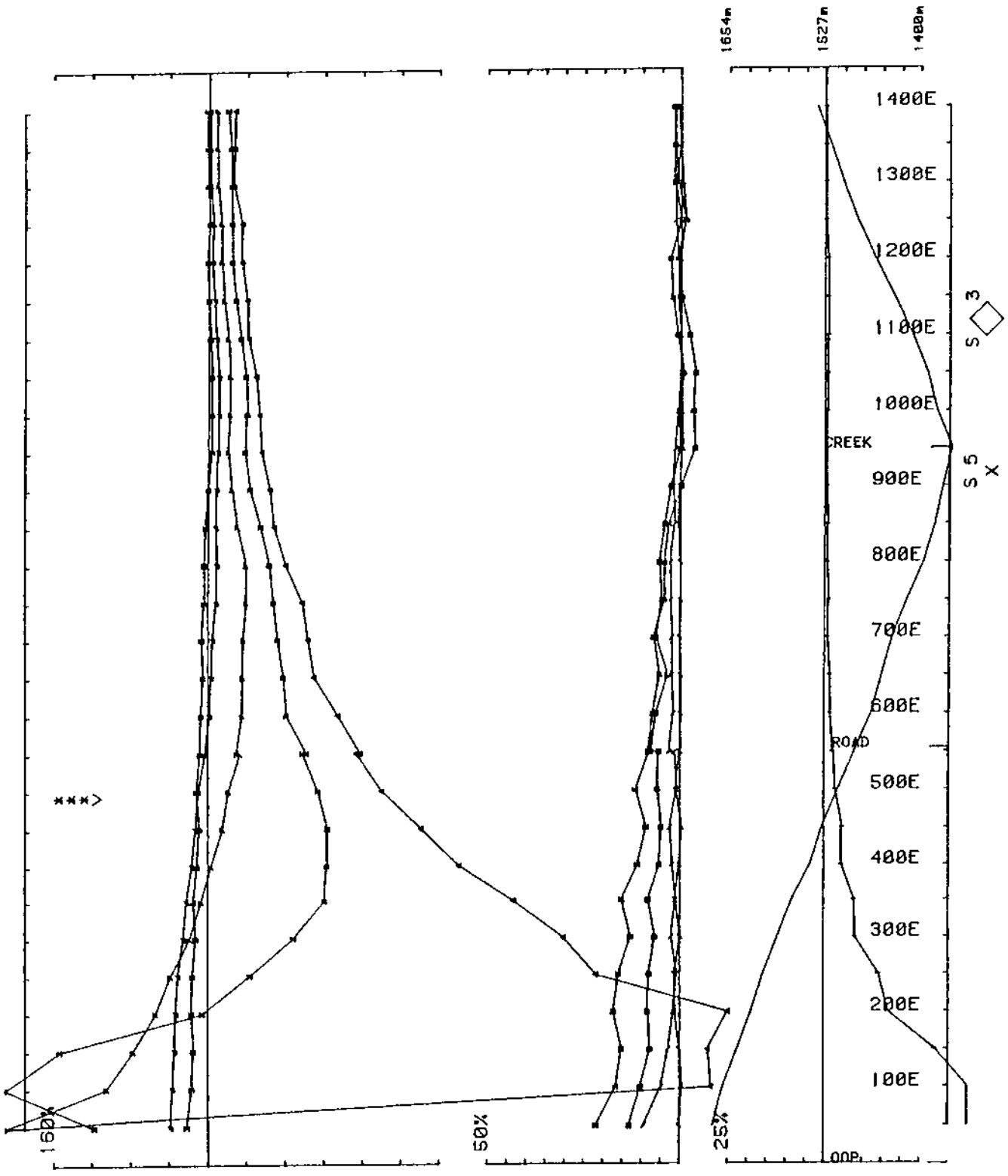
DATA SECTIONS



Area SHA SOUTH 88 COMINCO operator IJ MP freq(hz) 30.974

Loopno 4 Line 200S component Hz secondary Ch I normalized Ch I reduced

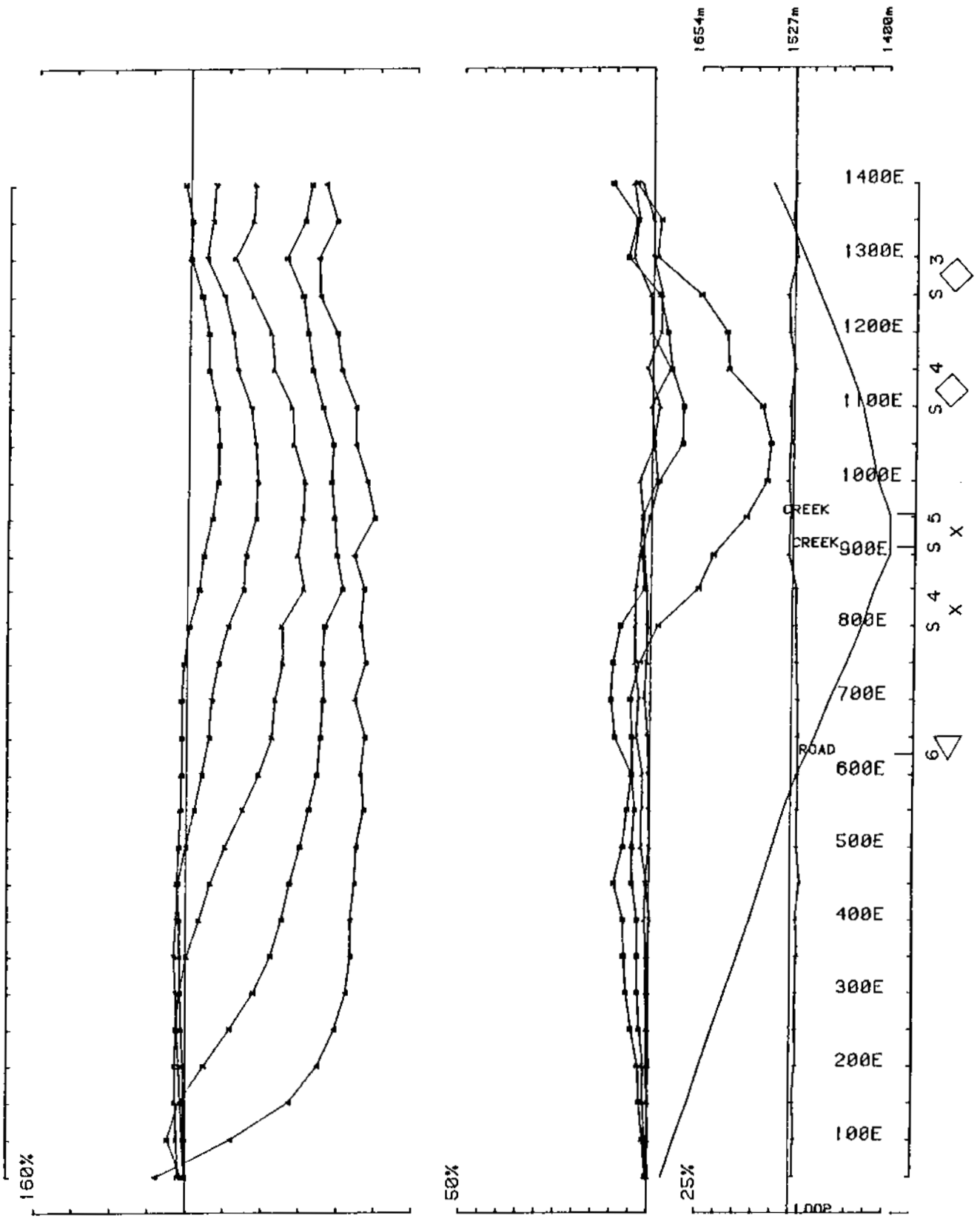
D.S. I



Area SHA SOUTH 88 COMINCO operator IJ MP freq(hz) 30.974

Loopno 4 Line 200S component Hz secondary Ch I normalized Ch I reduced

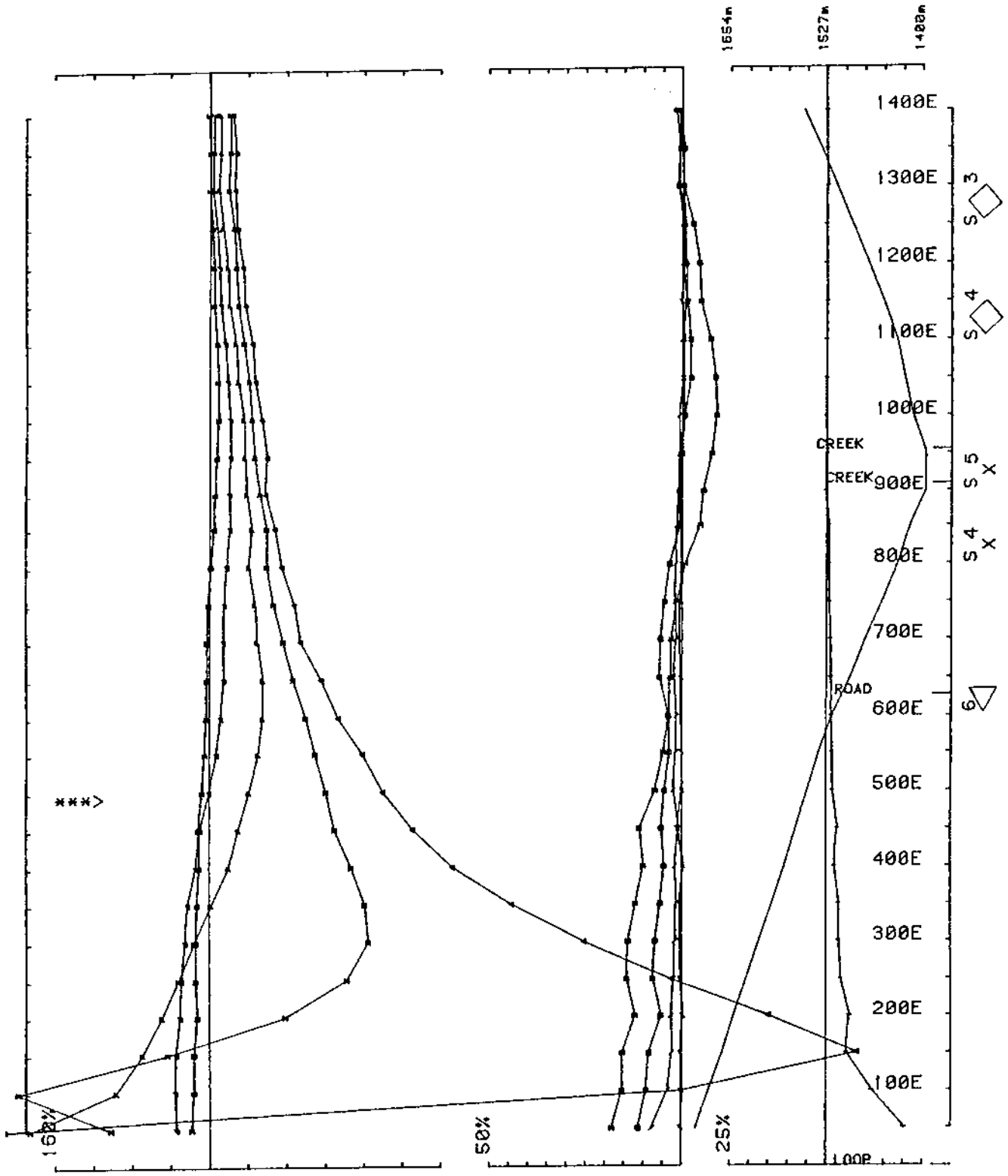
D.S. Ip



Area SHA SOUTH 88 COMINCO operator IJ MP freq(hz) 30.974

Loopno 4 Line 0N component Hz secondary Ch 1 normalized Ch 1 reduced

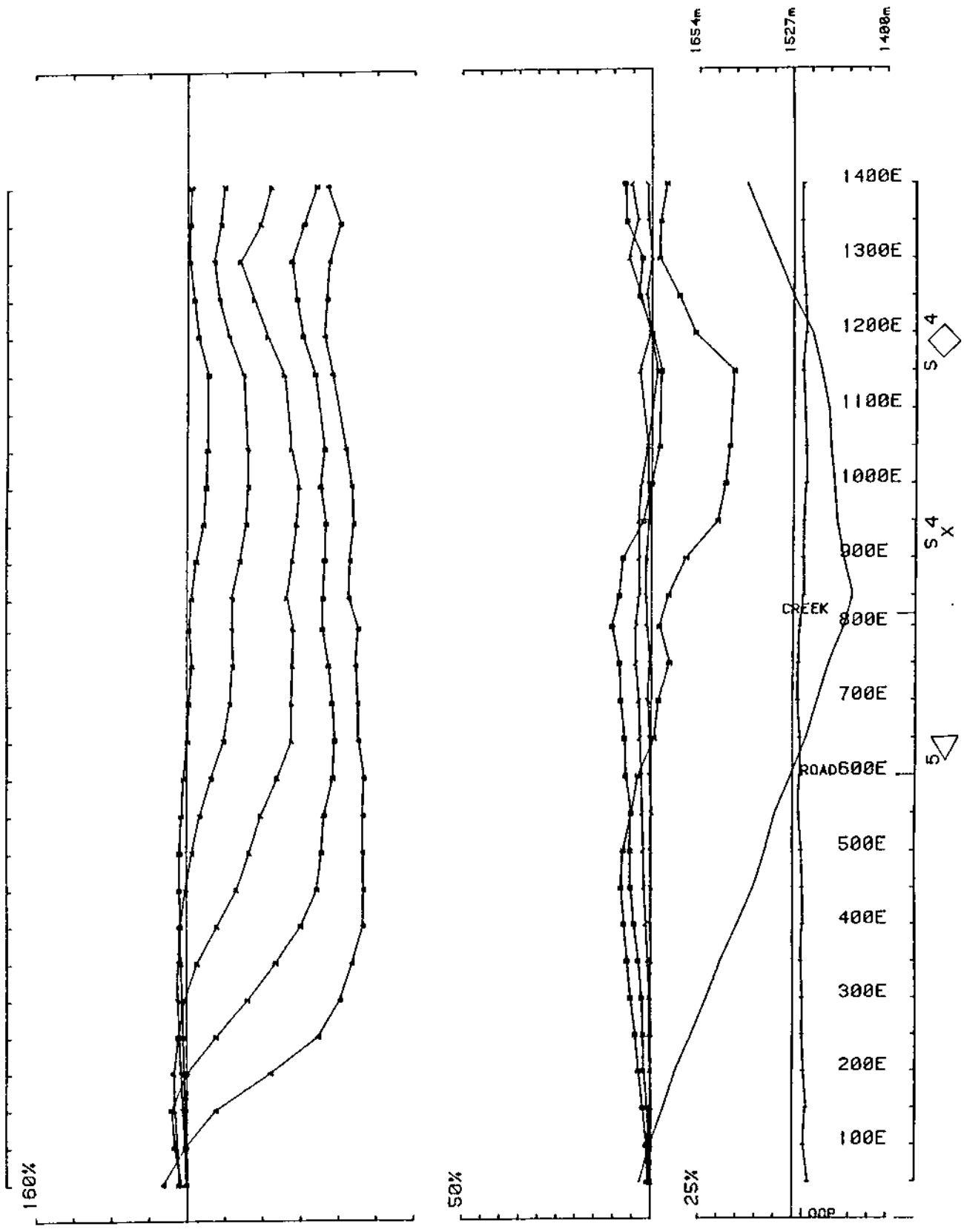
D.S. 2



Area SHA SOUTH 88 COMINCO operator IJ MP freq(hz) 30.974

Loopno 4 Line 0N component Hz secondary Ch I normalized Ch I reduced

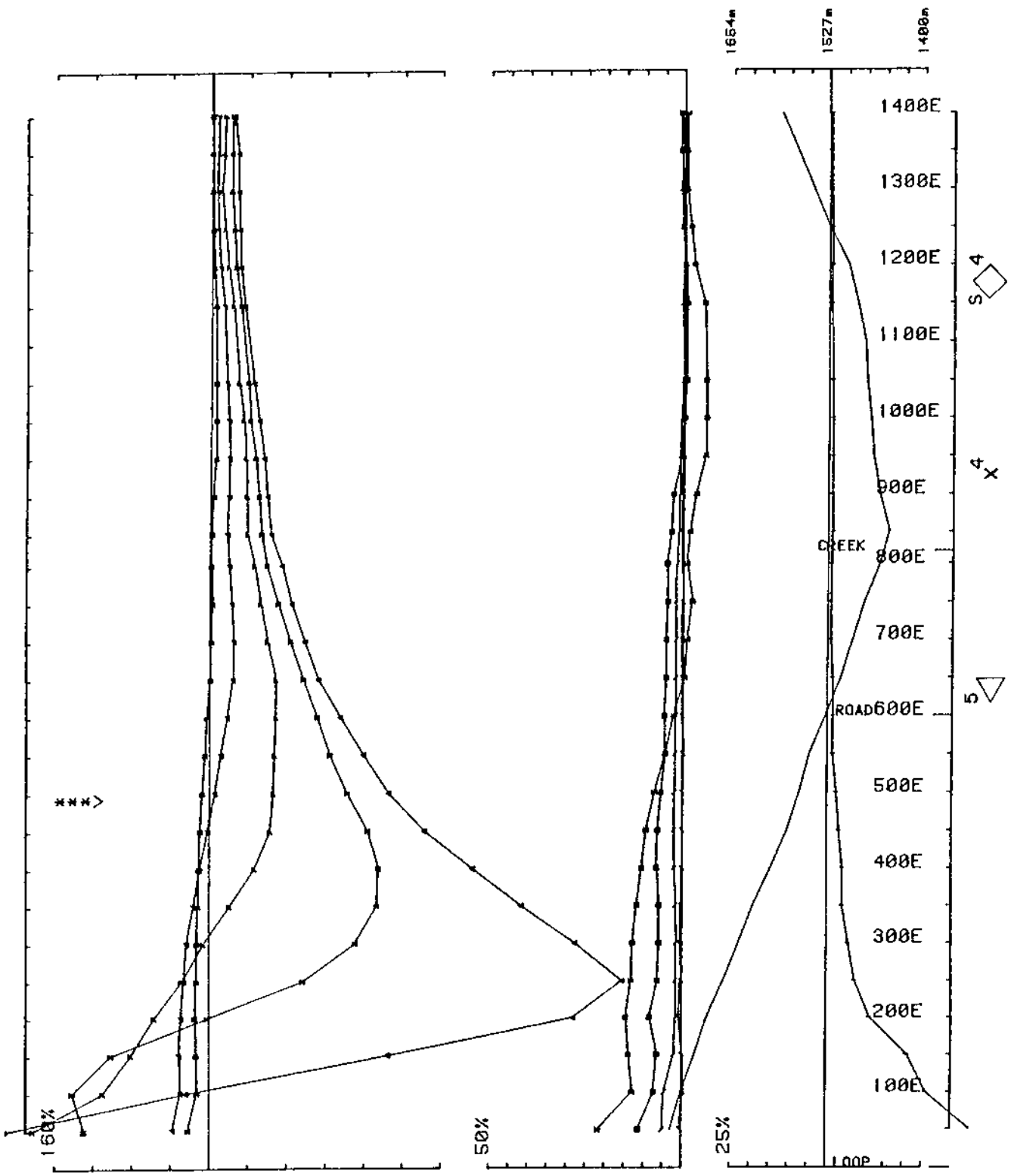
D.S. 2p



Area SHA SOUTH 88 COMINCO operator IJ MP freq(hz) 30.974

Loopno 4 Line 200N component Hz secondary Ch I normalized Ch I reduced

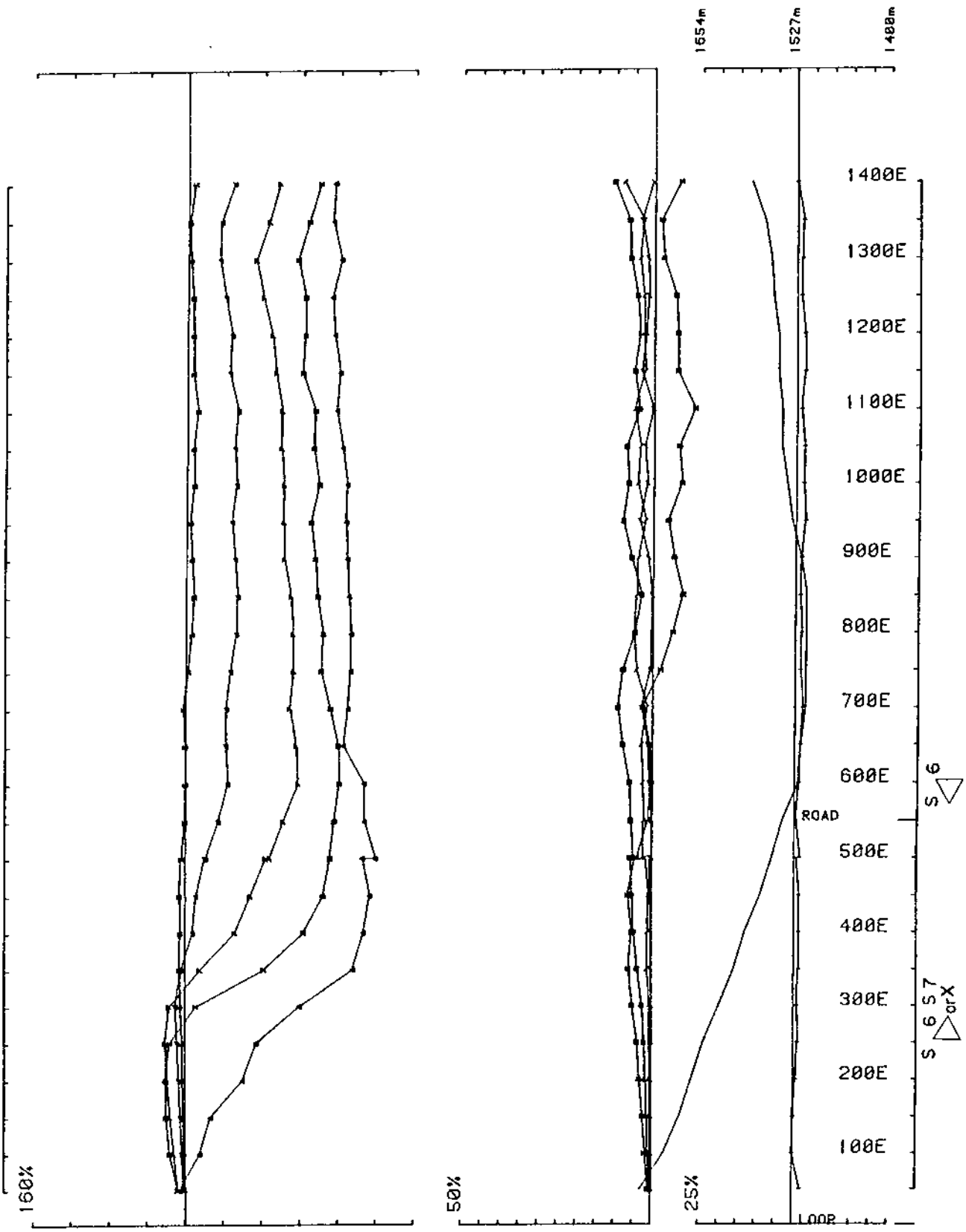
D.S. 3



Area SHA SOUTH 88 COMINCO operator IJ MP freq(hz) 30.974

Loopno 4 Line 200N component Hz secondary Ch I normalized Ch I reduced

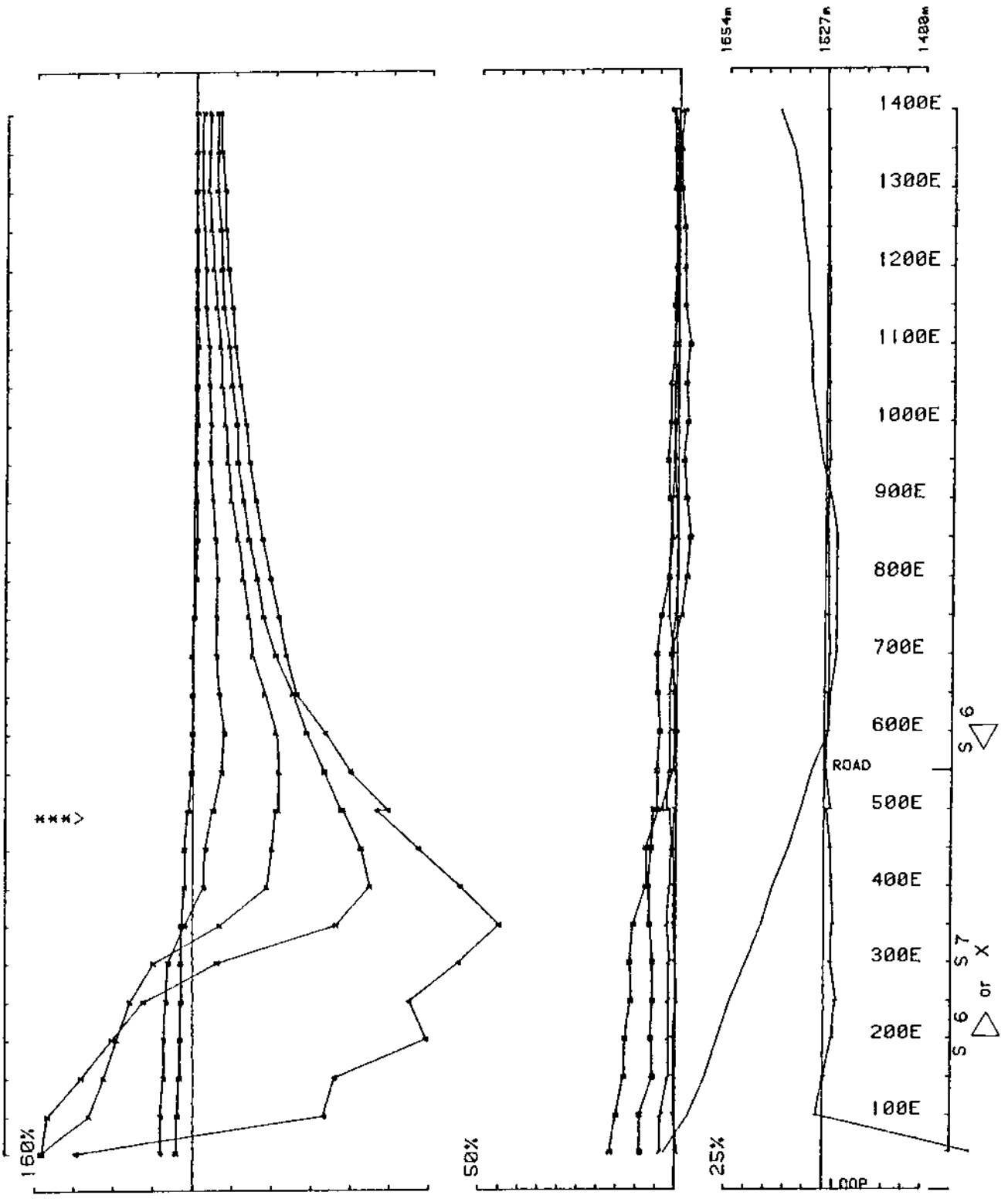
D.S. 3p



Area SHA SOUTH 88 COMINCO operator IJ MP freq(hz) 30.974

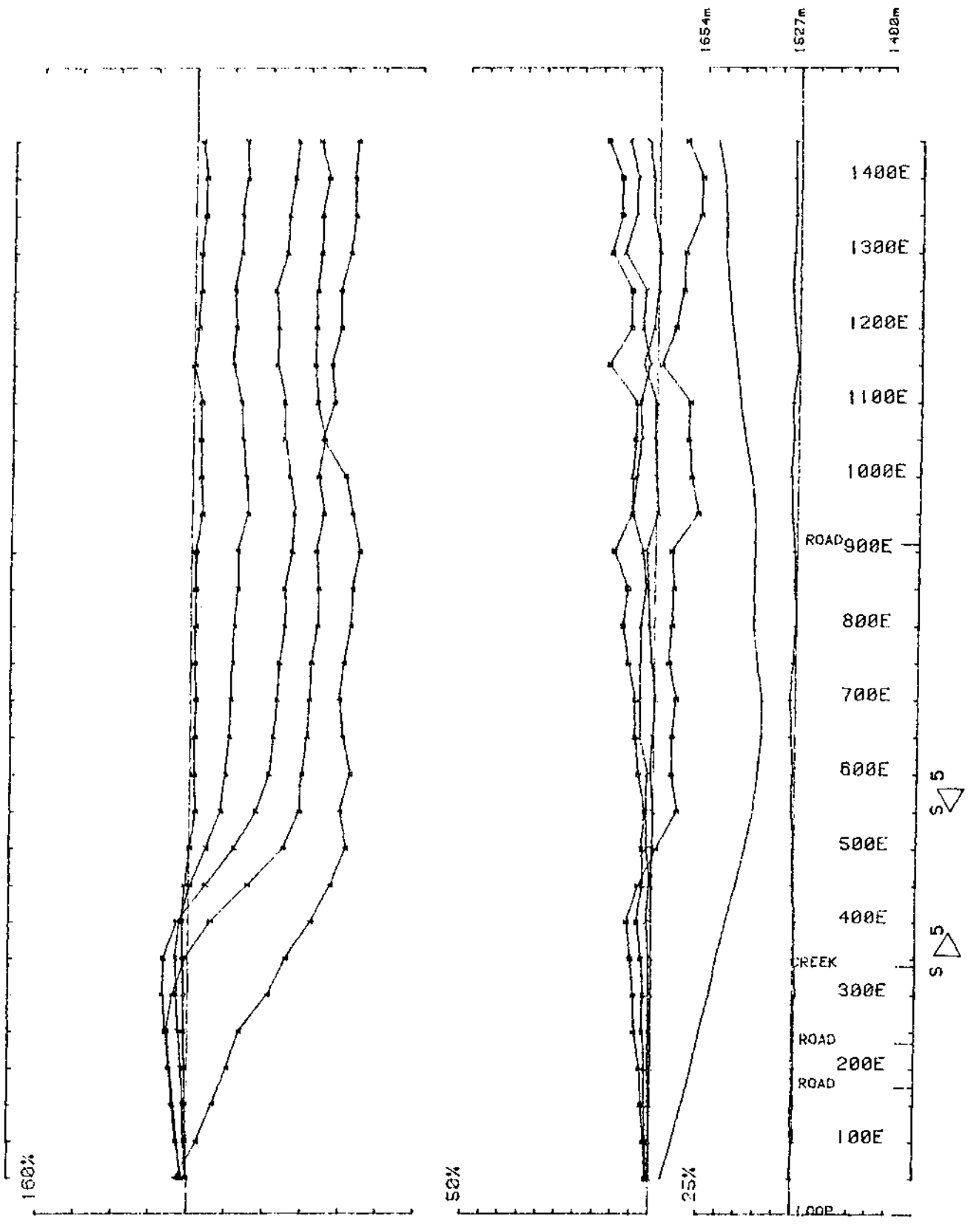
Loopno 4 Line 400N component Hz secondary Ch I normalized Ch I reduced

D.S. 4



Area SHA SOUTH 88 COMINCO operator IJ MP freq(hz) 30.974

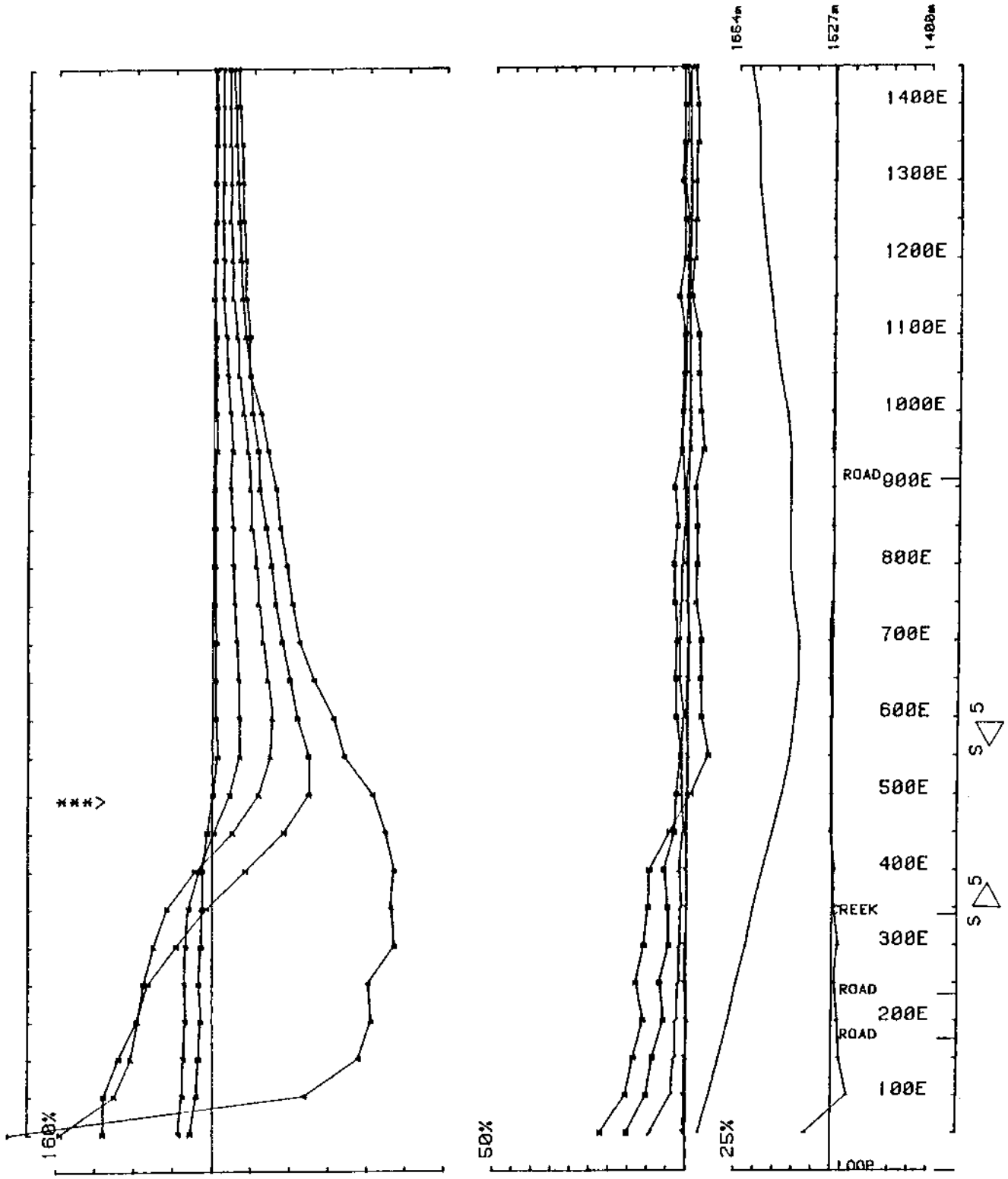
Loopno 4 Line 400N component Hz secondary Ch 1 normalized Ch 1 reduced



Area SHA SOUTH 88 COMINCO operator IJ MP freq(hz) 30.974

Loopno 4 Line 600N component Hz secondary Ch I normalized Ch I reduced

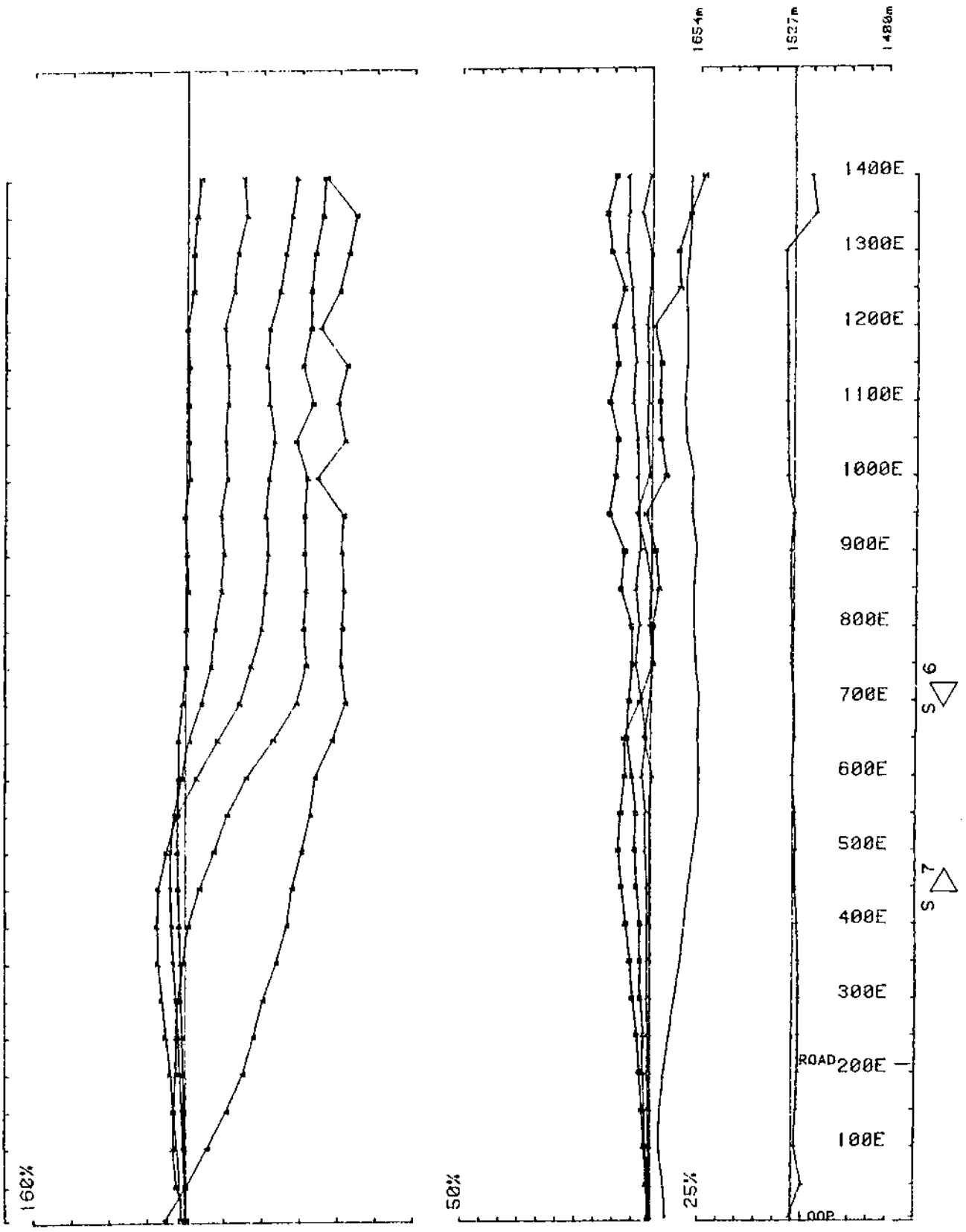
D.S. 5



Area SHA SOUTH 88 COMINCO operator IJ MP freq(hz) 30.974

Loopno 4 Line 600N component Hz secondary Ch 1 normalized Ch 1 reduced

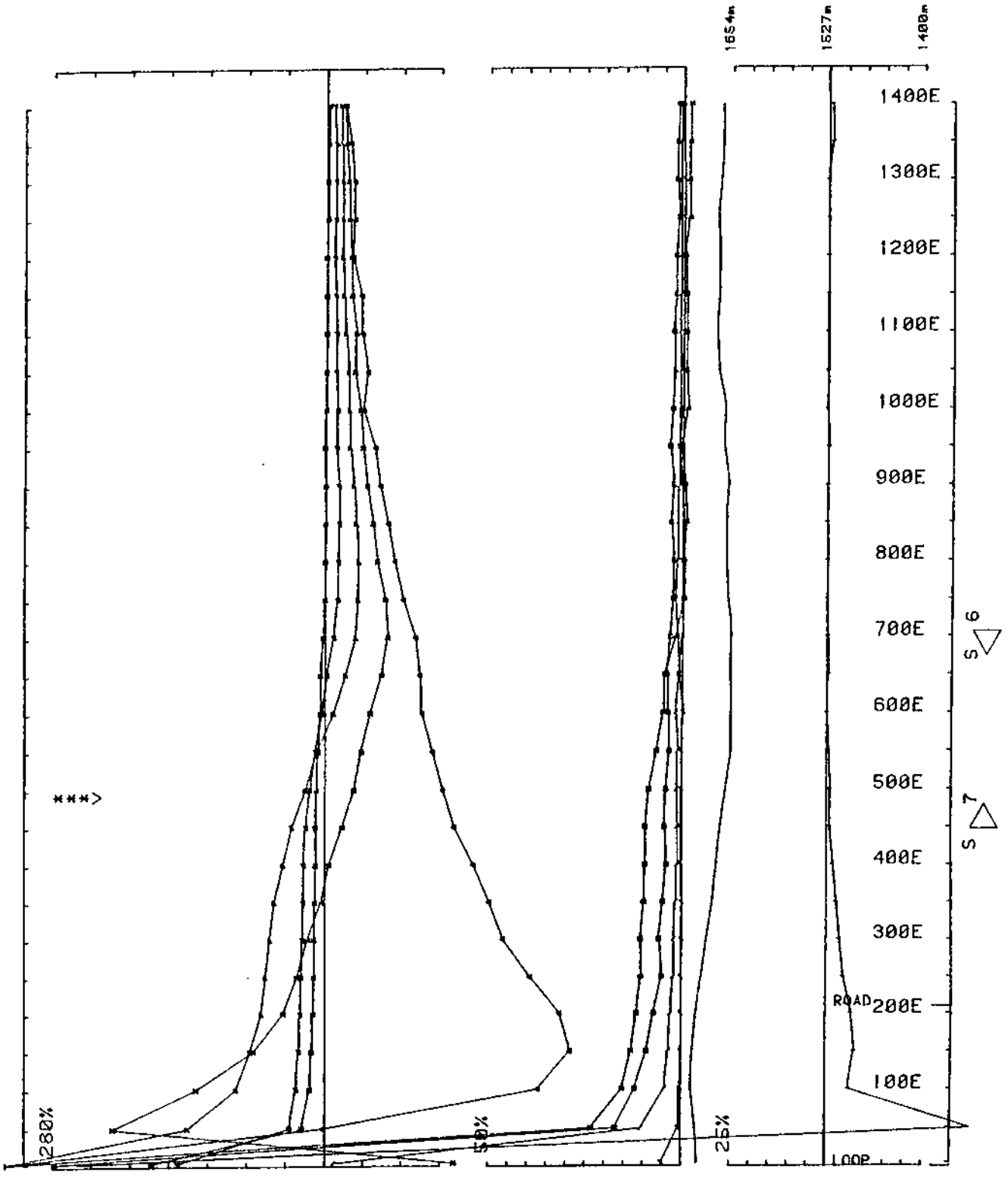
D.S. 5p



Area SHA SOUTH 88 COMINCO operator IJ MP freq(hz) 30.974

Loopno 4 Line 800N component Hz secondary Ch I normalized Ch I reduced

D.S. 6



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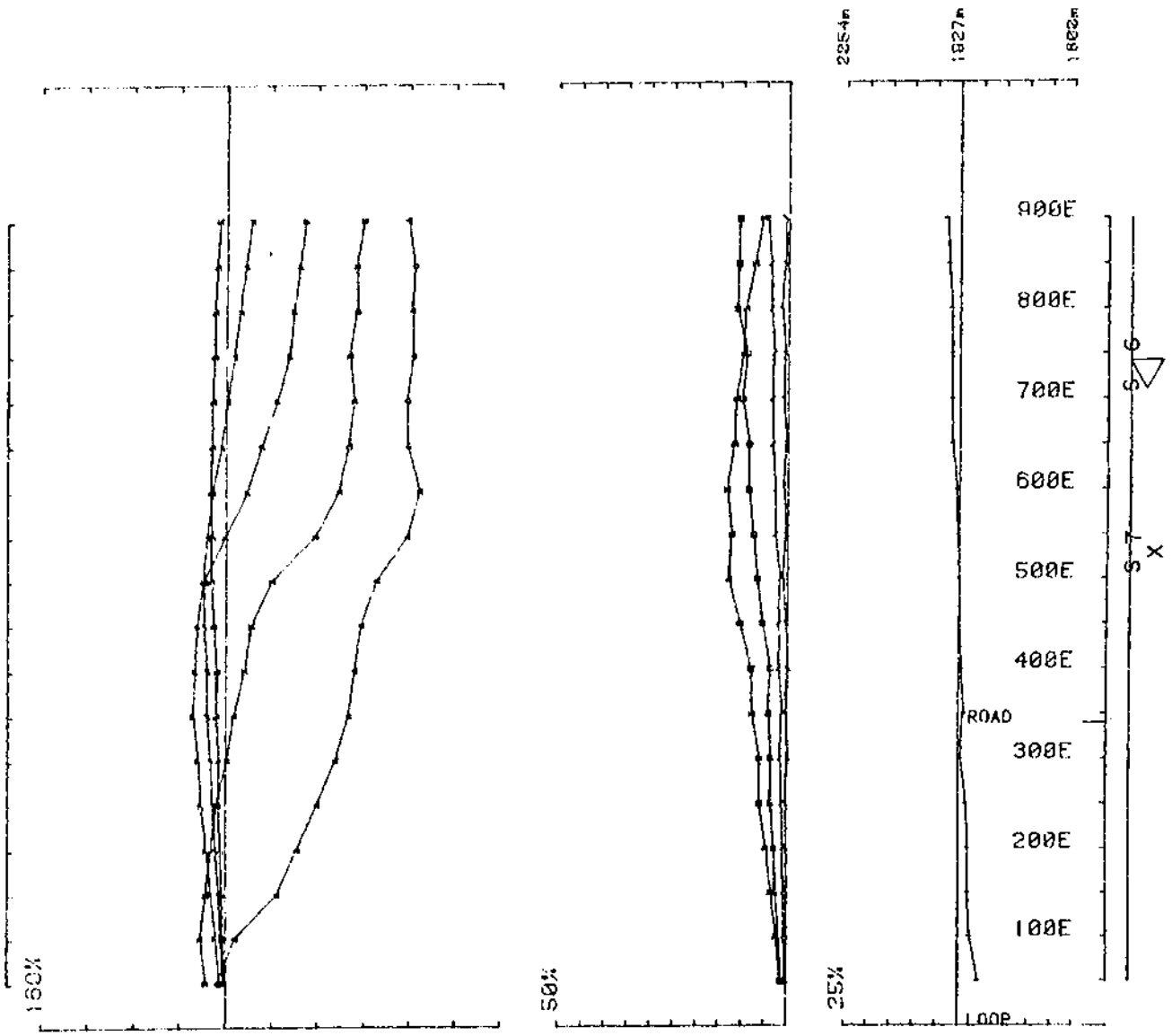
Loopno 4 Line 800N component Hz secondary Ch I normalized Ch I reduced

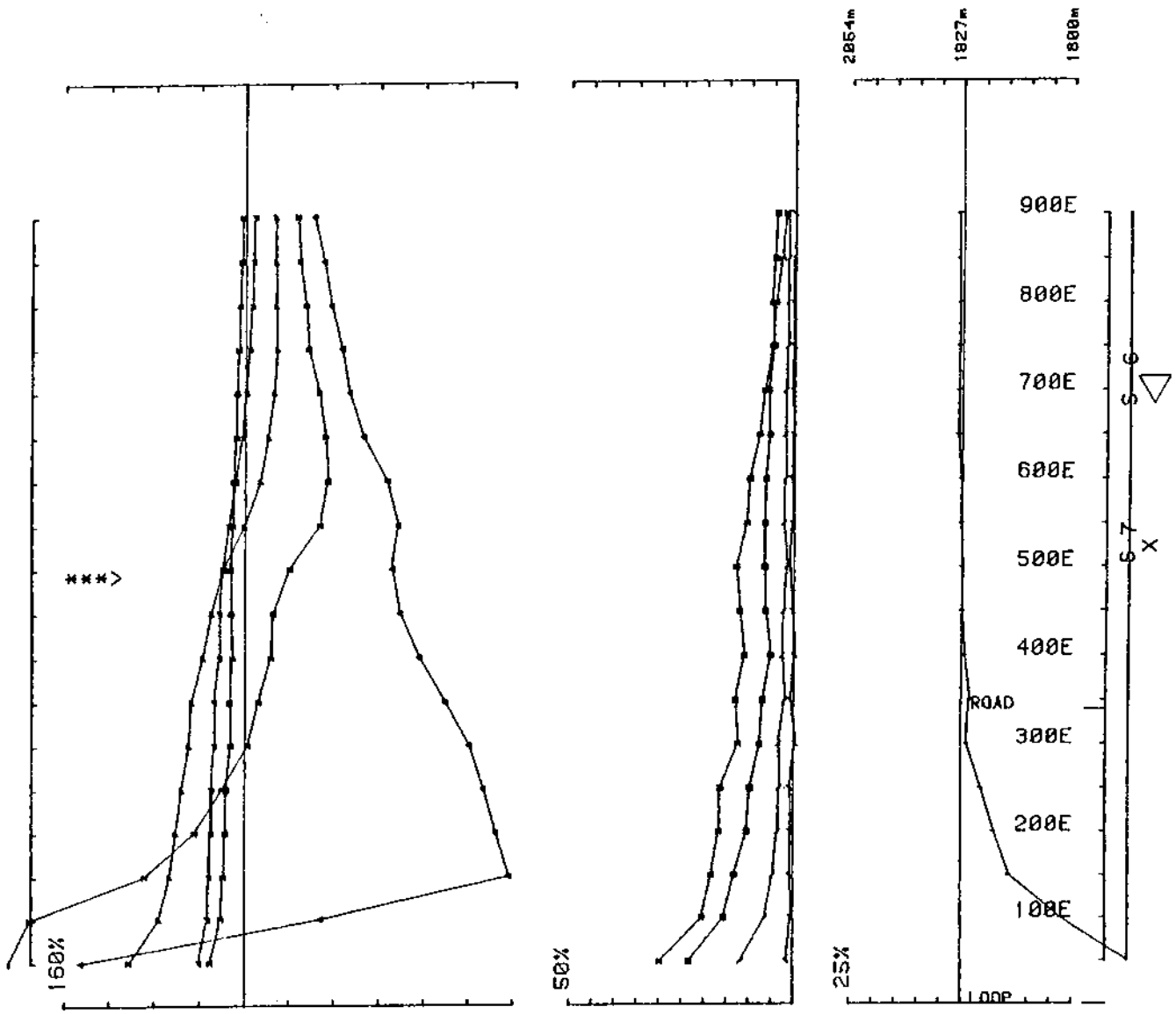
D.S. 6p



Area SHA SOUTH 88 COMINCO operator IU MP freq(hz) 30.974

Loopno 3 Line 1000N component Hz secondary Ch I normalized Ch I reduced

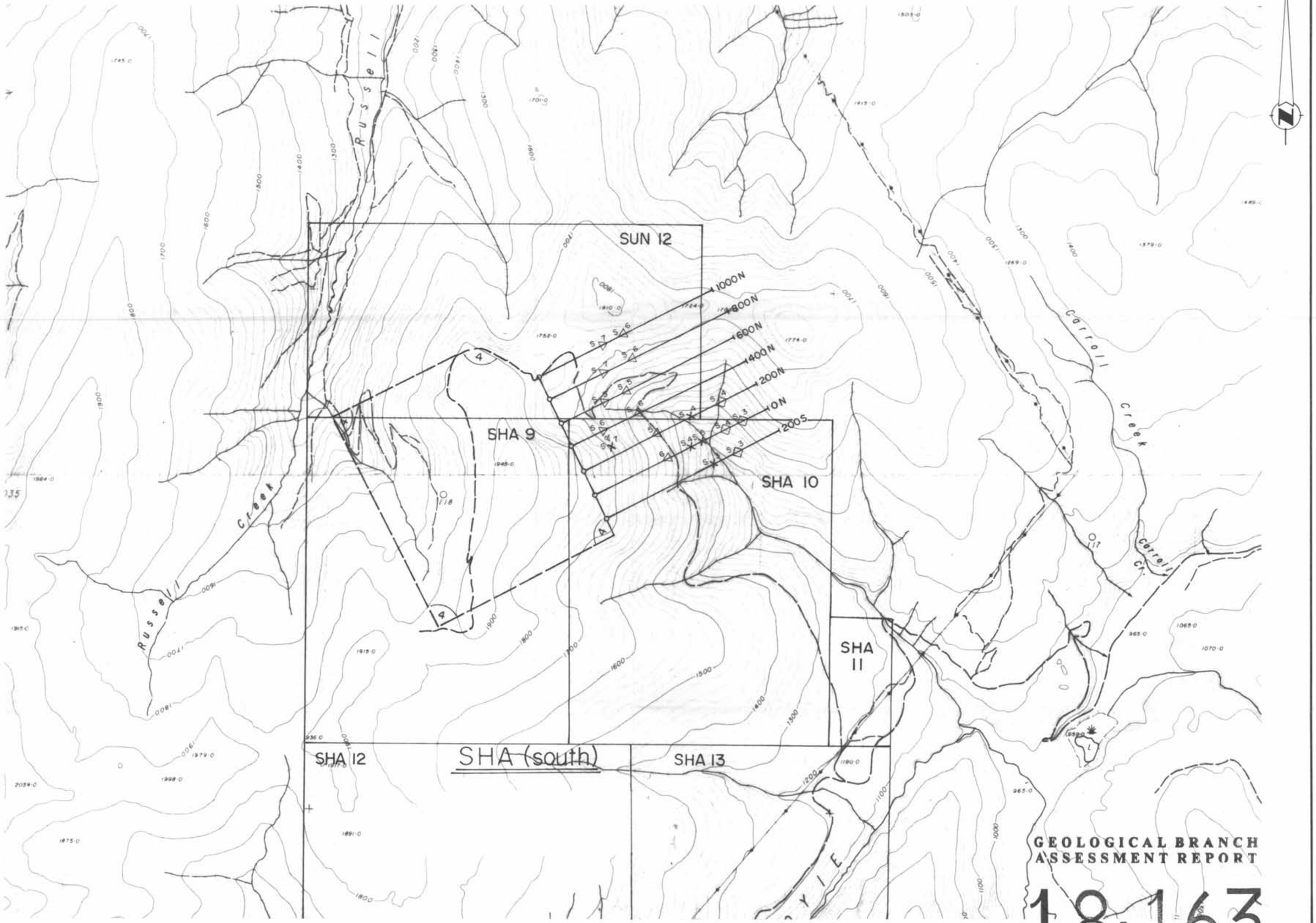
D.S. 7



Area SHA SOUTH 88 COMINCO operator IJ MP freq(hz) 30.974

Loopno 3 Line 1000N component Hz secondary Ch 1 normalized Ch 1 reduced

D.S. 7p



$^{S}X^{4}$ AXIS OF A CROSSOVER ANOMALY THE NUMBER INDICATES THE LATEST ANOMALOUS CHANNEL. DEPTH INDICATED BY : S - Shallow
M - Moderate
D - Deep

▷ ◁ REVERSE CROSSOVER - description as above

$^{S}◇^{3}$ AREA OF CONDUCTIVITY WHICH IS HIGHER THAN AVERAGE BACKGROUND

4 OUTLINE OF TRANSMITTER LOOP AND LOOP NUMBER

0 500 1000 1500 METRES

GEOLOGICAL BRANCH
ASSESSMENT REPORT

18,163

SHA (South) - 1988-

FORT STEELE M.D., B.C.

NTS 82 - F/1

Drawn by:		Traced by:	
Revised by	Date	Revised by	Date

UTEM COMPILATION MAP

Scale: 1 20,000 | Date: DEC 1988 | Plate: 345 - 88 - 2

210-0620