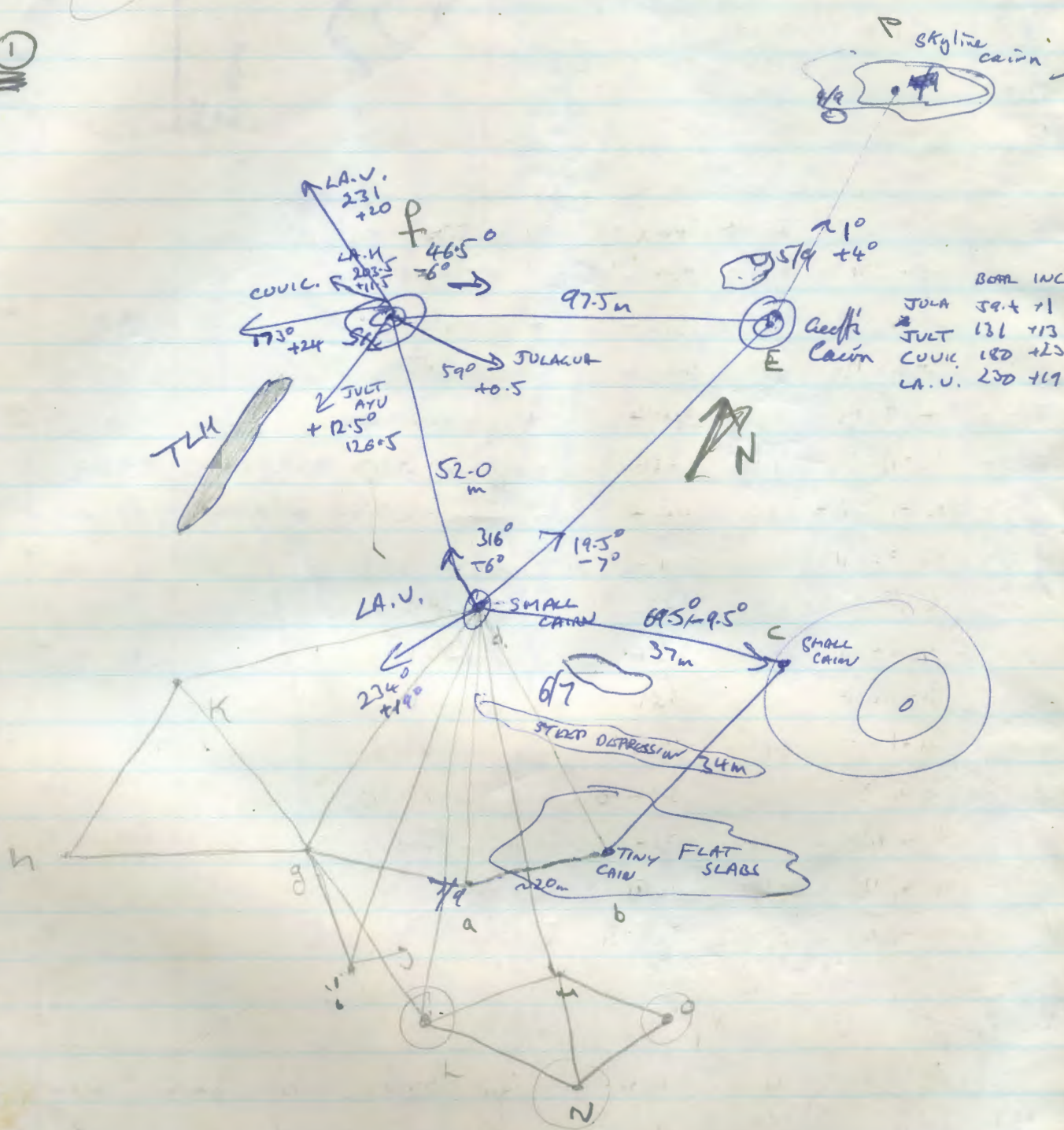
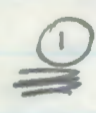


1322

Surface Surveys of around Area 9.



	BORE	INC
JOLA	59.4	+1
JULT	131	+13
COVIC.	180	+23
LA.V.	230	+19

	Beat	INC
A → B	45	-5
G → A	31	-10
G → H	190	+20
i → G	267	-12
δ → v	215	+3
ū → D	317	-5

13 INC

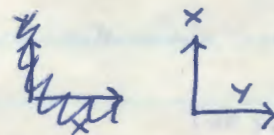
JULA. 645 +1
 JULY. 135 +12
 CIVIC. 178 +20
 LA.H. 202 +8

	BEAR	INC	BEAR	INC	BEAR	INC	BEAR	INC
	138	-2	114	+9	21	-7	341.5	+0
	316	-9	284	-18	4	-11	33	-8
	302.5	-13	261	+11.5	267	-4	299.5	+12.5
	319	+7.5	241	-3	271.5	+3		

Bearings	H		S		L		O	
	Bear	INC	Bear	INC	Bear	INC	Bear	INC
Selagua	58	+1	-	-	55	-1	52.5	+1
Tulkay	181	+32	188	+34	123	13	124.5	+24.5
Covichetti	238	+20	243	+22	23	23	-	-8
La Verd!	321	+9	319	+9	237.5	21	239	+22.5

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$r = \text{dist}$
 $\theta = \text{bearing}$
 $\phi = \text{inclination}$



$$\begin{aligned}
 x &= \text{North} & x &= r \sin \theta \cos \phi \\
 y &= \text{East} & y &= r \sin \theta \sin \phi \\
 z &= \text{down UP} & z &= r \cos \phi \\
 \text{Ext} &= \text{extended elevation} & \text{Ext} &= r \cos \phi
 \end{aligned}$$

How to set up Geoff's calculator for converting spherical coordinates into cartesian coordinates, according to the above conventions.

1 Programming - If the program is not yet stored,

- 1.1 2nd CP clears the program storage
- $\text{2nd PART} \text{ 1 } \Sigma$ defines program/memory space division (displays "415.71")
- LRN switches to programming mode (displays "ST")

1.2 The program:

- LBL A
- $\text{RCL } 01$
- $x \rightleftharpoons t$
- $\text{RCL } 03$
- 2nd PAR
- R/S
- $x \rightleftharpoons t$
- R/S
- $x \rightleftharpoons t$
- $\text{RCL } 02$
- 2nd PAR
- R/S
- $x \rightleftharpoons t$
- R/S
- RST

(press the figure keys slowly the display must show "01" here)

LRN switches back to calculating mode

2 Calculating -

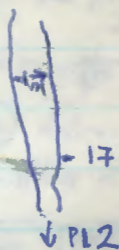
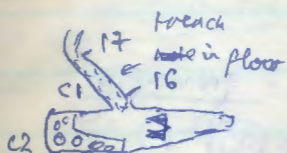
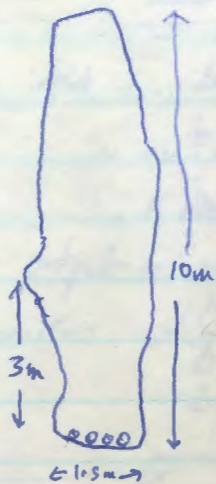
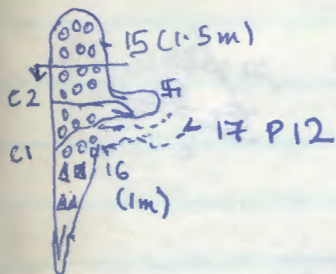
- 2.1 enter length of leg
- 2.2 $\text{STO } 01$
- 2.3 enter bearing
- 2.4 $\text{STO } 02$
- 2.5 enter inclination (+ = up, - = down)
- 2.6 $\text{STO } 03$
- 2.7 A shows Δz
- R/S shows ext. elev.

q/n 15-7-85
see over for more comfortable version

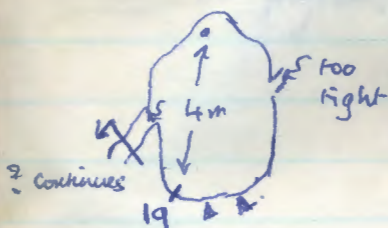
- R/S shows Δy
- R/S shows Δx
- 2.8 for reverse bearings, note the $\Delta x, \Delta y, \Delta z$ each with the opposite sign.
- 2.9 repeat the above (as from 2.1) for each leg.

~~sketches from~~

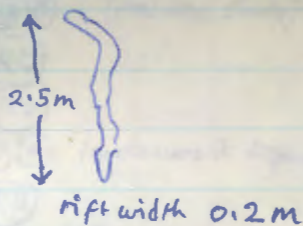
3/5 Alternative Route (cont-4)



NB. Station 18 is on a ledge halfway down the pitch.



floor solid rock at last!



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Surface Survey of Area 9

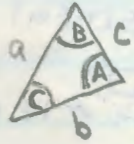
(1)

Using letter notation as in (1)
sine rule

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

cosine rule

$$a^2 = b^2 + c^2 - 2bc \cos A$$



Survey of relative positions is no peak readings.

Points	Horizontal Dist	Vertical Dist	Bearing
F → E	97	-10	46.5
D → F	51.7	-5.4	316

(2)

Conversion of raw surface data into cartesian coordinates, release 1.2
 (using Geoff's calculator) (1329)

Conventions:

input - length of leg in m
 bearing in $^{\circ}$
 inclination in $^{\circ}$, positive = up, negative = down

output - extended elevation in m (always positive)

Δz
 Δx
 Δy } in m: positive x going north
 positive y going east
 positive z going up

Programming: (if the program isn't already stored)

- 2nd CP clears program memory
- 2nd PART (1) (2) defines prog. memory space (displays "415.11")
- LRN switches to program mode (displays "ST")

The program:

STD
 0/0 (press keys slowly)
 RIS
 STD
 0/1 (make sure it displays "004 01" here)
 RIS
~~LBL~~
~~A~~
~~RCL~~
~~X \rightleftharpoons t~~
 RCL
 0/0
 X \rightleftharpoons t
 2nd PDR
 X \rightleftharpoons t
 RIS
 X \rightleftharpoons t

RIS
 RCL
 0/1
 2nd PDR
~~0/0~~
 X \rightleftharpoons t
 RIS
 X \rightleftharpoons t
 RIS
 RST
 LBL
 2nd A'
 X \rightleftharpoons t
 RCL
 0/0
 X \rightleftharpoons t

2nd PDR
 X \rightleftharpoons t
 RIS
 X \rightleftharpoons t
 +/-
 +/-
 RIS
 RCL
 0/1
 2nd PDR
 X \rightleftharpoons t
 RIS
 X \rightleftharpoons t
 RIS
 RST

displays "045 RST" if you haven't left out anything

LRN switches back to calculating mode

Use: for each leg type RST length of leg RIS bearing RIS inclination
 then for a forward leg, A — for a backward leg, 2nd A'

- after a while, the display shows the extended elevation.
- press RIS to show Δz , RIS again to show Δx (takes a while),
- RIS again to show Δy .
- repeat the above per leg.

Don't press any other keys between these or you'll get funny results.

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P. Rose Survey station 315 from
to Wingerts Riff to Kater 20/7/85

Station	Time	Compass	Clino	Stn Ht etc (Approx)
2 → 1	13/22 ^{8/39}	131/15	+24	1/45 ①
2 → 3	6/19	311	-44	4/0 ③
4 → 3	4/15	063	+62	4/95 ④
4 → 5	1/51	041	-31	1/00 ⑤
6 → 5	3/69	111	+13	0/8 ⑥
6 → 7	1/25	260	+9	⑦ 0/40 from helay.
8 → 7	20/11	-	+90	⑧ 1/15
9 → 8	14/66	136	-4	
9 → 10	37/50	-	-90	⑩ 1/60
11 → 10	13/14	325	+24	⑪ 4/100
11 → 12	3/30	166	-35	⑫ 2/100
13 → 12	5/63	279	-13	⑬ 4/100
13 → 14	5/55	171	-29	⑭ 4/100
15 → 14	3/48	330	+75	⑮ 5/60
16 → 15	2/14	237	-2	⑯ 1/70
16 → 17	1/29	345	0	⑰ 1/90
17 → 18	1/08	118	-7	⑱ 1/80
19 → 18	1/14	339	+12	⑲ 1/70
20 → 19	3/46	261	+5	⑳ 1/60
20 → 21	2/08	046	+45	㉑ 3/100
21 → 22	3/21	100	-4	㉒ 4/00
22 → 23	2/32	032	+1	—
23 → 24	4/02	085	-35	㉔ 7/50
25 → 24	8/24	281	+32	㉕ 4/100
25 → 26	3/83	135	-26	㉖ 2/70
27 → 26	4/05	3853	+10	㉗ 10/30
27 → 28	9/62	144	-54	㉘ 8/20
29 → 28	8/72	300	+70	㉙ 4/00
29 → 30	27/22	114	-74	㉚ 1/50

Calculated with the ~~and~~ ~~Graph~~ ~~add~~ Program

ExVEL	Δx	Δx	x_{cm}	Δy	y_{cm}
7.66	-3.41	5.082	502	-5.78	-5.78
4.96	-4.79	3.26	828	-3.75	-9.53
2.32	-4.37	-1.05	723	-2.07	-11.6
1.29	-0.78	0.98	821	0.95	-10.75
3.60	-0.83	1.29	9.5	-3.36	-14.11
1.23	0.14	-0.21	924	-1.22	-15.33
0	-20.11	0		0	-15.33
14.6	1.02	10.52	19.81	-10.16	-25.49
0	-37.50	0	19.81	0	-25.49
12	-5.34	-9.83	9.98	6.89	-18.6
2.7	-1.89	-2.62	736	0.65	-17.95
5.99	1.27	-4.80	2.56	-2.66	-20.61
4.85	-2.64	-4.79	-223	0.76	-19.85
0.9	-3.36	-6.78	-9.01	0.45	-19.4
2.19	0.075	1.16	-7.91	1.79	-17.6
1.29	0	1.24	-8.67	-0.33	-17.99
1.07	-0.13	-0.503	-7.173	0.946	-16.99
1.11	-0.24	-1.04	-8.21	0.90	-16.59
3.45	-0.3	0.54	-7.67	3.4	-13.19
1.47	1.47	1.02	-6.65	1.06	-13.13
3.2	-0.22	-0.56	-7.21	3.15	-9.98
2.32	0.04	1.97	-5.24	1.23	-8.75
3.29	-2.3	0.29	-4.95	3.28	-5.47
6.99	-4.37	-1.33	-6.28	6.86	1.39
3.44	-1.88	-2.43	-8.71	2.43	3.82
3.44	-0.7	-3.98	-12.67	-0.789	3.33
5.65	-7.78	-4.57	-17.24	3.32	6.69
2.98	-8.19	-1.49	-18.73	2.58	7.23
7.5	-26.17	-3.05	-21.72	6.85	16.8

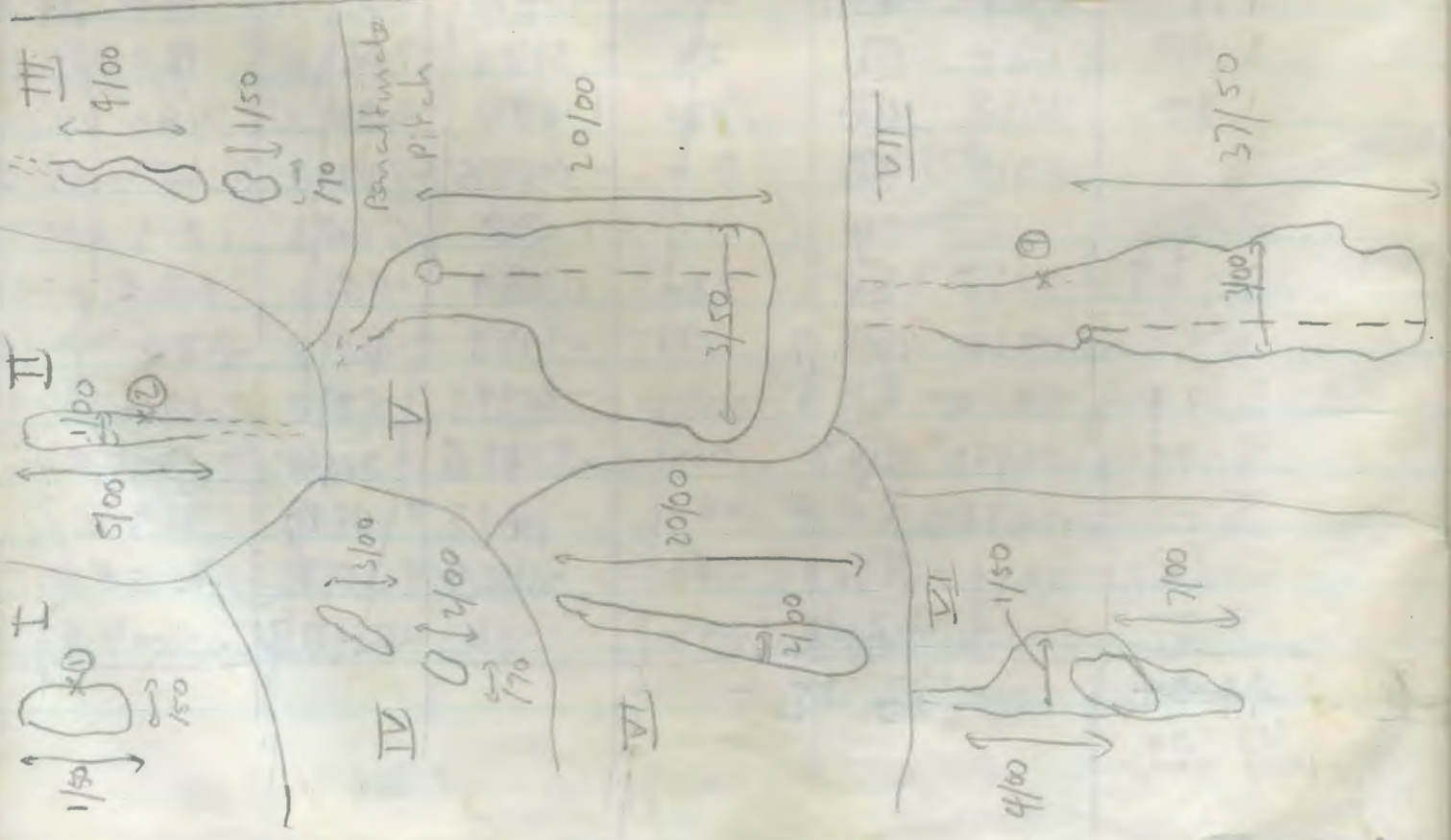
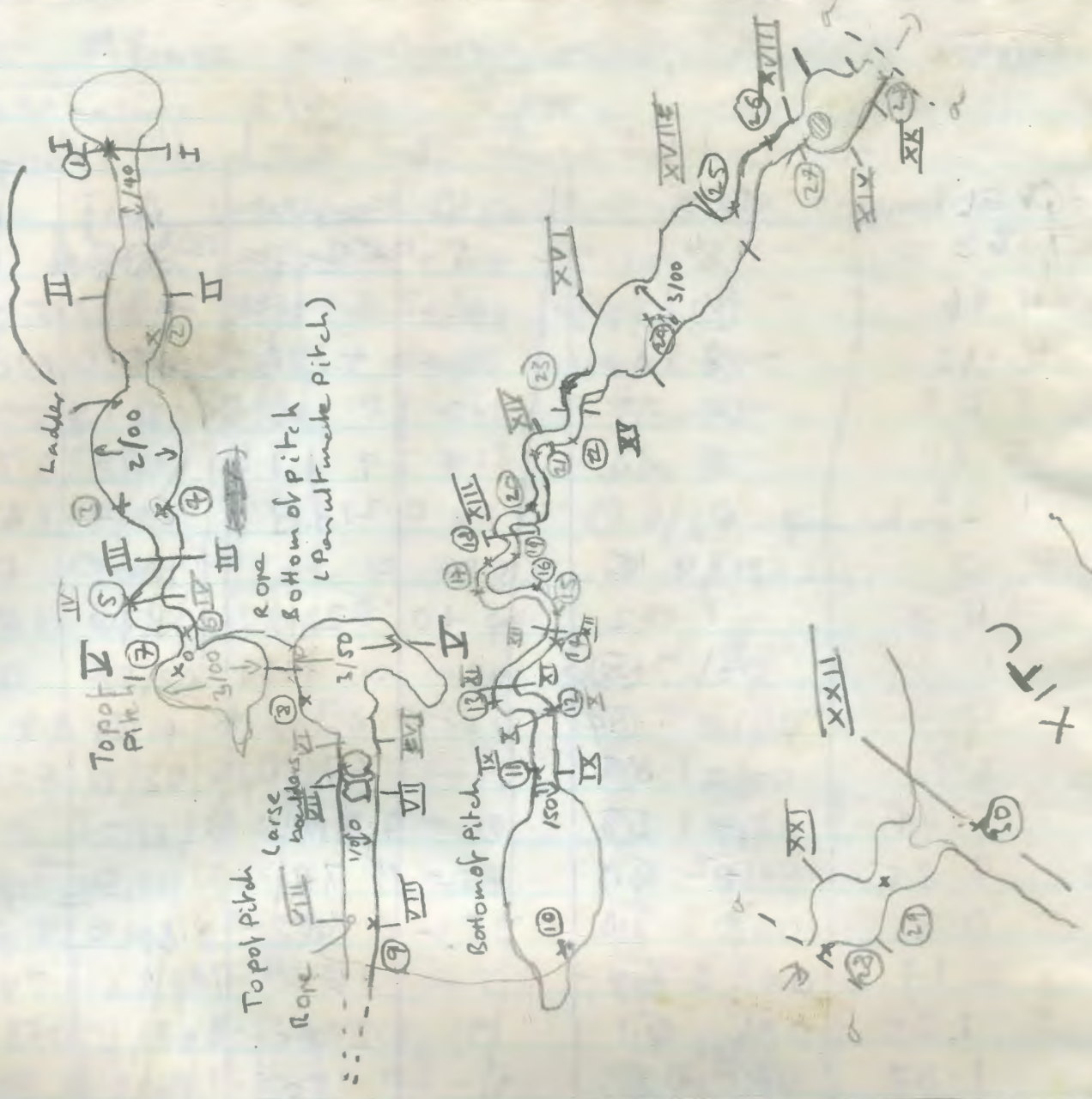
~~44.25~~
111.49

-133.125

(22)

Plan

win 2000 ft.





See Next Page for continuation.



B34

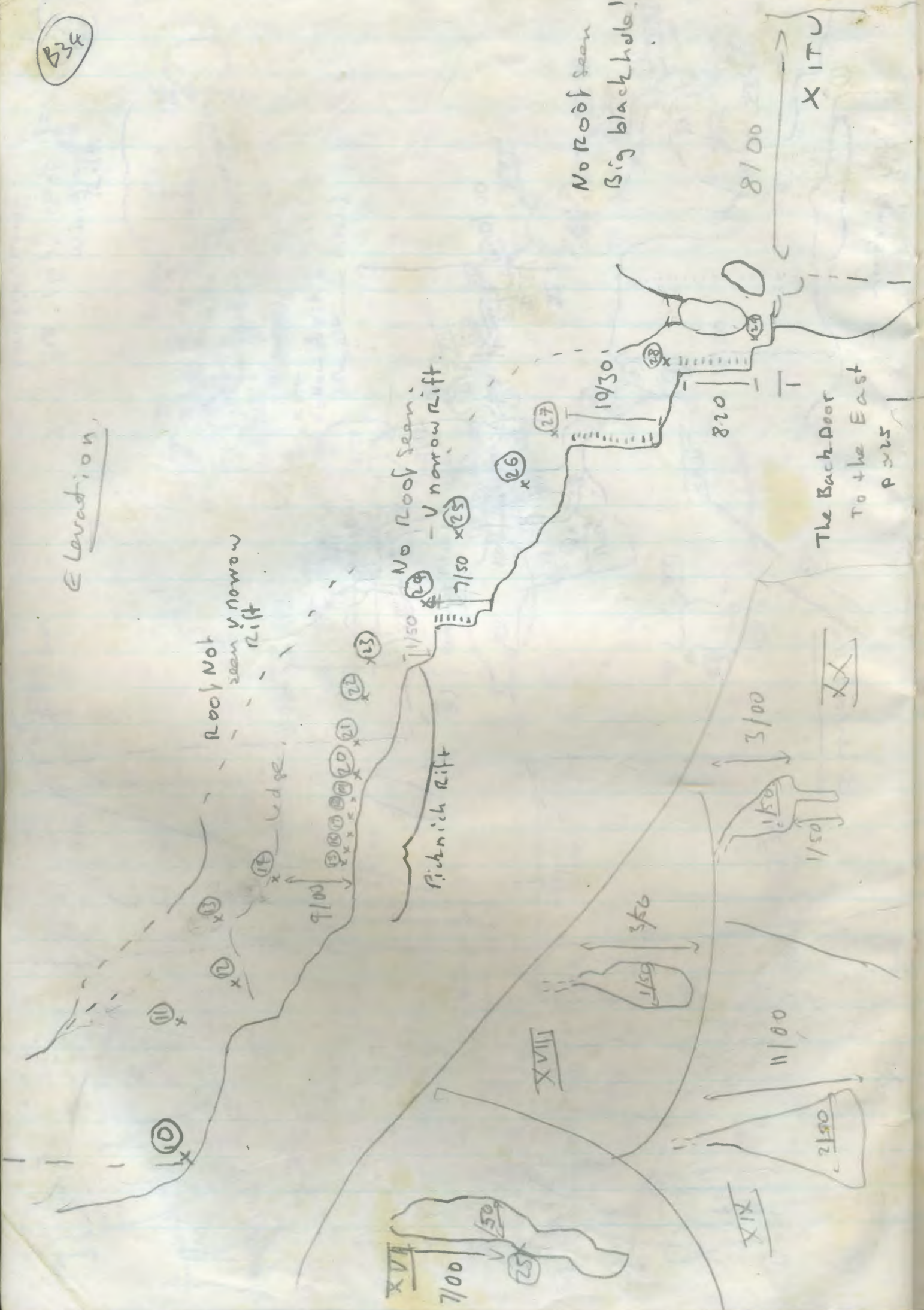
Elevation

Roof Not seen
- narrow Rift

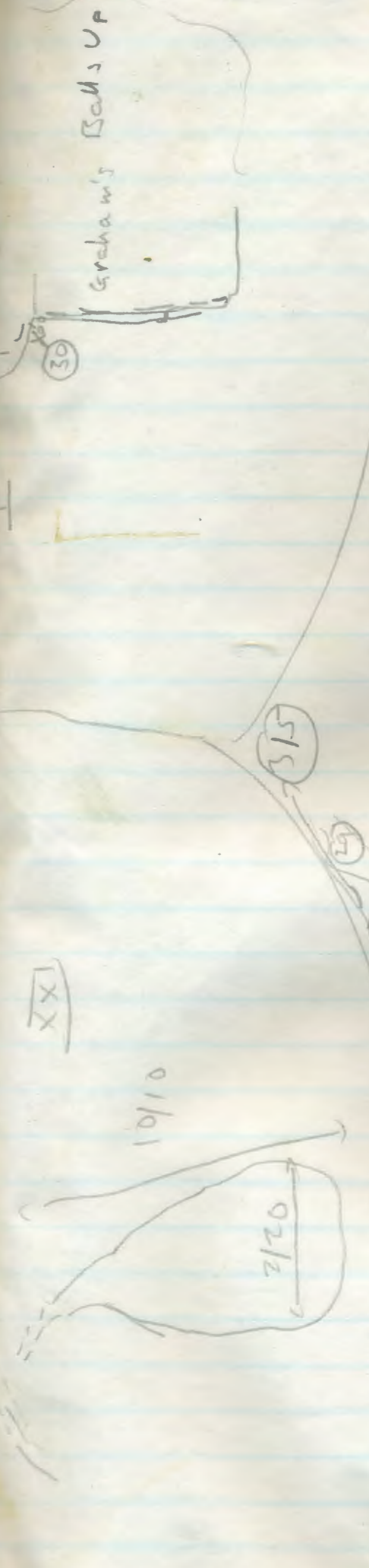
No Roof seen
- V narrow Rift

No Roof seen
Big black hole!

The Back Door
To the East
P 215



Graham's Balls Up



XXI

10/10

2/20

XXII

XIV

Choss +
boulders

Graham's Balls Up

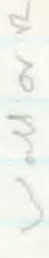
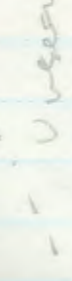
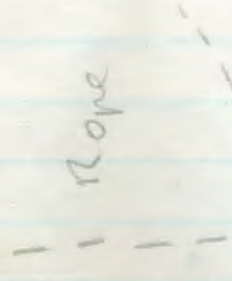
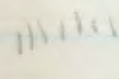
30

Ladder

Rope

Useless

Wall or Root



30

315

35