

Filling in and calculation of universal field book

Surveyor:		Sketch of the position:				
Date:						
Visibility:						
Station No.	Direction to point No.	Horizontal directions				
		1 st set	Aver. Red.	2 nd set	Aver. Red.	(6) - (8) / 2
01	02	I				
		II				
		I				
		II				
		I				
		II				
		I				
		II				
		I				
		II				
		I				
		II				

Surveyor: _____

Date: _____

Visibility: _____

Sketch of the position: _____

Station		Direction to point No.	Horizontal directions					
No.			1 st set	Aver. Red.	2 nd set	Aver. Red.	{(6) + (8)} / 2	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		I						
		II						
		I						
		II						
		I						
		II						
		I						
		II						
		I						
		II						
		I						
		II						
I								
II								

Theodolite: _____

Recorded by: _____

Calculated by: _____

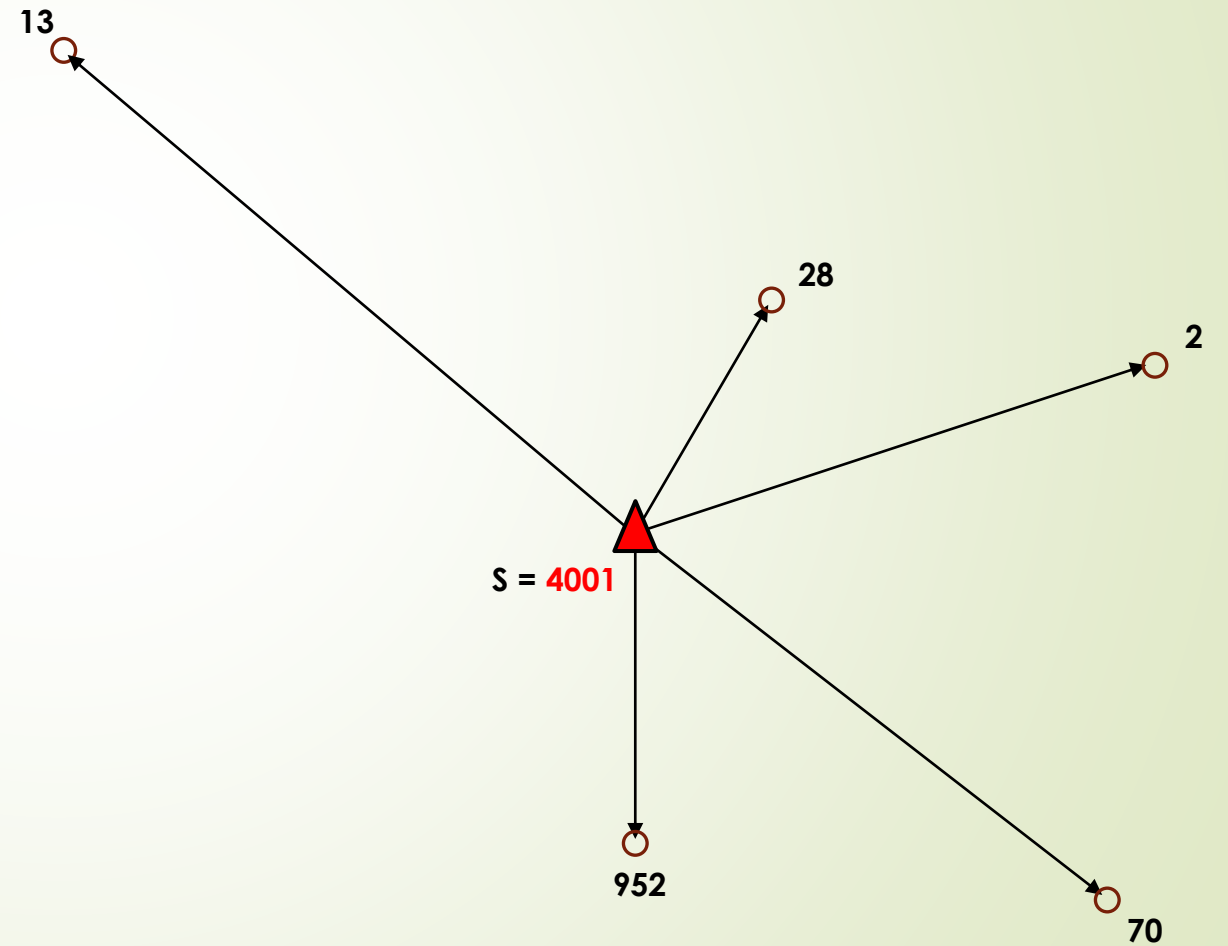
Checked by: _____

Zenith angles z				Distances				
		Reading	z	Measurement			Aver.	
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	I			horiz.				
	II			slope.				
	Σ			vertic.				
	I			horiz.				
	II			slope.				
	Σ			vertic.				
	I			horiz.				
	II			slope.				
	Σ			vertic.				
	I			horiz.				
	II			slope.				
	Σ			vertic.				
	I			horiz.				
	II			slope.				
	Σ			vertic.				
	I			horiz.				
	II			slope.				
	Σ			vertic.				
	I			horiz.				
	II			slope.				
	Σ			vertic.				
	I			horiz.				
	II			slope.				
	Σ			vertic.				

Surveyor:			Sketch of the position:					
Date:								
Visibility:								
Station		Direction to point No.	Horizontal directions					
No.				1 st set	Aver. Red.	2 nd set	Aver. Red.	$\{(6) + (8)\} / 2$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			I					
			II					
			I					
			II					
			I					
			II					
			I					
			II					
			I					
			II					
			I					
			II					
			I					
			II					
			I					
			II					

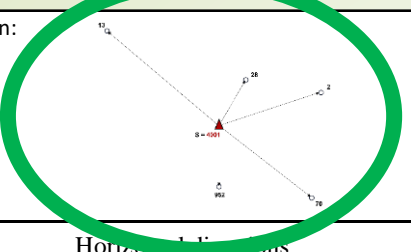
The left part

- for filling in of horizontal directions in sets
- Example situation:



Surveyor: P. Adams,
J. Smith, J. Blue
Date: 20. 10. 2022
Visibility:
cloudy, windy

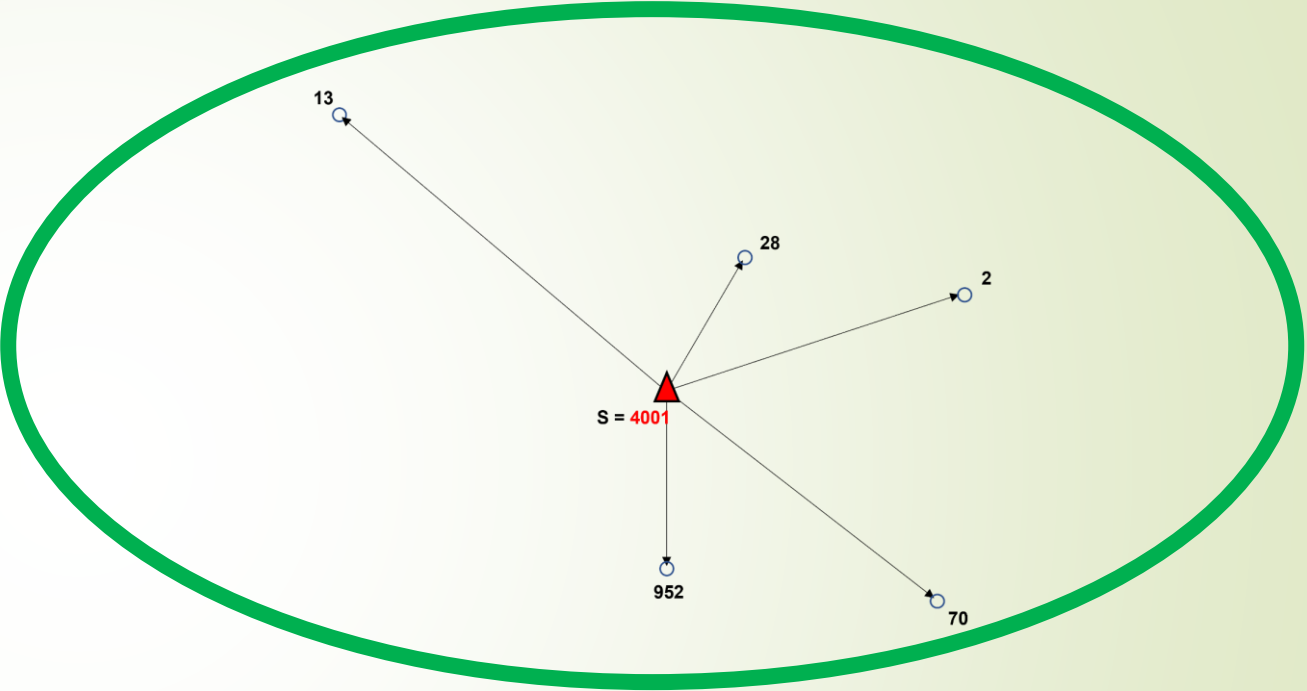
Sketch of the position:



Station		Horizontal						
No.	Direction to point No.	1 st set	Aver. Red.	2 nd set	Aver. Red.	{(6) + (8)} / 2		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			I					
			II					
			I					
			II					
			I					
			II					
			I					
			II					
			I					
			II					
			I					
			II					
			I					
			II					
			I					
			II					

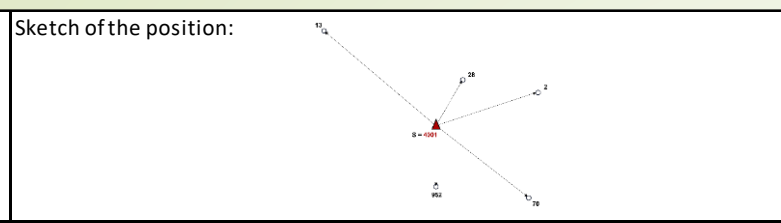
The left part

➤ Example situation:



- Surveyor: names of the surveying group members
- Date: measurement date
- Visibility: Atmospheric condition during measurement

Surveyor: P. Adams,
 J. Smith, J. Blue
Date: 20. 10. 2022
Visibility:
 cloudy, windy

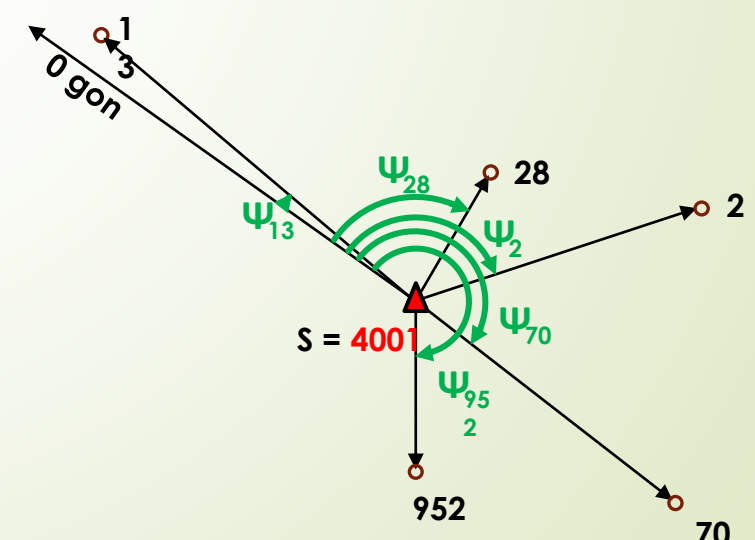


Station		Horizontal directions							
No.	Direction to point No.		1 st set	Aver. Red.	2 nd set	Aver. Red.	{(6) + (8)} / 2		
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
4001	13	I	0 05 26	↓					
		II							
	28	I	95 32 41						
		II							
	2	I	122 02 21						
		II							
	70	I	199 99 93						
		II							
	952	I	251 51 12						
		II							
	13	I	0 05 10						
		II							
			I						
			II						
		I							
		II							

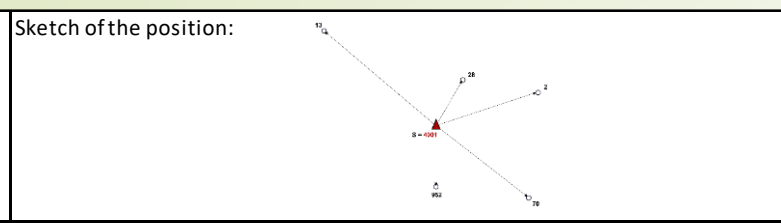
The left part

- Set of directions preparing
 - Station number = 4001
 - Point numbers in the set of directions + repeated pointing at the first point (13, 28, 2, 70, 952, 13)

- Progressive measuring of directions set in the face left position of the telescope :
 - setting of zero reading at the first point (slightly greater than zero)
 - Measuring of horizontal direction (ψ) in clockwise direction
- Order: 13, 28, 2, 70, 952, 13
- | | |
|-----|----------|
| (4) | (5) |
| I | 24 01 15 |
| II | |
- filling: gons | centigons | centicentigons = 24,0115 gon



Surveyor: P. Adams,
 J. Smith, J. Blue
Date: 20. 10. 2022
Visibility:
 cloudy, windy



Station		Horizontal directions							
No.	Direction to point No.	1 st set	Aver. Red.	2 nd set	Aver. Red.	{(6) + (8)} / 2			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
4001	13	I	0	05	26				
		II	200	05	48				
	28	I	95	32	41				
		II	295	32	76				
	2	I	122	02	21				
		II	322	02	40				
	70	I	199	99	93				
		II	0	00	17				
	952	I	251	51	12				
		II	51	50	84				
	13	I	0	05	10				
		II	200	04	99				
		I							
		II							
	I								
	II								
	I								
	II								

The left part

➤ Check 1
 ➤ Measured value at the first point should be similar (within the limits of accuracy).

➤ Progressive measuring of directions set in the face right position of the telescope:
 ➤ Measuring of horizontal direction(ψ) in **clockwise direction**
 Order: 13, 952, 70, 2, 28, **13**
 ➤ filling: **gons** | centigons | centicentigons

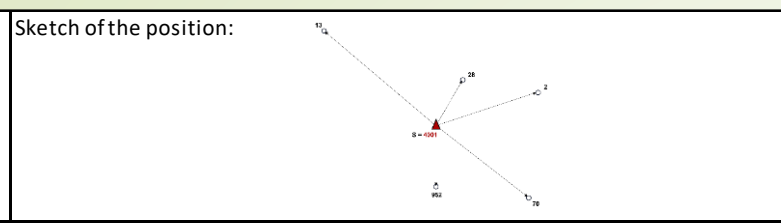
(4)	(5)
I	24 01 15
II	224 01 22

= 224,0122 gon

➤ Field book is filled in **bottom up**
 ➤ Measured value in face right position should be **shift about 200 gons** besides face left position (within the limits of accuracy – systematic and random errors)

➤ Check 2
 ➤ Measured values at the first point should be similar (within the limits of accuracy).

Surveyor: P. Adams,
 J. Smith, J. Blue
Date: 20. 10. 2022
Visibility:
 cloudy, windy



Station		Horizontal directions							
No.		Direction to point No.		1 st set	Aver. Red.	2 nd set	Aver. Red.	{(6) + (8)} / 2	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
4001	13	I	0	05	26				
		II	200	05	48				
	28	I	95	32	41				
		II	295	32	76				
	2	I	122	02	21				
		II	322	02	40				
	70	I	199	99	93				
		II	0	00	17				
	952	I	251	51	12				
		II	51	50	84				
	13	I	0	05	10				
		II	200	04	99				
			I						
			II						
			I						
			II						
		I							
		II							

The left part

➤ Filling of the first set of directions (face left and face right position)

➤ If it was measured in two sets, then a filling would be made here. Filling and measurement are similar only reading is shifted.

Within this example measurement in one set of directions is solved

Filling in and calculation of universal field book

The Right part –
zenith angles and
distances

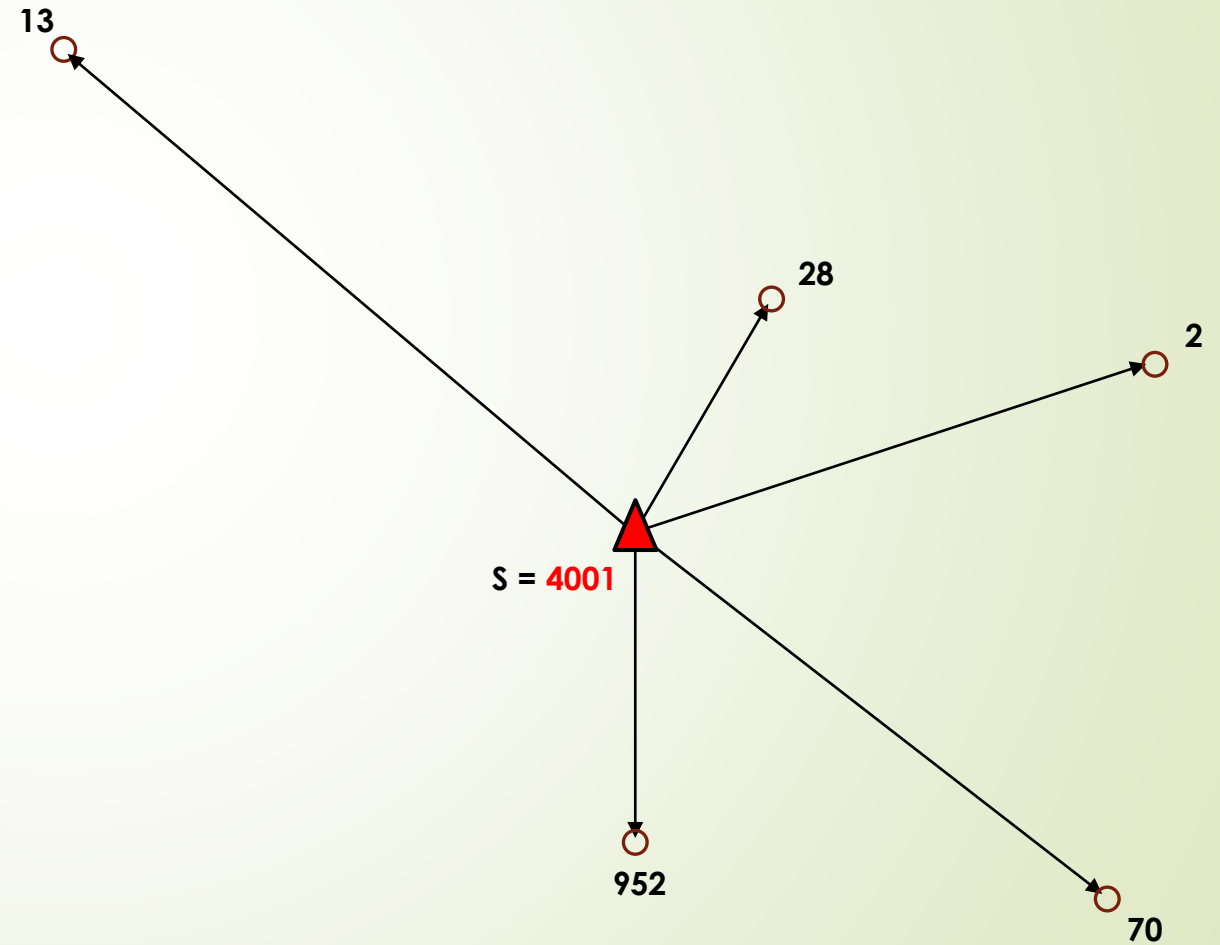
Filling in and check in terrain

Theodolite:					Recorded by:				
					Calculated by:				
					Checked by:				
Zenith angles z					Distances				
		Reading	z		Measurement			Aver.	
(10)	(11)	(12)	(13)		(14)	(15)	(16)	(17)	(18)
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				

Theodolite:					Recorded by:				
					Calculated by:				
					Checked by:				
Zenith angles z					Distances				
		Reading		z	Measurement			Aver.	
(10)	(11)	(12)		(13)	(14)	(15)	(16)	(17)	(18)
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				

The right part

- For filling of zenith angles and distances
- Filling usually takes place **together with filling of horizontal directions**
- Example situation:



Theodolite:
 Trimble M3
 S.N.: 11223366

Recorded by: P. Adams
Calculated by: J. Smith
Checked by: J. Blue

The right part

➤ **Theodolite:** instrument name, serial number

➤ **Recorded by, Calculated by, Checked by:** fill in the names of the group members who did it

➤ Progressive filling of measured values in the face left position:

➤ **Order is the same as for horizontal directions** (13, 28, 2, 70, 952)

➤ Measuring and filling of zenith angles (**z**)

- filling: **gons** | **centigons** | **centicentigons**

= 101,2310 gon

		Reading		z	
(10)	(11)	(12)		(13)	
	I	101	23	10	
	II				
	Σ				

➤ Measuring and filling of slope distances (**sd**)

Measurement				Aver.
(14)	(15)	(16)	(17)	(18)
horiz.				
slope.	101,256			
vertic.				

= 101,256 m

Zenith angles z				Distances					
		Reading		z	Measurement			Aver.	
(10)	(11)	(12)		(13)	(14)	(15)	(16)	(17)	(18)
	I	101	23	10	horiz.				
	II				slope.	101,256			
	Σ				vertic.				
	I	81	54	19	horiz.				
	II				slope.	30,581			
	Σ				vertic.				
	I	119	17	97	horiz.				
	II				slope.	60,118			
	Σ				vertic.				
	I	93	61	20	horiz.				
	II				slope.	65,857			
	Σ				vertic.				
	I	73	89	12	horiz.				
	II				slope.	27,683			
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				
	I				horiz.				
	II				slope.				
	Σ				vertic.				

Theodolite:
 Trimble M3
 S.N.: 11223366

Recorded by:
 P. Adams

Calculated by:
 J. Smith

Checked by:
 J. Blue

The right part

➤ Progressive filling of the measured values in the face right position:

➤ **Order is the same as for horizontal directions** (952, 70, 2, 28, 13)

➤ Measuring and filling of zenith angles (z)

➤ filling: **gons** | centigons | centicentigons

		Reading			z		
(10)	(11)	(12)			(13)		
	I	101	23	10			
	II	298	77	23			
	Σ						

= 298,7723 gon

➤ Measuring and filling of slope distances (sd)

Measurement				Aver.
(14)	(15)	(16)	(17)	(18)
horiz.				
slope.	101,256	101,253		
vertic.				

= 101,253 m

Zenith angles z					Distances					
		Reading			z	Measurement			Aver.	
(10)	(11)	(12)			(13)	(14)	(15)	(16)	(17)	(18)
	I	101	23	10		horiz.				
	II	298	77	23		slope.	101,256	101,253		
	Σ					vertic.				
	I	81	54	19		horiz.				
	II	318	45	72		slope.	30,581	30,585		
	Σ					vertic.				
	I	119	17	97		horiz.				
	II	280	82	03		slope.	60,118	60,120		
	Σ					vertic.				
	I	93	61	20		horiz.				
	II	306	40	26		slope.	65,857	65,857		
	Σ					vertic.				
	I	73	89	12		horiz.				
	II	326	10	57		slope.	27,683	27,681		
	Σ					vertic.				
	I					horiz.				
	II					slope.				
	Σ					vertic.				
	I					horiz.				
	II					slope.				
	Σ					vertic.				
	I					horiz.				
	II					slope.				
	Σ					vertic.				

Filling in and calculation of universal field book

The left part – horizontal direction

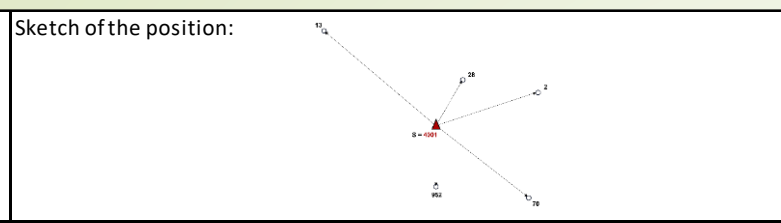
Calculation

Station		Direction to point No.	Horizontal directions									
No.			1 st set			Aver. Red.	2 nd set		Aver. Red.	{(6) + (8)} / 2		
(1)	(2)	(3)	(4)	(5)			(6)	(7)		(8)	(9)	
4001	13	I	0	05	26							
		II	200	05	48							
	28	I	95	32	41							
		II	295	32	76							
	2	I	122	02	21							
		II	322	02	40							
	70	I	199	99	93							
		II	0	00	17							
	952	I	251	51	12							
		II	51	50	84							
	13	I	0	05	10							
		II	200	04	99							
		I										
		II										
		I										
		II										
	I											
	II											

Surveyor: P. Adams,
J. Smith, J. Blue
Date: 20. 10. 2022
Visibility:
cloudy, windy

Sketch of the position:

Surveyor: P. Adams,
 J. Smith, J. Blue
Date: 20. 10. 2022
Visibility:
 cloudy, windy



Station		Direction to point No.	Horizontal directions								
No.			1 st set		Aver. Red.	2 nd set		Aver. Red.	{(6) + (8)} / 2		
(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)	(9)		
4001		13	I	0	05	26	05	37			
			II	200	05	48					
		28	I	95	32	41	32	59			
			II	295	32	76					
		2	I	122	02	21	02	31			
			II	322	02	40					
		70	I	199	99	93	00	05			
			II	0	00	17					
		952	I	251	51	12	50	98			
			II	51	50	84					
		13	I	0	05	10	05	05			
			II	200	04	99					
					I						
					II						
			I								
			II								
			I								
			II								

The left part

➤ Calculation of average between the face left and right $\bar{\psi}$

➤ The resulting average is free of the effect of incline and collimation errors.

$$\bar{\psi} = \frac{\psi_I + (\psi_{II} - 200 \text{ gon})}{2}$$

➤ Generally only centigons and centicentigons are filled in.

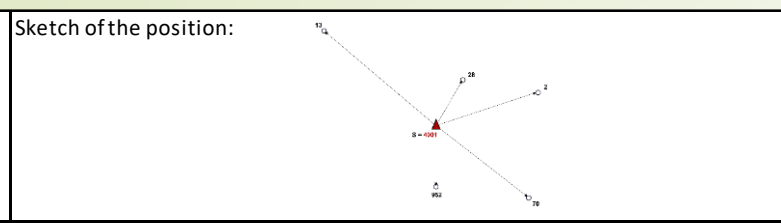
	1 st set			Aver. Red.	
(4)	(5)		(6)		
I	95	32	41	32	59
II	295	32	76		

$(95,3241 + (295,3276))/2 = 95,3259 \text{ gon}$

filling: centigons | centicentigons

➤ If the gon value also changes due to the average, it will be marked in red at the first position.

Surveyor: P. Adams,
 J. Smith, J. Blue
Date: 20. 10. 2022
Visibility:
 cloudy, windy



Station		Direction to point No.	Horizontal directions							
No.			1 st set		Aver. Red.	2 nd set		Aver. Red.	{(6) + (8)} / 2	
(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)	(9)	
4001	13	I	0	05	26	05	37			
		II	200	05	48	00	00			
	28	I	95	32	41	32	59			
		II	295	32	76	27	22			
	2	I	121	122	02	21	02	31		
		II	322	02	40	96	94			
	70	I	199	99	93	00	05			
		II	0	00	17	94	68			
	952	I	251	51	12	50	98			
		II	51	50	84	45	61			
	13	I	399	0	05	10	05	05		
		II	200	04	99	99	68			
			I							
			II							
		I								
		II								
		I								
		II								

The left part

➤ Calculation of reduced directions $\bar{\Psi}$

- Reduction of directions means numerical rotation of measured set of directions so that the zero of the horizontal circle is pointed to the first point of the set of directions.

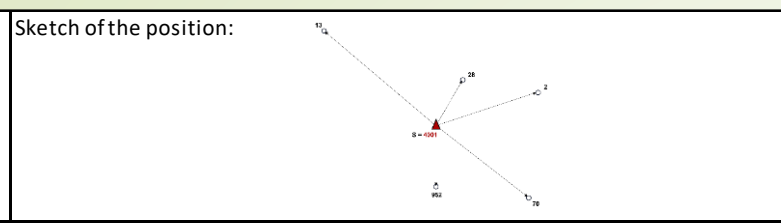
$$\bar{\Psi}_i = \Psi_i - \Psi_1$$
- Only centigons and centicentigons are usually filled in.

	1 st set			Aver. Red.	
(4)	(5)	(6)	(6)	(6)	(6)
I	0	05	26	05	37
II	200	05	48	00	00
I	95	32	41	32	59
II	295	32	76	27	22

Filling: **centigons** | **centicentigons**
 $\bar{\Psi}_1 = 0,0537 - 0,0537 = \mathbf{0,0000 \text{ gon}}$
 $\bar{\Psi}_2 = 95,3259 - 0,0537 = \mathbf{95,2722 \text{ gon}}$

➤ If the gon value also changes due to the reduction, it is marked in red at the face left position.

Surveyor: P. Adams, J. Smith, J. Blue
Date: 20. 10. 2022
Visibility: cloudy, windy



Station		Horizontal directions									
No.	Direction to point No.	1 st set		Aver. Red.	2 nd set		Aver. Red.	{(6) + (8)} / 2			
(1)	(2)	(3)	(4)		(5)	(6)	(7)		(8)	(9)	
4001	13	I	0	05	26	05	37				
		II	200	05	48	00	00				0 00 00
	28	I	95	32	41	32	59				
		II	295	32	76	27	22				95 27 22
	2	I	121	02	21	02	31				
		II	322	02	40	96	94				121 96 94
	70	I	199	99	93	00	05				
		II	0	00	17	94	68				199 94 68
	952	I	251	51	12	50	98				
		II	51	50	84	45	61				251 45 61
	13	I	399	05	10	05	05				
		II	200	04	99	99	68				399 99 68
		I									
		II									
	I										
	II										
	I										
	II										

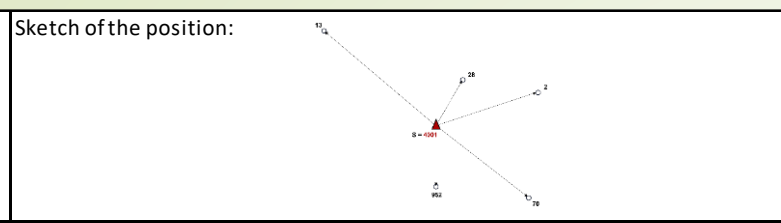
The left part

- Filling of resulting directions
 - Average form sets.
 - If only one set is measured, then the resulting value is filled in.

Filling: **gons** | **centigons** | **centicentigons**

	1 st set		Aver. Red.	2 nd set		Aver. Red.	{(6) + (8)} / 2
(4)	(5)		(6)	(7)		(8)	(9)
I	95	32 41	32 59				
II	295	32 76	27 22				95 27 22

Surveyor: P. Adams,
 J. Smith, J. Blue
Date: 20. 10. 2022
Visibility:
 cloudy, windy



The left part

Station		Horizontal directions											
No.		Direction to point No.	1 st set		Aver. Red.	2 nd set		Aver. Red.	{(6) + (8)} / 2				
(1)	(2)	(3)	(4)	(5)		(6)		(7)		(8)	(9)		
4001		13	I	0	05	26	05	37					
			II	200	05	48	00	00				0	00
		28	I	95	32	41	32	59					
			II	295	32	76	27	22				95	27
		2	I	121	02	21	02	31					
			II	322	02	40	96	94				121	96
		70	I	199	99	93	00	05					
			II	0	00	17	94	68				199	94
		952	I	251	51	12	50	98					
			II	51	50	84	45	61				251	45
		13	I	399	0	05	10	05	05				
			II	200	04	99	99	68				399	99
			I										
			II										
	I												
	II												
	I												
	II												

- Adjustment
 - Highlighting of important values :
 - Number of points
 - Reduced directions
 - Resulting directions

➤ Finish

Filling in and calculation of universal field book

The right part –
zenith angles and
distances

Calculation

Theodolite:						Recorded by:					
Trimble M3 S.N.: 11223366						P. Adams					
						Calculated by:					
						J. Smith					
						Checked by:					
						J. Blue					
Zenith angles z						Distances					
		Reading			z		Measurement				Aver.
(10)	(11)	(12)			(13)		(14)	(15)	(16)	(17)	(18)
	I	101	23	10			horiz.				
	II	298	77	23			slope.	101,256	101,253		
	Σ	400	00	66			vertic.				
	I	81	54	19			horiz.				
	II	318	45	72			slope.	30,581	30,585		
	Σ	399	99	91			vertic.				
	I	119	17	97			horiz.				
	II	280	82	03			slope.	60,118	60,120		
	Σ	400	00	00			vertic.				
	I	93	61	20			horiz.				
	II	306	40	26			slope.	65,857	65,857		
	Σ	400	01	46			vertic.				
	I	73	89	12			horiz.				
	II	326	10	57			slope.	27,683	27,681		
	Σ	399	99	69			vertic.				
	I						horiz.				
	II						slope.				
	Σ						vertic.				
	I						horiz.				
	II						slope.				
	Σ						vertic.				
	I						horiz.				
	II						slope.				
	Σ						vertic.				
	I						horiz.				
	II						slope.				
	Σ						vertic.				

Theodolite:
 Trimble M3
 S.N.: 11223366

Recorded by:
 P. Adams

Calculated by:
 J. Smith

Checked by:
 J. Blue

The rightpart

- Calculation of the sum of zenith angles:
 - Sum of zenith angles should be 400 gon (within the limits of accuracy)

$$\Sigma_i = z_I + z_{II} \approx 400 \text{ gon}$$

- Filling: **gons** | **centigons** | **centicentigons**

		Reading			z		
(10)	(11)	(12)			(13)		
	I	101	23	43			
	II	298	77	23			
	Σ	400	00	66			

= 400,0066 gon

- Checking of distances

- Distances in both positions of the telescope should be the same within the limits of accuracy (mm up to cm)

Zenith angles z				Distances						
		Reading			z	Measurement			Aver.	
(10)	(11)	(12)			(13)	(14)	(15)	(16)	(17)	(18)
	I	101	23	10		horiz.				
	II	298	77	23		slope.	101,256	101,253		
	Σ	400	00	66		vertic.				
	I	81	54	19		horiz.				
	II	318	45	72		slope.	30,581	30,585		
	Σ	399	99	91		vertic.				
	I	119	17	97		horiz.				
	II	280	82	03		slope.	60,118	60,120		
	Σ	400	00	00		vertic.				
	I	93	61	20		horiz.				
	II	306	40	26		slope.	65,857	65,857		
	Σ	400	01	46		vertic.				
	I	73	89	12		horiz.				
	II	326	10	57		slope.	27,683	27,681		
	Σ	399	99	69		vertic.				
	I					horiz.				
	II					slope.				
	Σ					vertic.				
	I					horiz.				
	II					slope.				
	Σ					vertic.				
	I					horiz.				
	II					slope.				
	Σ					vertic.				

Theodolite:				Recorded by:			
Trimble M3				P. Adams			
S.N.: 11223366				Calculated by:			
				J. Smith			
				Checked by:			
				J. Blue			

The right part

► Calculation of the index error

► Index error i is one of the axial errors of the theodolite, which occurs equally in both telescope positions and is almost systematically constant within the measurement.

► It is usually expressed in the form of a correction

$$i_i = \frac{400 - \Sigma_i}{2}$$

► Filling: **(centigons) | centicentigons**

		Reading			z		
(10)	(11)	(12)			(13)		
	I	101	23	43			
	II	298	77	23			
	Σ	400	00	66			- 33

$$i = - 0,0033 \text{ gon}$$

► Calculation of the resulting zenith angle

$$\bar{z}_i = z_{i,I} + i_i$$

► Filling: **gons | centigons | centicentigons**

		Reading			z		
(10)	(11)	(12)			(13)		
	I	101	23	43	101	23	10
	II	298	77	23			
	Σ	400	00	66			- 33

$$= 101,2310 \text{ gon}$$

Zenith angles z					Distances					
		Reading			z	Measurement			Aver.	
(10)	(11)	(12)			(13)	(14)	(15)	(16)	(17)	(18)
	I	101	23	43	101	23	10	horiz.		
	II	298	77	23				slope.	101,256	101,253
	Σ	400	00	66				vertic.		
	I	81	54	19	81	54	24	horiz.		
	II	318	45	72				slope.	30,581	30,585
	Σ	399	99	91				vertic.		
	I	119	17	97	119	17	97	horiz.		
	II	280	82	03				slope.	60,118	60,120
	Σ	400	00	00				vertic.		
	I	93	61	20	93	60	47	horiz.		
	II	306	40	26				slope.	65,857	65,857
	Σ	400	01	46				vertic.		
	I	73	89	12	73	89	28	horiz.		
	II	326	10	57				slope.	27,683	27,681
	Σ	399	99	69				vertic.		
	I							horiz.		
	II							slope.		
	Σ							vertic.		
	I							horiz.		
	II							slope.		
	Σ							vertic.		
	I							horiz.		
	II							slope.		
	Σ							vertic.		
	I							horiz.		
	II							slope.		
	Σ							vertic.		

Theodolite:								Recorded by:							
Trimble M3								P. Adams							
S.N.: 11223366								Calculated by:							
								J. Smith							
								Checked by:							
								J. Blue							

The right part

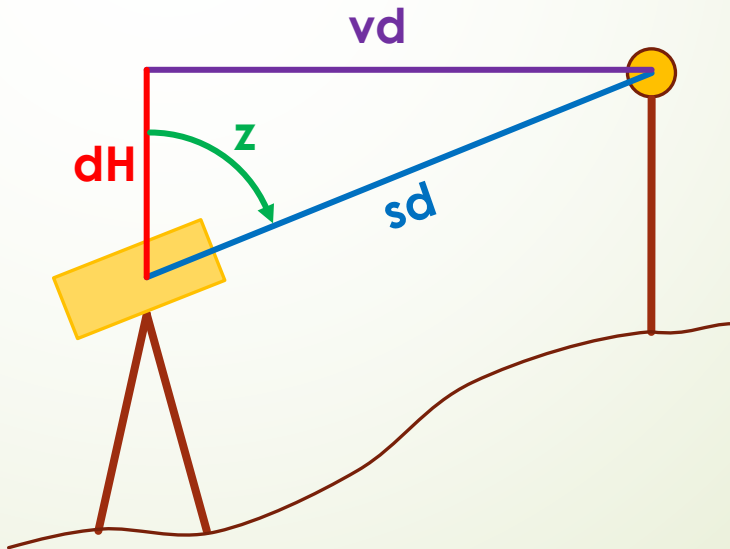
➤ Average of slope distances

$$\overline{sd}_i = \frac{sd_{i,I} + sd_{i,II}}{2}$$

Measurement				Aver.
(14)	(15)	(16)	(17)	(18)
horiz.				
slope.	101,256	101,253		101,254
vertic.				

= 101,254 m

➤ Calculation of horizontal distance (**vd**) and high difference (**dH**)



$$vd_i = \sin(\overline{z}_i) * \overline{sd}_i$$

$$dH_i = \cos(\overline{z}_i) * \overline{sd}_i$$

Zenith angles z								Distances							
		Reading			z			Measurement				Aver.			
(10)	(11)	(12)			(13)			(14)	(15)	(16)	(17)	(18)			
	I	101	23	10	101	23	10	horiz.				101.235			
	II	298	77	23				slope.	101,256	101,253		101.254			
	Σ	400	00	66			- 33	vertic.				-1.95778			
	I	81	54	19	81	54	24	horiz.				29.3066			
	II	318	45	72				slope.	30,581	30,585		30.583			
	Σ	399	99	91			5	vertic.				8.74326			
	I	119	17	97	119	17	97	horiz.				57.4112			
	II	280	82	03				slope.	60,118	60,120		60.119			
	Σ	400	00	00			0	vertic.				-17.8395			
	I	93	61	20	93	60	47	horiz.				65.525			
	II	306	40	26				slope.	65,857	65,857		65.857			
	Σ	400	01	46			- 73	vertic.				6.60468			
	I	73	89	12	73	89	28	horiz.				25.3867			
	II	326	10	57				slope.	27,683	27,681		27.682			
	Σ	399	99	69			16	vertic.				11.0366			
	I							horiz.							
	II							slope.							
	Σ							vertic.							
	I							horiz.							
	II							slope.							
	Σ							vertic.							
	I							horiz.							
	II							slope.							
	Σ							vertic.							

Theodolite:				Recorded by:			
Trimble M3				P. Adams			
S.N.: 11223366				Calculated by:			
				J. Smith			
Checked by:							
J. Blue							

The right part

- Adjustment
 - Highlighting of important values:
 - Sum of zenith angles
 - Resulting zenith angle
 - Index error (correction) - **red**
 - Average slope distance

➤ Finish

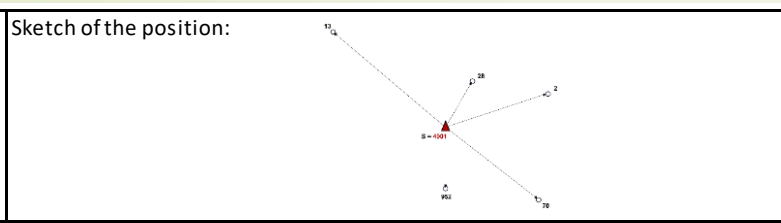
Zenith angles z							Distances					
		Reading			z			Measurement				Aver.
(10)	(11)	(12)			(13)			(14)	(15)	(16)	(17)	(18)
	I	101	23	10	101	23	10	horiz.				101.235
	II	298	77	23				slope.	101,256	101,253		101.254
	Σ	400	00	66			- 33	vertic.				-1.95778
	I	81	54	19	81	54	24	horiz.				29.3066
	II	318	45	72				slope.	30,581	30,585		30.583
	Σ	399	99	91			5	vertic.				8.74326
	I	119	17	97	119	17	97	horiz.				57.4112
	II	280	82	03				slope.	60,118	60,120		60.119
	Σ	400	00	00			0	vertic.				-17.8395
	I	93	61	20	93	60	47	horiz.				65.525
	II	306	40	26				slope.	65,857	65,857		65.857
	Σ	400	01	46			- 73	vertic.				6.60468
	I	73	89	12	73	89	28	horiz.				25.3867
	II	326	10	57				slope.	27,683	27,681		27.682
	Σ	399	99	69			16	vertic.				11.0366
	I							horiz.				
	II							slope.				
	Σ							vertic.				
	I							horiz.				
	II							slope.				
	Σ							vertic.				
	I							horiz.				
	II							slope.				
	Σ							vertic.				



The final field book

K154, Ing. T. Suk, 2022

Surveyor: P. Adams,
 J. Smith, J. Blue
Date: 20. 10. 2022
Visibility:
 cloudy, windy



Station		Direction to point No.	Horizontal directions								
No.			1 st set		Aver. Red.	2 nd set		Aver. Red.	{(6) + (8)} / 2		
(1)	(2)	(3)	(4)	(5)		(6)		(7)	(8)	(9)	
4001	13	I	0	05	26	05	37				
		II	200	05	48	00	00				0 00 00
	28	I	95	32	41	32	59				
		II	295	32	76	27	22				95 27 22
	2	I	121	02	21	02	31				
		II	322	02	40	96	94				121 96 94
	70	I	199	99	93	00	05				
		II	0	00	17	94	68				199 94 68
	952	I	251	51	12	50	98				
		II	51	50	84	45	61				251 45 61
	13	I	399	0	05	05	05				
		II	200	04	99	99	68				399 99 68
		I									
		II									
	I										
	II										
	I										
	II										

Theodolite:
 Trimble M3
 S.N.: 11223366

Recorded by:
 P. Adams

Calculated by:
 J. Smith

Checked by:
 J. Blue

Zenith angles z				Distances							
		Reading		z		Measurement			Aver.		
(10)	(11)	(12)		(13)		(14)	(15)	(16)	(17)	(18)	
	I	101	23	10	101	23	10	horiz.		101.235	
	II	298	77	23				slope.	101,256	101,253	101.254
	Σ	400	00	66				vertic.			-1.95778
	I	81	54	19	81	54	24	horiz.			29.3066
	II	318	45	72				slope.	30,581	30,585	30.583
	Σ	399	99	91				vertic.			8.74326
	I	119	17	97	119	17	97	horiz.			57.4112
	II	280	82	03				slope.	60,118	60,120	60.119
	Σ	400	00	00				vertic.			-17.8395
	I	93	61	20	93	60	47	horiz.			65.525
	II	306	40	26				slope.	65,857	65,857	65.857
	Σ	400	01	46				vertic.			6.60468
	I	73	89	12	73	89	28	horiz.			25.3867
	II	326	10	57				slope.	27,683	27,681	27.682
	Σ	399	99	69				vertic.			11.0366
	I							horiz.			
	II							slope.			
	Σ							vertic.			
	I							horiz.			
	II							slope.			
	Σ							vertic.			
	I							horiz.			
	II							slope.			
	Σ							vertic.			