PENTAX®

Electronic Total Station

R-300 SERIES

R-315(N)/R-325(N)/R-335(N)/R-322(N)/R-323(N)/R326

Special Functions

PSF Software Ver.365

PENTAX Industrial Instruments CO., Ltd.

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Document Ver.1.10: July 2004

Before using this product, be sure that you have thoroughly read and understood this instruction manual to ensure proper operation. After reading this manual, be sure to keep in a convenient place for easy reference.

Display and Keyboard

● The display and keyboard of the R-300 series are described below.
.
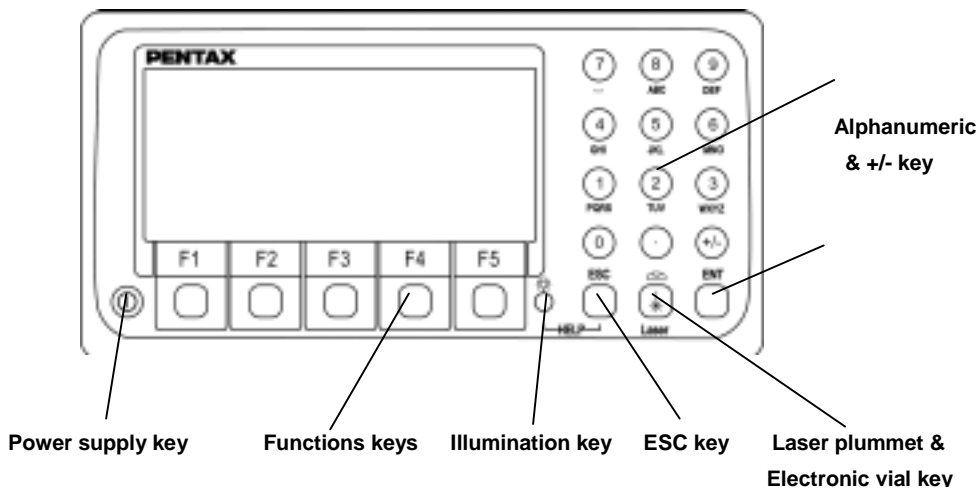
Operation Keys

Key	Description
POWER	ON/OFF of power supply
[ESC]	Returns to previous screen or cancels an operation.
Illumination	Turns the illumination of the LCD display and telescope reticle on and off.
[ENT]	Accepts the selected , hilighted, choice or the displayed screen value.
[Laser]	Displays the laser plummet *1, Electronic vial function, and the LD point screen when you push the laser plummet/electronic vial key. (Refer to "2-5 LD POINT", "3-2 Laser plummet", and "3-5 Leveling with Electronic vial"). *1:Only the product with the Laser plummet function
Alphanumeric	At the numerical value screen, the numerical value and the sign '.' displayed are input. The English characters printed right under numeric of each key are input.
[HELP]	Pressing [ILLU]+[ESC] key causes a help menu to appear in A MODE or B MODE or causes a help message to appear.

Function Keys

Display	F Key	Description
Mode A		
[MEAS]	F1	Pressing this key one-time measures the distance and measurement type can be selected by Initial Setting 2.
[MEAS]	F1	Pressing this key twice measures the distance and another measurement type can be selected by Initial Setting 2.
[TARGET]	F2	Select whether the target is SHEET/PRISM/REFRECTORLESS.)
[0 SET]	F3	Resets the horizontal angle to 0° 0' 0" by pressing twice.
[DISP]	F4	Toggles the display composition in the order "H.angle/H.dist./V.dist.", "H.angle/V.angle/S.dist.", and "H.angle/V.angle/H.dist./S.dist./V.dist".
[MODE]	F5	Toggles the screen between MODE A and MODE B.
Mode B		
[S.FUNC]	F1	PSF Special Functions
[ANG SET]	F2	Brings up the angle setting screen for setting angle-related parameters (ANGLE, %GRADE, H.ANGLE INPUT and R/L REVERSE).
[HOLD]	F3	Pressing this key twice retains (holds) the horizontal angle shown on the display.
[CORR]	F4	Brings up the screen for changing the Target constant, Temperature, Pressure setting
[MODE]	F5	Toggles the screen between MODE A and MODE B.
Other functions		
[ ]	F1	Moves the cursor to the left.
[ ]	F2	Moves the cursor to the right.
[ ]	F1	Goes back five Items on the screen
[ ]	F2	Goes forward five items on the screen.
RETICLE	F3	Changing the Reticle illumination when pressing Illumination key
[ ]	F3	Moves the cursor up
LCD	F4	Changing the LCD contrast when pressing Illumination key
[ ]	F4	Moves the cursor down
ILLU	F5	Changing the LCD illumination when pressing Illumination key
[CLEAR]	F5	Clears the figure
[SELECT]	F5	Opens the selection window

Alphanumeric Input

The point name is inputted by the Alphanumeric keys as following.

Key	Letter under Key	Letter & Figure sequential order to input
[0]		[@][.][_][-][:][/][0]
[1]	PQRS	[P][Q][R][S][p][q][r][s][1]
[2]	TUV	[T][U][V][t][u][v][2]
[3]	WXYZ	[W][X][Y][Z][w][x][y][z][3]
[4]	GHI	[G][H][I][g][h][i][4]
[5]	JKL	[J][K][L][j][k][l][5]
[6]	MNO	[M][N][O][m][n][o][6]
[7]		[ ][?][!][_][ ][^][|][&][7]
[8]	ABC	[A][B][C][a][b][c][8]
[9]	DEF	[D][E][F][d][e][f][9]
[.]		[.][,][:][;][#][(][)]
[+/-]		[+][-][*][/][%][=][<][>]

Memories in the Instrument

This instrument incorporates not only 8 measuring programs but also a MEMORY MANAGER program as special functions and so it can receive and record Coordinates data and surveying

data of maximum 7500 points.

Relations between memories and each Special function

Special Function	Memory	Data to be read	Data to be stored
DATA STORAGE	Yes	Job name	Job name, Station P.*1Measured P.*1
COORDINATES	Yes	Job name, Station P.*2 Backsight P.	Job name, Station P.*2 Backsight P., Measured P.*2
COORD. STAKEOUT	Yes	Job name, Station P.*2 Backsight P., Stakeout P.	Job name, Station P.*2 Backsight P., Stakeout P.
OFFSET SHOTS	Yes	Job name, Station P.*2 Backsight P.	Job name, Station P.*2 Backsight P., Target P.
RESECTION	Yes	Job name, Known P. A,B,C	Job name, Station P.*2 Known P. A,B,C
RDM	-----	-----	-----
REM	-----	-----	-----
DISTANCE STAKEOUT	-----	-----	-----
MEMORY MANAGER	Yes	(Yes)	(Yes)

Each data contents

Station P.*1	Station P. No. Description Instrument H. Target C. Temperature Pressure ppm Correction value
Station P.*2	P. No. Coordinate Description
Backsight P.	P. No. Coordinate Description
Stakeout P.	P. No. Coordinate Description
Target P.	P. No. Coordinate Description
Known P.	P. No. Coordinate Description
Measured P.*1	P. No. Prism H. H. Angle V. Angle S. Distance Description
Measured P.*2	P. No. Coordinate Description

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Copyright

Display and Keyboard

Memories in the Instrument

Relations between memories and each function

1   INTRODUCTION

1.1   INTRODUCTION

Thank you for your first looks at PSF by reading this manual. The PSF is a user friendly data collection and calculation program for the PENTAX total station R-300 series.
The PSF is developed based on the PCS-300 Special functions, which is known as versatile on-board software for PENTAX PCS-300 total station series. The optimum combination of PCS-300 and R-300 hardware makes PSF as an easy and useful fieldwork tool. The main menu offers you the following possibilities.

- COORD. STAKEOUT
- DISTANCE STAKEOUT
- RDM
- COORDINATES
- OFFSET SHOTS
- REM
- RESECTION
- DATA STORAGE
- MEMORY MANAGER

1.2   BEFORE USING THE R-300 PSF software MANUAL

- The PSF manual mainly describes the R-300 special functions, and the basic operations are described in the (basic) R-300 manual. And, therefore, refer to the R-300 basic manual regarding the R-300 general instrument operations.

- Before performing PSF functions, select the Target type, "Reflector Sheet" or "Prism" or "Reflectorless".

- General pictures of measurement:
    This illustrates the content of the program.

- Detailed Operating procedures:
  This describes the actual detailed operating procedures. Since detailing the Operating procedures of each program would cause unnecessary complexity, this manual shows detail for "Coordinate Stakeout Measurement" only, as an example.
  Descriptions of the other programs are simplified. The guide messages, however, of each step of the operation help you to proceed in a proper manner for the other programs. We are confident, therefore, that you will be able to use the other application programs once you're familiar with the operation of "Coordinate Stakeout Measurement" program.

- Press the keys, which are drawn by the index finger.

- For further information, please contact your local Pentax Authorized dealer.

2 ACCESSING THE SPECIAL FUNCTIONS

2-1 ACCESSING BY SPECIAL KEY

Example: COORD. STAKEOUT

1 Press the **[S.FUNC]** key at mode B. (Mode A must be changed to mode B by pressing the [MODE] key.)	**Pentax Special Function** 1.DATA STORAGE 2.COORDINARES 3.COORD.STAKEOUT 4.OFFSET SHOTS 5.RESECTION
2 Move the cursor to **3.COORD.STAKEOUT** by pressing [Δ], [∇] or [$\uparrow$], [$\downarrow$]key.	**Pentax Special Function** 1.DATA STORAGE 2.COORDINARES **3.COORD.STAKEOUT** 4.OFFSET SHOTS 5.RESECTION
3 **The COORD.STAKEOUT** can be accessed by pressing the [ENT] key.	**COORD.STAKEOUT** **1. JOB NAME** 2. STATION SET UP 3. STAKEOUT

Other Pentax Special Function are:

Pentax Special Function

5. RESECTION
6. RDM
7. REM
8. DIST STAKEOUT
9. MEMORYMANAGER

2-2 ACCESSING BY HELP KEY

Example: COORD. STAKEOUT

1 Press the **[ESC]** key while pressing the **[ILLU]** at mode A or B. The HELP menu is displayed.	HELP 1.HELP 2.401 TARGET CONST 3.402 ATM CORR : AUTO 4. 501 MEAS.MIN DISP: COARSE. 5. 502 SHOT COUNT SELECT
2 Move the cursor to **28. COORD.STAKEOUT** by pressing [Δ], [∇] or [$\uparrow$], [$\downarrow$] key.	HELP 28. 109 COORD. STAKEOUT 29. 112 REM 30. 113 RESECTION 31. 119 DATA STORAGE 32. 200 MEMORY MANAGER SELECT
3 The **COORD. STAKEOUT** can be accessed by pressing the **[SELECT]** at F5 key.	COORD.STAKEOUT 1. JOB NAME 2. STATION SET UP 3. STAKEOUT

2-3 ACCESSING BY 007

Example: COORD. STAKEOUT

1	
Press numeric keys of **0-0-7** to enter Command input screen on MODE A or B.	**007** H.angle 92° 35' 20" H.dst V.dst **000** **CLEAR**
2	
Press the numeric key **1- 0- 9** of COORD. STAKEOUT.	**007** H.angle 92° 35' 20" H.dst V.dst **109**
3	
Special function **COORD.STAKEOUT** can be accessed by pressing the **[ENT]** key.	**COORD.STAKEOUT** **1. JOB NAME** 2. STATION SET UP 3. STAKEOUT

The PSF Command No. list

Special Functions	**007 Command**
Distance Stakeout	101
RDM	103
Coordinates	104
Offset Shots	105
Coord. Stakeout	109
REM	112
Resection	113
Data Storage	119
MEMORY MANAGER	200

3   COORD. STAKEOUT

General pictures of measurement

With COORD. STAKEOUT measurement, "Stakeout point coordinates" can be staked out in 3 dimensions based on the known "Station point coordinates" and the "Backsight point coordinates or Backsight point azimuth". The horizontal angle, horizontal distance and vertical distance to the stakeout point are automatically calculated as design values, and the differences between the measured values and design values are displayed as deviations. When the coordinate values of the Station point, Backsight point and Stakeout point are recorded on the instrument memory, designation of each measured point number makes it possible to omit the each time coordinates value input.

General pictures
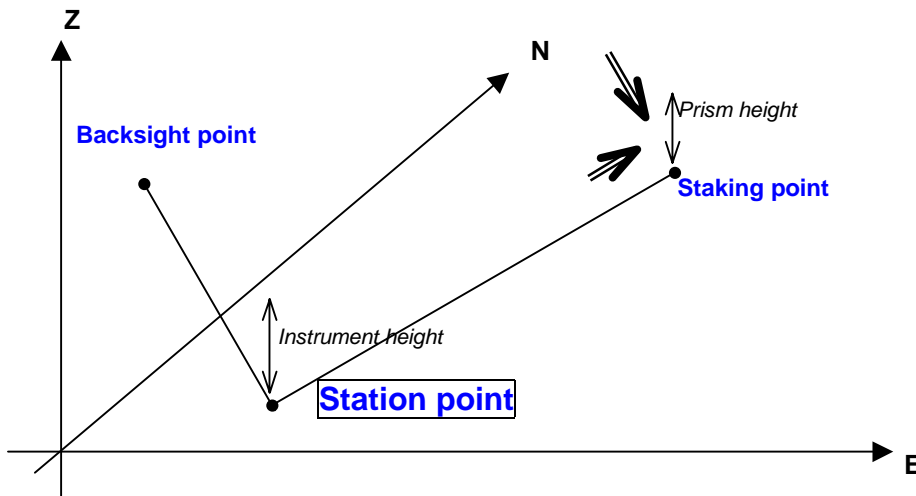
Design values and deviation
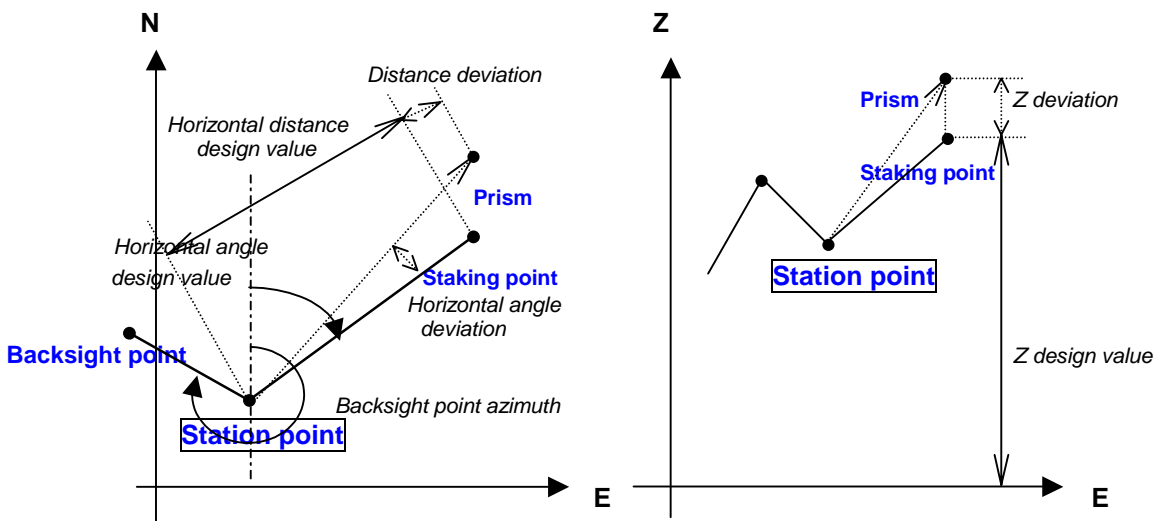
Detailed Operating procedures

Access the COORD. STAKEOUT according to the "1. ACCESSING THE SPECIAL FUNCTIONS".

1. JOB NAME

(1) JOB NAME input

<table>
<tr>
<td>1

Press the [ENT] key to view COORD. STAKEOUT screen.</td>
<td>
COORD.STAKEOUT

<u>1. JOB NAME</u>
2. STATION SET UP
3. STAKEOUT
</td>
</tr>
<tr>
<td>2   <u>For example, "XXXX" is inputted.</u>

Press the [ENT] key to view JOB NAME INPUT screen.

Press the [ENT] key to view JOB NAME screen.

Input the JOB NAME "XXXX" by pressing the Alphanumeric keys and arrow key.</td>
<td>
JOB NAME INPUT
1.

JOB NAME

XXXX

BS   CLEAR TO 123
</td>
</tr>
<tr>
<td>3
Press the [ENT] key to enter.</td>
<td>
STATION NUMBER LIST
1.   000   :
</td>
</tr>
</table>

● Maximum 15 letters can be inputted on the JOB NAME input.
● When the **same JOB NAME** is already stored, the stored one is displayed after pressing the [ENT] key at the Operating procedure 3.   **"The same job name is found"** is displayed.

(2) JOB NAME selection

<table>
<tr>
<td>

1

  Press the **[ENT]** key.

</td>
<td>

COORD. STAKEOUT

```
1. JOB NAME
2. STATION SET UP
3. STAKEOUT
```

</td>
</tr>
<tr>
<td>

2

For example, stored **"3.BBBB"** is selected.

Move the cursor to "**3. BBBB**" by pressing the [$\triangle$], [∇], [$\uparrow$], [$\downarrow$] keys and press the [ENT] key.

Press the **[ENT]** key to enter.

</td>
<td>

JOB NAME INPUT

```
1.            :
2. XXXX
3. BBBB
4. CCCC
5. DDDD
```


JOB NAME INPUT

```
1.            :
2.AAAA
3.BBBB
4. CCCC
5. DDDD
```


COORD. STAKEOUT

```
1. JOB NAME
2. STATION SET UP
3. STAKEOUT
```

</td>
</tr>
</table>

● The **JOB NAME selection** is possible only when some **NAME** are already stored.

2. STATION SETUP

(1) Station Coordinates

a. Station Coordinates input

1	**COORD.STAKEOUT**
Move the cursor to **2. STATION SETUP.**	1. JOB NAME 2. STATION SET UP 3. STAKEOUT
2 Press the [**ENT**] key to view the **STATION NUMBER LIST** screen.	**STATION NUMBER LIST** 1. 0000
3 Press the **[ENT]** key to view the **POINT NUMBER** screen. For example "**1234**" is inputted. Input the "**1234**" by pressing the numerical keys.	**POINT NUMBER** 1. 1234 CLEAR

4

Press the **[ENT]** key to view the **STATION COORDINATES INPUT** screen.

STATION COORDINATES INPUT

2.DESCRIPTION   :
3.X COORD.   : 000000.000m
4.Y COORD.   : 000000.000m
5.Z COORD.   : 000000.000m
6.INST. H   :   00.000m

STORE   SELECT

5

For example, X COORDINATE **"-123456.890"** is inputted as following.

Move the cursor to **3. X** and press the **[SELECT]** key at F5 to input the **X COORDINATE.**

STATION COORDINATES INPUT

2.DESCRIPTION   :
3.X COORD.   : 000000.000m
4.Y COORD.   : 000000.000m
5.Z COORD.   : 000000.000m
6.INST. H   :   00.000m

STORE   SELECT

6

Press the numerical key , **+/-** and point key and input the above figures.

Press the **[ENT]** key to go to **Y COORD.**

X COORD.

2.DESCRIPTION   :
3.X COORD.   : 000000.000m
4.Y COORD.   : 000000.000m
5.Z COORD.   : 000000.000m
6.INST. H   -123456.890 m

CLEAR

7

Input the **Y and Z COORDINATE** and INST. H and press the **[ENT]** key.

STATION COORDINATES INPUT

2.DESCRIPTION   :
3.X COORD.   : - 123456.890 m
4.Y COORD.   :   12345.789 m
5.Z COORD.   :   123.678 m
6.INST. H   :   00.000 m

STORE   SELECT

8

The **STATION COORDINATE** which is input:

For store -Press the [**STORE**] key.
Not for store-Press the **[ENT]** key.

STATION COORDINATES INPUT

2.DESCRIPTION   :
3.X COORD.   : - 123456.890 m
4.Y COORD.   :   12345.789 m
5.Z COORD.   :   123.678 m
6.INST. H   :   1.3000 m

STORE   SELECT

15

| The **BACKSIGHT SELECTION** screen is viewed. | BACKSIGHT SELECTION

1. COORDINATES INPUT
2.FORESIGHT COORD.(AZIMUTH)
                      INPUT |

- Articles marked by * are not changed.
- **DESCRIPTION** input: Press the **[SELECT]** key, and input letters or marks.
- Maximum 8 letters can be inputted at the "**DESCRIPTION**".

b. Search and call of the stored Station Coordinates

1 Move the cursor to **2 STATION SETUP**.	COORD STAKEOUT 1. JOB NAME **2. STATION SET UP** 3. STAKEOUT
2 Press the **[ENT]** key to view the **STATION NUMBER LIST** screen.	STATION NUMBER LIST **1. 0000** 2. 1234 3. 0564 4. 0678
3 Stored "**1234**" is searched for example. Move the cursor to "**2. 1234**" by pressing the [△], [▽], [↑], [↓] keys and press the **[ENT]** key to view the **INSTRUMENT HEIGHT INPUT** screen. Pre-stored data in the Coordinate memory is displayed.	STATION NUMBER LIST 1. 0000 **2. 1234** 3. 0564 4. 0678 INSTRUMENT HEIGHT INPUT 2.DESCRIPTION : * 3.X COORD. : * 113456.890 m 4.Y COORD. : * 22345.789 m 5.Z COORD. : * 323.678 m 6.INST. H : 1.5000 m SELECT

4	BACKSIGHT SELECTION
Confirm the called **STATION P. COORDINATES** and then press the **[ENT]** key. When the **INSTR. H.** change is needed, change the height value, and press the **[ENT]** key to view the **BACKSIGHT SELECTION** screen.	1. COORDINATES INPUT 2.FORESIGHT COORD.(AZIMUTH) INPUT

(2) Backsight Selection

a. Coordinates input

■ **The Backsight Point Number and Coordinates input**

1	BACKSIGHT SELECTION
	1. COORDINATES INPUT 2.FORESIGHT COORD.(AZIMUTH) INPUT

2	BACKSIGHT NUMBER LIST
Push the **[ENT]** key at "**1.COORDINATES INPUT".** **BACKSIGHT NUMBER LIST** screen is viewed.	1. 0000

3	POINT NUMBER
Press the **[ENT]** key to view the **POINT NUMBER** screen. Input the **Backsight point number** according to the STATION P.NUMBER input. Press the **[ENT]** key to view the **BACKSIGHT COORDONATES INPUT** screen.	1. 0025 CLEAR

4	**BACKSIGHT COORDONATES INPUT**
Input the **Backsight Coordinates** according to the COORDINATES input.	1. POINT No. * 0025 2.DESCRIPTION : 3.X COORD. : -xxxxx.xxx m 4.Y COORD. xxxxx.xxx m 5.Z COORD. : xxxxx.xxx m STORE SELECT
5	**BACKSIGHT AIMING**
Press the **[ENT]** key to view the **FORESIGHT NUMBER LIST** screen after aiming at the **Backsight Point**.	After aiming the Backsight Point, push the ENT.
6	**FORESIGHT NUMBER LIST**
	1. 0000 2. 1234 3. 0025

● Maximum 4 digits can be inputted on the **Backsight number input.**

■ **Search and Call of the stored Backsight Point Number**

1	**BACKSIGHT SELECTION**
Press the **[ENT]** key on **1 COORDINATES INPUT** to view the **BACKSIGHT NUMBER LIST** screen .	1. COORDINATES INPUT 2.FORESIGHT COORD.(AZIMUTH) INPUT
2	**BACKSIGHT NUMBER LIST**
Move the cursor to your desired **Backsight Point Number.**	1. 0000 2. 1234 3. 0025
3	**BACKSIGHT AIMING**
Confirm the **Backsight Point Coordinates** and press the [**ENT**] key. After aiming at the **Backsight Point**, push the [ENT] key to view the **FORESIGHT NUMBER LIST** screen.	After aiming the Back Sight Point, push the ENT

4	**FORESIGHT NUMBER LIST** 1. 0000 2. 1234 3. 0025

b. Azimuth angle input

1 Move the cursor to **2. FORESIGHT COORD. (AZIMUTH) INPUT** and press the **[ENT]** key, and go to the **Operating procedures 2 of 3. STAKEOUT**.	**BACKSIGHT SELECTION** 1. COORDINATES INPUT **2.FORESIGHT COORD.(AZIMUTH) INPUT** **FORESIGHT NUMBER LIST** 1. 0000 2. 1234 3. 0025

● The **Azimuth angle** input is performed at the Operating procedures **1) - 3) of BACKSIGHT SELECTION screen** in **3. STAKEOUT**.

3.   STAKEOUT

(1) Input and Stakeout of Foresight Point Number and Coordinates

1 Move the cursor to **3. STAKEOUT**.	**COORD. STAKEOUT** 1. JOB NAME 2. STATION SET UP **3. STAKEOUT**
2 Press the **[ENT]** key.	**FORESIGHT NUMBER LIST** 1. 0000 2. 1234 3. 0025

3

Input the **Foresight point number**.

4

Input the **Foresight point Coordinates**.

For store: : Press the **[STORE]**.
Not for store: Press the **[ENT]**.

```
FORESIGHT COORDINATES INPUT
 2.DESCRIPTION   :
 3.X COORD.      :   xxxxx.xxx m
 4.Y COORD.      :   xxxxx.xxx m
 5.Z COORD.      :    xxx.xxx m
 6.INST. H       :      x.xxx m

      STORE          SELECT
```

5

Press the **[ENT]** key to view the **ANGLE COMPARE screen**.

```
ANGLE COMPARE
 DESIGN      90°  00'  00"
 H.angle      0°  00'  00"
 DEVIATE   - 90°  00'  00"


   H.INPUT  0 SET  ANG/DIST
```

"BACKSIGHT SELECTION" screen explanation:

◆   Go to Input or Call of **BACKSIGHT NUMBER LIST** in case of **1. COORDINATES INPUT** selection of the **BACKSIGHT SELECTION** screen.

◆   Go to the **Operating procedures 2. FORESIGHT NUMBER LIST** of **3. STAKEOUT** in case of **2. FORESIGHT COORD. (AZIMUTH) INPUT** selection of the **BACKSIGHT SELECTION** screen.

```
BACKSIGHT SELECTION

 1. COORDINATES INPUT
 2.FORESIGHT COORD.(AZIMUTH) INPUT
```

---

1)

Aim at the **Backsight point** and input the **AZIMUTH angle** in case of **2. FORESIGHT COORD. (AZIMUTH) INPUT selection**.

Press the **[H. INPUT]** at F2 key.

```
H. ANG INPUT




                    000°  00'  00"
```

---

2)

For example, input the **225°   00'   00"** .

```
H. ANG INPUT
                    000°  00'  00"
```

---

3) Press the **[ENT]** key.	**ANGLE COMPARE** DESIGN 90° 00' 00" H.angle 0° 00' 00" DEVIATE - 90° 00' 00" H.INPUT 0 SET ANG/DIST
6 Rotate the instrument horizontally and stop it where the displayed **DEVIATE** becomes **0** and fix the horizontal rotation.	**ANGLE COMPARE** DESIGN 90° 00' 00" H.angle 90° 00' 00" DEV.IATE 00° 00' 00" H.INPUT 0 SET ANG/DIST
7 Press the **[ANG/DIST]** at F4 key.	**DIST. COMPARE** H.dst DESIGN 360.555 m Z coord.DESIGN 0.000 m H.dst DEVIAT Z coord.DEVIAT S.dst MEAS TRACK TARGET ANG/DST
8 Move the prism toward the aiming direction of a telescope, and press the **[TRACK]** at F2 key and aim at the prism.	**DIST. COMPARE** H.dst DESIGN 360.555 m Z coord. DESIGN 0.000 m H.dst DEVIAT -2.835 m Z coord. DEVIAT -0.242 m S.dst 378.452 m MEAS TRACK TARGET ANG/DIST
9 The DEVIATE value approaches to 0, and then press the [MEAS] at F1 key. Find a place where the DEVIATE value becomes **exactly 0**, and the place is the STAKEOUT POINT. The STAKEOUT of the first STAKEOUT POINT is completed.	**DIST. COMPARE** H.dst DESIGN 360.555 m Z coord. DESIGN 0.000 m H.dst DEVIAT 0.000 m Z coord. DEVIAT 0.000 m S.dst 378.452 m MEAS TRACK TARGET ANG/DST
10 Press the **[ENT]** key. The **Stakeout** of the second or third Stakeout point is performed in the same way.	**FORESIGHT NUMBER LIST** 1. 0000

<table>
<tr><td></td><td></td></tr>
</table>

● At the procedure 6, the 00" of the DEVIATE.value can be easily got if the minimum count is set to 1 ".
● At the procedure 8, a prism can be easily tracked if a position is searched using the [TRACK] function and then using the [MEAS] function.

(2) Search and Call of the stored Foresight Point Number

1	
Move the cursor to **3. STAKEOUT**	**COORD.STAKEOUT** 1. JOB NAME 2. STATION SET UP **3. STAKEOUT**
2	
Press the **[ENT]** key.	**FORESIGHT NUMBER LIST** 1. 0000 2. 1234 3. 0025
3	
Search for the **desired Foresight point number**.	
4	
Confirm the called **Foresight Coordinates** and press **[ENT]** key. If the prism height change is necessary, press the **[ENT]** key after the change.	**ANGLE COMPARE** DESIGN 90° 00' 00" H.angle 0° 00' 00" DEVIATE. - 90° 00' 00" H.INPUT 0 SET ANG/DIST

4   DISTANCE STAKEOUT

General pictures of measurement

With DISANCE STAKEOUT measurement, the deviation between the input design values (specified distance) and the distance to the prism is displayed, making it easier to stake a point.

General pictures

Slope distance design value

Stakeout Point

Elevation design value

Station Point

Horizontal distance design value

Design values and deviation

Deviation

Deviation

Slope distance measured value

Stakeout Point

Elevation measured value

Station Point

Deviation

Horizontal distance measured value
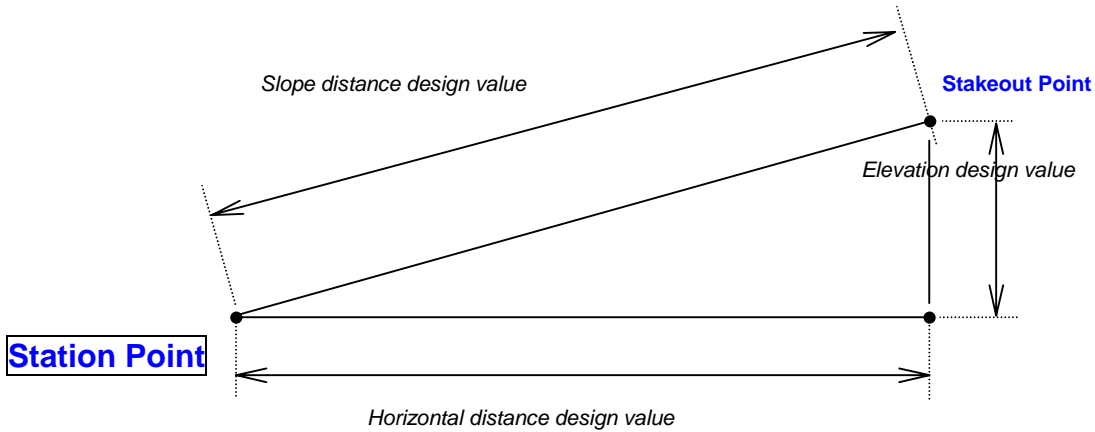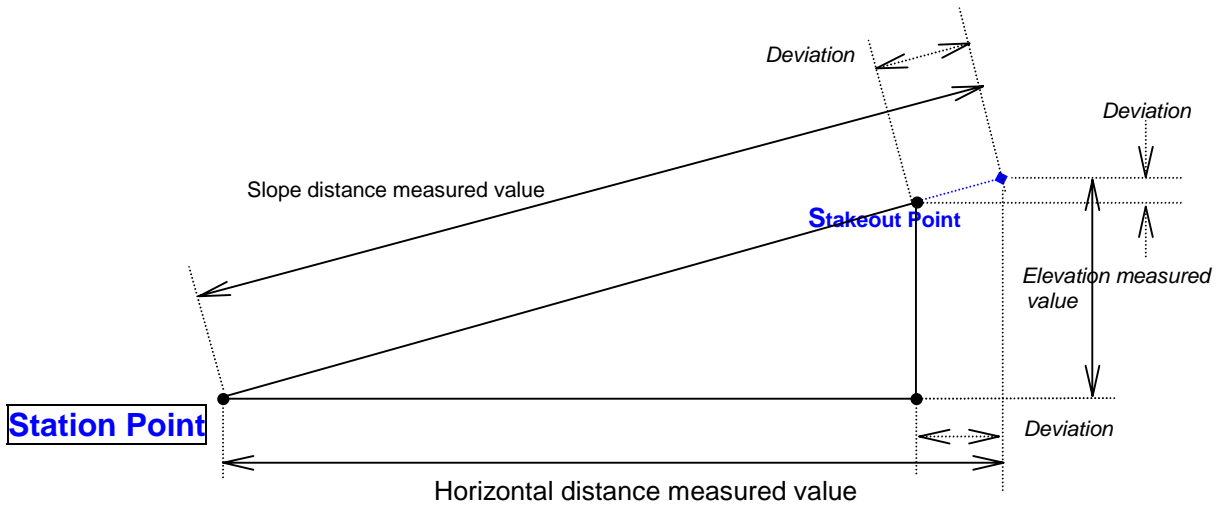
Detailed Operating procedures

Access the DISTANCE STAKEOUT according to "1. ACCESSING THE SPECIAL FUNCTIONS".

Step 1   **Selecting the distance to be displayed and inputting the design values.**

(1) | DISTANCE STAKEOUT | → | 1 .H.dist. | → | SELECT | → | Input H.dist. |

→ | ENT | → | ENT | → | DIST COMPARE | → | To Step 2 |

*   **Input the S.dist. and V.dist. in the same way.**

Step 2   **STAKEOUT start**

(1) | TRACK / MEAS | → | Move the prism to the ground point where the deviation is "0" |

(2) | Use the ground point where the deviation is "0" as the STAKEOUT point |

(3) | Use the [ENT] key to exit the STAKEOUT function | → | Go back to Step 1 | → | If necessary, repeat the measurement |

| Use the [ESC] key to exit the distance stake-out function |
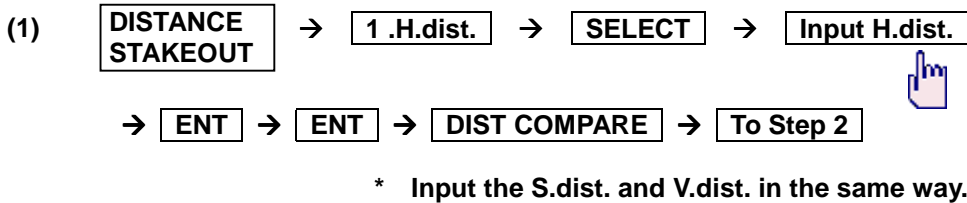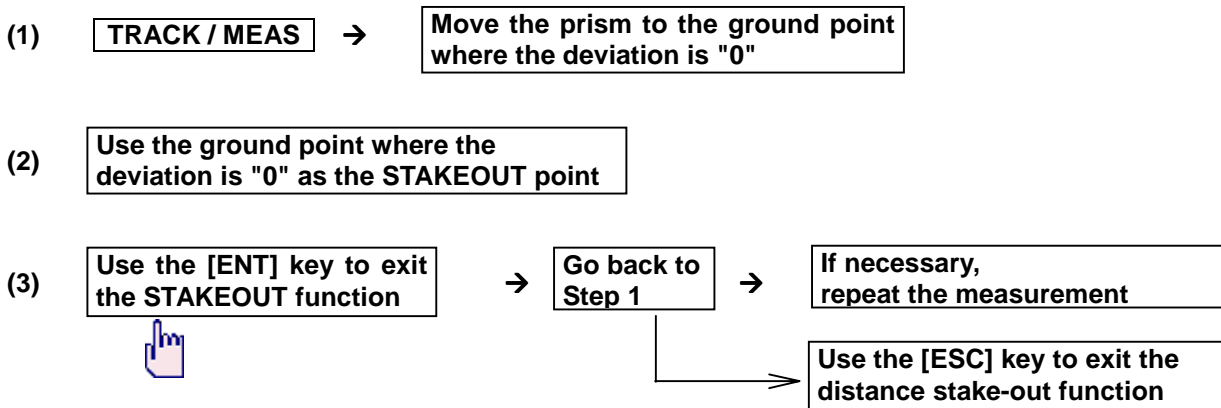
● A prism can be easily tracked if a position is searched by using a [TRACK] function and then using a [MEAS] function.

5   RDM

General pictures of measurement

With RDM measurement, the horizontal distance, the slope distance, difference in height and the percentage of slope between the reference point and the observation point are measured. The distance between one observation point and another observation point is measured as well.

General Pictures

Slope distance

Target

Slope **%**

Height difference

Reference Point

Horizontal distance

Station Point

REF.P-P   **P-P**   **P-P**   **P-P**

Target

Target

Reference Point

Target

REF.P.-P

REF.P.-P

REF.P.-P

Target

REF.P.-P
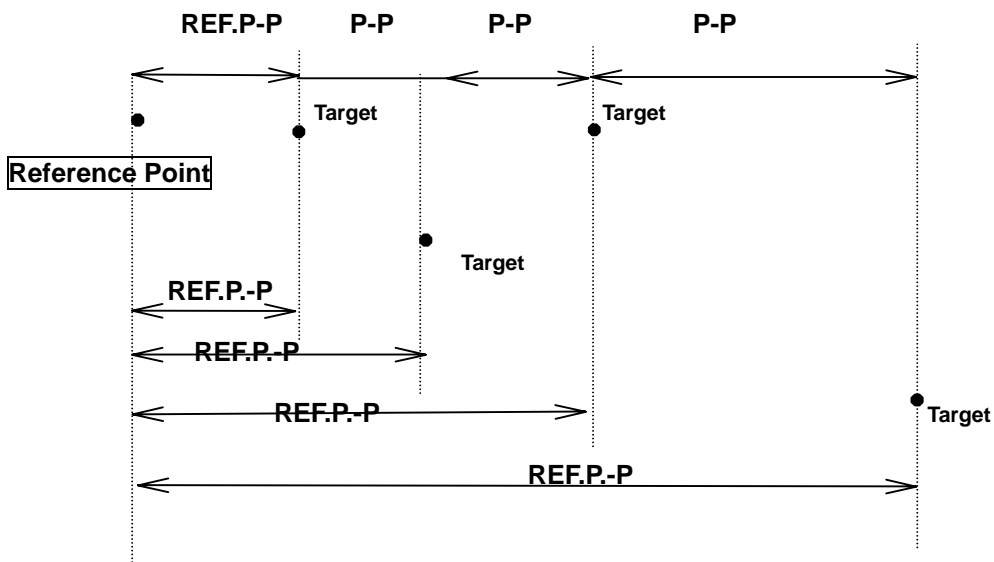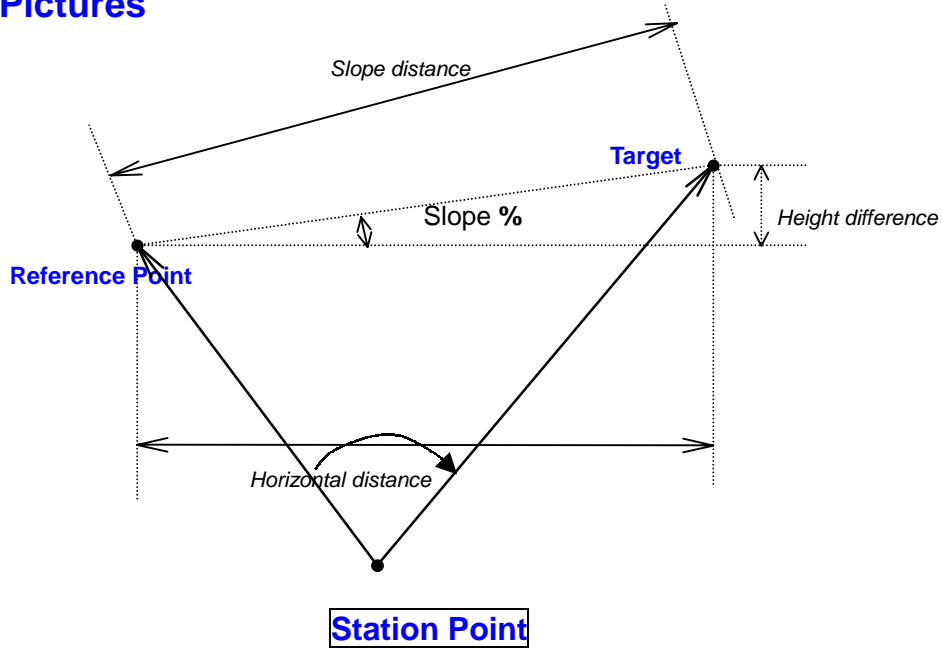
Detailed Operating procedures

Access the RDM according to "1. ACCESSING THE SPECIAL FUNCTIONS".

Step 1 Observation of the reference point

(1) | PRISM H | → | INPUT PRIZM H | → | ENT | → | MEAS | → | Display the distance to the Reference Point |

| ENT | → | Go to Step 2 |

Step 2 Observation of the target point (P1)

(1) | PRISM H | → | INPUT PRISM H | → | ENT | → | MEAS |

→ | Display the distance to P1 | → | ENT | → | Display the distance between the reference point and P1 | → | ENT |

(2) | PRISM H | → | INPUT PRISM H | → | ENT | → | MEAS |

→ | Display the distance to | → | ENT | → | Display the distance between the reference point and P2, and the distance between P1 and P2 | → | ENT |

*Use [DIST] key to change the distance display (REF-P/P-P)

(3) | PRISM H | → | INPUT PRISM H | → | ENT | → | MEAS |

→ | Display the distance to Px | → | ENT | → | Display the distance between the reference point and Px, and the distance between P (x-1) and Px |

* Use [DIST] key to change the distance display (REF-P/P-P)

● The slope that can be calculated and displayed with the RDM function is within +/-200.00 %.
● The difference in height is indicated in +/-.

6   COORDINATES

General pictures of measurement

Any desired Target coordinates can be determined and stored by setting a Station Point as an original point and inputting the Backsight coordinate in COORDINATES measurement. The coordinates values from Original coordinates point can be determined by the Station coordinates input even if the Station Point is not set as original point. Coordinates values input can be omitted by designating the Station Point No. whenever the Station coordinates are stored in the internal memory.

General pictures
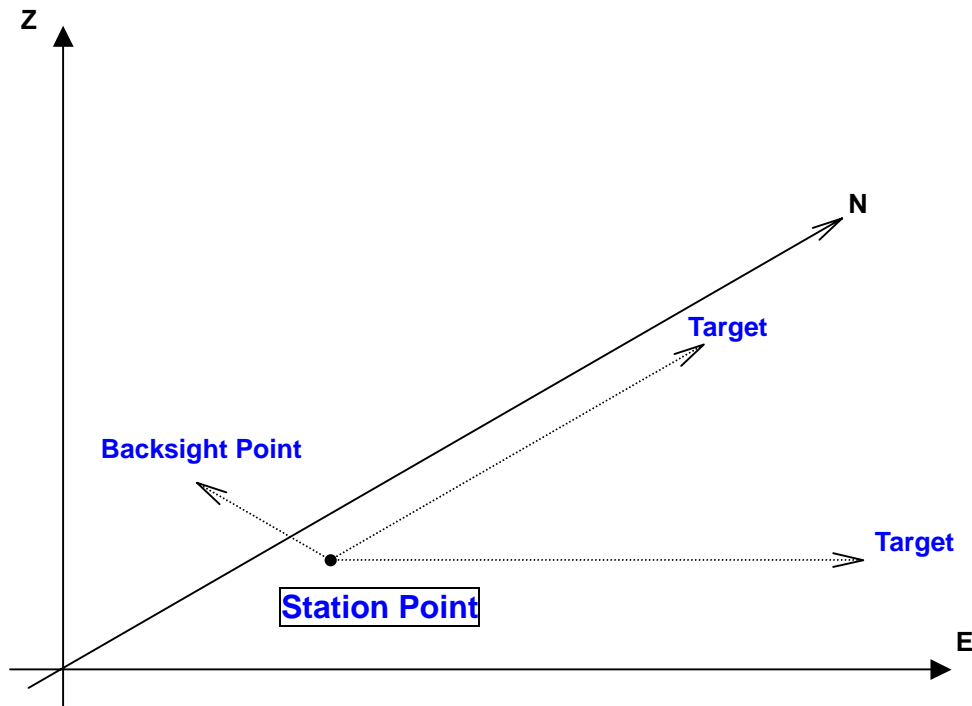
Detailed Operating procedures

Access the COORDINATES according to " ACCESSING THE SPECIAL FUNCTIONS ".

1. JOB NAME

(1)   **JOB NAME input** (Selection keys: $\Leftarrow, \Rightarrow, \Uparrow, \Downarrow$)

    1.JOB NAME → ENT → COORDINATE JOB NAME INPUT → ENT

    → JOB NAME input by pressing selection keys → ENT

(2)   **JOB NAME selection** (Selection keys: $\triangle, \nabla, \Uparrow, \Downarrow$)

    1. JOB NAME → ENT → COORDINATES JOB NAME INPUT

    → Select the JOB NAME by shift keys → ENT → To the primary screen of the COORDINATES

● The JOB NAME can be selected only when the JOB NAMES are already stored.
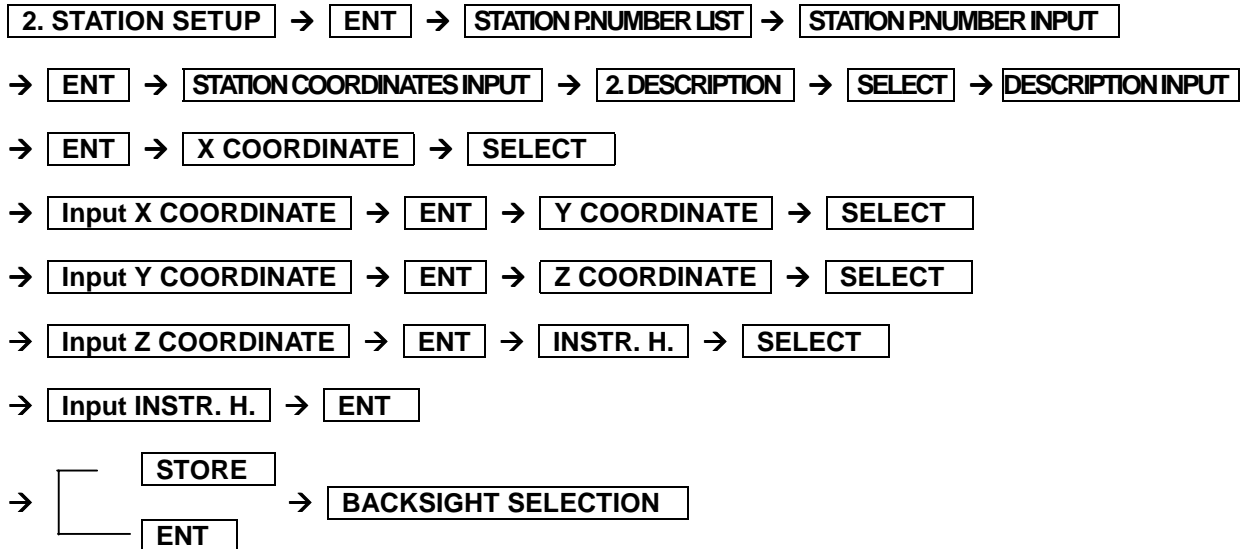
2. STATION SETUP

(1) STATION COORDINATES

a. STATION COORDINATES input

| 2. STATION SETUP | → | ENT | → | STATION P.NUMBER LIST | → | STATION P.NUMBER INPUT |

→ | ENT | → | STATION COORDINATES INPUT | → | 2. DESCRIPTION | → | SELECT | → | DESCRIPTION INPUT |

→ | ENT | → | X COORDINATE | → | SELECT |

→ | Input X COORDINATE | → | ENT | → | Y COORDINATE | → | SELECT |

→ | Input Y COORDINATE | → | ENT | → | Z COORDINATE | → | SELECT |

→ | Input Z COORDINATE | → | ENT | → | INSTR. H. | → | SELECT |

→ | Input INSTR. H. | → | ENT |

→ ┌ | STORE |
  │   → | BACKSIGHT SELECTION |
  └ | ENT |

- Maximum 4 digits can be inputted at STATION P.NUMBER.
- Please press the [STORE] key to store the input data.
- Maximum 8 letters can be inputted at the "DESCRIPTION".

b. Search and call of stored STATION COORDINATES

| 2. STATION SETUP | → | ENT | → | STATION P.NUMBER LIST | → | STATION P.NUMBER by shift keys |

| ENT | → | Confirm the STATION COORDINATES values | → | INSTR.H. | → | SELECT |

→ | Input the INSTR. H. | → | ENT | → | BACKSIGHT SELECTION |
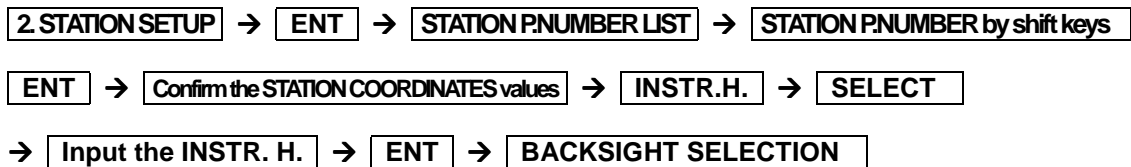
- The INSTR.H. can be changed.

(2) BACKSIGHT SELECTION

a. COORDINATES INPUT
■   BACKSIGHT P. NUMBER and COORDINATES input

| BACKSIGHT SELECTION | → | 1 . COORDINATES INPUT | → | ENT |

| BACKSIGHT P. NUMBER LIST | → | ENT | → | Input the P.No | → | ENT |

| BACKSIGHT COORDINATES INPUT | → | 2. DESCRIPTION | → | SELECT | → | DESCRIPTION INPUT | → | ENT |

→ | X COORDINATE | → | SELECT | → | Input X COORDINATE | → | ENT |

→ | Y COORDINATE | → | SELECT | → | Input Y COORDINATE | → | ENT |

→ | Z COORDINATE | → | SELECT | → | Input Y COORDINATE | → | ENT |

→ | STORE
  | ENT | → | **Aim at the Backsight Point** | → | **ENT** | → | **SURVEY**

- Maximum 4 digits can be inputted at the BACKSIGHT P. NUMBER.
- Please press the STORE key to store the input data.

■ Search and call of the stored BACKSIGHT P. NUMBER

| BACKSIGHT SELECTION | → | 1. COORDINATES INPUT | → | ENT |

→ | BACKSIGHT P. NUMBER | → | Select by shift keys | → | ENT |

→ | Confirm the BACKSIGHT P. COORDINATES values | → | ENT |

→ | Aim at the Backsight point | → | ENT | → | SURVEY |

- **Shift keys: ($\triangle, \nabla, \Uparrow, \Downarrow$)**

b. AZIMUTH input

| BACKSIGHT SELECTION | → | 2. AZIMUTH INPUT | → | ENT |

→ | Aim at the Backsight point | → | Press F5 (1/2) | → | Press H. INPUT |

→ | AZIMUTH INPUT | → | ENT | → | Press F5 (2/2) |

- **"Aim at the Backsight point"** is not displayed.

3. SURVEY

(1) | 3. SURVEY | → | ENT | → | Press the [POINT] key | → | MEASURED POINT
1.POINT No. 2.DESCRIPTION 3.PRISM H |

→ | 1. POINT No. | → | SELECT | → | POINT No. input | → | ENT |

→ | 2. DESCRIPTION | → | SELECT | → | DESCRIPTION INPUT | → | ENT |

→ | 3. PRISM H. | → | SELECT | → | PRISM H. input | → | ENT | → | ENT |

→ | Measure the P1 | → | XYZ COORDINATES are displayed | → | STORE / ENT |

- Maximum 4 digits can be inputted at the POINT NUMBER.
- Please press the [STORE] key to store the measured data.
- The PRISM H. can be changed.

(2) | POINT P2 P3, P4, -Px are measured in the same way. |

(3) | SURVEY is completed by ESC key. | → | If necessary, repeat the measurement. |

→ | The COORDINATES is completed by pressing the ESC key. |

7   OFFSET SHOTS

General pictures of measurement

OFFSET SHOTS can be used when the Prism cannot be positioned because of an obstacle in the way. With this type of measurement, the Target coordinates are measured and stored indirectly. Coordinates values input can be omitted by designating the Station point number whenever the Station coordinates are stored in the internal memory.

General pictures

D, C and H are offset value.

Top view

Target Point **(-)**

C

Backsight Point
Reflector

D

Reflector **(+)**
Offset Point

Station Point

Target Point **(+)**

H

Backsight Point
Reflector

Obstacle

Reflector
Offset Point

Station Point

31
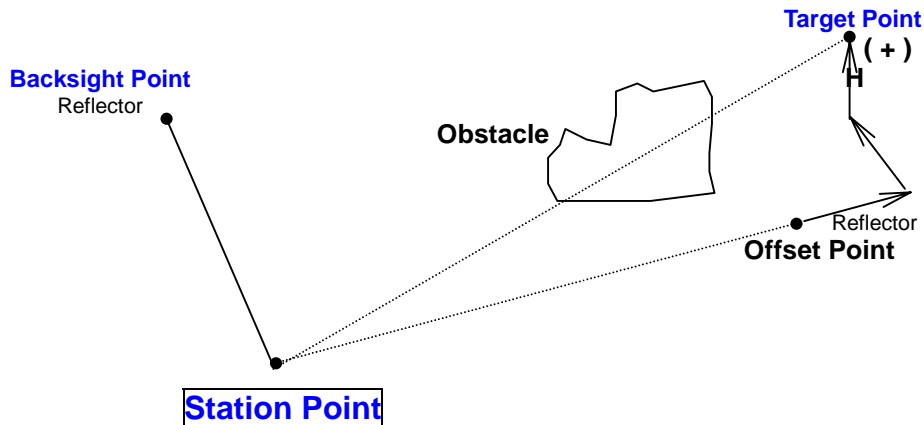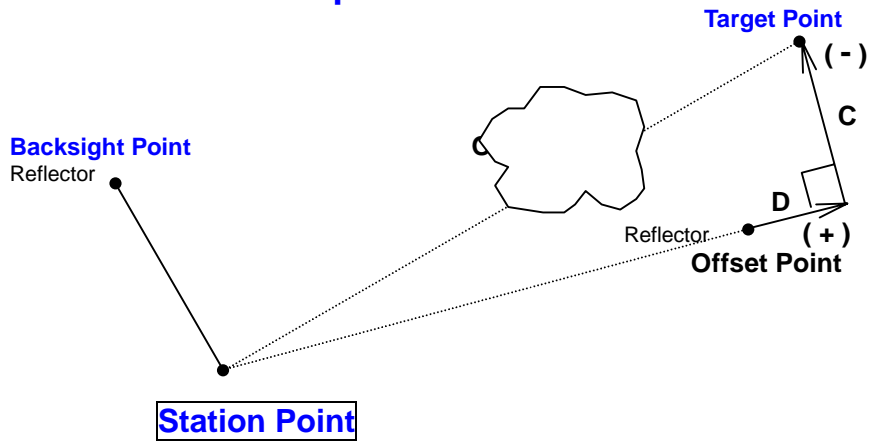
Detailed Operating procedures

1. JOB NAME

(1) JOB NAME input   (Selection keys: $\Leftarrow, \Rightarrow, \Uparrow, \Downarrow$)

| 1. JOB NAME | → | ENT | → | COORDINATE JOB NAME INPUT Screen | → | ENT |

→ | JOB NAME input by pressing selection keys | → | ENT | → | STATION P. NUMBER LIST Screen |

→ | ENT | → | P No | → | ENT |

(2) JOB NAME selection (Selection keys: $\Leftarrow, \Rightarrow, \Uparrow, \Downarrow$)

| 1 . JOB NAME | → | ENT | → | COORDINATE JOB NAME INPUT Screen |

→ | Select the JOB NAME by shift keys | → | ENT | → | To the primary screen of OFFSET SHOTS |

- The JOB NAME can be selected only when it is already stored.

2. STATION SETUP

(1) STATION COORDINATES
a. STATION COORDINATES input

| 2. STATION SETUP | → | ENT | → | STATION P. NUMBER LIST Screen | → | ENT | → | P. No input |

→ | ENT | → | STATION COORDINATES INPUT Screen | → | 2. DESCRIPTION | → | SELECT |

→ | DESCRIPTION INPUT | → | ENT | → | X COORDINATE | → | SELECT |

→ | Input Y COORDINATE | → | ENT | → | Y COORDINATE | → | SELECT |

→ | Input Z COORDINATE | → | ENT | → | Z COORDINATE | → | SELECT |

→ | Input INSTR. H. | → | ENT |

→ ┌ | STORE | ┐
       │   ├ → | BACKSIGHT SELECTION Screen |
     └ | ENT | ┘

- Maximum 4 digits can be inputted at STATION P. NUMBER.
- Please press the [STORE] key to store the input data.
- Maximum 8 letters can be inputted at the "DESCRIPTION".

b. Search and call of the stored STATION COORDINATES

| 2. STATION SETUP | → | ENT | → | STATION P. NUMBER LIST Screen |

→ | SELECT the NUMBER by shift keys | → | ENT | → | Confirm the STATION COORDINATES values |

→ | INSTR. H. | → | SELECT | → | INPUT INSTR. H. | → | ENT |

→ | BACKSIGHT SELECTION Screen |

● The INSTR. H, can be changed.

(2) BACKSIGHT COORDINATES

a. COORDINATES input
■   **BACKSIGHT COORDINATES input**
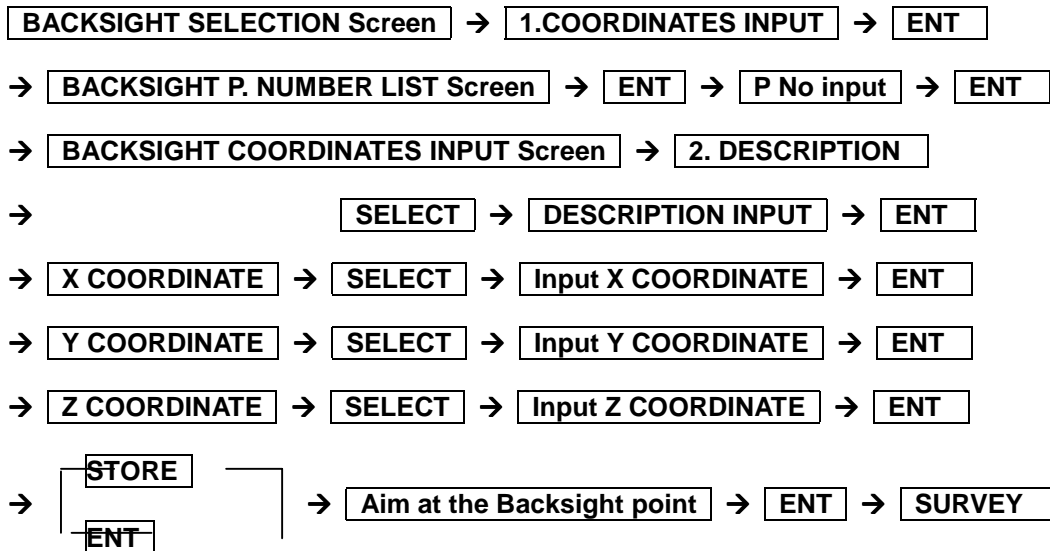
| BACKSIGHT SELECTION Screen | → | 1.COORDINATES INPUT | → | ENT |

→ | BACKSIGHT P. NUMBER LIST Screen | → | ENT | → | P No input | → | ENT |

→ | BACKSIGHT COORDINATES INPUT Screen | → | 2. DESCRIPTION |

→ | SELECT | → | DESCRIPTION INPUT | → | ENT |

→ | X COORDINATE | → | SELECT | → | Input X COORDINATE | → | ENT |

→ | Y COORDINATE | → | SELECT | → | Input Y COORDINATE | → | ENT |

→ | Z COORDINATE | → | SELECT | → | Input Z COORDINATE | → | ENT |

→ | STORE / ENT | → | Aim at the Backsight point | → | ENT | → | SURVEY |

● Maximum 4 digits can be inputted at the BACKSIGHT P. NUMBER.
● Please press the [STORE] key to store the input data.

■   **Search and call of the stored BACKSIGHT COORDINATES**

| BACKSIGHT SELECTION Screen | → | 1. COORDINATES INPUT | → | ENT |

→ | BACKSIGHT P. NUMBER LIST Screen | → | Select by shift keys | → | ENT |

→ | Confirm the BACKSIGHT P. COORDINATES values | → | ENT |

→ | After aiming at the Backsight point, push the ENT | → | ENT | → | SURVEY Screen |

● Shift keys: $(\Delta, \nabla, \Uparrow, \Downarrow)$

b. AZIMUTH input

| BACKSIGHT SELECTION | → | 2 AZIMUTH INPUT | → | ENT |

→ | Aim the Backsight Point | → | Press F5 (1/2) | → | Press H. INPUT |

→ | AZIMUTH INPUT | → | ENT | → | Press F5 (2/2) |
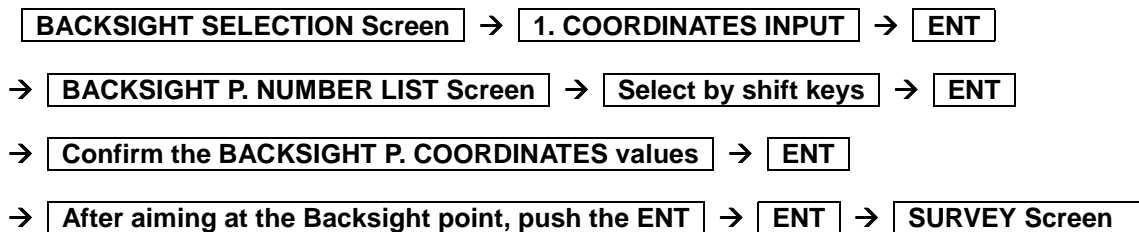
→ | Press MEAS | → | SURVEY Screen |
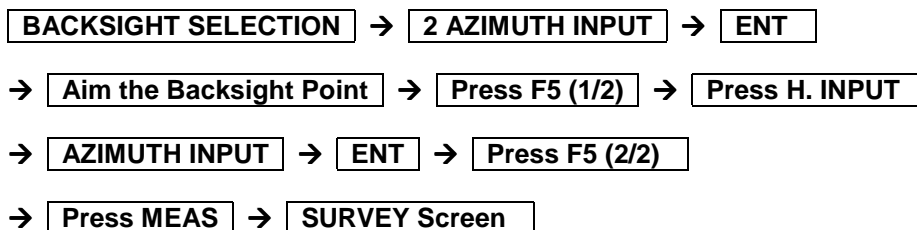
3. SURVEY

a. Offset point survey
Place an Offset point at the place where the measurement from the Station point is possible.

| 3. SURVEY | → | ENT | → | SURVEY Screen | → | Press the F3 (PRISM H) |

| PRISM H input | → | ENT | → | Press MEAS (Measure the Offset point) |

| Distance to the Offset P Is displayed. | → | ENT | → | OFFSET MEASURE Screen |

a. Target point survey

| OFFSET MEASURE Screen | → | 1. DISTANCE | → | SELECT | → | Value D input |

| ENT | → | 2. CROSS | → | SELECT | → | Value C Input | → | ENT |

| 3. HEIGHT | → | SELECT | → | Value H Input | → | ENT | → | ENT |

| OFFSET SHOTS Screen (Target point coordinates are displayed.) | → | STORE / ENT |

| SURVEY Screen |

● Value D,C and H are measured by using a tape measure.

8 REM

General pictures of measurement

With REM measurement, a prism (Reference point) is set approximately directly below the place to be measured, and by measuring the prism, the height to the target object can be measured. This makes it easy to determine the heights of electric power lines, bridge suspension cables, and other large items used in construction.

General pictures

Height

Prism height

Horizontal distance **Prism**
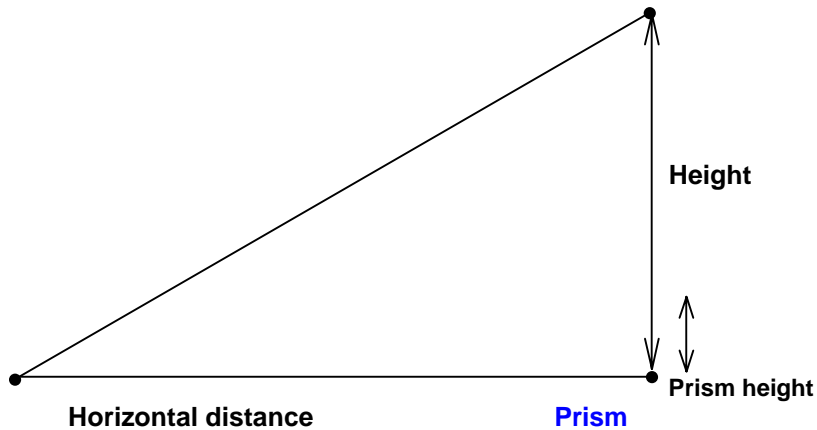
Detailed Operating procedures

Access the REM according to "1 . ACCESSING THE SPECIAL FUNCTIONS".

Step 1 Observing the reference point

(1) PRISM H → INPUT PRISM H → ENT → Input the height of the prism at the reference point

→ ENT → Measure the distance to the reference point → ENT → Go to Step 2
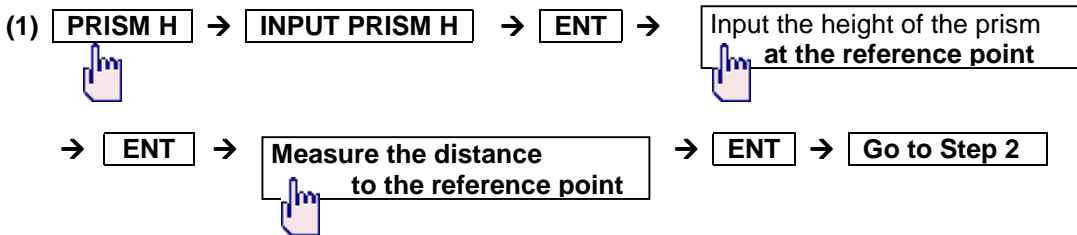
Step 2 Observing the target

(1) Sight the target → ENT → Display the height of the target

(2) Press "ENT" to conclude the observation → Go back to Step 1 → If necessary, repeat the measurement

→ Press the "ESC" key to conclude the function
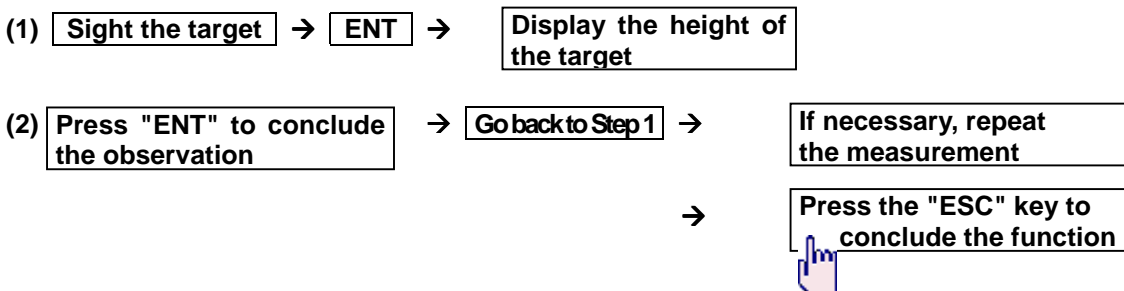
9   RESECTION

With RESECTION, two known points or three known points are measured in order to determine the coordinates of the Station Point.
When the coordinates values of point A, B and C are stored in the internal memory, each coordinate input can be omitted by designating the each point number.

General pictures
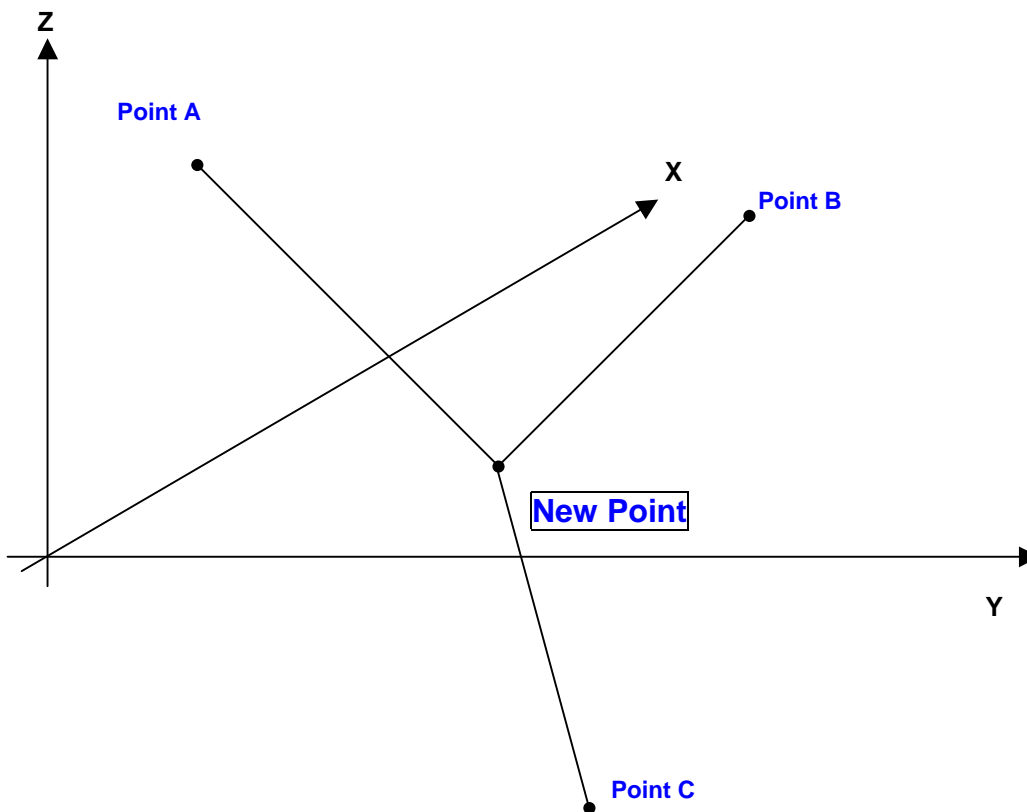
Detailed Operating procedures

Access the RESECTION according to "ACCESSING THE SPECIAL FUNCTIONS".

1. JOB NAME

(1)   JOB NAME input   (Selection keys: $\Leftarrow, \Rightarrow, \Uparrow, \Downarrow$)

$\boxed{\text{1. JOB NAME}}$ → $\boxed{\text{ENT}}$ → $\boxed{\text{COORDINATE JOB NAME INPUT Screen}}$ → $\boxed{\text{ENT}}$

→ $\boxed{\text{JOB NAME input by pressing selection keys}}$ → $\boxed{\text{ENT}}$ → $\boxed{\text{STATION POINT INPUT}}$

● **Maximum 15 characters can be inputted at JOB NAME.**

(2) Stored JOB NAME selection   (Selection keys: $\Leftarrow, \Rightarrow, \Uparrow, \Downarrow$)

$\boxed{\text{1. JOB NAME}}$ → $\boxed{\text{ENT}}$ → $\boxed{\text{COORDINATE JOB NAME INPUT Screen}}$

→ $\boxed{\text{Select the stored JOB NAME by shift keys}}$ → $\boxed{\text{ENT}}$ → $\boxed{\text{To the primary screen}}$

● The JOB NAME can be selected only when it is already stored.

2. STATION SETUP

| 2. STATION SETUP | → | STATION POINT INPUT | → | 1. STATION No. | → | SELECT |

→ | STATION No, input | → | ENT | → | 2. DESCRIPTION | → | SELECT |

→ | DESCRIPTION INPUT | → | ENT | → | 3. INSTR. H. | → | SELECT |

→ | INSTR H Input | → | ENT | → | ENT | → | To AP. NUMBER LIST Screen |

● Maximum 8 letters can be inputted at the "DESCRIPTION".

3. SURVEY

(1) 2 known points survey
a. Known coordinates input
■   **Point A survey**

| 3. SURVEY | → | ENT | → | AP. NUMBER LIST Screen | → | ENT | → | P No input |

→ | A COORDINATES INPUT Screen | → | 2. DESCRIPTION | → | SELECT | → | DESCRIPTION INRUT | → | ENT |

→ | X | → | SELECT | → | X input | → | ENT | → | Y | → | SELECT | → | Y input | → | ENT |

→ | Z | → | SELECT | → | Z input | → | ENT | → | PRIZM H. Screen | → | SELECT |

→ | PRISM H. input | → | ENT | → | STORE / ENT | → | A SURVEY Screen | → | MEAS |

→ | Point A distance is displayed | → | ENT | → | B P. NUMBER LIST Screen |

■   **Point B survey**

| B P. NUMBER LIST Screen | → | ENT | → | P No input | → | ENT |

→ | B COORDINATES INPUT Screen | → | 2. DESCRIPTION | → | SELECT | → | DESCRIPTION INPUT |

→ | ENT | → | X | → | SELECT | → | X input | → | ENT |

→ | Y | → | SELECT | → | Y input | → | ENT |

→ | Z | → | SELECT | → | Z input | → | ENT | → | PRISM H. | → | SELECT |

→ | PRISM H. Screen | → | SELECT | → | PRISM H. Input | → | ENT | → | STORE/ ENT |

→ | B SURVEY Screen | → | MEAS | → | Point B distance is displayed. | → | ENT |

→ | Calculated Station Point coordinates are displayed. | → | STORE/ ENT |

b. Search and call of the stored known coordinates
■ **Point A survey**

| 3. SURVEY | → | ENT | → | A P. NUMBER LIST Screen |

→ Search and shift to desired P No → ENT → Confirm point A coordinates

→ A PRISM HEIGHT INPUT Screen → SELECT

→ PRISM H. input → ENT → ENT → A SURVEY Screen → Aim at point A

→ MEAS → Point A distance is displayed → ENT

→ B P. NUMBER LIST Screen

■ **Point B survey**

B P. NUMBER LIST Screen → Search and shift to desired P No → ENT

→ Confirm point B coordinates → B PRISM HEIGHT INPUT Screen

→ SELECT → PRISM H. input → ENT → ENT → B SURVEY Screen

→ Aim at point B → MEAS → Point B distance is displayed. → ENT

→ Calculated Station Point coordinates are displayed. → STORE / ENT

(2) 3 known points survey
a) Known coordinates input
■ Point A survey

3. SURVEY → ENT → A P. NUMBER LIST Screen → ENT → P No input

→ A COORDINATES INPUT Screen → 2. DESCRIPTION → SELECT → DESCRIPTION INPUT

→ ENT → X → SELECT → X input → ENT → Y

→ SELECT → Y input → ENT → Z → SELECT → Z input

→ ENT → PRISM H → SELECT

→ PRISM H. input → ENT → STORE / ENT → Aim at the point A

→ ENT

■ Point B survey

B P. NUMBER LIST Screen → ENT → P No input → ENT

→ B COORDINATES INPUT Screen → 2. DESCRIPTION → SELECT → DESCRIPTION INPUT

→ ENT → X → SELECT → X input

→ ENT → Y → SELECT → Y input → ENT

→ Z → SELECT → Z input → ENT → PRISM H. Screen → SELECT

→ PRISM H. input → ENT → STORE / ENT → Aim the point B → ENT

■ Point C survey

CP. NUMBER LIST Screen → ENT → P No input → ENT

→ ☐C COORDINATES INPUT Screen → ☐2. DESCRIPTION → ☐SELECT → ☐DESCRIPTION INPUT

→ ☐ENT → ☐X → ☐SELECT → ☐X input

→ ☐ENT → ☐Y → ☐SELECT → ☐Y input → ☐ENT

→ ☐Z → ☐SELECT → ☐Z input → ☐ENT → ☐PRISM H. Screen → ☐SELECT

→ ☐PRISM H. input → ☐ENT → ☐STORE / ENT → ☐Aim the point C → ☐ENT

→ ☐Calculated station coordinates are displayed. → ☐STORE / ENT

- The 3 known points survey does not require the distance measurement.

b. Search and call of the stored known coordinates

■Point A survey

☐3. SURVEY → ☐ENT → ☐A P. NUMBER LIST Screen → ☐Search and shift to desired P No → ☐ENT

→ ☐A PRISM HEIGHT Screen → ☐PRISM H. → ☐SELECT

→ ☐PRISM H. input → ☐ENT → ☐ENT → ☐A SURVEY Screen

→ ☐Aim at point A → ☐ENT

■Point B survey

☐B P. NUMBER LIST Screen → ☐Search and Shift to desired P No → ☐ENT

→ ☐B PRISM HEIGHT Screen → ☐PRISM H. → ☐SELECT

→ ☐PRISM H. input → ☐ENT → ☐ENT → ☐B SURVEY Screen

→ ☐Aim at point B → ☐ENT

■Point C survey

☐C P. NUMBER LIST Screen → ☐Search and shift to desired P No → ☐ENT

→ ☐C PRISM HEIGHT INPUT Screen → ☐PRIZM H. → ☐SELECT

→ ☐PRISM H. input → ☐ENT → ☐C SURVEY Screen

→ ☐Aim at point C → ☐ENT → ☐STATION POINT Screen

→ ☐Calculated Station coordinates are displayed. → ☐STORE / ENT

- The 3 known points survey does not require the distance measurement.

10 DATA STORAGE

General pictures of measurement

With Data storage, the data of the JOB NAME a STATION is stored in the internal memory or the instrument.

General pictures

Target

Target

•

Target
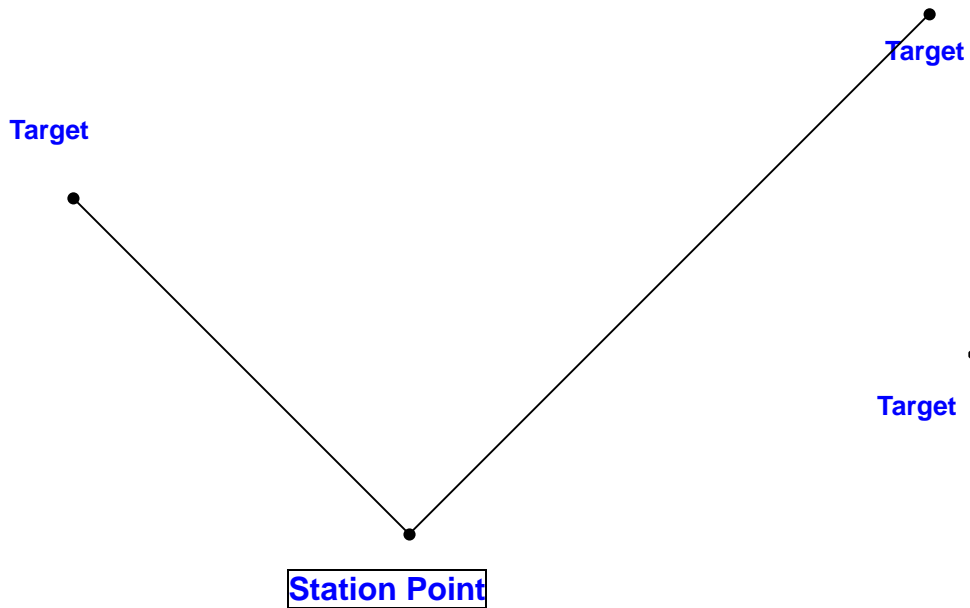
Station Point

Detailed Operating procedures

Access the DATA STORAGE according to " ACCESSING THE SPECIAL FUNCTIONS ".

1. JOB NAME

(1) JOB NAME input   (Selection keys: $\Leftarrow, \Rightarrow, \Uparrow, \Downarrow$)

| 1 . JOB NAME | → | ENT | → | SURVEY JOB NAME INPUT | → | ENT |

 → | JOB NAME input by pressing selection keys | → | ENT | → | STATION POINT input |

- Maximum 15 letters can be inputted at JOB NAME.

(2) JOB NAME selection   (Selection keys: $\triangle, \nabla, \Uparrow, \Downarrow$)

| 1 . JOB NAME | → | ENT | → | SURVEY JOB NAME |

 → | Select JOB NAME by shift keys | → | ENT | → | To the STATION POINT input |

- The JOB NAME can be selected only when it is already stored.

2. STATION SETUP

| 2. STATION SETUP | → | ENT | → | STATION POINT INPUT | → | STATION No. | → | SELECT |

→ | STATION No. input | → | ENT | → | DESCRIPTION | → | SELECT |

→ | Input DESCRIPTION by Selection keys | → | ENT | → | INSTR. H. | → | SELECT |

→ | Input INSTR.H. | → | ENT | → | STORE |

- Maximum 4 digits can be inputted at STATION NUMBER.
- Please press the STORE key to store the input data.
- Maximum 15 letters can be inputted at the DESCRIPTION.

3. SURVEY

| 3. SURVEY | → | ENT | → | Press the POINT key | → | MEASURED POINT
1.POINT No. 2. DESCRIPTION 3.PRISM H |

| 1. POINT No. | → | SELECT | → | POINT No. input | → | ENT |

| 2. DESCRIPTION | → | SELECT | → | DESCRIPTION INPUT | → | ENT |

| 3. PRISM H. | → | SELECT | → | PRISM H. input | → | ENT | → | ENT |

→ | Measure the P1 | → | STORE / ENT |

- Maximum 4 digits can be inputted at the POINT NUMBER.
- Please press the STORE key to store the measured data.
- The H. INPUT, O SET, HOLD of Horizontal angle is possible by pressing the F5 (2/2) key.
- Maximum 8 letters can be inputted at the "DESCRIPTION".

11   MEMORY MANAGER

With MEMORY MANAGER, following MEMORY MANAGEMENT of the instrument data can be performed.

Coordinate data: SEND, RECEIVE, EDIT, DELETE

Survey data: SEND, EDIT, DELETE

Detailed Operating procedures

Access the MEMORY MANAGER according to the "I . ACCESSING TO THE SPECIAL FUNCTIONS".

1. COORDINATES SEND : *DC1, AUX and CSV data can be transferred.*
This function can send the stored Coordinates data into a personal computer etc.

a. Send by input of the stored COORDINATES JOB NAME

| 1. COORDINATES SEND | → | ENT | → | JOB NAME INPUT Screen | → | ENT |

| Select and Input a stored JOB NAME (The same job name Is found) | → | ENT |

| COORDINATES SEND Screen | → | 1. COMMUNICATION SET UP | → | SELECT | → | 1. BAUD RATE |

  → | SELECT | → | Shift to desired value | → | ENT | → | 2. DATA LENGTH |

  → | SELECT | → | Shift to desired value | → | ENT | → | 3. PARITY BITS |

  → | SELECT | → | Shift to desired article | → | ENT | → | 4. STOP BITS |

  → | SELECT | → | Shift to desired value | → | ENT | → | 5. SIGNAL CONTROL |

  → | SELECT | → | Shift to ON/OFF | → | ENT | → | 6. XON/XOFF |

  → | SELECT | → | Shift to ON/OFF | → | ENT | → | ENT |

→ | 2. FORMAT | → | SELECT | → | Shift to desired FORMAT | → | ENT |

→ | 3. COORD AXIS | → | SELECT | → | Shift to desired COORD AXIS | → | ENT |

→ | ENT | → | SEND CONFIRMATION Screen |

→   **(JOB NAME---, After the push ENT key, Set the PC in com, mode)**   → | ENT | → | SEND |

b. SEND by the search of stored COORDINATES JOB NAME

| 1. COORDINATES SEND | → | ENT | → | JOB NAME INPUT Screen | → | ENT |

| Shift to a desired JOB NAME | → | ENT |

| COORDINATES SEND Screen | → | COMMUNICATION SET UP | → | SELECT | → | 1. BAUD RATE |

   → | SELECT | → | Shift to desired value | → | ENT | → | 2. DATA LENGTH |

   → | SELECT | → | Shift to desired value | → | ENT | → | 3. PARITY BITS |

   → | SELECT | → | Shift to desired article | → | ENT | → | 4. STOP BITS |

   → | SELECT | → | Shift to desired value | → | ENT | → | 5. SIGNAL CONTROL |

   → | SELECT | → | Shift to ON/OFF | → | ENT | → | 6. XON/XOFF |

   → | SELECT | → | Shift to ON/OFF | → | ENT | → | ENT |

→ | 2. FORMAT | → | SELECT | → | Shift to desired FORMAT | → | ENT |

→ | 3. COORD AXIS | → | SELECT | → | Shift to desired COORD AXIS | → | ENT |

→ | ENT | → | SEND CONFIRMATION Screen |

→ (JOB NAME---, After the push ENT key, Set the PC in com. mode) → | ENT | → | SEND |

2. COORDINATES RECEIVE : *DC1, AUX and CSV data can be transferred.*

This function can receive the Coordinates data from a personal computer etc.

| 2. COORDINATES RECEIVE | → | ENT |

| COORDINATES RECEIVE | → | 1. COMMUNICATION SETUP | → | SELECT | → | 1. BAUD RATE |

   → | SELECT | → | Shift to desired value | → | ENT | → | 2. DATA LENGTH |

   → | SELECT | → | Shift to desired value | → | ENT | → | 3. PARITY BITS |

   → | SELECT | → | Shift to desired article | → | ENT | → | 4. STOP BITS |

   → | SELECT | → | Shift to desired value | → | ENT | → | 5. SIGNAL CONTROL |

   → | SELECT | → | Shift to ON/OFF | → | ENT | → | 6. XON/XOFF |

   → | SELECT | → | Shift to ON/OFF | → | ENT | → | ENT |

→ | 2. FORMAT | → | SELECT | → | Shift to desired FORMAT | → | ENT |

→ | 3. COORD AXIS | → | SELECT | → | Shift to desired COORD AXIS | → | ENT |

→ | ENT | → | RECEIVE CONFIRMATION Screen |

→ (After the PC in com. Mode, push ENT key.) → | ENT | → | RECEIVE |

3. COORDINATES EDIT

This function can edit the stored Coordinates data.

a. Edit by input & call of the COORDINATES JOB NAME and COORDINATES NUMBER

3. COORDINATES EDIT → ENT → JOB NAME INPUT → ENT

→ Input the stored JOB NAME → (The same job name is found) → ENT

→ POINT NUMBER INPUT → ENT

→ Input the P No → ENT → COORDINATES EDIT → 2. DESCRIPTION

→ SELECT → DESCRIPTION INPUT → ENT → X COORD.

→ SELECT → Input the X COORD → ENT → Y COORD.

→ SELECT → Input the Y COORD → ENT → Z COORD.

→ SELECT → Input the Z COORD → ENT → ENT → (OVER WRITE) → ENT

b. Edit by search & shift of the COORDINATES JOB NAME and COORDINATES NUMBER

3. COORDINATES EDIT → ENT → JOB NAME INPUT → ENT

→ Search and shift to the JOB NAME → ENT → POINT NUMBER INPUT

→ Search & shift to the stored POINT NUMBER → ENT

→ COORDINATES EDIT → 2. DESCRIPTION → SELECT → DESCRIPTION INPUT → ENT

→ X COORD. → SELECT → Input the X COORD → ENT

→ Y COORD. → SELECT → Input the Y COORD → ENT

→ Z COORD. → SELECT → Input the Z COORD → ENT

→ ENT → (OVER WRITE) → ENT

4. COORDINATES DELETE

This function can delete the stored Coordinates data.

a. Delete by input of the COORDINATES JOB NAME

4. COORDINATES DELETE → ENT → JOB NAME INPUT Screen → ENT

→ Input the stored JOB NAME → (The same job name is found) → ENT

→ (JOB NAME---, Delete the job data. Are you sure ?) → ENT

b. Delete by search of the COORDINATES JOB NAME

| 4. COORDINATES DELETE | → | ENT | → | JOB NAME INPUT Screen |

→ | Search & shift to stored JOB NAME | → | ENT |

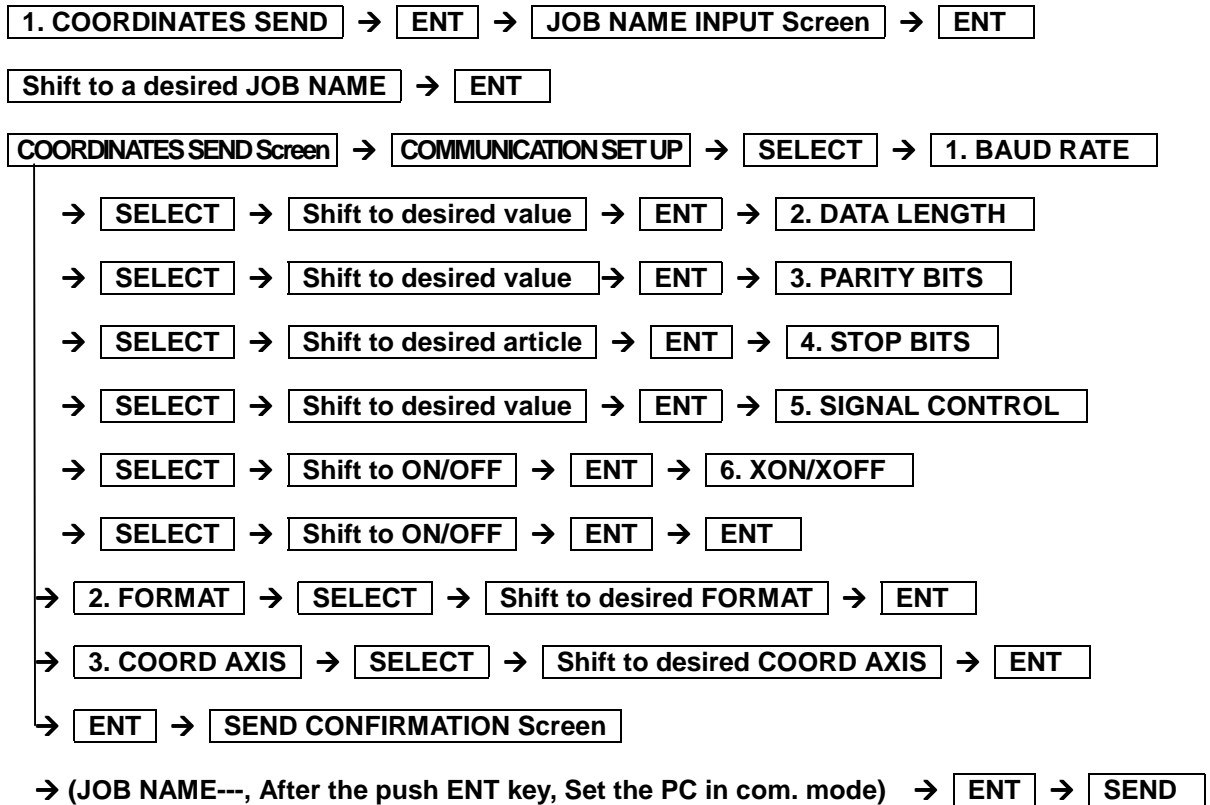→ | (JOB NAME---, Delete the job data. Are you sure ?) | → | ENT |

5. SURVEY DATA SEND : *DC1, AUX and SDR data can be transferred.*

This function can send the stored Survey data into a personal computer etc.
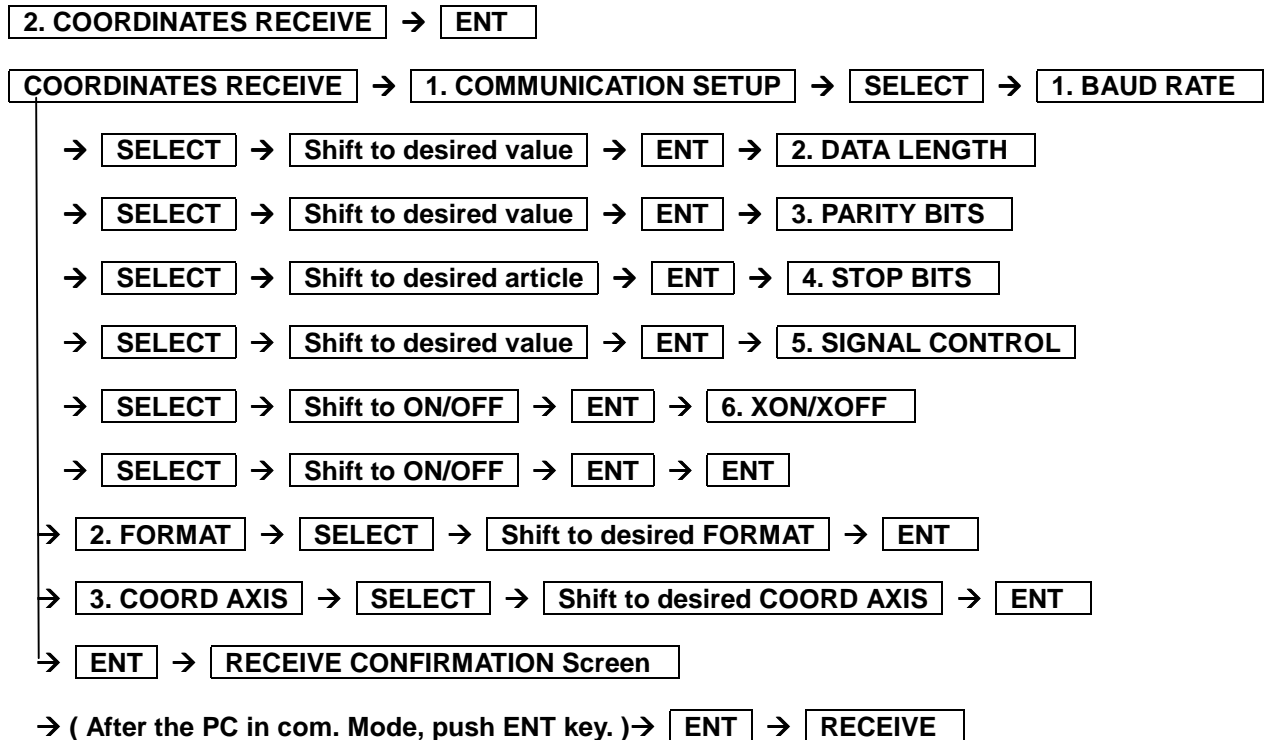
a. Send by input of the SURVEY JOB NAME

| 5. SURVEY DATA SEND | → | ENT | → | JOB NAME INPUT Screen | → | ENT |

| Select and Input a stored JOB NAME (The same job name is found) | → | ENT |

| SURVEY DATA SEND Screen | → | 1. COMMUNICATION SET UP | → | SELECT | → | 1. BAUD RATE |

→ | SELECT | → | Shift to desired value | → | ENT | → | 2. DATA LENGTH |

→ | SELECT | → | Shift to desired value | → | ENT | → | 3. PARITY BITS |

→ | SELECT | → | Shift to desired article | → | ENT | → | 4. STOP BITS |

→ | SELECT | → | Shift to desired value | → | ENT | → | 5. SIGNAL CONTROL |

→ | SELECT | → | Shift to ON/OFF | → | ENT | → | 6. XON/XOFF |

→ | SELECT | → | Shift to ON/OFF | → | ENT | → | ENT |

→ | 2. FORMAT | → | SELECT | → | Shift to desired FORMAT | → | ENT |

→ | ENT | → | SEND CONFIRMATION Screen |

→ (After the PC in com. Mode, push ENT key.) → | ENT | → | RECEIVE |

→ (JOB NAME---, After the push ENT key, Set the PC in com. mode) → | ENT | → | SEND |

b. Send by search & call of the SURVEY JOB NAME

5. SURVEY DATA SEND → ENT → JOB NAME INPUT Screen

→ Search a stored JOB NAME → ENT

SURVEY DATA SEND Screen → 1. COOMUNICATION SET UP → SELECT → 1. BAUD RATE

→ SELECT → Shift to desired value → ENT → 2. DATA LENGTH

→ SELECT → Shift to desired value → ENT → 3. PARITY BITS

→ SELECT → Shift to desired article → ENT → 4. STOP BITS

→ SELECT → Shift to desired value → ENT → 5. SIGNAL CONTROL

→ SELECT → Shift to ON/OFF → ENT → 6. XON/XOFF

→ SELECT → Shift to ON/OFF → ENT → ENT

→ 2. FORMAT → SELECT → Shift to desired FORMAT → ENT

→ ENT → SEND CONFIRMATION Screen

→ (JOB NAME---, After the push ENT key, Set the PC in com, mode) → ENT → SEND

6. SURVEY DATA EDIT

This function can edit the stored Survey data.

a. Edit by input & call of the SURVEY JOB NAME & SURVEY POINT NUMBER

6. SURVEY DATA EDIT → ENT → JOB NAME INPUT → ENT

→ Input the stored JOB NAME → (The same job name is found) → ENT

→ POINT NUMBER INPUT Screen → ENT → Input the P No → ENT

→ STATION (POINT) EDIT Screen → 1. STATION (POINT) No. → input → SELECT → ENT

→ 2. DESCRIPTION → SELECT → Input → ENT → 3. INST. (PRISM) HEIGHT

→ SELECT → Input → ENT → ENT → (OVER WRITE) → ENT

b. Edit by search & call of the SURVEY JOB NAME & SURVEY POINT NUMBER

6. SURVEY DATA EDIT → ENT → JOB NAME INPUT Screen

→ Search & shift to the stored JOB NAME → ENT → POINT NUMBER INPUT Screen

→ ENT → Search & shift to the stored (STATION) → ENT

→ STATION (POINT) EDIT Screen

→ 1. STATION (POINT) No. → SELECT → Input → ENT

→ 2. DESCRIPTION → SELECT → input → ENT → 3. INST. (PRISM) HEIGHT

→ | SELECT | → | Input | → | ENT | → | ENT | → (OVER WRITE) → | ENT |

7. SURVEY DATA DELETE

This function can delete the stored Survey data.

a. Delete by input and call of the SURVEY JOB NAME

| 7. SURVEY DATA DELETE | → | ENT | → | JOB NAME INPUT Screen | → | ENT |

→ | Input the stored JOB NAME | → (The same job name is found) → | ENT |

→ (JOB NAME---, Delete the job data. Are you sure ?) → | ENT |

b. Delete by search and call of the SURVEY JOB NAME

| 7. SURVEY DATA DELETE | → | ENT | → | JOB NAME INPUT Screen |

→ | Search & shift to stored JOB NAME | → | ENT |

→ (JOB NAME---, Delete the job data. Are you sure ?) → | ENT |

12 DataLink DL- 01 Software

DataLink DL01 Software allows you to send collected data by R-300 to other devices, to receive coordinates data, and to convert the resulting files into a number of common formats.

a) Recommendation for "PN"
It is recommended that "PN" (Point Name) data should consist of less or equal to 4 (one-byte) numeric characters to convert files with DL-01. Because, it may not be converted properly if alphabetic characters or more than 5 (one-byte) numeric characters are used for the "PN".

b) Notes for the data transferring.
Please, be careful about following items for the data transfer with "DL-01".

b-1 Notes for unit.
If you are requested to select unit when you convert data on DL-01, please select unit according to the settings on   -300.

b-2 Limitation for each format.
Please, use "CSV" or "DC1(DC-1Z) " format to transfer data to/from   -300.

Limitation for the "CSV" format.
With the "CSV" format, "PN" and "PC" (Point Code) data consist of less or equal to 8 (one-byte) characters can be transferred.

Limitations for the "DC1 (DC-1Z)" format.
With "DC1 (DC-1Z)" format, the length of "PN" data should consist of less or equal to 8 (one-byte) characters. And with the "DC1 (DC-1Z)" format "PC" data cannot be transferred.

b-3 Recommended communication settings on R-300.
Recommended settings for "COMMUNICAYTION SETUP" on R-300 special function is as follows.

R-300⇨PC(DL-01) for "COORDINATES SEND"
```
    1.BAUD RATE:          1200
    2.DATA LENGTH:        8
    3.PARITY BITS:        NIL
    4.STOP BITS:          1
    5.SIGNAL CONTROL:     OFF
    6.XON/XOFF:           OFF
```

R-300⇨PC(DL-01)   for "SURVEY DATA SEND"
```
    1.BAUD RATE:          1200-9600
    2.DATA LENGTH:        8
    3.PARITY BITS:        NIL
    4.STOP BITS:          1
    5.SIGNAL CONTROL:     OFF
    6.XON/XOFF:           OFF
```

PC(DL-01) R-300   for "COORDINATES RECEIVE"
```
    1.BAUD RATE:          1200
    2.DATA LENGTH:        8
    3.PARITY BITS:        NIL
    4.STOP BITS:          1
    5.SIGNAL CONTROL:     OFF
```

6.XON/XOFF: OFF

Please note that these settings should be common with DL-01's.

b-4 Recommended communication settings on DL-01

To configure DL-01 Communication setting, please read "Configuring the software" in the Help topics of DL-01. And select values as follows.

For setting "Type of Device" in the "Settings" panel (Menu—"Edit"--"Settings"),
select "PCS-300/R-100(PCS)/R-300(PSF)" for "R-300 PentaxSpecificationFunction" and other setting should be as follows.
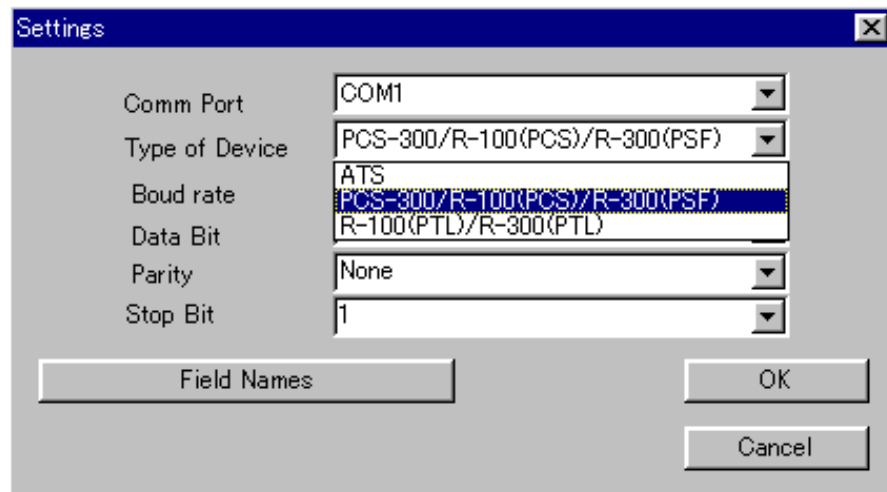
(Please note that these settings should be common with   -300's. And if the selection of "Type of Device" is not collect it may result in missing some data.)

R-300⇨PC(DL-01)
  Bits per second: 1200   (1200-9600 for sending "SURVEY DATA")
    Databits: 8
    Parity: None
    Stop bits: 1

  PC(DL-01)⇨   -300
    Bits per second: 1200
    Databits: 8
    Parity: None
    Stop bits: 1

c) Note for the Memory capacity

Data transfer failure from DL01 to R-300 may cause reduction of memory capacity. If memory capacity becomes less, please back up required data first, and then initialize coordinates data.
To initialize coordinates data, turn on the instrument while pressing [F2]+[F5]+[ON/OFF] keys, and take your finger off from [ON/OFF] again.
After you see the message "COORD. DATA INITIAL", press [F5] key. Then the message "Please,
wait" is displayed. When it is completed, the panel of Electronic Vial is displayed.

d) Difference between CSV format on "PentaxSpecialFunction" and "PowerTopoLite"

CSV file format from R-300 "PentaxSpecialFunction" version is slightly different from "PowerTopoLite" version as follows.

Type of software version	Format
R-300 "PentaxSpecialFunction" version	**PN,X,Y,Z,Code**
R-300 "PowerTopoLite" version	PN,X,Y,Z,Code,

At the end of each line of CSV file output by "PowerTopoLite", there is "," as shown above.

e) Note on converting CSV file

When you attempt to convert CSV file from R-300 by DL-01, please note that it may not succeed if CSV data type is not correct.

After [CONVERT] button is clicked on DL-01 then "CSV files from PCS/R-100 (*.*)"is selected for the type of file,"CSV Import Option" will be appear.

In the case of CSV data doesn't have "CODE" field, please select "PN XY" or "PN XYZ" from following four types for the "type" of data on the "CSV Import Option" panel.

    PN XY (Code)
    PN XYZ(Code)
    PN XY
    PN XYZ

f) For more information to work with DL-01, please refer to the "help" file after the installation.
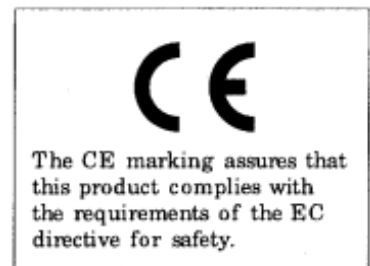
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TS01101EB2