TPS300 Basic Series

User Manual Mining Application Program

English
Version 1.0

Leica Geosystems

To use equipment in the permitted manner, please refer to the detailed safety instructions in the TPS300 Basic Series User Manual (English version).

Contents

How to use this manual

This manual describes the basic operation of the TPS300 Mining field programs. It shall be used together with a TPS300 instrument.

For detailed description about the whole functionality of the TPS300 instrument please to refer in the TPS300 User Manual.

Symbols used in the sequence of operation

Press the fixed key PROG

Press the fixed key ENTER

Navigation keys

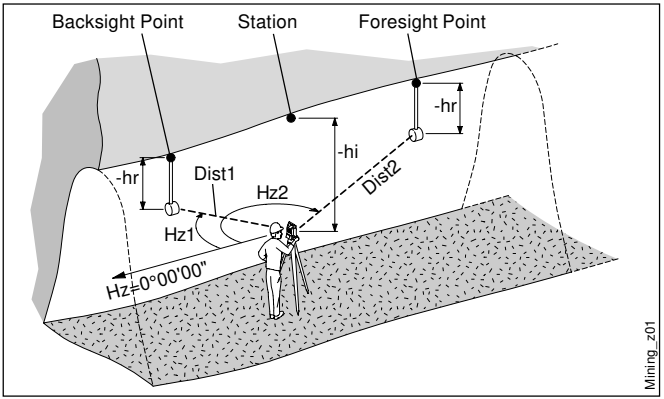
Repeat operation

User input is necessary

Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

Introduction

The application "Peg Survey" is used to establish a forward peg (point). It is used to control the intermediate horizontal angle between backsight and foresight points. It also checks the horizontal distances and heights of the backsight and foresight points. It computes the coordinates of the foresight point. "Peg Survey" allows users to measure several sets in different sequences. (The quality of measurement is controlled by the tolerances which are set before starting "Peg Survey").



Known:

- Coordinates of station
- Coordinates of backsight point

Unknown:

- Coordinates of foresight point

Data uploading using "Mining Editor"

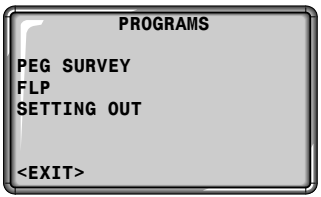
- Station coordinates (East, North, Height, Grade elevation)
- Backsight point coordinates (East, North, Height, Grade elevation)
- Tolerances, sequence, number of sets
- Job definition

Uploading of fixpoint coordinates, tolerances, sequence and number of sets is mandatory to enable the operation of "Peg Survey".

To create new jobs on board the instrument, a set of tolerance must be available.

Start "Peg Survey" from the program menu.

Start-up menu:

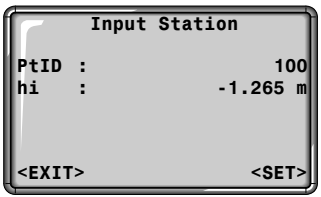


Choose "Peg Survey" and press  .

> Step 1 Select a job.

> Step 2 Confirm the set of tolerances.

Sample dialog:



> Step 3 Choose "Start" and press  , then enter point number (PtID) and instrument height (hi) for the station.

The sign for the instrument height (hi) is normally negative.

> Step 4 **<SET>**
Set Point number (PtID) and instrument height (hi).

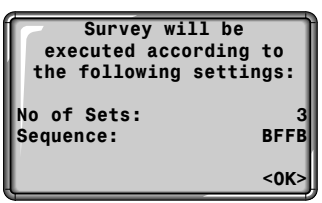
<EXIT> Leaves "Input Station" and returns to the start-up menu.

Station or BS point has no valid coords !

- The point number entered is not available in the internal memory or it has invalid coordinates.

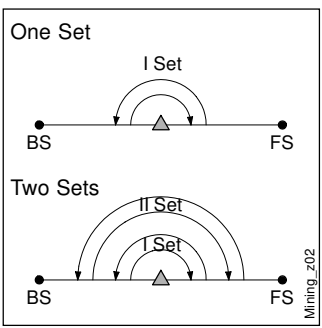
Re-enter point number (**> Step 3**).

Sample dialog:



Number of sets:
One set means to measure two times the backsight point and two times the foresight point in both faces.

The meaning of set is described:



The user must complete the number of sets as preset in the tolerance setting.

Sequence:

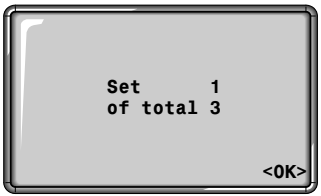
It defines the measuring sequence.

Options:

- **BFFB**
  Backsight-Foresight-Foresight-Backsight
- **BFBF**
  Backsight-Foresight-Backsight-Foresight
- **BBFF**
  Backsight-Backsight-Foresight-Foresight

<OK> Leaves this dialog and proceed to the next dialog.

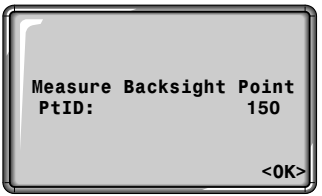
Sample dialog:



Set 1 of total 3
Start with measurement first set of three.

<OK> Leaves this dialog and proceed to the next dialog.

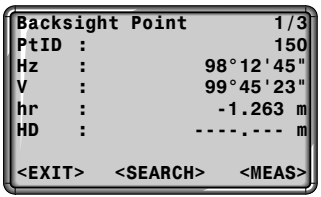
Sample dialog:



Measure Backsight Point
Information about which backsight point the user has to measure.

<OK> Leaves this dialog and proceed to the measure dialog.

Sample dialog:



> Step 5 Enter the reflector height (hr) for the backsight point, if required.

The sign for the reflector height (hr) is normally negative.

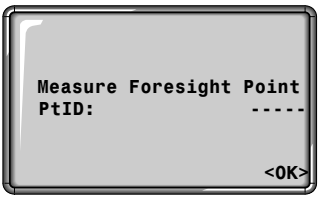
> Step 6 Aim at backsight point and measure.

<MEAS>, ALL or **DIST/REC** Angle and distance measurements are triggered and stored in the internal memory.

<SEARCH> Allows users to search and choose a different backsight point.

<EXIT> Terminates the program and returns to the start-up menu.

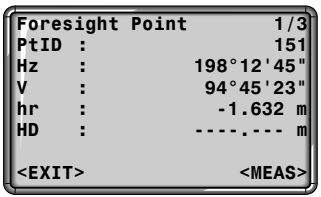
Sample dialog:



> Step 7 Enter a desired foresight point number (PtID).

<OK> Saves the foresight point number and proceed to the measure dialog.

Sample dialog:



> Step 8 Enter the reflector height (hr) for the foresight point, if required.

The sign for the reflector height (hr) is normally negative.

> Step 9 Aim at foresight point and measure.

<MEAS>, ALL, or **DIST/REC** Angle and distance measurements are triggered and stored in the internal memory.

<EXIT> Terminates the program and returns to the start-up menu.

Repeat **> Step 6** and **> Step 9** until all sets are measured.

If the tolerances after a set are not met, the user has the option to continue with the measuring or rejecting the data.

<REJECT> Reject the measurement and measure the set again.

<ACCEPT> Accept the result and continue with the next set.

Sample dialog:

```
TOLERANCES MET !  (PAGE1)

dHz   :          00°00'25"
TolHz :          00°00'50"
dHD BS:            0.001 m
dHD FS:            0.003 m
TolHD :            0.006 m
```

Page down

Sample dialog:

```
TOLERANCES MET !  (PAGE2)

dH BS :            0.003 m
dH FS :            0.001 m
TolH  :            0.004 m
Set No:         <ALL SETS>

<EXIT>                <OK>
```

Tolerances dialog:

- **dHz:** Residual on the horizontal angle
- **dHD:** Residual on the horizontal distance
- **dH:** Height residual
- **TolHz, TolHD, TolH:** Tolerances horizontal angle, horizontal distance and height
- **Set No:** Set number

<OK> Leaves this dialog and proceed to the result dialog.

<EXIT> Terminates the measurement and returns to the start-up menu.

Sample dialog:

```
TRAVERSE RESULT (PAGE1)

mHz   :          56°36'25"
mHDBS :            56.465 m
mHBS  :             0.786 m
mHDFS :            46.632 m
mHFS  :             1.236 m
```

SHIFT Page down

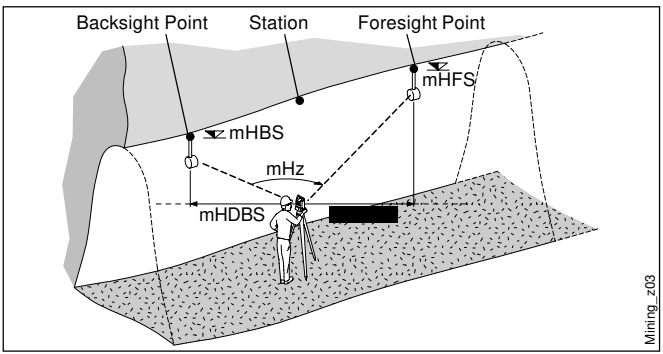
Sample dialog:

```
TRAVERSE RESULT (PAGE2)
Pt BS :                101
Pt FS :                102
mHz   :          56°36'25"
Seq   :               BFFB
Num   :                  2

<EXIT>                <OK>
```

Result dialog:

- **mHz:** Average intermediate horizontal angle between backsight point and foresight point
- **mHDBS/FS:** Average horizontal distance (Backsight and Foresight)
- **mHBS/FS:** Average height (Backsight and Foresight)
- **Pt BS/FS:** Point number (Backsight and Foresight)
- **Seq:** Sequence
- **Num:** Number of sets



<OK> Quits the program.

<EXIT> Terminates the measurement and returns to the start-up menu.

Saving data

The following result data are stored in the internal memory:

Result:

mHz:	Average intermediate horizontal angle between backsight point and foresight point
mHD:	Average horizontal distance (backsight and foresight)
mH:	Average height (backsight and foresight)

Residual:

dHz:	Residual on the horizontal angle
dHD:	Residual on the horizontal distance
dH:	Height residual

Coordinates foresight point:

E:	Easting
N:	Northing
H:	Height point
GrEl:	Grade Elevation

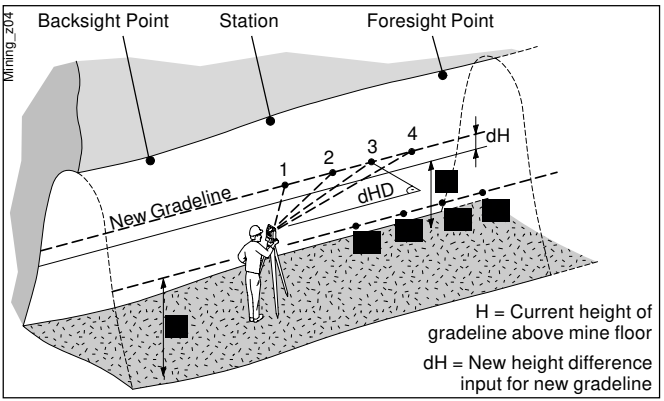
Introduction

The application "FLP" is used to mark a new line peg (Front line peg). This application is similar to "Peg Survey" and **there is only one set of measurement required**.

For a more detail explanation of "FLP", please refer to chapter "Peg Survey".

Introduction

"Grades" application is used to mark gradelines along the side walls of the mines (tunnels). It allows users to input the slope gradient and an offset concerning the grade point. It computes the stake out height difference. The program allows also to map the positions of the grades points along the gradelines.



Known:

- Coordinates and grade elevation of station
- Coordinates and grade elevation of backsight point
- Slope gradient (station until foresight point)
- Height difference (dH) between current gradeline and new gradeline

Unknown:

- Stake out height difference (dHgt) between measure point and gradeline point
- Horizontal distance (dHD) along the foresight line

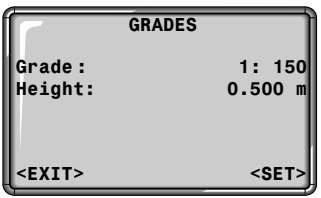
- Station setup
- Application "FLP" is done

Menu dialog of "FLP":

Start "Grades" after "FLP" (Front Line Peg) choose

<Grades> and press  .

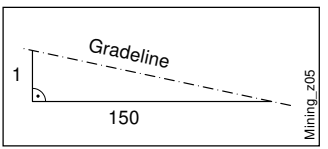
Sample dialog:



If the slope gradient (station until foresight point) is the same like the slope gradient (backsight point until station) then continue direct with **> Step 3** .

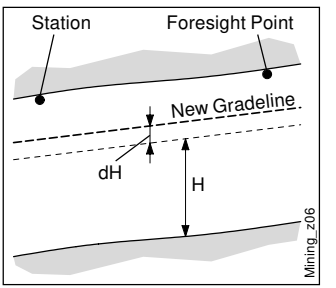
> Step 1 Enter the slope gradient (proportion e.g. 1:150).

Slope gradient explained:



> Step 2 Enter the height difference.

Height difference explained:



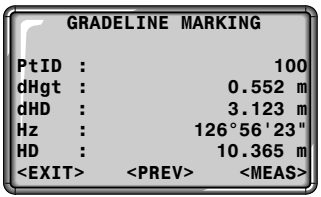
H: Current height of gradeline above mine floor

dH: Height difference

> Step 3 **<SET>** Set the entered values and proceeds to the gradeline marking dialog.

<EXIT> Leaves the application "Grades" and return to the menu dialog of "FLP".

Sample dialog:



> Step 4 Enter a desired point number (PtID).

> Step 5 Aim at target point and measure.

<MEAS>, **ALL** or **DIST/REC**
Measurement is triggered and stored in the internal memory.

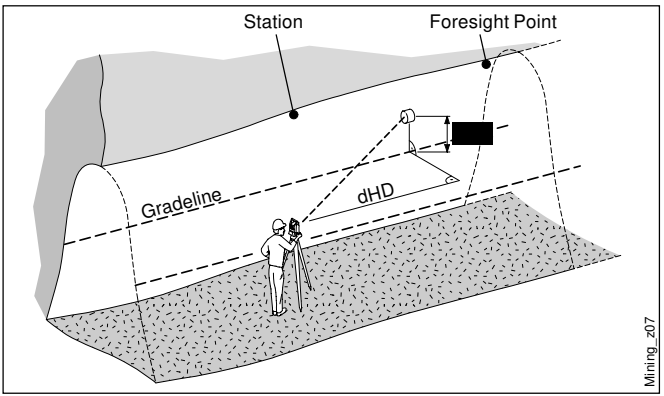
<PREV> Returns to the start of "Grades" application.
For a new definition of slope gradient and height difference repeat **> Step 1** until **> Step 3**.

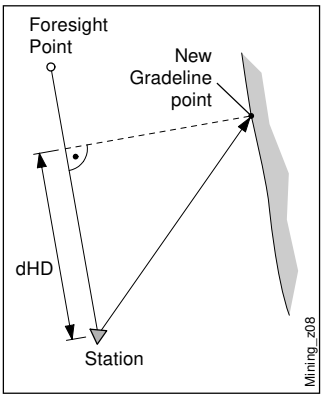
<EXIT> Leaves the application "Grades" and return to the menu dialog of "FLP".

Results

Grades computes the height difference (dHgt) between measure point and stake out point and the horizontal distance (dHD) along the foresight line.

Height difference (dHgt) and horizontal distance (dHD) explained:





If the sign is negative the grade point are above the measure point.

If the sign is positive the grade point are below the measure point.

> Step 6 Turn the telescope until the height difference (dHgt) is zero, then repeat the measurement (**> Step 5**).

Saving data

The following result data are stored in the internal memory:

Measurement data:

PtID:	Point number
Hz:	Horizontal angle
V:	Vertical angle
HD:	Horizontal distance
SD:	Slope distance
dH:	Height difference

Coordinates of new gradeline point:

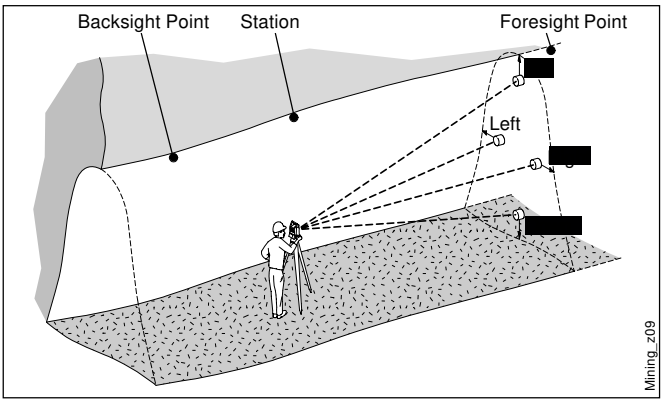
E:	Easting
N:	Northing
H:	Height

Grades Result:

daH:	Stake out height difference
daHD:	Horizontal distance along the foresight line
Grd:	Slope gradient
GE:	Grade elevation

Introduction

"Offset" application is generally used to obtain sections of the tunnels for volume computation as well as mapping of the tunnels. It allows users to input offset value (left, right, up and down) and computes after measurement the actual coordinates of the tunnel walls.



Known:

- Coordinates of station
- Coordinates of backsight point
- Offset value

Unknown:

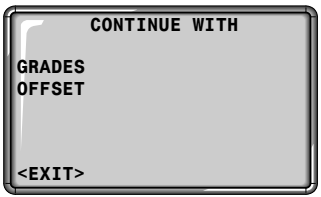
- Point coordinates of the tunnel walls

Before starting Offset

- Station setup
- Application "FLP" is done

Start and execution Offset

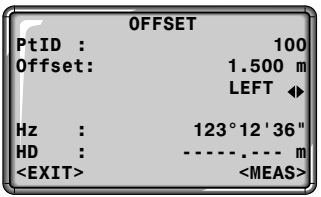
Menu dialog of "FLP":



Start "Offset" after "FLP" (Front Line Peg) choose <OFFSET>

and press  .

Sample dialog:



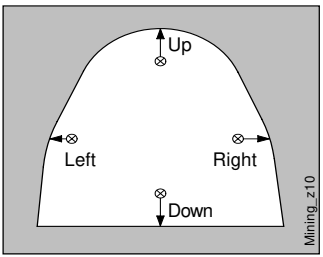
> Step 1 Enter a desired point number (PtID) and the offset value.

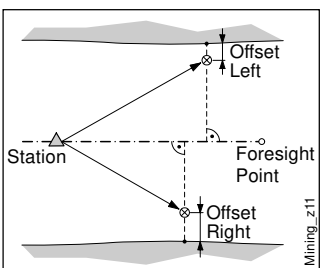
> Step 2 Using  for the offset definition.

 (Left, Up, Right, Down)

 (Left, Down, Right, Up)

Definition of offset explained:





> Step 3 Aim at target point and measure.

<MEAS>, **ALL** or **DIST/REC**
Measurement is triggered and stored in the internal memory.

<EXIT> Leaves the application Offset and return to the menu dialog of "FLP".

After storing, the program returns to the measuring dialog.

If you want to measure a new point repeat **> Step 1** until **> Step 3**.

Saving data

The following result data are stored in the internal memory:

Measurement data:

PtID:	Point number
Hz:	Horizontal Angle
V:	Vertical Angle
HD:	Horizontal distance
SD:	Slope distance

The measurement data are already corrected.

Offset information:

Offset:	Offset value
OffsetDir:	Offset direction (left, up, right, down)

Coordinates of new offset point:

E:	Easting
N:	Northing
H:	Height

Introduction

"Mining Editor" (PC Program Package) is a Windows-based program used for the data exchange between the TPS300 Series and the PC.

Installation on the PC

The installation program for the "Mining Editor" can be found on the CD-ROM supplied. Please note that the "Mining Editor" program can only be installed under the operating systems MS Windows 95, 98, NT4.0, WINDOWS2000.
For the installation call program "setup.exe" in the directory "MiningEditor\Disk1" on the CD-ROM and follow the onscreen instructions to complete the installation.

Program content

The "Mining Editor" can be used for the following purposes:

- **Data Import & Export**
  Import and export fixpoint files (ASCII format).
- **Data Transfer between PC and TPS300 instrument**
  Upload and download of fixpoint files, upload of tolerances, download of measurement data and conversion of measurement data to various formats for peg calculation and archiving.

Practical Examples

- **Define and upload Tolerances**
  Defining tolerances, editing tolerances (password protected), uploading tolerances
- **Creating fixpoint files**
  Creating and editing of fixpoint files (Coordinates)

The following pages of the manual describe the functionality of "Mining Editor" with two practical examples.

- **Example1:**
  Creating fixpoint files, Define tolerances, Uploading them to the instrument
- **Example2:**
  Importing of fixpoints in ASCII format

Creating fixpoint files

> Step 1 Open a new file: ***File → New***

> Step 2 Enter point number, coordinates, backsight reference point, grade elevation.

Mining.gsi

	Point ID	Easting	Northing	Elevation	Backsight Point	Grade Elevation
1	P101	77.765	55.987	90.265	P100	88.265
2	P102	88.365	60.325	91.354	P101	90.365
3						

> Step 3 Save the created coordinate list: ***File → Save As***

In the fixpoint entry module, the "Mining Editor" allows users to create, view, modify and save coordinate lists.

Define tolerances

> Step 1 Open tolerances: ***Options → Tolerances → Edit***

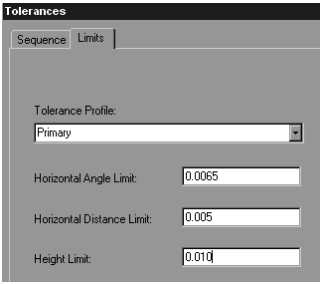
> Step 2 Enter a password.

Create a new password: ***Options → Password***

> Step 3 Select a measuring sequence (BFFB, BFBF or BBFF).

(B = Backsight point and F= Foresight point).

> Step 4 Enter number of sets.



> Step 5

a) Select a tolerance type (Primary, Secondary, Tertiary).

b) Enter the values for:
- Horizontal Angle Limit
- Horizontal Distance Limit
- Height Limit

Upload Fixpoints and Tolerances to the instrument

Ensure that the unit setting on the instrument (Menu / All Settings / Unit Settings) is identical to the units set in the "Mining Editor" (***Options → Settings***).

> Step 1 Open a fixpoint file: ***File → Open***

> Step 2 Choose Upload: ***Data → Upload***

> Step 3 Select a job.

> Step 4 Enter jobname, operator and comments.

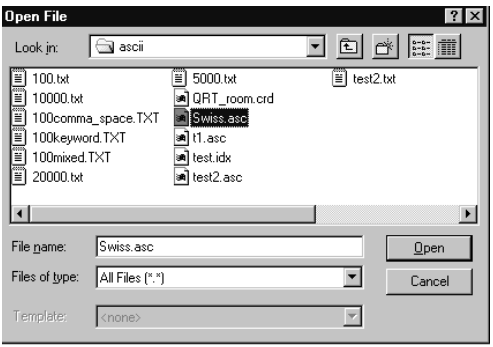
Operator and comments are optional.

> Step 5 Select a tolerance type.

Process import fixpoint files

The "Mining Editor" allows to import fixpoint files in ASCII format.

> Step 1 ***File → Open***



> Step 2 ASCII-File search and select.

> Step 3 Open the selected file.

Follow the wizard onscreen instructions to produce the correct format.

> Step 4 Save the created file:
File → Save as

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Total Quality Management- Our commitment to total customer satisfaction

Ask your local Leica Geosystems agent for more information about our TQM program

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