Foreword

Thanks for you purchasing the FOIF EL300 series Digital Level. In order to use the instrument well, please read this instruction manual carefully and keep it cautiously for consulting in the further.

Product confirmation:

The model and the serial number of your product are indicated on the type plate. Enter the model and the serial number in your manual and always refer to this information when you need to contact your agency or FOIF authorized service workshop.

Type: ____________ Serial no.: ____________
NOTE:
- Please read this instruction manual carefully before use it.
- Avoiding insolates the instrument, and don’t collimate the sun directly for protecting eyes and instrument.
- When using it please insure the connection between tripod and instrument is firm. If raining, you can hooed it with rainproof cover.
- Please loose the clamp system when the instrument in the case, and keep the case dry.
- When transporting, keep the instrument in the case and try your best to lighten librations.
- After working in wet or raining condition, please wipe water on surface and keep it in air, when it is dry completely, you can put it in the case.
- Don’t clean the instrument surface with alcohol, ether or other irritant chemical things; and use the equipped paper to clean the optical parts.
- If you do not use the instrument for a long time, you should take the battery pack down and recharge once every month.
- If you do not use the instrument for a long time, take the instrument out of the case and keep it in the dry condition.
- If the temperature changing is sharp (for example: move it out from one hot vehicle), the measured data will be influenced, so it can be used when it adapts the surrounding condition.
- Before use it, you should check the voltage for whether it is enough.
- Do not remove the battery at working time, otherwise some settings or measured data may be lost.
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1. Application

EL300 digital level is designed with new coding technology, which can maximize work efficiency and minimize human error, providing consistent measurement precision and speed, regardless of operator skill; Also auto compensator is adopted for high measuring accuracy and working efficiency. Model EL300 Digital Level is adoptable for the Second or Third-order geodetic leveling of national networks; It can be used for engineering and deformation surveys, such as height control for engineering projects, deformation and subsidence measurements, checking bridges and structures, monitoring movements, etc. It is also used for general construction engineering and installation of large size machines.
2. Nomenclature and functions

2.1 Nomenclature

- Sight vane
- LCD
- Key Board
- Circular bubble
- Eyepiece
- Adjusting screw for Circular bubble
- Communication port
- Model label
- Handle
- Fast measuring key
- Serial number label
- Focusing Screw
- Horizontal Tangent Screw
- Bottom Plate
2.2 Display

EL300’s display uses a graphic LED which has 8 lines, the content will changes with the different measuring mode.

◆ Display of EL300 series:

- **Main display**
  - Files
  - Config
  - Survey
  - Calculate

- **Configuration display**
  - 1. Input
  - 2. Limits/Tests
  - 3. Adjustment
  - 4. Instrument Settings
  - 5. Settings of recording

- **Fast setting display**

- **Project management display**

- **Distance measuring display**

- **Line measuring display**

Measured distance
HD: 12.345m
### 2.3 Operating Key

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<th>1st Function</th>
<th>2nd Function</th>
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<td>Power On/Off</td>
<td></td>
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<tr>
<td>ESC</td>
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</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>Shift</td>
<td>Shift character inputting mode</td>
<td>between numbers and letters</td>
</tr>
<tr>
<td>BS</td>
<td>Delete character at inputting mode</td>
<td></td>
</tr>
<tr>
<td>Func</td>
<td>Enter fast setting menu</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enter key, press it to confirm</td>
<td></td>
</tr>
<tr>
<td>,</td>
<td>Input comma sign</td>
<td>Input minus sign</td>
</tr>
<tr>
<td>.</td>
<td>Input point sign</td>
<td>Input plus sign</td>
</tr>
<tr>
<td>0-9</td>
<td>Input numbers</td>
<td>Input letters</td>
</tr>
<tr>
<td></td>
<td>Turn menu page</td>
<td>Navigates through menus, shows drop-down lists and changes check box status</td>
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</tbody>
</table>
3. **Battery**

3.1 Removing the battery

(1) Hold the battery by hand on the clamp and holder.

(2) Pull out the clamp as the arrow direction, at same time take the battery upwards, the battery will be removed.

3.2 Mounting the battery

Put the battery on the right position and press it until the lock clicks in place, it will be mounted on the digital level.
3.3 Battery Indicator

Battery power display indicates the power condition. You should recharge or replace the battery when you hear the continue buzz. Please turn off in the normal way in order to save the data. Please find the battery operating time on Specifications.

The precise condition of the battery can be called up in every measurement menu with the Function Field “info”
3.4 Recharge

(1) Insert the charger pin to the hole of battery; plug the charger on 100-240VAC (50-60Hz) power supply, the red lamp lighting.

(2) When recharge is complete, the light become green. Normally, it will take about 3-4 hours.

Caution: For indoor use only.

Note:

1. The new battery (or not be used for long time) need to recharge and discharge for several times, the battery could become the good performance for using. Please recharge more than 10 hours.

2. Please prolong charge 1-2 hours after green lamp lighting to reach the best performance.

3. Lamp situation:
   - red lamp lighting--charging;
   - green lamp lighting--charge complete;
   - red lamp flash--waiting, not connecting or battery defective.

4. If the red lamp flashes when plug the charger, please remove the charger and wait a minute to plug it again.
4. Preparation for measurement
4.1 Setting up the instrument

(1) Setting up the tripod
First, extend the extension legs to suitable lengths and tighten the screws on the midsections
(2) Attaching the instrument on the tripod head
Place the instrument carefully on the tripod head and slide the instrument by loosening the tripod screw.
(3) Leveling with the circular level
Adjusting leveling screws, position the bubble in the center of vial.

4.2 Focusing and Sighting
The telescope is pointed towards a uniformly light surface, or a sheet of white paper, and the telescope eyepiece is turned until the reticule cross hair appears sharp and absolutely back. The eyepiece dioptric scale reading now indicates the correct setting for the observer’s eye. By hand the telescope is pointed roughly at the leveling staff. Turn the focusing knob, which has coarse and fine motion until the staff image appears sharp and free from parallax with respect to the cross hairs, i.e. there should be no apparent movement between the horizontal hairs and a staff graduation when the observer moves his eye slightly up and down. To bring the vertical cross hair exactly on to the centre of the staff by turning the horizontal drive screw.
4.3 Mounting and removing SD card
(1) Remove the battery firstly.
(2) Remove the rubber cover.
(3) Insert SD card to the slot, when removing it, press the SD card slightly, the card will leap out automatically and take it out by hand.
(4) Put on the rubber cover.
(5) Mounting the battery on the digital level.
Select as **Files/Memory**, press left/right navigation key to change the memory media, select **External** to take SD card as current store memory.
5. Basic measurement program

5.1 Switching on
(1) Confirm the instrument is leveled.
(2) Switch on the instrument with the Power key, after a short display of the Logo and go to main menu automatically.

5.2 Switching off
When the level power on, at any display press Power key, power off dialog box will display, select Yes to switch off the instrument.
5.3 Screen backlight switching on/off
(1) At any mode press Func key to enter function menu.

(2) Press the arrow key to move the cursor to the sixth option *Illum On*, press Enter key to confirm, the symbol will change from sun to moon, and screen backlight will be on.

(3) Press Enter key again, screen backlight will be off, and the symbol will change from moon to sun.

NOTE: On the function setting menu, you can press the 6 icon directly to switch on/off screen backlight.
5.4 Distance measurement

(1) At any mode press Func key to enter function menu.

(2) Press the arrow key to move the cursor to the first option *Meas dist* to enter distance measuring screen.

(3) Collimate the staff, press Meas key to measuring distance, the data will display.

(4) Press ESC key to finish the distance measurement and back to function menu.
5.5 Inversed staff measurement

Inverted measurement are required for work underground and inside buildings, the staff base is turned upwards. The inverted staff measurement will be set for all measurements made until this setting is changed.

1. At any mode press Func key to enter function menu.

2. Press the arrow key to move the cursor to the third option *Rod invers*.

3. Select Yes to confirm inverted staff setting.

When inverted staff is set an arrow pointing downwards will be shown in the lower right corner of the display.
5.6 Multiple Measurements
Repeated measurements and standard deviation can be defined to be sure that the required accuracy is reached.

\( nM = 1 \) \( \) One measurement only

\( nM > 1; mR = 0 \) Performance of all measurements

\( nM > 1; mR > 1 \) Performance of measurements until number of repetitions or standard deviation has been reached.

In repeat measurements, the mean values of staff reading and distance and the standard deviation are displayed after each measurement.

If the standard deviation has been defined, at least three measurements are performed.

1. At any mode press Func key to enter function menu.

2. Press the arrow key to move the cursor to the fourth option Mult meas.

3. Input the number of measurement \( nM \) and standard deviation \( mR \). Press Enter key to store.

   \( nM = \) The number of measurements that the instrument will make before a result is accepted.

   Maximum=10 measurements.

   \( mR = \) The maximum standard deviation to be reached before a result is accepted. A minimum of three measurements will be made.
5.7 Input Comments
Whenever it is necessary during the measurement alphanumeric text information including date and time can be entered successively.

1. At any mode press Func key to enter function menu.
2. Press the arrow key to move the cursor to the fifth option Comments. Select Input future information.
It is now possible to enter alpha and numeric signs.
Press right or left key to add current date or time to the information, select Append current date and/or Append current time.
Press Enter key to store the information.

With this command it is possible to document the basic status of the instrument. Data lines with the following contents are then successively recorded: measuring unit.
# 6. Menu introduction

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</tr>
<tr>
<td>6. USB</td>
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<td>Input of different Limits and control settings</td>
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<td>Line of sight adjustment</td>
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<td></td>
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<td>Setting unit, auto-off, language, voice, date and time type, etc.</td>
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<td></td>
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<tr>
<td>Calculate</td>
<td>1. Line adjustment</td>
<td>Line Adjustment</td>
</tr>
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</table>
7. **Instrument settings**
7.1 Settings of condition and limits

In the Configuration menu it is possible to set all general instrument settings and make the instrument adjustments.

Select **Configuration** from main menu.

Under **Input** menu it is possible to set the Refraction coeff., Addition constant (R), Data and Time. Press Enter key to save.

Under **Limits/Tests** menu to set the leveling measurement limits.
Key in the **Max.Sight dist, Min.Sight Height** and **Max.Sighting Height** of your choice and press Enter key to continue to page 2
Max.Sight dist inputting range: 0-100m
Min.Sight dist inputting range: 0-1m
Max.Sight height inputting range: 0-5m
Page 2 of **Limits/Tests** menu
Input in the **Max difference** of your choice. Press Enter key to continue to page 3.
Max.difference inputting range: 0m - 0.01m

Page 3 of **Limits/Tests** menu
Key in the Max.distance of your choice for a station (**BS to FS**) and for the whole line (**Total BS to FS**)  
BS to FS inputting range: 0m-5.0m  
Total BS to FS inputting range: 0m-100m
7.2 Adjusting the line of sight
Long transportation, prolonged storage and major changes in temperature may lead to misalignment of the instrument and faulty measurements results, particularly in case of different distances from instrument to staff, adjusting the line of sight and defined measurement methods eliminating these errors.

Define a distance of approx. 45m length and divide it roughly into three. Setup 2 instrument stations (1,2) about 15m away from the rods on the connecting line between them. Measure both rods from each of these stations.

Select 3.Adjustment from the Configuration menu, the old adjustment value and information are displayed.

Select Curvature and Refract.corr on or off during adjustment, press Enter key to confirm.

Select Yes to continue or NO to stop the adjustment.

NOTE: After an adjustment is made line continuation is impossible.
Set up the instrument on Station 1, input the distance to staff A, aim and focus A, press Meas key to measure.

Input the distance to staff B, aim and focus B, press Meas key to measure.

Set up the instrument on Station 2, input the distance to staff B, aim and focus B, press Meas key to measure.

Input the distance to staff A, aim and focus A, press Meas key to measure.

The result of the adjustment will be displayed. Select Yes to accept the new value, select No to cancel the adjustment and exit the program.

Turn the staff B around or replace it with a metric graduated staff and compare the reading with the specified value R. If the difference exceeds 1mm, adjustment should be operated again.
7.3 Instrument settings
Select **4. Instrument Settings** from the Configuration menu.

Page 1:
Select **Height unit**
- m= meter
- ft= foot (US Survey foot)

Select the number of decimals that will be displayed, **Display(R)**
Select 10 min, to switch off the instrument after 10 minutes without any key press, **Shut off**.

Select the display **Language**.

Press the Enter key to save and continue to Page 2.

Page 2:
Select the **Date** system

Select the **Time** system.
- D=Day
- M=Month
- Y=Year
7.4 Settings of recording

Page_1.

Select **5. Settings of Recording** from the Configuration menu.

Select or clear the **Recording** check box to turn on or off the recording.

Select **Record Data**.

R-M= Only the measured values are saved

RMC= The measured and calculated values and saved.

Select **Rec. additional data**. Press Enter key to continue to Page 2.

Page 2: Number system Line measurement

Enter **PNo.increment** and Start number Press enter key to confirm and continue.

Enter **Start** number, the start number count with the PNo.increment

Page 3: Number system Single point measurement/Intermediated sights:

Enter **PNo.increment** and Start number Press enter key to confirm and continue.

Enter **Start** number, the start number count with the PNo.increment

Press Enter key to save and continue.
8. Measuring program
8.1 Single point measurement (Without Reference Height)
When measuring without reference height, staff reading can be displayed successively and independently of each other. If recording and point number incrementation have been activated, the measurements are stored correspondingly.
Result: \( R = \text{Staff reading} \quad \text{HD} = \text{Horizontal distance} \)

Switch on, select Survey on the main menu.

Survey menu will display
Select **1. Single point measurement**, enter point number and point Code, press MEAS key to start the measurement, measuring result will display. Point number will increase and start measurement to next point.

**NOTE:**
The point number and code entered will be stored with the next measurement.

Select **Info** shorts battery status and time, data. Select **Rpt.** to repeat the measurement.
8.2 Line leveling measurement
The individual height difference are measured and added up. When entering the heights of the start and end points, the normal-actual is computed. Intermediate sights and stake out within the lines as well as continuing the line are possible.
Result:  Sh: total height difference.
Db, Df: sum of backsight and foresight distances.
Dz: final difference (if reference heights for start and end points have been entered)

On the main menu select Survey.

Select 2.Line leveling to enter measuring program
Select Line? to define a leveling line, when selecting Continue an uncompleted line will be automatically continued.
When selecting New to create new leveling line.
Input the **Line number** after selecting new line.

Press Down key to Measure method, select measuring method, there are five options can be selected: BF, BFFB, BFBF, BBFF, FBBF

Select or deselect **alternate**.
Press Enter key to confirm the inputs on this page and continue to the next page.

Select point number (**PNo.**) from the drop-down list or input the point number of your choice.
Select **From project** to select a point number from the present project.
Select **Other project** to select a point number from another project.

Press Down key to next item **Code**.
Select *Code* from the drop-down list or input the code of your choice.

Press navigation key (Right arrow) to open the code list.

Input in the *Benchmark* height. If Point number is chosen from a list the benchmark height will be given automatically.

Press Enter to save the inputting and continue.

According to selected measuring method to aim and focus related staff, here the example is aBF.

Start a backsight with the Meas key, when the backsight measurement is ready the result will be displayed.

**NOTE:**

*MEAS* on the right bottom part of the display indicates that the instrument is ready to measure.

When a measurement is ready the number of measurement will increment.
Select incremented or individual point number.

Select Point number from the drop-down list or input the point number of your choice.
Select *From project* to select a point number from the present project.
Select *Other project* to select a point number from another project.

Select *Code* from the drop-down list or input the code of your choice.

Press Right key to open the code list.

Aim and focus foresight staff, press MEAS key to start measuring, when the foresight measurement is ready the result will be displayed.

When a measurement is ready the number of measurement will increment.
Select **Info** to check information Memory, Battery, Date, Time and total sighting, Db and Df.

**NOTE:**

As total sighting distance are known, the next stations have to be selected in such a way that the total sighting distances Db and Df are almost identical at the end of the line.

Select **Rpt**, if you wish to repeat the last measurement or the last station.

To set up automatic controls see Limits/Tests on page 22.

The instrument will warn the user when a measurement is outside the set limits. Press **No** to accept measurement or **Yes** to repeat measurement.
Continue next stations measurement. Select **Lend** to finish the line leveling measurement.

Select Yes at a point with a known height. Select No at a point with a unknown height.

When finish with know point, enter **Point number, Code** and **Benchmark** height from your choice.

Press Enter key to continue, Line leveling measurement will display:
- **Sh**: total height difference
- **Db**, **Df**: sum of backsight and foresight distance.
- **Dz**: final difference because entering the benchmark heights.

When finish with unknown point, only Total height difference (Sh) and Total sighting distance are displayed.
8.3 Intermediate sights
After a backsight measurement of a point with known height, the heights of discretionary points are determined.

Result:
\[ Z = \text{Height of intermediate point} \]
\[ h = \text{Height difference between new and backsight point (for display only)} \]

On the main menu select Survey.

Select 3. Intermediate sights program.
Select point number (PNo.) from the drop-down list or input the benchmark point with number, Code and Benchmark height of your choice.

Select From project to select a point number from the present project.
Select Other project to select a point number from another project.

Press Enter key to continue.

Aim and focus the instrument to the staff at the benchmark.
Start the measurement with MEAS key.
Accept the measurement to benchmark point or repeat the measurement.

Input the point number and code for new point.

Start the measurement with MEAS key. Result of new point will display. Select Disp to change view. Select Rpt. to repeat last measurement.

Press ESC key to escape. Select YES to end the program. Select NO to continue the program.
8.4 Stake Out
After the measurement of point with known height, the heights of the point to be stake out and the differences between nominal and actual values are determined. The staff is shifted until the difference measured between the nominal and actual values has been reduced sufficiently.

Result: $dz$: Setting out difference (nominal-actual)

On the main menu select *Survey*.

Select *Stake out* program.
Select point number (PNo.) from the drop-down list or input the benchmark point with number, Code and Benchmark height of your choice.

Select From project to select a point number from the present project. Select Other project to select a point number from another project.

Press Enter key to continue.

Aim and focus the instrument to the staff at the benchmark. Start the measurement with MEAS key.

Accept the measurement to benchmark point or repeat the measurement.
Select point number from the drop-down list or input the Point number, Code and Benchmark height for the Stake out point of your choice.

Press ENTER key to continue.

Aim and focus instrument to staff at Stake out point.
Start the measurement with MEAS key.
Measuring result will display, according to the deviation dz, staff will be shifted and measurement repeated until dz has been reduced sufficiently.

Select Accept and press ENTER key to confirm and save the result.

Define next point for stake out, steps are save as above descriptions.

Press ESC key to escape.
Select YES to end the program.
Select NO to continue the program.
8.5 Continue measurements
With this program to continue the last leveling measurement or setting the measuring times or auto off on/off.

On the main menu select *Survey*.

Select *5. Continuous measurement* program.

Input Station number, *Code*, measuring time and select *Shut off* on/off.

Press ENTER key to continue, instrument information will display.

Press ENTER key to continue, aim and focus the instrument to the staff. Start the measurement with MEAS key to continue the last measurement.
9. Line Adjustment

In line leveling, a line is linked to points with known heights at the beginning and at the end so that the measured height difference can be compared with the nominal height difference.

The “line adjustment” program allows spreading the occurring difference over the individual staff stations proportionally to the sighting distances, obtaining adjusted heights as result. During this operation, the measured values (staff readings, distances) are not changed. Intermediate sights are only improved according to the improvement of the respective instrument station.

Line adjustment can only be performed if the leveling line has been completed and saved on the memory along with the intermediate heights.

It may happen that the definite heights of backsight points are not yet known when the line is measured. In this case, the nominal height values can be entered during the line adjustment. It is also possible to adjust loops. Loops are leveling lines with identical start and end height.

Requirements for a line adjustment:

1. The entire leveling line has to be recorded in one project.

2. Set in any case the recording mode RMC. Otherwise line adjustment will not be possible, as in the project no space is reserved for the adjusted heights.

3. While measuring a station, the leveling line must not be interrupted in such a way that measurements are skipped.

4. Different partial lines started in each case with “new line” can only be adjusted separately.

5. Line adjustment can not be repeated.

6. Before starting line adjustment, make sure the battery is sufficiently charged.

7. The data stored on memory must not be changed between line
measurement and line adjustment.

In the Main menu select Calculation.

Select Line Adjustment

Select the project to be adjusted and press Enter key to continue.

The program offers the “working” project as default. All lines in all projects are adjustable.

Define the search criteria and enter the value of your choice, press Enter key to continue.

Search is available with Point number, Point code, Line number and Memory address.

Select Accept and press Enter key to accept the proposed line. Press navigating keys up or down arrow to search for lines with the same criteria.

Press Enter key to continue, the program will find automatically the end of this line and all the continuations.
Program will inform about the data lines for the chosen line. Select **YES** and press Enter key to continue.

Input or confirm the proposed Benchmark heights $Z$, press Enter key to continue.

Input or confirm the proposed **Code** for the changed Benchmark heights. Press Enter key to continue. NOTE: Changed point code helps to identify the changed heights

Press Enter key to continue. It will helpful to identify human errors in this process.

Press Enter key to accept the adjusted values.

Finalize the adjustment by pressing Enter key.
10. Data Management
EL300 offers a project (files) oriented data storage. Data are stored physically in the internal memory in an internal data format. The data can be transferred directly via cable to PC. During transfer of the data the format will changed to the common ASCII format. The exported project will have the unit of measurement in relation to the current setting (Configuration, Instrument settings, Height unit). This allows exporting the file in different units of measurement appropriate to the users chooses.

10.1 Project Management
The submenu allows select, create, delete and rename projects.

In the Main Menu select Files.

Select *Project Menu*.

Select *Select project*
Select the requested project from the project list and press ENTER key to select.

Instrument will return to previous menu, selected project will be displayed in Main Menu.

10.2 Create a project

Select New project.

Input the project Name of your choice. You can also input the Operator name. Press ENTER key to store the project. The project can now be selected from the project list.

Input fields are open for alpha and numeric inputs Press Shift key, alpha and numeric inputting will switch. Name field is limited to 8 characters.
10.3 Rename a Project

Select *Rename project.*

Select the requested project and press ENTER key to continue.

All projects are available in the chronological order they were created.

Input the new project name and press ENTER key to store.

Input fields are open for alpha and numeric inputs Press Shift key, alpha and numeric inputting will switch.

The changes will be shown in the project list.

10.4 Delete a Project

Select Delete project.

Select the requested project and press ENTER key to continue.

All projects available in order of created time.
Select **YES** and press ENTER key to delete the selected project.
Select **NO** and press ENTER key to escape.

**10.5 Data Edit**

It allows searching data lines for viewing and changing, input data lines (Height, Point number and Code), delete data lines and creating or modifying the three codes lists.

In the Main dialog select **Files**.

Select **Data editor**.
Select Project from the drop down list. Press ENTER key to continue.

**10.5.1 Searching data lines**
Select **Data view**, the last data line of the project will be shown.
Select **Search** and press ENTER key to continue.

Select Data lines from the drop down list. Select point number (**PNo.**), Memory address (**Memory adr.**) or **Line number**. Press ENTER key to continue.

Input the Point number, press ENTER key to continue.

Press navigation keys up or down arrow to search for lines with identical criteria.

For key in point, **Change** will display, select **Change** to change Heights, Point numbers and Codes.

10.5.2 Input of Data Lines

In Data editor menu, select **Input data**.

Input Point number (**PNo.**), **Code**, **Benchmark height**. Press ENTER key to store the values.

When all points have been entered, press ESC key to return to the Data editor menu.
10.5.3 Deleting Data Lines

In Data editor menu, select **Delete data**.

Select **Delete all Data**.

Select **YES** to delete all data in the address range.
Select **NO** to cancel the operation, the data will not be deleted.

11.5.4 Deleting selected data lines

In Data editor menu, select **Delete data**.

Select **Select data**.

Press navigation key to select searching criteria from **Data line 1**.
According to searching criteria to key in the point number or address or line number.
Press ENTER key to continue, data line will display.
Select *Accept* to confirm, the selected will be deleted.

10.5.5 Data import
In Data editor menu, select *Date import*.

“Waiting to receive date” will display.
Connect the EL300 digital level with PC via serial cable.

Run data transfer program on PC, set Comport firstly, then click *Opencom* button, the indicator change from red to green.
Select the data format for uploading data lines, click *OpenFile* button to import the data file, all the data in this file will display in the window of transfer program, click *Upload Data* to transfer the displayed data to the internal memory of EL300.

10.6 Edit code list

In the Main menu select *Files*.

Select *Code editor*, code list will display.

Highlight *Ins* and press ENTER key to insert a new item.

Input the code and code formation, press ENTER key to save it to memory.

Press up/down navigation keys to highlight the item you want to delete, highlight *Del* and press ENTER key.

Select *YES* and press ENTER key to continue or select *NO* and press ENTER key to stop.
10.7 Export data from EL300 to PC
Connect PC via serial cable to the EL300 digital level, start data transfer program at PC.
Run data transfer program on PC, set Comport firstly, then click Opencom button, the indicator change from red to green.
In the Main muna select Files.
Select Data export.
Select proposed project in the list.
On PC, click Download Data to waiting data from EL300.
Press ENTER key of EL300 to continue, the data in selected project will be transferred to PC.
After the transferring finish, EL300 will return project management menu.

10.8 Memory
In the Main dialog select **Files**.
Select **Memory**, memory information will display.

Select **Format** to format the memory.

Select **YES** and press ENTER key to continue.
CAUTION- When formatting the memory all stored data will be lost.

Select **NO** and press ENTER key to abort.

EL300 will return to File Management manu.
10.9 Transfer data via USB cable
For EL300 USB cable D30-2200 is standard data transfer cable, you can connect EL300 and PC by D30-2200 directly, no driver program need.

In the Main dialog select Files to project management menu.
Press Down key turn to page 2.

Select USB.

Connect instrument and PC via D30-2200 cable, EL300 will display “U FUNCTION Press ESC exit”. ※1 ) It means the EL300 is connected with PC already.
Press [ESC] to disconnect them, and the instrument back to previous menu.

After EL300 is connecting with PC, the internal memory will be taken as one flash drive of PC, with data transfer software to view the data.
11. Formula and Constants

Correction of staff reading and sighting distance

\[ L = L_0 - K_1 + K_2 \]

\[ K_1 = \frac{E^2}{2R} \]  
earth curvature correction

\[ K_2 = rk \cdot \frac{E^2}{2R} \]  
refraction correction

Where:

- \( L_0 \): uncorrected staff reading
- \( E \): sighting distance
- \( R \): earth radius, \( R = 6380000 \) m
- \( rk \): refraction coefficient
12. Specifications

Telescope

<table>
<thead>
<tr>
<th>Image</th>
<th>Erect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnification</td>
<td>30×</td>
</tr>
<tr>
<td>Objective lens</td>
<td>Φ45mm</td>
</tr>
<tr>
<td>Field of view</td>
<td>1°30′</td>
</tr>
<tr>
<td>Minimum focus</td>
<td>1.0m</td>
</tr>
</tbody>
</table>

Measurement

Accuracy

Standard deviation for 1 km double leveling (ISO17123-2)

Electronic measurement

| EL302A  | ±0.7mm/EL302A |
| EL312A  | ±1.5mm/EL312A |

Optical measurement

| EL302A  | ±1.5mm/EL302A |
| EL312A  | ±2.0mm/EL312A |

Distance measuring accuracy

| d ≤ 10m        | ±10mm          |
| 10m < d ≤ 50m  | ±0.1%×d        |
| d > 50m        | ±0.2%×d        |

Time for single measurement

≤ 2s

Measuring range

2-105m

Measurement modes

single, average, tracking

Height unit

m/inch selectable

Display resolution

<table>
<thead>
<tr>
<th>Height</th>
<th>EL302A</th>
<th>0.1mm(0.0001ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EL312A</td>
<td>1mm(0.001ft)</td>
</tr>
<tr>
<td>Distance</td>
<td>EL302A</td>
<td>1mm(0.001ft)</td>
</tr>
<tr>
<td></td>
<td>EL312A</td>
<td>10mm(0.01ft)</td>
</tr>
</tbody>
</table>

Automatic Compensator
<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working range</td>
<td>14’</td>
</tr>
<tr>
<td>Setting accuracy</td>
<td>±0.5”</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td>2000mAh Ni-MH Rechargeable</td>
</tr>
<tr>
<td>Voltage</td>
<td>7.4 V DC</td>
</tr>
<tr>
<td>Continuous operation time</td>
<td>Approx. 12 hours</td>
</tr>
<tr>
<td>Chargers</td>
<td>FDJ6 (100V to 240V 50/60Hz)</td>
</tr>
<tr>
<td>Charging time (at +20°C)</td>
<td>Approx. 4 hours</td>
</tr>
<tr>
<td><strong>On-board programs</strong></td>
<td>BF, BFFB, BFBF, BBFF, FBBF, Stake out, intermediate</td>
</tr>
<tr>
<td><strong>On board adjustment</strong></td>
<td>YES</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>3000 points, support SD card</td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td>LCD, 7 lines x 32 characters</td>
</tr>
<tr>
<td><strong>Keyboard</strong></td>
<td>Alphanumeric key board</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>USB, RS-232C optional</td>
</tr>
<tr>
<td><strong>Sensitivity of circular level</strong></td>
<td>8'/2mm</td>
</tr>
<tr>
<td><strong>Water and dust protection</strong></td>
<td>IP54 (IEC60529)</td>
</tr>
<tr>
<td><strong>Dimension</strong></td>
<td>237x194x194mm (WxDxH)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>3kg</td>
</tr>
<tr>
<td><strong>Operating temperature</strong></td>
<td>-20°C ~ +50°C</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>-40°C ~ +70°C</td>
</tr>
</tbody>
</table>

*Depending on staff and leveling technique*
13. Packing list

- Carrying case            1 each
- Instrument              1 each
- Battery                 1 each
- Charger                 1 each
- Tool kit                1 each
- Instruction manual&CD    1 each
- Communication cable (D30-2200)  1 each
NOTE:
These designs, figures and specifications are subject to change without notice. We shall not be held liable for damages resulting from errors in this instruction manual.
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