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ABT 8000
Data Logging Laser Height & Stagger Gauge

Overhead Line

Height and Stagger measurements to overhead catenary wire.

Instruction Manual

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2.0 Item List

- Data Logging Height & Stagger Gauge
- REFOS Unit
- CAT S42 Android Phone
- Brake Assembly
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3.0 Technical Specification

Abtus No.	Physical Weight & Dimensions	Cant/ Super-Elevation	Cable Stagger	Cable Height	REFOS
ABT 8000 – 56.5"	Length – 63 $^5/_8$in Height– 56 $^{11}/_{16}$in Width – 10 $^5/_{16}$in Weight – 24.3lb	Range ± 7$^7/_8$ in Accuracy ± $^1/_{16}$in Resolution $^1/_{16}$in	Range ± 20 $^1/_2$ in Accuracy ± $^3/_{16}$in (STD2) Resolution $^1/_{16}$in	Range 6.5ft to 328ft Accuracy ±$^1/_{16}$in @ 16ft Resolution $^1/_{16}$in	Range 6.5ft to 328ft Accuracy ±$^1/_{16}$in Resolution $^1/_{16}$in
ABT8000–1435g	Length–1616mm Height –1440mm Width - 262mm Weight - 11kg	Range ± 200mm Accuracy ± 1.0mm Resolution 1mm	Range ± 520mm Accuracy ± 5mm (STD2) Resolution 1mm	Range 2m to 100m Accuracy ±2.0mm@ 5m Resolution 1mm	Range 2m to 100m Accuracy ± 2.0mm Resolution 1mm
ABT8000-1600g	Length–1770mm Height –1440mm Width – 262mm Weight – 12kg	Range ± 200mm Accuracy ± 1.0mm Resolution 1mm	Range ± 520mm Accuracy ± 5mm (STD2) Resolution 1mm	Range 2m to 100m Accuracy ±2.0mm@ 5m Resolution 1mm	Range 2m to 100m Accuracy ± 2.0mm Resolution 1mm
ABT8000-1676g	Length–1845mm Height– 1440mm Width – 262mm Weight – 12.5kg	Range ± 200mm Accuracy ± 1.0mm Resolution 1mm	Range ± 520mm Accuracy ± 5mm (STD2) Resolution 1mm	Range 2m to 100m Accuracy ±2.0mm@ 5m Resolution 1mm	Range 2m to 100m Accuracy ± 2.0mm Resolution 1mm

GPS   :   Expected Accuracy 2.5m CEP

Temperature Sensor: Working range -20°C to 50°C, Accuracy ±1°C

Features:
- **Fully insulated**
- **Rechargeable battery pack– up to 8 hours on a full charge**
- **Carry/ storage case**
- **REFOS laser unit**

4.0 Getting Started

4.1 Overview

The ABT8000 is a light-weight gauge that allows the user to safely take Height and Stagger measurements of the OHL (Over Head Line) using laser technology as well as the ability to log and store data directly to an android device. The ABT8000 also features a built in display which can show the recorded readings and a downloadable application for smart phones. This application is able to connect to the gauge using wireless technology and can save post processing time back at the office. The gauge can additionally measure Super-Elevation (SE), Rail Edge to Face of Structure (REFOS), temperature and GPS location.

The built-in laser unit is positioned at eye-level and features a 90° view finder with a red LED guide dot, enabling the operator to easily set the laser location marker onto the OHL in all weather conditions including bright sunshine.

The ABT8000 also features a removable REFOS laser unit which can be attached magnetically to either foot of the gauge and can be controlled via controls on the vertical beam or the smart phone application.

The vertical beam folds down flat to the horizontal beam for storage and transport.

4.2   Assembly

1. To release the vertical beam, pull the lever towards you (See Figure 1). Lift the vertical beam until it rests against the stop at 90°. Turn the locking handle towards the vertical beam to lock it vertically in place (shown in Figure 2).
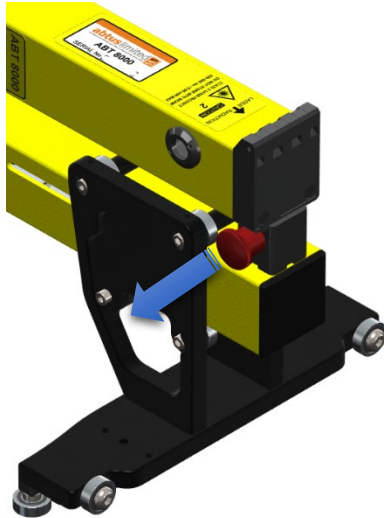

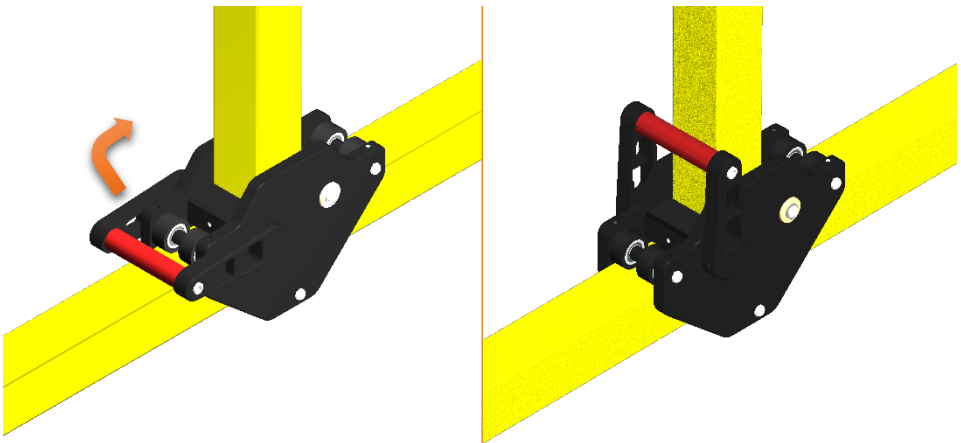**Figure 1 – Pull the lever to release the vertical beam**

Figure 2 – Raise the handle against the beam to lock it in place

2. Place the REFOS unit carefully in the slot provided on gauge foot.

3. The magnets will ensure the device is connected correctly in place if placed slowly. The REFOS unit may be fitted on either side of the gauge as required (see Figure 3).
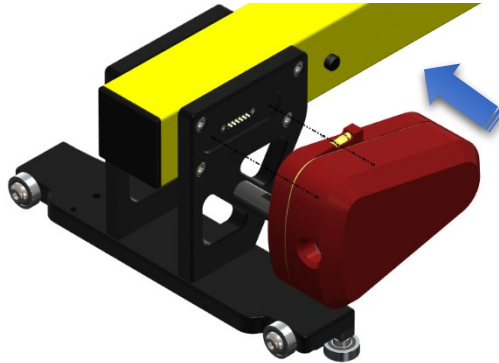

Figure 3 – REFOS unit is held on magnetically

4. The phone holder provided with the DLHS gauge can be fitted on the ball mount present above the stagger adjustment wheel.

4.3   Operating the Laser in standard mode

1. Turn on the ABT 8000 by pressing the ⏻ button on the vertical beam.
   a. After displaying the welcome page, the main page with all the available recording features will be shown on the built-in screen.

Figure 4 – Built-in display

b.   There are two additional buttons below the ⏻ button, these are the **M** (OHL Laser height measurements, Stagger readings) and **R** (REFOS measurement Left/Right).

▪   *The readings taken in standalone mode (without use of App) are not saved in the DLHS. The user will need to document these readings manually.*

4.4   Measuring Height & Stagger

1.   Ensure vertical beam is in the operating position.

2.   Press 'M' to turn on the measurement laser. The laser will stay turned on for 1 minute and during this time the user can position the DLHS gauge to the measurement location.

3.   Look through the view finder on the vertical beam to view a red LED guide dot (shown in Figure 5). This will assist the user in aligning the measurement laser with the OHL.
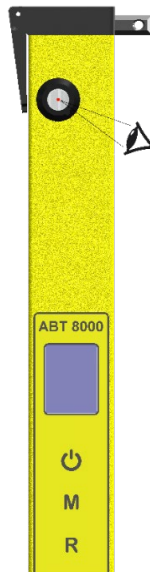

Figure 5 – 90° View-finder

4.   The vertical beam can be moved from side to side by turning the stagger adjustment wheel located in the centre of the vertical beam (shown in figure 6). Adjust the vertical beam until the red LED guide dot is on the OHL, press '**M**' again to record the stagger measurement which will be displayed on the screen of the DLHS gauge.
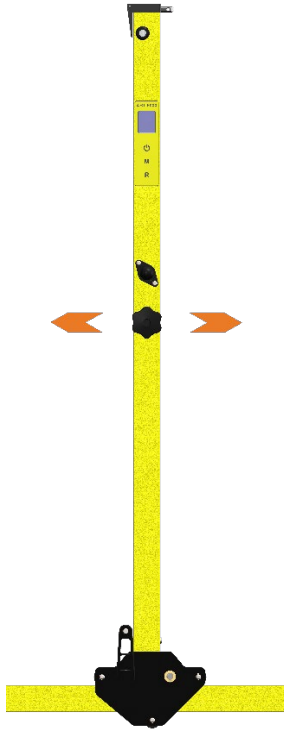
Figure 6 – Stagger adjustment

4.5   Measuring Cant/ Super Elevation & Track Gauge

1.   The Cant / SE and Track Gauge are measured automatically when an OHL stagger measurement is made following the instructions in Section 4.4. The measurements will appear on the screen of the DLHS gauge.

A positive SE reading is when the right rail is higher than the left.

4.6   Measuring REFOS

1.   Secure the REFOS laser unit supplied with the DLHS carefully to the connector slots on either foot of the gauge. The laser unit is powered by the DLHS batteries. (See Figure 3).

2.   Use the spirit level on the laser unit to ensure it is level after placing the gauge in a position to take the reading.
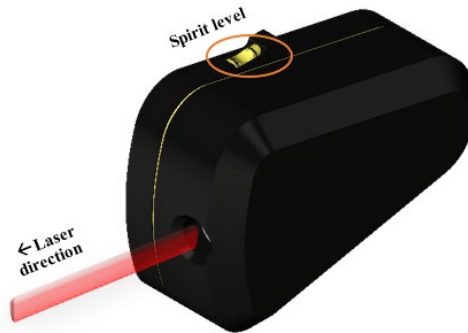
Figure 7 – REFOS laser unit

3. Press the '**R**' button on the gauge once to turn on the REFOS laser. Ensure the laser is positioned correctly and then press the '**R**' button again to take the reading. The reading will appear on the built-in screen of the DLHS gauge.

Hold the ⏻ button for at least 1 second to turn off the DLHS gauge.

4.7 DLHS app

The ABT8000 comes with an S42 CAT android phone which has the DLHS application pre-installed, set up and ready for use. The app offers exclusive features for the DLHS that are only available while being connected such as the ability to log readings from the gauge, change stagger measurement modes (nominal gauge, measured gauge), e-mail results etc. ∗

4.8 Using the App

The DLHS device will transmit a Wi-Fi signal when turned on. The android device with the DLHS app installed has the '**Connect**' button to connect automatically to the device as shown in Figure 8 (an initial pairing via accessing the Wi-Fi settings on the android device is required).

While connected to the DLHS app, pressing the physical buttons on the DLHS device will automatically update the text fields in the app screen with readings. The user also has the option to control the DLSH directly via the app.

∗ *The e-mail functionality is only available once the user has set up the mobile device with an existing email address.*
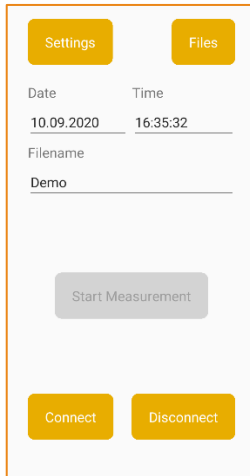
Figure 8 – Home screen of DLHS app

4.8.1   Settings

The settings screen can be accessed by pressing the 'Settings' button on the top left corner of the home screen. The features available in the settings page are only available through the app and cannot be changed without being connected to the gauge. (Figure 9). By clicking on the corresponding buttons, the user can change various aspects of the gauge such as;

a.   Set nominal gauge (Stagger measurement mode) – The stagger measurement shown in readings will be calculated from the fixed end side of the DLHS gauge and the gauge set to 1435mm (nominal).

b.   Set measured gauge – The stagger measurement shown in readings will be calculated from the live gauge recording.

c.   Phone display On/Off – The phone display can be toggled ON or OFF to preserve phone battery life.

d.   DLHS display On/Off – The DLHS built-in display can be toggled ON & OFF to preserve device battery life. The built-in display can be turned on when used in standalone mode.

e.   E-mail address – The e-mail address written in this box will receive the recorded files that are sent through the built-in email functionality in the DLHS app.

f. Save and go to main page – After typing an e-mail address in the input box, press the '**Save**' button to allow the application to remember it.
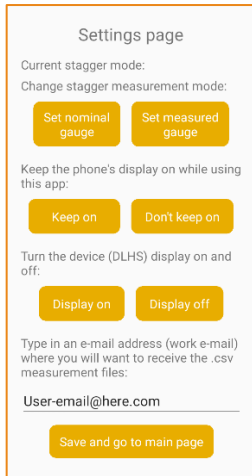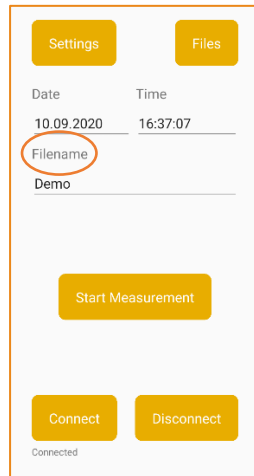

Figure 9 – Settings Page

Figure 10 – Home screen of DLHS app
(Connected to DLHS gauge)

4.8.2 Data Logging

The '**Start Measurement**' button will become available when the user has successfully connected a DLHS device to the mobile device (shown in Figure 10).

Follow the steps below to start a recording file using the DLHS app:

a. Enter a 'File name' in the provided text box on the home screen. Press the '**Start Measurement**' button after entering a file name.

- If a file already exists under the name you entered, a screen prompting you whether to append readings to the existing file or delete/overwrite the existing file will appear.

b. The various recording features available in the DLHS gauge can be seen on the main recording screen (Figure 11). Press the 'Measure' button once to turn on the laser in the vertical beam. The laser will stay on for 1 minute, allowing the user to make the stagger adjustments and position the DLHS gauge to take a reading. Refer to **Section 4.4** for more details regarding adjusting stagger and positioning DLHS gauge with the OHL.

Figure 11 – Main recording screen

c. Press the '**Measure**' button a second time to take the measurement. The text fields under each header will be filled with the recorded readings as shown in Figure 11.

- The user may press the '**Measure**' button again to reset the fields and turn on the laser again to retake the measurement.

d. Similarly, press the '**Meas. REFOS**' button to turn on the REFOS laser and tap it a second time to take a measurement. Refer to Section 4.4 for further information regarding REFOS.

e. The user can press the text field under '**Notes**' to enter a custom note and add it to this recording.

f. Press the '**Save**' button to save the readings current shown on the app screen to the recording file.

4.8.3 Recorded Files & File Sharing

Abtus recommends the user create a unique email account with Google-mail for use with the mobile device for each DLHS gauge in order to utilize the e-mail data functionality. Abtus recommends the user create an email address in the format of <u>**DLLHSSerialNo000@gmail.com**</u> (replace the '000' with the serial number of the DLHS gauge, e.g. SN'**025**').

a. The saved file can be viewed by pressing '**Files**' button in the home page (Figure 8) or the '**View Meas.**' Button in the recording screen (Figure 11).
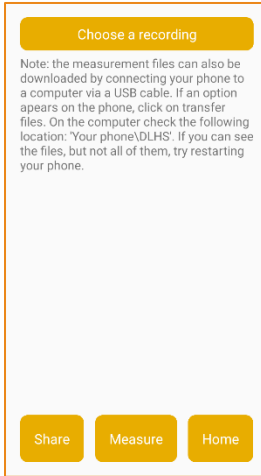

Figure 12 – View recorded files

b. The following screen (Figure 12) allows the user to view the recordings, add additional measurements to the recorded files and share the files via email.
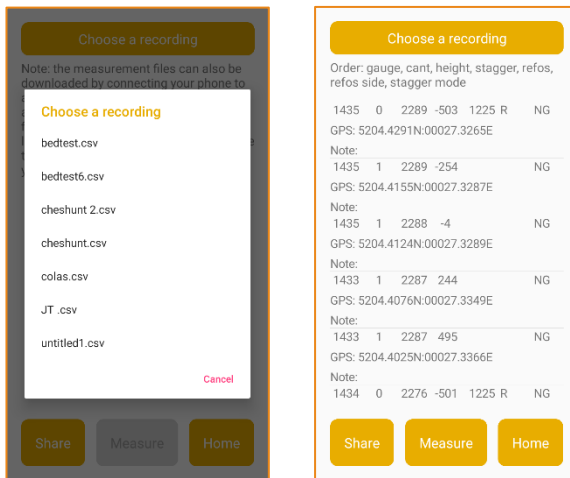

Figure 13 – Recorded file

c. Press '**Choose a recording**' to open a list of all the saved measurement files.

d. After choosing a recording, press 'Share' to send the file to the email address saved in the 'Settings' screen. The app will use the email address the mobile device has set up with as the 'Sender'.

    i. Pressing 'Share' will open the screen shown in Figure 14, prompting the user to choose a program to share the files with. The S42 supplied with DLHS gauge comes with 'Gmail' as the default option. Press either of the options available; 'Just Once' or 'Always'.

    ii. A new page with all the fields filled as per the settings will appear. Ensure the recipient details are correct and then press the 'Send' button (circled in Figure 13).
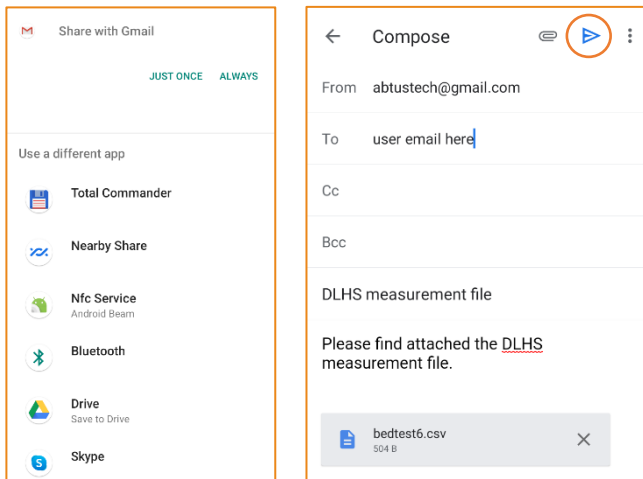

Figure 14 – Emailing .csv results
(Left – Choose share .csv function, Right – Sending .csv via Gmail)

e. Pressing 'Measure' will direct the user to the recording screen where additional recordings can be appended to the chosen file (Figure 13).

f. Press the 'Home' button to return to the home screen.

5.0   Maintenance

5.1   User Advice

- Check that the bearing surfaces that are in contact with the rail are clean and can move freely

- Ensure that the vertical beam locks firmly into place and there is no slack.

- Ensure the laser window on the vertical beam and the REFOS laser unit are clear.

5.2   Every 3 Months

- Visually check for damage

- Ensure the vertical beam moves smoothly across the cross beam using the stagger adjustment wheel.

5.3   Annual

- To ensure the ongoing accuracy of your ABT8100, the gauge should be calibrated every 12 months. For UK users this means returning to Abtus for re-calibration and for overseas users this means returning to your local Abtus Representative, a list of which can be found on www.abtus.com.

6.0   Trouble Shooter

6.1   Readings are not showing or incorrect

- Ensure the batteries are fully charged.

- Restart the gauge and reconnect the DLHS to the app. Ensure the '**Connected**' message appears when pressing the '**Connect**' button.

- The '**Measure'** button has to be pressed twice to get a reading; first press to turn on the laser and second press to measure the distance. The user must wait at least 1 second between the presses to allow the laser enough time to receive a reading and display it on the screen.

- Pressing the '**Measure'** button three times rapidly will cause the DLHS to show an error message on the readings. Please allow enough time for the device to measure and send the reading to the display before starting a new recording.

6.2   GPS readings are not showing or inaccurate

- After a cold start, the GPS unit requires roughly 1 minute to locate the satellites and provide an initial GPS reading. This delay should only happen on the first recording, subsequent readings shouldn't have any delays in providing accurate GPS coordinates.

- Certain areas on the track and conditions can affect the readings provided by the GPS, including signal obstructions caused by tunnels, buildings, trees or even lack of satellites.