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Postex System User Guide

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ABSTRACT

The Postex system (Haglöf Sweden AB, Långsele, SE) is used to position objects–most often, and in our case, trees–within sample plots. The positions of individual trees are easily obtained and accurate, making the Postex system suitable for collecting ground-based measurements that compliment aerial surveys. Using ultrasound technology, the three stationary transponders, centered around the plot centre, measure the distance between each other and the handheld device, located at the object (i.e., tree) of interest and determines the position of the object in relation to the plot center. The Postex system was used during the canopy tree surveys of the forested Canadian Airborne Biodiversity Observatory (CABO) study sites: Parc national du Mont-Mégantic and Parc national du Mont-Saint-Bruno. Here, we provide a stepwise guide to using the Postex system, specifically related to how it was used for CABO canopy tree surveys (for full description of the Postex system please refer to the Postax version 2.2 and DP II user manuals, see pdfs attached below).

EXTERNAL LINK

http://www.caboscience.org/

ATTACHMENTS

DP II_User Manual.pdf

PosTax DPII V22_User Manual.pdf

GUIDELINES

This protocol provides a stepwise description of the set-up and use of the Postex system, specifically, in regards to its usage by the Canadian Airborne Biodiversity Observatory (CABO). For a full description of the Postex system please refer to the Postax version 2.2 and DP II user manuals (see pdfs attached below the abstract). For full methods of the CABO canopy tree surveys please refer to the Canopy Tree Survey Protocol - Forest of southern Québec.

Haglöf Sweden refers to the Postex system as both "Postex" and "Postax", here we will only use Postex.

MATERIALS TEXT

Citation: Anna Crofts (04/08/2020). Postex System User Guide. https://dx.doi.org/10.17504/protocols.io.8jxhupn

1. SmartScale Calipers
2. Transponders (x3)
3. DP II Handheld Device (with DME attached)
4. Level
5. Lower Tripod (no mounts)
6. Upper Tripod (with transponder mounts)

* Charging cables not pictured

System 2 DP Postex with DP II Caliper and L5 Laser Art no 15-103-1041

Haglof Sweden -

BEFORE STARTING

This user guide is intended for the set-up and use of the Postex system (Haglöf Sweden AB, Långsele, SE), specifically, in regards to the CABO canopy tree surveys. For a complete description of the Postex system, please refer to the Postax version 2.2 and DP II user manuals (see pdfs attached below the abstract).

Ensure that the DP II handheld device and SmartScale calipers are fully charged prior to field work and pack extra alkaline AA batteries (x3) for transponders (see Step 9: Charging DP II and SmartScale Calipers).

Citation: Anna Crofts (04/08/2020). Postex System User Guide. https://dx.doi.org/10.17504/protocols.io.8jxhupn

Activate the Transponders

1
- Using the DP II handheld device, activate the transponders:
  Settings → System → Test → DpDme → MEAS
- As the DP II measures, aim the DP DME towards the ultrasound transceiver of each transponder (Fig. 1).
- Two short beeps from the transponders indicate that the transponder has been turned on.
- Transponders automatically turn off after 20 mins of inactivity.

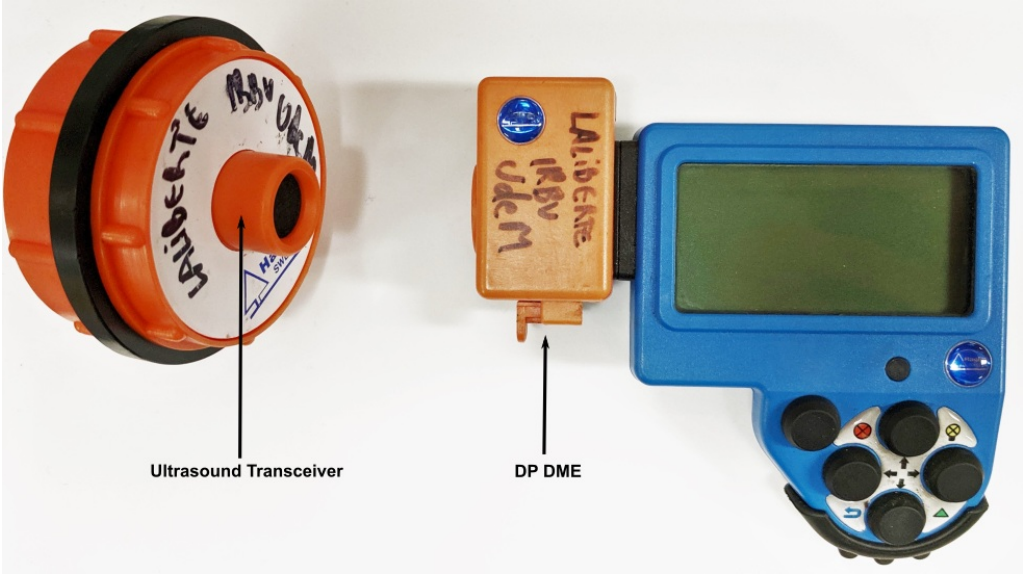

Figure 1. Photograph of how to orient transponders and DP II handheld device to activate (and deactivate) transponders.

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Set-up Tripod

2
- Attach the two tripods (herein referred to as tripod) and unfold and extend all tripod legs/arms.
- Position the tripod so it is centred over the plot centre.
- Level the tripod - place the level in the centre of the tripod and adjust- so that the upper arms are on the same horizontal plane.
- Using a compass, orient the upper arms so that one arm faces **north.**
- Place the activated transponders in adapters attached to the upper tripod arms, with the **black transponder facing north**[1]**, white transponder southwest**, and **green transponder southeast** (Fig. 2).

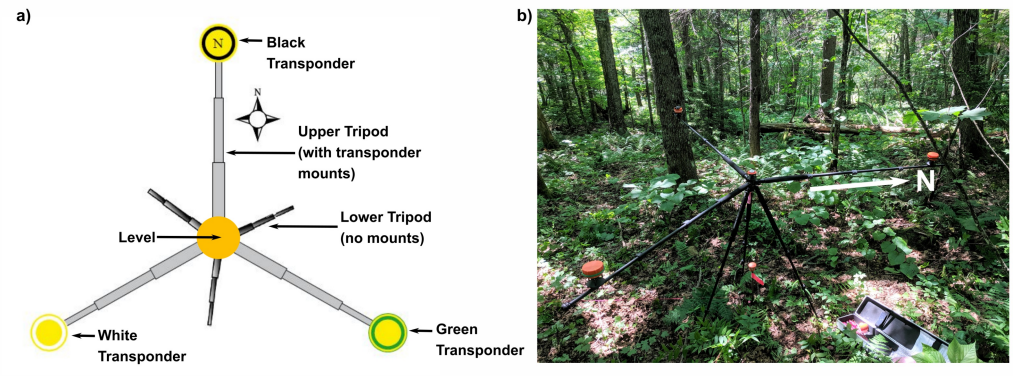

Figure 2. The Postex system set-up as **a)** an aerial schematic (modified from the Postax version 2.2 User Manual, Haglöf Sweden AB) and **b)** photographed in the forest of Parc national du Mont-Mégantic. Note that the black transponder is oriented north.

[1] *By placing the black transponder north, the local coordinate system had a Y-axis of north-south and an X-axis east-west.*

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Calibrate the DP DME

3
- Measure exactly 10 m, in any direction[1], from the centre of the **white transponder** using a tape (or equivalent instrument) - *keep the tape level and pull the tape tight to reduce error.*
- Hold the DP II handheld device at 10 m and aim the DP DME (i.e., ultrasonic transceiver / the black circle on orange accessory) towards the white transponder (Fig. 3).
- Using the DP II handheld device go to:
  Settings → System → Test → DpDme → CAL
- **'Cal-OK'** means that the calibration is complete[2].

**** Calibrate at least once daily - ideally, calibrate before every sample plot.**

**** Make sure the DP II handheld device is at current air temperature (do not keep the DP II in your pocket)[3].**

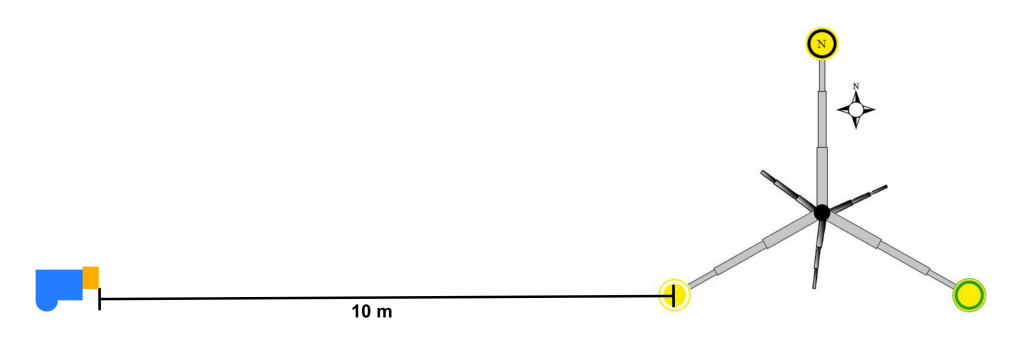

Figure 3. Schematic of how to calibrate the DP DME. Note that the DP DME can be calibrated at 10 m in any direction from the white transponder (modified from the Postax version 2.2 User Manual, Haglöf Sweden AB).

[1] *Calibration can be done in any direction, as the ultrasound is transmitted from the white transponder in 360°.*

[2] *Do not worry about the number that are displayed under 'Cal-OK', I was informed that these numbers are for the system engineers.*

[3] *Ultrasonic pulses travel at different speeds at different air temperatures. Error will be introduced if the DP DME is not calibrated at ambient air temperature. The temperature pending measurement fault at 10 m is approximately 2 cm/°C.*

Create a New Plot

4
- Using the DP II handheld device select:
  Plots → New Plot
- Enter desired **ID,** set **RADIUS** to 15 m, and set **COORD** to 'Cartesian' (Fig. 4a).
- You will be prompted for **Plot Coord.?** press right arrow to answer **NO**[1] and then press Enter (Fig. 4b).
- Mount the DP II handheld device onto the SmartScale Caliper (Fig. 5).

**** Create a new plot for each sample plot.**

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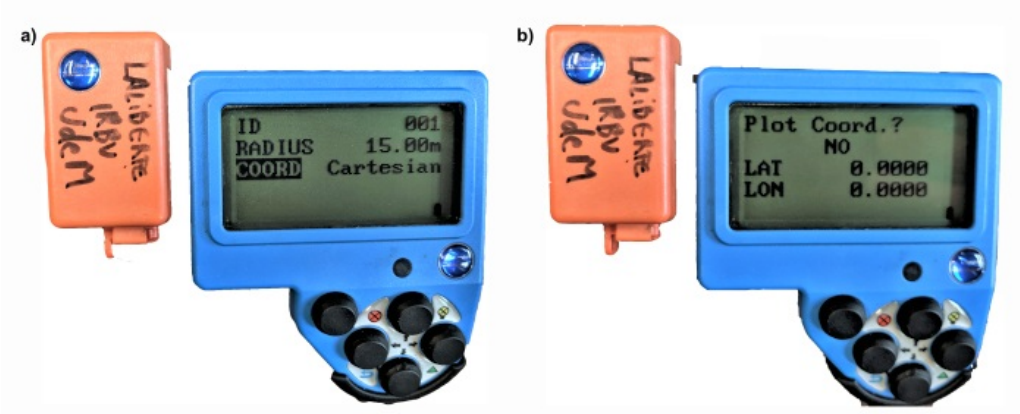

Figure 4. DP II handheld device imaged during plot creation where **a)** you are prompted to enter desired plot id, plot radius, and coordinate system and **b)** you would be prompted for plot coordinates.

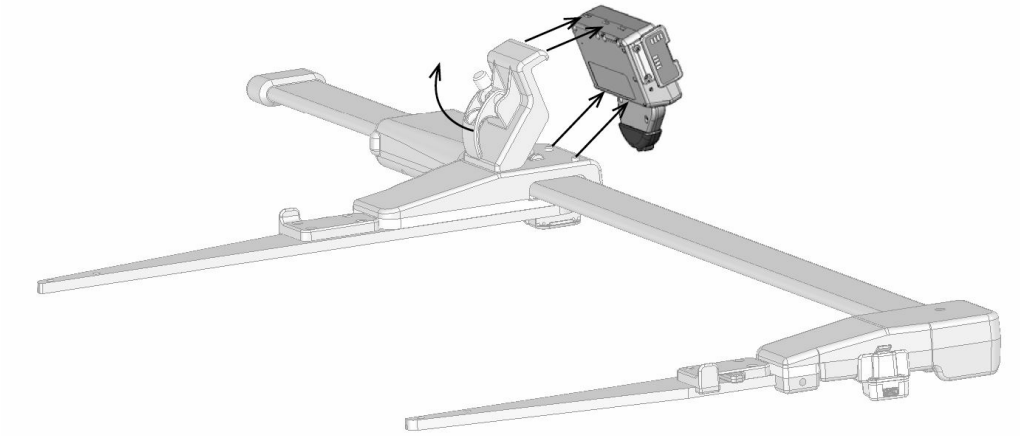

Figure 5. Schematic of how to mount the DP II handheld device onto the SmartScale caliper (taken from the DP II User Manual, Haglöf Sweden AB).

[1] *I have confirmed with Haglöf support staff that this version of the DP II handheld device is unable to connect to GPS devices via bluetooth to import lattitude and longitude coordinates.*

Citation: Anna Crofts (04/08/2020). Postex System User Guide. https://dx.doi.org/10.17504/protocols.io.8jxhupn

Security Check

5
- Test the calibration and tripod set-up by measuring the length of the upper tripod arms using the DP II handheld device.
- Aim the DP DME downwards towards the tripod's centre, select **PostexDME Dist**[1] in the plot menu of the DP II handheld device, and press Enter to measure.
- Once measurement is complete, three distances (the distance to each transponder) and XY coordinates will be displayed (Fig. 6).
- Check the measurements. **The distances to the transponders must diverge by no more than 1 cm and should measure between 117 cm to 120 cm**[2].
- If distances measured do not meet the aforementioned requirements, check to make sure the tripod arms are fully extended and repeat check. If they are fully extended and distances still do not meet the requirements, recalibrate the DP DME and repeat check.

Figure 6. DP II handheld device imaged in the **PostexDME** function prior to the distance measurements have been taken. After taking distance measurements, values of the distance between each transponder and the DP II handheld device will be displayed (**d1**, **d2**, and **d3**) as well as the **X** and **Y** coordinates.

[1] *If* **PostexDME** *is not displayed in the plot menu of the DP II handheld device, use the back keys to return to the main menu of DP II handheld device and select:*

Settings → Postex DME

and use the right arrow to check the box, then press Enter. The DP II will beep.

[2] *The tripod arm length (from centre of tripod to the centre of the transponder mount) is 115.5 cm. However because of the height of the mount, and thus transponder, greater distances than the arm length will be obtained (i.e., 117 to 120 cm). Slight variation in the distances will occur as a result of slight variations in distance when calibrating.*

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Start Measuring Trees

6
- Using the DP II handheld device in the plot menu, select **Measure.**
- Enter the **ANGLE**[1] by toggling to desired value (as measured by LaserGeo or equivalent device) and press Enter (Fig. 7a).
- **SPEC** will be highlighted, enter the species code and press Enter (Fig. 7b).
- **D** will be highlighted, place calipers at DBH of tree being measured with the DP DME aimed towards the tripod and press Enter, DBH will be measured and displayed (Fig. 7b).
- Press Enter to take distance measurements[2], three distance measurements (**Ds**) and the **XY** coordinates will be taken and displayed (Fig. 7b).
- **H** will be highlighted, enter height (as measured by LaserGeo or alternate clinometer) and press Enter (Fig. 7b).
- The device will beep and advance to the next tree (number of trees sampled, bringing you to back to the **ANGLE** step (Fig. 7a).

****If the calculated distance between the plot centre and the tree being measured is greater than the plot radius, the DP II handheld device will beep and you will be asked whether you wish to save the tree.**

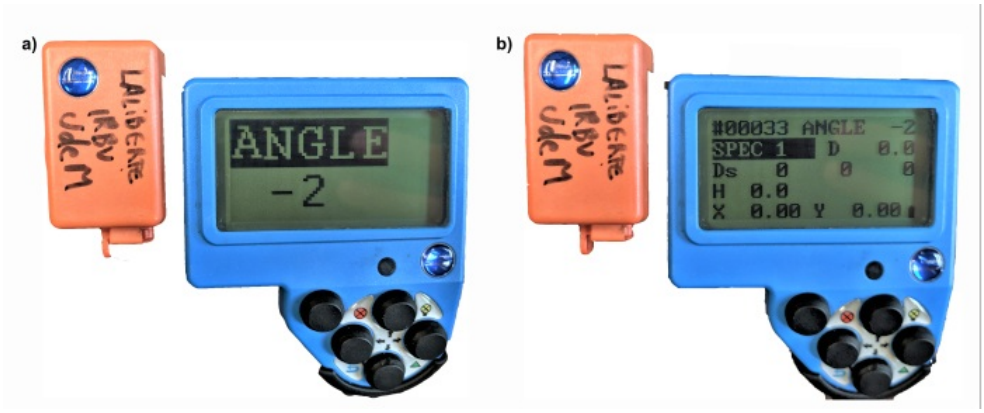

Figure 7. DP II handheld device imaged during tree measurement where **a)** you are prompted to enter the angle and **b)** you enter species code, take diameter and distance measurements, and enter height measurements. Here, **SPEC** is highlighted indicating you can enter the species code. When you press enter to move to the next step, the highlighted box will move to the next variable.

[1] *If you are not prompted for an angle, use the back keys to return to the main menu of DP II handheld device and select:*
Settings → Angle to Plotc
and use the right arrow to check the box, then press Enter. The DP II will beep.

[2] *If you are unable to obtain a distance measurement, try moving any obstacles between DP II and the tripod (e.g., push aside shrubs). If you are still unable to obtain a distance measurement, check the transponders' batteries - are they still making a clicking sound when distance measurements are being taken ? Remember, the transponders turn off after 20 minutes of inactivity. To change transponders' batteries see Step 9.*

Turning Off

7
- Once finished data collection, disassemble tripods and turn off transponders.
- To turn off transponders, in the plot menu of the DP II handheld device select **PostexDME Dist.**
- As the DP II measures, aim the DP DME towards the ultrasound transceiver of each transponder (Fig. 1).
- Four short beeps from transponders indicates that the transponder has been turned off.

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Exporting Data

8
- To export data from the DP II handheld device to your computer, in the main menu of the DP II select:
  Print All → Comma separ. → To File
- The screen will read "Deleting file POSTAX\plotnumber.csv".
- Once complete, in the main menu of the DP II select **USB** (Fig. 8).
- Connect the DP II to your computer, then find and select the DP II device.
- Data is stored in the DATA → POSTAX folder as separate csv files for each plot.

Figure 8. DP II handheld device imaged in USB mode.

Citation: Anna Crofts (04/08/2020). Postex System User Guide. https://dx.doi.org/10.17504/protocols.io.8jxhupn

9
- The start up screen of the DP II handheld device, indicates the battery remaining of the DP II and the SmartScale. There is also a battery icon in the bottom left corner of the DP II that indicates battery remaining.
- Place the USB converter on the DP II handheld device or SmartScale and use a microUSB to USB cord to connect to a power source (Fig. 9).
- For faster charging, put the DP II in USB mode. In the main menu of the DP II, select **USB** (Fig. 8).

**** Fully charged batteries of the DP II and SmartScale should last approximately one week.**

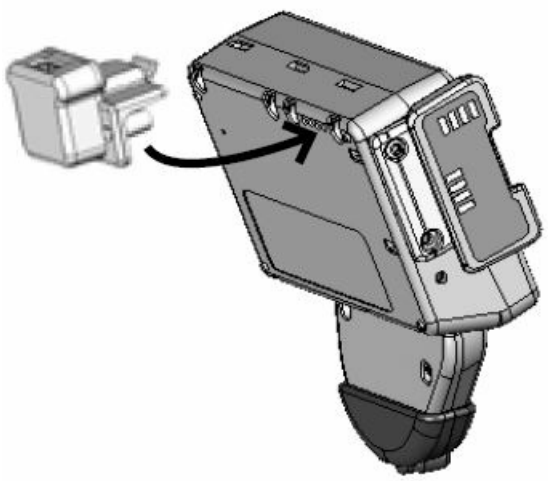

Figure 9. A schematic of how the USB converter connects to the DP II handheld device (taken from the DP II User Manual, Haglöf Sweden AB).

- Each transponder uses one alkaline AA (1.5V) battery placed under the lid -twist off lid to replace (Fig 10).

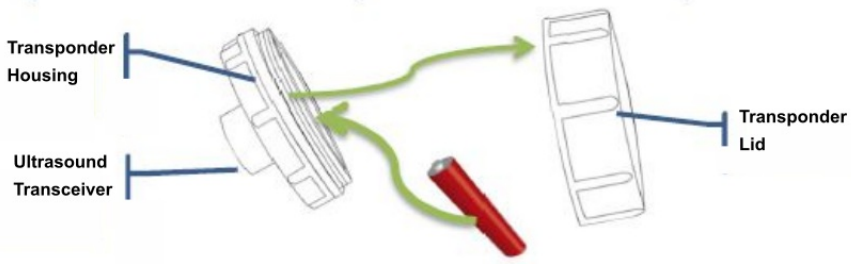

Figure 10. Schematic of how to change transponder batteries (modified from the Postax version 2.2 User Manual, Haglöf Sweden AB).

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Calibrating the SmartScale Caliper

10
- In the main menu of the DP II handheld device select:
  Settings → System → Test → Scale
- If the displayed diameter is not equal to that read manually off the SmartScale caliper, it is time to calibrate.
- To calibrate the SmartScale caliper, in the main menu of the DP II handheld device select:
  Settings → System → Calibrate
- Place the moveable jaw at 0 cm and press Enter.
- Place the moveable jaw at 50 cm and press Enter.
- The caliper is now calibrated.

**** The SmartScale caliper does not need regular calibration, however it is good practice to check that the displayed diameter on the DP II handheld device is identical to the measured diameter on the SmartScale.**

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