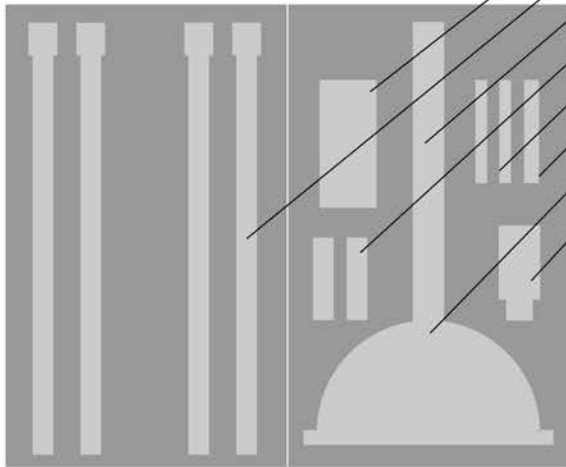
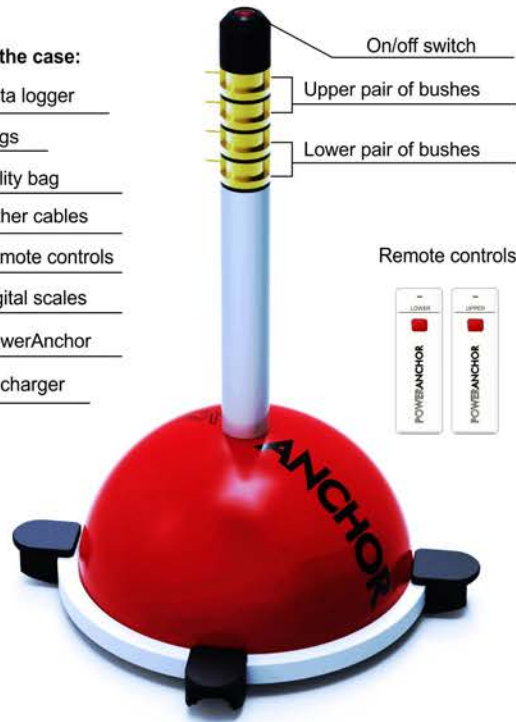


PA 4-200 POWERANCHOR



In the case:

- Data logger
- Legs
- Utility bag
- Tether cables
- Remote controls
- Digital scales
- PowerAnchor
- Recharger



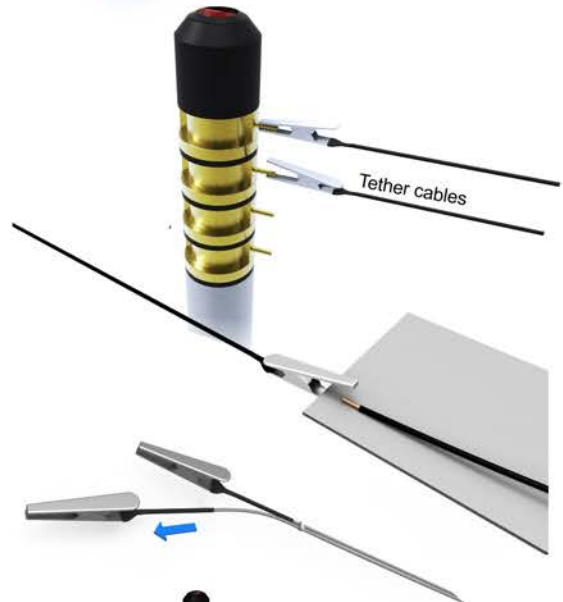
Set up the PowerAnchor in a large flat area minimum 5m diameter, preferably indoors. Turn the PowerAnchor on at the switch (turn off after use).

Connect the tether cables to the PowerAnchor by clamping them onto a pair of bushes (upper pair or lower pair). Connect the other end of the tether cables to a student made plane or car by clamping them onto a motor cable *and* the vehicle. For car projects use tabs on the vehicle as connection points. For plane projects clamp onto the end of the wing.

Use the remote control to supply power to the vehicle and it will travel around the PowerAnchor. Each pair of bushes (upper and lower) is controlled by its own remote controller as indicated on the remote. If the vehicle goes backwards reverse the connections to the bushes. The maximum range of the controllers is 50m.

For car projects point the vehicle outwards by adjusting the effective length of each cable by pulling one through the cable tie. Use the second set of bushes and hand controller to run two vehicles at the same time.

For aircraft projects attach the four legs by pushing them hard into the connectors. To remove, tap firmly at the top of the leg from the inside. Do not attach legs for car projects.



When power is low, plug the charger into the charge point. Refer to the indicator lights on the powerpack to know when charging is complete. Do not use the PowerAnchor while charging. Fully recharge before packing away. A full charge will power over 10000 laps.





Use the PowerAnchor data logger (PADL) to measure the speed and height of planes or the speed of cars as they go around the PowerAnchor. For indoor use only.



For car projects use the software in car mode. Place the PADL on its side and point it directly at the PowerAnchor approximately 20cm from the car as it moves past. Listen for the 'beep' then start recording. The software (see p.5) will display the speed of the car.



For aircraft projects face the PADL upwards and use the software in flight mode. When the aircraft has reached full and consistent height, position the PADL under its flight path so that the plane wing flies over the PADL. Listen for the 'beep' and start recording. The software (see p.5) will display the speed and height of the aircraft. Planes must fly at a minimum height of 55cm to record height. Planes lower than this are not considered to have achieved full flight.

PADL positioning is important, but if a lap is not recorded (missed) any bad data is filtered out by the *data clean* function on the software.

Planes are given a rating based on speed, height and payload (added weight. Digital scales provided) A rating over 100 is good; over 125 is very good.

Download the PADL software for PC. Connect the PADL to the laptop with USB cable. Open the software, choose port. The software will *beep* when a data event is detected. When the PADL unit is in position and the software beeps it is ready to start recording the data. Click the green *start* button and data for each lap is recorded. Note: lap zero does not 'beep'.

The blue *data clean* function is available once a minimum of quality data has been recorded. When selected, the *data clean* displays the five most consistent, consecutive laps (removing any anomalous data). Only use cleaned data averages for analysing performance of planes and cars. Height accuracy is $\pm 1.5\text{cm}$ after data clean. Best results are when consistency is over 90%.

The screenshot shows the 'POWERANCHOR DATA LOGGER' software interface. On the left, there are four buttons: a grey airplane icon for 'Select mode: flight or car', a green play button for 'Start/stop recording', a blue button with a plus sign for 'Data clean: isolates 5 most consistent laps.', and a purple circular arrow for 'Reset'. The main display area shows 'LAP COUNT' at 10 laps, 'TIME' at 0 min 24s, 'SPEED' with last lap at 7.21 m/s, maximum at 7.35 m/s, and average at 6.51 m/s. Below speed is a line graph. 'HEIGHT' shows last lap at 1.25 m and average at 1.40 m, with a consistency bar. A 'RATING' section shows a red needle gauge and the text 'Product of speed, payload & height'. On the right side, there are three buttons: 'Refresh ports', 'Print results', and 'Input payload (added weight)'. A label 'Performance rating' points to the rating gauge, and 'Hover over data points to see values' points to the graphs.

Tips:

- For car projects ensure the vehicle is pointing slightly outwards. This will help the car pull the tether cable tight.
- If legs do not all make contact with the ground, gently push the PowerAnchor downwards to spread the legs slightly.
- When landing a plane turn the controller off and on repeatedly reducing thrust to come in for a soft landing.
- After use, wind up tether cables carefully to avoid tangling. Store them in separate case compartments.

Troubleshooting:

- Use the correct hand controller.
- If the vehicle is going backwards switch the cables on the bushes.
- Ensure the cable clips are not touching each other causing a short circuit.
- Ensure tether cables are connected to the motor cables *and* attached to a part of the vehicle.
- Ensure the PowerAnchor is charged.
- Replace hand controller batteries (2 x AAA) as needed.
- If software is not responding then disconnect PADL, close app, reconnect PADL, restart software, refresh ports and select port.

Looking after your PowerAnchor:

- Always turn off after use.
- Do not use while charging.
- If there is excessive build-up between the bushes wipe their contact surfaces with isopropyl alcohol.
- When not in use for extended periods wrap the bushes in stretch plastic wrap.
- Ensure PowerAnchor is fully charged after use. This will maintain the life of the battery.
- When removing legs, push them directly outwards without rotating.
- Store PowerAnchor in the high impact case.
- Avoid touching the PADL reader. Clean with a soft cloth.

Safety:

- Create an exclusion zone around the PowerAnchor when in use to avoid collisions.

Technical

- This product houses a rechargeable Li-ion battery: 12V,78Ah (93.6Wh)
- The PADL uses lidar at wavelength 905nm, 1.5Watts, class A, beam spread 1°.