

The djb microtech *ALBA Ranger* ultrasonic measuring device

The *ALBA Ranger* is an ultrasonic measuring device with which one can collect position data, analyse the motion of objects, obtain Distance/displacement-time graphs, Velocity/Speed-time graphs and Acceleration-time graphs and their associated tables of data, extract and plot gradients of such graphs against time, or just use its display meter to show distance away, velocity or acceleration. It is based on the Polaroid™ camera ultrasonic sensor and is shown with its plug-top power supply in Figure 1.

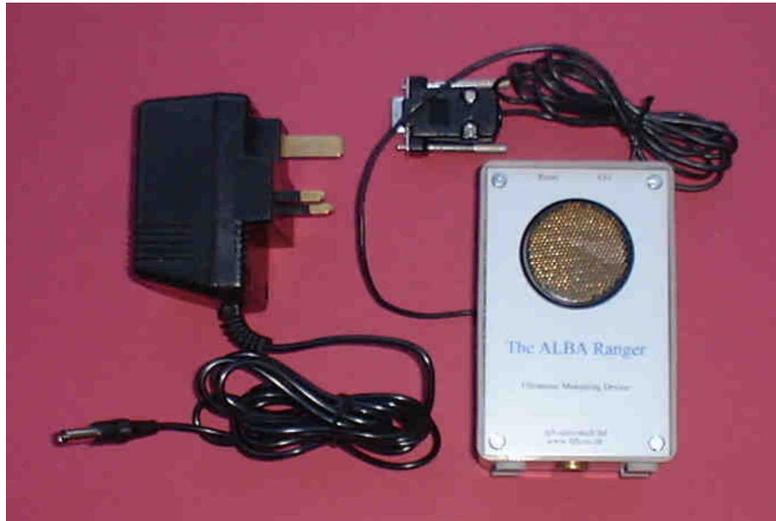


Figure 1 *ALBA Ranger* with its plug-top power supply

It is very easy to set up, calibrate and use. Any combination of table, graph and meter display is possible, with any combination of Distance-time, Velocity-time or Acceleration time graphs. The graphs in Figures 2 show a movement of my hand at varying speed away and towards the sensor. Each graph can be expanded vertically, as in Figure 3, and horizontally, and their data tables displayed too.

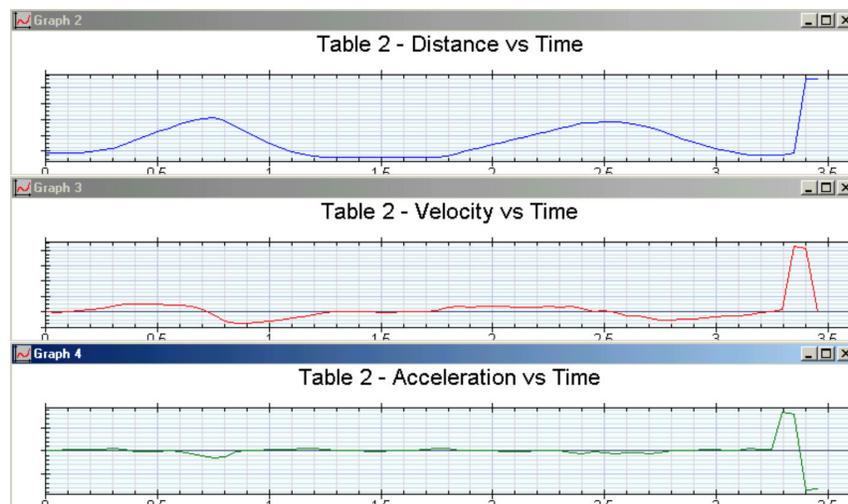


Figure 2 Distance-time, Velocity-time and Acceleration-time graphs for the movement of my hand

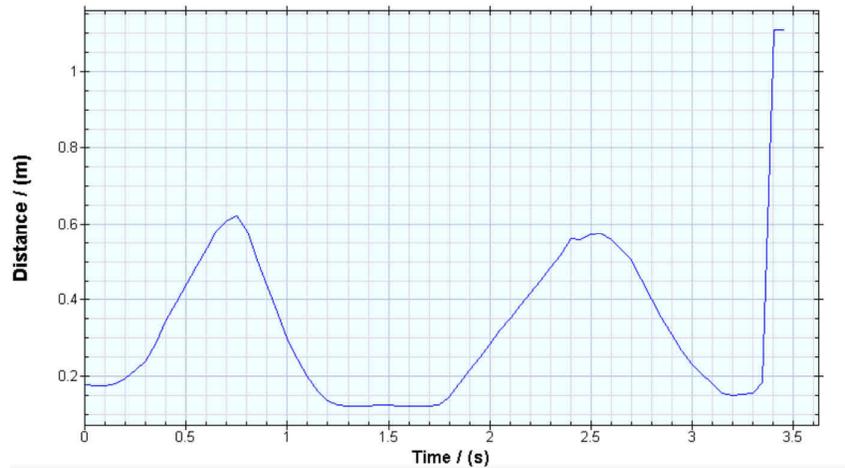


Figure 3 The expanded Distance-time graph

A rather nice feature is the capacity to plot the gradients of graphs, obviously what is being done automatically to get the Velocity-time and Acceleration-time graphs, but by personal selection instead of automatically. For older students this feature is a boon, reinforcing the links between graphs and those of their gradients. Figure 4 shows the graph of the Gradients of the Distance-time graph of Figures 2 and 3 against time. As you will note, it is not a bad match with the original automatically plotted Velocity-time graph, bar for its scale.

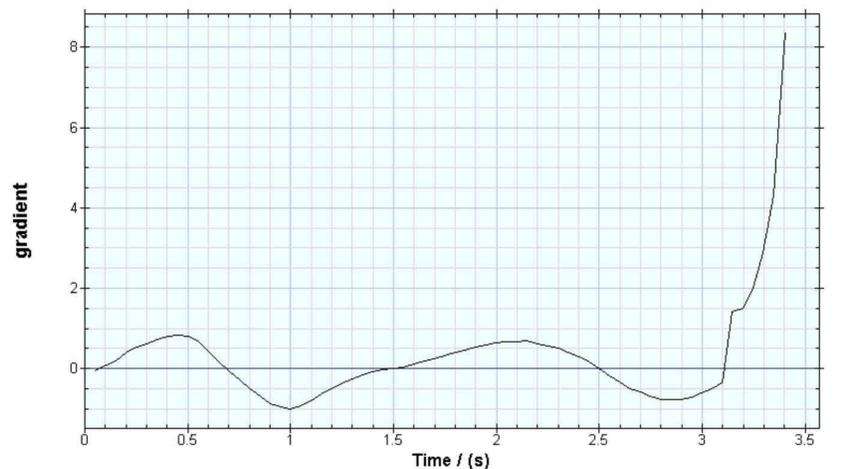


Figure 4 Graph of Gradients of Distance-time graph against time

The package has lots of other useful features, but of particular note in the dynamics field is its ability to calculate the areas under graphs.

I see *ALBA Ranger* as an asset in analysing the motion of vehicles on runways and linear air tracks, of falling or bouncing bodies, of oscillating bodies, or indeed of random motion. Additionally it would greatly aid students' appreciation of the meaning of such graphs as it can plot, and one might have fun and a lot of learning, in getting students to try to reproduce particular graphs by their own motion.

The *djb* web-site is well worth looking at too as it has a section on *Teaching Ideas using the ALBA Ranger* to which you might also like to add. There are also ideas for the *ALBA* system reviewed in *Physics Education* Volume 36 Number 6 November 2001. The web-site has some interesting links too.

Hardware requirements

- PC 150MHz or faster
- Windows 95 or more recent
- 32MB Ram
- CD/DVD-ROM drive
- Serial port 38.4kBaud or faster
- Colour monitor
- Colour video card 16 bit or greater

I ran the package on a 166MHz Pentium MMX with 96MB RAM and Windows Millennium (ME); a 266MHz Pentium MMX notebook with 64MB RAM and Windows 98, and on a 1.3GHz Pentium 2 with 256MB RAM and Windows XP. It worked fine on each. The notebook did not have a serial port so I used the USB to Serial 9 Pin Male converter from Maplin Electronics.

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