Pasco SPARK

One of the chief difficulties in reviewing a Pasco SPARK (Figure 1) is deciding how to categorise it. The SPARK certainly has features that take it beyond the realm of a conventional data logger. It uses a system of electronic workbooks called SPARKlabs. The Pasco website [1] claims that SPARKlabs "…completely integrate background content, data collection and analysis, even assessment—all within the same environment". According to the manufacturers, it is a "science learning system". The SPARK looks tough, attractive and quite simple. Make your own jokes about professional footballers. The 14.5 cm colour LCD display screen is touch-sensitive. It has 1 GB memory and comes with a mains charger, software CD and voltage and temperature probes. The two large buttons at the top of the screen can be used to start and stop logging. On one side of the unit (Figure 2) is an on / off switch, charger socket and a compartment for the built-in battery. A charging bay is available that allows a class set of SPARKs to be charged together. The two round contacts that mate with this can be seen to the right of the switch.

The SPARK has four sensor ports (Figure 3). 3.5 mm and 2.5 mm jack sockets are available for the supplied temperature and voltage probes respectively. There are also two ports for PASport sensors. Two USB sockets facilitate connection to a computer, printer, mouse or memory stick. A package can be downloaded to allow a SPARK to interface with a computer.

There are more than 60 SPARKlabs built into the SPARK and the users can design their own. A SPARKlab consists of a number of pages. These may contain text, images or displays such as graphs. Figure 4 shows a page from a SPARKlab on pH. The page gives instructions to the user and also displays pH when the data collection icon (the triangle at the bottom of the screen) is touched.

Screenshots can be saved to a pen drive for inclusion in student reports.

We tested the SPARK for ourselves by using the voltage probe to investigate the variation of current with time when a capacitor is charged (Figure 5).

To obtain the graph in Figure 5, we had to define current in terms of the measured voltage across a known resistance in the circuit divided by that resistance, then change the graph to display current rather than voltage against time. Carrying out these steps was easy and fairly intuitive, though we did have to RTFM [2] now and again. We would have liked to have been able to define our own units for current, but this did not appear to be possible.

Figure 1 *- Nothing fishy about the Pasco SPARK.*

Figure 2 *- on/off switch and charging sockets (base of unit).*

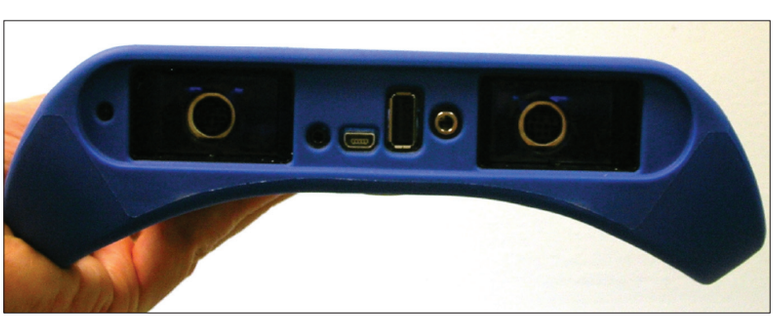

Figure 3 *- SPARK ports (top of unit).*

The 10 readings per second data capture rate was fine for this experiment. We were able to increase this to 1000 Hz for others. Capture rate appears to depend on the sensor used. By zooming in on a voltage / time graph, we determined the voltage resolution to be 5 mV, the same as the Xplorer GLX we reviewed in Bulletin 226 [3]. This suggests that a 12 bit analogue to digital converter is used. When we reviewed the Xplorer, Pasco pointed out to us that analogue to digital conversion usually takes place in the sensor itself and hence may be of a higher resolution for some sensors.

Figure 6 illustrates a number of the SPARK's data handling and analysis tools. Data has been selected by calling up the graph tools (on the right of the picture). Selecting a region of the graph involves touching two places on the screen. We found this quite fiddly at first, especially if the points were near the top, bottom or edges of the screen. When dragging the selection tool, it was quite easy to accidentally rescale the graph or shift its position. Also, dragging was very slow when we set the data capture rate to a high value, though it was not an issue with our capacitor experiment's 10 Hz capture rate. Some of these issues were less apparent when we used a mouse.

Once data is selected, you can zoom in on it, or perform various functions such as statistical analysis or curve fitting. This is perhaps the first handheld logger where we feel it is unnecessary to transfer data to a computer with a larger screen for detailed analysis.

Conclusion

At the time of writing, the SPARK costs £305, £10 more than the same company's Xplorer GLX. The Xplorer has four ports for Pasport sensors as opposed to the SPARK's two, two fast response temper-ature probes whereas the SPARK has one, a built-in signal generator and sound sensor. In these respects it has a higher specification than the SPARK. Where the SPARK scores is in ease of use. Teachers can design their own SPARKlabs, deciding on the types of displays and instructions to show on screen. Combine this with a chunky, attractive design and push-button operation and you have a device that is appealing to a wide range of users.

The SPARK is available from Feedback Instruments [4].

Stars: *versatile SPARKlabs,
*looks sturdy yet attractive
*(relatively) large, colourful touch screen

Wishes: less fiddly data selection

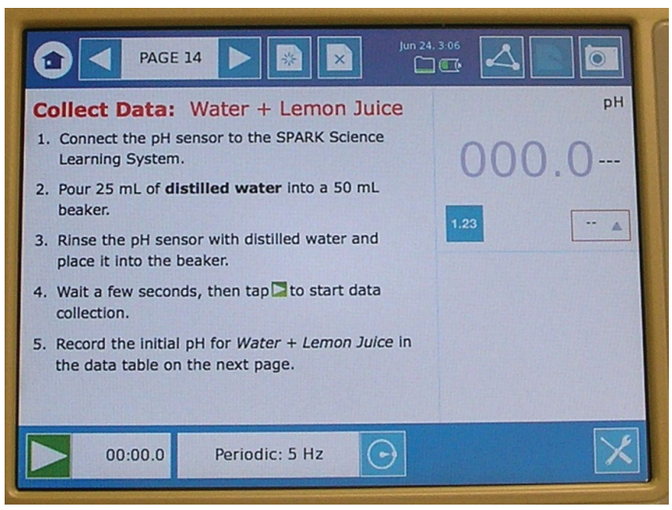

Figure 4 *- One page of SPARKlab.*

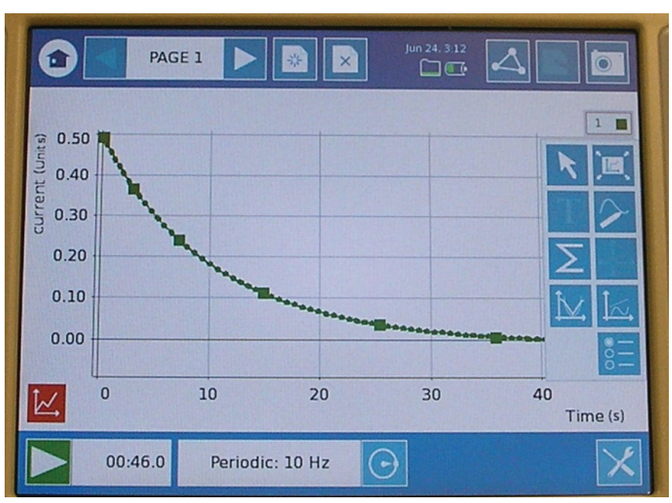

Figure 5 *- Graph of charging current versus time in a d.c. circuit containing capacitor and resistor.*

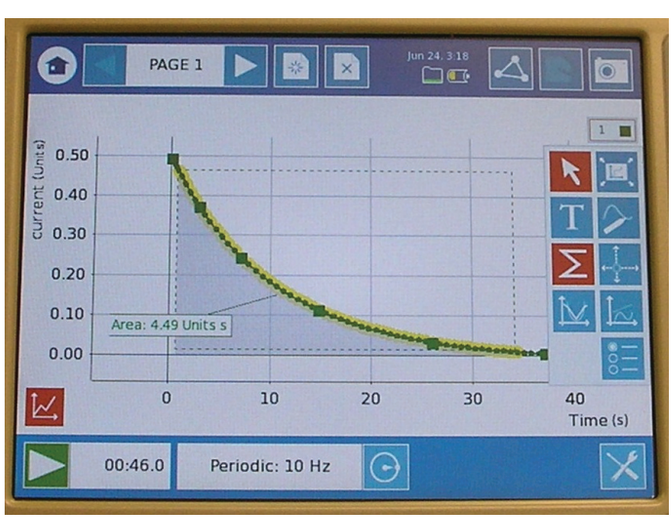

Figure 6 *- Statistical analysis performed on selected data.*

References

[1] http://www.pasco.com/spark/
[2] RTFM = read the flaming manual
[3] http://tinyurl.com/interfaces-226
[4] www.fbk.com (but www.pascophysics.co.uk takes you to data logging products and http://www.pasco.com/featured-products/spark/index.cfm is more useful for further SPARK information)