The djb microtech limited TSA (Time - Speed - Acceleration) meter

The TSA meter makes the measuring of times from 50μs to 999s, speeds and accelerations, very easy to achieve and without the need for any associated computer. In its various modes of operation it can measure up to four time intervals, eight event times, operate as a stopclock, be used as a fast timer with a resolution of 10μs, measure a gap time, measure up to four speeds and up to two accelerations.

It has two digital inputs, from either 4mm of DIN sockets. The latter have the advantage of also being able to power light gates directly.

Figure 1 The TSA meter

Each unit can be powered by a 9-12V dc supply or, for portability, by a 9V PP3 battery connected externally.

I found it extremely simple to set up and use. In measuring a speed I merely had to select Speed mode, then the width of the timing card I was using, and all was then ready to go. All the other modes are equally easy to set up with each stage being prompted on the unit's LCD display where the measurements made are also displayed. In Figure 2 it is shown being used to measure the speed of a trolley just before entering an escape lane sand-trap. In this investigation students look at the effects of vehicle speed, vehicle mass and depth of sand, on the braking distance in the sand-trap.

Figure 2 The TSA meter being used in an escape lane sand-trap investigation

For most work in schools and colleges just one unit per activity group would be needed but, if momentum conservation was being looked at through 'explosions' on a linear air track, then the use of two units would be recommended so that any coincident timings could be recorded separately. The use of two units in this example is also good practice as it makes it obvious which vehicle's motion is being recorded.

This device makes the teaching and learning of dynamics very straightforward and avoids all the complications of connecting to computers (although obviously it is one in its own right), takes up little space, and it makes the calculations required for measuring both speed and acceleration. Needless to say, by using only a timing mode you can also get students to go through the stages of calculation to obtain the same measurements if needs be.

Cost
TSA meter £111.20, plug-top power supply £5.80, battery lead £3.60 - all plus VAT and p&p. Associated light-gates, sound switches etc. are extras.

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