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PAL:
EXPLORATIONS IN COMPUTER BASED INSTRUMENTATION
AN INTERFACING PACKAGE

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Reviewed by Brian Pankuch*

NEEDED: Apple II+, 48K, DOS 3.3

SUPPLIED:

HARDWARE is a PAL interface box, with a ribbon cable which connects the Apple game port to the PAL interface, two cables which connect light and temperature sensors back to the PAL interface. All the equipment is easily set up to allow either of the sensors to send its electrical signal back over the cable to the appropriate input on the PAL interface, which sends its output over the ribbon cable to the Apple game port.

Software comes on a diskette which can and should be copied. The programs supplied allow you to do experiments on:

1) Camera speed measurement - allows you to check exposure times.

2) Reaction times - an individual can check the time it takes them to cover or uncover the light sensor in response to a 'beep' from the Apple.

3) Pendulum timing - use a swinging weight to cut the light path from a light source to the light sensor and see the period after each pass of the pendulum on the screen.

4) Light 1/ R^2 - you can vary the distance between the light sensor and the light source and measure the distance with a meter stick. The distance between the sensor and the source will appear on the screen as calculated by the $1/R^2$ law.

5) Flicker fusion - you see what appears to be a point of light on the screen, the rate at which it is being switched on and off is slowed till you are aware of the on-off flicker, touch a key and the rate of the flicker is displayed.

6) Cooling Curve - take a heated substance, insert the temperature probe and a graph will be drawn of temperature vs. time on the screen.

7) Heart rate measurement - put your fingers over a source of light and the light sensor over your finger - you see your pulse on the screen. The Apple does some curve analysis, it puts x's of the points its using on the screen. It reports your heart rate or that the data was unsuitable. Also, this program was used to collect pendulum data to display the actual graph and measure the period of the pendulum.

8) Solar energy - use the temperature sensor to measure solar insolation.

The MANUAL is brief and to the point. There are a few places in which the manual is unclear, e.g. the way to attach the ribbon cable at the Apple game port isn't carefully explained. Since there are only two possibilities I tried both, found the correct direction and didn't even have any smoke coming out of the computer.

STRENGTHS:

Overall the package fits together well. The individual experiments are interesting. You get a genuine understanding for what is happening, as you make a change in the position of the sensor or in what it is measuring and the output on the screen changes. Most of the experiments are easy to set up and perform. Only the ability to measure temperature as a function of time is directly applicable to the usual chemistry experiments. However, I can think of a number of reactions which when placed between a light source and the light sensor would give an interesting graph of light intensity versus time.

WEAKNESSES:

One of the sensor cables came with a short in it; since you get two cables, check both with a multimeter before concluding your interface doesn't work. The reaction time experiment is probably the easiest to check yourself and the equipment with.

My temperature probe is dissolving! Or rather the tape it's wrapped with is. I tried using naphthalene for cooling curve experiment and the probe didn't like it at all. I should be able to rewrap it but beware. I've used the whole system for demonstrations and several times wished I could erase the entire screen at a single keystroke. We also found the rate program would not run; it turned out that an invisible CONTROL C was embedded at the end of the name in the directory. We renamed the program without the CONTROL C and the program works satisfactorily.

Using the program to measure heartbeat is elusive and not very reproducible, but fun enough to be worth playing with. In a few places the manual tells you to do one thing and the program something a bit different. For instance, you are told to use three waterbaths to calibrate the temperature sensor; after setting them up you only use two.

OVERALL EVALUATION:

Compared to any other interfacing kit I've seen, this is by far the easiest and most interesting to use. If you have been lucky enough to meet Dr. Tinker in one of his many workshops, you will be happy to find the same cleverness and thoughtfulness throughout the package. I'm going to send a copy of this review to Cambridge Development Laboratories. With a little quality control the above weaknesses should disappear by the time you read this. The package without the above problems is easy to use, and provides you with intriguing possibilities.

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COMPUTERS IN CHEMISTRY AT THE UNIVERSITY OF WATERLOO

by Chung Chieh*

There have always been many applications of computers in chemical research, particularly in theoretical chemistry, crystallography, and spectroscopy. Some schools have acquired mainframe computer facilities for use in undergraduate instruction. Recently, we have established a microcomputer network dedicated for use in chemical education. This network consists of eight IBM Personal Computers all connected to one master controller IBM-PC, which has one floppy and one hard disk drive; however, it is expandable to 32 slave computers. The network was developed by the Department of Computer Service (DCS) at the University of Waterloo. The network software was written by J.F. Bolce and C.E. Pilkington, whereas the network interfacing was developed by A. Weerheim. Two of them (J.F.B. and A.W.) were involved in developing a similar network for the Physics Department before the IEEE-488 board became available. The group responsible for development of the network named it JANET standing for Jerry-Adrian NETwork or Just Another NETwork. Since JANET is a rather nice name, we choose to name our network the Chemistry JANET.

The hard disk in the master has a storage capacity of 17 megabytes. The disk is partitioned into many virtual disks. These virtual disks can be system disks, such as IBM-DOS, NETWORK COMMANDS, FORTRAN, APL, PASCAL, WORD-PROCESSING, course disks which hold specific software for certain courses, private disks for faculty members or students to do their work, and student disks assigned for courses. Some disks contain software, which is in a public library, other disks can be accessed only by those having a password to them.

Every IBM-PC in the network is a work station, which performs like a stand-along PC, but the users never have to worry about finding the right disk to insert into the proper drive. A user at a work station can access a maximum of 4 disks. Disk A can be a system disk, a course disk, or a boot disk, whereas disk B is the user's own disk which is accessed in write mode. Disks C and D can be accessed as one of the languages or programs in the public domain.

At the time this article was submitted the system was in operation for only a few weeks. Initially, we set up a few demonstration accounts (no password required) to encourage anyone interested in the system to try it. One of the demonstration programs provides real plots of the Van der Waal's equation. He, Kr, N_2, CO_2, and H20 were chosen as examples. These plots look rather nice on the screen, but they can also be printed out on the EPSON dot-matrix printer.

The advantages of a network like JANET is that many users can share softwares without having to be bothered with the managing of many floppy disks. It is ideal for a chemistry department like ours. I would like to exchange programs as well as ideas with other institutions or colleagues so that I can build up a rich library of software for the education of chemists.

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