

printer cables, but Tradecom says it can produce only 25 per week.

Brainwave will still deliver to customers who have already ordered but is directing all new business to Tradecom UK. Details on (01) 941 3519. *Jerry Sanders*

'C' is for Apple

Apple Computer has finally launched its much rumoured transportable version of the Apple IIe in the form of a 7½lb machine that costs £925 plus VAT. It should run almost all current IIe software.

Called the IIc, the one-piece machine comes as standard with a built-in, half-height 5¼in disk drive, 128k RAM, and an RF modulator to allow the machine to connect up to a television set. It is based on the CMOS version of the 6502 chip, known as the 65C02. A simple, typewriter style, keyboard is

Similarly, if you want to use the IIc with its optional 9in Apple monitor (£140 extra), another button just above the featured but this can be converted from the standard qwerty keyboard layout to the alternative Dvorak keyboard style at the touch of a button.

keyboard allows the user to switch from 40-column to 80-column display mode.

Original Apple II users still upset about past mistakes with the one-touch reset button will be glad to hear that although the IIc's reset button is set to the top left of the keyboard, it must be depressed with two other special keys before it will operate.

A range of I/O connectors identified by icons are built into the back of the IIc. One connector has been provided to allow a mouse—or a joystick—to be attached (many new packages are being developed for the IIc that are mouse compatible and old ones are being enhanced for the same reason).

The IIc mouse will cost £70.

Other connectors include two RS232 serial ports for connecting a modem and/or a printer, an extended video port for attaching the RF modulator or a special colour monitor, a standard video port, and a second disk drive port. The IIc is powered by an external transformer, but it is not too choosy about where the DC power comes from—this means that you could operate it off a car cigarette lighter

socket if you have a battery-powered television. By the end of the year Apple expects to announce a liquid crystal display that clips onto the IIc and which can handle 80 columns by 24 lines in what is being called super or ultra high resolution. This is a far more expensive proposition than a TV since it may cost as much as £600.

Except for what you can add via the I/O connectors, the IIc is not expandable in the conventional sense, and Apple hopes that this all in one approach will appeal to those wanting to buy a computer for use in the home.

Sandwiching it on either side are various Apple IIe system bundles: it will be possible to buy a special IIe starter system for just £795 (CPU, one disk with controller, no display); a professional system for £1095

(two drives and a monitor); and a business system for £2290 (this is a professional system plus a 5Mbyte Profile hard disk).

Robin Webster in the US

Apricot delight

Is your Apricot screen giving you eye-strain? If so how about a 12in monitor?

Emco Electronics expects the idea to appeal and is offering to supply a customised Indesit monitor (green on black) for around £220.

From June new Apricot buyers can specify the 12in screen to dealers on ordering, but if your dealer pleads ignorance, get in touch with Emco's marketing manager, David Bernheim, on (01) 737 3333.

Jerry Sanders

PCW Subscriptions down!

Relentless diatribes from PCW subscribers and the editorial team have finally worn down your publisher. He has agreed in his magnanimity and mortification to cut the subscription cost of the greatest micro magazine from £25 to £15 per year.

If you've already forked out a whole £25 for PCW subscriptions, don't have apoplexy—you are now entitled to a whole extra year of PCWs.

NUMBERS COUNT

Quotients

This month Mike Mudge examines the quotients of Fermat and Wilson.

Notation

We write $A \equiv B \pmod{C}$, read as A is congruent to B modulo C, if A and B leave the same remainder when divided by C. For example, $16 \equiv 21 \pmod{5}$, $64 \equiv 0 \pmod{16}$.

The Fermat Quotient

A famous theorem in classical number theory, Fermat's Little Theorem states that if p is prime and does not divide a, then $a^{p-1} \equiv 1 \pmod{p}$. The number $F_p = \frac{a^{p-1} - 1}{p}$ is Fermat's Quotient.

Computations by Fröberg for $a=2$ and p less than 5000 have revealed only two solutions, $p=1093$ and $p=3511$, to the equation $F_p \equiv 0 \pmod{p}$. It is still an open question whether any more solutions exist for $a=2$ with p greater than 5000, and the nature of any solutions for $2 < a \leq 31$; this range being relevant to the proof of Fermat's Last Theorem.

The Wilson Quotient

A well-known theorem by Wilson states that if p is prime, then $(p-1)! \equiv -1 \pmod{p}$.

p). The number

$W_p = \frac{(p-1)! + 1}{p}$ is known as Wilson's Quotient.

Computations by Fröberg for $3 \leq p \leq 50000$ have revealed only three solutions, $p=5$, $p=13$ and $p=563$, to the equation $W_p \equiv 0 \pmod{p}$. It is theoretically probable that there are more solutions to this equation.

Large tables of $W_p \pmod{p}$ would be useful in empirical number theory. At the present time, only two small tables are known: p less 300, and p less than or equal to 211, due to NGWH Berger (1920) and ET Lehmer (1937).

Readers are invited to reproduce the results given above, and to extend them in any natural way. Submissions should include program listings, hardware description, run time and output, and will be judged for accuracy, originality and efficiency (not necessarily in that order). A prize of £10 will be awarded to the 'best' entry received by

1 August 1984. Please address to Mr MR Mudge, 'Square Acre', Stourbridge Road, Penn, Nr Wolverhampton, Staffs WV4 5HF.

Please note that submissions can only be returned if a suitable stamped addressed envelope is provided.

Fractional Approximation to Primes Review—January 1984

This problem was attacked by a number of readers. A careful analysis of the results shows that a ZX81 with 16k RAM has produced the 'best' result. Mr L Faltin, Wilhelminenstrasse 147/1, A-1160 Wien has compared orders of approximation (. . . 5). The use of log/log graph paper may shrink the computing time, apparently!

Decomposition of $p=31$ to the 5th order may need about four days.

Is this statement true or false? Answers to Mr Faltin or Mike Mudge.