player in Tokyo was selling at about £330!).

Yes, my first impression had been right: the sound quality from these players is staggering, with a depth and realism which immediately make the LP obsolete. In fact so enthusiastic was I that I rushed out and bought another couple of discs (they're about £10 each, rather cheaper than a high-quality conventional LP and providing considerably better sound) on the grounds that I'm sure to end up buying a player one day.

Like all the other CD players now being sold, the Philips model plugs straight into your existing amplifier. All you are in effect doing is adding a second turntable – there's no need to junk your hi-fi system and buy a new one.

The selection of discs available now is quite good, although a little thinly distributed around record shops, and most European record companies will be producing recordings on CD format as well as LPs from now on. The exception is EMI, which isn't convinced that the CD will catch on, but EMI wasn't convinced that the LP would catch on either, and had to scramble hard to catch up with the rest of the world when the truth finally dawned.

I am convinced that the CD system will destroy the LP just as the LP did to the 78. If you think that £500 for a newfangled record deck on which you can't play your existing LPs is too much, well, my guess is that while there might be some cost-cutting in the Tottenham Court Road, the price will probably stay pretty much the same in figures, and the effect of inflation will be to make it cheaper in real terms – rather in the way that colour TV prices have behaved. The revolution won't happen overnight, either, but I would be prepared to bet that within five to seven years, we'll see a CD player in as many homes as now have colour TV sets. Which brings me on to the real reason for sneaking a piece of audio equipment into the pages of *PCW*.

When (not if) CD players reach the same level of penetration that conventional audio equipment now has, we will suddenly have a unique and fairly inexpensive medium on which to publish computer software and electronic data of all sorts. Conventional optical disc wisdom says that the laser video disc, currently enjoying a mini sales boom in the US but apparently a disaster here, will be *the* way of distributing computer-readable information. A video disc can hold, typically, 2 gigabytes of data, compared to the CD format which I estimate can store about 30 megabytes or so – it's difficult to tell because information isn't held on them in as straightforward a way as on a computer disk. But although read-write video disks are already in the laboratory stage and expected to hit the High Streets one day, it will be the CD which gains widespread acceptance first and which gains the widest-spread acceptance.

Because it is so much more robust than a computer disk, a Compact Disc offers a very rugged, low cost-per-bit medium for distributing software and large databases of information such as encyclopaedias, books, knowledge bases for expert systems, etc. All that is needed is an output from the player which allows a computer to tap into the digital signal stream before it gets converted to analogue form. The Philips player has no such outlet but this is hardly surprising: the CD market has only just begun in Europe (it's booming in Japan, apparently) and it will take time to gain acceptance and become familiar on the audio scene. Only then can we computerists get our hands on it, but if I were a software house or an electronic publisher, I'd be looking hard at CDs right now.

In the meantime, if Santa Claus is a *PCW* reader, you know what I want for Christmas, squire!

NUMBERS COUNT

U-SEQUENCES

Mike Mudge muses mathematically.

An increasing sequence of positive integers consists of a list of such integers, separated by commas; it is read in the conventional way from left to right and each number is to be smaller than that which follows it.

This work is concerned with certain non-terminating (or infinite) sequences which will be written $\{u_r\}$ as 'short-hand' for u_1, u_2, u_3, ... The first two positive integers u_1 and u_2 will be given and the sequence is to be continued by including only those integers which can be expressed in just one way as the sum of two distinct earlier members of the sequence. Such a sequence is named a U-sequence after Stanislav M Ulam. Details will be given for the fundamental U-sequence defined by $u_1 = 1$ and $u_2 = 2$ although obvious generalisations are possible.

$\{u_r\}$ = 1,2,3,4,6,8,11,13,16,18,26,28,36,38,47,48,53 ...

$u_{100} = 690$, $u_{500} = 5685$, $u_{1000} = 12294$

Questions

Note: These are based upon the work of Bernardo Recamán, American Mathematical Monthly Vol 80 1973.

(i) When is the sum of two consecutive terms of a U-sequence also a member of that sequence?

For the fundamental sequence

$u_1 + u_2 = 1 + 2 = 3 = u^3$

$u^{19} + u^{20} = 62 + 69 = 131 = u_{31}$

(ii) Which positive integers are not the sum of two terms of a given U-sequence?

For the fundamental sequence these include 23,25,33,35,43,45,67,92,94,96.

(iii) Which pairs of consecutive integers are to be found in a given U-sequence?

For the fundamental sequence these include (1,2), (2,3), (3,4), & (47,48).

(iv) Are there arbitrarily large gaps between consecutive terms of a given U-sequence?

Problem

Submit a program which investigates some of the above questions for the U-sequence generated by a prescribed pair of positive integers u_1 and u_2.

In particular, verify the results of P Muller, MSc thesis, University of Buffalo 1966 that up to u_{20000} for the fundamental U-sequence the only four pairs of consecutive terms are those given in (iii) above but that over 60 per cent of consecutive terms differ by precisely 2. All submissions should include program listings, hardware descriptions, run times and output; they 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.

Entries, to arrive by 1 August to: Mr M R Mudge BSc FIMA FBCS, Room 560/A, Department of Mathematics, The University of Aston in Birmingham, Gosta Green, Birmingham B4 7ET.

Note: Submissions will only be returned if suitable stamped addressed envelopes are included.

Lucky numbers winner

Major errors of presentation prompted a considerable initial response from as far afield as Luxembourg, Derby, and Chichester.

All programs eventually submitted were written in Basic; hardware including PET, TRS-80, BBC and Spectrum: the latter having been run for four days ...

Various algorithms were designed for the construction of the desired sequence of lucky numbers, counting twin luckies and expressing even integers as the sum of two such lucky numbers.

The 'best' entry has been chosen as that of K P Leary of 2 Grove Vale, Chiselhurst, Kent BR7 5DS, whose presentation deserves particular commendation both for its content and its appearance, attributed jointly to Tandy Scripsit software and an Anadex WP6000 printer in correspondence mode.

A suitable prize will shortly be on its way to Chiselhurst.

The prize-winning investigation provides further empirical evidence for the Goldbach-type conjecture relating to lucky numbers, also for distribution theorems analogous to those for primes relating both to luckies and twin luckies. At the time of writing, however, analytic proofs of these results seem as remote as they ever were.