

Gerald's Column *by Gerald Fitton*

Although Archive 9.3 has been out only a few days I have already received many letters about my comments under the sub heading Marketing. I expect many more. I shall try to summarise the gist of those I've received up to now before moving on to my theme for this month, the impending demise of the electronic calculator and its replacement!

Upgrades to Impression

It seems that those of you who originally bought Impression or Impression Junior were more than happy to pay for the upgrade to Style or Publisher. You upgraded very quickly and, because the initial upgrade price was set deliberately low, you feel that you've done well. Even those of you who didn't upgrade at the original low price but waited and then upgraded at the higher price later don't feel that you were cheated because you were warned of the deadline and you made your choice. As I said last month, it seems to me that Computer Concepts marketed the upgrade in an exemplary manner precisely because it didn't follow the text book method of creaming off the enthusiasts at a high initial price! They have no problems with 'old' Impression users' complaints – 'old' Impression users have either upgraded or they accept that they had the chance to upgrade and didn't!

I have been told that there is a more recent version of Publisher available than the one I have but that, if I want to upgrade, then I have to pay £15. Undoubtedly that means that if I upgrade and then upgrade again it will cost me £15 a time. My inclination is to wait for two or three upgrades until either my version isn't doing what I want it to do or until I need the features of the new version. I hope that leap frogging in this way will save me money.

As a general rule it would seem that you do not mind paying for upgrades which add functionality, particularly if you can use those new features. What you object to is paying for an 'upgrade' which is nothing more than a bug fix intended to bring a package up to the specification which you were led to believe you'd bought. I am sure that in future paying for upgrades will become the rule rather than the exception.

Fireworkz Pro

There is a new version of Fireworkz Pro, Version 1.23. If you already have Fireworkz Pro then the upgrade is free and I recommend it to you. It does fix a lot of the problems you have reported.

Some of you will have Fireworkz (non Pro) Version 1.07 and are wondering what to do. I have been told that all registered users of Wordz, Resultz, Recordz and Fireworkz will soon receive a mail shot – but what it will contain is not yet finalised so I'll make a guess.

I guess that you'll be able to upgrade to Version 1.23 of all the subsidiary packages of Fireworkz Pro – but at a price. For example, if you have Fireworkz (non Pro) Version 1.07 then you'll be able to upgrade it to Fireworkz (non Pro) Version 1.23 by paying for the upgrade. The price of the upgrade is not yet fixed but I expect that Colton Software will bear in mind that Computer Concepts are charging £15 for their upgrade to Publisher. I expect that you'll be offered an upgrade from what you have (eg Wordz) to Fireworkz Pro

but not the possibility of upgrading from, say, Wordz to Fireworkz (non Pro).

I have no doubt in my mind that it would be to Colton Software's benefit if most of the people with subsidiary packages of Fireworkz Pro (eg Wordz) upgraded to Pro so that they could concentrate their development effort on Pro rather than on the subsidiary packages. I would hope that the prices offered for an upgrade to Pro would reflect some of that saving. From your letters to me it seems that if the upgrade price were reasonable then many of you would upgrade to Pro even if you don't expect to use all the features of Pro.

There is another aspect to consider. It seems to me that if Colton Software are to continue to offer good value to Fireworkz Pro users then it will be difficult for them to continue to support the subsidiary packages with the same vigour as Fireworkz Pro. The first sign of this difficulty is that the upgrade to version 1.23 is available for Pro right now but, as I write, it is not available for the subsidiary packages yet!

What you might find is that you are faced with a four pronged strategy designed to persuade you to upgrade to Pro now namely: (a) an upgrade from the subsidiary packages to Pro roughly at the discount prices offered at the recent Wembley Show (b) that this offer will be for a well defined initial period (say six months) after which the cost of upgrading to Pro will be substantially increased (c) that after the same initial period (say six months) there would be no further upgrades to those subsidiary packages and (d) in the meantime (say six months) upgrades to the subsidiary packages would be charged at a rates which are a substantial proportion of the cost of upgrading from to Fireworkz Pro!

I may be wrong but that's the way I see things going. Perhaps by writing to Colton Software you may be able to help them decide how to market this product! If you don't get your mail shot soon then write to them anyway.

I remember the slide rule

Slide rules in one form or another have been around for over 300 years. I once had a beautifully crafted wooden slide rule; when it broke I replaced it with a cheap plastic clone.

When I was at school slide rules were banned – we had to use four figure log tables as an aid to multiplication, division and for taking roots and powers! The alternative to using log tables for the School Certificate Exam (the forerunner of 'O' Levels) was the tedious and error prone method of long multiplication and long division.

After gaining a degree in Applied Mathematics at Imperial College (London) my first job was to help design fighter airplanes for Vickers. Although much less accurate than log tables, like all my colleagues, I bought and used a slide rule. When greater accuracy was required we used a mechanical calculator. To multiply you turn the handle clockwise – to divide turn anticlockwise.

I remember the electronic calculator

After the introduction of the electronic calculator the 300 year life of the slide rule came to an end within two to three years. I believe that, over the next two or three years, we shall see a similar decline in the use of the calculator. So you don't believe me! Read on!

In the mid 1970s I bought one of the first electronic calculators. To be more truthful my company (Redpoint Associates) bought me one; the price was around £200. The display was not the more modern liquid crystal but red LEDs. It was faster and more accurate than my trusty slide rule. Indeed, it was more accurate than four figure log tables and it had the advantage that I could use it for addition and subtraction (not possible with a slide rule).

The price of calculators fell, the LED display was replaced by the less power hungry liquid crystal display, the 'reverse polish logic' was discarded in favour of the more conventional brackets. Today every child at school is taught to use a calculator and (I speak from bitter experience as a lecturer) as a result many pupils never learn multiplication tables, many never learn long division or multiplication, many never learn to convert fractions to decimals and far too many can not divide by 100 without their trusty calculator!

My old friends log tables and slide rules are obsolete. Only my mature (older) students have heard of them. My 16 year old students know of no other way of doing sums except with a calculator – and when I first see them only a few have heard of spreadsheets.

I remember the spreadsheet

Something called a spreadsheet existed centuries before computers. They were constructed on paper in rows and columns just like their electronic counterpart; formulae were usually written in shorthand at the top of each column. Paper spreadsheets of this type have been used by scientists, engineers and accountants for centuries. As an aeronautical engineer I remember using them at Vickers (in the late 1950s) in conjunction with a slide rule, log tables and a mechanical calculator! Along came computers; the software engineers who created the early spreadsheet packages (in the 1970s), to their everlasting credit, took into account the centuries of expertise hard won by their predecessors. The reason it is so difficult to find improvements to the basic concept of an electronic spreadsheet is precisely because it was built on the foundation of centuries of experience.

I know I still own an electronic calculator. It's somewhere in my 'computer room' – but I don't seem to use it any more! Nowadays, when I need to do some sums I find it much easier to use a spreadsheet. I use PipeDream, I use Fireworkz or, if I have my IBM clone running (and when I'm at college), I use Excel, Lotus or even AsEasyAs (a Lotus clone).

The big single disadvantage of the calculator is that it is a one line display. Before you write to me in protest, I do know that you can get calculators which display more than one line but the display is still limited to just a few lines – and they're not interdependent like a spreadsheet but more like a printed record.

Whilst calculators display only one line, spreadsheets, even the paper ones, display the whole of a calculation or a set of similar calculations on the page. The electronic spreadsheet has a further advantage and that is the speed with which a "What if?" calculation can be executed. Simply change one pivotal value in a spreadsheet and all the dependent formulae are recalculated and the results ripple through the clearly visible slots of the spreadsheet. "What if?" has many uses; accountants use the "What if?" feature of spreadsheets for fine tuning their budgets; scientists and engineers use it for solving intractable equations with a 'try it and see' method of iteration. Iteration as a general method of solving equations is included in GNVQ Application of Number Level 5.

So what will replace the calculator

The biggest single disadvantage of most current spreadsheets is that they run on personal computers. Personal computers are boxes with hard discs, printers, VDU screens, plug in keyboards and GUI interfaces which need a mouse or tracker ball. Most personal computers need to be plugged into the mains and they're not very portable.

I suppose that the lap top computer is a step in the direction of portability but you usually have to pay a high price both in money and missing features. Acorn's A4 is similar to an A5000 but the screen is monochrome and it's more expensive. Acorn are on record as saying that they have no plans for marketing a successor to the A4 at present; their rationale is that the market wants a lap top with a colour screen and a long battery life at a much lower price than that at which they can build such a machine!

No product lasts for ever. The five classic stages in the life cycle of a product are Introduction, Development, Maturity, Saturation and Decline. The Introduction of the calculator in the 1970s caused the Decline of the slide rule. I believe that the calculator has now passed the Maturity and Saturation stages of its life cycle and that, within a year, it will be in Decline! So what will replace it? What do I think will push it into Decline? Certainly not the lap top which, even on Acorn's reckoning, is too expensive.

When Acorn launched its version of the Psion Pocket book, some of the Psion standard software was removed to make space for, guess what, a spreadsheet called Abacus! There has been much criticism of Acorn's ability to market their products but, in my view, this was an idea which reflects their brilliance. Yes! I believe that the palm top computer with spreadsheet will replace the calculator during the next two or three years.

Oh! I have just found my calculator. I see that it's a scientific calculator with hyperbolic functions and built in conversion of polar to rectangular coordinates both of which I use in many of my college spreadsheets for engineers – but I don't take a calculator to work now! What I and many others want is a portable spreadsheet instead of a calculator. If they could afford it, many people would throw away their calculator and buy a lap top (some of my more wealthy mature students bring their lap tops into class – and I encourage it) but what they would prefer is a palm top with a good (better than Abacus) spreadsheet.

I am sure that, once equipped with a spreadsheet package with the features of, say, PipeDream 4, the palm top will replace its cheaper rival (the calculator) because of its greater functionality. There will be a steep Development phase in its life cycle because people know how to use spreadsheets – they will have learned how to use them at work or at school or at college on a bulky and non portable personal computer.

I wonder if Acorn are considering putting their RISC chips into a new palm top rather than further developing the A4? Even with a monochrome screen, with only a system font and no printer I would want one. Many engineers and scientists would buy one. At the right price many students would buy one and schools would teach their use as, at the moment, they teach the use of calculators. Perhaps some of you know of a school where palm tops are handed out to pupils at the beginning of lessons as once we handed out calculators.

Iteration – Root 2

Those of you teaching Level 5 Application of Number will know of the Performance Criterion which (in abbreviated form) reads "Find the solution to equations using iterative methods". Spreadsheets (and not calculators) are ideal for this.

After giving my students some general chat about the intractability of the more interesting mathematical problems to analytical methods I usually start by getting my students to find the square root of 2 by a 'try it and see' method. Rather than get into any fancy linear or non linear interpolation (which would converge more rapidly) I get my students to choose for their next guess a value half way between two previous guesses. In PipeDream format the spreadsheet looks like the screenshot below:

	A	B	C	D	E
1					
2		Find the square root of		2.0000	
3					
4					
5		Low	Guess	High	Square
6					
7		1.0000	1.5000	2.0000	2.2500
8		1.0000	1.2500	1.5000	1.5625
9		1.2500	1.3750	1.5000	1.8906

This file, [Root2], is on the Archive monthly disc in PipeDream format. If you have Fireworkz then you can drag the PipeDream file directly into Fireworkz and the PipeDream loader will automatically convert the PipeDream file into a Fireworkz file.

The slots B7 and D7 contain 1 and 2 respectively; these are two initial guesses at root 2, one too high and one too low. The formula in C7 is $(B7 + D7)/2$ and the formula in E7 is $C7^2$; the result, $1.5^2 = 2.25$. This is larger than the 2 stored in D2 so we know that our guess of 1.5, in C7, is too large.

The key to automating the iterative process are the formulae in B8 and D8. The formula in B8 is `if(E7>D$2,B7,C7)` and the formula in D8 is `if(E7>D$2,C7,D7)`. The first of these two formulae selects either the previous Low or Guess values as the new Low; the second formula selects either the previous Guess or High as the new High value. Note the use of the \$ character; it fixes the D2 so that the 2 does not change as the formula is replicated down the spreadsheet. Row 8 can be copied down as far as necessary to find root 2 to as many decimal places as required.

Yes! I know that in PipeDream and Fireworkz I could use a custom function with the

necessary iterative loop built into it. I know that would be more elegant. I don't want to be elegant I want to be understood! And, as a by-the-way, (and to avoid you writing to me) when I was at school I was taught how to "extract roots" using a method not unlike long division based on the formula $(x + y)^2 = x^2 + 2xy + y^2$. Maybe some of you remember it too.

Iteration – Optimisation

As a second exercise I get the students to design an open topped box of a given volume and a square base. The objective is to design the box so that it uses the minimum amount of material, ie the minimum surface area. Those of you who are familiar with differential calculus will have no difficulty setting up the equations, differentiating and finding the shape of the box having the minimum surface area. All of the students to whom I set this task as a problem to be solved by iteration don't know of the differential calculus – and I don't tell them of that secret method! It's not in Level 5.

I give each student a separate individual volume between 1/4 cubic metres and 8 cubic metres and get them to set up a spreadsheet which, given the side of the base, will calculate the surface area using one row of the spreadsheet.

	A	B	C	D	E
1					
2		Volume =	7.0000		
3		Increment =	0.1000		
4		First Guess	2.0000		
5					
6	Base length	Base area	Height	Sides area	Total area
7	2.0000	4.0000	1.7500	14.0000	18.0000
8	2.1000	4.4100	1.5873	13.3333	17.7433

This simple spreadsheet, on the Archive monthly disc, uses row 7 as the row for the first calculation. The base area in B7 is $A7^2$. The Height, in C7, is Volume/Base area for which the formula is $C\$2/B7$. Once again, the \$ character in C\$2 ensures that the volume from C2 is fixed and hence copied correctly as the formula is replicated down the spreadsheet. The four sides are identical so that the area of the four sides, in D7, is $4*A7*C7$. The total area, in E7, is $B7+D7$.

Slot A8 contains $A7+C\$3$ so that row 8 performs the same calculations with a small increase in the base length. The formula from B7E7 are replicated into B8E8. By copying Row 8 down the spreadsheet the Total area of material used for the box can be found easily as a function of the Base length. For a Volume of 7 cubic metres the minimum Total area of about 17.42 square metres of material occurs at about 2.4 metres Base length.

I get the students to change the Increment and First Guess (in C3 and C4 respectively) until they home in on the base length which gives the minimum Total area for their (unique to them) Volume to about four significant figures.

The students to whom I teach iteration in this way are not in the top 20% (if they were then they'd know about differential calculus), many are not in the top 30% but (nearly) all of them see this as a practical example of the power of the iterative method. Of course, I have a secret which I don't tell them which allows me to check very easily whether they have the right answer. When the Total area is minimised the Height is half the Base length. I persuade the faster students to repeat the exercise with what I call the "Heinz Beans Can Problem", an open topped and then a closed top circular cylinder. You might like to see what ratio of height to diameter gives the minimum amount of metal in a Heinz Beans Can. Finally I emphasise that 'try and see' is a very powerful method of finding the numerical solution to many mathematical problems particularly when there is no analytical solution.

Back to the portable spreadsheet

Whilst it is unlikely that you will need to optimise the shape of a can of beans for Heinz I would like you to give some thought to the above and agree with me that spreadsheets represent a much more powerful mathematical tool than the calculator. I remember receiving from one of my correspondents a currency exchange spreadsheet and from another a spreadsheet listing their purchases from the local supermarket. Both of these applications would have much more utility if they were on a palm top rather than on a large bulky machine. What would you use a palm top spreadsheet for?

I look forward to the day when all my students will carry with them a palm top spreadsheet instead of a calculator so that we'll be able to do these sums in an ordinary classroom instead of in one fitted out with our expensive (networked) computers.

I see that Dixons offer two, a Sharp and the Psion (with 2 Mb of RAM) both at £399.99. In Paul's latest price list you'll find the 1 Mb Pocket Book II at £335. Is there a 2 Mb Acorn version yet? I still haven't been able to afford a Risc PC, but I'll see if I can persuade Father Christmas (or Jill, my wife) to afford me a palm top!

I shall remember the personal computer

Recently I read an article which, tongue only lightly in cheek, suggested that the days of the personal computer may be numbered! If so then what was to be the replacement? The suggestion was that it would be simple terminals used to access data such as that contained in an encyclopaedia or a Mills and Boon novel or for e-mail communication. If this happens then I foresee palm top machines not only for personal instant use but perhaps, as the terminal connected via a portable digital 'phone a world wide network!

Finally

Please write to me at the Abacus Training address which you'll find at the back of Archive. I shall be most grateful for return postage and a self addressed label. If you have a problem or anything other than the simplest comment then it would be most helpful if you

send it to me on a disc. I can't read HD format so please format your disc to 800 Kb.