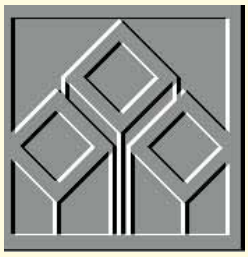


Salted peanuts

Making up 'pay packets' for the RNLI was far from plain sailing. Stephen Wells smooths the waters.

As a relative of mine is the helmsman of our offshore lifeboat, I felt a twang of empathy when I heard from Tony Nixon of the Isle of Anglesey. He wrote: "I was recently asked by the local secretary of the RNLI to assist him in computing the making up of 'pay packets', and providing a summary for the treasurer to draw the necessary from the bank. I thought this would be a simple task, eminently suitable for the shareware As-Easy-As spreadsheet which you included in your July cover disk.

"I include a working version of my program and a printout with some notes. You will see that it did not give the expected results in all circumstances with regard to the number of 20p and 10p coins. I don't think I've done anything wrong. It seems that the program maths has rounding errors somewhere. I use a 486DX33, not a Pentium. I would be grateful for an explanation of what is going on and perhaps a warning to users with similar errors."

I returned Tony's disk with an instant solution to get him in business using his present worksheet. This was to go to any cell which had an unhelpful formula and press F2, F9, Enter. What this does, in this and most other leading spreadsheets, is replace the existing formula with the calculated value as seen on the screen.

It's one thing to get a vehicle going so it will get the driver home, but it's also important to understand what is happening so the problem is circumvented in the future.

Firstly, I would clarify that the work of most lifeboat crew is voluntary. The "pay packets" referred to hold nominal honorariums. Secondly, Pentium paranoia should not be allowed to deter us from suspecting simple programming shortcomings.

Here's what Tony has on his worksheet: column B holds the pay packet amounts, B5=£34.70, B6=£24.70 and B7=£4.70. From there on out, rows 5 through to 7 have the same formulae with only the logical row number changing.

Column N calculates the number of £10 notes required. Cell N5 has @INT(B5/10). Column O gives the balance, calculated in O5 as +B5-(N5*10).

Column P calculates the number of £5 notes. P5=@INT(O5/5). And the new balance is in column Q. Q5=+O5-(P5*5).

This series continues logically to the right with the number of £1, 50p, 20p and 10p coins shown in columns R, T, V and X, respectively.

The balance columns change, so cell S5=(Q5-R5)*100, U5=+S5-(T5*50) and W5=+U5-(V5*20).

Further down the sheet, he sums each column so he knows the total number of each type of note and coin to get from the bank.

Now, in Tony's example, everything works out fine in rows 5 and 7. It's row 6, based on an amount of £24.70, that's making him seasick. The answer should be two £10 notes, four £1 coins, one 50p coin and one 20p coin. Yet As-Easy-As is telling him he doesn't need any 20p coins, but one 10p coin instead. No, there's nothing the matter with the software. The *PCW* July issue cover disk provided version 5.5F, a mature, fully-featured, DOS spreadsheet.

The first thing is to dig in and examine what is happening. If you go to cell N5 and enter

/ Range, Format, Science, 7 (decimals), N5..X7

you'll turn everything into a load of asterisks. Now enter

/ Sheet, ColWidth, RAnge, N5..X7, 15

Column S displays

7.0000000E+01

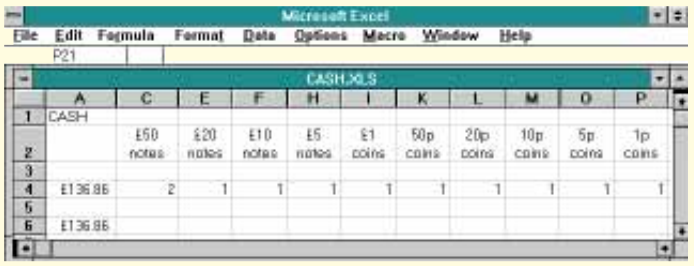
in rows 5 and 7, but row 6 shows

6.9999999E+01.

So, although all three rows show one

Fig 1

An alternative solution to the pay packet problem using Excel



Panel (a) Converting currency to coinage

```
A4  ENTER AMOUNT
A6  =SUM(C4*50,E4*20,F4*10,H4*5,I4,K4*0.5,L4*0.2,
         M4*0.1,O4*0.05,P4*0.01)
B4  =DOLLAR(A4,2)
C2  £50 notes
C4  =IF(A4>99.99,MID(RIGHT(B4,7),2,1),0)*2
D4  =IF(A4>9.99,MID(RIGHT(B4,6),2,1))
E2  £20 notes
E4  =INT(IF(D4>4,(D4/2),0))
F2  £10 notes
F4  =IF(D4>2,D4*10-(E4*20),D4)/10
G4  =INT(RIGHT(B4,4))
H2  £5 notes
H4  =IF(G4>5,1,0)
I2  £1 coins
I4  =IF(G4>5,G4-5,G4)
J4  =VALUE(MID(RIGHT(B4,3),2,1))
K2  50p coins
K4  =IF(J4>=5,1,0)
L2  20p coins
L4  =INT(IF(J4>2,(J4*10-(K4*50))/20))
M2  10p coins
M4  =(J4*10-(K4*50)-(L4*20))/10
N4  =IF(RIGHT(B4)>0,RIGHT(B4),0)
O2  5p coins
O4  =IF((VALUE(N4)>=5),1,0)
P2  1p coins
P4  =N4-(O4*5)
```

Panel (b) Financial analysis template listing

```
A40  GEARING RATIOS (%)
A41  Debt to Equity
B41  =Total_Liabilities/Stockholders__Equity*100
A42  Fixed Assets to Long-Term Debt
B42  =Net_Plant___Equipment/Long_Term_Debt*100
A43  Long-Term Debt to Working Capital
B43  =Long_Term_Debt/Working_Capital*100
```

50p coin, the balance in pence in cell U6=1.9999999E+01, a sliver under the single 20p coin mark, but more than enough to provide a 10p coin in column X.

The best solution is to use the ROUND function. To solve the immediate problem, if you edit cell O6 to read @ROUND(B6-(N6*10),2) the 10p coin disappears and a 20p coin surfaces. As insurance, you could use the ROUND function in all formulae in the balance columns.

As-Easy-As also offers the MOD function. This returns the remainder (or modulus in number theory) after a number has been divided. It is a variation of the INT function and it just depends on how you want to construct your worksheet.

As the subject of translating spreadsheet-calculated currency to coinage is of interest to more people than those making up pay packets, and as so many readers use Excel, *Fig 1 (page 270)* shows one solution for doing it in that spreadsheet.

I've only entered one line but you can see how it would continue down the page. The total numbers of each denomination would then be added at the bottom. The amount to be converted to coinage is entered in cell A4. The figure in A6 is a simple cross-check. That formula multiplies the number of each note or coin by its size, and adds them all up.

The layout is shown in Fig 1. The formulae are listed in *Panel (a)*. Columns B, D, G, J, N have been set to zero width (using the shortcut Ctrl 0, zero). They hold intermediary formulae.

To eliminate potential rounding problems, I started by converting the entered amount to text using the DOLLAR function. Then I've referred to individual digits in the amount with functions like MID and RIGHT. Fortunately, Excel is generally smart enough to recognise a number in text when you want to calculate with it. After some entered amounts gave Excel pause in columns J and O, I popped in a VALUE function to give it a nudge. It was probably because of this that I had to throw in two or three INT functions here and there when Excel occasionally came back with a result of one and a half for the number of one denomination.

I wouldn't want to swear that this worksheet works in every instance, but I've tried numerous random entries from £0.99 to £999.99 and the final version shown here always gave correct answers.

Financial analysis

Last month, we looked at the Liquidity Ratios in the financial analysis template for service companies. We now come to the gearing section. It's what they call "leverage" in the US. Both terms communicate the same idea: using someone else's money to finance the company's expansion plans, albeit at a cost.

Panel (b) shows the listing for the three Gearing Ratios. Rows 39 and 44 are blank. Column A gives the definition. Column B gives the formulae. They are the same in columns C through F because we're using the Names created in the July issue *Spreadsheets* column.

Column G holds the average results for the company's industry for any ratio which is commonly collected. As the example we have been using is an advertising agency, and the majority of agencies typically don't carry much Long-Term Debt, here the only average available is for the Debt to Equity ratio: everything the company owes compared with everything the company's stockholders own through the company.

Fig 2 (page 272) shows the results if you use the sample Balance Sheet and Income Statement figures from the July and August issues. As trends are more easily recognised with a chart, we'll make another here.

Of all the ways to make a chart in Excel, here's the easiest in this instance: open the worksheet we've been creating, SERVICE.XLS. Because many people like to print out all the ratios on a page, the labels of the years are on line 34 in the template which you can obtain on disk. To save a bit of work later, simply copy these headings from B34:G34 to B40:G40. They are not shown in *Fig 2* because this is just a working procedure. You can get rid of the headings later by closing the worksheet without saving it.

Now select the range, A40:G43. Select, Edit, Copy. Then select, File, New, Chart; and then Edit, Paste Special. In the dialogue box choose Values in Columns.

Fig 2 & Fig 3

Microsoft Excel

File Edit Formula Format Data Options Macro Window Help

F41 =Total_Liabilities/Stockholders__Equity*100

	A	B	C	D	E	F	G
39							
40	GEARING RATIOS (%)						
41	Debt to Equity	358.96	269.23	179.61	210.00	225.53	22
42	Fixed Assets to Long-Term Debt	733.33	525.00	266.67	269.23	325.00	
43	Long-Term Debt to Working Capital	7.06	8.60	13.64	14.77	14.63	

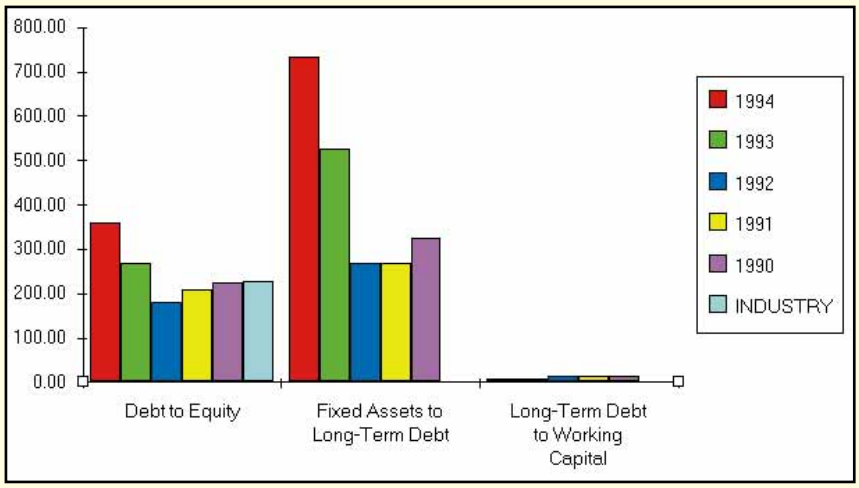


Fig 2 (top) *Example results for the Gearing Ratios portion of the financial analysis template for service companies*

Fig 3 *A chart of the results shown in Fig 2*

Accept the default selections of Series Names in First Row, and Categories in First Column.

Select, Chart, Add Legend. Select Chart, Attach Text and choose Chart Title. In the Formula bar, enter an equals sign and select Window, SERVICE.XLS, cell A40. Delete the word "Title" on the end of the line.

As the x-axis legends are extra long, their last lines may not appear on the bottom of your screen. Simply choose Format, Text, Horizontal Orientation and they'll sort themselves out. You should now have the chart shown in *Fig 3*.

Advertising agencies typically carry huge Accounts Payable because on the books they can have multi-million pound media bills to pay for their clients. It all balances out because their Accounts Receivable are higher still, but it tends to inflate their perceived debt. However, it is not Long-Term Debt (i.e. more than a year). That's why on the chart, the Debt to Equity ratio peaks at over 350%, and although the Fixed Assets to Long-Term Debt rises to more than 700%, the Long-Term Debt to Working Capital is way down there between 7% and 15%.

The latter ratio is included on the template, though, because in other service businesses it can be quite significant, particularly if they own real estate.

Gearing ratios measure the use of debt by a company. The lower the Debt to Equity ratio, the more the company may be reducing its debt and increasing its ability to repay.

If this ratio increases from year to year, reflecting a higher percentage increase in Net Worth, then the annual interest charges will add to the overhead — even if bank loan interest rates don't rise. Management can find itself spending more time with bankers than clients.

But a low ratio can indicate that management is too conservative and not capitalising on the potential of the business.

To summarise: The ratio compares the investment in the company by all creditors and the amount invested by the shareholders. It is an indicator of whether the company is carrying too much or, in the case of too conservative a management, too little debt. Ideally, the ratio will not change much from year to year and be comparable with the company's industry. In the example, shown in *Figs 2 and 3*, the company dropped below the industry average for three years but then in '93 and '94 started climbing. That the ratio not only exceeded the industry average but also climbed for two years may not necessarily mean trouble, but it's important for management to find out why it happened.

If the Fixed Assets to Long-Term Debt ratio is high or rising from year to year, it indicates a shrinking dependence on Long-Term Debt to finance major investments in items like buildings or perhaps information technology hardware. It also indicates that less of the company's capital is used for plant and equipment and more is available for current use.

A low or decreasing ratio indicates some loss of protection to long-term creditors. And it shows that more of the company's capital is used for plant and equipment and less is available for working capital.

To summarise: This is a useful indicator when deciding whether to invest in new plant and equipment. Fixed assets which may appear to be a good investment are no bargain if they tie up working capital. However, a very high ratio may suggest an under-investment in plant and equipment. In the example, the position has been more stable than the chart would suggest. But because the relatively small Long-Term Debt of the company halved over the five years while the investment in Plant and Equipment rose 13%, the ratio rocketed from 325% to 733%. Nothing there to get the wind up about.

If the Long-Term Debt to Working Capital ratio is more than 100%, the company can find that much of its capital is locked up in relatively fixed assets, and management will need to borrow even further in order to operate. A low or declining ratio is usually the better position.

To summarise: This is a ratio which may not be recorded in many industries, one reason being that the ratio is so closely related to the Fixed Assets to Net Worth Ratio. This latter is among the Activity Ratios which we'll come to in a later column. When the Fixed Assets to Net Worth ratio is exactly 100%, the Long-Term Debt to Working Capital ratio will also be 100%. However, this third Leverage Ratio is included in the template because it is a useful measurement of the amount of Long-Term Debt that a company can comfortably handle.

Next month: Activity Ratios.

PCW Contacts

Stephen Wells welcomes questions on spreadsheets, and solutions to be shared, via *PCW* Editorial at the usual address or at **stephen_wells@pcw.ccmail.compuserve.com**. For the financial analysis Excel templates for service companies and those which carry stock, send a formatted 3.5in disk and a stamped, self-addressed envelope.