

## **Lease Analytics 101: The Principal and Interest (P&I) Schedule**

*Get your own P&I Excel spreadsheet calculator*

*By Bill Bosco of Leasing101*

This is the first in a series of “Lease Analytics 101” articles that will give you a set of tools that may come in handy when structuring and analyzing lease transactions and cash flows. Don’t pass this article off as too basic because if you do read it you will find out how to get a free copy of an Excel P&I schedule calculator.

### **What is a P&I schedule?**

A P&I schedule is mortgage amortization schedule that provides an analysis of what portion of each periodic payment is applicable to the reduction in the principal balance and to the recognition of interest. Some in the leasing industry refer to it as a mortgage amortization schedule.

The terms mortgage balance, loan balance or unamortized balance can be substituted for the words principal balance in the above definition. Also the word finance income or lease revenue can be substituted for the word interest in the above definition.

### **Applications in the leasing business**

The P&I schedule is used in the leasing industry for fixed rate “money-over- money” transactions, namely direct finance leases (DFL), conditional sale agreements (CSAs) and secured loans (loans). It is used to create the accounting for lease and interest income on the money over money transactions as well as true leases that are classified as direct finance leases. In most cases it is the basis for calculating the amount a customer owes in the case of a prepayment. It is also used as the basis for doing analysis like portfolio runouts and projected portfolio balances.

### **The basic inputs**

The elements needed to calculate the P&I schedule are:

- the principal in the case of a loan or equipment cost in the case of a DFL or CSA
- desired interest rate in the case of a loan or yield in the case of a DFL or CSA
- the term
- the frequency of payments
- the balloon, if any, or the residual, if any, in the case of a DFL
- the periodic payment (rent or loan payment) which is usually the element that we solve for.

Loans are always in arrears (payments occurring at the end of the payment period), but DFLs and CSAs are often in advance (payment occurs at the beginning of the payment period). The free Excel spreadsheet has the option to do the analysis in advance or arrears. The DFL, CSA and many loan products in our industry are typically structured

assuming each month has 30 days and the year has 360 days. The financial calculators like the HP12c, HP17b, etc. use the 30/360 mode. The 30/360 mode is used in the P&I schedule as well. This is not to say that one cannot structure a fixed payment transaction that is based on another mode like actual number of days assuming a 365 day year, etc (there are more choices), but that would be very rare and would present administration and systems problems.

### Example

I have calculated a P&I schedule using the following assumptions for a DFL:

Equipment cost	\$1,000
Yield rate	9%
Term	5
Frequency	annual
Residual	15%
Advance/arrears	arrears

Using an HP 12C financial calculator, I solved for the rent payment with the following key strokes:

```
1,000 CHS PV
9 i
5 n
150 FV
g END
PMT which solves the payment of 232.03
```

To create the P&I schedule, the interest and principal portions of the first payment as well as the ending balance can be calculated on the HP 12C as follows:

```
1 f AMORT solves for the first month's interest = $90.00
x<>y solves for the first month's principal amortization = $142.03
RCL PV solves for the ending principal balance = $857.97
```

Repeat the calculation for the term of the lease/loan with the exception of the fifth year principal which has to be adjusted for the residual payment.

The result is the schedule below. The portion of the \$232.03 payment that applies to interest or, in this case lease income, is calculated by multiplying the opening balance in the payment period by the interest rate of 9% (in the first period  $\$1,000.00 \times 9\% = \$90.00$ ). The portion of the payment that is applied to amortize the balance is the difference between the payment and the interest portion as calculated above (in the first period  $\$232.03 - \$90.00 = \$142.03$ ). The full schedule is presented below. Note that the payment in period 5 is the sum of the rent and the residual ( $\$232.03 + \$150.00 = \$382.03$ )

Period	Payment	Interest	Principal	Balance
				1,000.00

1	232.03	90.00	142.03	857.97
2	232.03	77.22	154.81	703.16
3	232.03	63.28	168.74	534.42
4	232.03	48.10	183.93	350.48
5	382.03	31.54	350.48	0.00

### **Get your free P&I calculator spreadsheet**

Now that you know how to create your own P&I schedule by hand with a financial calculator you can forget it all and get your own Excel P&I schedule calculator that automatically does the above calculations. You don't really want to do those calculations by hand if you don't have to and, using the Excel P&I schedule calculator, you can view the whole schedule and get a printout. The Excel P&I schedule calculator automatically adjusts itself to the term and frequency you specify to do a customized P&I schedule. The best part is that it is absolutely free. Just send an email to [wbleasing101@aol.com](mailto:wbleasing101@aol.com) and I will send you your Excel P&I schedule calculator. The Excel P&I schedule calculator was developed by Paul Benjamin who collaborated in producing this article. If enough of you read this article, find it useful and email for your free copy, we will follow up with future articles and free Excel spreadsheets. So far we have a backlog of ideas including spreadsheets that calculate NPV, IRR and average life of a loan/lease as well as portfolio modeling. Send us your emails and give us feedback and suggestions for other spreadsheet applications.

*Bill Bosco is the Principal Partner in Leasing 101, a lease consulting company. His expertise is in product development, structuring, accounting, tax and training. Bill is a frequent speaker and author on leasing topics. Bill can be reached at [wbleasing101@aol.com](mailto:wbleasing101@aol.com).*

*Paul Benjamin is a Partner in Leasing 101. His expertise is in structuring, pricing and analysis. Paul can be reached at [pster@yahoo.com](mailto:pster@yahoo.com)*