CALCULATING THE EFFECTIVE INTEREST RATE © **effective.doc**
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The formula shown below will ***approximate*** the effective annual yield (interest rate) of an investment/debt where there are periodic receipts/payments of interest and a final lump-sum receipt/payment where the initial amount invested/borrowed isn't equal to the final lump-sum receipt/payment.

Y = [I + (P – M) / N] / (P + M) / 2

Where: Y = Effective annual yield (rate)
N = Number of periods of compounding in total
M = Amount paid/received at date of purchase/sale
P = Face/Maturity value (final lump-sum payment)
I = Amount of income received/paid per compounding period

A good application of this formula would be an investment/sale of a bond where the nominal (stated) interest rate is higher, or lower, than the effective (market) rate on the date of purchase/sale. Required information: (1) periodic interest receipts/payments, (2) initial investment/sales amount, and (3) final lump-sum receipt/payment (maturity value). Knowledge of the nominal (stated) interest rate is not required.

An example: A 5-year bond with a maturity value of $100,000.00, a stated annual interest rate of 5.000% with annual interest payments of $5,000.00 (5% x $100,000.00) is sold to yield a 6.000% effective rate. The initial amount of cash changing hands (present value) on the sales date would be $95,787.63 as determined by using present value tables. [($100,000.00 * 0.74725817) + ($5,000.00 * 4.21236379)] = $95,787.63. The amortization schedule shown below provides proof of the accuracy of the present value.

Calculation of the effective interest rate using the formula:

Y = [5,000 + (100,000.00 – 95,787.63) / 5] / (100,000.00 + 95,787.63) / 2

Y = 5,842.474 / 97,893.815

Y = 5.968172669 % ← Close to effective interest rate of 6.000%

Amortization Schedule:

Period	Periodic Payment/ Receipt	Actual Interest Amount	Amortization Amount	Carrying Value
0				95,787.63
1	5,000.00	5,747.26	747.26	96,534.89
2	5,000.00	5,792.09	792.09	97,326.98
3	5,000.00	5,839.62	839.62	98,166.60
4	5,000.00	5,890.00	890.00	99,056.60
5	5,000.00	5,943.40	943.40	100,000.00