Using the HP 10B and TI BA II Plus Financial Calculators

This appendix is intended to help you use your Hewlett-Packard HP 10B or Texas Instruments TI BA II Plus financial calculator to solve problems encountered in an introductory finance course. It describes the various calculator settings and provides keystroke solutions for nine selected problems from this book. Please see your owner's manual for more complete instructions. For more examples and problem-solving techniques, please see *Financial Analysis with an Electronic Calculator,* 7th edition, by Mark A. White (New York: McGraw-Hill, 2007).

CALCULATOR SETTINGS

Most calculator errors in introductory finance courses are the result of inappropriate settings. Before beginning a calculation, you should ask yourself the following questions:

1. Did I clear the financial registers?
2. Is the compounding frequency set to once per period?
3. Is the calculator in END mode?
4. Did I enter negative numbers using the +/− key?

Clearing the Registers

All calculators have areas of memory, called registers, where variables and intermediate results are stored. There are two sets of financial registers, the time value of money (TVM) registers and the cash flow (CF) registers. These must be cleared before beginning a new calculation. On the Hewlett-Packard HP 10B, pressing ▓ {CLEAR ALL} clears both the TVM and the CF registers.[1] To clear the TVM registers on the TI BA II Plus, press 2nd {CLR TVM}. Press 2nd {CLR Work} from within the cash flow worksheet to clear the CF registers.

Compounding Frequency

Both the HP 10B and the TI BA II Plus are hardwired to assume monthly compounding, that is, compounding 12 times per period. Because very few problems in introductory finance courses make this assumption, you should change this default setting to once per period. On the HP 10B, press 1 ▓ {P/YR}. To verify that the default has been changed, press the ▓ key, then press and briefly hold the INPUT key.[2] The display should read "1P_Yr".

On the TI BA II Plus, you can specify both payment frequency and compounding frequency, although they should normally be set to the same number. To set both to once per period, press the key sequence 2nd {P/Y} 1 ENTER, then press ↓ 1 ENTER. Pressing 2nd {QUIT} returns you to standard calculator mode.

---

[1] The ▓ key is colored orange and serves as a Shift key for the functions in curly brackets.

[2] This is the same keystroke used to clear all registers; pretty handy, eh?

END Mode and Annuities Due

In most problems, payment is made at the end of a period, and this is the default setting (end mode) for both the HP 10B and the TI BA II Plus. *Annuities due* assume payments are made at the *beginning* of each period (begin mode). On the HP 10B, pressing ▇ {BEG/END} toggles between begin and end mode. Press the key sequence **2nd** {BGN} **2nd** [SET] **2nd** {QUIT} to accomplish the same task on the TI BA II Plus. Both calculators will indicate on the display that your calculator is set for begin mode.

Sign Changes

Sign changes are used to identify the direction of cash inflows and outflows. Generally, cash inflows are entered as positive numbers and cash outflows are entered as negative numbers. To enter a negative number on either the HP 10B or the TI BA II Plus, first press the appropriate digit keys and then press the change sign key, +/− . Do *not* use the minus sign key, − , as its effects are quite unpredictable.

SAMPLE PROBLEMS

This section provides keystroke solutions for selected problems from the text illustrating the nine basic financial calculator skills.

1. Future Value or Present Value of a Single Sum

Compute the future value of $2,250 at a 17 percent annual rate for 30 years.

HP 10B		TI BA II PLUS	
-2,250.00 **PV**		-2,250.00 **PV**	
30.00 **N**		30.00 **N**	
17.00 **I/YR**		17.00 **I/Y**	
FV 249,895.46		**CPT** **FV** 249,895.46	

The future value is $249,895.46.

2. Present Value or Future Value of an Ordinary Annuity

Betty's Bank offers you a $20,000, seven-year term loan at 11 percent annual interest. What will your annual loan payment be?

HP 10B		TI BA II PLUS	
-20,000.00 **PV**		-20,000.00 **PV**	
7.00 **N**		7.00 **N**	
11.00 **I/YR**		11.00 **I/Y**	
PMT 4,244.31		**CPT** **PMT** 4,244.31	

Your annual loan payment will be $4,244.31.

3. Finding an Unknown Interest Rate

Assume that the total cost of a college education will be $75,000 when your child enters college in 18 years. You presently have $7,000 to invest. What rate of interest must you earn on your investment to cover the cost of your child's college education?

HP 10B		TI BA II PLUS	
-7,000.00 **PV**		-7,000.00 **PV**	
18.00 **N**		18.00 **N**	
75,000.00 **FV**		75,000.00 **FV**	
I/YR 14.08		**CPT** **I/Y** 14.08	

You must earn an annual interest rate of at least 14.08 percent to cover the expected future cost of your child's education.

4. Finding an Unknown Number of Periods

One of your customers is delinquent on his accounts payable balance. You've mutually agreed to a repayment schedule of $374 per month. You will charge 1.4 percent per month interest on the overdue balance. If the current balance is $12,000, how long will it take for the account to be paid off?

HP 10B		TI BA II PLUS	
-12,000.00 **PV**		-12,000.00 **PV**	
1.40 **I/YR**		1.40 **I/Y**	
374.00 **PMT**		374.00 **PMT**	
N 42.90		**CPT** **N** 42.90	

The loan will be paid off in 42.90 months.

5. Simple Bond Pricing

Mullineaux Co. issued 11-year bonds one year ago at a coupon rate of 8.25 percent. The bonds make semi-annual payments. If the YTM on these bonds is 7.10 percent, what is the current bond price?

HP 10B		TI BA II PLUS	
41.25 **PMT**		41.25 **PMT**	
1,000.00 **FV**		1,000.00 **FV**	
20.00 **N**		20.00 **N**	
3.55 **I/YR**		3.55 **I/Y**	
PV -1,081.35		**CPT** **PV** -1,081.35	

Because the bonds make semiannual payments, we must halve the coupon payment (8.25 ÷ 2 = 4.125 ==> $41.25), halve the YTM (7.10 ÷ 2 ==> 3.55), and double the number of periods (10 years remaining × 2 = 20 periods). Then, the current bond price is $1,081.35.

6. Simple Bond Yields to Maturity

Vasicek Co. has 12.5 percent coupon bonds on the market with eight years left to maturity. The bonds make annual payments. If one of these bonds currently sells for $1,145.68, what is its YTM?

HP 10B			TI BA II PLUS	
-1,145.68	**PV**	-1,145.68	**PV**	
125.00	**PMT**	125.00	**PMT**	
1,000.00	**FV**	1,000.00	**FV**	
8.00	**N**	8.00	**N**	
I/YR 9.79		**CPT**	**I/Y**	9.79

The bond has a yield to maturity of 9.79 percent.

7. Cash Flow Analysis

What are the IRR and NPV of the following set of cash flows? Assume a discount rate of 10 percent.

YEAR	CASH FLOW
0	−$1,300
1	400
2	300
3	1,200

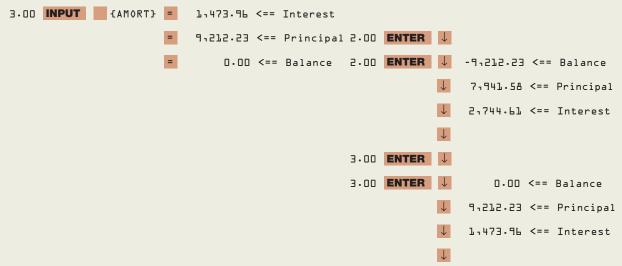| HP 10B			TI BA II PLUS		
-1,300.00	**CFj**		**CF**		
400.00	**CFj**		**2nd** {CLR Work}		
1.00	{Nj}	-1,300.00	**ENTER**	↓	
300.00	**CFj**	400.00	**ENTER**	↓	
1.00	{Nj}	1.00	**ENTER**	↓	
1,200.00	**CFj**	300.00	**ENTER**	↓	
1.00	{Nj}	1.00	**ENTER**	↓	
{IRR/YR} 17.40		1,200.00	**ENTER**	↓	
10.00	**I/YR**	1.00	**ENTER**	↓	
{NPV} 213.15		**IRR** **CPT** 17.40			
		NPV			
		10.00	**ENTER**		
		↓	**CPT** 213.15		

The project has an IRR of 17.40 percent and an NPV of $213.15.

8. Loan Amortization

Prepare an amortization schedule for a three-year loan of $24,000. The interest rate is 16 percent per year, and the loan calls for equal annual payments. How much interest is paid in the third year? How much total interest is paid over the life of the loan?

To prepare a complete amortization schedule, you must amortize each payment one at a time:

HP 10B				TI BA II PLUS			
	-24,000.00	**PV**			-24,000.00	**PV**	
	16.00	**I/YR**			16.00	**I/Y**	
	3.00	**N**			3.00	**N**	
	PMT 10,686.19			**CPT** **PMT** 10,686.19			
1.00 **INPUT** {AMORT}	=	3,840.00 <== Interest		**2nd** {AMORT} **2nd** {CLR Work}			
	=	6,846.19 <== Principal					
	=	-17,153.81 <== Balance	1.00 **ENTER** ↓				
2.00 **INPUT** {AMORT}	=	2,744.61 <== Interest	1.00 **ENTER** ↓	-17,153.81 <== Balance			
	=	7,941.58 <== Principal		↓	6,846.19 <== Principal		
	=	-9,212.23 <== Balance		↓	3,840.00 <== Interest		
				↓			

(*Continued*)

```
3.00  INPUT    {AMORT} =    1,473.96 <== Interest
                         =    9,212.23 <== Principal 2.00  ENTER  ↓
                         =        0.00 <== Balance   2.00  ENTER  ↓    -9,212.23 <== Balance
                                                                  ↓     7,941.58 <== Principal
                                                                  ↓     2,744.61 <== Interest
                                                                  ↓
                                            3.00  ENTER  ↓
                                            3.00  ENTER  ↓        0.00 <== Balance
                                                         ↓    9,212.23 <== Principal
                                                         ↓    1,473.96 <== Interest
                                                         ↓
```

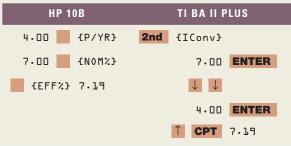Interest of $1,473.96 is paid in the third year.

Enter both a beginning and an ending period to compute the total amount of interest or principal paid over a particular period of time.

HP 10B	TI BA II PLUS
-24,000.00 PV	-24,000.00 PV
16.00 I/YR	16.00 I/Y
3.00 N	3.00 N
PMT 10,686.19	CPT PMT 10,686.19
1.00 INPUT	2nd {AMORT} 2nd {CLR Work}
3.00 {AMORT} = 8,058.57 <== Interest	
= 24,000.00 <== Principal	1.00 ENTER ↓
= 0.00 <== Balance	3.00 ENTER ↓ 0.00 <== Balance
	↓ 24,000.00 <== Principal
	↓ 8,058.57 <== Interest

Total interest of $8,058.57 is paid over the life of the loan.

9. Interest Rate Conversions

Find the effective annual rate, EAR, corresponding to a 7 percent annual percentage rate, APR, compounded quarterly.

HP 10B	TI BA II PLUS
4.00 {P/YR}	2nd {IConv}
7.00 {NOM%}	7.00 ENTER
{EFF%} 7.19	↓ ↓
	4.00 ENTER
	↑ CPT 7.19

The effective annual rate equals 7.19 percent.