

VI. Hewlett Packard (HP) 10BII

The HP10BII is programmed to perform two basic types of operations: statistical operations and financial operations. Various types of computations are activated by depressing the mauve or orange “shift” keys located in the leftmost column of keys on the keypad. The mauve colored shift key activates mainly statistical functions and operations indicated in mauve written above some of the keys on the keypad. The orange colored shift key activates mainly financial functions and operations indicated on the bottom half of most of the keys on the keypad.

The HP 10BII has continuous memory. Therefore, turning of the calculator does not affect the information you have previously stored in the calculator. If not turned off manually, the calculator will turn off automatically approximately 10 minutes after last use. The HP 10BII uses two lithium batteries and has a low battery indicator symbol which is activated when battery power is low indicating the need to replace them.

It is worth noting that the cursor () is visible when you are entering a number and that using the back key () will erase the last digit entered and visible on the display. When the cursor () is not visible, then pressing the back key () will clear the entire display and cancel any pending calculation. When you are entering a number, pressing (C) also clears it to zero.

This guide uses the notation OS to indicate the selection of the orange shift key.

A. Turning the calculator on and off, clearing the display, clearing error messages, clearing memory, and setting the decimal points:

	Keystrokes	Display	Description
1.	ON	0.00	Turns the calculator on.
2.	OS ¹ ON		Turns the calculator off.
3.	C		Clears the display of its current contents and cancels the current calculation.
4.	? or C		Clears any error message and restores the original contents of the display.
5.	OS C All	0.00	Clears all memory. Does not reset modes. ²

¹ The keystroke symbol OS indicates the need to depress the orange shift key located in the left column of the keypad at the third position from the bottom.

² Modes on the HP 10 BII include (a) the number of payments assumed to occur each year, (b) whether payments occur at the beginning or the end of the year, and (c) and the number of decimals displayed.

6.	(Hold)	ON	N	FV	0.00	Press and hold down ON, N, and FV. When you release all three, memory is cleared and all functions revert to original factory settings.
7.	OS	CL?	.		0.00	Clears statistical memory.
8.	OS	DISP		(0 through 9) or (.)		Selecting 0 through 9 will set the number of decimal places displayed to the number selected. Selecting (.) will cause the number of decimal places displayed to “float.”

B. Using the memory capability:

The HP 10BII can store numbers for re-use in several different ways:

- ?? Use the (K) or constant key to store a number and its operator for repetitive operations.
- ?? Use the 3 key memory [(? M), (RM), and (M+)] to store, recall, and sum numbers respectively.
- ?? Use (OS) (STO) and (RCL) to store to, and recall from, the 10 numbered registers.

Using Constants: Use (K) to store a number and arithmetic operator for repetitive calculations.

Example: Calculate $5 + 2$, $6 + 2$, and $7 + 2$.

	Keystrokes	Display	Description
1.	(5) (+) (2) (K)	2.00	Stores “+2” as constant.
2.	(=)	7.00	Adds $5 + 2$.
3.	(6) (=)	8.00	Adds $6 + 2$.
4.	(7) (=)	9.00	Adds $7 + 2$.

Using the M Register: The (? M), (RM), and (M+) keys perform memory operations in a single storage register called the M register. Although it generally is unnecessary to clear the M register, it can be cleared by pressing (0) (? M). To add a series of number to the M register, use (? M) to store the first number and (M+) to add subsequent numbers. To subtract numbers from the M register, press (+/-).

Example: Use the M register to add 17, 14, and 16. Then subtract 4 and recall the result.

	Keystrokes	Display	Description
1.	(1) (7) (? M)	17.00	Stores 17 in the M register.
2.	(14) (M+)	14.00	Adds 14 to M register.
3.	(16) (M+)	16.00	Adds 16 to M register.
4.	(4) (+/-) (M+)	-4.00	Adds -4 to the M register.
5.	(RM)	43.00	Recalls contents of the M register.

Using Numbered Registers: The (OS) (STO) and (RCL) keys access the 10 user registers. The (OS) (STO) key is used to copy the displayed number to a designated register. The (RCL) key is used to copy a number from the register to the display.

Storing and recalling numbers requires two steps:

1. Press (OS) (STO) or (RCL). To cancel this step, press (?) or (C).
2. Enter the register number (0 through 9).

Example: In the following example, two storage registers are used. Calculate the following: $475 \div 39$ and $(560 + 475) \div 39$.

	Keystrokes	Display	Description
1.	(475) (OS) (STO)(1)	475.00	Stores 475 in register 1.
2.	(÷) (39) (OS) (STO) (2)	39.00	Stores 39 in register 2.
3.	(=)	12.18	Completes the first calculation.
4.	(560) (+) (RCL) (1)	475.00	Recalls register 1.
5.	(÷) (RCL) (2)	39.00	Recalls register 2.
6.	(=)	26.54	Completes the second calculation.

C. Time Value Basics: Clearing time value of money (TVM) registers, setting beginning and end-of-period modes, and establishing interest rate compounding frequency.

Keystrokes	Display	Description
Clear all memory including TVM.		
1. (OS) (C ALL)	0.00	Clears Time-Value-of-Money worksheet. This sets N, I/YR, PV, PMT, and FV to zero and briefly displays the current value of P/YR.
Set begin and end modes.		
1. (OS) (BEG/END)	BEGIN	The calculator comes programmed with the assumption that cash flows occur at the end of the period. This keystroke combination sets the calculator to the beginning-of-period.
2. (OS) (BEG/END)		Resets the calculator to end-of-the period mode.
Set compounding frequency.		
1. (1) (OS) (P/YR)	1.00	Sets the frequency of interest compounding to one time per year. The calculator is factory programmed to assume 12 compounding periods per year.

D. Calculating the present value of a lump sum amount:

Example: Liz anticipates it will cost her \$65,000 to buy a house in eighteen months. How much should she invest today, at an annual interest rate of 15% (interest is compounded monthly), to be able to afford the house in one and a half years?

Keystrokes	Display	Description
Clear all memory.		
1. (OS) (C ALL)	0.00	Clears Time-Value-of-Money worksheet.
2. (65000) (FV)	65,000.00	Enter \$65,000 as the future value.
3. (18) (N)	18.00	Enter the number of periods of 18 months.
4. (15) (I/Y)	15.00	Enter the annual interest rate of 15%.
5. (PV)	-51,975.99	Computes the present value deposit needed to accumulate to \$65,000 in 18 months assuming 15% annual interest compounded monthly.

Note: The display in step 5 has a negative sign because it represents a cash outflow (investment) today.

E. Calculating the future value of a lump sum amount:

Example: If John invests \$1,850 today in an asset earning a 10% rate of return (compounded annually), how much will he have after two years?

Keystrokes	Display	Description
Clear all memory.		
1. (OS) (C ALL)	0.00	Clears Time-Value-of-Money worksheet.
2. (1) (OS) (P/YR) (C)	0.00	Sets the frequency of compounding to once per year and clears the register.
3. (1850) (PV)	1,850.00	Enter \$1,850 as the present value.
4. (2) (N)	2.00	Enter the number of periods of 2 years.

5. (10) (I/Y)	10.00	Enter the annual interest rate of 10%.
6. (FV)	-2,238.50	Computes the future value of \$1,850 deposit earning 10 percent annual interest after 2 years.

F. Calculating the present value of an annuity:

Example: How much should you invest now so that, starting one year from today, your daughter can receive \$6,000 per year for the next five years? Assume the discount rate is 15%.

Keystrokes	Display	Description
Clear all memory.		
1. (OS) (C ALL)	0.00	Clears Time-Value-of-Money worksheet.
2. (1) (OS) (P/YR) (C)	0.00	Sets the frequency of compounding to once per year and clears the register.
3. (6000) (PMT)	6,000.00	Enter \$6,000 as the annuity payment.
4. (5) (N)	5.00	Enter the number of periods of 5 years.
5. (15) (I/Y)	15.00	Enter the annual interest rate of 15%.
6. (PV)	-20,112.93	Computes the present value of a \$6,000 end-of-the period annuity earning 15 percent annual interest for 5 years.

G. Calculating the present value of an annuity due:

Example: In this case, instead of receiving payments at the end of each year, your daughter will receive the payments at the beginning of each year. Therefore, her first payment will be received immediately.

Keystrokes	Display	Description
Clear all memory.		
1. (OS) (C ALL)	0.00	Clears Time-Value-of-Money worksheet.
2. (1) (OS) (P/YR) (C)	0.00	Sets the frequency of compounding to once per year and clears the register.
3. (OS) (BGN/END)	0.00	In addition to the 0.00 on the LED display, the word BEGIN should now appear indicating beginning of the period payments.
4. (6000) (PMT)	6,000.00	Enter \$6,000 as the annuity payment.
5. (5) (N)	5.00	Enter the number of periods of 5 years.
6. (15) (I/Y)	15.00	Enter the annual interest rate of 15%.
7. (PV)	-23,129.87	Computes the present value of a \$6,000 beginning-of-the-period annuity earning 15 percent annual interest for 5 years.

H. Calculating the future value of an annuity:

Example: You have recently won a lottery for \$10,000. Your winnings will come in five annual payments of \$2,000 each, starting one year from now. If the annual compound rate is 11.4%, how much is the lottery worth at the end of five years?

Keystrokes	Display	Description
Clear all memory.		
1. (OS) (C ALL)	0.00	Clears Time-Value-of-Money worksheet.

2.	(1) (OS) (P/YR) (C)	0.00	Sets the frequency of compounding to once per year and clears the register.
3.	(2000) (PMT)	2,000.00	Enter \$2,000 as the annuity payment.
4.	(5) (N)	5.00	Enter the number of periods of 5 years.
5.	(11.4) (I/Y)	11.4	Enter the annual interest rate of 11.4%.
6.	(FV)	-12,555.07	Computes the future value of a \$2,000 end-of-the period annuity earning 11.4 percent annual interest for 5 years.

I. Calculating the future value of an annuity due:

Example: In this case, your winnings will be paid at the beginning, instead of at the end, of each year for five years. So, you are going to get the first payment of your \$10,000 lottery, i.e. \$2,000, immediately! There are two methods to calculate the future value of an annuity due:

	<u>Keystrokes</u>	<u>Display</u>	<u>Description</u>
	Clear all memory.		
1.	(OS) (C ALL)	0.00	Clears Time-Value-of-Money worksheet.
2.	(1) (OS) (P/YR) (C)	0.00	Sets the frequency of compounding to once per year and clears the register.
3.	(OS) (BGN/END)	0.00	In addition to the 0.00 on the LED display, the word BEGIN should now appear indicating beginning of the period payments.
4.	(2000) (PMT)	2,000.00	Enter \$2,000 as the annuity payment.
5.	(5) (N)	5.00	Enter the number of periods of 5 years.

6. (11.4) (I/Y)	11.4	Enter the annual interest rate of 11.4%.
7. (FV)	-13,986.35	Computes the future value of a \$2,000 beginning-of-the-period annuity earning 11.4 percent annual interest for 5 years.

J. Calculating the net present value (NPV) of a series of equal or uneven cash flows using the cash flow (CFj) register.

Example: Jane thinks if she invests \$80,000 by buying property today, she can get \$15,000 in rent from it for each of the next twenty years (the rent will be paid quarterly). If she wants a rate of return of 12% (with quarterly discounting) on her investment, what is the net present value of this project?

Keystrokes	Display	Description
Clear all memory.		
1. (OS) (C ALL)	0.00	Clears Time-Value-of-Money worksheet.
2. (4) (OS) (P/YR) (C)	0.00	Sets the frequency of compounding to four times per year and clears the register.
3. (80000) (+/-) (CFj)	-80,000.00	Inputs initial cash outflow.
4. (1) (OS) (Nj)	1.00	Stores the frequency with which the initial outflow of \$80,000 occurs.
5. (15000) (÷) (4) (=) (CFj)	3,750.00	Stores the quarterly cash inflow.
6. (4) (x) (20) (=) (OS) (Nj)	80.00	Stores the number of quarterly rent payments to be received.
7. (12) (I/Y)	12.00	Stores the annual interest rate.
8. (OS) (NPV)	33,252.86	Calculates the net present value of the investment.

K. Calculating the internal rate of return (IRR) of a series of equal or uneven cash flows using the cash flow (CFj) register.

Example: ABC Inc. is planning to spend \$35,000 to buy a warehouse. Under the contract, they will receive an after-tax cash flow of \$6,000 (paid semiannually) from the property for the next eight years. What is the internal rate of return for the investment?

	Keystrokes	Display	Description
	Clear all memory.		
1.	(OS) (C ALL)	0.00	Clears Time-Value-of-Money worksheet.
2.	(2) (OS) (P/YR) (C)	0.00	Sets the frequency of compounding to twice per year and clears the register.
3.	(35000) (+/-) (CFj)	-35,000.00	Inputs initial cash outflow.
4.	(1) (OS) (Nj)	1.00	Stores the frequency with which the initial outflow of \$35,000 occurs.
5.	(6000) (÷) (2) (=) (CFj)	3,000.00	Stores the quarterly cash inflow.
6.	(8) (x) (2) (=) (OS) (Nj)	16.00	Stores the number of quarterly rent payments to be received.
7.	(OS) (IRR/YR)	7.97	Computes the internal rate of return of the investment.

L. Bond valuation:

Example: How much would you be willing to pay for a bond today if it pays \$100 in interest annually for 20 years (starting next year), and has a principal payment of \$1,000? The yield to maturity is 15%.

Keystrokes	Display	Description
Clear all memory.		
1. (OS) (C ALL)	0.00	Clears Time-Value-of-Money worksheet.
2. (1) (OS) (P/YR) (C)	0.00	Sets the frequency of compounding to once per year and clears the register.
3. (100) (PMT)	100.00	Enter \$100 as the annuity payment.
4. (1000) (FV)	1,000.00	Enter \$1,000 as the future value
5. (20) (N)	20.00	Enters the maturity of the bond in years.
6. (15) (I/Y)	15.00	Enter the annual interest rate of 15%.
7. (PV)	-687.03	Computes the present value of the bond at \$687.03.