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HP 10BII Discounted Cash Flow (DCF) Basics

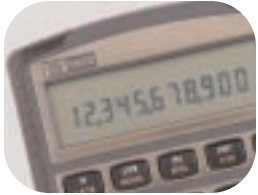
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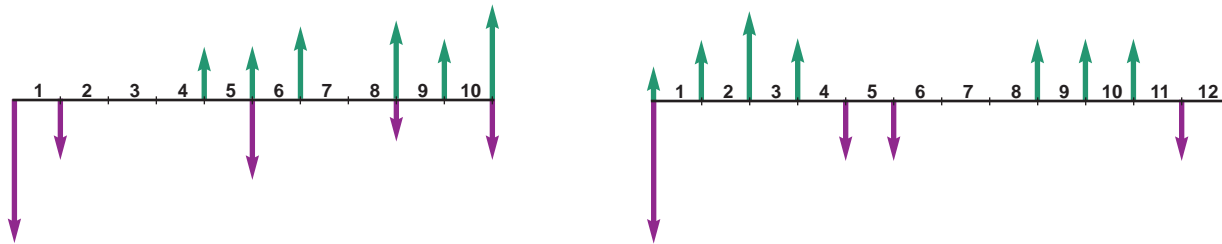


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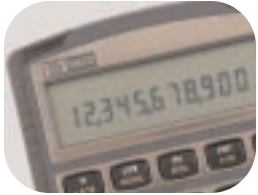
When to Use DCF Analysis Instead of TVM

The five financial (TVM) registers form a handy and powerful tool for one common cash flow situation: where there is a steady PMT amount flowing uniformly, once per period. This amount may be zero, or positive or negative, but it must always be the same amount and it must occur exactly once—at the same time—each period. But there are plenty of investment and financial scenarios where such a uniform series of cash flows simply isn't present. Look at these examples:



You simply can't use the TVM registers on the 12C to analyze such situations, *because the periodic cash flows are uneven in amount and direction*. But you do have another set of tools that can help: the **Discounted Cash Flow (DCF)** keys. These keys include **CFj**, **Nj**, **NPV** and **IRR/YR**.

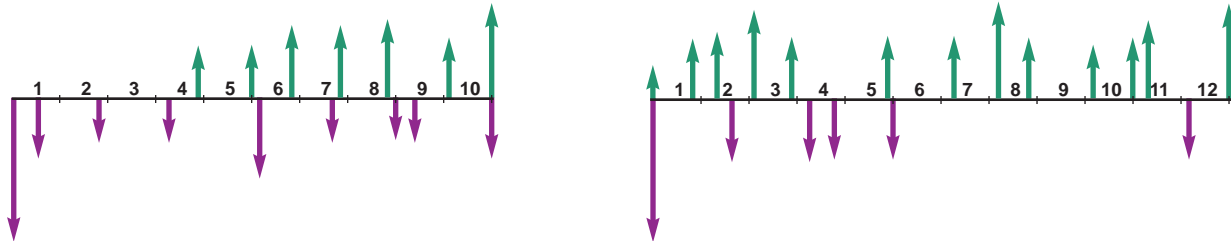
This discussion will focus on the first two of those keys: **CFj** and **Nj**. These are the keys you use to “draw the picture” for your calculator. The other two keys are the actual calculations, and they're big enough topics to merit separate discussions, which you'll find at [Net Present Value \(NPV\)](#) and [Internal Rate of Return \(IRR\)](#).



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The DCF keys are not all-powerful. There are plenty of situations where not even the DCF keys can calculate NPV or IRR results exactly, such as these:



Notice the difference between these scenarios and those on the previous page (which are DCF-friendly): These here vary in the time between cash flows—a no-no for DCF.

The DCF keys still require a single cash flow each period. The cash flows may differ in amount and sign, but the time periods must still be uniform.

So whenever you have steady, uniform cash flow amounts (one per period), use TVM; whenever you have uneven cash flow amounts (but still uniform in time—one per period), use DCF.

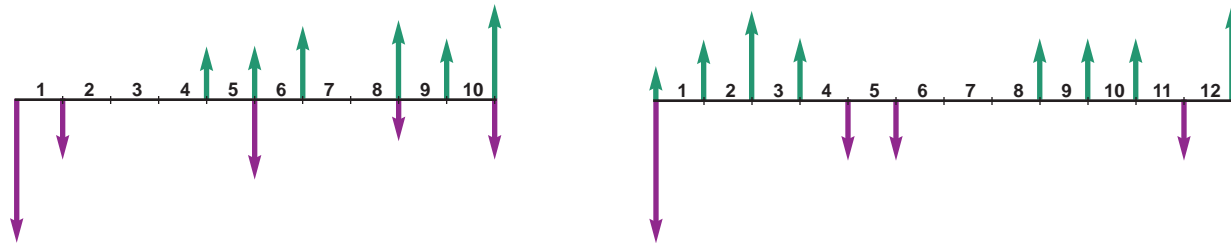


HP 10BII Discounted Cash Flow (DCF) Basics

Cash Flow Diagrams for DCF Analysis

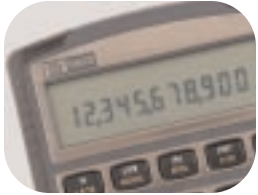
You're probably already familiar with cash flow diagrams from your work with TVM calculations. (If not, then you should stop here and read [Time Value of Money Basics](#) and [Mortgage/Loan Basics](#) before continuing here.)

The same rules apply to diagramming uneven cash flow situations:



- Pick one party's perspective and stick with it.
- The directions of the arrows tell whether you're receiving money (up) or paying it (down).
- The lengths of the arrows represent relative values—longer arrows mean more money.
- The horizontal axis is a time line that is marked at regular intervals denoting the periods at which interest compounds and cash flows occur.
- You can net (add) together any cash flows that occur simultaneously.

The same principle of discounting (sliding the cash flows up and down the time line, adjusting their values according to the prevailing interest rate) applies, too.

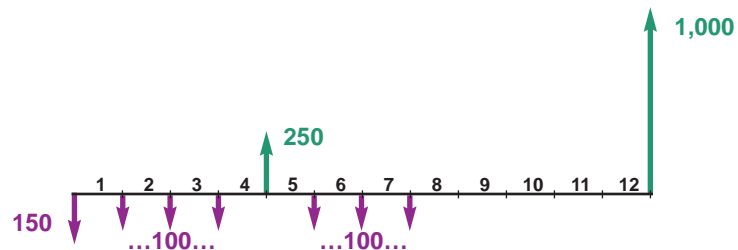


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Drawing a DCF Picture for the HP 10BII

Because of all the possible variations, the actual process of drawing a DCF picture for your HP 10BII is a little more complicated than a TVM picture, but the calculator has been designed to help simplify things. Basically, the idea is that you work chronologically (left to right) across the time line, keying in cash flows in **groups**—sets of identical consecutive flows. Take a look at this example:



Your verbal description to yourself:

“The cash flow at the beginning of the time line is $-\$150$.”

“The next cash flow group has flows of $-\$100$ each.”

“There are 3 such flows in this group.”

“The next cash flow group has flows of $\$250$ each.”

“There is 1 such flow in this group.”

“The next cash flow group has flows of $-\$100$ each.”

“There are 3 such flows in this group.”

“The next cash flow group has flows of $\$0$ each.”

“There are 4 such flows in this group.”

“The next cash flow group has flows of $\$1000$ each.”

“There is 1 such flow in this group.”

Your description to the calculator:

 150  

100  

3 

250 

1 

100  

3 

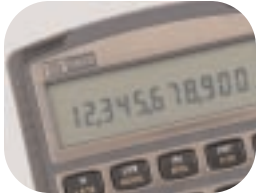
0 

4 

1000 


1 














Notice how the calculator tells you with an annunciator whether it is accepting your entry as a CF value or an N value. Notice also, how the display line briefly reminds you of the *number* of the cash flow group you are working on before it confirms the value you have entered.



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Get the idea? One point that's handy (but not essential) to know: *If there is just a single cash flow in a group, you need not press 1 —the HP 10BII will assume that there is one such flow unless you specify otherwise.* In other words, you could have entered the previous scenario as follows:

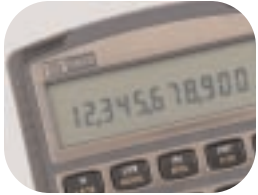
Group 0: -\$150 (initial flow)	 150  
Group 1: -\$100 (3 flows)	100   3 
Group 2: \$250 (1 flow)	250 
Group 3: -\$100 (3 flows)	100   3 
Group 4: \$0 (4 flows)	0  4 
Group 5: \$1000 (1 flow)	1000 

Question: Where does the HP 10BII store the cash flow *amounts* (i.e. when you press )?

Answer: In internal memory (not registers in the sense that you know them). There is room for the initial cash flow, plus 14 more cash flow groups.

Question: Where does the HP 10BII store the *size* of each cash flow group (i.e. when you press )?

Answer: Also in internal memory. Each group can have no more than 99 flows in it. (If you have a group larger than that, you have to split it into two or more consecutive groups which each have 99 flows or fewer.)



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Question: Then how can you completely review a DCF “picture” after you’ve keyed it in, to see if you’ve entered everything properly?

Answer: Reviewing a DCF situation is nearly as easy as reviewing a TVM situation (which, after all, is just a matter of recalling four values: $\text{RCL } \text{N}$, $\text{RCL } \text{I/YR}$, etc.), but you can do it.

The whole idea is to identify each cash-flow group by a number and use it to “recall” the CFj value accordingly. Once you have identified the group number in this way, you can then recall the Nj value for that group, also. (You cannot recall the Nj value without first referring to the CFj value in order to identify the group.)

$\text{RCL } \text{CFj } 0$ shows the amount of each flow in Group 4 (**-150.00**)

$\text{RCL } \text{Nj}$ then shows the number of flows in Group 0 (**1**).

$\text{RCL } \text{CFj } 1$ shows the amount of each flow in Group 1 (**-100.00**)

$\text{RCL } \text{Nj}$ then shows the number of flows in Group 1 (**3.00**).

$\text{RCL } \text{CFj } 2$ shows the amount of each flow in Group 2 (**250.00**)

$\text{RCL } \text{Nj}$ then shows the number of flows in Group 2 (**1.00**).

$\text{RCL } \text{CFj } 3$ shows the amount of each flow in Group 3 (**-100.00**)

$\text{RCL } \text{Nj}$ then shows the number of flows in Group 3 (**3.00**).

$\text{RCL } \text{CFj } 4$ shows the amount of each flow in Group 4 (**0.00**)

$\text{RCL } \text{Nj}$ then shows the number of flows in Group 4 (**4.00**).

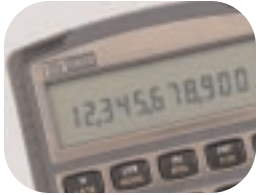
$\text{RCL } \text{CFj } 5$ shows the amount of each flow in Group 5 (**1000.00**).

$\text{RCL } \text{Nj}$ then shows the number of flows in Group 5 (**1.00**).

Find a mistake? Not a big problem. You can replace an entry in the same manner—using the STO key.

For example, to change the amount of group 2 above to, say, 350, you would press 350 $\text{STO } \text{CFj } 2$.

Or, to change the number of flows in group 4 to, say, 10, you would press $\text{RCL } \text{CFj } 4$ (because you cannot store the Nj value without first referring to the CFj value—in order to identify the group), then 10 $\text{STO } \text{Nj}$.



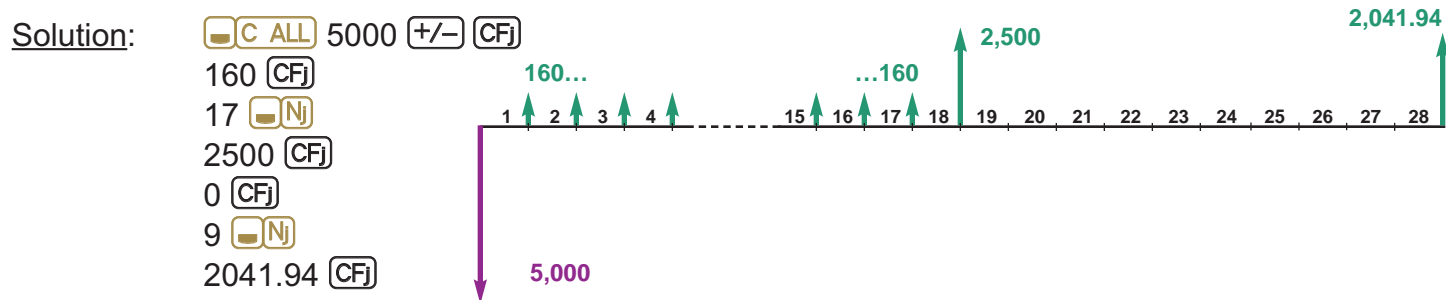
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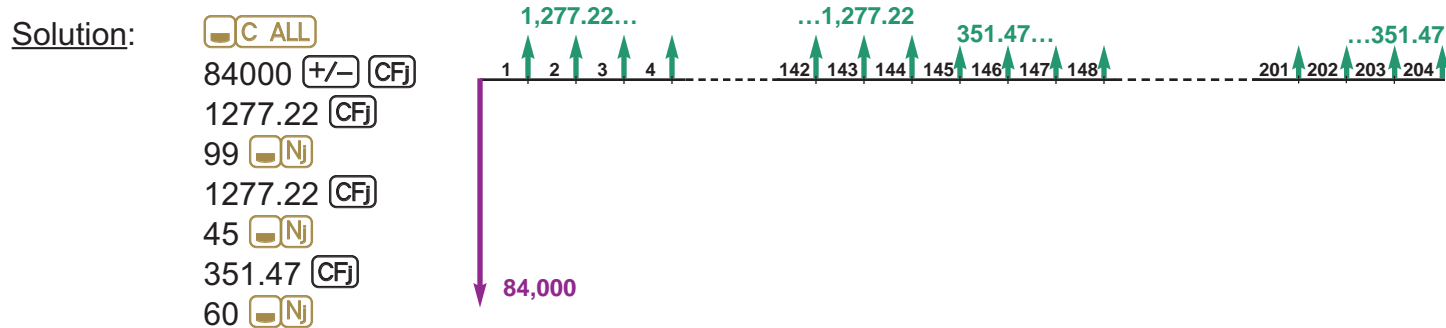
More Practice Keying in DCF Situations

Practice some more with these DCF investment scenarios here. Keep in mind how you can review your entries afterwards, if you wish. (Reminder: The largest number of cash flows allowable in any one group is 99. If you have a group larger than that, break it into two or more consecutive groups.)

Problem: Enter this cash flow situation on the HP 10BII:



Problem: Enter this cash flow situation on the HP 10BII:



Now that you're comfortable with the entry of DCF situations into the HP 10BII, you're ready to do actual calculations, such as [Net Present Value \(NPV\)](#) and [Internal Rate of Return \(IRR\)](#).