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HP 12C Registers, Storage and Memory

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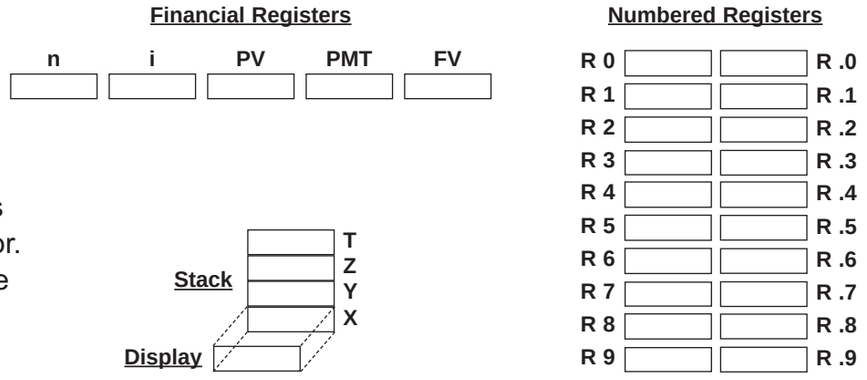
The Whole Picture

Like any computing device, the HP 12C is simply a workspace where information is stored and calculated. So in order to understand how to operate it, it helps to be able to visualize it. *What's going on inside?*

This is a conceptual "picture" of the insides of your calculator —not all that complicated, really:



Each of the boxes here represents a ***storage register*** in the calculator. A storage register is simply a place in the calculator's memory where it can store one number.

These registers are permanent memory areas inside the machine. You can't destroy them or erase them, so don't worry. In fact, you can't even empty them: No matter what you do, no matter what buttons you press, power on or power off, rain or shine, there is always a number in each register. Of course, when you clear the registers (and there's more to read about Clearing), the numbers change to 0's, but they're still numbers!

Furthermore, no matter what numbers are in the registers, they don't change until you change them. You could do a calculation today, then come back next week and the results of that calculation would still be sitting in one or more registers in the HP 12C. This is what the **C** stands for in HP 12C, by the way: **C**ontinuous memory.

Notice that each register has a name—and that they are gathered together in various groups. That's because each group has a different use. Take a brief look now at each group.

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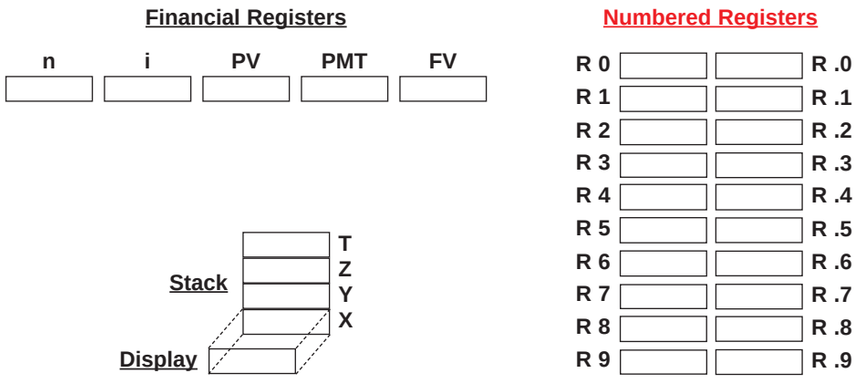
HP 12C Registers, Storage and Memory

The Numbered Storage Registers

Look first at this group of 20 storage registers here.



Each of these registers is "named with a number, from 0 to 9 or .0 to .9. When you use these registers for storage, you'll usually refer to them by these "number names" as you store and recall values—more about that in a minute.

Bear in mind, too, that these registers are useful not only for whatever values (calculation results) you want to save, but also for doing statistics, even programming. (Of course, when you use these registers for programs, they're no longer available for storing number—there is more about this under Clearing, Editing and Correcting.)

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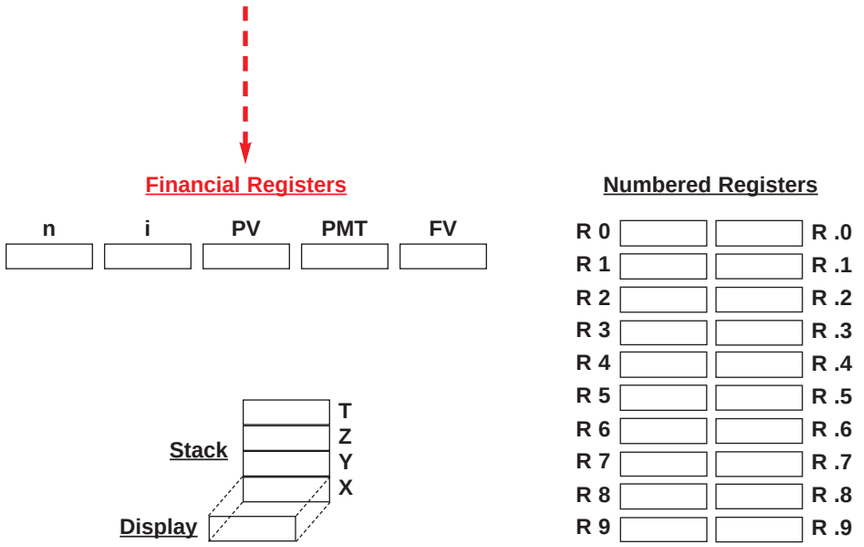
HP 12C Registers, Storage and Memory

The Financial Registers

Next, notice the five financial registers:



Just like any other storage register, each of the financial registers holds one number at a time, but the numbers stored there mean something particular to the calculator:

n	is the "**n**umber of periods" register.
i	is the "**i**nterest rate" register.
PV	is the "**P**resent **V**alue" register.
PMT	is the "**P**ay**M**en**T**" register.
FV	is the "**F**uture **V**alue" register.

These are the registers where the HP 12C does its Time Value of Money (TVM) calculations—and you'll be using these a lot. You'll be storing numbers in any four out of these five registers, then asking the calculator to calculate the fifth value.

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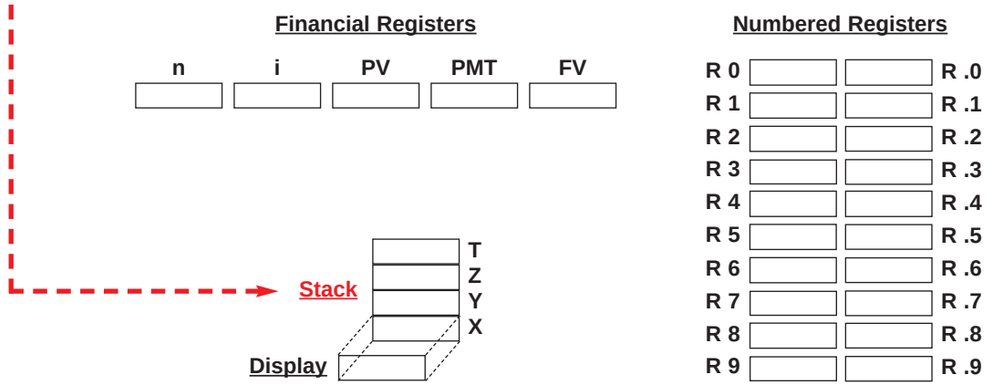
HP 12C Registers, Storage and Memory

The Stack Registers

Now look at the stack registers for a moment.



Again, each of these four registers will hold one number at a time. But these registers are linked together in a certain way that makes behave as if they're "stacked" on top of one another.

To help you remember this link between these registers, they're named **X**, **Y**, **Z** and **T** (the **T** being the Top of the stack).

In many ways, the stack registers are the most important registers in the calculator, because that's where you enter numbers and do Basic Arithmetic.

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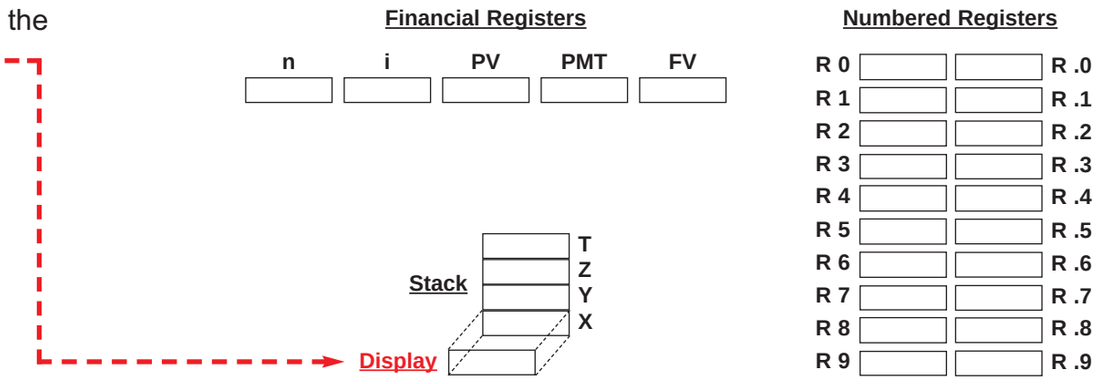
HP 12C Registers, Storage and Memory

The Display Register

Finally, focus on the display register.



Notice how the display register is always positioned in front of the **X** register at the bottom of the stack. That's because it's the window of your calculator—what you look through to "see into" the machine. When you look at the number in the display of the HP 12C, you are looking at the number in the **X** register.

But why bother with a display register at all? Why not just look directly at the **X** register?

Because the display is a little different from the other registers. Yes, it contains just one number at a time—but it can show other things, too. As the window into your calculator, it offers some unique advantages:

First of all, you can partly close that window, so that it doesn't show you all of the number in the **X** register—just the part you want to see. After all, every number stored in any storage register in the HP 12C has ten digits, but you don't necessarily want to see all those decimal places. For example, if you're doing financial calculations, you generally need just two decimal places—dollars and cents.

Also, the HP 12C uses the display window to tell you other messages, too—information about the operating modes of the calculator—things that aren't numbers and so can't be put into storage register. (You can read more about the Display and Operating Modes if you wish.)

hp calculators

HP 12C Registers, Storage and Memory

Storing and Recalling Numbers

So, with all these various storage registers—numbered, financial, stack—how do you put numbers there (and get them out again? It's quite simple. Try an example.

Do this: Put the number 100 into Register **2** (that's one of the numbered storage registers, often denoted simply as **R 2**).

Solution: 100 STO 2. That's it—you're done. (Notice how at the end of any operation, the display will always show you the number of decimal places you have requested—even if you didn't key in the extra zeroes. Right now, for example, you're probably seeing **100.00**, if your display is set for two decimal places, which is the usual setting.

There is more to read about the Display and Operating Modes.)

This storage was simply enough for you to do, but what actually happened was this: When you pressed the digit keys (1 0 0), the number you typed went into the **X** register (the bottom register of the stack)—and you could see it by looking at the display, which always shows you (at least part of) what's in the **X** register.

Then, when you pressed STO 2, the calculator copied that value into Register **2**.

Notice two things:

STO always deals with the number in the **X** register. In fact, just about every operation you do in the machine involves the **X**-register somehow. (That's why the display is positioned in front of it.)

STO is a *copying* process. There's a **100** now in register **2**, but there's the original **100** still sitting in the **X** register, as you can see by looking at the display.

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HP 12C Registers, Storage and Memory

Question: How do you know for sure that you actually stored the number 100 into Register **2**?

Answer: You can prove it—by recalling it….

First, you'll have to clear the **X** register, so that you can be sure that you won't just be seeing the 100 that's still there now. Press CLX. (There's a lot more discussion available about Clearing, but for now, just know that CLX does what it says: it clears the **X** register—puts a zero there in place of whatever was there before.)

Now recall the contents of Register **2**: Press RCL 2.

That's it—you're done. Sure enough, there's the 100 you had previously stored in Register **2**.

Here's what happened: When you pressed RCL 2, the machine copied the value it found in Register **2** into the **X** register.

Notice two things:

Like STO, RCL also deals with the **X** register. In fact, just about every operation you do in the machine involves the **X**-register somehow. (That's why the display is positioned in front of it.)

Like STO, RCL is a copying process. There's a 100 now in the **X** register, but there's still a 100 in Register **2**, as well (as you can easily prove by repeating this exercise: CLX RCL 2).

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HP 12C Registers, Storage and Memory

Try another STO - RCL exercise, this time with some of the financial registers.

Do this: Put the number 25 into the **PV** register. Then clear the **X** register, and—without keying in any more numbers—put the number 25 into the **FV** register, too.

Solution: Press 25 STO PV, then CLX.

Then RCL PV STO FV. All you see is **25.00**. What just happened?

First, you keyed in the number 25 and stored it (a copy, right?) into the **PV** register. At that point, you were still looking at **25.00** in the **X** register, too.

Next, you cleared the **X** register—pressed CLX—which replaced that 25 with zero.

Then you recalled (copied) the value in the **PV** register back to the **X** register. So now, once again, you had the number 25 in both the **PV** and **X** registers.

Finally, you stored (a copy of) that 25 from the **X** register to the **FV** register. So at the end, you had the number 25 in three places: The **PV** register, the **FV** register and the **X** register (which you see in the display).

Play around with STO and RCL some more, as you wish. Get comfortable with the idea. And as you do, get used to the idea that RCL is the harmless way to examine what's in any storage register: You just recall a copy to the **X** register so that you can look at it. Since it's a copy (which you can clear away from the **X** register when you're finished), this doesn't affect the contents of the register in question. It's like taking a picture of something and looking only at the picture, not at the original item.