Parts of a Solar-Powered Calculator

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Why This Device Was Chosen

We chose to take apart a solar powered calculator.This device has been around for a very long time and technically everybody has used a calculator at least once. What I like about this device is that its useful and simple. So what is cool about this device is that it is not so simple in the inside. The exterior is simple, when the interior is complicated. There are different parts with different functions. You have the parts that power it up and the parts that make it work. This is like the human body. All of the parts work together to make it function, but some of the parts are more important than others. In this presentation, we will give a brief description on each part we found, and what they do in the calculator (decided not to add frames because they aren't that important.

The Circuit

This part is located on the interior of the calculator. This part is crucial to this device, or any electronic device. The circuit is the headquarters of the entire device in the way that it gives instructions on what each other part will do. It also contains a lot of the wiring to the parts of the device. The part uses lots of tiny electrical parts to give signal to the other parts in the calculator, giving them their function. This is the part of the calculator that calculates. It identifies the input numbers and symbols and uses binary code to turn all the numbers to 0's and 1's to calculate. The reason they calculate so fast is because they have no moving parts, it's all done through binary code.

-Headquarters of the calculator

-Uses tiny electrical parts to send signals

-Uses binary code to calculate

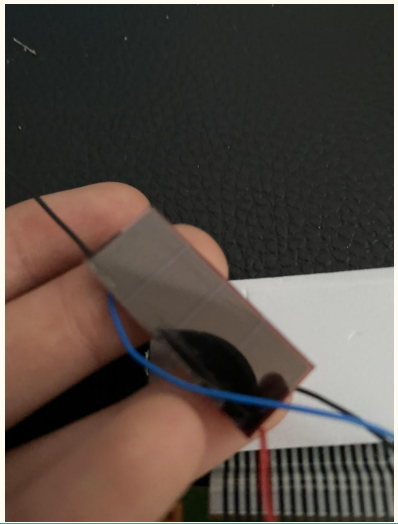
The Solar Chip

This part is located on the exterior of the top right corner of the calculator. The solar chip of the calculator is what makes the calculator work, so if you are not in a sunny place with the calculator, it will not work, which is why this part is one of the most important parts in this specific calculator. Other calculators unlike this one are not solar-powered and does not require a solar chip. The solar chip was connected to the main circuit of the calculator. The way this works is not unlike solar chips for a house, which converts solar energy to electricity to power up lights and appliances.

-Converts sunlight to energy to power up the calculator

-Unlike most calculators which do not use solar energy

-Important part in this specific calculator



Lithium Battery

This is located in the top right corner of the interior. This lithium battery gives power to the calculator, now you may be thinking that since its a solar-powered calculator, why is there a battery? The reason there is a battery is because the solar chip is actually connected to it, so when the solar chip receives sunlight, it immediately converts it to electricity and transfers it to the battery, which then powers the calculator. The thing that is different about this battery than other batteries in other calculators is that it is not the main source of energy because it is previously charged. Other calculators could run out of electricity and stop working because the battery runs out, but this calculator could never die out unless the solar chip fails because the battery isn't the main source of energy, unlike those other ones.

(to refresh, the solar chip makes the calculator work, but the battery powers it up)

Picture in next slide —>

Display Screen

This part doesn't need much explanation, it displays the number you input from the keyboard. It is wired to the circuit and is a somewhat fragile piece. This part is wired to the circuit so that the circuit can transfer all of the calculations to display on the screen. For each combination of 0's and 1's,, which are the numbers you input, there's a combination of pixels that will display on the screen whenever you press it.

Keyboard Membrane

This part is located right on top of the circuit and keyboard sensors. The Keyboard membrane is what you feel when you press down on the plastic keys. The keys of the calculator are hard plastic where as the membrane is made out of a more flexible silicone. The keyboard membrane acts as an electrical current to the keyboard sensors. So when you press a key, you press the membrane which goes to the keyboard sensors, making the key you pressed showing up on the screen.

-Acts as an electrical current to the keyboard sensors

-Made of silicone to transmit signals

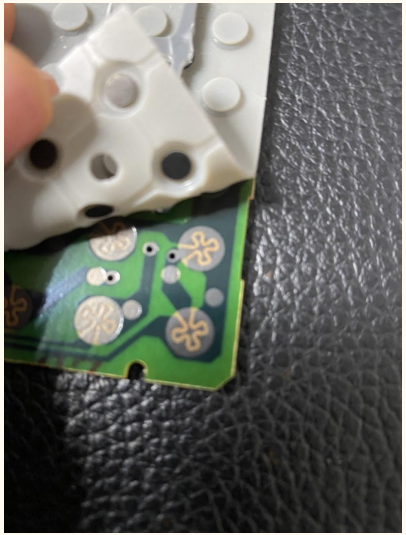
Keyboard Sensors

This part is located underneath the keyboard membrane. The keyboard sensors sense when you press a button. When you press a button, the sensors activate and signal to the circuit, which communicate to the calculator chip which button you pressed. Then, the calculator chip signals the screen, which displays the number button you pressed.

-Sense when you press a button

-Under the keyboard silicone membrane and part of the circuit

-Signals the circuit whenever button is pressed



Summary

This calculator is a solar-powered one, which means instead of the main source of energy coming from a battery, the main source of energy in this specific calculator comes from a solar chip. However, something important to understand this device clearly is that the solar energy that the solar chip absorbs, that is later converted to electricity, does not transfer directly to the circuit. When the solar chip absorbs sunlight, it immediately turns it to electricity, then that electricity is transferred to a small lithium battery, which then passes the electricity it receives to the circuit, just like any other battery. But, the difference with this battery is that it is not the main source of energy because it receives it from the solar chip. Due to this, the calculator will not work in a place that lacks sunlight.

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Summary (continued)

Another important part of the calculator is the circuit, which sends electrical signals to the other parts of the calculator telling them what to do, making it the headquarters of the system. It also uses binary code to calculate input equations as 0's and 1's. Wired to the circuit and lithium battery is the display screen, which has a really simple function: to display what number you pressed. This brings us to the keyboard parts. Attached to the circuit are the keyboard sensors and the keyboard silicone membrane. These two parts work together to make the calculator keyboard function. The plastic pieces that display numbers belong on top of the silicone membrane. When you push down on a number, the keyboard membrane acts as an electrical current to —>

Summary (continued)

...send a signal to the keyboard sensors. The keyboard sensors then alerts the circuit to calculate an equation or simply show a number, and then, the circuit signals the display screen, which displays what number you pressed.

Conclusion

When we got the the calculator to take it apart, we thought that we wouldn't find many parts inside. We thought it would be simple on the inside, just like the outside. Of course, this was not the case. There were a lot of parts inside, each contributing to the functionality of the calculator. With these slides, it is clear that the simplest looking devices could have complicated inside workings.