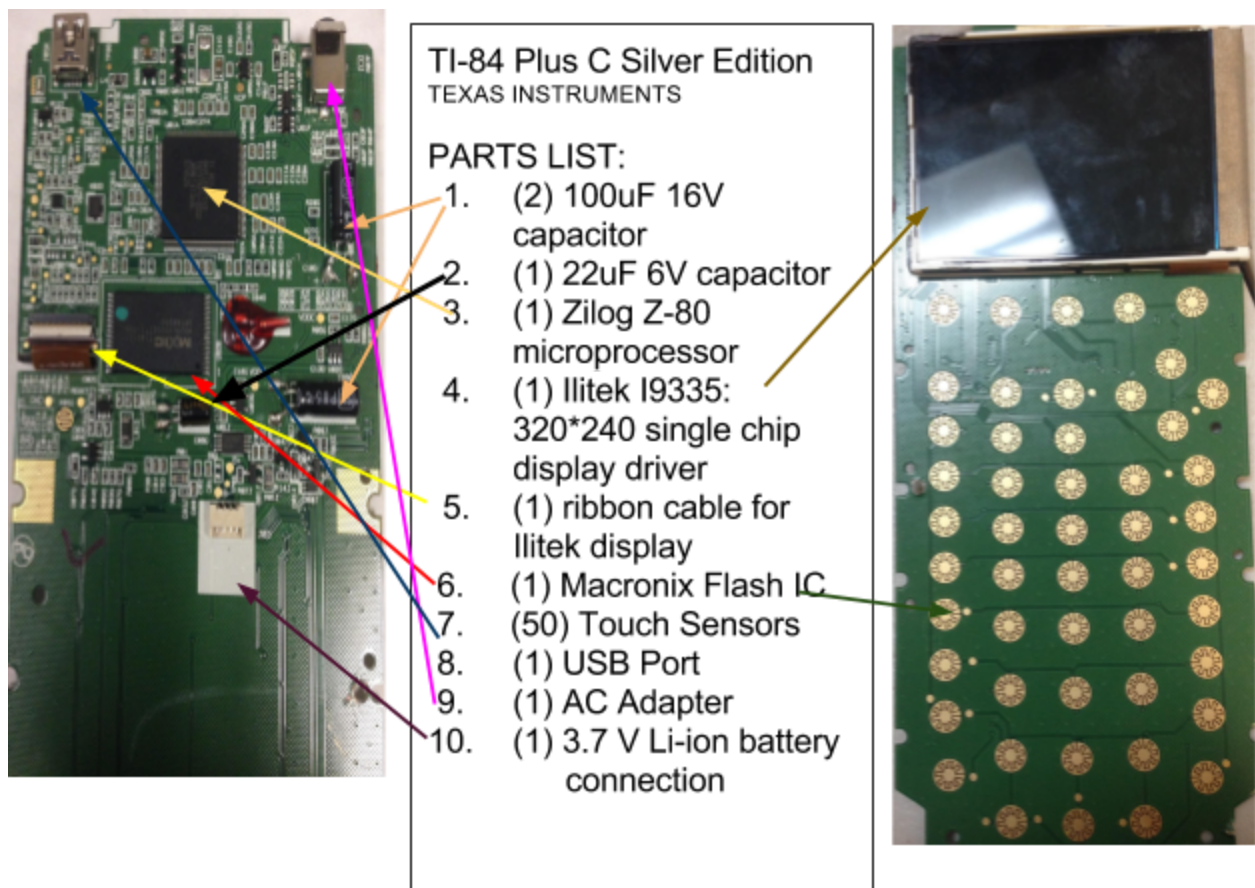


TI - 84 PLUS C Silver Edition Calculator

TEXAS INSTRUMENTS

By 7700E Rolling Robots

Since the invention of Pat Haggerty and Jack Kilby's first pocket calculator in the early 1960s, the daily lives of people throughout the developed world were changed profoundly by the innovation of a machine, almost fantasy, that could compute simple mathematical operations without the help of a human. Calculators expanded the math capabilities of everyone from students to theoretical physicists. It all started with a microscopic chip, the Zilog Z-80, 8-bit microprocessor



1.



These two capacitors are a 100 uFarad, 16 Volt capacitor, and a 22 uFarad, 6 Volt, respectively. A capacitor is essentially a mini backup battery that provides a source of power when the main source is down.

The inside of a capacitor has two panels with some type of insulation in the middle. When you connect positive and negative lead to each panel, the insulation in the middle stops them from reaching each other and over time there's a buildup of positive and negative electricity until finally the energy crosses or it goes back around through the battery.

2.



3.



This application-specific integrated circuit (**ASIC**), the Zilog Z-80, is an 8-bit microprocessor (used in various Texas Instruments calculators) - the main computing operator of the calculator. It can solve mathematical operations including addition, subtraction, multiplication, and division, etc, and (more specifically) in graphing calculators such as this one, can solve graph equations

4.



This display is an Ilitek I9335: Single-chip 320*240 pixel display driver (2.8" diagonal) and displays a resolution of 140 dots per inch (DPI); 16-bit color. This supplier: Ilitek makes displays used in Apple products and Windows computers (see link in Sources)

6.



Since the 1980s, Flash ICs such as this Macronix integrated circuit (shown above) have been a vitally important integrated circuit in consumer electronics. These ICs come with millions of tiny transistors on a silicon chip a few millimeters square. This Flash IC has a 32 Mbit capacity that can be segmented into various sizes. They save data permanently unlike other types of memory ICs, which retain data only as long as the power stays on.

7.



This is a close up look at one of the 50 touch sensors on the calculator. The touch senses whether the button is being pushed or not in binary data. It then transfers this data to the microprocessor, which computes an equation from the data of which buttons are pressed. The microprocessor then sends the final answer to the Ilitek display, which displays it.

9.



This AC Adapter is one of two main sources of power for the calculator. It converts AC from an outlet to DC that can power the calculator. The type is a China made AC9211U. It can handle an input of 100-240V from an outlet, but an output of 5.0V 1000mA in DC goes to the motherboard.

Conclusion:

From this TI Challenge, we learned about the engineering inside a TI-84 Plus Silver Edition Calculator. The main processing unit of the calculator is a Zilog Z-80 microprocessor. It does receives data from the buttons (touch sensors) - computes the operations, and then sends it to the Ilitek Display. We were surprised to how intricate the circuitry was. So many diverse parts from many different companies around the globe were found inside, such as, Macronix, Ilitek, and Texas Instruments.

Sources:

TEXAS INSTRUMENTS, TI page about the TI 84 Plus C Silver Edition series:

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Wikipedia page of TI 84 Plus series

- https://en.wikipedia.org/wiki/TI-84_Plus_series

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- <http://www.datamath.org/>

Macronix, PDF about the Flash Integrated Circuit

- <http://www.macronix.com/en-us/Pages/default.aspx>
- <http://www.macronix.com/Lists/Datasheet/Attachments/4946/MX29LV320E%20T-B,%203V,%2032Mb,%20v1.3.pdf>

Ilitek Display Screen

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