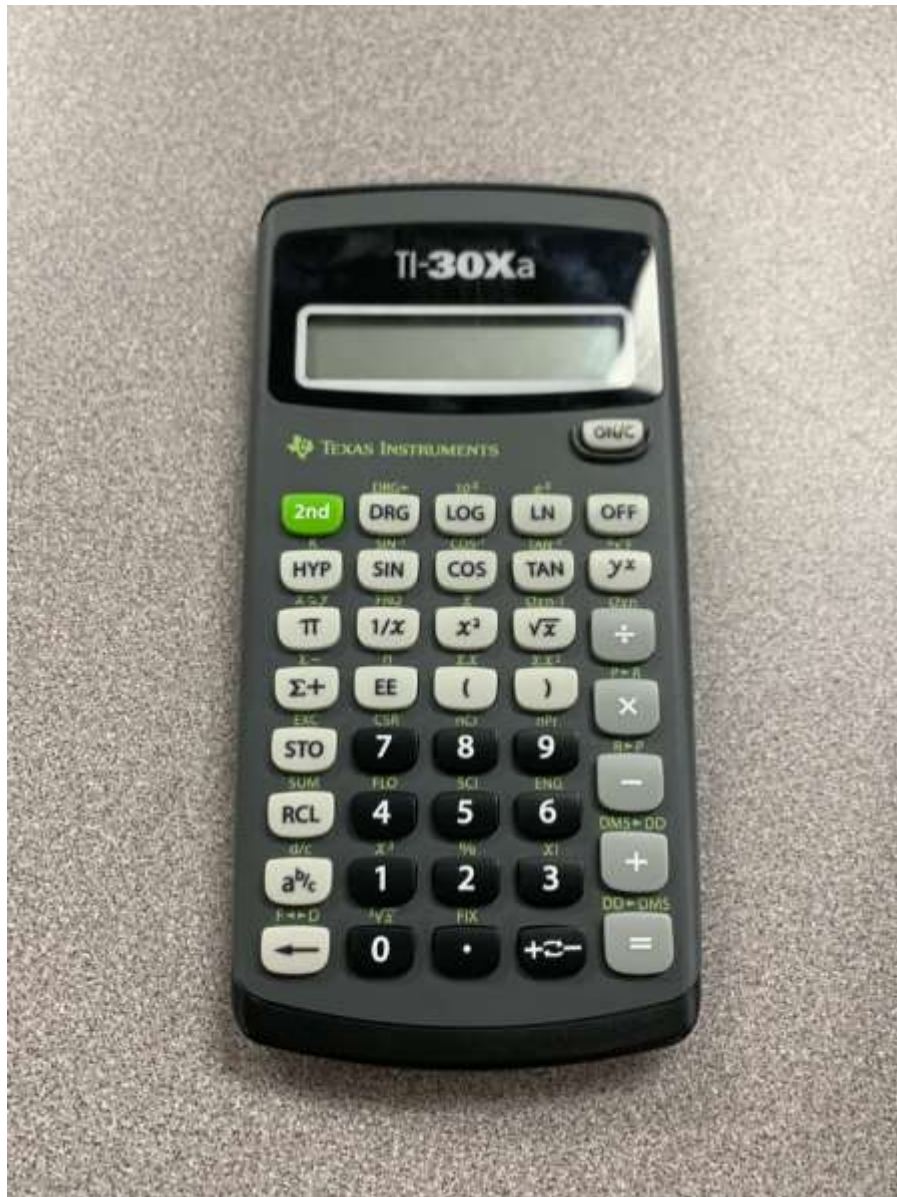


VEX Online Challenge: Reverse Engineering

Camellia, Grace, Austin, Alex, Kovid, and Ayden

Team 7983D

Centennial High School, Bakersfield, California



We chose a TI-30Xa Texas Instruments calculator because it is a small electronic device that is readily available, and it is commonly used in our own everyday life as students. It would be interesting to see inside something we often overlook for its simplicity of design and ease of use.

The main components of the calculator are a motherboard, an LCD screen, a ribbon cable, 36 buttons, a battery, and a chip under the black dot. These components allow the calculator to run.



The first noticeable thing is the LCD screen. LCD stands for liquid crystal display. The LCD screen uses the light modulating properties of liquid crystal combined with polarizers to display an image.

The motherboard is the next apparent object that you see. It is the most important part of the calculator.

A motherboard is a complex set of circuits that run data to other areas of the calculator. The motherboard is mostly made out of fiberglass and copper with a conductive layer on top. Most calculators use chips, or integrated circuits, that have transistors to perform calculations. There are numbers on the motherboard that allows the user to check which line has an error in it, which allows the user to better identify which part of the program has the error.

A ribbon cable is used to send data and information to the LCD screen. The ribbon cable is made of multiple connecting wires lined up next to each other to create flat, wide cabling. It is used because it is thin and bendable, allowing it to best use the limited space available in the calculator.

The inputs to the calculator are acquired when you press a button on the calculator. The button presses against a rubber padding. On the underside of the padding is a wire, and pressing down on that button completes the circuit, sending a signal to the central processing unit. After that the CPU translates the binary code into readable numbers, it informs the LCD screen to display that certain set of numbers. When you press an operation key, (+, -, x, \) the CPU stores those numbers and clears the screen, letting you type in more. Upon pressing the equals key (=)

the calculator conducts the operation with the saved numbers, and the numbers that are on-screen. There is also a battery and a battery holder. It powers the calculator using electricity.



We learned that ribbon cable is used in a variety of items, and it is used to send data and information with limited space. We also learned that a chip is important to process data and information.