[1.10] Patents for TI-89 and TI-92 Plus

This section contains abstracts of the six patents listed on the calculators, and additonal patents which may apply to graphing calculators in general. All the patents are assigned to Texas Instruments. For the full patent text including claims and figures, search by patent number at the US Patent and Trademark Office, here:

http://www.uspto.gov

Note that all the patents listed on the calculators issued between 1974 and 1982. I only present the abstracts, but it is the patent claims that specify the patented properties of the invention. Note also that two listed patents have the same title and abstract. This is not uncommon, and the claims section of the patents would describe the difference between the two inventions.

Jack Kilby is listed as an inventor on patent 3819921. Jack Kilby invented the integrated circuit, and was awarded the 2000 Nobel prize in physics for that work. For more information on Mr. Kilby, go here:

http://www.ti.com/corp/docs/kilbyctr/jackstclair.shtml

TI has been granted at least 89 patents with the word *calculator* in the title. If you are interested in the history of calculators in general and TI in particular, these may provide hours of interesting reading.

3819921: Miniature electronic calculator

Inventor(s): Kilby; Jack S., Merryman; Jerry D., Van Tassel; James H.
Issued/Filed Dates: June 25, 1974 / Dec. 21, 1972

Binary-coded decimal electronic calculator capable of adding, subtracting, multiplying and dividing with some degree of automatic decimal point placement to provide a visual display of answers of up to 12 decimal digits. The decimal digits are serially displayed at a speed compatible with the calculator operations. The parts of the calculator are so adapted electrically and mechanically in relation to each other to result in a minature portable battery operated calculator of extremely small dimensions for example the outside case dimensions of 41/4 inches by 61/8 inches by 13/4 inches and very low weight of about 45 ounces, having a calculating capability only before obtainable in calculators of much larger size and weight while retaining mechanical and operational simplicity. Some significant aspects of the calculator are the primary electronics embodied in an integrated semiconductor circuit array located in substantially one plane for performing the arithmetic calculations and generating the control signals, a keyboard input arrangement located in substantially one plane parallel to the integrated semiconductor circuit array for producing unique electrical signals corresponding to number and command entries and a visual display using a semiconductor array, as for a thermal printer for printout.

3921142: Electronic calculator chip having test input and output

Inventor(s): Bryant; John D., Hartsell; Glenn A.,
Issued/Filed Dates: Nov. 18, 1975 / Sept. 24, 1973

An MOS/LSI semiconductor chip for providing the functions of an electronic calculator includes a data memory, an arithmetic unit for executing operations on data from the memory, and a control arrangement for defining the functioning of the machine including a ROM for storing a large number of instruction words, an instruction register for receiving instruction words from the ROM and reading out parts to various sections of the control arrangement, and an address register for

selecting the location in the ROM for read out of the next instruction. Input and output terminals are provided for keyboard input, display output, timing signals, etc. A test mode of operation is provided for quality control upon completion of manufacture of the chip. The test mode allows the entire ROM to be tested by reading in addresses to the address register from external and reading out the resulting word from the instruction register. During the test mode, normal incrementing and branching of the address register may be externally inhibited.

3932846: Electronic calculator having internal means for turning off display

Inventor(s): Brixey; Charles W., Hartsell; Glenn A., Vandierendonck; Jerry L.
Issued/Filed Dates: Jan. 13, 1976 / Sept. 24, 1973

An electronic calculator system of the type having a keyboard input and a visual display is implemented in MOS/LSI semiconductor chips having a data memory, an arithmetic unit, a read-only-memory for storing instruction words, and control circuitry for operating the system in response to keyboard inputs by selecting addresses for instructions from the read-only-memory, all of which is located in monolithic semiconductor units. A technique is provided for turning off the display after a selected time period by holding an instruction word in an instruction register while repeatedly incrementing an address register for the ROM until it overflows, then branching to an address defined in such instruction word. This is repeated until the selected time period is reached.

4115705: Electronic calculator with push-button on-off system

Inventor(s): McElroy; David J.
Issued/Filed Dates: Sept. 19, 1978 / June 14, 1976

An electronic calculator with a power supply ON-OFF arrangement actuated by momentary-closure push-button switches which are part of the keyboard. A bistable latch circuit on the calculator chip is continuously powered by the battery, and is caused to flip to an ON condition by actuating an ON key, and this turns on a large, low-resistance transistor which is in series with the voltage supply line going to all of the other electronic circuitry on the chip.

4208720: Calculator with algebraic operating system

Inventor(s): Harrison; Herman W.
Issued/Filed Dates: June 17, 1980 / July 26, 1976

Disclosed is an electronic calculator having a data entry unit for inputting numeric data, expressions such as parentheses and hierarchal mathematical commands, an arithmetic unit for performing arithmetic operations on the numeric data, a memory for storing the numeric data and associated hierarchal mathematical commands inputted via the data entry unit and logic circuitry for enabling the arithmetic unit to perform arithmetic operations on numeric data inputted via the data entry unit within a pair of parentheses, the logic circuitry enabling the arithmetic unit to perform a higher order hierarchal mathematical command before a lower order hierarchal command even though the higher order command is received after the lower order hierarchal mathematical command.

4348733: Calculator with algebraic operating system

Inventor(s): Harrison; Herman W.
Issued/Filed Dates: Sept. 7, 1982 / Nov. 19, 1979

Disclosed is an electronic calculator having a data entry unit for inputting numeric data, expressions such as parentheses and hierarchal mathematical commands, an arithmetic unit for performing arithmetic operations on the numeric data, a memory for storing the numeric data and associated hierarchal mathematical commands inputted via the data entry unit and logic circuitry for enabling the arithmetic unit to perform arithmetic operations on numeric data inputted via the data entry unit within a pair of parentheses, the logic circuitry enabling the arithmetic unit to perform a higher order hierarchal mathematical command before a lower order hierarchal command even though the higher order command is received after the lower order hierarchal mathematical command.

The following patents are not listed on the calculator, which means that they may not include claims which apply to the TI-89 and TI-92 Plus. However, it is good practice to mark the product with *all* relevant patents, because this aids in proving willful infringement during litigation, with its attendant treble damages.

4,521,868 Electronic data processing apparatus with equation operating system having improved exponentiation operators
[possibly related to 89/92+/V200's entry line and numeric solver]

Inventor(s): Caldwell; David; Ferrio; Linda J.; Hunter; Arthur C.
Issued/Filed Dates: June 4, 1985 / February 29, 1984

The equation operating system is an improved data and command entry format together with a compatible operation system for use with electronic data processing apparatuses, most particularly with scientific calculators which provide an alphanumeric display of entered equations. This invention provides a different set of commands and displayed characters for performing exponentiation. An up arrow together with a down arrow serve to define the expression of the exponent. The numeric data stored in a numeric display register upon implementation of the exponentiation is raised to the power of the expression between the up arrow and the down arrow. This invention also includes an integral power exponentiation command which enables easy entry of single digit positive integral exponents, thereby eliminating the need for a completing command.

4,823,311 Calculator keyboard with user definable function keys and with programmably alterable interactive labels for certain function keys
[TI-95 keyboard, but also applies to an extent to 89/92+/V200]

Inventor(s): Hunter; Arthur C.; Ferrio; Linda J.
Issued/Filed Dates: 18 April 1989 / May 30, 1986

Calculator having a keyboard in which one or more keys have labels created by a display and subject to changing interactively as the user desires. Typically, advanced scientific-programmable calculators may have too many functions to be adequately included on the keys of the keyboard associated therewith. In such calculators, certain functions require a plurality of keys to be actuated in order to be performed. Thus, such keyboards tend to be cluttered an confusing to the user. Thus, a keyboard is proposed having a small number of keys labeled with different functional labels as the user proceeds through a menu or tree structure containing all the desired functions. Keys in a certain group of keys on the keyboard are thereby subject to redefinition or relabeling so as to provide a variety of functions.

5,168,294 Display demonstration system for providing enlarged projected image of calculator display
[magnifying device for View Screen]

Inventor(s): Davis; Peter H.; Christensen; Brad V.; Ahlfinger; Robert R.
Issued/Filed Dates: September 27, 1991 / December 1, 1992

A calculator or other computing device uses a remote display set upon an elevated platform above the base of an overhead projector. Light through the base lens is passed through the display and is enlarged by lens.

5,392,081 Calculator projection display
[ViewScreen]

Inventor(s): Tarnay; Thomas N.; Wyatt; W. Gerald
Issued/Filed Dates: February 21, 1995 / September 29, 1993

A projection display for an electronic data processing device for use in conjunction with an overhead projector is provided. The projection display includes a display with a light transmitting screen, and the screen is framed by a uniquely constructed housing. The housing defines a free convection air channel below the screen to conduct a cooling air flow. The air flow in the free convection air channel substantially eliminates the problem of image deterioration due to screen overheating.

5,532,946 Calculator with table generation capability
[TI-82 table, feature also on 89/92+/V200]

Inventor(s): Phipps; Ann E.; Santucci; David M.

Issued/Filed Dates: July 2, 1996 / September 11, 1995

A digital computer or calculator is equipped with a numerical data table generation capability. It provides a user with the ability to specify one or more mathematical functions, and the ability to specify how the numerical data in support of the functions are to be displayed.

5,377,130 Method and apparatus for solving terms of a numerical sequence
[sequence graphing mode solving algorithm]

Inventor(s): Frank; Olivier L.; Phipps; Ann E.

Issued/Filed Dates: January 26, 1993 / December 27, 1994

A digital computer is provided for generating a solution of a term of a numerical sequence. The digital computer includes a memory. The memory has stored within it solving instructions of a sequence-solving program and recognizing instructions for recognizing the type of numerical sequence. The digital computer also includes a processor for executing the solving instructions and recognizing instructions. An input device receives data from a user. The data represents a mathematical expression of the numerical sequence. The data also represents a value of a term identifier representing the term of the numerical sequence to be solved. A display is also provided for displaying the solution of the term.

5,870,319 Device and method for collecting data from graphed images
[developed for, but not necessarily limited in application to, TI graphing calculators]

Inventor(s): Thornton; Glen Allen; Ferrio; Linda Jean; Stone; David S.; Howard; Veronica L.
Issued/Filed Dates: February 9, 1999 / January 4, 1996

A computing device for capturing designated data from one or more graphic applications comprising a screen area for viewing one or more graphic functions wherein each function is manipulated with a plurality of shortcut keys or a cursor pad communicably linked to the screen area. A first applications with a screen interface for the user is provided within the device having graphing capabilities for manipulating the graphs on the screen area. A cursor, cursor pad and shortcut keys are used to trace data along the graph and capture the points to a stack area where they are stored for future use by a second application. The second application gives the user the ability to further study and analyze the data. Alternatively, shortcut keys can be used to automate the transfer from the first application to the second application.

(Credit to John Gilbertson for the recent patents)