BRPN Calculator Version 2.0 by Ivan Berry   5-23-93

Summary:

       The Berry RPN Calculator utilizes Reverse Polish Notation, such as that utilized in the Hewlett-Packard line of calculators. If you are unfamiliar with this notion, see Section 1 Using BRPN. Key features of this version of the BRPN calculator are:
1)   Extensive units conversion in metric and English for units of Area, Length, Volume and Weight.
2)   Preset scientific units (MKS) such as Boltzman's Constant, Gravitational Constant, Electron Rest mass, etc.
3)   5 Programmable function keys. (Available only to Registered Users.)
4)   28 user definable constants.   (Available only to Registered Users.)
5)   Advanced math functions including: hyperbolic functions, Besssel functions, gamma functions, etc.
6)   Periodic table with physical constants for each element.

Disclaimer: Use this release of the Berry RPN calculator at your own risk. We shall not be held liable for any errors (programming bugs or otherwise) in the use and operation of this utility.

Section 1. Using BRPN

       RPN notation is an efficient technique for determining operator hierarchy without the use of parenthesis used in calculators utilizing algebraic notation. RPN notation uses a register stack. A stack is a series of storage locations arranged in a stack (i.e. one on top of the other). The top stack is called the X register, followed by the Y register, and so on down to the Z3 register. The RPN calculator has 6 stacks. Each time the ENTER key is pressed the stack is rotated downward and the entered number is placed in the top, X register. See below.

Entered Value	->	X register
X register	->	Y register
Y register	->	Z0 register
Z0 register	->	Z1 register
Z1 register	->	Z2 register
Z2 register	->	Z3 register
Z3 register	->	is lost.

       No attempt is made to determine a stack overflow (i.e. important data being lost out of the last register.) This should not present a major problem since most calculations require only 3-4 stacks. The RPN Calculator gives you 6 stacks.
The function of the stacks can be observed by checking the Show Stacks check box (see Section 5).
       To see how the stacks function, select the Show Stacks check box. Click on 5, click on enter. You should see the 5 in both the X and Y register. Not click on 6 and then enter. Now you should see a 6 in the X and Y register and a 5 in the Z0 register. (Note: The calculators display always equals the value in the X register. The Show Stacks display is however only updated on and operator entry such as Enter, X, /, sin, etc. This was done to speed up entry operations.)

       Two operand operators such as times (X), Division (/), etc. operate on the X and Y registers. Such operators perform the following:
       (1) Y register OP X register   e.g.   Y - X

(2) The stack is moved up one level i.e. Z0 -> Y, Z1 -> Z0, Z2 -> Z1, Z3 -> Z2.
(3) The result of the operation is placed in the X register and shown on the calculator display screen.

Single operand operators such as sine, 1/X, etc. only operate on the X register and do not effect the rest of the stack. Results are stored in the X register.

Constants such as PI and the scientific constants are entered onto the stack with the stack being moved down one location.

Examples: (It will be helpful to have Show Stacks Displayed)

Calculate 6.5 - 3.7

Click in 6.5,   Click Enter
Click in 3.7   Click -

The result 2.8 is displayed.

Calculate 2(6.5 - 3.7)

Click in 2   Click Enter
Click in 6.5   Click Enter
Click in 3.7   Click -
Click X
The result 5.6 is displayed

Calculate 2(6.5 - 3.7 -1.2) +1/3

Click in 2   Click Enter
Click in 6.5   Click Enter
Click in 3.7   Click -
Click in 1.2   Click -
Click X
Click in 3   Click 1/x
Click +
The result 3.5333333333 is displayed

Section 2 Buttons & Keys

0, 1, 2, etc. - Numbered Buttons enter digits into the display. (The numbers on the keyboard may also be used)

C   - Clear all registers except for the constant

CE   - Clear entry, i.e. clear X register

+, -, x, /   - Add, subtract, multiply, divide

+/-   - Change the sign of the X register

sin, cos, tan - sine, cosine, tangent. Inverses obtained by first pressing the inv. key.

10*   - ten to the X register power. inv 10* gives $\log_{10}$ of X

e*   - e to the X register power. inv e* gives ln of x

x<>y   - exchange the contents of the X and Y registers.

y*   - Y register to the X register power. inv y* gives $\log_x$ of y

π   - the constant PI

x²   - The X register squared

1/X   - one over the X register.

stac   - rotate the stack up one with the X register going into the Z3 register

STO   - store the value of the X register into the constant.

RCL   - place the constant on the stack and shift the stack down.

inv   - provide the inverse function.

F1, F2 .. - Programmable Function Keys. See Section 4

←   - delete last digit in display, edit

Deg or Rad - Select Degrees or Radians as the unit for sin cos and tan. **Double clicking converts x register to Deg or Rad.**

Section 3 Menus

Conversions

         Selects one of 4 conversion tables or a physical constants table. The conversions work on the x register and do not effect the stack. Conversions are performed by first clicking on the unit to convert FROM. Then clicking on the unit to convert to. The conversion will be entered back into the X register and displayed.
         The **Constants (Cntrl+N)** are entered by clicking on a key. The stack is first shifted down then the constant is entered in the x register and displayed. The name and units of the constant are displayed when the button is clicked.
         User Constants (Cntrl+S) are up to 28 user defined constants. This function is available only to registered users.
         Math Fctns (Cntrl+M) displays additional buttons for Error functions, Gamma Function, Exponential Integrals, Bessel Functions and the Probability function. In general these functions are accurate to about 6 decimal places.
         Periodic Table (Cntrl+P) displays the periodic table. Clicking on any element pops up a menu providing several physical constants for that element. Clicking on any of the constants will paste that value into the calculator. At present this cannot be programmed into the function keys.

Edit
         Copy

         Copy contents of the X register (display) to the clipboard.

         Paste

Paste the contents of the clipboard to the X register (display).

Fix Dec

Set the number of decimal places to display. This does not change the value of the stacks, only the value displayed. Setting the value to -1 removes the fixed decimal display and returns to a floating decimal display.

Toggle Exp

Toggle between scientific notation display and the normal floating/fixed decimal display.

Learn

Begins programming of either of the five function keys. Selecting this menu will ask you to press the function key to be programmed. Then ask you for a 4 character label to be displayed on the key. All calculator button presses are now recorded in the function key (up to 256 button presses) until the stop command is issued. The function keys remain permanently programmed until re-programmed or deleted.   The Calculator background is changed from blue to red to remind you that programming is turned on.

The Z or z key on the keyboard has a special meaning during function key programming. Pressing the Z or z key will bring up an entry menu allowing the programmed function to request entries from the keyboard. This will allow you to program multi-variable functions. The values typed into this menu will be entered into the X register and displayed.

Stop

End key programming and store the results in the function key. No notice is given if the button press count exceeds 256. **Remember to turn off the programming.**

Info

About

Gives version information about the program.

Register

Allows entry for registration information. When you register you will be given a registration number. Enter that number here to activate the function keys. All future releases of this program will utilize the same registration number. So if you register once you will be registered for all future releases. See section 5 for registration information.

Help

Displays this document.

Section 4 Programmable Keys and the RPNCALC.INI File

The function keys programming information is stored in the RPNCALC.INI file in the windows directory. The function equation is represented by a character string with the following representation:

Character(s)	Representation
0 - 9	numbers 0-9
.	decimal point
+	plus
-	minus
X	times
/	divide
\	+/-
b	back arrow (Back delete)
]	Enter
C	Clear
E	Clear Entry
s	sin
c	cos
t	tan
N	10*
e	e*
x	X<>Y
y	y*
P	PI
Q	X*X
O	1/X
T	STO
R	RCL
I	inv
p	exp
g	F1
h	F2
i	F3
j	F4
k	F5
Z	request keyboard entry
<	copy X Reg/Display to clipboard
>	paste clipboard into X Reg/Display
U	use conversion tables or constant tables. Following U is 2 bytes defining the lookup table and the button to use

Byte 1

A	area table
W	weight table
L	linear table
V	volume table
C	constant table
u	user table

Byte 2   Button index. (CHR$(index + 60))

H   other math function followed by the following:

Byte 1

S	hyperbolic sine
C	hyperbolic cosine
T	hyperbolic tangent
F	factorial
3	x cubed
E	E1(x)
e	Ei(x)
G	Gamma fctn
r	error fctn

c	complementary error fctn
J	Bessel Fctn Jo
j	Bessel Fctn J1
Y	Bessel Fctn Yo
y	Bessel Fctn Y1
P	Probability Function

The function keys may be edited by editing this string in the RPNCALC.INI file. The edited function will not take effect until the calculator is restarted.

NOTE: Direct stack manipulation, and Pasting to and from the constant cannot be programmed into the function keys nor can paste from the periodic table physical constants. Copy and Paste to the X register/Display may be programmed.

SECTION 5 Show Stacks

The Show Stacks Check Box, when checked, will display the 6 stacks and the constant register. Each of these stacks/registers may be edited by selecting with the mouse and entering new values in from the keyboard.

The individual registers may be edited by selecting with the mouse and typing in new values. These new values will ONLY take effect when the **Update Edit** button is pressed

The Up and Down arrow keys scroll the stack up or down.

The Edit Menu allows copying and pasting to and from the constant register and the clipboard. This can be used for entering/retrieving values in other applications.

REMEMBER: The ability to perform direct stack manipulation such as stack scrolling, direct editing, etc. cannot be programmed into the function keys/buttons.

SECTION 6 Registration

Individuals:

To register send a check for $10.00 US along with your name and address to: (Maryland residents add 5% sales tax.)

Skip Berry
3716 Font Hill Drive
Ellicott City, Md. 21042

Site License:

Businesses and institutions may register for a one time site license for unlimited use at any one location/address for $50.00 US.

If you register you will be given access to the programmable function keys as well as registered status for all future releases of this product. If you provide your Compuserve, Genie or America Online mail addresses when you register, we will attempt to keep you informed of future updates.

I hope you find this utility useful. I have attempted to provide accurate data, but there is always room for improvement. If you find any errors in the conversions, constants, etc. please let me know. I will correct these errors in future releases. And as always, your one-time registration is good for all future releases.

Comments can be directed to Skip Berry by mail at the above address or through any of the following electronic mail addresses.

Compuserve 73107,3055

Genie   Skip..B

America On-Line   Skip Bear

Thank you for your support.

Section 7 Changes   Version 1.0A from 1.0

1.   RCL and PI function handle the stack operations more intuitively. When numbers were entered immediately after a RCL or PI event, the numbers were tacked on to the display number instead of starting a new value.

2.   The Conversion Tables now never push the stack down. They always work on the X register value and return the result to the X register regardless of the previous key stroke.

3.   An Edit Right key ← was added to the Calculator. This behaves like backspace for editing purposes.

4.   Cut and Paste to the Display/X stack are now allowed. Use the **Edit** menu or press **Ctrl+C** for copy and **Ctrl+V** for Paste

5.   The number of decimals displayed may now be set (From **Edit** menu select **Fix Dec**).

6.   The display may be toggled between scientific notation and arithmetic notation. (From **Edit** menu select **Toggle Exp**).

7.   Scroll up and Down keys were added to the Stacks window.

8.   The stacks can be manually edited. The **UpdateEdit** button must be pressed for the edited values to be accepted.

9.   The function programming now allows multiple entries by pressing **Z** or **z** during programming.

10.   User defined constants have been added for registered owners. This function allows the entry of up to 28 user defined constants in a similar format to the pre-defined constants.

Version 1.1 Changes

1.   The conversion tables and constant tables may not be programmed into the function buttons/keys.

2.   A problem with entering a decimal point immediately after a conversion has been corrected.

Version 2.0 Changes

1.   Hyperbolic functions, factorial and x^3 have been added to the calculator.

2.   Math functions have been added for Error Functions, Bessel Functions, Gamma Function, Exponential Integral, and the Probability Function.

3.   A periodic table with elemental physical constants has been added.