Excalibur For Windows

EXCALIBUR was written to provide a fully flexible pop-up calculator with multiple function banks. It is an exclusively RPN calculator designed for ease of use and quick results. For a full description on how to use the RPN notation with this calculator see the RPN Quick Start Guide this document.

Although making this calculator use the RPN notation greatly facilitated the programming effort, that was not the reason it was chosen. I fully believe that the RPN notation is superior to the normal algebraic notation for long or complex equations. I also feel that, given some practice to undo the old method, this method is more natural more similar to how you would work out an equation given just a pencil and paper (more on this in the RPN Keypad and Stack Usage section). I hope that using the RPN notation has not turned any potential users from using this tool and I think the small effort in learning RPN may be worth the investment. Learning RPN does not mean that you will forget how to use other calculators which use the standard algebraic notation but will give you the ability to use either variety with ease.

Basic Operation

Function Banks

If you find a bug in this program or just want to let me know you enjoyed Excalibur, please email me at **dber@tiac.net** or drop by my homepage at **www.tiac.net/users/dber** for the newest version. If you contact me, please include your Excalibur version number and whether you use the 16 or 32 bit version.

Basic Operations (RPN Quick Start Guide)

This section describes how operations and calculations take place in Excalibur. It is intended that after you read this section you will have enough knowledge to work complex equations in Excalibur with a minimum of difficulty.

The Memory Stack

The automatic memory stack is at the heart of all calculations in this (or any) RPN calculator. It provides for an efficient storage of intermediate results during complex equations and allows for easy visualization of where your entered numbers are stored.

The automatic memory stack is shown as follows:

T	0	Oldest register
Z	0	
Y	0	
X	0	Newest or Current register

Values which you are currently entering are placed in the X register. Older values have been pushed up the stack to Y, Z or T.

Here is an example which will fill in the stack with a desired set of numbers:

(1) Press the C key to clear out all of stack memory. The stack will look like the table above with zeros for all elements.

(2) Press the following digit keys: 157. The stack display should look as follows:

T	0	Oldest register
Z	0	
Y	0	
X	157_	The underscore tells you current edit position

(3) Press the ENTER key. This separates one number on the stack from another number. The old value is pushed up the stack to the Y register and makes room for a new entry on the X register. The stack will look as follows:

T	0	Oldest register
Z	0	
Y	157	Pushed value
X	157	Last value is copied to the X register

(4) Notice the X register has the same value as the Y register. This is done for convenience since you may want to do something with the value in both registers. However, if you now press any digit key the new number will automatically replace the X register contents.

(5) Press the following digit keys: 90.5 This will enter a new value in the X register. The memory stack looks as follows:

T	0	Oldest register
Z	0	
Y	157	Pushed value
X	90.5_	New value is being entered here

(6) Again, press ENTER to force a stack push so that a new number can be entered.

T	0	Oldest register
Z	157	Pushed value
Y	90.5	Pushed value
X	90.5	Room for new number

(7) Press the following digit keys: 3.14 This will enter a new value in the X register. The memory stack looks as follows:

T	0	Oldest register
Z	157	
Y	90.5	
X	3.14_	New value is being entered here

(8) Again, press ENTER to force a stack push so that a new number can be entered.

T	157	Oldest register
Z	90.5	
Y	3.14	
X	3.14	Room for new number

(9) Press the following digit keys: 50 This will enter a new value in the X register. The memory stack looks as follows:

T	157	Oldest register
Z	90.5	
Y	3.14	
X	50_	New value is being entered here

(10) You have now filled the stack with chosen numbers. New numbers can be entered and the stack will continue to behave as you have seen here except that the contents of the T register will be pushed off the stack and are lost. Only the last four values can ever be shown and used.

One piece of information that might also be useful is how to enter fractions. A fraction can be entered by pressing the decimal point key twice. For example, to enter 2/5 into the calculator you can type 2..5 and the calculator will display 2/5.

Now that you know how enter numbers on the stack its time to learn how to perform basic operations on those numbers. See the next topic to see how to work with these numbers on the stack.

Addition Subtraction Multiplication and Division

Basic math operations (Add, Subtract, Multiply and Divide) in an RPN calculator (like Excalibur) is easy. First you need to get the two numbers you want on the stack. See the previous section if you don't already know how to do this.

Lets try Addition. To add add **13.3** and **45.4** we must first get those numbers on the stack.

T	0
Z	0
Y	45.3
X	13.3

We simply hit the + key on the keypad (or click the + key in the Excalibur window). This will add the contents of the X and Y register. The contents of the X and Y register will be popped off the stack (shifting T and Z down) for the addition. The result of the addition will be pushed back on the stack. After the addition operation, the stack will look as follows:

T	0
Z	0
Y	0
X	58.6

To illustrate this point further, if the stack looked as follows:

T	30
Z	20
Y	10
X	5

And addition is performed, the stack will look as follows:

T	30
Z	30
Y	20
X	15

As you can see, the X and Y registers are popped off the stack, the T and Z registers are shifted down (with the T register repeating to fill in the back end) and after the addition, the result of 15 is pushed back on the stack. The pushing and popping to and from the stack is an important thing to remember about RPN calculators. It can let you work out complex equations in little or no time.

Subtraction is exactly the same as addition. X is subtracted from Y and the result pushed back on the stack.
Multiplication will multiply X and Y and push the result on the stack.
Division will divide X into Y and push the result on the stack.

Always remember, it's just like working out the equation on paper. If you wanted to divided 8 by 2 you would wright down 8. Under that you would write down 2 and you would divide them. Do the same with any RPN calculator. Enter 8, enter 2 and hit the Divide key. This is the basis for any calculations you will ever work out.

The RPN calculator makes quick work of long chain calculations. The trick is to remember what's on the stack (Excalibur makes it easy since you can see all four stack locations on screen). The trick with long calculations is to work from the innermost set of parenthesis out and knowing the precedence of operations (multiply and divide before addition and subtraction).

For example, the equation 45.2 + (6 / 2.98) * 44.33

You would enter 6, enter 2.98 and press the Divide key. Enter 44.33 (which pushes the result of the previous divide up to the Y register) and press the multiply key. Once again, the result is in the X register. Enter 45.2 and press the plus key. The result is the final result of the equation above.

Statistical Functions

The statistical function bank is used to select a set of keys for work with statistical calculations. Statistical functions use an internal set of registers to keep track of X and Y values. There is an internal register N (number of elements) to keep track of how many pairs of X and Y values have been accumulated.

The following functions are available with this layout:

Summation+	Adds X and Y to the summation registers. Adds one to N and returns N in the X register (replacing the current contents of X).
Summation-	Subtracts X and Y from the summation registers. Subtracts one from N and returns N in the X register (replacing the current contents of X).
Clear Summation	Clears the internal summation registers and sets N back to zero.
Summation N	Recalls the internal variable N to the stack.
sX	Sample Standard Deviation of X.
X	Population Standard Deviation of X.
sY	Sample Standard Deviation of Y.
Y	Population Standard Deviation of Y.
Ave X	Returns the Mean value of X.
Ave Y	Returns the Mean value of Y.
Sum X	Returns the total sum of all X values entered into the statistics registers.
Sum Y	Returns the total sum of all Y values entered into the statistics registers.
Sum X Squared	Returns the total sum of all X values squared.
Sum Y Squared	Returns the total sum of all Y values squared.
Sum XY	Returns the total sum of all X * Y products.
r	Returns the Correlation Coefficient.
b	Returns the Y intercept.
m	Returns the slope.
y	Estimates Y based on previous statistical entries and the value in the X register.
x	Estimates X based on previous statistical entries and the value in the X register.

Menu Items Explained

File

Settings	This menu item brings up a dialog box to display common Excalibur settings. Things you can change here include: **Angle Mode**: Degrees, Radians, Gradients **Tax Constant**: Constant for calculating Tax (see Business Key Layout) **Numlock**: You can have the numlock key active on entry or you can tell Excalibur not to change the numlock state. **Comma Display**: On or off. Determines if you want commas shown on numbers greater than 1000. **Key Settings**: For you die-hard HP fans you can have your choice of key labels for exponents and change sign.
Copy X To Clipboard	The current X value is sent to the clipboard for pasting into your favorite application.
Copy All To Clipboard	The current X, Y, Z and T values are sent to the clipboard for pasting into your favorite application.
Program Usage Stats	Shows the number of pushes and pops to and from the RPN stack. Also shows the number of minutes the Excalibur window has been in focus.
Define Custom Set	Brings up a dialog box to allow a custom set of keys to be configured. These are saved to the EXCAL32.DAT file for use on future starts of the program.
Exit	Exits the program (you can also use the standard window close button on the top of the frame.

Type

Scientific	Selects the Scientific function Bank.
Statistics	Selects the Statistical function Bank.
Business	Selects the Business function Bank.
Conversion	Selects the Conversion function Bank.
Programming	Selects the Programming Mode function Bank (32-bit mode).
Geometry	Selects the Geometry function Bank.
Complex	Selects the Complex Number function Bank.
Miscellaneous	Selects the Miscellaneous Number function Bank.

Custom	Selects the Custom function Bank. See **Define Custom Set** above in the **File** menu.
Always On Top	Instructs Excalibur to always remain on top of the current set of windows being displayed.

Help

Excalibur Help	Displays this help file.
About Program	Excalibur version number and Copyright Information.

Key Shortcuts

Although all functions and digit entry can be carried out with the use of the mouse, a few keyboard shortcuts are used in Excalibur for those who wish to speed up their calculations:

Key 0-9	Enters the digit 0-9
Decimal Pt Key	Enters a single Decimal Point. If pressed twice, it will enter a fraction.
Backspace	Erases the last typed character on the display (X Register).
Key C	Clear Stack
Key X	Exchange X and Y
Key +	Add
Key -	Subtract
Key *	Multiply
Key /	Divide
Key ENTER	Same as ENTER on the keypad. Used to enter a number on the stack.
Key N	Change Sign (Negate)
Key E	Exponent
Key S	Store
Key R	Recall
Key L	Last X
Key M	Display Mode
Key H	Help Key
Key F	Last Function Bank
Key TAB	Clear X

Basic RPN Keys

The most basic keys in Excalibur are the number keys. These consist of 0-9 and the decimal point. These, along with the ENTER key allow any number to be entered into the calculator.

To the right of the digit entry keys are the 4 basic math operator keys: Addition(+), Subtraction(-), Multiplication(*) and Division(/).

To the right of these keys are two columns of frequently used keys. These keys include:

Help	Press this key and you will see the work Help displayed in the status bar at the bottom of the program. Click any other button in Excalibur and a short but useful description of the key will be shown (more information that the standard tool-tips).
X<>Y	Exchange the contents of the X and Y register.
+/- or CHS	Change sign of the value in the X register.
E or EEX	Exponent. Used when entering a number with an exponent. For example, 6.23E-03 could be entered by pressing 6.23 then the EEX key then the CHS key then 03.
STO	Store number to one of 26 internal registers. These are save when the program terminates and are restored when Excalibur restarts.
RCL	Recall a number from one of the 26 internal storage registers.
CLX	Clear X register only.
R+	Rotate stack up. T wraps to X.
R-	Rotate stack down. X wraps to T.
Last X	Recalls the last value of X before the last operation took place.
Mode	Brings up the precision display mode dialog box. Allows selection of Best Fit, Scientific, Engineering and Fixed format. Up to 14 decimal places can be specified.
BSP	Erase the last character typed in the X register (only works when you are entering a number – not after you have performed some operation).
RclA	Recalls the contents of the A register (as stored using the STO key). This just provides quick access to a user-defined register.
Rec	Puts the calculator in Record mode. The REC indicator should be shown in the status bar. It will record all button presses (but not menu selections or dialog box inputs) until Rec is hit again. Use Play to playback the buttons. Used for Macro-style programming of the calculator. Up to 200 button presses can be recorded.
Play	Plays back the last recorded button sequence.

All of the above keys are always visible regardless of what function bank is selected (for example, Scientific, Business, Conversion, etc).

Function Bank Selection

To the right of the main keypad there are some keys to allow quick switching between function banks. They are:

Scientific	Selects the Scientific function Bank.
Statistics	Selects the Statistical function Bank.
Business	Selects the Business function Bank.
Conversion	Selects the Conversion function Bank.
Programming	Selects the Programming Mode function Bank (32-bit mode).
Geometry	Selects the Geometry function Bank.
Complex	Selects the Complex Number function Bank.
Miscellaneous	Selects the Miscellaneous Number function Bank.
Custom	Selects the Custom function Bank.

Scientific Functions

The scientific function bank is used to select a set of keys for work with scientific calculations. The following functions are available with this layout:

Sine	Computes the Sine of X.
Cosine	Computes the Cosine of X.
Tangent	Computes the Tangent of X.
Hyperbolic Functions	Press this key then Sine, Cosine or Tangent to get Hyperbolic versions of these functions.
ArcSine	Computes the ArcSine of X.
ArcCosine	Computes the ArcCosine of X.
ArcTangent	Computes the ArcTangent of X.
Absolute Value	Computes the Absolute Value of X.
X Squared	Computes the square of X.
Square Root	Computes the square root of X.
Inverse (1/X)	Computes the inverse of X (which is 1/X).
10 ^ X	Returns 10 raised to the X power.
Exponential	Returns e.
Natural Log	Computes the natural log of X
Log Base 10	Computes the Log base 10 of X
Factorial	Computes the factorial of X.
Power	Raise Y to the X power.
INT	Returns the Integer portion of X.
FRAC	Returns the fractional portion of X.
RAND	Returns a random number between 0 and 1 in the format 0.XXXX
Combinations	Returns the number of Y combinations grouped X at a time.
Permutations	Returns the number of Y permutations grouped X at a time.
PI	Returns the transcendental number 3.1416….
Constants	Brings up a dialog box with many useful constants which can be inserted into the X register.

Conversion Functions

The conversion function bank is used to select a set of keys for common conversions. For single number conversions, enter the value in the X register. Functions which require more than one value to be entered on the stack will identify those inputs.

The following functions are available with this layout:

Kb->Lbs	Converts Kilograms to Pounds.
Lbs->Kgs	Converts Pounds to Kilograms.
C->F	Converts Degrees Celsius to Degrees Fahrenheit.
F->C	Converts Degrees Fahrenheit to Degrees Celsius.
In->Cm	Converts Inches to Centimeters.
Cm->In	Converts Centimeters to Inches.
g->Oz	Converts Grams to Ounces.
Oz->g	Converts Ounces to Grams.
Gal->l	Converts Gallons to Liters.
l->Gal	Converts Liters to Gallons.
Ft->Mi	Converts Feet to Miles.
Mi->Ft	Converts Miles to Feet.
Mi->Km	Converts Miles to Kilometers.
Km->Mi	Converts Kilometers to Miles.
Cal->J	Converts Calories to Joules.
J->Cal	Converts Joules to Calories.
->H.MS	Converts from Hours to Hours Minutes Seconds. For example, 2.15 hours converts to 2 hours, 8 minutes and 6 seconds.
->H	Converts from Hours Minutes Seconds to Hours.
Deg->Rad	Converts from Degrees to Radians.
Rad->Deg	Converts from Radians to Degrees.
R->P	Converts from Rectangular to Polar Coordinates.
P->R	Converts from Polar to Rectangular Coordinates.
Ft->Fa	Converts from Feet to Fathoms.
Fa->Ft	Converts from Fathoms to Feet.
Ft->m	Converts from Feet to Meters.
m->Ft	Converts from Meters to Feet.
SqIn->SqCm	Converts from Square Inches to Square Centimeters.
SqCm->SqIn	Converts from Square Centimeters to Square Inches.
SqFt->SqM	Converts from Square Feet to Square Meters.
SqM->SqFt	Converts from Square Meters to Square Feet.
CbIn->CbCm	Converts from Cubic Inches to Cubic Centimeters.
CbCm->CbIn	Converts from Cubic Centimeters to Cubic Inches.
CbFt->CbM	Converts from Cubic Feet to Cubic Meters.
CbM->CbFt	Converts from Cubic Meters to Cubic Feet.
FlOz->ml	Converts from Fluid Ounces to Milliliters.
ml->FlOz	Converts from Milliliters to Fluid Ounces.
At->PSI	Converts from Atmospheres to Pounds per Square Inch.
PSI->At	Converts from Pounds per Square Inch to Atmospheres.
Acr->SqFt	Converts from Acres to Square Feet.
SqFt->Acr	Converts from Square Feet to Acres.

Business Functions

The business function bank is used to select a set of keys for work with financial and date calculations. Business functions use an internal set of registers.

The following functions are available with this layout:

TAX	Multiplies the X value by the tax constant (see Files/Settings).
%	Calculates Y percentage of X.
% Change	Calculates the percentage change from Y to X.
% Total	Calculates the percentage X is of Y.
Clear Fin Reg	Clears the contents of the financial registers.
Store Fin Reg	Stores the X value into one of several financial registers. Values must be stored in the financial registers before many of the financial buttons will work.
Recall Fin Reg	Recalls one of the financial registers to the X register.
n	Calculates the Number of Periods. Present value, Future Value, interest and the payment amount must be stored in the financial registers.
I%	Calculates the interest (expressed as a percent) based on Present Value, Future Value, Number of Periods and Interest. Interest entered into Excalibur is always expressed as interest per period (see examples below).
PV	Calculates the Present Value given the Future Value, Payment, Interest and Number of Periods.
PMT	Calculates the payment given Present Value, Future Value, Interest and Number of Periods.
FV	Calculates the Future Value given the Present Value, Interest, Payments and Number of Periods.
fMode	Selects whether the payments are made at the beginning of a compounding period or the end of a compounding period.
Amort	Based on the values in the Financial Registers, displays a table of payments, interest paid, total paid, etc. See below for an example of how to use this.
DATE	The user keys in a date in the Y register in either DD.MMYYYY or MM.DDYYYY (depending on date mode) and a number of days from that date in the X register (either positive or negative). The calculator returns the resulting date in X and the day of the week in Y (1=MON..7=SUN). Note, the calculator will currently only correctly handle dates from 1900 to the year 9999. For working with dates, it is convenient to put the calculator in fixed 6 decimal point mode.
DAYS	The user keys into the X and Y register two dates in either DD.MMYYYY or MM.DDYYYY format (depending on the date mode) and the calculator will return the number of days between those dates. Note, the calculator will currently only correctly handle dates from 1900 to the year 9999 For working with dates, it is convenient to put the calculator in fixed 6 decimal point mode.
TODAY	Returns today's date in the X register. The format will be either DD.MMYYYY or MM.DDYYYY depending on the date mode selected. For working with dates, it is convenient to put the calculator in fixed 6 decimal point mode.
dMode	Selects either DD.MMYYYY or MM.DDYYYY for the date mode. For working with dates, it is convenient to put the calculator in fixed 6

	decimal point mode.
12 Divide	Divides the contents of the X register by 12. Useful when interest is compounded monthly and the annual interest is entered in X but the interest financial register must be set to interest per compounding period.
12x	Multiplies the contents of the X register by 12.
100	Divides the contents of the X register by 100. Useful when converting percents to and from parts per 100.
100x	Multiplies the contents of the X register by 100. Useful when converting percents to and from parts per 100.
CF0	Cash flow. Initial value.
CFj	Cash flow, subsequent values.
NPV	Calculates the Net Present Value based on a set of cash flows an a rate of return stored in the **i** financial register. The NPV calculated is shown in the X register and is also stored in the **PV** financial register.
IRR	Calculates the Internal Rate of Return based the Net Present Value and the stored cash flows. If no value can be found, a message will be given to indicate this.
MU%C	Calculates the markup cost as a percentage of price as entered into the financial registers.
MU%P	Calculates the markup price as a percentage of cost as entered into the financial registers.
COST	Calculates the cost based on Price and Markup%C (or Markup %P if Markup%C is zero).
PRICE	Calculates the price based on Cost and Markup%C (or Markup %P if Markup%C is zero).

Financial Examples

Calculate Future Value

Let's say you have a savings account which pays 3.9% interest compounded monthly. You have $9500 to deposit for two years. What will be the future value (in 2 years) of the money you deposit today. First, you are deposing money so money is leaving you and going to the bank so this is a negative cash flow. Key in –9500 and store that in the Present Value register. Key in 3.9 (for the percentage) but don't store that into the Interest register yet – we are compounding monthly so that annual figure needs to be divided by 12 to give us the interest % per compounding period (which is what the calculator wants). We can use the convenient **Divide by 12** key before we store the interest register. We are going to leave it in the savings account for 2 years which is 24 compounding periods. Enter 24 and store that value in the N register. Now we are all set, we can simply hit the **FV** key to get the result of 10,269.37 which is how much money will be in the account after 2 years.

You can also get more complicated answers if you include a payment. For example, you want to know how much money you will have with an initial deposit of $9500 at 3.9% interest (compounded monthly) for 2 years but you will be depositing an additional $200 each month. This is exactly the same as above except you want to store –200 (remember it's an outgoing cash flow to the bank) to the Payment register. Hit the **FV** key and you will get 15,253.12 which is quite a bit more than the figure above due to the additional payments (the calculator figures in all the interest on each of these payments).

Calculate Payment Amount

You take out a $15000 loan on a car at 4.8% financing for 4 years. What will be your

payment each month? First key in 15000 into the Present Value register (it's positive because you are receiving the money from the bank). Enter 4.8% (divided by 12 for monthly compounding) into the Interest register. Enter 48 (12 months X 4 years) into the N register. Be sure Future Value is set to zero (you are paying off the loan until you owe $0 in the future). Hit the **PMT** key and you will see that your payments each month will be $344.08 (shown with a negative sign to indicate a payment out).

Calculate Present Value
Let's say you want to have $10,000 accumulated in 5 years. How much money would you need to put into an account today giving 5.5% interest (compounded monthly) to get this amount? First, enter 10000 into the Future Value register (it's positive because this amount will be paid to you). Then enter 5.5% (divided by 12 since we are compounding monthly) into the Interest register. Enter 60 (12 months X 5 years) into the N register. Be sure the Payment register is set to zero. Now hit the **PV** key and the calculator will tell you that you need 7,600.50 dollars deposited to this account to yield $10,000 in 5 years (the calculator will return a negative number indicating a deposit to the account).

Calculate Interest
Let's say you want to take out a $15000 loan for 4 years but don't want to pay back more than $325 per month. What interest would you need to get to achieve this? First, key in 15000 in the Present Value register (it's positive because this is the amount that will be paid to you by the loan). Enter –325 into the Payment register (it's negative since you will be paying out each month). Enter 48 into the N register (12 months X 4 years). Hit the **i%** key which will give 0.1612 which is the interest per period. You need to hit the **12x** key to get this number expressed as an annual interest rate. This will give 1.93% which is the annual interest rate that you must get on the loan so that you will only pay $325 per month to pay off the loan in 4 years.

Calculate Number of Pay Periods
This is not used very often but you can figure the number of pay periods assuming you know the Present Value, Future Value, Payment and Interest ahead of time. Just key those values in and press the **N** key to calculate the number of pay periods.

Amortization
You take out a $15000 loan on a car at 4.8% financing for 4 years and will be paying back $344.08 per month. What will your payment schedule look like? First key in 15000 into the Present Value register (it's positive because you are receiving the money from the bank). Enter 4.8% (divided by 12 for monthly compounding) into the Interest register. Enter 48 (12 months X 4 years) into the N register. Be sure Future Value is set to zero (you are paying off the loan until you owe $0 in the future). Finally, enter -344.08 into the Payment register (it's negative since you are paying the money out). Now hit the **Amort** key and you will see a month by month breakdown of your payments – how much is applied to principal, how much is applied to interest, etc. At the bottom you will see your total payment out and how much you have paid in interest in total over the 4 years (this can be very interesting information).

Markup and Cost Percent
If you buy something for $25 and sell it for $36 what percentage was the markup. There are two ways to look at this. First enter 25 into the Cost (what you paid for it) financial register. Then enter 36 into the Price register (what you are selling it for). Then hit the **MU %C** button. This will yield 44 (percent) in the X register. This means that the $25 item is marked up 44% to be sold at $36. If you press the **MU%P** button instead, it will give 30.55 (percent) in the X register indicating that you paid 30.55% less than the selling price of $36

for the item.

Markup and Cost
If you buy something for $25 and you want to mark it up 65% then you would enter $25 in the Cost register and 65.0 in the Markup%C register. Hitting **PRICE** will give the desired resulting price of $41.25 which is a 65% markup over the cost of $25.

If you know an item can be sold for $75 and you want to have a 40% markup, you would enter $75 into the Price register and 40% into the Markup%C register. Hit **COST** and this tells you how much you would need to pay for the item to get 40% and sell it for $75. Entering these numbers and hitting the COST key gives 53.57 which means that you would need to pay $53.57 for an item in order to mark it up 40% for a final selling price of $75.

Cash Flows - Net Present Value and Internal Rate of Return
When you are entering values for calculating net present value you should first clear out the financial registers. Then set the initial investment in CF0 (changing sign if it is a negative cash flow) and all subsequent values are entered into the calculator and then CFj is pressed to store the next cash flow. Be sure to observe cash flow conventions of values being entered (negative cash flows out would be entered with a negative sign while cash in would be a positive entry). After all cash flow values are entered,.you must enter the Rate of Return in the **i** financial register. You can then press the **NPV** to calculate the Net Present Value. The solution is also stored in the **PV** financial register. To calculate the IRR, enter all values as above except instead of entering the i value, enter the NPV value (in the **PV** register) and press the **IRR** key to calculate the Internal Rate of Return. This value will be shown on screen and also stored in the **i** financial register.

Geometry Functions

The Geometry function bank is used to select a set of keys for geometry calculations. The following functions are available with this layout:

CircC	Calculates Circle circumference with radius X.
CircA	Calculates Circle Area with radius X.
Elip A	Calculates the area of an ellipse with radii X and Y.
Tri A	Calculates the area of a triangle with base X and height Y.
Rect C	Calculates the circumference of a rectangle with sides X and Y.
Rect A	Calculates the area of a rectangle with sides X and Y.
Box A	Calculates the area of a cube with side length X.
Box V	Calculates the volume of a cube with side length X.
Sphr A	Calculates the area of a sphere with radius X.
Sphr V	Calculates the volume of a sphere with radius X.
Cyl A	Calculates the area of a right cylinder with radius X and height Y.
Cyl V	Calculates the volume of a right cylinder with radius X and height Y.
Cone A	Calculates the area of a right cone with base radius X and height Y.
Cone V	Calculates the volume of a right cone with base radius X and height Y.
Quad	Computes the two roots of the quadratic equation for X, Y and Z and stores the result in X, Y.
Pyth	Pythagorean Theorem. Computes the hypotenuse in a right triangle with lesser sides X and Y.
Hero's	Computes hero's (or Herons) formula. Computes the area of a triangle with side lengths X, Y and Z.

Programming Functions

The Programming function bank is used to select a set of keys for computer science type conversions and computations. Currently the only word size supported is a 32-bit signed integer. This is fine for most people, but some will want to set a different word size or a changed from signed to unsigned mode. This type of programming mode will be supported in a future version.

The following functions are available with this layout:

Dec	Puts the calculator in Decimal Mode (base 10). This is the default when you enter the programming layout mode.
Hex	Puts the calculator in Hexadecimal Mode (base 16). Keys A-F are used to key in the upper hex digits.
Bin	Puts the calculator in Binary Mode (base 2). Only zeros and ones are allowed. Only 16 binary digits are shown at a time. Use the BinHI and BinLO buttons to switch between the upper and lower bits.
Oct	Puts the calculator in Octal Mode (base 8). Only digits 0-7 are allowed.
A-F	These buttons are used for Hex mode only to key in those "digits".
AND	Logical AND of X,Y
OR	Logical OR of X,Y
NOT	Logical complement of X
NAND	Logical NAND of X,Y
NOR	Logical NOR of X,Y
XOR	Logical XOR of X,Y
SHL	Shifts the contents of register X left one bit. A zero bit is shifted into the first position.
SHR	Shifts the contents of register X right one bit. A zero bit is shifted into the last position.
ROL	Rotates the contents of register X left one bit shifting the last bit into the first bit.
ROR	Rotates the contents of register X right one bit shifting the first bit into the last bit.
ASCII	Brings up the ASCII chart dialog box.
MOD	Computes Y MOD X.
BinHI	Shows the upper 16 bits when in binary mode.
BinLO	Shows the lower 16 bits when in binary mode.
SHL,x	Shift Y left X bits.
SHR,x	Shift Y right X bits.
RL,x	Rotate Y left X bits.
RR,x	Rotate Y right X bits.
ASR	Arithmetic Shift Right shifts the X register right 1 bit and keeps the sign bit on the left end.
#B	Computes the number of 1 bits in the current X value (for example, the equivalent of 01100010 would return 3).
SB	Sets the Xth bit in Y (zero-based).
CB	Clears the Xth bit in Y (zero-based).
MaskL	Creates a left justified string of 1s (or equivalent value if not in BIN mode). For example, MaskL of 5 would create the Binary equivalent of 11111.
MaskR	Creates a right justified string of 1s (or equivalent value if not in

	BIN mode).
WSIZE	For future use. Currently all programming mode features are represented internally as 32-bit signed integers. In the future 8 bit, 16 bit and possibly 64 bit values will be supported in both signed (1's complement, 2's complement) and unsigned modes.

Miscellaneous Functions

The Miscellaneous function bank is used to select a set of keys for computations and functions not falling into one of the other categories.

The following functions are available with this layout:

Prime#	Brings up a dialog box with all primes from 1 to 10000. Allows any of these values to be inserted into the X register of the calculator.
Resist	Brings up the resistor dialog box for quick work with resistor color codes. Allows any of these values to be inserted into the X register of the calculator.
Elmnts	Brings up a dialog box for the Periodic Table of Elements. Allows any of these values to be inserted into the X register of the calculator.
Prefix	Brings up a dialog box with metric prefixes. Allows any of these values to be inserted into the X register of the calculator.

Licensing Info - Excalibur 32-Bit version BETA

Copyright Notice and Disclaimer

This version is distributed as FREEWARE and may be freely copied and distributed as long as the entire unmodified program is copied and no fee is charged.

This program is provided 'as is' and no warranties are implied or given. Care has been taken to produce a solid application but the author shall not be held responsible for any errors, incompatibilities or consequential losses before, during or after use of this program. The author does not guarantee fitness for a particular purpose. The risk as to the quality and performance of the Software is taken on by you.

Grant of Use
The author grants you a non-exclusive license to use this software product ("Software"). This Software is currently free of charge. (However, if you find it useful, send me some email and let me know what you liked).

Bugs and Features
Although I cannot fix every bug in a timely manner or even respond to every email question I do need to know about bugs in the program or features you would like to see in future releases of the program. Please email me with comments/suggestions at the following address:

dber@tiac.net

And put as the first word in the subject line: Excalibur so it will be easy for me to know what the message is about (you can put as long a subject as you like, just put Excalibur somewhere in the subject line). I'm working on some feedback forms for my home page (see below). If you contact me, please include your Excalibur version number and whether you use the 16 or 32 bit version.

Patches and new releases will (hopefully) be available on my home page:

http://www.tiac.net/users/dber

System requirements

Excalibur 32-bit requires Windows 95 or WinNT (intel version) with 4MB of RAM and a hard drive with 500K free.
Excalibur 16-bit requires Windows 3.1 or 3.11 with 4MB of RAM and a hard drive with 500K free.

About This Beta Version 0.99a
First beta release.

Uninstalling
This program was distributed with Install Shield to automatically install the program. To uninstall it, simply use the normal Win95/NT Control Panel Add/Remove Programs to remove Excalibur 32-bit.

Complex Functions

Complex Functions are currently only supported by the 32-bit version of Excalibur. The 16 bit version does not support this function bank layout.

Up to 2 Complex pairs can be entered into Excalibur in the X,Y pair (X is the real part and Y the imaginary part) and in Z,T (same real/imaginary arrangement).

The following functions are available with this layout:

Cpx+	Complex Addition. {Z,T} + {X,Y}
Cpx—	Complex Subtraction. {Z,T} – {X,Y}
Cpx Div	Complex Division. {Z,T} / {X,Y}
Cpx X	Complex Multiplication. {Z,T} * {X,Y}
cSIN	Complex Sine of {X,Y}
cCOS	Complex Cosine of {X,Y}
cTAN	Complex Tangent of {X,Y}
Conj	Complex Conjugate of {X, Y}
Cpx e	Complex Natural Exponential of {X,Y}
cLN	Complex Natural Log of {X,Y}
cLOG	Complex Log (base 10) of {X,Y}
cPOW	Complex Power {Z, T} raised to the {X,Y}
cSQRT	Complex Square root of {X,Y}
cABS	Complex Absolute Value of {X,Y}

Custom Bank

From the main menu, you can select the **Define Custom Bank**. This will bring up a dialog box to allow you to select each of the function bank layouts and choose any button combinations to copy to the custom bank. Once the custom bank is accepted, you can select it by choosing Custom from the **Type** menu or selecting the **Custom** button. All of the buttons you selected will be available. This lets you create a layout that is right for you. You may mix and match buttons from any layout when defining the custom set. If you select a button that is a programming mode button, when that button is selected, the stack will automatically switch from Floating Point Mode to Integer Mode. When a non-programming mode button is selected, the mode will automatically switch back.