



# libbaltcalc Usage and API Manual

libbaltcalc v3.2.0 (manual version 1.1)

Part of the SBTCVM Project.

Originally Written By:

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# History

v1.0 initial version of manual

v1.1 updates and clarifications.

# Introduction

libbaltcalc is the mathematics backbone of the SBTCVM project. It provides the very core mathematics operations that make everything from the assembler, to the calculator, to the virtual machine itself, work at all. In this manual, you will find the official formal documentation for this ever important component.

## Libbaltcalc API

### Older string-based Functions:

**Note:** BTTODEC and DECTOBT are also used by the newer btint API.

BTTODEC(btinteger)	Convert Balanced ternary integer string to decimal
DECTOBT(decinteger)	Convert Decimal integer to balanced ternary string
btmul(numA, numB)	Multiply two balanced ternary integer strings
btadd(numA, numB)	Add two balanced ternary integer strings
btsb(numA, numB)	Subtract two balanced ternary integer strings
btdivcpu(numA, numB)	Divide two balanced ternary integer strings. Returns "ZDIV" upon zero division.
btdiv(numA, numB)	Divide two balanced ternary integer strings.
BTINVERT(numtoinvert)	Invert balanced ternary integer string to its opposite. i.e. "-+" would invert to "+-"
progbiasand(polarset, inpA, inpB)	A "programmable" biased and gate. returns a positive if: input a (inpA) = input b (inpB) = polarity line (polarset) else it returns zero
polarityand(inpA, inpB)	A polarized and gate returns + if both input A (inpA) and input B (inpB) = + returns - if both input A (inpA) and input B (inpB) = - otherwise it returns zero
progbiasor(polarset, inpA, inpB)	A programmable biased or gate returns "+" if either or both inputs equal the polarity line

	(polarset) else it returns "0"
progbiasnor(polarset, inpA, inpB)	A programmable biased orxn gate returns "+" if either equal the polarity line (polarset) returns "0" either if neither or both inputs equal the polarity line (polarset)

## btint class:

Syntax:

int1=btint("+ -")	+0- notation is supported, and used by default.
int2=btint("pn")	p0n notation is supported.
int3=btint(2)	
int4=btint(int2)	passing a btint instance to copy the value from is supported.

## methods

method	example/description	notes
invert()		returns the balanced ternary inversion. i.e. -+0- becomes +-0+
dec()		explicitly returns a normal python integer
bt()		explicitly returns balanced ternary integer in string form, using the +0- notation.
p0n()		explicitly returns balanced ternary integer in string form using the p0n notation.  useful for operations needing an alphanumeric string, or where + and - cant be used.

copy()	btintC=btintA.copy()	return a new btint instance with an identical value.
changeval(newval)	btintC.changeval("+") btintC.changeval("pn") btintC.changeval(2) btintC.changeval(btintA)	changes the internal value of a btint class instance.
bttrunk(tritlen)	print btintA.bttrunk(12)	preforms string-based ternary trit truncation and also pads resulting balanced ternary integer string with zeros. primarily useful for logic simulations.
dectrunk(tritlen)	btintC=btintA.dectrunk(12)	preforms mpi/mni limiting truncation

## Supported built-in methods:

Note: mixed operations with python integers are supported, and will return a btint object.

method	example/description	notes
string	<code>str(btintA)</code> <code>print(btintA)</code>	(returns balanced ternary integer in string form.)
integer	<code>int(btintA)</code>	(returns a normal python integer)
add	<code>btintC=btintA+btintB</code> <code>btintA+=btintB</code>	
subtract	<code>btintC=btintA-btintB</code> <code>btintA-=btintB</code>	
Floor division	<code>btintC=btintA//btintB</code> <code>btintA//=btintB</code>	(limited to integers only as floating point operations are not yet supported)
multiply	<code>btintC=btintA*btintB</code> <code>btintA*=btintB</code>	
absolute	<code>btintC=abs(btintA)</code>	
negative	<code>btintC=-btintA</code>	
positive	<code>btintC=+btintA</code>	
invert	<code>btintC=~btintA</code>	( returns the tritwise inversion. i.e. -+0- becomes +-0+)
Length	<code>len(btintA)</code>	get the length in trits of a balanced ternary integer.
Comparisons (works with both python 2 AND 3.	supports common comparison operators (i.e. <code>==</code> , <code>&gt;=</code> , <code>&gt;</code> , <code>&lt;=</code> , <code>&lt;</code> , <code>!=</code> )  if <code>btintA&gt;=btintB</code> :	



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