



# **libbaltcalc usage and API manual**

libbaltcalc v3.1.0 (manual version 1.0)

part of the SBTCVM Project

Originally Written By:

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# History

v1.0 initial version of manual

# 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

### Functions:

BTTODEC(btinteger)	Convert Balanced ternary integer to decimal
DECTOBT(decinteger)	Convert Decimal integer to balanced ternary
btmul(numA, numB)	Multiply two balanced ternary integers
btadd(numA, numB)	Add two balanced ternary integers
btsb(numA, numB)	Subtract two balanced ternary integers
btdivcpu(numA, numB)	Divide two balanced ternary integers. Returns "ZDIV" upon zero division.
btdiv(numA, numB)	Divide two balanced ternary integers.
BTINVERT(numtoinvert)	Invert balanced ternary integer 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 orn 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:

<code>int1=btint("+ -")</code>	
<code>int2=btint(2)</code>	
<code>int3=btint(int2)</code>	

## methods

method	example/description	notes
<code>invert()</code>		(returns the balanced ternary inversion. i.e. -+0- becomes +-0+)
<code>dec()</code>		(explicitly returns a normal python integer)
<code>bt()</code>		(explicitly returns balanced ternary integer in string form.)
<code>copy()</code>	<code>btintC=btintA.copy()</code>	
<code>changeval(newval)</code>	<code>btintC.changeval("+ -")</code> <code>btintC.changeval(2)</code> <code>btintC.changeval(btintA)</code>	changes the internal value of a btint class instance.
<code>bttrunk(tritlen)</code>	<code>print btintA.bttrunk(12)</code>	performs string-based ternary trit truncation and also pads resulting balanced ternary integer string with zeros. primarily useful for logic simulations.
<code>dectrunk(tritlen)</code>	<code>btintC=btintA.dectrunk(12)</code>	performs mpi/mni limiting truncation

## Supported built-in methods:

Note: related i and r methods also supported. mixed operations with python integers are supported, and will return a btint object. Not all supported types are listed.

method	example/description	notes
<code>__str__</code>	i.e. <code>str(btintA)</code> , <code>print btintA</code>	(returns balanced ternary integer in string form.)
<code>__int__</code>	<code>int(btintA)</code>	(returns a normal python integer)
<code>__add__</code>	<code>btintC=btintA+btintB</code>	
<code>__sub__</code>	<code>btintC=btintA-btintB</code>	
<code>__floordiv__</code>	<code>btintC=btintA//btintB</code>	(limited to integers only as floating point operations are not yet supported)
<code>__mul__</code>	<code>btintC=btintA*btintB</code>	
<code>__abs__</code>	<code>btintC=abs(btintA)</code>	
<code>__neg__</code>	<code>btintC=-btintA</code>	
<code>__pos__</code>	<code>btintC=+btintA</code>	
<code>__invert__</code>	<code>btintC=~btintA</code>	( returns the tritwise inversion. i.e. -+0- becomes +-0+)
<code>__len__</code>	<code>len(btintA)</code>	get the length in trits of a balanced ternary integer.
<code>__cmp__</code>	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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