Bullalgo Trading Systems, Inc.
Trailing Matrix User Manual
Version 1.0
Manual Revision 20150917

Trailing Matrix

The ***Trailing Matrix*** is a Bullalgo Trading Systems, Inc. add-on Trailing Stop strategy that is applicable to any existing system or strategy that uses EasyLanguage in TradeStation, including our Orion products. This Matrix allows the user to have a plethora of Trailing Stop options at his/her fingertips. It is the perfect tool for protecting gained assets during the life of a trade. Use of the *Trailing Matrix* will take anyone's automated strategy building to new heights by allowing them to protect gains through the execution of Trailing Stop exits according to their unique trading style.

Trailing Matrix Profile

Can be used in conjunction with any system

Multiple creative trailing stops

Use each individually

Use each in conjunction

Trailing Matrix

Dynamic Highest High Lowest Low (HHLL) Trailing Stop

Dynamic Highest Low Lowest High (HLLH) Trailing Stop

NumBar Trailing Stop

Dollars Trailing Stop

Percent of Profit Trailing Stop

Percent of Entry Price Trailing Stop

Ticks Trailing Stop

Product Support, helpful tips, and other *Trailing Stop* users can be found in Bullalgo's trading forums "***The War Room***" located at **www.bullalgotradingsystems.com.**

Ryan Fuda

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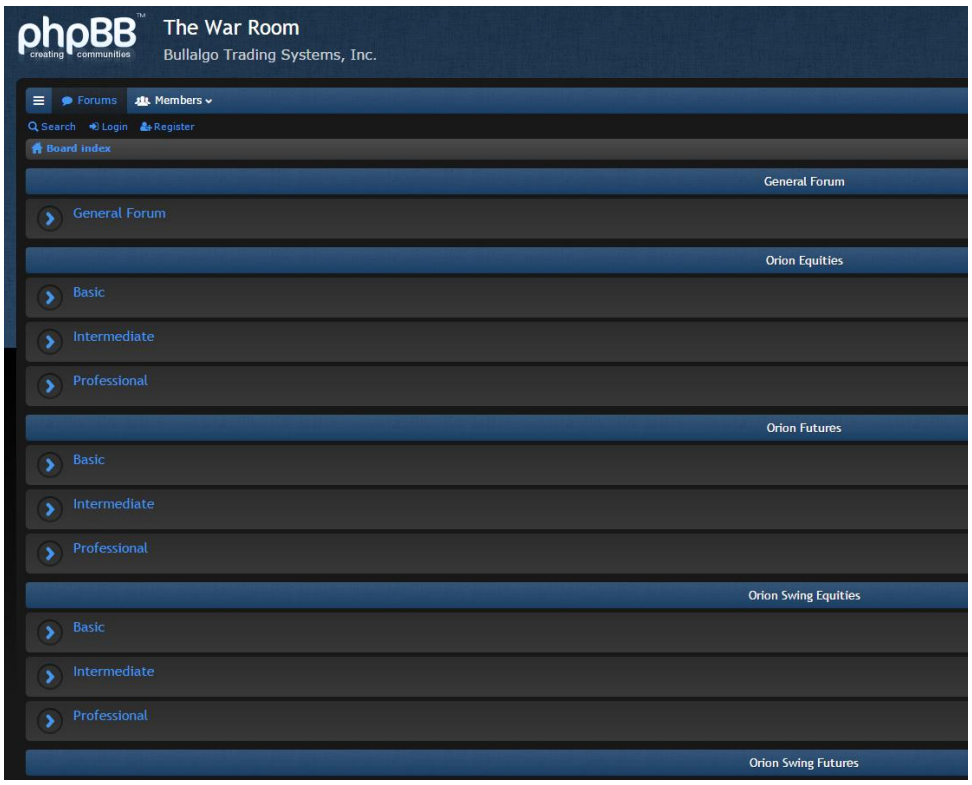

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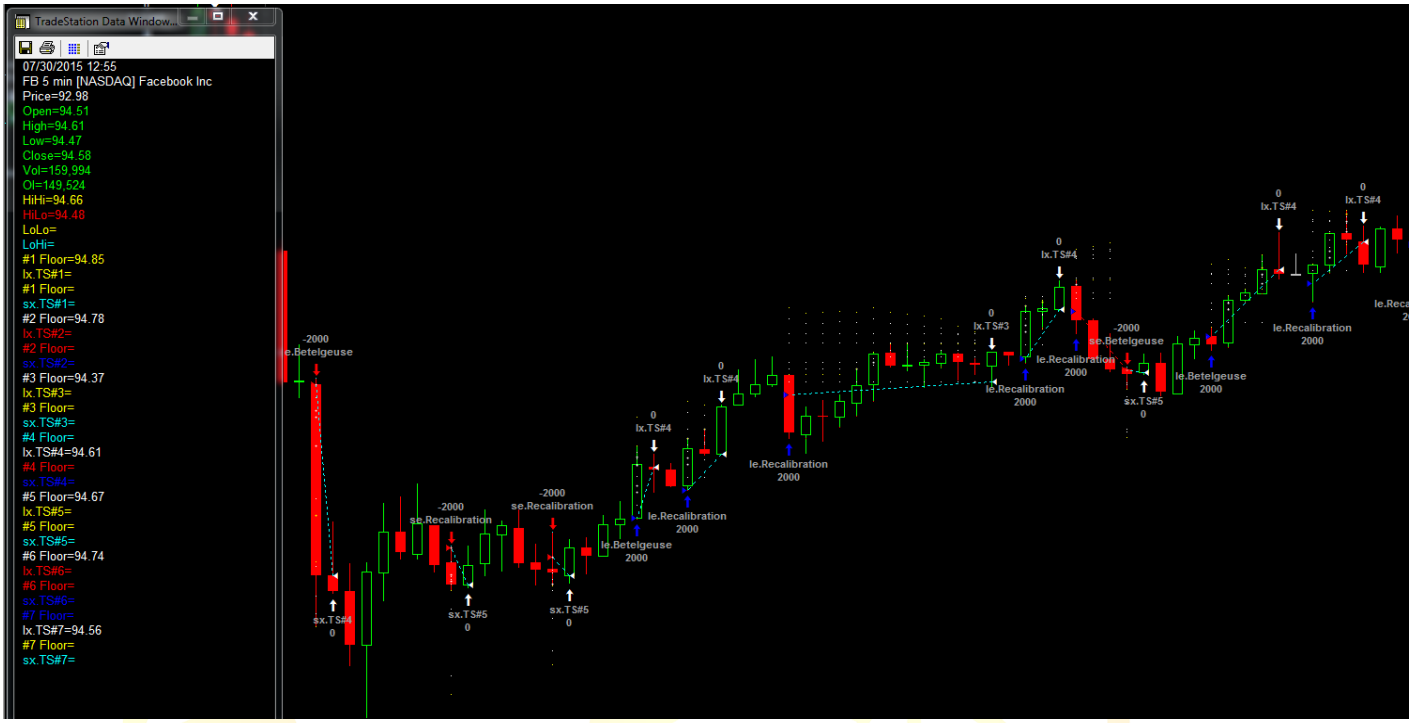
Getting Acquainted with the Trailing Matrix



A Trailing Stop is used in automated trading strategies to protect and retain profits. It is specifically designed to allow profits to run while only giving back a predefined portion of that gain before exiting a trade. The term "Floor" describes a threshold (which can be price, profit, or several other measures) of a profitable trade that must be breached before a Trailing Stop becomes active. There is then a specified "Amount" which is permitted to be given back during which allows for retracements/stutter steps during profit taking where the trader is looking ultimately for new price highs to be achieved during the life of his/her trade. All forms of Bullalgo's Trailing Stops are based on 2 basic principles. First, they track price action as it moves higher into a profitable trade territory. Second, this Matrix uses that price movement as the yardstick to create and move it's Trailing Stop Exits accordingly.

"Redefining automated trading systems for everyone!
Not just for the select few any longer..."

Note: *For brevity and clarity during this manual we will only consider the Long Trailing Stop Exit (Sell) orders for each Trailing Stop type. Short Trailing Stop Exit (Buy to Cover) orders are the reverse of what is outlined here in the Trailing Stop descriptions. Long/Short exits are designed to be created independent of each other.*

Inputs -Thorough Definitions

Tmatrix_Master_Off_On = *Trailing Matrix* Master Off/On Switch. "0=Off; 1=On". If this input is < or = 0, then this input completely disables the entire Trailing Matrix. This action is similar to clicking its Status to OFF. The *Trailing Matrix* is enabled if the input value is > or = 1. (Note: this is true for all switches in the *Trailing Matrix*.)

TMatrix_Method_Length = The Length (often referred to as "Period") in bars used by Method calculations.

TMatrix_GaugeBrake_Off_On = If this input = 0 then the "*GaugeBrake*" calculation is Disabled. If > or = 1 then the GaugeBrake is enabled and will reduce soaring volatility controlled by the next two inputs (*MethodGauge* and *MethodBrake*). Be sure to use the Bullalgo Trading Systems *Volatility Gauge* indicator to monitor the *TMatrix_GaugeBrake*.

TMatrix_MethodGauge_Pcnt = The "*Gauge*" is a base level that is determined using some longer term averages and the Gauge Input allows you to shift this base level up (ex: 110) or down (ex: 90) by a percentage, the value varies around 100. The Method Gauge shapes the Method Brake.

TMatrix_MethodBrake_Pcnt = The "*Brake*" is the percent by which to allow the Volatility to exceed the Gauge level. A value of 50 (50%) lets half off the Volatility beyond the Gauge level being used.

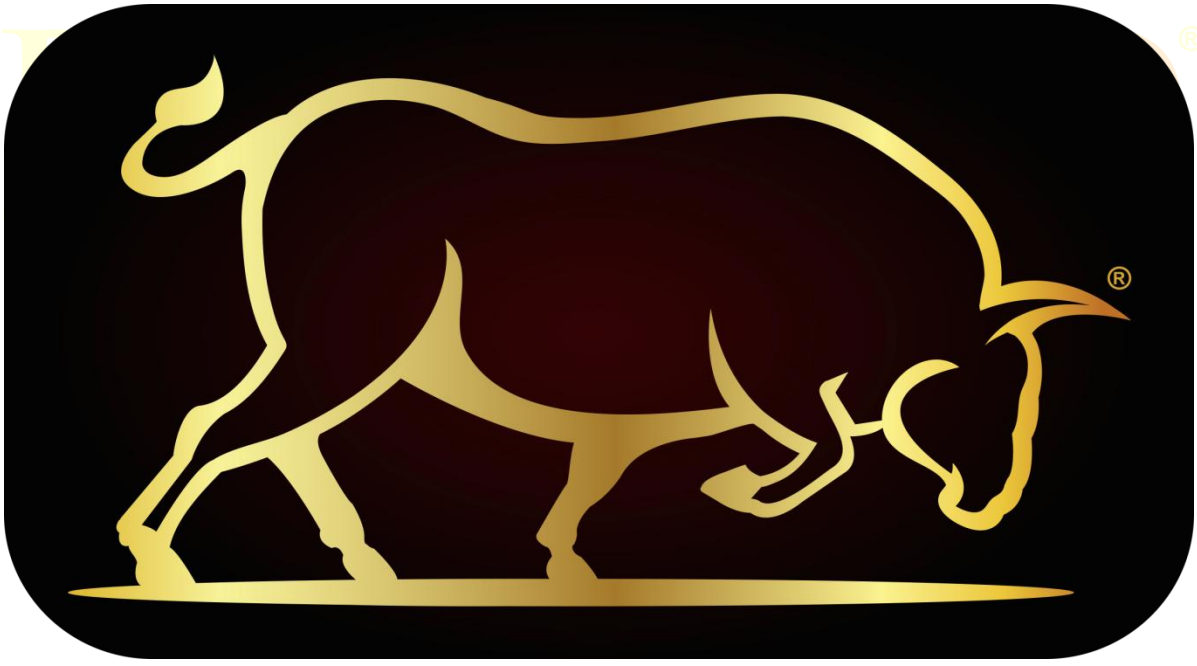


Chart order name labels

lx = Long Exit
sx = Short Exit

Order Name	Definition
lx.TS#1	Long Trailing Stop #1 Exit
sx.TS#1	Short Trailing Stop #1 Exit
lx.TS#2	Long Trailing Stop #2 Exit
sx.TS#2	Short Trailing Stop #2 Exit
lx.TS#3	Long Trailing Stop #3 Exit
sx.TS#3	Short Trailing Stop #3 Exit
lx.TS#4	Long Trailing Stop #4 Exit
sx.TS#4	Short Trailing Stop #4 Exit
lx.TS#5	Long Trailing Stop #5 Exit
sx.TS#5	Short Trailing Stop #5 Exit
lx.TS#6	Long Trailing Stop #6 Exit
sx.TS#6	Short Trailing Stop #6 Exit
lx.TS#7	Long Trailing Stop #7 Exit
sx.TS#7	Short Trailing Stop #7 Exit

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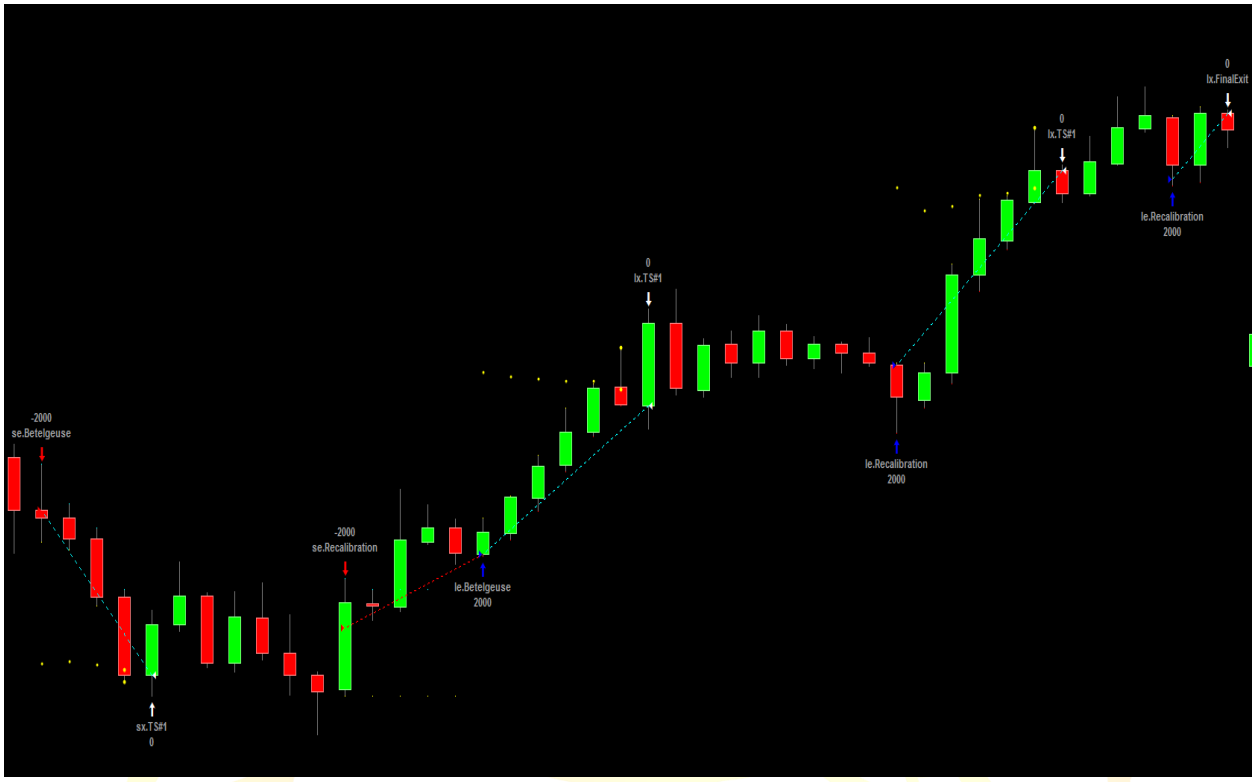
Trailing Stop #1 - Dynamic Highest High Lowest Low (HHLL)



The *Dynamic Highest High Lowest Low (HHLL)* Trailing Stop uses a specified unit of Volatility ("*Method*") to calculate the Floor and Amount for a trade to use for trailing. The Method is then recalculated using a "*Method Multiple*" on each new bar close so that this Stop is dynamic. Meaning that the Floor and Amount expand and contract on each new bar close. Only the Highest High "*HH*" is static, yet it expands to new heights as price action becomes more profitable.

The *Dynamic Highest High Lowest Low (HHLL)* Trailing Stop tracks the HH of a trade starting with the bar of entry and takes on and holds new HH Levels as they occur. When this HH exceeds the Floor value then this Trailing Stop becomes active. The "*Amount*" is subtracted from the HH on a bar by bar basis ensuring that this Trailing Stop Exit continues to move higher as price action continues to reach HH's.

lx_ DynamicHHLL _TS_Off_On = Long exit. "0=Off; 1=On".

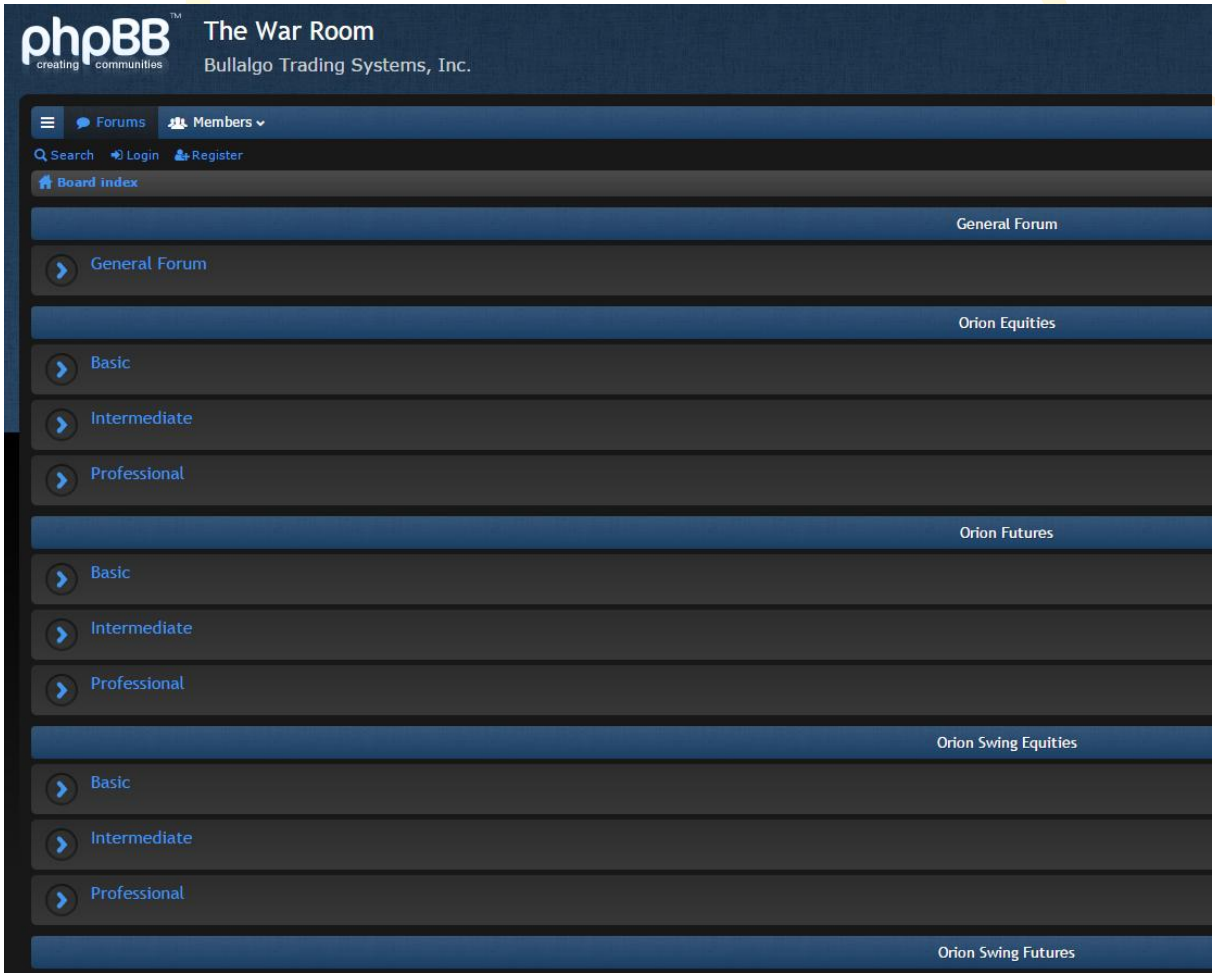
lx_ DynamicHHLL _TS_Method = Long exit. This input selects the "*Method*" used to calculate Volatility for the *DynamicHHLL* Long Exit. An input value of 1 uses a "*Standard Error*" calculation, 2 uses the "*Standard Deviation of the Close*", 3 uses the raw Average True Range *("ATR")*, 4 uses "*ATR Gap*" (any gap on the session break removed) and 5 uses the "*ATR Gapless* (all gaps are removed from the calculation).

lx_ DynamicHHLL _TS_FloorMult = This input uses *the lx_ DynamicHHLL _TS_Method* chosen from above to calculate a Floor setting. The entered value chosen here is multiplied by the *Method* to create the threshold that price action must break through to activate TS#1. A *FloorMult* value of 1 would be 100% (*DynamicHHLL Method* x 1).

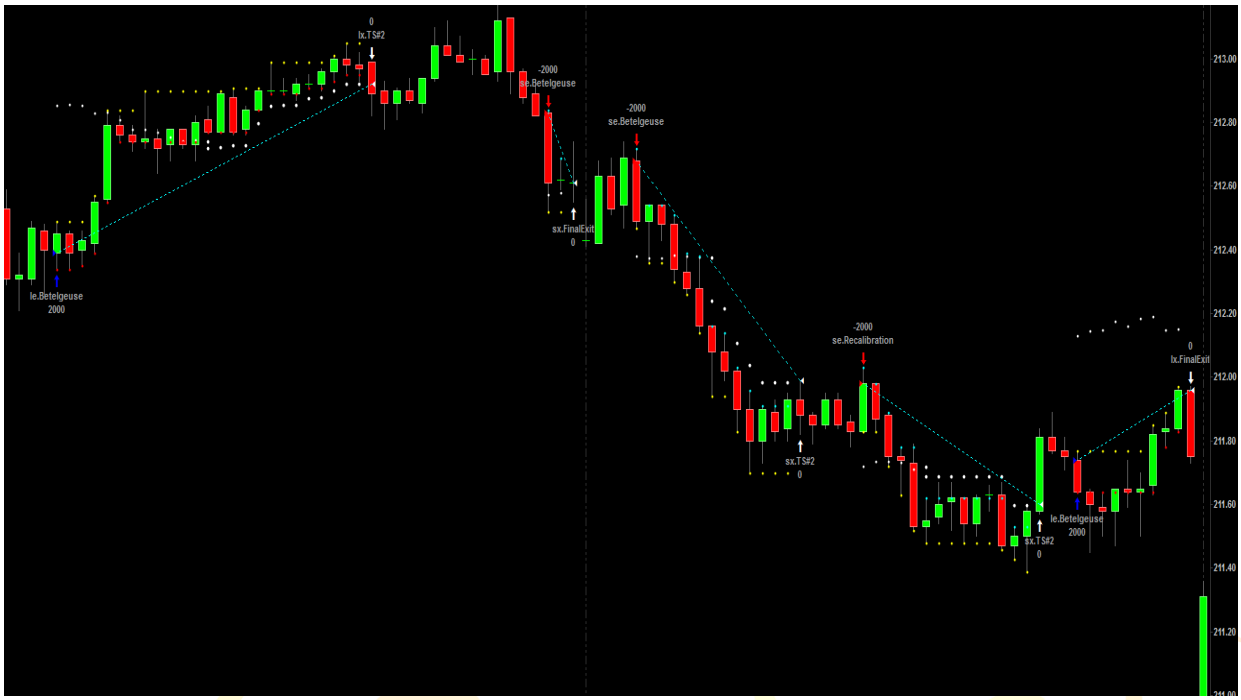
lx_ DynamicHHLL _TS_ExitMult = Long Exit. The Multiple of the Method chosen that price action must come back to the entry price once the floor has been breached for a Long Exit TS#1.

> **lx_ DynamicHHLL _TS_ExitMult Example**: Entering .5 in *ExitMult* using ATR as the Method = Price must move 1/2 ATRs back from the Highest High to exit the position.

The Short Exit inputs function the same in the opposite direction.



Trailing Stop #2 - Dynamic Highest Low Lowest High (HLLH)



The *Dynamic Highest Low Lowest High (HLLH)* Trailing Stop is very similar to the *Dynamic Highest High Lowest Low (HHLL)* Trailing Stop. However, it tracks the "Highest Low" instead of the "Highest High" for a long position and "Lowest High" instead of the "Lowest Low" for a short position.

lx_ DynamicHLLH _TS_Off_On = Long exit. "0=Off; 1=On".

lx_ DynamicHLLH _TS_Method = Long exit. This input selects the "*Method*" used to calculate Volatility for the *DynamicHLLH* Long Exit. An input value of 1 uses a "*Standard Error*" calculation, 2 uses the "*Standard Deviation of the Close*", 3 uses the raw Average True Range *("ATR")*, 4 uses "*ATR Gap*" (any gap on the session break removed) and 5 uses the "*ATR Gapless* (all gaps are removed from the calculation).

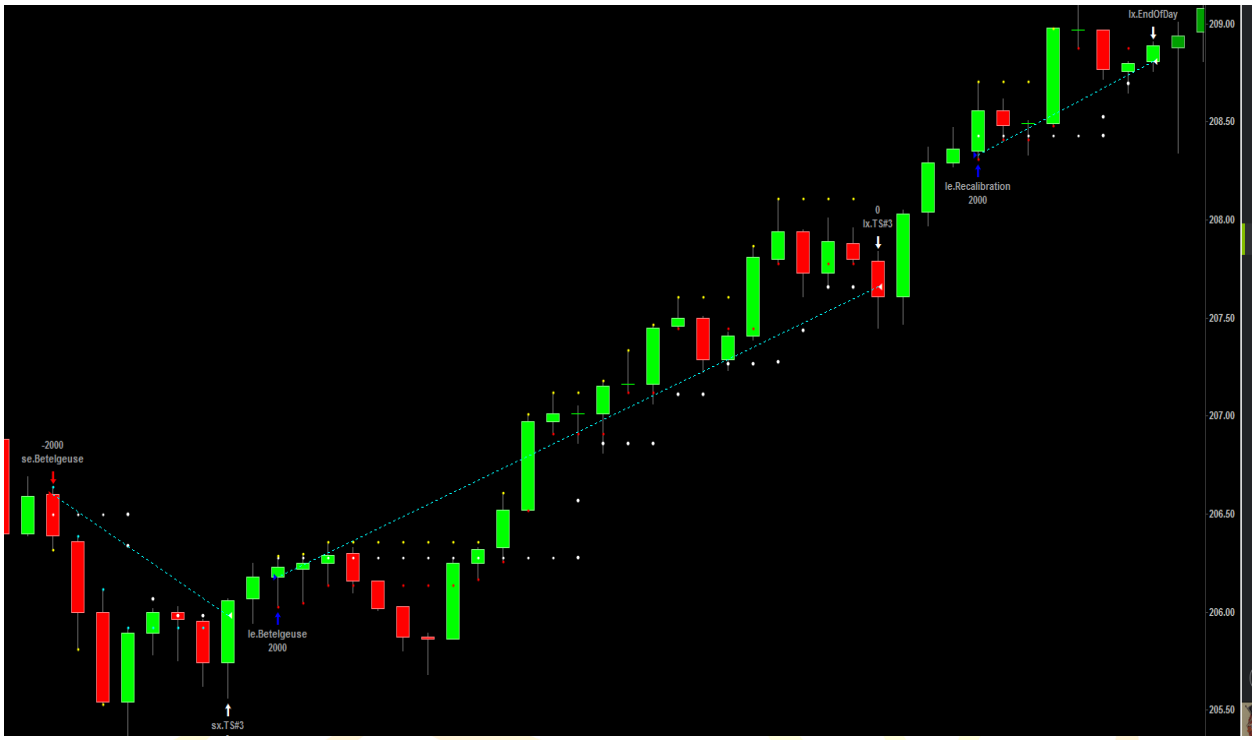
lx_ DynamicHLLH _TS_FloorMult = Long Exit. This input uses *the lx_ DynamicHLLH _TS_Method* chosen from above to calculate a Floor. The entered value chosen here is multiplied by the *Method* to create the threshold that price action must break through to activate TS#2. A *FloorMult* value of 1 would be 100% (*DynamicHLLH Method* x 1).

lx_ DynamicHLLH _TS_ExitMult = Long Exit. The Multiple of the Method chosen that price action must come back to the entry price once the floor has been breached for a Long Exit TS#2.

> **lx_ DynamicHLLH _TS_ExitMult Example**: Input 1 in FloorMult using ATR as your method = Price must move 1 ATRs favorably and touch or break the 1 ATR user input threshold to become active. Next, input .5 in ExitMult using ATR as the method = Price must move 1/2 ATRs back from the Highest Low to exit the position.

The Short Exit inputs function the same in the opposite direction.

Trailing Stop #3 - NumBar (*Number of Bars*)



The *NumBar* Trailing Stop is dynamic in that it moves higher and does not allow for retracements. This Trailing Stop tracks the *Lowest Low* (LL) of a period (often three bars). This allows the market to continue advancing with up to *nBars* = 1 (Number of Bars = 1) of retracement before continuing on to higher highs, or at minimum higher lows. On the third bar of a retracement, or a significant move against you, this Trailing Stop will hit the stop price and exit the entire trade. This exit has a Floor expressed as Ticks. However, in this case it is the *Highest Low* (HL) value that must exceed the Floor. This exit has a Number of Ticks input *lx_NumBar_TS_Fudge_Tiks* as a "Fudge Factor" in case you want the market to prove that it wants to break through the support threshold of the previous Bar Low.

lx_NumBar_TS_Off_On = Long exit. "0=Off; 1=On".

lx_NumBar_TS_nBars = Long Exit. Number of bars to count for TS#3 calculation.

lx_NumBar_TS_Floor = Long Exit. This exit also has a "Floor" expressed as Ticks. In TS#3, the "*Highest Low*" value that must exceed the Floor.

lx_NumBar_TS_Fudge_Tiks = Long Exit. Input in tick values used if you want the market to prove that it wants to break through the support of that previous Bar Low.

The Short Exit inputs function the same in the opposite direction.

Trailing Stop #4 - Dollars

The Dollar Trailing Stop has a "*Position Basis*" input *Dollars_TS_PositionBasis* that controls whether the Dollar values *lx_Dollars_TS_Floor* and *lx_Dollars_TS_Amount* are for a single share/unit or for the entire position. This Stop Loss has the same rules as the *Dynamic Highest High Lowest Low (HHLL)* in that it uses HH, however, the Floor and Amount to trail by are expressed in Dollars. These Dollar amount levels create the Floor and Amount values which are static in this Trailing Stop.

Dollars_TS_PositionBasis = Controls whether the Dollar values ("lx_Dollars_TS_Floor" and "lx_Dollars_TS_Amount") are for a single contract or for the entire position. True = Entire position; False = Per contract or share.

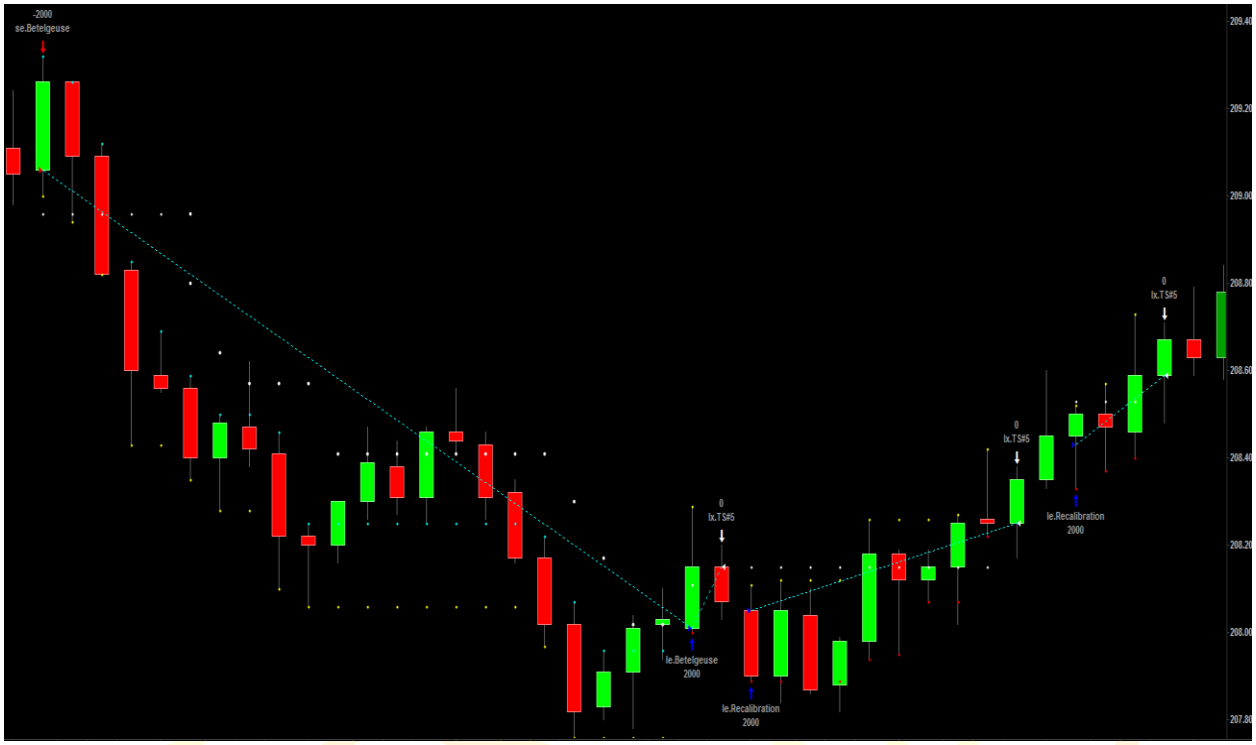
lx_Dollars_TS_Off_On = Long exit. "0=Off; 1=On".

lx_Dollars_TS_Floor = Long Exit. Same rules as the "DynamicHHLL" using Highest High. The "Floor" and "Amount" to trail by are expressed in Dollars. Dollar value input must exceed the Floor to make this Trailing Stop active.

lx_Dollars_TS_Amount = Long Exit. Dollar amount to set Trailing Stop #4 exit.

The Short Exit inputs function the same in the opposite direction.

Trailing Stop #5 - Percent of Profit



This Trailing Stop is similar to the *Dynamic Highest High Lowest Low (HHLL)* Trailing Stop. The Amount to trail by is expressed as a percentage of the Maximum Open Position Profit (HH - Entry Price). Instead of tracking price HH, this Trailing Stop tracks price internally. For the Floor we arbitrarily chose a number of Ticks. You cannot use Profit itself for the Floor because the profit on the bar of Entry is usually very small and the percent would be even smaller causing an immediate fill with minuscule profit retained. It would become, in effect, a Break Even Stop on the Bar of Entry, unlikely to prove profitable over time.

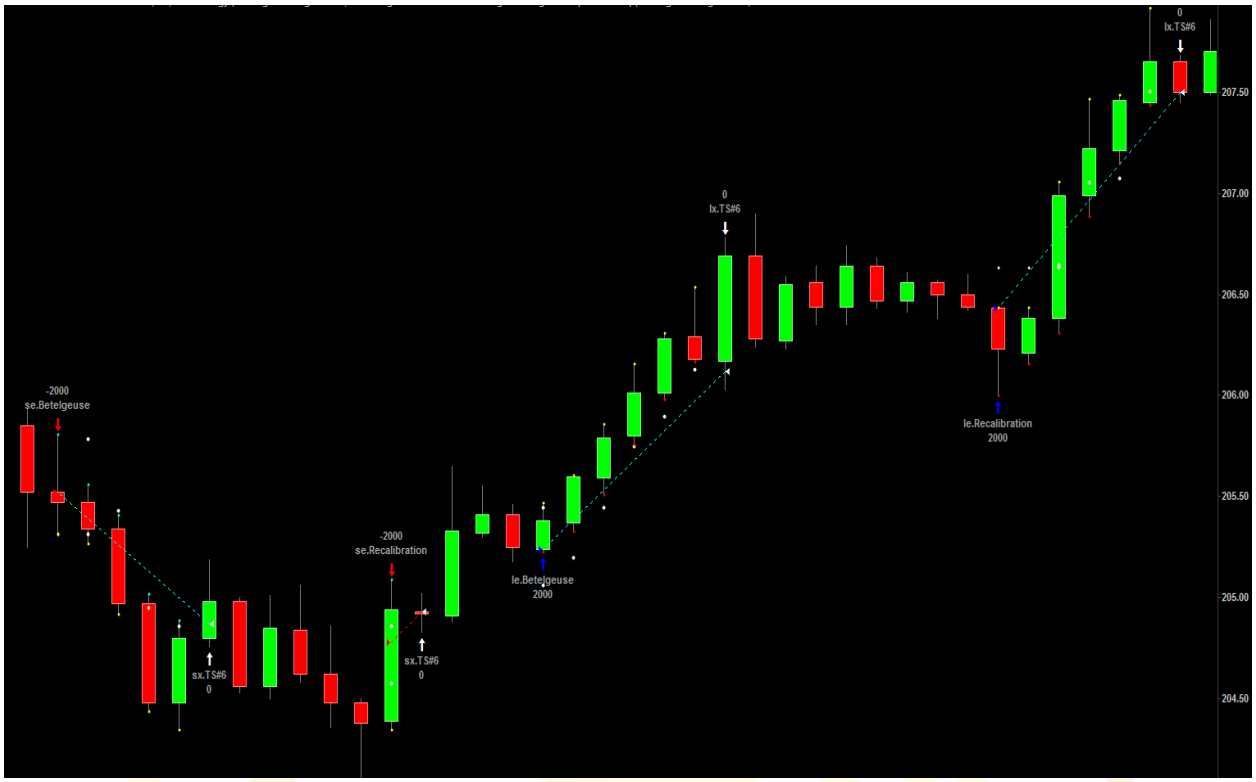
lx_Percent_TS_Off_On = Long exit. "0=Off; 1=On".

lx_Percent_TS_Floor_Tiks = Long Exit. Enter the number of ticks away from entry to set Floor which initiates TS#5.

lx_Percent_TS_Amount_Pcnt = Long Exit. Enter the percent of profit from the Highest High to trail by. **Example**: 50 = 50% of profit retained by the trailing stop.

The Short Exit inputs function the same in the opposite direction.

Trailing Stop #6 - Percent of Entry Price



This Trailing Stop uses the Entry Price as the "*Percent of EntryPrice*" to create the Floor which remains static throughout the life of a trade. EntryPrice is a non-zero value and is used as the basis for the "Floor". Trailing Stop #6 uses a percent of the Highest High for the amount to trail by. The distance from the EntryPrice to the Highest High keeps expanding so the exit price trails to higher levels with each new price high.

lx_EntryPricePcnt_TS_Off_On = Long exit. "0=Off; 1=On".

lx_EntryPricePcnt_TS_Floor_Pcnt = Long Exit. Enter the percentage from the entry price the floor will be set. Example: 2 = 2%.

lx_EntryPricePcnt_TS_Exit_Pcnt = Long Exit. Enter the percentage from the Highest High where TS#6 will begin to trail. **Example**: 1 = 1% from the Highest High.

The Short Exit inputs function the same in the opposite direction.

Trailing Stop #7 - Ticks

The *Ticks* Trailing Stop applies the same rules as Trailing Stop #1 "*DynamicHHLL*". However, the "*Floor*" and "*Amount*" to trail by are expressed in *Ticks* (converted to Points). This yields a Static Trailing Stop the same as Trailing Stops #4, #5 and #6.

lx_Ticks_TS_Off_On = Long exit. "0=Off; 1=On".

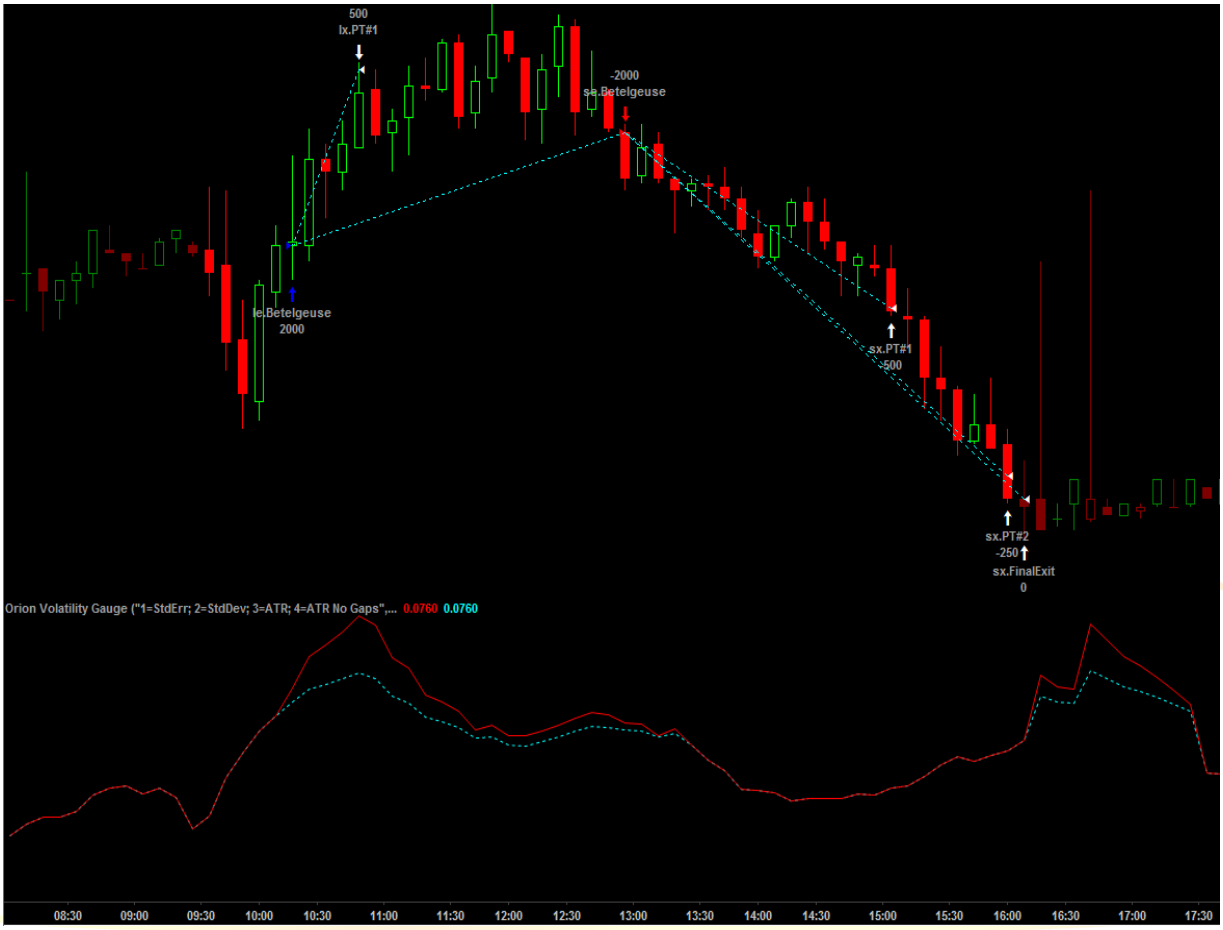
lx_Ticks_TS_Floor_Tiks = Long Exit. Enter the number of ticks away from entry to set floor which initiates TS#7.

lx_Ticks_TS_Exit_Tiks = Long Exit. Input the number of ticks from the Highest High to place the exit.

The Short Exit inputs function the same in the opposite direction.

ShowCmtry = *ShowCmtry* (Show Commentary) must be set to TRUE (not case sensitive) to enable this feature. Enabling Analysis Commentary, Expert Commentary or Expert Analysis, (the name has changed over the years) can give you some insight into which switches are enabled/disabled and what orders are being placed on the Open of the following bar. All orders are generated on the Close of a bar to be executed during the life of the following bar. *ShowCmtry* is recalculated from the first bar of available data and up to the bar that you clicked the cursor. The ShowCmtry report is generated to show the strategy action for the current bar.

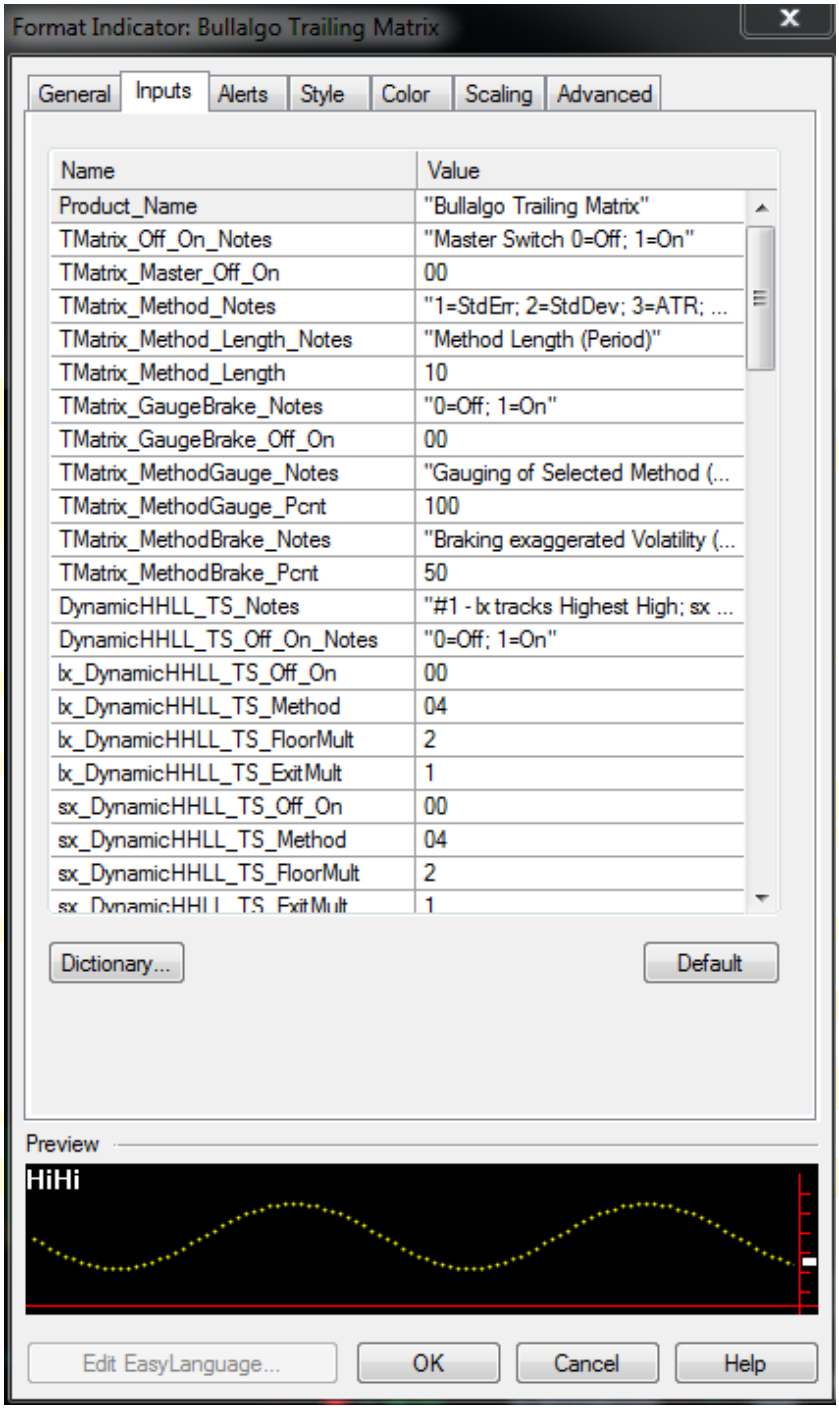
Bullalgo Volatility Gauge/Brake Indicator



The *Bullalgo Volatility Gauge/Brake Indicator* is available as a Trailing Matrix *add-on*.

The ***Bullalgo Volatility Gauge/Brake Indicator*** is designed to visually observe the Gauge and Brake functions when using MGB. The Gauge and Brake halt volatility when it becomes excessive which can set "Method" Profit Targets and Stop Losses completely out of reach and unreasonable. When markets open, excessive volatility happens almost everyday. This is Bullalgo's solution to manage excessive volatility by gauging it and then putting the brake to it.

Trailing Matrix Study/Indicator Setup

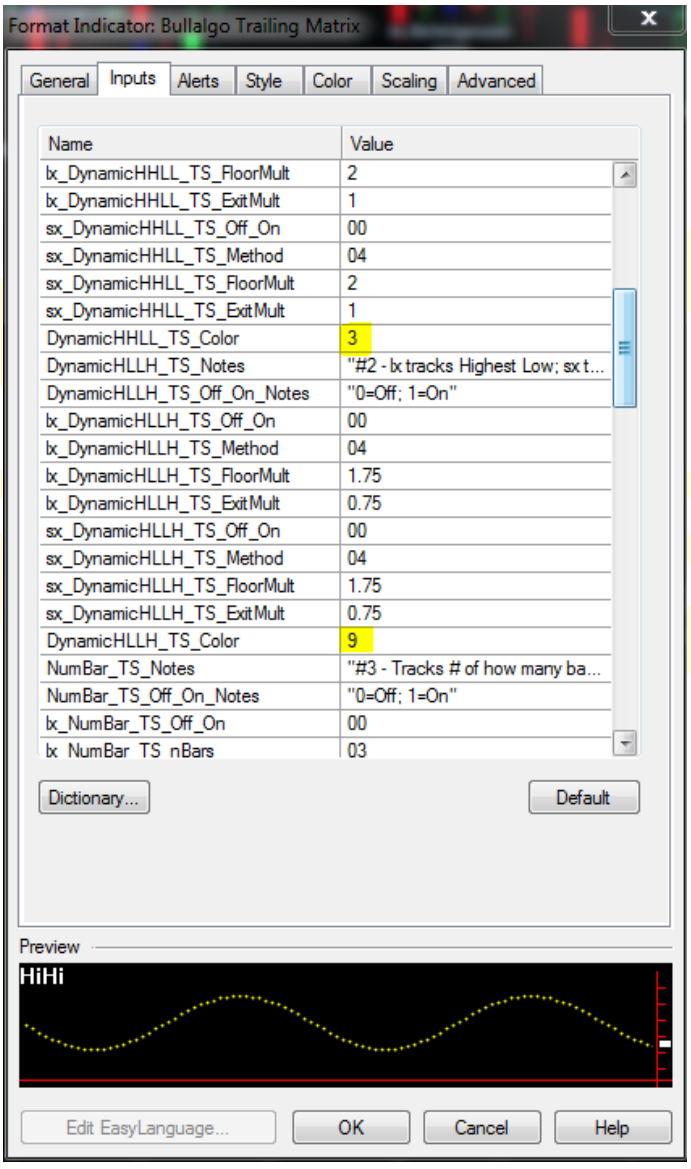


To use the Trailing Matrix Study, Insert the *Bullalgo Trailing Matrix Study/Indicator* into your chart. Next, double click one of the indicator's points in the chart, or you can click Format >Analysis Techniques>select Bullalgo Trailing Matrix>Format. Then enter the same optimized values from your Format Strategies inputs pop-up window for the Trailing Matrix.

Color Reserved Word/Legacy Color Value

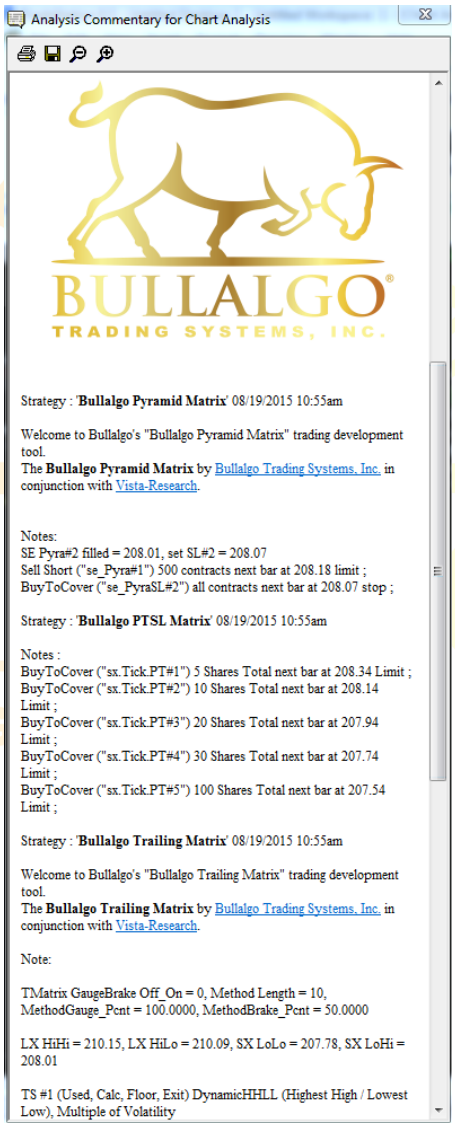
Below are the Color Reserved Words and Legacy Color Values for the Trailing *Matrix study _Color Inputs*. The Legacy number values can be used in place of the Color Reserved Words.

Black	1	Dark Blue	9
Blue	2	Dark Cyan	10
Cyan	3	Dark Green	11
Green	4	Dark Magenta	12
Magenta	5	Dark Red	13
Red	6	Dark Brown	14
Yellow	7	Dark Gray	15
White	8	Light Gray	16



Bullalgo Analysis Commentary

All Bullalgo products come equipped with programmed *Analysis Commentary* for visual play by play action of the product being used. At the bottom of any Bullalgo Trading Systems, Inc. product input list the user may set Analysis Commentary to "True" or "On". Then click the Analysis Commentary icon on the toolbar in TradeStation (pictured above). Next, click any bar in a chart and the Analysis Commentary window will display important information including what Entries or Exits are coming soon, Stop Losses approaching, Custom Indicator Parameters and so much more.



"Making Trading Dreams a Reality"

Past trading results are not indicative of future results. Past price patterns may not repeat in precisely the same way and subsequently trading systems may not achieve profits/losses similar to past actual or hypothetical results. There are just too many variables in the markets to accurately forecast future results for any system or trader.

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ONE OF THE LIMITATIONS OF HYPOTHETICAL PERFORMANCE RESULTS IS THAT THEY ARE GENERALLY PREPARED WITH THE BENEFIT OF HINDSIGHT. IN ADDITION, HYPOTHETICAL TRADING DOES NOT INVOLVE FINANCIAL RISK, AND NO HYPOTHETICAL TRADING RECORD CAN COMPLETELY ACCOUNT FOR THE IMPACT OF FINANCIAL RISK IN ACTUAL TRADING CONDITIONS. IN ADDITION THE ABILITY TO WITH STAND LOSSES OR TO ADHERE TOA PARTICULAR TRADING PROGRAM IN SPITE OF TRADING LOSSES ARE MATERIAL POINTS WHICH CAN ALSO ADVERSELY AFFECT ACTUAL TRADING RESULTS. THERE ARE MANY OTHER FACTORS RELATED TO THE FINANCIAL MARKETS IN GENERAL OR TO THE IMPLEMENTATION OF ANY SPECIFIC TRADING PROGRAM WHICH CANNOT BE FULLY ACCOUNTED FOR IN THE PREPARATION OF HYPOTHETICAL PERFORMANCE RESULTS, ALL OF WHICH CAN ADVERSELY AFFECT ACTUAL TRADING RESULTS.

THE RISK OF LOSS IN TRADING FUTURES, OPTIONS, COMMODITIES, AND STOCKS CAN BE SUBSTANTIAL. YOU SHOULD THEREFORE CAREFULLY CONSIDER WHETHER SUCH TRADING IS SUITABLE FOR YOU IN LIGHT OF YOUR FINANCIAL CONDITION. IN CONSIDERING WHETHER TO TRADE OR TO AUTHORIZE SOMEONE ELSE TO TRADE FOR YOU, YOU SHOULD BE AWARE OF THE FOLLOWING: IF YOU PURCHASE OR SELL A FUTURE, OPTION, YOU MAY SUSTAIN A TOTAL LOSS OF THE INITIAL MARGIN FUNDS AND ANY ADDITIONAL FUNDS THAT YOU DEPOSIT WITH YOUR BROKER TO ESTABLISH OR MAINTAIN YOUR POSITION. IF THE MARKET MOVES AGAINST YOUR POSITION, YOU MAYBE CALLED UPON YOUR BROKER TO DEPOSIT A SUBSTANTIAL AMOUNT OF ADDITIONAL MARGIN FUNDS, ON SHORT NOTICE. IF YOU DO NOT PROVIDE THE REQUIRED FUNDS WITHIN THE PRESCRIBED TIME, YOUR POSITION MAY BE LIQUIDATED AT A LOSS, AND YOU WILL BE LIABLE FOR ANY RESULTING DEFICIT IN YOU ACCOUNT. THE PLACEMENT OF CONTINGENT ORDERS BY YOU OR YOUR TRADING ADVISOR, SUCH AS A "STOP LOSS" OR "STOP LIMIT" ORDER, WILL NOT NECESSARILY LIMIT YOUR LOSSES TO THE INTENDED AMOUNTS, SINCE MARKET CONDITIONS MAY MAKE IT IMPOSSIBLE TO EXECUTE SUCH ORDERS.

THE HIGH DEGREE OF LEVERAGE THAT IS OFTEN OBTAINABLE IN FUTURES AND OPTIONS MARKETS CAN WORK AGAINST YOU, AS WELL AS FOR YOU. THE USE OF LEVERAGE CAN LEAD TO LARGE LOSSES AS WELL AS GAINS. THIS BRIEF STATEMENT CANNOT DISCLOSE ALL THE RISK AND OTHER SIGNIFICANT ASPECTS OF THE FINANCIAL MARKETS.

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Trade executions and system response and performance may be adversely affected, including delays and failures, as a result of: market volatility; high share volume; other market fluctuations; illiquidity; other market conditions and risks; quote delays; system and software errors; Internet system problems relating to Internet traffic volume and capacity or other causes; and other factors. One or more of these factors may occur before or after you place a trade, resulting in delayed or failed order placement, order cancellation, trade execution and/or acknowledgement of any of those actions. Solely you assume those risks.

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