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StrategyDesk™

Formula & Syntax Guide

Version 3.3

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StrategyDesk Formula Wizard

Formulas can be used in StrategyDesk to perform various tasks:

- Define entry and exit rules for a trading strategy (both for trading and backtesting)
- Build screeners to find stocks that meet certain criteria
- Create alerts to notify you of a market condition or event
- Set up custom studies, columns, and indicators

Trade Alert Setup

Settings
Type: **Advanced** Symbols (delimit by space): XYZ
Symbol Lists...

Choose from Formula Library
Click "Browse Library" to select a formula Browse Library...

-- OR -- Create Your Own Formula

1. Select Function: **A** **RSI** 3. Add Guide Me

2. Customize Parameters
Fields: **RSI** Length: **14** Interval: **D**
Optional N Bars Ago: **0** Symbol Override:

4. Build and Group Conditions
1 2 3 ^ % +
4 5 6 () AND
7 8 9) AND
. 0 * / OR
< <= = > >= <>

Formula
Formula Builder Save to Library Append from Library Validate Add Comment

Bar[Close,D] > MovingAverage[MA,Close,20,0,D] AND Bar[Close,D,1] <= MovingAverage[MA,Close,20,0,D,1] AND RSI[RSI,14,D] >= 40

On Alert
 Place Order: Stock Option Conditional Edit Account: Multiple...
Action: Buy Order Type: Limit Instructions: None Price: Ask
Shares: # 100 Expires: DAY Routing: Auto
 Play sound: C:\Program Files\TD AMERITRADE\StrategyD Browse... Test

OK
Cancel
Help

For illustrative purposes only.

StrategyDesk provides a library of pre-set formulas to help you get started using the tool. You can also edit any pre-set formula, or create and save your own formulas. StrategyDesk Formula Wizard lets you select, edit, and build custom formulas.

The Formula Library is organized into several categories, including indicators, screeners, and signals. To select an existing formula from the Formula Library, click the **Browse Library** button. Use the **Append from Library** button to append or combine formulas from the library.

The Formula Wizard makes it easy to build your own formulas or modify existing ones:

1. Select a function from the drop-down list of built-in indicators.
 - The function list contains more than 60 fields including quotes (e.g. last, bid, ask, etc) and technical indicators (e.g. moving average, MACD, RSI, etc). To narrow down the list of functions, click on the **A** button to select from the following categories: quote functions, option functions, system functions, and technical indicators.
 - To get detailed help on the function syntax, click the **Guide Me** button on the right side of the function list. The complete list of functions along with descriptions, syntax, and examples is available in this guide.
2. Customize the function parameters, which are displayed under the function name. Parameters are specific to the selected function and are pre-populated with default values.
3. Click the **Add** button to place the function along with parameters into the formula text area.
4. Build and group conditions using the calculator buttons on the right side of the Formula Wizard dialog:
 - Arithmetic operators (such as +, -, *, /) are used to create expressions. For example, the daily range can be expressed as: **Bar[High,D] – Bar[Low,D]**
 - Use comparison operators (such as > or <) to build conditions. For example, formula **Bar[Close,D] > Bar[Close,D,1]** tests whether today's close is above yesterday's close.
 - Logical operators (such as AND, OR) let you combine multiple conditions. For example, formula **Bar[High,D] > Bar[High,D,1] AND Bar[High,D,1] > Bar[High,D,2]** checks whether the stock is making a higher high for 2 days in a row.
 - Parentheses allow you to group conditions together and override default operator precedence. For example, formula **(Bar[High,D] > Bar[High,D,1] AND Bar[High,D,1] > Bar[High,D,2]) OR (Bar[Low,D] < Bar[Low,D,1] AND Bar[Low,D,1] < Bar[Low,D,2])** checks whether the stock is making a higher high OR a lower low for 2 days in a row.
5. Repeat the steps above to build and group multiple conditions. Once you are done building the formula, click the **Validate** button to check it for any syntax errors. Use the **Add Comment** option to include comments within your formula. Press the **Save to Library** button to store your formula to the library for future use.

Example: A formula that detects when a stock's 14-day RSI moves above 30: **RSI[RSI,14,D] > 30 AND RSI[RSI,14,D,1] < 30**. The first condition checks if RSI is above 30 today. The second condition checks if RSI was below 30 yesterday.

This guide provides many sample formulas that can be used to build strategies, set up screeners, create alerts, and customize indicators.

Introduction to the Bar Function

The Bar function lets you access the open, high, low, close, and volume for a given period. You can also reference the start date/time of the bar, such as hour, minute, second, day, month, and year.

For example, a screener in the Level I window that shows securities whose price opened at least 2 points higher than the previous day's close is expressed: **Bar[Open,D] - Bar[Close,D,1] >= 2**.

More examples of how the Bar function can be used in formulas:

DESCRIPTION	FUNCTION
Closing price of the day	Bar[Close,D]
Opening price of the day	Bar[Open,D]
Closing price 2 days ago	Bar[Close,D,2]
Daily Volume	Bar[Volume,D]
Highest price of the current 15-minute bar	Bar[High,15]
Lowest price of the current 30-minute bar	Bar[Low,30]
Hour at which the 60-minute bar starts	Bar[Hour,60]
Minute at which the 5-minute bar starts	Bar[Minute,5]
Highest price of XYZ yesterday	Bar[High,D,1,XYZ]
Bar date in YYYYMMDD format	Bar[Date,D]
Timestamp of the 3-minute bar	Bar[Time,3]
Day of week	Bar[DayOfWeek,D]

Function Examples

The following are examples of StrategyDesk functions that can be used for creating entry and exit signals for backtesting and trading strategies, setting up alerts, customizing indicators, and building screeners.

DESCRIPTION	FUNCTION
High of the Day	Bar[High,D]
50-day Average Volume	MovingAverage[MA,Volume,50,0,D]
10-day Moving Average	MovingAverage[MA,Close,10,0,D]
Exponential Moving Average (length=15, interval=60 minutes)	ExpMovingAverage[EMA,Close,15,0,60]
20-day Weighted Moving Average	MovingAverage[WMA,Close,20,0,D]
Volume Weighted Moving Average (length=30, interval=15min)	MovingAverage[VWMA,Close,30,0,15]
Upper Bollinger Band (length=20, standard dev=2)	BollingerBands[Upper,Close,20,2,D]
Upper Moving Average Envelope (length=20, 3%)	MAEnvelopes[Upper,Close,20,3,D]
Lower Keltner Band (length=10, multiplier=1)	KeltnerBands[Lower,10,1,D]
14-day Average True Range	AvgTrueRange[ATR,14,D]
20-day CCI	CCI[CCI,20,D]
14-day Choppiness	Choppiness[Chop,14,D]
ADX (length=14, smoothing=14)	DirectionalMovement[ADX,14,14,D]
Difference between 14-day +DI and -DI	DirectionalMovement[+DI,14,14,D] - DirectionalMovement[-DI,14,14,D]
Moving Average Convergence/Divergence	MACD[MACD,Close,12,26,9,D]

MACD Histogram	MACD[Diff,Close,12,26,9,D]
Point change from last price to 20-minutes ago	MomentumROC[Momentum,Close,20,0,1]
% Change from last price to 2 days ago	MomentumROC[Momentum,Close,2,1,D]
Daily On-Balance Volume	OnBalanceVolume[OBV,D]
Highest high for the last 5 days	PriceRangeChannels[Upper,5,0,D]
Lowest Low for the last 10 minutes	PriceRangeChannels[Lower,10,0,1]
14-day RSI	RSI[RSI,14,D]
Fast Stochastic (15-minutes)	Stochastic[StocK,14,3,1,15]
Slow Stochastic (60-minutes)	Stochastic[StocK,14,3,3,60]
14-day Money Flow Index	MoneyFlowIndex[MFI,14,D]
14-day StochasticRSI	StochasticRSI[StocK,14,14,3,1,D]
Parabolic SAR (daily)	ParabolicSAR[PSAR,0.02,0.02,0.2,D]
Ultimate Oscillator (7, 14, 28), 60-minutes	UltimateOscillator[OSC,7,14,28,60]
Chaikin Oscillator (3, 10), Daily	ChaikinOscillator[OSC,3,10,D]
Chaikin Money Flow (21 days)	ChaikinMoneyFlow[CMF,21,D]
Accumulation/Distribution (daily)	AccumulationDist[AD,D]
Aroon Up (14 days)	Aroon[Up,14,D]
Time Series Forecast (10 days)	TimeSeriesForecast[TSF,Close,10,0,D]
Double Exponential MA (20 days)	ExpMovingAverage[DEMA,Close,20,0,D]
Triple Exponential MA (50 days)	ExpMovingAverage[TEMA,Close,50,0,D]
Adaptive Moving Average (20 days)	AdaptiveMA[AMA,Close,20,2,30,D]

The examples presented above are for illustrative purposes only and should not be considered recommendations of any particular security or strategy.

*Backtesting is the evaluation of a particular trading strategy using historical data. Results presented are hypothetical, they did not actually occur and they may not take into consideration all transaction fees or taxes you would incur in an actual transaction. And just as past performance of a security does not guarantee future results, past performance of a strategy does not guarantee the strategy will be successful in the future. Results could vary significantly, and losses could result.

Quote Functions

Following are the quote functions that can be used to create alerts, build screeners and set up custom columns in a Level I window. These are called quote functions, because they don't include historical data. Consequently, they can't be used when backtesting a trading strategy or building a custom chart study.

Price, Volume, Bid, Ask, and Range Functions	
Last	Most recent price for the day
Change	Price difference between the last price and the previous day's close
PctChange	Percentage difference between the last price and the previous day's close
Volume	Number of shares traded today
YesterdayClose	Previous day's closing price
Bid	Price at which security is offered to be bought
Ask	Price at which security is offered to be sold
BidSize	Number of shares available at the bid price
AskSize	Number of shares available at the ask price
BidAskSpread	Difference between the bid and ask quotes
1YearHigh	Highest price over a 52-week period
1YearLow	Lowest price over a 52-week period
PctInDailyRange	Indicates where the current price is relative to the high and low of the day; ranges

	from 0 to 100%
PctInYearlyRange	Indicates where the current price is relative to the high and low over the 52-week period; ranges from 0 to 100%
TradeSize	Size of the last trade
Option Functions	
<p><i>Please note: Options are not suitable for all investors as the special risks inherent to options trading may expose investors to potentially rapid and substantial losses. Options trading subject to TD AMERITRADE review and approval. Please visit www.tdameritrade.com or contact TD AMERITRADE at 800-669-3900 for options disclosure documents. Carefully read these documents before investing in options.</i></p> <p>Greek values (Delta, Gamma, Theta, Vega, Rho) are provided to help you make informed investment decisions and should be used in conjunction with other research and information. Greek values tend to change dynamically as option prices, share prices, and market conditions change. Past performance of a security does not guarantee future results.</p>	
ImpliedVolatility	Measures option price fluctuation
OpenInterest	The total number of outstanding option contracts
InTheMoney	Measures the difference between the strike price and the market price of the underlying stock
TimeValue	Measures the difference between the price of an option and its intrinsic value
DaysToExpiration	Number of days until the option expires
ExpirationDay	Day of the month when the option expires
Multiplier	Used to determine the aggregate strike price and premium on index and equity options . The multiplier for an option is typically 100.
Delta	Measures how changes in the price of the underlying stock affect an option's value
Gamma	Measures the sensitivity of an option's delta to a change in the underlying stock price
Theta	Measures how the passage of time may affect an option's value
Vega	Measures an option's sensitivity to changes in volatility
Rho	Indicates an option's sensitivity to changes in interest rates

Fundamental Functions	
PERatio	Ratio of the current stock price to earnings per share
Dividend	The dollar amount of a portion of a corporation's assets paid to stockholders on a per share basis
DividendYield	Dividend divided by the stock price, expressed as a percentage
System Functions	
EntryPrice	<p>The price at which the entry signal triggered. This function can be referenced in the exit formula of a strategy to set up stop-loss and profit-target rules. EntryPrice can also be used within Level I custom columns to reference the entry price for your positions and watch lists.</p> <p>Example: Bar[Close,1] - EntryPrice >= .15 OR Bar[Close,1] - EntryPrice <= -.05</p>
EntryShares	<p>The number of shares specified in the entry order of a strategy. This function can be referenced in the exit formula of a strategy to set up stop-loss and profit-target rules. EntryShares can also be used within Level I custom columns to reference the number of shares for your positions and watchlists.</p> <p>Example: (Bar[Close,1] - EntryPrice) * EntryShares >= 500 OR (Bar[Close,1] - EntryPrice) * EntryShares <= -200</p>
EntryDate	<p>The date when the entry signal triggered. This function can be used in the exit formula of a strategy to build rules based on the number of daily bars since entry.</p> <p>Example: EntryDate = Bar[Date,D,3]</p>
EntryTime	<p>The timestamp when the entry signal triggered. This function can be used in the exit formula of a strategy to build rules based on the number of bars since entry.</p> <p>Example: EntryTime <= Bar[Time,1,5]</p>
NumTriggered	<p>Expresses the number of times the alert has triggered so far. Alerts containing the NumTriggered function automatically reset after each trigger.</p> <p>NumTriggered can be used to set the maximum number of times that an alert can trigger. Example: Bar[Close,D] > MovingAverage[MA,Close,10,0,D] AND NumTriggered < 5</p> <p>NumTriggered can also be used to apply different rules depending on how many times the alert triggered. The following example uses 10-day MA for the 2 initial triggers and 15-day MA thereafter: (Bar[Close,D] > MovingAverage[MA,Close,10,0,D] AND NumTriggered < 2) OR (Bar[Close,D] > MovingAverage[MA,Close,15,0,D] AND NumTriggered >= 2)</p>
DayOfWeek	Refers to day of the week component of the current time. Expressed as a number:

	1=Monday; 7=Sunday.
Month	Refers to month component of the current time. Range: 1=January to 12=December.
Day	Refers to day of the month component of the current time. Expressed as a number between 1 and 31.
Hour	Refers to hour component of the current time
Minute	Refers to minute component of the current time
Second	Refers to seconds component of the current time

Technical Indicators

The following technical indicators can be used to define strategies, set alerts, build screeners, and create custom studies. A few things to note about parameters:

- The **interval parameter** can be set to minutes (1, 5, 10, 15, 30, 60, or any other number), daily (D), weekly (W), or monthly (M).
- Optional **N Bars Ago** lets you specify the number of bars ago you want to reference with a function. Example: Bar[Close,D,2] references the daily closing price 2 days ago.
- Optional **Symbol Override** lets you compare a symbol against another symbol or an index. Example: RSI[RSI,14,D] > RSI[RSI,14,D,0,XYZ] tests whether the RSI of an individual symbol is greater than the RSI of XYZ.

Functions & Examples	Parameters	Description
<p>Bar</p> <p>Examples:</p> <ul style="list-style-type: none"> • Bar[Close,D] Closing price of the day • Bar[High,D,2] Daily high 2 days ago • Bar[Volume,D] Daily Volume • Bar[Hour,60] Hour at which the 60-min bar starts • Bar[Date,D] Bar date in YYYYMMDD format • Bar[Time,1,5] >= EntryTime Bar timestamp (used with EntryTime) 	<ul style="list-style-type: none"> • Fields: Open, High, Low, Close, Volume, Hour, Minute, Second, Day, Month, Year, Date, Time, DayOfWeek • Interval • Bar reference (optional) • Symbol override (optional) 	<p>The bar function lets you access the open, high, low, close, and volume for a given period. You can also reference the start date/time of the bar using hour, minute, second, day, month, and year fields. The Date field combines year, month, and day of the bar using YYYYMMDD format. The Time field is the timestamp of the start of the bar, expressed in seconds since 1/1/1970. The DayOfWeek field ranges from 1 (Monday) to 5 (Friday).</p>

<p>MovingAverage</p> <p>Examples:</p> <ul style="list-style-type: none"> ▪ MovingAverage[MA,Close,10,0,D] 10-day Moving Average ▪ MovingAverage[WMA,High,50,0,30] 50-period weighted Moving Average on 30-minute bar highs ▪ MovingAverage[VWMA,Close,8,0,D] 8-day volume-weighted Moving Average ▪ MovingAverage[MA,Volume,65,0,D] 3-month Average Daily Volume 	<ul style="list-style-type: none"> • Fields: MA, WMA, VWMA • Source: Open, High, Low, Close, Volume • Length • Offset • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Moving Average calculates the average of prices or volume over <i>Length</i> bars. Moving Average can be calculated using simple (MA), weighted (WMA), or volume-weighted (VWMA) method. An offset parameter can be used to shift the moving average left (negative offset) or right (positive offset). Moving Averages are typically used to identify potential trends.</p>
<p>ExpMovingAverage</p> <p>Examples:</p> <ul style="list-style-type: none"> ▪ ExpMovingAverage[EMA,Close,10,0,5] 10-bar Exponential Moving Average (interval=5 minutes) ▪ ExpMovingAverage[EMA,High,20,0,D] 20-day Exponential Moving Average, calculated from the high of each day ▪ ExpMovingAverage[DEMA,Close,30,0,D] 30-day Double Exponential Moving Average ▪ ExpMovingAverage[TEMA,Close,50,0,D] 50-day Triple Exponential Moving Average 	<ul style="list-style-type: none"> • Fields: EMA, DEMA, TEMA • Source: Open, High, Low, Close, Volume • Length • Offset • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Exponential Moving Average calculates the weighted average of prices or volume over <i>Length</i> bars, placing more weight on recent activity. Offset parameter can be used to shift the moving average left (negative offset) or right (positive offset). Double Exponential Moving Average (DEMA) and Triple Exponential Moving Average (TEMA) are designed to provide additional smoothing while reducing the lag. Exponential Moving Averages are typically used to identify possible trends.</p>
<p>MACD</p> <p>Examples:</p> <ul style="list-style-type: none"> ▪ MACD[MACD,Close,12,26,9,D] Daily MACD ▪ MACD[Diff,Close,12,26,9,5] 5-minute MACD Histogram 	<ul style="list-style-type: none"> • Fields: MACD, Signal, Diff • Source: Open, High, Low, Close, Volume • Length 1 • Length 2 • Smoothing • Interval • Bar reference (optional) • Symbol override (optional) 	<p><i>Length1</i> and <i>Length2</i> define the length of two exponential moving averages. MACD is the difference between the two exponential moving averages. Signal is an exponential moving average of MACD over <i>smoothing</i> bars. MACD histogram (Diff) is the difference between MACD and signal lines. MACD is a momentum indicator which can be used to detect trend changes and identify possible divergences with price.</p>
<p>RSI</p>	<ul style="list-style-type: none"> • Fields: RSI • Length 	<p>RSI is an oscillator which measures the strength of the</p>

<p>Example:</p> <ul style="list-style-type: none"> ▪ RSI[RSI,14,D] 14-day RSI 	<ul style="list-style-type: none"> • Interval • Bar reference (optional) • Symbol override (optional) 	<p>direction of closing prices over <i>Length</i> bars. It calculates a ratio of the closing prices in the up direction to the closing prices in the down direction. RSI can be used to identify possibly overbought and oversold conditions.</p>
<p>Stochastic</p> <p>Examples:</p> <ul style="list-style-type: none"> ▪ Stochastic[StocK,14,3,1,D] 14-day fast %K Stochastic ▪ Stochastic[StocD,14,3,3,D] 14-day slow %D Stochastic 	<ul style="list-style-type: none"> • Fields: Stock, StocD • %K Length • %D Length • %K Smoothing • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Stochastic %K oscillator calculates the percentage of the current price relative to the highest high and lowest low over <i>%K length</i> bars, where the highest high is 100% and the lowest low is 0%. Stochastic %D is a moving average of %K over <i>%D Length</i> bars. <i>%K smoothing</i> parameter specifies the length of moving average to smooth Stochastic %K line. Stochastic is typically used to identify possibly oversold and overbought conditions as well as generate %K and %D crossover signals.</p>
<p>StochasticRSI</p> <p>Example:</p> <ul style="list-style-type: none"> ▪ StochasticRSI[StocK,14,14,3,1,60] 14-period StochasticRSI on 60-minute bars 	<ul style="list-style-type: none"> • Fields: Stock, StocD • RSI Length • %K Length • %D Length • %K Smoothing • Interval • Bar reference (optional) • Symbol override (optional) 	<p>This oscillator measures the value of RSI relative to its highest high and lowest low over <i>%K Length</i> periods. StochasticRSI %D is a moving average of %K over <i>%D Length</i> bars. <i>%K smoothing</i> parameter specifies the length of moving average to smooth %K line. StochasticRSI ranges from 0 (lowest low) to 1 (highest high).</p>
<p>BollingerBands</p> <p>Examples:</p> <ul style="list-style-type: none"> ▪ BollingerBands[Upper,Close,20,2,D] Upper Bollinger Band (source=Close, length=20, standard deviations=2) ▪ BollingerBands[Lower,Close,20,2,D] Lower Bollinger Band (source=Close, length=20, standard deviations=2) 	<ul style="list-style-type: none"> • Fields: Upper, Lower, Basis • Source: Open, High, Low, Close, Volume • Length • Standard Deviations • Interval • Bar reference (optional) • Symbol override 	<p>Bollinger Bands are typically used to measure volatility and relative price levels. The basis line is a moving average over <i>Length</i> bars. The upper and lower bands are usually two standard deviations above and below the basis line.</p>

	(optional)	
<p>MAEnvelopes</p> <p>Examples:</p> <ul style="list-style-type: none"> ▪ MAEnvelopes[Upper,Close,20,3,D] Upper MA Envelope (source=Close, length=20, 3%) ▪ MAEnvelopes[Lower,Close,20,3,D] Lower MA Envelope (source=Close, length=20, 3%) 	<ul style="list-style-type: none"> • Fields: Upper, Lower, MA • Source: Open, High, Low, Close, Volume • Length • Percentage • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Moving Average Envelopes consist of a moving average over <i>Length</i> bars (MA) and two envelope lines (Upper and Lower). The envelopes are plotted at X% above and below the moving average. MA Envelopes can be used to identify potential trading ranges as well as support and resistance levels.</p>
<p>KeltnerBands</p> <p>Examples:</p> <ul style="list-style-type: none"> ▪ KeltnerBands[Upper,20,2,D] Upper Keltner Band (length=20, multiplier=2) ▪ KeltnerBands[Lower,10,1,D] Lower Keltner Band (length=10, multiplier=1) 	<ul style="list-style-type: none"> • Fields: Upper, Lower, Mid • Length • Multiplier • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Keltner channels consist of a moving average over <i>Length</i> bars (Mid line) and two channel lines (Upper and Lower). The channel lines are calculated as a multiplier times Average True Range above and below the center line. Channels can be used to measure volatility.</p>
<p>PriceRangeChannels</p> <p>Examples:</p> <ul style="list-style-type: none"> ▪ PriceRangeChannels[Upper,5,0,D] Highest High for the last 5 days ▪ PriceRangeChannels[Lower,10,0,5] Lowest Low over the last ten 5-minute bars 	<ul style="list-style-type: none"> • Fields: Upper, Lower, Mid • Length • Offset • Interval • Bar reference (optional) • Symbol override (optional) 	<p>This function calculates the highest high (upper channel) and lowest low (lower channel) over <i>Length</i> bars. Mid line is the mid-point between upper and lower channels. Offset parameter can shift the channels left (negative offset) or right (positive offset). Channels indicate volatility and support/resistance levels.</p>
<p>ParabolicSAR</p> <p>Example:</p> <ul style="list-style-type: none"> • ParabolicSAR[PSAR,0.02,0.02,0.2,D] Parabolic SAR (daily) 	<ul style="list-style-type: none"> • Fields: PSAR • Initial • Increment • Maximum • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Parabolic SAR is a stop-and-reverse indicator which can be used to set trailing stops for long and short positions. SAR acceleration factor is controlled by the <i>Initial</i>, <i>Increment</i>, and <i>Maximum</i> parameters. Parabolic SAR is typically used in the trending markets to identify entry and exit points when price crosses</p>

		above or below PSAR.
<p>TimeSeriesForecast</p> <p>Examples:</p> <ul style="list-style-type: none"> • TimeSeriesForecast[TSF,Close,50,0,D] 50-day Time Series Forecast • TimeSeriesForecast[Slope,Close,20,0,D] 20-day Linear Regression Slope • TimeSeriesForecast[R2,Close,10,0,D] 10 day R-Squared 	<ul style="list-style-type: none"> • Fields: TSF, Slope, R2 • Source: Open, High, Low, Close, Volume • Length • Offset • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Time Series Forecast calculates the statistical trend over <i>Length</i> bars using linear regression analysis. TSF is based on the last point of linear regression trend-line plus its slope. R-squared (R2) is a correlation coefficient which can be used together with Slope to determine the strength and direction of the trend.</p>
<p>AdaptiveMA</p> <p>Example:</p> <ul style="list-style-type: none"> • AdaptiveMA[AMA,Close,10,2,30,D] 10-day Adaptive Moving Average 	<ul style="list-style-type: none"> • Fields: AMA • Source: Open, High, Low, Close, Volume • Length • Fast Period • Slow Period • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Adaptive Moving Average indicator is a type of exponential moving average which assigns more weight to current prices when they are trending and less weight when they are in a trading range. The AMA period is determined based on the last <i>Length</i> bars, ranging between <i>Fast Period</i> and <i>Slow Period</i>.</p>
<p>Aroon</p> <p>Examples:</p> <ul style="list-style-type: none"> • Aroon[Up,14,D] 14-day Aroon Up • Aroon[Down,14,D] 14-day Aroon Down 	<ul style="list-style-type: none"> • Fields: Up, Down • Length • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Aroon indicator can help to determine whether a security is trending or trading in a range. Aroon uses <i>Length</i> bars to calculate the time elapsed between the first bar and the bar with the highest high (Up) or lowest low (Down). Aroon equals the number of bars elapsed divided by <i>Length</i> bars, expressed as a percentage.</p>
<p>UltimateOscillator</p> <p>Example:</p> <ul style="list-style-type: none"> • UltimateOscillator[OSC,7,14,28,60] Ultimate Oscillator (60-minutes) 	<ul style="list-style-type: none"> • Fields: OSC • Length1 • Length2 • Length3 • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Ultimate Oscillator is a weighted sum of three oscillators. Parameters <i>Length1</i>, <i>Length2</i>, and <i>Length3</i> define the length of component oscillators. Ultimate Oscillator ranges from 0 to 100. It is typically used to identify possibly overbought and oversold conditions.</p>

<p>CCI</p> <p>Example:</p> <ul style="list-style-type: none"> ▪ CCI[CCI,20,60] 20-period CCI on 60-minute bars 	<ul style="list-style-type: none"> • Fields: CCI • Length • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Commodity Channel Index is an oscillator that is used to identify possibly overbought and oversold levels. High values indicate that prices are unusually high compared to average prices while low values indicate that prices are unusually low.</p>
<p>Choppiness</p> <p>Example:</p> <ul style="list-style-type: none"> ▪ Choppiness[Chop,14,D] 14-day Choppiness 	<ul style="list-style-type: none"> • Fields: Chop • Length • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Choppiness is used to determine whether the security is in a trending or choppy state.</p>
<p>DirectionalMovement</p> <p>Examples:</p> <ul style="list-style-type: none"> ▪ DirectionalMovement[ADX,14,14,D] ADX (length=14, smoothing=14) ▪ DirectionalMovement[+DI,14,14,D] - DirectionalMovement[-DI,14,14,D] Difference between 14-day +DI and -DI 	<ul style="list-style-type: none"> • Fields: ADX, +DI, -DI • Length • Smoothing • Interval • Bar reference (optional) • Symbol override (optional) 	<p>ADX is an oscillator that can measure the strength of a trend. Higher values of ADX indicate stronger trends while lower values indicate weaker trends. ADX is based on positive directional indicator (+DI) and negative directional indicator (-DI).</p>
<p>MomentumROC</p> <p>Examples:</p> <ul style="list-style-type: none"> ▪ MomentumROC[Momentum,Close,5,0,3] Point change between the last price and the price five 3-minute bars ago ▪ MomentumROC[Momentum,Close,2,1,D] % Change from last price to 2 days ago 	<ul style="list-style-type: none"> • Fields: Momentum • Source: Open, High, Low, Close, Volume • Length • Points or % Change (0 for point change, 1 for % change) • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Momentum Rate-of-Change (ROC) calculates the net change (in points or percentage terms) between the last price and the price <i>Length</i> bars ago.</p>
<p>AvgTrueRange</p> <p>Example:</p> <ul style="list-style-type: none"> ▪ AvgTrueRange[ATR,14,D] 14-day Average True Range 	<ul style="list-style-type: none"> • Fields: ATR • Length • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Average True Range is typically used to measure volatility. True range is the greatest of:</p> <ul style="list-style-type: none"> • Today's high minus today's low • Today's high minus yesterday's close

		<ul style="list-style-type: none"> Today's low minus yesterday's close <p>Average True Range is a moving average of true ranges over <i>Length</i> bars.</p>
<p>AccumulationDist</p> <p>Example:</p> <ul style="list-style-type: none"> AccumulationDist[AD,D] Daily Accumulation/Distribution 	<ul style="list-style-type: none"> Fields: AD Interval Bar reference (optional) Symbol override (optional) 	<p>Accumulation & Distribution (A/D) is a volume-based indicator that measures the flow of money in and out of the security. It multiplies the volume of each bar by a factor, which ranges from -1 to 1 based on the location of the closing price compared to the high and low of the bar. A/D line is the cumulative total of these values.</p>
<p>ChaikinOscillator</p> <p>Example:</p> <ul style="list-style-type: none"> ChaikinOscillator[OSC,3,10,D] Chaikin Oscillator (daily) 	<ul style="list-style-type: none"> Fields: OSC Length1 Length2 Interval Bar reference (optional) Symbol override (optional) 	<p>Chaikin Oscillator is based on the Accumulation & Distribution (A/D) indicator. It calculates the difference between two exponential moving averages of the A/D line. Crossovers above the zero line are generally considered bullish while crossovers below the zero line are generally considered bearish.</p>
<p>ChaikinMoneyFlow</p> <p>Example:</p> <ul style="list-style-type: none"> ChaikinMoneyFlow[CMF,21,D] 21-day Chaikin Money Flow 	<ul style="list-style-type: none"> Fields: CMF Length Interval Bar reference (optional) Symbol override (optional) 	<p>Chaikin Money Flow is based on the Accumulation & Distribution (A/D) indicator. It sums up the A/D line over <i>Length</i> bars and divides the total by cumulative volume over the same period. Chaikin Money Flow can be used to measure buying and selling pressure. Crossovers above the zero line are generally considered bullish while crossovers below the zero line are generally considered bearish.</p>
<p>OnBalanceVolume</p> <p>Example:</p>	<ul style="list-style-type: none"> Fields: OBV Interval Bar reference (optional) 	<p>On Balance Volume is a volume-based indicator that tracks a running sum of positive and negative</p>

<ul style="list-style-type: none"> ▪ OnBalanceVolume[OBV,D] Daily On-Balance Volume 	<ul style="list-style-type: none"> • Symbol override (optional) 	<p>volume. If the bar closes above the previous bar's close, then volume for that bar is added to the sum. If the bar closes below the previous bar close, then volume for that bar is subtracted from the sum.</p>
<p>MoneyFlowIndex</p> <p>Example:</p> <ul style="list-style-type: none"> ▪ MoneyFlowIndex[MFI,14,D] 14-day Money Flow Index 	<ul style="list-style-type: none"> • Fields: MFI • Length • Interval • Bar reference (optional) • Symbol override (optional) 	<p>Money Flow Index is an oscillator that measures the conviction behind money flowing in and out of the security. MFI can be used to identify possibly overbought and oversold conditions.</p>

Formula Operators

Operators are the arithmetic, comparison, and logical symbols used to combine functions in formulas.

- + (addition)
- - (subtraction)
- * (multiplication)
- / (division)
- < (less than)
- <= (less than or equal)
- = (equal)
- > (greater than)
- >= (greater than or equal)
- <> (not equal)
- ^ (to the power of, e.g. $2^3 = 8$)
- % (remainder from integer division, e.g. $3 \% 2 = 1$)
- AND
- OR

Parentheses () can be used to group conditions and specify the precedence of operators. Without parentheses, the following order of operator precedence applies:

1. ^
2. *, /, %
3. +, -
4. <, <=, =, >, >=, <>
5. AND, OR

Trading Strategies

Trading strategies are comprised of two parts: an *entry signal* and an *exit signal*. Entry signals are conditions you set to trigger an order to *buy* or *sell short*, exit signals are the conditions you set to trigger an order to *sell* or *buy to cover*.

Trading strategies can be backtested to see if they might have been profitable in the past. To backtest a strategy, open a Backtesting window, and select **Strategy Setup** from the right-click menu. To visualize strategy signals on a chart, right-click on any backtesting result row and select **View Chart**. For more information on backtesting, please see the **StrategyDesk User Manual**.

StrategyDesk also lets you set up strategies for program trading to automatically enter orders when criteria you set are met. To set up a strategy for trading, go to the top-level **Trade** menu and select **Setup Trade Strategy**. Orders will only be entered in your account when your computer is on and StrategyDesk is running. For more information on program trading, please see the **StrategyDesk User Manual**.

Following are examples of entry and exit formulas along with actions and interval settings:

Strategy	Formula
Enter when price crosses above its 10-day moving average and exit when it crosses below the moving average	<p>Entry signal: Bar[Close,D] > MovingAverage[MA,Close,10,0,D] AND Bar[Close,D,1] < MovingAverage[MA,Close,10,0,D,1] Action: Buy</p> <p>Exit signal: Bar[Close,D] < MovingAverage[MA,Close,10,0,D] AND Bar[Close,D,1] > MovingAverage[MA,Close,10,0,D,1] Action: Sell Interval: Daily</p>
Enter when price crosses above Parabolic SAR and exit when it crosses below PSAR on daily charts	<p>Entry signal: Bar[Close,D] > ParabolicSAR[PSAR,0.02,0.02,0.2,D] AND Bar[Close,D,1] <= ParabolicSAR[PSAR,0.02,0.02,0.2,D,1] Action: Buy</p> <p>Exit signal: Bar[Close,D] < ParabolicSAR[PSAR,0.02,0.02,0.2,D] AND Bar[Close,D,1] >= ParabolicSAR[PSAR,0.02,0.02,0.2,D,1] Action: Sell Interval: Daily</p>
Enter when MACD Histogram crosses above the zero line and exit when it crosses below the zero line on daily charts	<p>Entry signal: MACD[Diff,Close,12,26,9,D] > 0 AND MACD[Diff,Close,12,26,9,D,1] < 0 Action: Buy</p> <p>Exit signal: MACD[Diff,Close,12,26,9,D] < 0 AND MACD[Diff,Close,12,26,9,D,1] > 0 Action: Sell Interval: Daily</p>
Enter when price	<p>Entry signal: Bar[Close,D] > BollingerBands[Lower,Close,20,2,D] AND</p>

<p>crosses above the lower Bollinger band and exit when profit reaches 4% or cut losses at 1.5%</p>	<p>$\text{Bar}[\text{Close}, D, 1] < \text{BollingerBands}[\text{Lower}, \text{Close}, 20, 2, D, 1]$ Action: Buy</p> <p>Exit signal: $(\text{Bar}[\text{Close}, D] \geq 1.04 * \text{EntryPrice}) \text{ OR } (\text{Bar}[\text{Close}, D] \leq 0.985 * \text{EntryPrice})$ Action: Sell Interval: Daily</p>
<p>Enter when slow %K Stochastic crosses above %D on 60-minute bars. Exit at 1% profit or at the end of the day.</p>	<p>Entry signal: $\text{Stochastic}[\text{StocK}, 14, 3, 3, 60] > \text{Stochastic}[\text{StocD}, 14, 3, 3, 60]$ AND $\text{Stochastic}[\text{StocK}, 14, 3, 3, 60, 1] < \text{Stochastic}[\text{StocD}, 14, 3, 3, 60, 1]$ Action: Buy</p> <p>Exit signal: $(\text{Bar}[\text{Close}, 60] \geq 1.01 * \text{EntryPrice}) \text{ OR } (\text{Bar}[\text{Hour}, 60] = 15 \text{ AND } \text{Bar}[\text{Minute}, 60] = 30)$ Action: Sell Interval: 60</p>
<p>Enter when slow %K Stochastic crosses above 20 and exit when it crosses below 80 on 60-minute bars</p>	<p>Entry signal: $\text{Stochastic}[\text{StocK}, 14, 3, 3, 60] > 20$ AND $\text{Stochastic}[\text{StocK}, 14, 3, 3, 60, 1] < 20$ Action: Buy</p> <p>Exit signal: $\text{Stochastic}[\text{StocK}, 14, 3, 3, 60] < 80$ AND $\text{Stochastic}[\text{StocK}, 14, 3, 3, 60, 1] > 80$ Action: Sell Interval: 60</p>
<p>Enter when CCI crosses above -100. Exit when CCI crosses below 100 on 60-minute bars.</p>	<p>Entry signal: $\text{CCI}[\text{CCI}, 20, 60] > -100$ AND $\text{CCI}[\text{CCI}, 20, 60, 1] < -100$ Action: Buy</p> <p>Exit signal: $\text{CCI}[\text{CCI}, 20, 60] < 100$ AND $\text{CCI}[\text{CCI}, 20, 60, 1] > 100$ Action: Sell Interval: 60</p>
<p>Enter when daily close breaks out above the Upper Bollinger Band. Exit at 3% profit or in 3 days or on Friday.</p>	<p>Entry signal: $\text{Bar}[\text{Close}, D] > \text{BollingerBands}[\text{Upper}, \text{Close}, 20, 2, D]$ AND $\text{Bar}[\text{Close}, D, 1] < \text{BollingerBands}[\text{Upper}, \text{Close}, 20, 2, D, 1]$ Action: Sell Short</p> <p>Exit signal: $(\text{Bar}[\text{Close}, D] \leq 0.97 * \text{EntryPrice}) \text{ OR } (\text{Bar}[\text{Date}, D, 3] = \text{EntryDate}) \text{ OR } (\text{Bar}[\text{DayOfWeek}, D] = 5)$ Action: Buy to Cover Interval: Daily</p>
<p>Enter when price crosses above Lower MA Envelope. Exit at 4% profit or cut losses at 1.5%.</p>	<p>Entry Signal: $\text{Bar}[\text{Close}, D] > \text{MAEnvelopes}[\text{Lower}, \text{Close}, 20, 3, D]$ AND $\text{Bar}[\text{Close}, D, 1] \leq \text{MAEnvelopes}[\text{Lower}, \text{Close}, 20, 3, D, 1]$ Action: Buy</p> <p>Exit Signal: $(\text{Bar}[\text{Close}, D] \geq 1.04 * \text{EntryPrice}) \text{ OR } (\text{Bar}[\text{Close}, D] \leq 0.985 * \text{EntryPrice})$ Action: Sell Interval: Daily</p>

Enter when price crosses above its 20-day double exponential moving average (DEMA) and exit when it crosses below DEMA

Entry Signal: $\text{Bar}[\text{Close}, D] > \text{ExpMovingAverage}[\text{DEMA}, \text{Close}, 20, 0, D]$
 $\text{AND } \text{Bar}[\text{Close}, D, 1] \leq \text{ExpMovingAverage}[\text{DEMA}, \text{Close}, 20, 0, D, 1]$

Action: Buy

Exit Signal: $\text{Bar}[\text{Close}, D] < \text{ExpMovingAverage}[\text{DEMA}, \text{Close}, 20, 0, D]$
 $\text{AND } \text{Bar}[\text{Close}, D, 1] \geq \text{ExpMovingAverage}[\text{DEMA}, \text{Close}, 20, 0, D, 1]$

Action: Sell

Interval: Daily

The examples presented above are for illustrative purposes only and should not be considered recommendations of any particular security or strategy.

Market volatility, volume and system availability may delay account access and trade executions.

You are responsible for all orders entered in your account when an alert-triggered order you set is activated. Please make sure you keep sufficient funds or positions in your account to support the order.

Backtesting is the evaluation of a particular trading strategy using historical data. Results presented are hypothetical, they did not actually occur and they may not take into consideration all transaction fees or taxes you would incur in an actual transaction. And just as past performance of a security does not guarantee future results, past performance of a strategy does not guarantee the strategy will be successful in the future. Results could vary significantly, and losses could result.

Trade Alerts

Create alerts to notify you with a popup message, sound, and/or e-mail when a market condition you specify is met. You can also set alerts for program trading to automatically enter an order when an alert triggers. Alerts will only be triggered if your computer is on and StrategyDesk is running.

Get started setting alerts by selecting **Set up Trade Alert** under the **Trade** menu. For more information on setting alerts, please see the **StrategyDesk User Manual**. Following are some examples of formulas that can be used to create alerts:

Condition	Formula
Bid crosses the ask between 9:30 – 16:00 ET	Bid >= Ask AND Hour * 100 + Minute >= 930 AND Hour * 100 + Minute < 1600
Price crosses above 10-bar MA on 30-minute charts	Bar[Close,30] > MovingAverage[MA,Close,10,0,30] AND Bar[Close,30,1] <= MovingAverage[MA,Close,10,0,30,1]
Price crosses above 10-bar MA on 30-minute charts but only at the end of the bar	Bar[Close,30,1] > MovingAverage[MA,Close,10,0,30,1] AND Bar[Close,30,2] <= MovingAverage[MA,Close,10,0,30,2]
Price crosses above Parabolic SAR on daily charts	Bar[Close,D] > ParabolicSAR[PSAR,0.02,0.02,0.2,D] AND Bar[Close,D,1] <= ParabolicSAR[PSAR,0.02,0.02,0.2,D,1]
Fast %K Stochastic crosses above %D on 30-minute charts	Stochastic[StocK,14,3,1,30] > Stochastic[StocD,14,3,1,30] AND Stochastic[StocK,14,3,1,30,1] < Stochastic[StocD,14,3,1,30,1]
Price rises above upper Bollinger Band	Bar[Close,D] > BollingerBands[Upper,Close,20,2,D] AND Bar[Close,D,1] <= BollingerBands[Upper,Close,20,2,D,1]
Price crosses above the lower MA Envelope on 30-minute charts	Bar[Close,30] > MAEnvelopes[Lower,Close,20,3,30] AND Bar[Close,30,1] <= MAEnvelopes[Lower,Close,20,3,30,1]
5-day EMA drops below 8-day MA	ExpMovingAverage[EMA,Close,5,0,D] < MovingAverage[MA,Close,8,0,D] AND ExpMovingAverage[EMA,Close,5,0,D,1] >= MovingAverage[MA,Close,8,0,D,1]
MACD Histogram drops below 0	MACD[Diff,Close,12,26,9,D] < 0 AND MACD[Diff,Close,12,26,9,D,1] >= 0

Slow Stochastic %K drops below 80	Stochastic[StocK,14,3,3,D] < 80 AND Stochastic[StocK,14,3,3,D,1] >= 80
Price hits the intra-day low	PctInDailyRange = 0
20-day CCI rises above +100	CCI[CCI,20,D] > 100 AND CCI[CCI,20,D,1] <= 100
Alert on a 2-minute doji bar (open equals close) but only at the end of the bar	Bar[Open,2,1] = Bar[Close,2,1]
14-day RSI rises above 30	RSI[RSI,14,D] > 30 AND RSI[RSI,14,D,1] <= 30
Price hits the highest high of last 30 minutes	Last = PriceRangeChannels[Upper,30,0,1]
14-day StochasticRSI rises above .2	StochasticRSI[StocK,14,14,3,1,D] > .2 AND StochasticRSI[StocK,14,14,3,1,D,1] <= .2
Ultimate Oscillator crosses above 30 on 60-minute charts	UltimateOscillator[OSC,7,14,28,60] > 30 AND UltimateOscillator[OSC,7,14,28,60,1] < 30
Price crosses above Time Series Forecast (50 days)	Bar[Close,D] > TimeSeriesForecast[TSF,Close,50,0,D] AND Bar[Close,D,1] <= TimeSeriesForecast[TSF,Close,50,0,D,1]
Price crosses below Double Exponential MA (20 days)	Bar[Close,D] < ExpMovingAverage[DEMA,Close,20,0,D] AND Bar[Close,D,1] >= ExpMovingAverage[DEMA,Close,20,0,D,1]
Price crosses above Adaptive Moving Average (20 days)	Bar[Close,D] > AdaptiveMA[AMA,Close,20,2,30,D] AND Bar[Close,D,1] <= AdaptiveMA[AMA,Close,20,2,30,D,1]

The examples presented above are for illustrative purposes only and should not be considered recommendations of any particular security or strategy.

Screener

A screener is a group of criteria you choose to scan securities for particular characteristics or conditions. Screeners can be useful in helping you find ideas for what to trade. For example, you can set up a screener to search all NASDAQ 100 components for any stock that crosses its 10-day moving average.

Get started setting screeners in a Level I window by selecting **Screener** in the top tool menu. For more information on setting screeners, please see the **StrategyDesk User Manual**. Following are some examples of formulas that can be used to set up screeners:

Screener	Formula
Stocks in the \$20 - \$30 range with today's volume at or above 100,000	Last >= 20 AND Last <= 30 AND Volume >= 100000
Price gapped up at least 2 points at the open	Bar[Open,D] - Bar[Close,D,1] >= 2
Volume is double the 3-month average daily volume	Bar[Volume,D] >= 2 * MovingAverage[MA,Volume,65,0,D]
New 52-week high	Bar[High,D] >= 1YearHigh
Price is in the upper 10% of daily range	PctInDailyRange > 90
Price is below the lower Bollinger Band	Bar[Close,D] < BollingerBands[Lower,Close,20,2,D]
Price is above the upper MA Envelope	Bar[Close,D] > MAEnvelopes[Upper,Close,20,3,D]
5-minute slow Stochastic crossed above 20	Stochastic[StocK,14,3,3,5] > 20 AND Stochastic[StocK,14,3,3,5,1] <= 20
Price drops below 10-day Moving Average	Bar[Close,D] < MovingAverage[MA,Close,10,0,D] AND Bar[Close,D,1] >= MovingAverage[MA,Close,10,0,D,1]
60-minute RSI is below 30	RSI[RSI,14,60] < 30
5-minute Slow Stochastic %K is above 80	Stochastic[StocK,14,3,3,5] > 80
20-day CCI above 100	CCI[CCI,20,D] > 100
Closing price has been rising	Bar[Close,D] > Bar[Close,D,1] AND Bar[Close,D,1] >

for the last 2 days	Bar[Close,D,2]
ADX is greater than 40	DirectionalMovement[ADX,14,14,D] > 40
MACD Histogram above 0	MACD[Diff,Close,12,26,9,D] > 0
30-minute StochasticRSI is above 0.8	StochasticRSI[Stock,14,14,3,1,30] > .8
P/E Ratio is above 300	PERatio > 300
ATR is greater than 3% of price	AvgTrueRange[ATR,14,D] > 0.03 * Bar[Close,D]
Chaikin Money Flow is above 0	ChaikinMoneyFlow[CMF,21,D] > 0
3 consecutive days with higher highs	Bar[High,D] > Bar[High,D,1] AND Bar[High,D,1] > Bar[High,D,2] AND Bar[High,D,2] > Bar[High,D,3]
Aroon Oscillator is below 0	Aroon[Up,14,D] - Aroon[Down,14,D] < 0
Linear Regression Slope is Positive (50 days)	TimeSeriesForecast[Slope,Close,50,0,D] > 0
R-Squared is above 0.40 (20 days)	TimeSeriesForecast[R2,Close,20,0,D] > .40
Price is above Double Exponential MA (20 days)	Bar[Close,D] > ExpMovingAverage[DEMA,Close,20,0,D]
Price is below Triple Exponential MA (50 days)	Bar[Close,D] < ExpMovingAverage[TEMA,Close,50,0,D]
Price is above Adaptive Moving Average (20 days)	Bar[Close,D] > AdaptiveMA[AMA,Close,20,2,30,D]

The examples presented above are for illustrative purposes only and should not be considered recommendations of any particular security or strategy. Past performance of a security does not guarantee future results or success.

Custom Columns in Level I

Custom columns display technical indicators or trading signals you build—such as 14-day stochastic or MACD crossover up—for symbols in a Level I window. You can then set alerts to notify you with sounds and/or text within the custom column when a condition is met for the formulas you've created. You can also sort the custom column to quickly identify the symbols matching your trading signals, or rank securities based on various indicators.

To add one of the built-in custom columns to your Level I layout, go to the **Columns** menu and select from a list under **Custom Fields**. To build your own custom column, go to the **Columns** menu, and select **Custom Field Wizard**. For more information on setting up custom columns, please see the **StrategyDesk User Manual**.

Following are some sample formulas that can be used to create custom columns:

CONDITION	FORMULA
% position of price to its 10 day Moving Average	$(\text{Last} / \text{MovingAverage}[\text{MA}, \text{Close}, 10, 0, \text{D}] - 1) * 100$
14-day RSI	$\text{RSI}[\text{RSI}, 14, \text{D}]$
12-day Rate-of-Change	$\text{MomentumROC}[\text{Momentum}, \text{Close}, 12, 1, \text{D}]$
20-day Commodity Channel Index	$\text{CCI}[\text{CCI}, 20, \text{D}]$
1-minute Exponential Moving Average (length=10)	$\text{ExpMovingAverage}[\text{EMA}, \text{Close}, 10, 0, 1]$
Highest high for the last 20 days	$\text{PriceRangeChannels}[\text{Upper}, 20, 0, \text{D}]$
Lowest Low for the last 30 minutes	$\text{PriceRangeChannels}[\text{Lower}, 30, 0, 1]$
14-day Average True Range	$\text{AvgTrueRange}[\text{ATR}, 14, \text{D}]$
MACD Histogram Crossover above 0	$\text{MACD}[\text{Diff}, \text{Close}, 12, 26, 9, \text{D}] > 0 \text{ AND } \text{MACD}[\text{Diff}, \text{Close}, 12, 26, 9, \text{D}, 1] < 0$
% position of price between Bollinger Bands	$(\text{Last} - \text{BollingerBands}[\text{Lower}, \text{Close}, 20, 2, \text{D}]) / (\text{BollingerBands}[\text{Upper}, \text{Close}, 20, 2, \text{D}] - \text{BollingerBands}[\text{Lower}, \text{Close}, 20, 2, \text{D}]) * 100$
%Change comparison to that of XYZ	$\text{PctChange} / \text{PctChange}[\text{XYZ}]$

Highest Price between 9:30am – 11:00am (<i>the 1st condition is active during 9:30-11:00, the 2nd one covers 11:00-12:30, and so on</i>)	$\begin{aligned} & \text{Bar}[\text{High},90] * (\text{Bar}[\text{Hour},90] = 9) + \\ & \text{Bar}[\text{High},90,1] * (\text{Bar}[\text{Hour},90] = 11) + \\ & \text{Bar}[\text{High},90,2] * (\text{Bar}[\text{Hour},90] = 12) + \\ & \text{Bar}[\text{High},90,3] * (\text{Bar}[\text{Hour},90] = 14) + \\ & \text{Bar}[\text{High},90,4] * (\text{Bar}[\text{Hour},90] = 15) \end{aligned}$
IF Close > Open THEN Close ELSE Open	$\begin{aligned} & (\text{Bar}[\text{Close},D] > \text{Bar}[\text{Open},D]) * \text{Bar}[\text{Close},D] + \\ & (\text{Bar}[\text{Close},D] \leq \text{Bar}[\text{Open},D]) * \text{Bar}[\text{Open},D] \end{aligned}$
Position profit/loss for the day	Change * EntryShares
Absolute value of today's % change	$(\text{PctChange} \wedge 2) \wedge 0.5$
52-week range	1YearHigh - 1YearLow
Upper EMA Envelope (20 days, 3%)	$1.03 * \text{ExpMovingAverage}[\text{EMA},\text{Close},20,0,D]$
Relative Strength vs. NASDAQ	$\text{Bar}[\text{Close},D] / \text{Bar}[\text{Close},D,0,\$COMPX]$
10-day ROC of 14-day RSI	$(\text{RSI}[\text{RSI},14,D] - \text{RSI}[\text{RSI},14,D,10]) / \text{RSI}[\text{RSI},14,D,10] * 100$

The examples presented above are for illustrative purposes only and should not be considered recommendations of any particular security or strategy.

Color Bar Columns in Level I

Create color bar columns to identify chart patterns for securities you're monitoring in a Level I window. For example, add a column that uses color bars to show the changes in stock price trend.

To add one of the built-in color bar columns to your Level I layout, go to the **Columns** menu and select from a list under **Color Fields**. To build your own color bar columns, go to the **Columns** menu, and select **Color Field Wizard**. For more information on setting up color bar columns, please see the **StrategyDesk User Manual**.

Following are some sample formulas and rules that can be used to set up color bar columns:

Condition	Formula and Color Rules
5-min Trend (difference between closing prices for last seven 5-min bars)	Formula: Bar[Close,5] - Bar[Close,5,1] # of Bars: 7 Rules: diff < 0 (red), diff = 0 (yellow), diff > 0 (green)
Daily Trend (difference between daily closing prices for last 4 days)	Formula: Bar[Close,D] - Bar[Close,D,1] # of Bars: 4 Rules: diff < 0 (red), diff = 0 (yellow), diff > 0 (green)
10-day Moving Average Trend (difference between daily MAs for last 5 days)	Formula: MovingAverage[MA,Close,10,0,D] - MovingAverage[MA,Close,10,0,D,1] # of Bars: 5 Rules: diff < 0 (red), diff = 0 (yellow), diff > 0 (green)
Candles (difference between daily open and close)	Formula: Bar[Close,D] - Bar[Open,D] # of Bars: 5 Rules: diff < 0 (red), diff = 0 (yellow), diff > 0 (green)
MACD Histogram (positive or negative)	Formula: MACD[Diff,Close,12,26,9,D] # of Bars: 5 Rules: < 0 (red), = 0 (yellow), > 0 (green)
5-minute OHLC (position of 5-min Close to High/Low of the bar)	Formula: (Bar[Close,5] - Bar[Low,5]) / (Bar[High,5] - Bar[Low,5]) # of Bars: 5 Rules: < 0.2 (red), < 0.4 (pink), < 0.6 (yellow), < 0.8 (green), <= 1.0 (dark green)

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Access to real-time data is subject to acceptance of the exchange agreements.

Custom Chart Studies

Use custom studies to build your own indicators and trading signals to display on a chart. For example, create a custom indicator displaying the 65-day average volume.

To add one of the built-in custom studies to your chart layout, go to the **Studies** menu and select from a list under **Add Custom Study**. To build your own custom study, go to the **Studies** menu, and select **Custom Study Wizard**. For more information on setting up custom studies, please see the **StrategyDesk User Manual**.

Following are some sample formulas that can be used to create custom studies:

Condition	Formula
65-day Average Volume	MovingAverage[MA,Volume,65,0,D]
Gap at the day open	Bar[Open,D] - Bar[Close,D,1]
14-day William's %R	Stochastic[StocK,14,3,1,D] - 100
Daily Bar Range	Bar[High,D] - Bar[Low,D]
Difference between Slow Stochastic K & D lines	Stochastic[StocK,14,3,3,D] - Stochastic[StocD,14,3,3,D]
20-Day Moving Average, shifted 2 bars to the right	MovingAverage[MA,Close,20,0,D,2]
% position of Close to Daily Range	$(\text{Bar}[\text{Close},D] - \text{Bar}[\text{Low},D]) / (\text{Bar}[\text{High},D] - \text{Bar}[\text{Low},D]) * 100$
Pivot Line	$(\text{Bar}[\text{High},D,1] + \text{Bar}[\text{Low},D,1] + \text{Bar}[\text{Close},D,1]) / 3$
% Price Oscillator	$100 * (\text{ExpMovingAverage}[\text{EMA},\text{Close},12,0,D] - \text{ExpMovingAverage}[\text{EMA},\text{Close},26,0,D]) / \text{ExpMovingAverage}[\text{EMA},\text{Close},26,0,D]$

% Volume Oscillator	$100 * (\text{ExpMovingAverage}[\text{EMA}, \text{Volume}, 12, 0, \text{D}] - \text{ExpMovingAverage}[\text{EMA}, \text{Volume}, 26, 0, \text{D}]) / \text{ExpMovingAverage}[\text{EMA}, \text{Volume}, 26, 0, \text{D}]$
Standard Deviation (20 days)	$\text{BollingerBands}[\text{Upper}, \text{Close}, 20, 1, \text{D}] - \text{BollingerBands}[\text{Basis}, \text{Close}, 20, 1, \text{D}]$
Bollinger Bands Width	$(\text{BollingerBands}[\text{Upper}, \text{Close}, 20, 2, \text{D}] - \text{BollingerBands}[\text{Lower}, \text{Close}, 20, 2, \text{D}]) / \text{BollingerBands}[\text{Basis}, \text{Close}, 20, 2, \text{D}]$
Bollinger Bands %	$100 * (\text{Bar}[\text{Close}, \text{D}] - \text{BollingerBands}[\text{Lower}, \text{Close}, 20, 2, \text{D}]) / (\text{BollingerBands}[\text{Upper}, \text{Close}, 20, 2, \text{D}] - \text{BollingerBands}[\text{Lower}, \text{Close}, 20, 2, \text{D}])$
Parabolic SAR Oscillator	$\text{Bar}[\text{Close}, \text{D}] - \text{ParabolicSAR}[\text{PSAR}, 0.02, 0.02, 0.2, \text{D}]$
Aroon Oscillator (14 days)	$\text{Aroon}[\text{Up}, 14, \text{D}] - \text{Aroon}[\text{Down}, 14, \text{D}]$
Linear Regression Slope (10 days)	$\text{TimeSeriesForecast}[\text{Slope}, \text{Close}, 10, 0, \text{D}]$
R-Squared (50 days)	$\text{TimeSeriesForecast}[\text{R2}, \text{Close}, 50, 0, \text{D}]$
TRIX (10 days)	$100 * ((\text{ExpMovingAverage}[\text{TEMA}, \text{Close}, 10, 0, \text{D}] - 3 * (\text{ExpMovingAverage}[\text{DEMA}, \text{Close}, 10, 0, \text{D}] - \text{ExpMovingAverage}[\text{EMA}, \text{Close}, 10, 0, \text{D}])) / (\text{ExpMovingAverage}[\text{TEMA}, \text{Close}, 10, 0, \text{D}, 1] - 3 * (\text{ExpMovingAverage}[\text{DEMA}, \text{Close}, 10, 0, \text{D}, 1] - \text{ExpMovingAverage}[\text{EMA}, \text{Close}, 10, 0, \text{D}, 1])) - 1)$
Relative Strength vs. S&P 500	$\text{Bar}[\text{Close}, \text{D}] / \text{Bar}[\text{Close}, \text{D}, 0, \$\text{SPX}.X]$
3-day MA of RSI	$(\text{RSI}[\text{RSI}, 14, \text{D}] + \text{RSI}[\text{RSI}, 14, \text{D}, 1] + \text{RSI}[\text{RSI}, 14, \text{D}, 2]) / 3$

Elliott Wave
Oscillator (5, 35)

$(\text{MovingAverage}[\text{MA,High,5,0,D}] + \text{MovingAverage}[\text{MA,Low,5,0,D}]) / 2 - (\text{MovingAverage}[\text{MA,High,35,0,D}] + \text{MovingAverage}[\text{MA,Low,35,0,D}]) / 2$

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Color Bar Charts

Use color bars to customize candle colors on a chart based on criteria you set. For example, set up a color bar chart that highlights the bars when a stock is possibly overbought or oversold.

To get started, go to the **Chart** menu and select **Color Bar Setup**. For more information on setting up color bar charts, please see the **StrategyDesk User Manual**.

Following are some sample formulas and rules that can be used to set up color bars:

Condition	Formula and Color Rules
MACD Histogram (positive or negative)	Formula: MACD[Diff,Close,12,26,9,D] Rules: < 0 (red), = 0 (yellow), > 0 (green)
Slow Stochastic (identifies oversold/overbought levels)	Formula: Stochastic[Stock,14,3,3,D] Rules: <= 20 (red), >= 80 (green)
RSI (identifies oversold/overbought levels)	Formula: RSI[RSI,14,D] Rules: <= 30 (red), >= 70 (green)
CCI (identifies oversold/overbought levels)	Formula: CCI[CCI,20,D] Rules: <= -100 (red), >= 100 (green)
StochasticRSI (identifies oversold/overbought levels)	Formula: StochasticRSI[Stock,14,14,3,1,D] Rules: <= .2 (red), >= .8 (green)
Slow %K Stochastic crosses above 20 (green) or below 80 (red). Identifies bars where a crossover occurred.	Formula: (Stochastic[Stock,14,3,3,60] > 20 AND Stochastic[Stock,14,3,3,60,1] <= 20) - (Stochastic[Stock,14,3,3,60] < 80 AND Stochastic[Stock,14,3,3,60,1] >= 80) Rules: = 1 (green), = -1 (red)

Price relative to Parabolic SAR	Formula: $\text{Bar}[\text{Close}, D] - \text{ParabolicSAR}[\text{PSAR}, 0.02, 0.02, 0.2, D]$ Rules: > 0 (green), < 0 (red)
Momentum (up or down)	Formula: $\text{MomentumROC}[\text{Momentum}, \text{Close}, 12, 0, D]$ Rules: > 0 (green), < 0 (red)

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