



The Future of Trading. Available Today!

IBKR Desktop: A sleek, powerful and easy-to-use platform designed for traders and investors of all levels.

Try it today and unleash your trading potential!



ibkr.com/desktop-trading



The best-informed investors choose Interactive Brokers

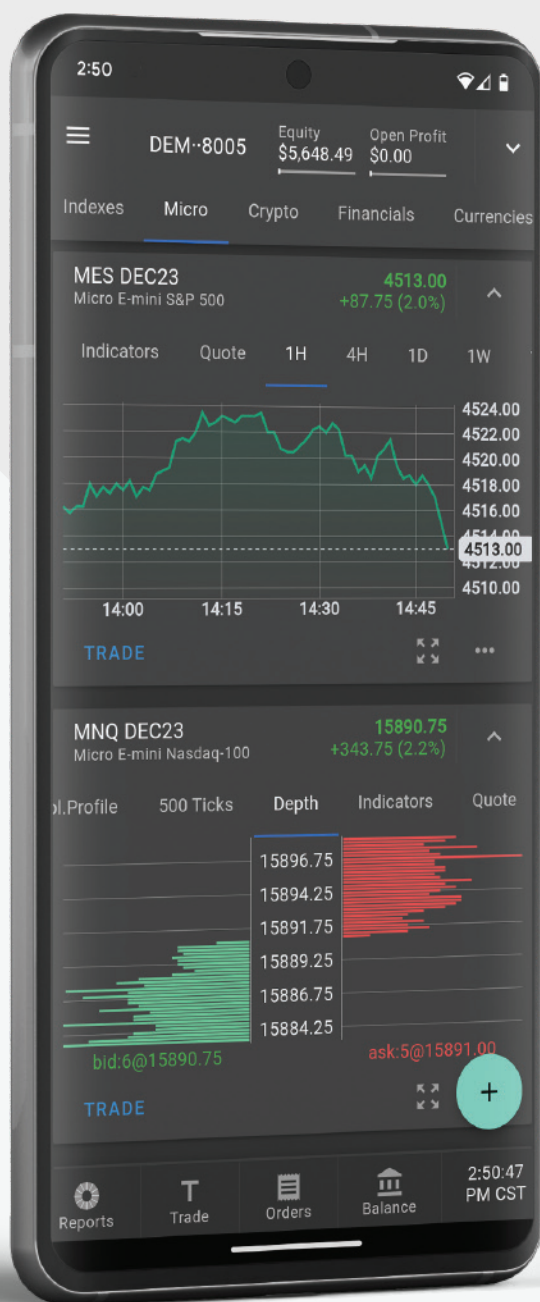
02-IB24-1666CH1664

Interactive Brokers LLC is a member of NYSE, FINRA, SIPC. Any trading symbols displayed are for illustrative purposes only and are not intended to portray recommendations.

NINJATRADER

TRADE FUTURES WITH A LEADING BROKER

Explore the futures markets with our award-winning platform with \$50 intraday margins.



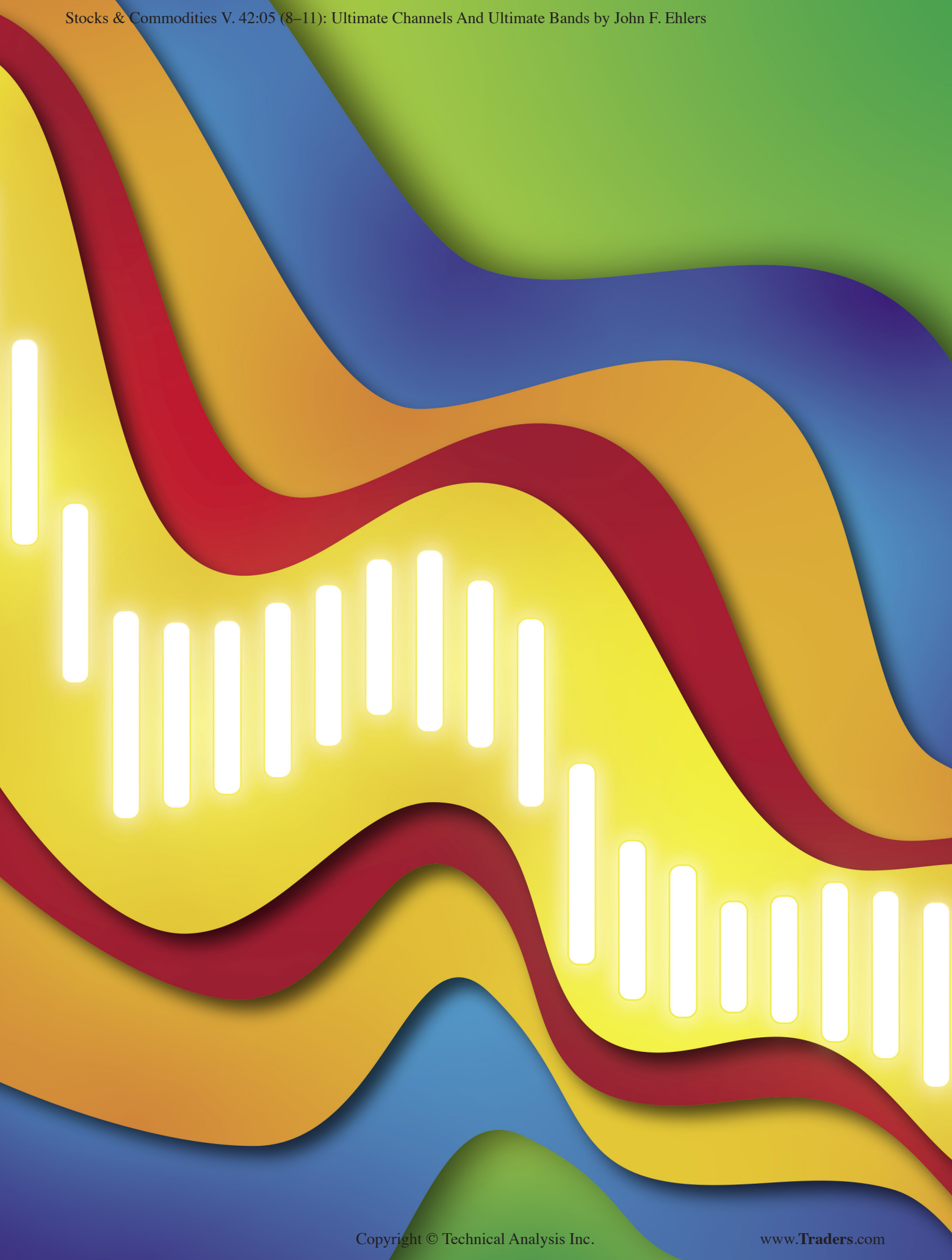
UNCOVER YOUR OPPORTUNITY
in futures trading with NinjaTrader:

- Simple pricing
- Low margins & commissions
- Risk-free simulated trading
- 1,000+ third-party tools & apps
- Daily livestreams & on-demand videos
- 100+ technical analysis tools
- 24/5 live support
- No deposit minimum requirement



**BETTER FUTURES
START HERE.**

Open your free
account today.



Getting The Lag Out Of Two Classic Indicators

Ultimate Channels And Ultimate Bands

Last time, we introduced an advancement in quantitative analysis for smoothing data with less lag: a new filter called the UltimateSmoother. Here, we show you how you can put it to use in your indicators.



A key element in the construction of Keltner channels and Bollinger Bands is the use of moving averages to determine the nominal center of their ranges. Use of moving averages in the indicators introduces lag, and lag leads to delayed entry and exit signals.

In my April 2024 article in this magazine I presented the UltimateSmoother technique I developed. In that article, I described its advantages for smoothing data with less lag and I detailed its construction.

In this article, I explore the use of the UltimateSmoother, instead of using moving averages, to mitigate indicator lag.

ULTIMATE CHANNEL

The Keltner channel uses an exponential moving average (EMA) to determine the center of the channel and average true range (ATR) to establish the width of the channel. The ATR has lag due to averaging as well as the lag due to the EMA. With reference to the code listing in the sidebar “The Ultimate Channel Indicator, In EasyLanguage,” both averages are replaced with UltimateSmoothers.

The true high (TH) is the close of the previous bar if it is higher than the high of the current bar, otherwise it is the high of the current bar. Similarly, the true low (TL) is the close of the previous bar if it is lower than the low of the current bar, otherwise it is the low of the current bar. The true range is the difference between the true high and the true low. Rather than compute the ATR, the code mitigates

lag by computing the smooth true range (STR) using the UltimateSmoother function. For flexibility, the length of the data used to compute the STR is an input variable. The upper channel value is computed as the UltimateSmoother of closes plus the STR times the input multiplier. Similarly, the lower channel value is computed as the UltimateSmoother of closes minus the STR times the input multiplier.

An example of the *ultimate channel indicator* is shown in Figure 1, where both *length* and *STRLength* are set to 20 and the *NumSTRs* is set to 1. Clearly, the channel has nearly zero lag. The channel limits can be smoothed by increasing the input *length* parameter. Doing this will modestly increase the indicator lag.

ULTIMATE BANDS

Bollinger Bands use a simple moving average to determine the center of the band and the standard deviations from it to establish the indicator band. Both increase the lag of the indicator. With reference to the code listing in the sidebar “The Ultimate Band Indicator, In EasyLanguage,” both averages are replaced with UltimateSmoothers.

Smooth is the center of the indicator band. It is computed using the UltimateSmoother function. The deviation at each data sample is the difference between *smooth* and the close at that data point. The standard deviation (SD) is computed as the square root of the average of the squares of the individual deviations. The bands are computed as *smooth* plus or minus the input variable *NumSDs* times the SDs.

An example of the *ultimate band indicator* is shown in Figure 2, where the *length* is set to 20 and the *NumSDs* is set to 1. Clearly, the indicator band has nearly zero lag. The band limits can be smoothed by increasing the input *length* parameter. Doing this

by John F. Ehlers

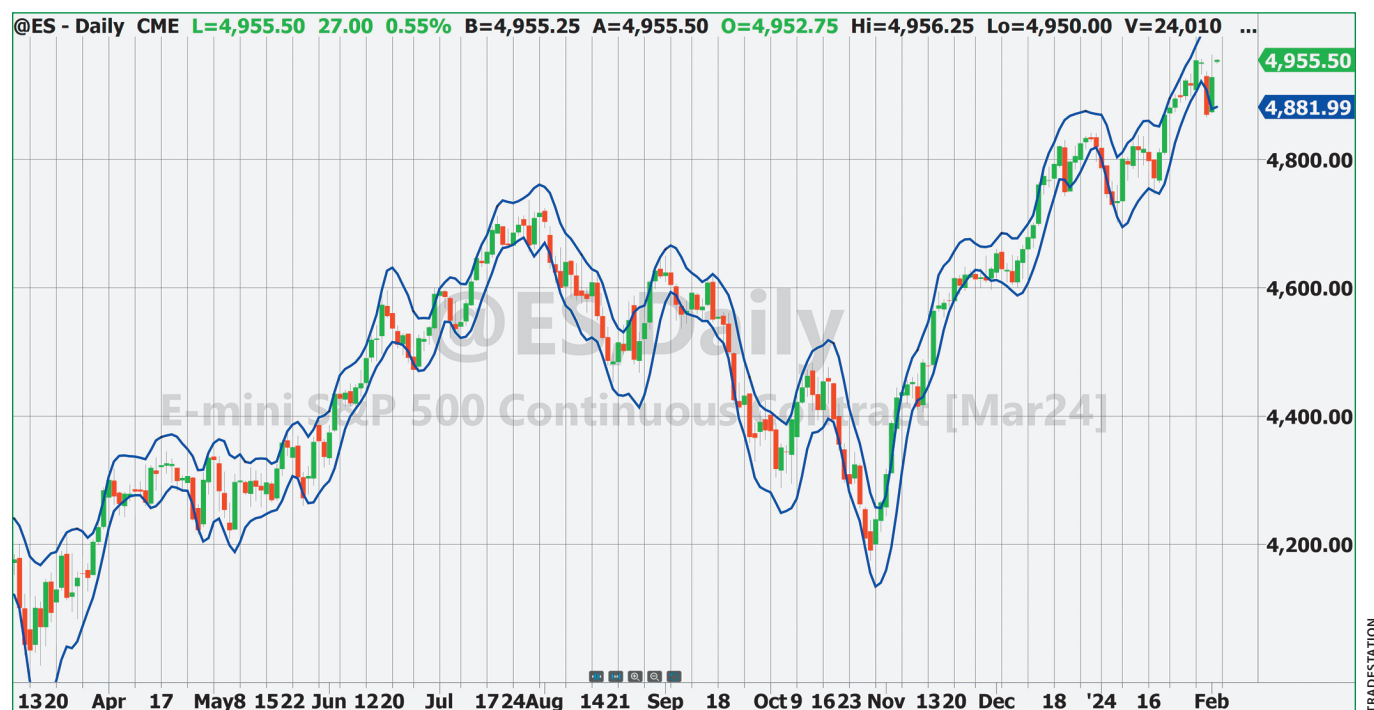


FIGURE 1: ULTIMATE CHANNEL. The ultimate channel indicator has minimum lag (less lag than the Keltner channel, not shown here).

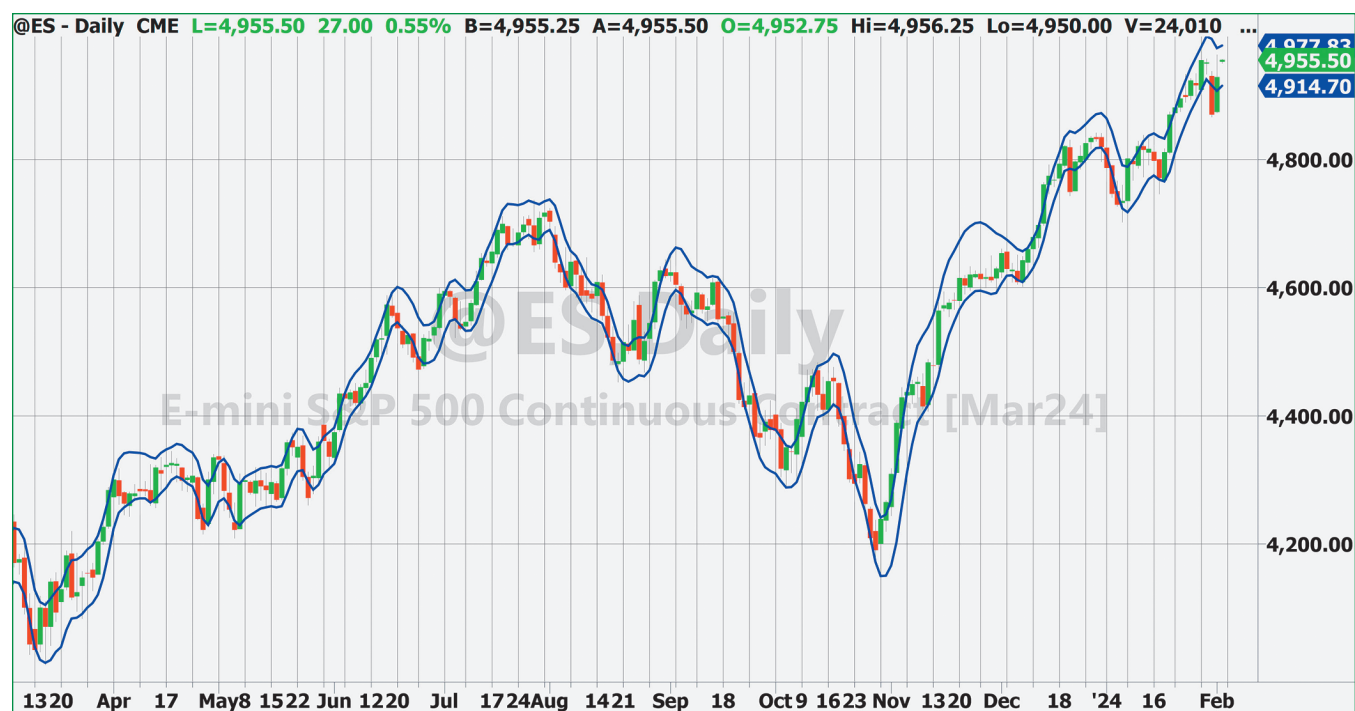


FIGURE 2: ULTIMATE BAND. The ultimate band also has minimum lag (less lag than Bollinger Bands, not shown here).

In this article, I explore the use of the UltimateSmoother, instead of using moving averages, to mitigate indicator lag.

will modestly increase the indicator lag. Interestingly, the ultimate band indicator does not differ from the ultimate channel indicator in any major fashion.

USE AND APPLICATION

The ultimate channel and ultimate band indicators can be used about the same way Keltner channels and Bollinger

THE ULTIMATE CHANNEL INDICATOR, IN EASYLANGUAGE

```

{
    Ultimate Channel
    (c) 2024 John F. Ehlers
}

Inputs:
    STRLength(20),
    Length(20),
    NumSTRs(1);

Vars:
    TH(0),
    TL(0),
    ROC(0),
    STR(0),
    UpperChnl(0),
    LowerChnl(0);

If Close[1] > High Then TH = Close[1] Else TH = High;
If Close[1] < Low Then TL = Close[1] Else TL = Low;
STR = $UltimateSmoother(TH - TL, STRLength);

UpperChnl = $UltimateSmoother(Close, Length) +
    NumSTRs*STR;
LowerChnl = $UltimateSmoother(Close, Length) -
    NumSTRs*STR;

Plot1(UpperChnl, "", Blue, 4, 4);
Plot2(LowerChnl, "", Blue, 4, 4);

```

Bands are used to interpret price action. There is sufficient variation in the indicator displays over a wide range of instruments through the use of the input variables to make the indicators be a useful addition to your technical trading library. The main difference is that indicator lag is greatly reduced compared to the standard indicators.

A simple trading strategy is to hold a position in the direction of the UltimateSmoother and exit that position when the price pops outside the channel or band in the opposite direction. This is basically a trend-following strategy with an automatic following stop.

John Ehlers is a retired electrical engineer and a retired technical analyst, specializing in the application of DSP (digital signal processing) to trading. For more information, see www.mesasoftware.com.

FURTHER READING

Ehlers, John [2024]. “The Ultimate Smoother,” *Technical Analysis of STOCKS & COMMODITIES*, Volume 42, April.

_____. [2014]. “Predictive And Successful Indicators,” *Technical Analysis of STOCKS & COMMODITIES*, Volume 32, January.

Ehlers, John [2004]. *Cybernetic Analysis For Stocks And*

THE ULTIMATE BAND INDICATOR, IN EASYLANGUAGE

```

{
    Ultimate Bands
    (c) 2024 John F. Ehlers
}

Inputs:
    Length(20),
    NumSDs(1);

Vars:
    Smooth(0),
    Sum(0),
    count(0),
    SD(0),
    UpperBand(0),
    LowerBand(0);

Smooth = $UltimateSmoother(Close, Length);

Sum = 0;
For count = 0 to Length - 1 Begin
    Sum = Sum + (Close[count] -
        Smooth[count])*(Close[count] - Smooth[count]);
End;
If Sum <> 0 Then SD = SquareRoot(Sum / Length);

UpperBand = Smooth + NumSDs*SD;
LowerBand = Smooth - NumSDs*SD;

Plot1(UpperBand, "", Blue, 4, 4);
Plot2(LowerBand, "", Blue, 4, 4);

```

Futures, John Wiley & Sons.

‡TradeStation

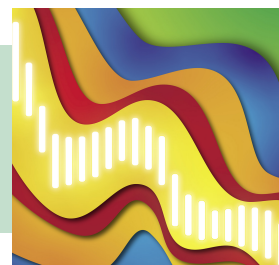
‡See Editorial Resource Index

*The code given in this article is available in the **S&C Article Code** section of our website, Traders.com.*

*See our **Traders' Tips** coding section of the magazine beginning on page 42 for implementation of John Ehlers' technique in various technical analysis programs and trading platforms. Code found in the Traders' Tips section is also posted to Traders.com.*

Find similar articles online at Traders.com

**Both moving averages
are replaced with
UltimateSmothers.**



Congratulations KJTradingSystems.Com



**Best Trading
School**



Verified Champion Trader
+ 5 Time
Best Selling Author
Kevin J. Davey



**Favorite Trading
Article**



**Get Your Free
Algo Strategy:**

kjtradingsystems.com/tasc.html



Futures Trading Involves Risk Of Loss. Don't Trade With Money You Can't Afford To Lose.

TRADE BRILLIANTLY



Schwab Trading is now powered by Ameritrade. A new era in trading has arrived.

Introducing a new, elevated trading experience.

- Go deeper with **thinkorswim**®, the powerful, award-winning trading platforms now at Schwab.
- Get support from the Trade Desk, our team of passionate traders ready to help.
- Sharpen your skills with an expanding library of education crafted for traders.

All designed to help you trade brilliantly.



Powered by **Ameritrade**™

Investing involves risks, including loss of principal.

© 2024 Charles Schwab & Co., Inc. All rights reserved. Member SIPC. (1023-345M) ADP121823-00

Schwab.com/Trading

SUBSCRIBE OR RENEW TODAY!

Every Stocks & Commodities subscription (regular and digital) includes:

- Full access to our Digital Edition
The complete magazine as a PDF you can download.
- Full access to our Digital Archives
That's 35 years' worth of content!
- Complete access to WorkingMoney.com
The information you need to invest smartly and successfully.
- Access to Traders.com Advantage
Insights, tips and techniques that can help you trade smarter.

1 year **\$89⁹⁹**

2 years **\$149⁹⁹**

3 years **\$199⁹⁹**

PROFESSIONAL TRADERS' STARTER KIT

A 5-year subscription to S&C magazine that includes everything above PLUS a free* book, *Charting The Stock Market: The Wyckoff Method*, all for a price that saves you \$150 off the year-by-year price! *Shipping & handling charges apply for foreign orders.

5 years **\$299⁹⁹**

That's around \$5 a month!



Visit **www.Traders.com** to find out more!