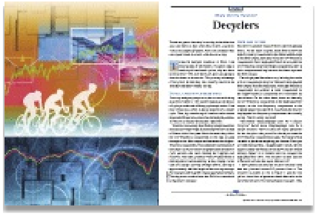
TRADERS’ TIPS

September 2015



For this month’s Traders’ Tips, the focus is John Ehlers’ article in this issue, “Decyclers.” Here, we present the September 2015 Traders’ Tips code with possible implementations in various software.

The Traders’ Tips section is provided to help the reader implement a selected technique from an article in this issue or another recent issue. The entries here are contributed by software developers or programmers for software that is capable of customization.

TRADESTATION: SEPTEMBER 2015

In “Decyclers” in this issue, author John Ehlers describes a method for constructing an oscillator that can help traders detect trend reversals with almost no lag. Ehlers calls this new oscillator a *decycler*. The author begins the process by isolating the high-frequency components present in the input data. He then subtracts these from the input data leaving only the lower-frequency components representing the trend.

For convenience, we are providing some EasyLanguage code for the simple decycler and decycler oscillator indicators based on Ehlers’ concepts. In addition, we are providing code for a TradeStation function to calculate the decycler oscillator, and a strategy that demonstrates the function’s usage.

Indicator: Simple Decycler

```
// TASC Sep 2015
// Decyclers - John F. Ehlers
// Simple Decyclers

inputs:
 HPPeriod( 125 ) ;

variables:
 alpha1( 0 ),
 HP( 0 ),
 Decycle( 0 ) ;

// High Pass Filter
alpha1 = ( Cosine ( 0.707 * 360 / HPPeriod ) +
Sine( 0.707 * 360 / HPPeriod ) - 1 )
/ Cosine( .707 * 360 / HPPeriod ) ;

HP = ( 1 - alpha1 / 2 ) * ( 1 - alpha1 / 2 ) *
( Close - 2 * Close[1] + Close[2] ) + 2 *
( 1 - alpha1 ) * HP[1] - ( 1 - Alpha1 ) *
( 1 - alpha1 ) * HP[2] ;

Decycle = Close - HP ;

Plot1( Decycle, "DeCycle" ) ;
Plot2( 1.005 * Decycle, "UpperBand" ) ;
Plot3( 0.995 * Decycle, "LowerBand" ) ;
```

Indicator: Decycler Oscillator

```
// TASC Sep 2015
// Decyclers - John F. Ehlers
// Decycler Oscillator
```

```
inputs:
 HPPeriod( 125 ),
 K( 1 ) ;

variables:
 alpha1( 0 ),
 alpha2( 0 ),
 HP( 0 ),
 Decycle( 0 ),
 DecycleOsc( 0 ) ;


alpha1 = ( Cosine ( 0.707 * 360 / HPPeriod ) +
Sine( 0.707 * 360 / HPPeriod ) - 1 )
/ Cosine( .707 * 360 / HPPeriod ) ;

HP = ( 1 - alpha1 / 2 ) * ( 1 - alpha1 / 2 ) *
( Close - 2 * Close[1] + Close[2] ) + 2 *
( 1 - alpha1 ) * HP[1] - ( 1 - Alpha1 ) *
( 1 - alpha1 ) * HP[2] ;

Decycle = Close - HP ;


alpha2 = ( Cosine( 0.707 * 360 / ( 0.5 * HPPeriod ) )
+ Sine( 0.707 * 360 / ( 0.5 * HPPeriod ) ) - 1) /
 Cosine( 0.707 * 360 / ( 0.5 * HPPeriod ) ) ;

DecycleOsc = ( 1 - alpha2 / 2 ) * ( 1 - alpha2 / 2 ) *
( Decycle - 2 * Decycle[1] + Decycle[2] ) + 2 *
( 1 - alpha2 ) * DecycleOsc[1] - ( 1 - alpha2 ) *
( 1 - alpha2 ) * DecycleOsc[2] ;


Plot1( 100 * K * DecycleOsc / Close, "DecycleOsc" ) ;
Plot2( 0, "ZeroLine" ) ;
```

Function: DecyclerOscillator

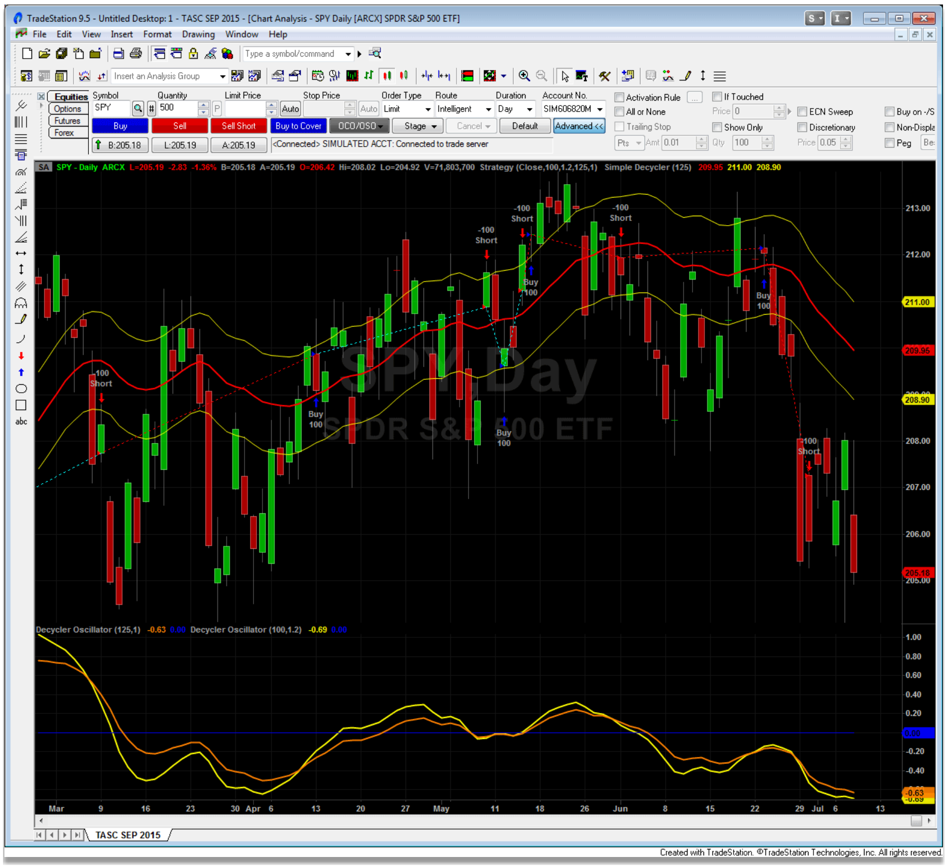
```
// TASC Sep 2015
// Decyclers - John F. Ehlers
// Decycler Oscillator Function

inputs:
 Price( NumericSeries ),
 HPPeriod( NumericSimple ),
 K( NumericSimple ) ;

variables:
 alpha1( 0 ),
 alpha2( 0 ),
 HP( 0 ),
 Decycle( 0 ),
 DecycleOsc( 0 ) ;

// High Pass Filter
alpha1 = ( Cosine ( 0.707 * 360 / HPPeriod ) +
Sine( 0.707 * 360 / HPPeriod ) - 1 ) /
Cosine( .707 * 360 / HPPeriod ) ;

HP = ( 1 - alpha1 / 2 ) * ( 1 - alpha1 / 2 ) *
( Price - 2 * Price[1] + Price[2] ) + 2 *
( 1 - alpha1 ) * HP[1] - ( 1 - Alpha1 ) *
( 1 - alpha1 ) * HP[2] ;

Decycle = Price - HP ;

alpha2 = ( Cosine( 0.707 * 360 / ( 0.5 * HPPeriod ) )
+ Sine( 0.707 * 360 / ( 0.5 * HPPeriod ) ) - 1) /
Cosine( 0.707 * 360 / ( 0.5 * HPPeriod ) ) ;

DecycleOsc = ( 1 - alpha2 / 2 ) * ( 1 - alpha2 / 2 ) *
( Decycle - 2 * Decycle[1] + Decycle[2] ) + 2 *
( 1 - alpha2 ) * DecycleOsc[1] - ( 1 - alpha2 ) *
( 1 - alpha2 ) * DecycleOsc[2] ;

DecyclerOscillator = 100 * K * DecycleOsc / Price ;
```

Strategy: Decycler Oscillator

```
// TASC Sep 2015
// Decyclers - John F. Ehlers
// Decycler Oscillator Strategy

inputs:
 Price( Close ),
 Fast_HPPeriod( 100 ),
 Fast_K( 1.2 ),
 Fast_K( 1.2 ),
 Slow_HPPeriod( 125 ),
 Slow_K( 1 ) ;

variables:
 Fast_Val( 0 ),
 Slow_Val( 0 ) ;

Fast_Val =
DecyclerOscillator( Price, Fast_HPPeriod, Fast_K ) ;

Slow_Val =
DecyclerOscillator( Price, Slow_HPPeriod, Slow_K ) ;

if Fast_Val crosses over Slow_Val then
 Buy next bar at Market
else if Slow_Val crosses over Fast_Val then
 SellShort next bar at Market ;
```

To download the EasyLanguage code, please visit our TradeStation and EasyLanguage support forum. The code for this article can be found here: http://www.tradestation.com/TASC-2015. The ELD filename is “TASC_SEP2015.ELD.” For more information about EasyLanguage in general, please see http://www.tradestation.com/EL-FAQ.

A sample chart is shown in Figure 1.



TradeStation 9.5 - Untitled Desktop: 1 - TASC SEP 2015 - [Chart Analysis - SPY Daily [ARCX] SPDR S&P 500 ETF]

Symbol: SPY
Quantity: 500
Order Type: Limit
Route: Intelligent
Duration: Day
Account No.: SIM606820M
B:205.18 L:205.19 A:205.19
<Connected> SIMULATED ACCT: Connected to trade server

SPY - Daily ARCX L=205.19 -2.83 -1.36% B=205.18 A=205.19 O=206.42 Hi=208.02 Lo=204.92 V=71,803,700 Strategy (Close,100,1.2,125,1) Simple Decycler (125) 209.95 211.00 208.90

Decycler Oscillator (125,1) -0.63 0.00 Decycler Oscillator (100,1.2) -0.69 0.00

Created with TradeStation. ©TradeStation Technologies, Inc. All rights reserved.

FIGURE 1: TRADESTATION. Here is an example of the simple decycler, decycler oscillator indicators, and decycler oscillator strategy applied to a daily chart of the SPY.

This article is for informational purposes. No type of trading or investment recommendation, advice, or strategy is being made, given, or in any manner provided by TradeStation Securities or its affiliates.

—Doug McCrary
TradeStation Securities, Inc.
www.TradeStation.com

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MetaStock

METASTOCK: SEPTEMBER 2015

In “Decyclers” in this issue, author John Ehlers presents a simple decycler and his decycle oscillator. MetaStock formulas based on his article are shown here:

Simple Decycler:

```
ti:= 125;{time periods}
alpha1:= (Cos(.707*360/ti) + Sin(.707*360/ti) -1)/Cos(.707*360/ti);
HP:= (1-alpha1/2)*(1-alpha1/2)*(C - Ref(2*C,-1) + Ref(C,-2)) +
2*(1-alpha1)*PREV - (1-alpha1)*(1-alpha1)*Ref(PREV,-1);
decycle:= C - hp;
Decycle;
1.005*decycle;
0.995*decycle
```

Decycle Oscillator:

```
ti:= 125;{time periods}
K:= 1;   {scaler}
alpha1:= (Cos(.707*360/ti) + Sin(.707*360/ti) -1)/Cos(.707*360/ti);
HP:= (1-alpha1/2)*(1-alpha1/2)*(C - Ref(2*C,-1) + Ref(C,-2)) +
2*(1-alpha1)*PREV - (1-alpha1)*(1-alpha1)*Ref(PREV,-1);
decycle:= C - hp;
alpha2:= (Cos(.707*360/(.5*ti)) + Sin(.707*360/(.5*ti)) -1)/Cos(.707*360/(.5*ti));
DecycleOsc:= (1-alpha2/2)*(1-alpha2/2)*(decycle - Ref(2*decycle,-1) + Ref(decycle,-2)) + 2*(1-alpha2)*PREV - (1-alpha2)*
(1-alpha2)*Ref(PREV,-1);
100*k*DecycleOsc/C
```

—William Golson
MetaStock Technical Support
www.metastock.com

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eSIGNAL: SEPTEMBER 2015

For this month’s Traders’ Tip, we’re providing two studies: SimpleDecycler.efs and DecyclerOscillator.efs, based on the article in this issue by John Ehlers, titled “Decyclers.” In the article, Ehlers presents a method of identifying trends with virtually no lag, unlike with moving averages. The SimpleDecycler study is overlaid on the chart (see Figure 2), whereas the DecyclerOscillator is displayed as a subchart (Figure 3).

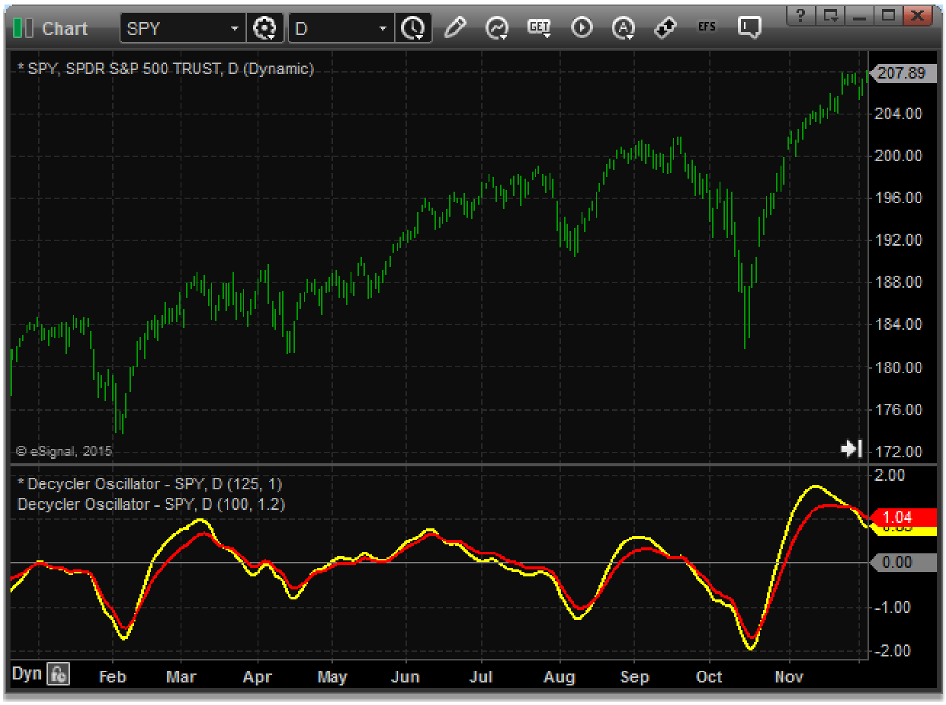

FIGURE 2: eSIGNAL. Here is an example of the SimpleDecycler study plotted on a daily chart of the SPY.

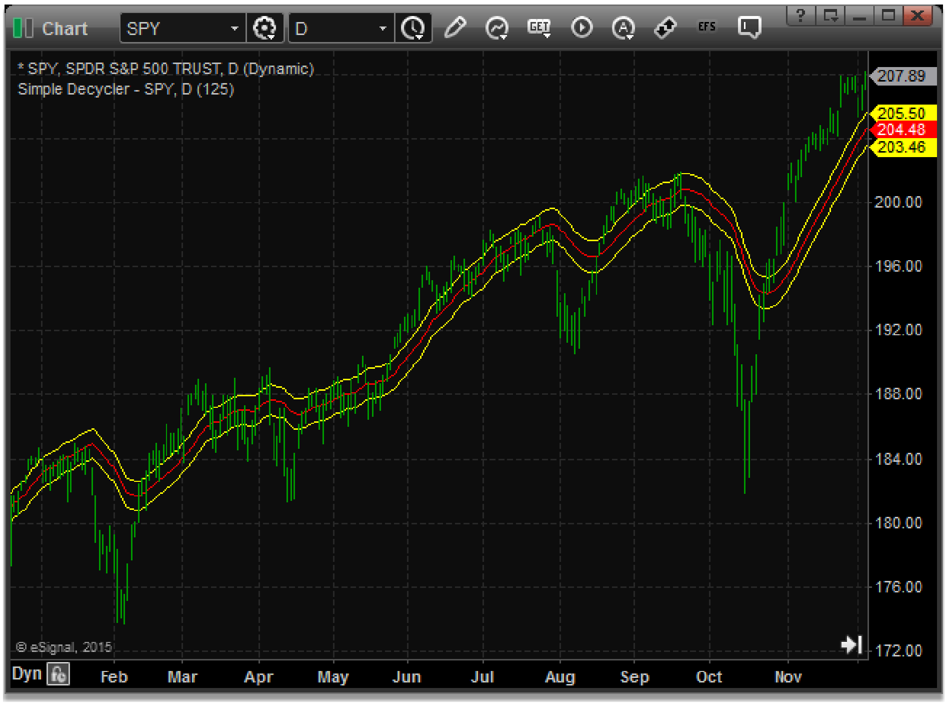

Figure 3: eSIGNAL. Here is an example of the DecyclerOscillator study plotted on a daily chart of the SPY.

The studies contain formula parameters that may be configured through the*edit chart* window (right-click on the chart and select “edit chart”).

To discuss this study or download a complete copy of the formula code, please visit the EFS Library Discussion Board forum under the *forums* link from the support menu at www.esignal.com or visit our EFS KnowledgeBase at http://www.esignal.com/support/kb/efs/. The eSignal formula script (EFS) is also available here:

SimpleDecycler.efs

```
/*********************************

Provided By:

    Interactive Data Corporation (Copyright © 2015)

    All rights reserved. This sample eSignal Formula Script (EFS)

    is for educational purposes only. Interactive Data Corporation

    reserves the right to modify and overwrite this EFS file with

    each new release.


Description:

    Decyclers by John Ehlers


Formula Parameters:                     Default:

    HP Period                           125


Version:            1.00  07/09/2015


Notes:

    The related article is copyrighted material. If you are not a subscriber

    of Stocks & Commodities, please visit www.traders.com.
```

```
**********************************/

var fpArray = new Array();

function preMain(){

    setStudyTitle("Simple Decycler");
    setPriceStudy(true);

    setCursorLabelName("UpperBand", 0);
    setCursorLabelName("Decycler", 1);
    setCursorLabelName("LowerBand", 2);

    setDefaultBarFgColor(Color.red, 1);

    var x = 0;

    fpArray[x] = new FunctionParameter("fpHPPeriod", FunctionParameter.NUMBER);
    with(fpArray[x++]){
        setName("HP Period");
        setLowerLimit(1);
        setDefault(125);
    }
}

var bInit = false;
var bVersion = null;

var xClose = null;
var xHP = null;

function main(fpHPPeriod){

    if (bVersion == null) bVersion = verify();
    if (bVersion == false) return;

    if (!bInit){

        xClose = close();
        xHP = efsInternal('Calc_HP', xClose, fpHPPeriod);

        bInit = true;
    };

    var nClose = xClose.getValue(0);
    var nHP = xHP.getValue(0);
    if (nHP == null || nClose == null)
        return;

    var nDecycle = nClose - nHP;

    return [nDecycle * 1.005, nDecycle, nDecycle * .995];
}

var nAlpha = null;

function Calc_HP(xSource, nPeriod){

    nAlpha = (Math.cos(.707*360 / nPeriod * Math.PI / 180) +
              Math.sin(.707*360 / nPeriod * Math.PI / 180) - 1) /
              Math.cos(.707*360 / nPeriod * Math.PI / 180);

    var nSource = xSource.getValue(0);
    var nSource1 = xSource.getValue(-1);
    var nSource2 = xSource.getValue(-2);

    if (nSource == null || nSource1 == null|| nSource2 == null)
        return;

    var nHP_1 = ref(-1);
    var nHP_2 = ref(-2);

    var nHP = Math.pow((1 - nAlpha / 2), 2) * (nSource - 2 * nSource1 + nSource2) +
              2 * (1 - nAlpha) * nHP_1 - Math.pow((1 - nAlpha), 2) * nHP_2;

    return nHP;
}

function verify(){

    var b = false;

    if (getBuildNumber() < 779){

        drawTextAbsolute(5, 35, "This study requires version 8.0 or later.",
            Color.white, Color.blue, Text.RELATIVETOBOTTOM|Text.RELATIVETOLEFT|Text.BOLD|Text.LEFT,
            null, 13, "error");
        drawTextAbsolute(5, 20, "Click HERE to upgrade.@URL=http://www.esignal.com/download/default.asp",
            Color.white, Color.blue, Text.RELATIVETOBOTTOM|Text.RELATIVETOLEFT|Text.BOLD|Text.LEFT,
            null, 13, "upgrade");
        return b;
    }
    else
        b = true;

    return b;
}
```

DecyclerOscillator.efs

```
/*********************************
Provided By:
    Interactive Data Corporation (Copyright © 2015)
    All rights reserved. This sample eSignal Formula Script (EFS)
    is for educational purposes only. Interactive Data Corporation
    reserves the right to modify and overwrite this EFS file with
    each new release.

Description:
    Decyclers by John Ehlers

Formula Parameters:                     Default:
    HP Period                           125
    K                                   1

Version:            1.00  07/09/2015

Notes:
    The related article is copyrighted material. If you are not a subscriber
    of Stocks & Commodities, please visit www.traders.com.

**********************************/

var fpArray = new Array();

function preMain(){

    setStudyTitle("Decycler Oscillator");

    setCursorLabelName("ZeroLine", 0);
    setCursorLabelName("DecyclerOsc", 1);

    setDefaultBarFgColor(Color.grey, 0);

    setDefaultBarThickness(1, 0);
    setDefaultBarThickness(2, 1);
    setDefaultBarThickness(2, 1);

    setShowCursorLabel(false, 0);
    setShowCursorLabel(true, 1);

    var x = 0;

    fpArray[x] = new FunctionParameter("fpHPPeriod", FunctionParameter.NUMBER);
    with(fpArray[x++]){
        setName("HP Period");
        setLowerLimit(1);
        setDefault(125);
    }

    fpArray[x] = new FunctionParameter("fpK", FunctionParameter.NUMBER);
    with(fpArray[x++]){
        setName("K");
        setDefault(1);
    }
}

var bInit = false;
var bVersion = null;

var xClose = null;
var xHP = null;
var xDecycle = null;
var xDecycleOsc = null;

function main(fpHPPeriod, fpK){

    if (bVersion == null) bVersion = verify();
    if (bVersion == false) return;

    if (!bInit){

        xClose = close();
        xHP = efsInternal('Calc_HP', xClose, fpHPPeriod);
        xDecycle = efsInternal('Calc_Decycle', xClose, xHP);
        xDecycleOsc = efsInternal('Calc_HP', xDecycle, .5 * fpHPPeriod);

        bInit = true;
    };

    var nClose = xClose.getValue(0);
    var nDecycleOsc = xDecycleOsc.getValue(0);
    if (nDecycleOsc == null || nClose == null)
        return;

    var nReturnValue = 100 * fpK * nDecycleOsc / nClose;

    return [0, nReturnValue];
}

var nAlpha = null;

function Calc_HP(xSource, nPeriod){

    nAlpha = (Math.cos(.707*360 / nPeriod * Math.PI / 180) +
              Math.sin(.707*360 / nPeriod * Math.PI / 180) - 1) /
              Math.cos(.707*360 / nPeriod * Math.PI / 180);

    var nSource = xSource.getValue(0);
    var nSource1 = xSource.getValue(-1);
    var nSource2 = xSource.getValue(-2);

    if (nSource == null || nSource1 == null|| nSource2 == null)
        return;

    var nHP_1 = ref(-1);
    var nHP_2 = ref(-2);

    var nHP = Math.pow((1 - nAlpha / 2), 2) * (nSource - 2 * nSource1 + nSource2) +
              2 * (1 - nAlpha) * nHP_1 - Math.pow((1 - nAlpha), 2) * nHP_2;

    return nHP;
}

function Calc_Decycle(xSource, xHP){

    var nSource = xSource.getValue(0);
    var nHP = xHP.getValue(0);

    if (nHP == null || nSource == null)
        return;

    var nDecycle = nSource - nHP;

    return nDecycle;
}
```

```
function verify(){

    var b = false;

    if (getBuildNumber() < 779){

        drawTextAbsolute(5, 35, "This study requires version 8.0 or later.",
            Color.white, Color.blue, Text.RELATIVETOBOTTOM|Text.RELATIVETOLEFT|Text.BOLD|Text.LEFT,
            null, 13, "error");
        drawTextAbsolute(5, 20, "Click HERE to upgrade.@URL=http://www.esignal.com/download/default.asp",
            Color.white, Color.blue, Text.RELATIVETOBOTTOM|Text.RELATIVETOLEFT|Text.BOLD|Text.LEFT,
            null, 13, "upgrade");
        return b;
    }
    else
        b = true;

    return b;
}
```

—Eric Lippert
eSignal, an Interactive Data company
800 779-6555, www.eSignal.com

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THINKORSWIM: SEPTEMBER 2015

In “Decyclers” in this issue, author John Ehlers presents the idea of *detrending* to build his decycler. In general, Ehlers discusses how cycle patterns go hand in hand with trends, so he built his decycler to go hand in hand with detrending studies.

We have built two new studies—the *simpler decycler* and *decycler oscillator*—for use in thinkorswim based on these concepts. The studies use our proprietary scripting language, thinkscript. We have made the loading process extremely easy; simply click on the following links: http://tos.mx/OZUx2C and http://tos.mx/HPPszc, and choose *save script to thinkorswim*, then choose to rename your studies to “SimplerDecycler” and “DecyclerOscillator,” in that order. You can adjust the parameters of these within the *edit studies* window to fine-tune your variables.

In the example chart in Figure 4, you see the SimplerDecycler plotted on top of the price graph and the DecyclerOscillator plotted in the subgraph.

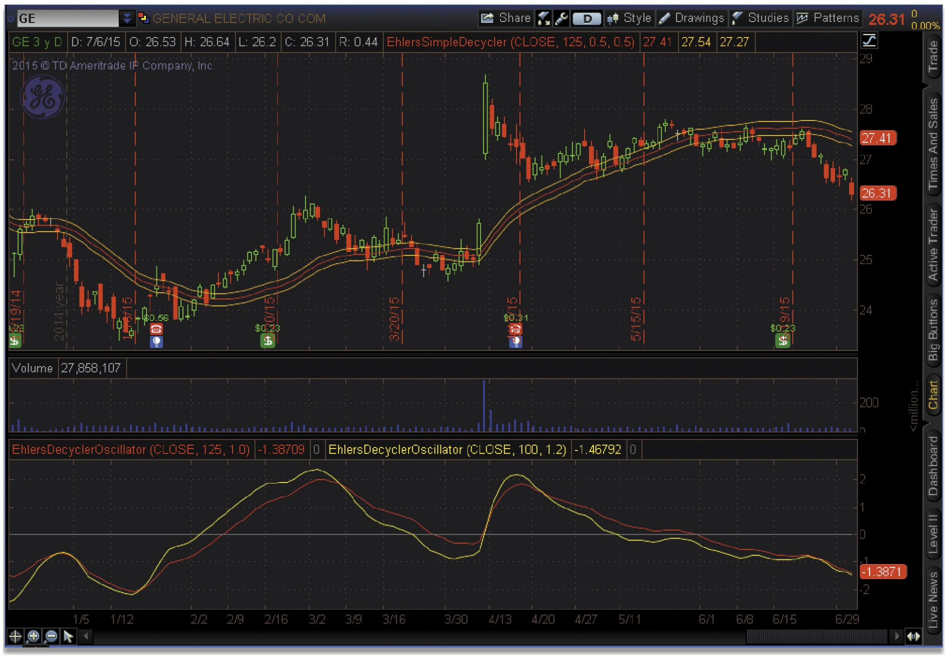

FIGURE 4: THINKORSWIM. The SimplerDecycler is plotted on top of the price graph and the DecyclerOscillator is plotted in the subgraph.

—thinkorswim
A division of TD Ameritrade, Inc.
www.thinkorswim.com

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WEALTH-LAB: SEPTEMBER 2015

In his article in this issue, titled "Decyclers," author John Ehlers shares two new decycler indicators whose main feature is the ability to identify trends with virtually zero lag.

We've developed a long-only trading system based on his concepts to demonstrate the timely response of the decycler oscillator to market action. It applies the idea of using a decycler oscillator pair with different parameters, as discussed in Ehlers' article:

- **Enter long** when the yellow line crosses over the red line
- **Exit long** when the yellow line crosses under the red line

On the price pane, the decycler is plotted along with the hysteresis lines (+/- 0.5 percent). The green background indicates an uptrend in the market (the prices are above the upper hysteresis line) and the red background indicates a downtrend (the prices are below the lower hysteresis line). The bottom pane illustrates trend detection according to the pair of decycler oscillators. The yellow line has a period of 100 a *K* value of 1.2 and the red line has a period of 125 and a *K* value of 1.

As can be seen in Figure 5, robust application of the decycler bands in a trading system requires putting in some logic against whipsaw conditions such as from March 2015 to June 2015. The DecyclerOscillator seems to produce less whipsaws.

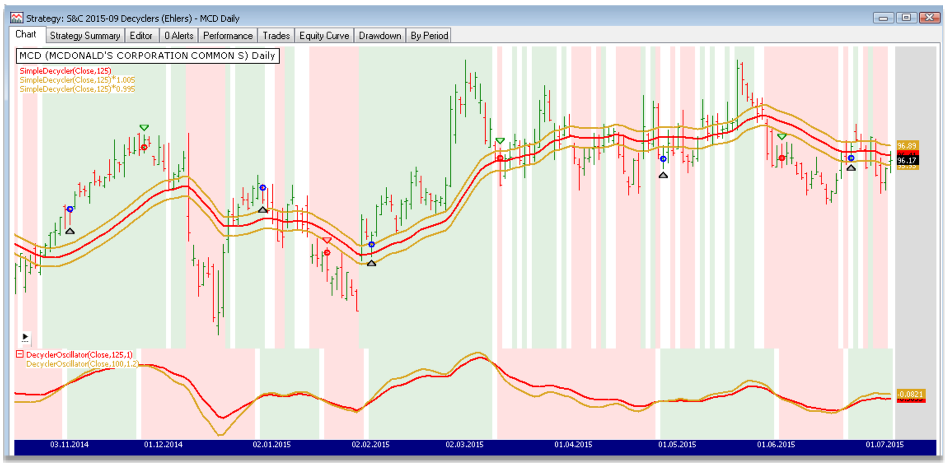
Strategy: S&C 2015-09 Decyclers (Ehlers) - MCD Daily
Chart
Strategy Summary
Editor
0 Alerts
Performance
Trades
Equity Curve
Drawdown
By Period
MCD (MCDONALD'S CORPORATION COMMON S) Daily
SimpleDecycler(Close,125)
SimpleDecycler(Close,125)*1.005
SimpleDecycler(Close,125)*0.995
96.89
96.17
DecyclerOscillator(Close,125,1)
DecyclerOscillator(Close,100,1.2)
-0.0821
03.11.2014
01.12.2014
02.01.2015
02.02.2015
02.03.2015
01.04.2015
01.05.2015
01.06.2015
01.07.2015

FIGURE 5: WEALTH-LAB. The price pane shows the decycler indicator with the hysteresis lines. The bottom pane plots a pair of decycler oscillators.

To execute the included trading system, Wealth-Lab users need to install (or update to) the latest version of the TASCIndicators library from the extensions section of our website if they haven’t already done so, and restart Wealth-Lab.

Wealth-Lab 6 code (C#):

```
using System;
using System.Collections.Generic;
using System.Text;
using System.Drawing;
using WealthLab;
using WealthLab.Indicators;
using TASCIndicators;

namespace WealthLab.Strategies
{
 public class MyStrategy : WealthScript
 {
  protected override void Execute()
  {
   // Decycler and oscillator
   SimpleDecycler sd = SimpleDecycler.Series(Close,125);
            DecyclerOscillator do1 = DecyclerOscillator.Series(Close,125,1.0);
   // Hysteresis band 0.5%
   DecyclerOscillator do2 = DecyclerOscillator.Series(Close,(int)(125 * 0.8),1.0 * 1.2);

   HideVolume();
   ChartPane paneDecyclerOsc = CreatePane(30,false,true);
   PlotSeries(paneDecyclerOsc,do1,Color.Red,LineStyle.Solid,2);
   PlotSeries(paneDecyclerOsc,do2,Color.Goldenrod,LineStyle.Solid,2);
   PlotSeries(PricePane,sd,Color.Red,LineStyle.Solid,2);
   PlotSeriesFillBand(PricePane, sd * 1.005, sd * 0.995, Color.Goldenrod, Color.Transparent, LineStyle.Solid, 2);

   for(int bar = GetTradingLoopStartBar(125); bar < Bars.Count; bar++)
   {
    if ( Close[bar] > (sd[bar] * 1.005) )
     SetPaneBackgroundColor( PricePane, bar, Color.FromArgb(30,Color.Green) );

    else
     if ( Close[bar] < (sd[bar] * 0.995) )
                    SetPaneBackgroundColor( PricePane, bar, Color.FromArgb(30,Color.Red) );

    bool reverse2Uptrend = CrossOver( bar, do2, do1 );
    bool reverse2Downtrend = CrossUnder( bar, do2, do1 );

    if (IsLastPositionActive)
    {
     if ( !reverse2Downtrend || reverse2Uptrend )
      SetPaneBackgroundColor( paneDecyclerOsc, bar, Color.FromArgb(30,Color.Green) );

     if( reverse2Downtrend )
      SellAtMarket(bar+1, LastPosition);
    }
    else
    {
     if ( reverse2Downtrend || !reverse2Uptrend )
      SetPaneBackgroundColor( paneDecyclerOsc, bar, Color.FromArgb(30,Color.Red) );


     if( reverse2Uptrend )
      BuyAtMarket(bar+1);
    }
   }
  }
 }
}
```

—Eugene, Wealth-Lab team
MS123, LLC
www.wealth-lab.com

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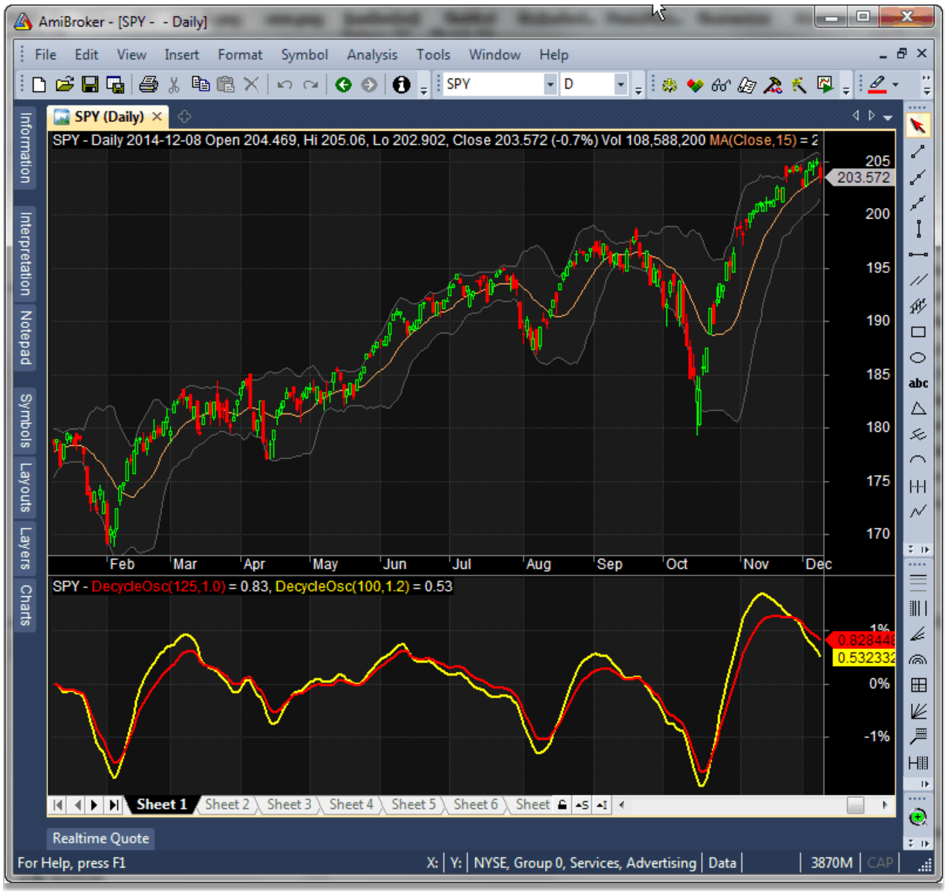
AMIBROKER: SEPTEMBER 2015

In “Decyclers” in this issue, author John Ehlers presents an oscillator based on a second-order high-pass filtering technique. A ready-to-use AmiBroker formula is shown here. The formula is written so it works with any AmiBroker version, but users of the most recent version may uncomment the part that uses the newly introduced IIR function for speed. To use the oscillator, enter the code in the formula editor and press the *apply indicator* button. You can adjust the exponential average period and the RSI smoothing period using the *parameters* window.

A sample chart is shown in Figure 6.



```
SPY - Daily 2014-12-08 Open 204.469, Hi 205.06, Lo 202.902, Close 203.572 (-0.7%) Vol 108,588,200 MA(Close,15) = 2
SPY - DecycleOsc(125,1.0) = 0.83, DecycleOsc(100,1.2) = 0.53
For Help, press F1    X: | Y: | NYSE, Group 0, Services, Advertising | Data |    3870M | CAP
```

FIGURE 6: AMIBROKER. Here is a daily chart of the SPY with decycle oscillators 125/1.0 and 100/1.2, which replicates one of the charts from John Ehlers' article in this issue.

AMIBROKER CODE LISTING.

```
SetBarsRequired( sbrAll );

function HighPass( input, alpha )
{
    output = input;

    for( i = 2; i < BarCount; i++ )
    {
      output[ i ] = ( 1 - alpha/2 ) ^ 2 *
                  ( input[ i ] - 2 * input[ i - 1 ] + input[ i -2 ] ) +
                  2 * ( 1 - alpha ) * output[ i - 1 ] -
                 ( 1 - alpha ) ^ 2 * output[ i - 2 ];
    }

    return output;
}

// newest version of AMiBroker (6.0) may use built-in IIR function instead
// - uncomment function below
/*
function HighPass( input, alpha )
{
   b0 = ( 1 - alpha/2 ) ^ 2;
   a1 = 2 * ( 1 - alpha );
   a2 = - ( 1 - alpha ) ^ 2;
   return IIR( input, b0, a1, -2 * b0, a2, b0 );
}
*/

function DecycleOsc( HPPeriod, K )
{
    alpha1 = 0;
    alpha2 = 0;
    HP = 0;
    Decycle = 0;

    // hipass filter
    PI = 3.1415926;

    angle1 = 0.707 * 2 * PI / HPPeriod;
    angle2 = 0.707 * 2 * PI / ( 0.5 * HPPeriod );

    alpha1 = ( cos( angle1 ) + sin( angle1 ) - 1 ) / cos( angle1 );
    alpha2 = ( cos( angle2 ) + sin( angle2 ) - 1 ) / cos( angle2 );

    HP = HighPass( Close, alpha1 );
    Decycle = Close - HP;
    return 100 * K * HighPass( Decycle, alpha2 );
}

Plot( DecycleOsc( 125, 1 )/Close, "DecycleOsc(125,1.0)",
      colorRed, styleThick );
Plot( DecycleOsc( 100, 1.2 )/Close, "DecycleOsc(100,1.2)",
      colorYellow, styleThick );
```

—Tomasz Janeczko, AmiBroker.com
www.amibroker.com

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NEUROSHELL TRADER: SEPTEMBER 2015

The quotient decycler and decycler oscillator indicators presented by John Ehlers in his article in this issue (“Decyclers”) can be easily implemented in NeuroShell Trader using NeuroShell Trader’s ability to call external dynamic linked libraries. Dynamic linked libraries may be written in C, C++, Power Basic, or Delphi.

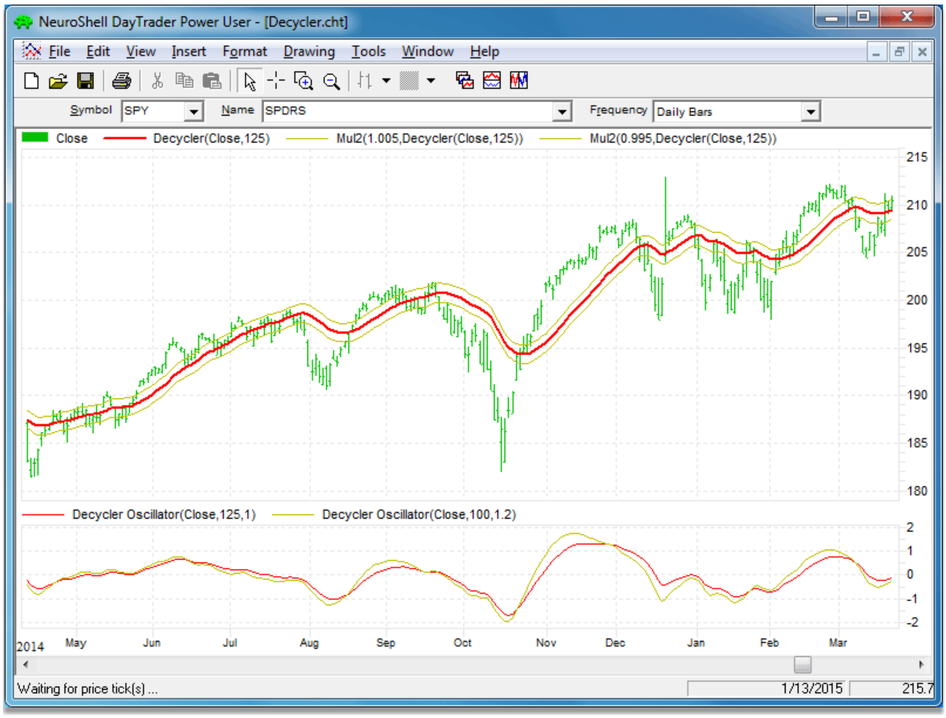
After moving the code given in Ehlers’ article sidebar to your preferred compiler and creating a DLL, you can insert the resulting indicators as follows:

1. Select “New indicator” from the **Insert** menu.
2. Choose the **external program & library calls** category.
3. Select the appropriate **external DLL call** indicator.
4. Set up the parameters to match your DLL.
5. Select the *finished* button.

Similar filter and cycle-based strategies can also be created using indicators found in John Ehlers’

Cybernetic and **MESA91** NeuroShell Trader Add-ons. Users of NeuroShell Trader can go to the Stocks & Commodities section of the NeuroShell Trader free technical support website to download a copy of this or any previous Traders' Tips.

A sample chart is shown in Figure 7.


NeuroShell DayTrader Power User - [Decycler.cht]
File
Edit
View
Insert
Format
Drawing
Tools
Window
Help
Close
Decycler(Close,125)
Mul2(1.005,Decycler(Close,125))
Mul2(0.995,Decycler(Close,125))
215
210
205
200
195
190
185
180
Decycler Oscillator(Close,125,1)
Decycler Oscillator(Close,100,1.2)
2
1
0
-1
-2
2014
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar

Symbol SPY
Name SPDRS
Frequency Daily Bars

Waiting for price tick(s) ...
1/13/2015
215.7

FIGURE 7: NEUROSHELL TRADER. This NeuroShell Trader chart displays the decycler and decyler oscillator indicators.

—Marge Sherald, Ward Systems Group, Inc.
301 662-7950, sales@wardsystems.com
www.neuroshell.com

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TRADERSSTUDIO: SEPTEMBER 2015

The TradersStudio code based on John Ehlers' article in this issue, "Decyclers," can be found at: www.TradersEdgeSystems.com/traderstips.htm.

The following code files are provided in the download:

- Function EHLERS_DECYCLER: Computes the decycler values
- Indicator plot EHLERS_DECYCLER_IND: For plotting the decycler indicator on a chart
- Function EHLERS_DECYCLER_OSC: Computes the DecyclerOsc values
- Indicator plot EHLERS_DECYCLER_OSC_IND: For plotting the DecyclerOsc indicator on a chart.

Figure 8 shows the two indicators plotted on a chart of the S&P 500 futures contract (SP) using data from Pinnacle Data Corp.

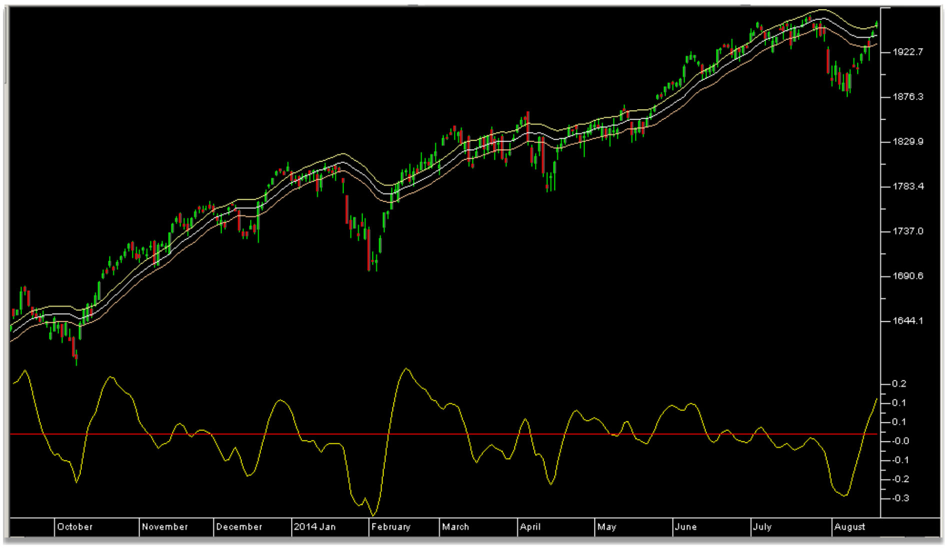

FIGURE 8: TRADERSSTUDIO. Here, the decycler indicators are shown on a chart of S&P 500 futures contract (SP).

The code is shown here as well as at the TradersEdgeSystems.com website.

```
'DECYCLERS
'Author: John F. Ehlers, TASC, Sept 2015
'Coded by: Richard Denning, 7/12/15
'www.TradersEdgeSystems.com


'HIGHPASS FILTER
Function EHLERS_DECYCLER(HPPeriod)
'HPPeriod=125
Dim alpha1
Dim HP As BarArray
If Cos(DegToRad(0.707*360/HPPeriod)) <> 0 Then
   alpha1 = (Cos(DegToRad(0.707*360/HPPeriod))+Sin(DegToRad(0.707*360/HPPeriod))-1)/Cos(DegToRad(0.707*360/HPPeriod))
End If
HP = (1-alpha1/2)*(1-alpha1/2)*(C-2*C[1]+C[2])+2*(1-alpha1)*HP[1]-(1-alpha1)*(1-alpha1)*HP[2]
EHLERS_DECYCLER = C - HP
End Function
'----------------------------------------------------------------------------------------------------
Sub EHLERS_DECYCLER_IND(HPPeriod)
Dim Decycle As BarArray
Decycle = EHLERS_DECYCLER(HPPeriod)
Plot1(Decycle)
Plot2(1.005*Decycle)
Plot3(0.995*Decycle)
End Sub
'----------------------------------------------------------------------------------------------------
function EHLERS_DECYCLER_OSC(HPPeriod)
'HPPeriod=125,K=1
Dim Decycle As BarArray
Dim alpha2 As BarArray
Dim DecycleOsc As BarArray
Decycle = EHLERS_DECYCLER(HPPeriod)
alpha2=(Cos(DegToRad(0.707*360/(0.5*HPPeriod)))+Sin(DegToRad(0.707+360/(0.5*HPPeriod))-1))/Cos(DegToRad(0.707-360/(0.5*HPPeriod)))
DecycleOsc=(1-alpha2/2)*(1-alpha2/2)*(Decycle-2*Decycle[1]+Decycle[2])+2*(1-alpha2)*DecycleOsc[1]-(1-alpha2)*(1-alpha2)*DecycleOsc[2]
EHLERS_DECYCLER_OSC=DecycleOsc
End Function
'----------------------------------------------------------------------------------------------------
sub EHLERS_DECYCLER_OSC_IND(HPPeriod,K)
Dim DecycleOsc As BarArray
DecycleOsc = EHLERS_DECYCLER_OSC(HPPeriod)
Plot1(100*K*DecycleOsc/C)
Plot2(0)
End Sub
'----------------------------------------------------------------------------------------------------
```

—Richard Denning
info@TradersEdgeSystems.com
for TradersStudio

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NINJATRADER: SEPTEMBER 2015

The *simple decycler* and *decycler oscillator* indicators described by John Ehlers in his article in this issue, “Decyclers”, has been made available for download at www.ninjatrader.com/SC/September2015SC.zip.

Once you have downloaded them, from within the NinjaTrader Control Center window, select the menu File → Utilities → Import NinjaScript and select the downloaded file. This file is for NinjaTrader version 7.

You can review the indicators’ source code by selecting the menu Tools → Edit NinjaScript → Indicator from within the NinjaTrader Control Center window and selecting either the SimpleDecycler or DecyclerOscillator file.

NinjaScript uses compiled DLLs that run native, not interpreted, to provide the highest possible performance.

A sample chart displaying the indicators is shown in Figure 9.

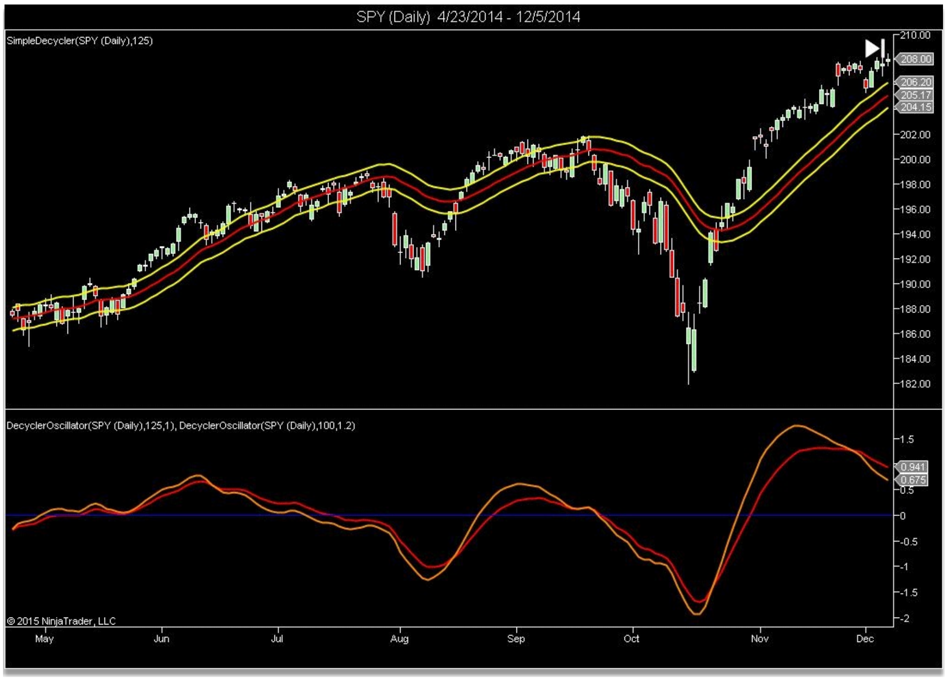

FIGURE 9: NINJATRADER. The decycler oscillator and simple decycler are displayed together on this sample SPY daily chart ended December 2014.

—Raymond Deux & Patrick Hodges
NinjaTrader, LLC
www.ninjatrader.com

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UPDATA: SEPTEMBER 2015

In “Decyclers” in this issue, author John Ehlers develops an oscillator that signals trend reversals with almost zero lag via digital signal processing techniques. A high-pass filter is subtracted from the input data and the high-frequency components are removed via cancellation of terms. Lower-frequency components are filtered from the output, so they are not canceled from the original data. Thus, the decycler displays them with close to zero lag.

The Updata code for both indicators is in the Updata library and may be downloaded by clicking the *custom* menu and *indicator library*. Those who cannot access the library due to a firewall may paste the code shown here into the Updata custom editor and save it.

```
'Decyclers
DISPLAYSTYLE 3LINES
INDICATORTYPE TOOL
COLOUR RGB(200,0,0)
COLOUR2 RGB(0,0,200)
COLOUR3 RGB(0,0,200)
PARAMETER "Period" #PERIOD=125
NAME "Decycler [" #PERIOD "]" ""
@ALPHA1=0
@HP=0
@DECYCLE=0
FOR #CURDATE=0 TO #LASTDATE
   'HIGHPASS FILTER
   @ALPHA1=1+(SIN(0.707*2*CONST_PI/#PERIOD)-1)/COS(0.707*2*CONST_PI/#PERIOD)
   @HP=(1-@ALPHA1/2)*(1-@ALPHA1/2)*(CLOSE-2*CLOSE(1)+CLOSE(2))+2*(1-@ALPHA1)*HIST(@HP,1)-(1-
@ALPHA1)*(1-@ALPHA1)*HIST(@HP,2)
   'DECYCLE THE DIFFERENCE BETWEEN INPUT AND HP DATA
   @DECYCLE=CLOSE-@HP
   @PLOT=@DECYCLE
   @PLOT2=1.005*@DECYCLE
   @PLOT3=0.995*@DECYCLE
NEXT

'DecyclerOscillator
DISPLAYSTYLE 2LINES
INDICATORTYPE CHART
COLOUR RGB(200,0,0)
COLOUR2 RGB(0,0,200)
COLOUR3 RGB(0,0,200)
PARAMETER "Period" #PERIOD=125
PARAMETER "K" @K=1
NAME "Decycler Osc. [" #PERIOD "] x [" @K "]" ""
@ALPHA1=0
@ALPHA2=0
@HP=0
@DECYCLE=0
@DECYCLEOSC=0
FOR #CURDATE=0 TO #LASTDATE
   'HIGHPASS FILTER
   @ALPHA1=1+(SIN(0.707*2*CONST_PI/#PERIOD)-1)/COS(0.707*2*CONST_PI/#PERIOD)
   @HP=(1-@ALPHA1/2)*(1-@ALPHA1/2)*(CLOSE-2*CLOSE(1)+CLOSE(2))+2*(1-@ALPHA1)*HIST(@HP,1)-(1-
@ALPHA1)*(1-@ALPHA1)*HIST(@HP,2)
   'DECYCLE THE DIFFERENCE BETWEEN INPUT AND HP DATA
   @DECYCLE=CLOSE-@HP
   'HIGHPASS FILTER OF DECYCLE TO CREATE THE OSC.
   @ALPHA2=1+(SIN(0.707*2*CONST_PI/(#PERIOD*0.5))-1)/COS(0.707*2*CONST_PI/(#PERIOD*0.5))
   @DECYCLEOSC=(1-@ALPHA1/2)*(1-@ALPHA1/2)*(@DECYCLE-2*HIST(@DECYCLE,1)+HIST(@DECYCLE,2))+2*(1-
@ALPHA1)*HIST(@DECYCLEOSC,1)-(1-@ALPHA1)*(1-@ALPHA1)*HIST(@DECYCLEOSC,2)
   @PLOT=100*@K*@DECYCLEOSC/CLOSE
   @PLOT2=0
NEXT
```

A sample chart is shown in Figure 10.

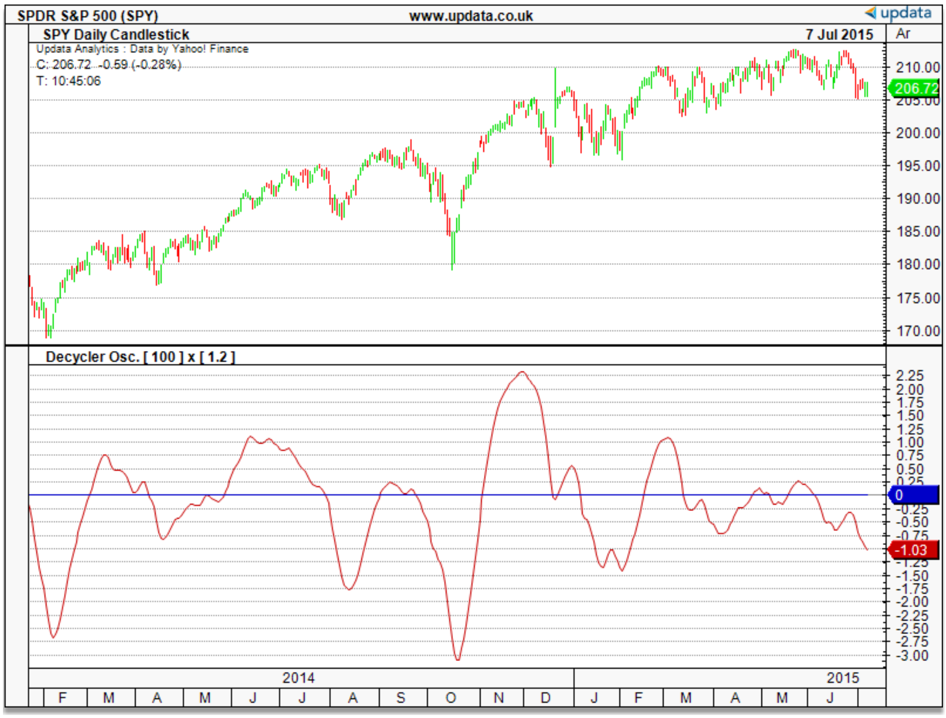

FIGURE 10: UPDATA. This chart shows the decycler oscillator [100][1.2] as applied to the SPY ETF of daily resolution.

—Updata support team
support@updata.co.uk, www.updata.co.uk

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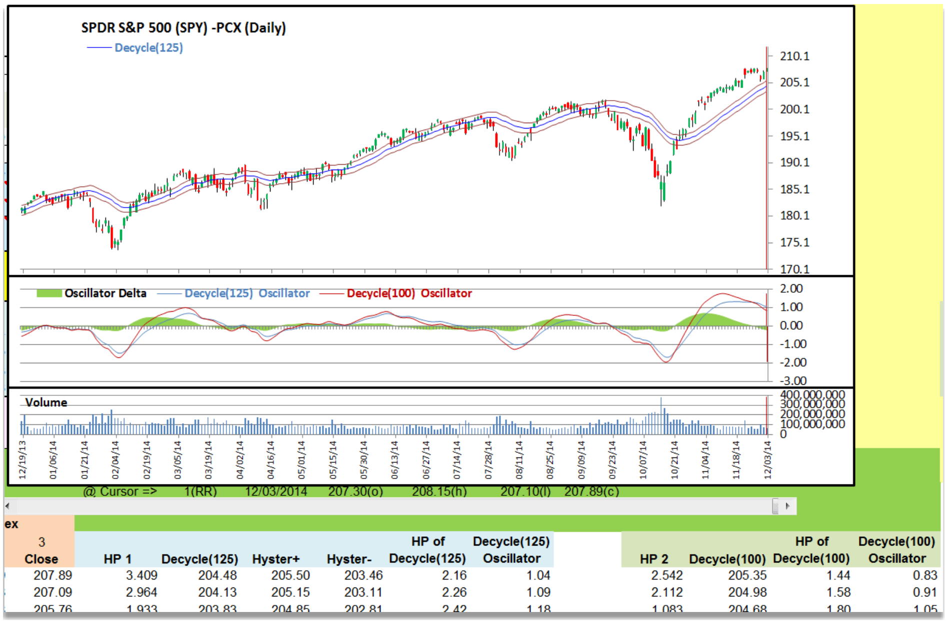
MICROSOFT EXCEL: SEPTEMBER 2015

In his article in this issue, titled "Decyclers," author John Ehlers presents a simple, interesting new way to use the high-pass filter concept that he has discussed before in previous articles and contexts. The idea is to subtract the high-pass filter value from the current close to get a "decycled" indicator that follows the trend rather well by removing much of the distracting high-frequency chatter. Apply a second high-pass filter using half the period from the first filter to the decycled indicator and you get a smoother result with much-reduced lag.

Divide this second result by the close value and you have an oscillator whose turning points provide very good sensitivity to trend turning points of our data—perhaps even better (with a bit less lag) than the base decycled indicator.

Ehlers suggests calculating two such oscillators with differing high-pass periods and plotting them with appropriate scaling. Then use the crossover points to confirm trend changes.

As shown on my oscillator plot in Figure 11, I find that it is also interesting to plot the delta of the two oscillators as a visual indication of the potential current strength of the indicated trend.



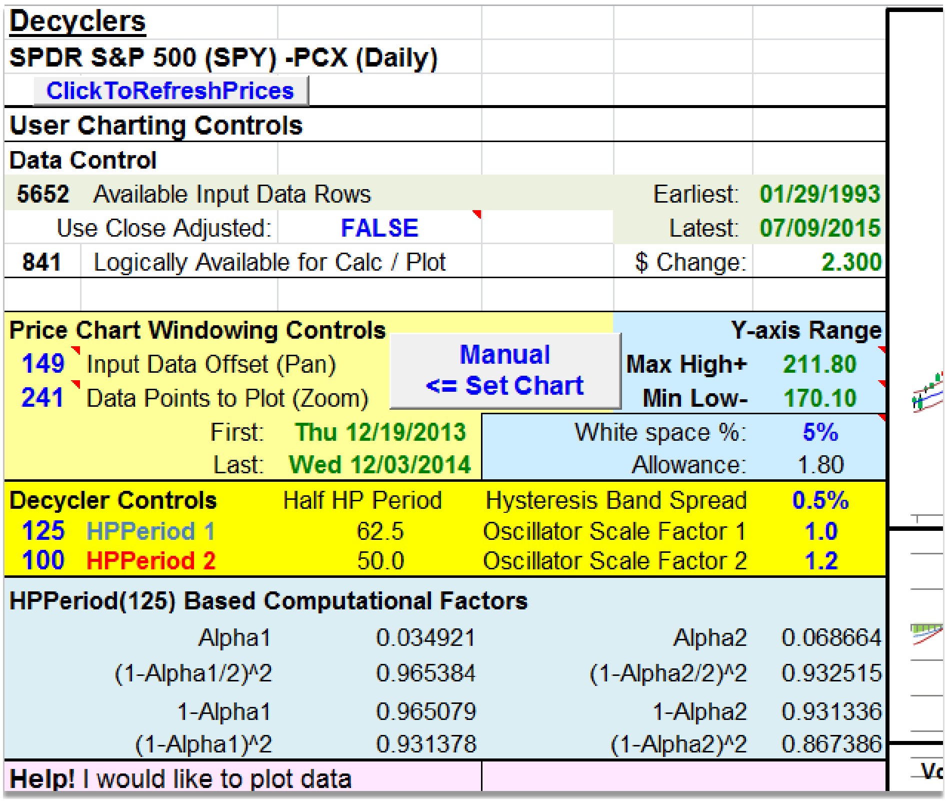
@ Cursor => 1(RR) 12/03/2014 207.30(o) 208.15(h) 207.10(l) 207.89(c)

ex

3 Close	HP 1	Decycle(125)	Hyster+	Hyster-	HP of Decycle(125)	Decycle(125) Oscillator	HP 2	Decycle(100)	HP of Decycle(100)	Decycle(100) Oscillator
207.89	3.409	204.48	205.50	203.46	2.16	1.04	2.542	205.35	1.44	0.83
207.09	2.964	204.13	205.15	203.11	2.26	1.09	2.112	204.98	1.58	0.91
205.76	1.933	203.83	204.85	202.81	2.42	1.18	1.083	204.68	1.80	1.05

FIGURE 11: EXCEL, SPY. Here is an Excel-produced composite, which approximates Figures 1 & 2 from John Ehlers' article in this issue. The date range used here is 12/19/2013 to 12/03/2014.

Figure 12 shows the five user-adjustable control values for the decycler and oscillator computations.



Decyclers

SPDR S&P 500 (SPY) -PCX (Daily)

ClickToRefreshPrices

User Charting Controls

Data Control

5652	Available Input Data Rows	Earliest:	01/29/1993
	Use Close Adjusted: FALSE	Latest:	07/09/2015
841	Logically Available for Calc / Plot	$ Change:	2.300

Price Chart Windowing Controls

149	Input Data Offset (Pan)	Max High+	211.80
241	Data Points to Plot (Zoom)	Min Low-	170.10
First:	Thu 12/19/2013	White space %:	5%
Last:	Wed 12/03/2014	Allowance:	1.80

Manual
<= Set Chart

Y-axis Range

Decycler Controls	Half HP Period		
125 HPPeriod 1	62.5	Hysteresis Band Spread	0.5%
		Oscillator Scale Factor 1	1.0
100 HPPeriod 2	50.0	Oscillator Scale Factor 2	1.2

HPPeriod(125) Based Computational Factors

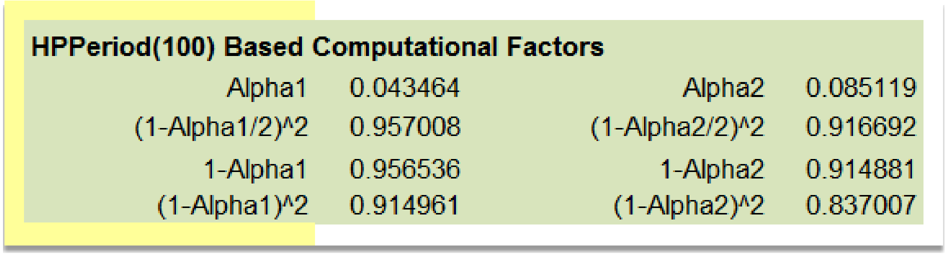
Alpha1	0.034921	Alpha2	0.068664
(1-Alpha1/2)^2	0.965384	(1-Alpha2/2)^2	0.932515
1-Alpha1	0.965079	1-Alpha2	0.931336
(1-Alpha1)^2	0.931378	(1-Alpha2)^2	0.867386

Help! I would like to plot data

FIGURE 12: EXCEL, USER CONTROLS. This shows the user controls: decycler periods, scale factors, and band spread.

In Ehlers' article sidebar, he presents formulas for the high-pass filter and oscillator. In the formulas, there are eight computational factors that remain constant once the high-pass period has been selected. I chose to compute these once and use the results in the indicator cell formulas. This approach saves computational time and physical space in memory and on disk.

Figure 13 shows the corresponding constants for the second oscillator computations. These can be found to the right of the charts.



HPPeriod(100) Based Computational Factors

Alpha1	0.043464	Alpha2	0.085119
(1-Alpha1/2)^2	0.957008	(1-Alpha2/2)^2	0.916692
1-Alpha1	0.956536	1-Alpha2	0.914881
(1-Alpha1)^2	0.914961	(1-Alpha2)^2	0.837007

FIGURE 13: EXCEL, COMPUTATIONS. This shows the “constants” for the second oscillator computations.

The spreadsheet file for this Traders’ Tip can be downloaded here. To successfully download it, follow these steps:

- Right-click on the Excel file link, then
- Select “save as” (or “save target as”) to place a copy of the spreadsheet file on your hard drive.

—Ron McAllister
Excel and VBA programmer
rpmac_xltt@sprynet.com

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