CHART PATTERNS

Identify And Trade Formations

Detecting Breakouts From Flags & Pennants

Here's a system to identify and trade flag and pennant formations.

by Markos Katsanos

In my previous article, I wrote about the measuring implications, duration, and identifying characteristics of flags and their variations, and promised to present a system to identify and trade these short-term and highly profitable formations. I constructed a viable system by distilling the most useful statistics together with technical observations of 100 flag and pennant samples. I optimized the test parameters in further out-of-sample testing of a list of 250 stocks.

In this article, I have presented the formula and methods used in this system, along with the test results on four stocks. I found the most profitable test returned an adequate 187% profit being only 8% of the time in the market, versus a tragic 91% loss for the buy and hold investor.

A frequent trader, however, will need to wait for the next entry signal, since the system test produced only one trade per year on average. Nevertheless, this need not be a major disadvantage, as a daily scan of a large database of stocks is bound to produce a few trades. I ran a MetaStock exploration on a database of 1,250 stocks and produced 13 hits. Results were highly profitable, producing an annualized 735% profit.

TEST DESIGN

The formula language of off-the-shelf technical analysis programs like MetaStock might be easy to use for the usual tasks but presents major limitations in recognizing patterns or formations. On the other hand, a lower-level programming language can be more effective but will require extensive and tedious programming.

METASTOCK CODE: SYSTEM TEST, FLAGS & PENNANTS

Enter Long

```
ZZ:=Zig(C,17,%);
X:=BarsSince(ZZ<Ref(ZZ,-1)AND Ref(ZZ,-1)>Ref(ZZ,-2));
X1:=LASTVALUE(X)+1; {flag duration}
X2:=X1+1;
SD:=Stdev(C,X2);

PERIOD:=22;
COEF:=.1;
INTRA:=Log(H)-Log(L);
VINTRA:=Stdev(INTRA,PERIOD);
INTER:=Log(Typical())-Log(Ref(Typical(),-1));
VINTER:=Stdev(INTER,PERIOD);
CUTOFF:=COEF*(VINTER+VINTRA)*C;
MF:=C-(H+L)/2+Typical()-Ref(Typical(),-1);
FVE:=Sum(If(MF>CUTOFF, +V, If(MF <-CUTOFF, -V,0)),PERIOD)/
Mov(V,PERIOD,S)/PERIOD*100;


X1<21 and X1>2 AND {Condition 1}
Ref(LinRegSlope(C,13)/Ref(C,-13)*100,-X1)>2.2{Condition 2}
AND Ref(LinRegSlope(C,X2)/Ref(C,-X2),-1)*100<.2
AND LinRegSlope(C,X1)/Ref(C,-X1)>-1.2 {Condition 3}
AND Ref(LinRegSlope(V,X2)/Ref(V,-X2),-1)*100<-2 {Condition 4}
AND Ref(LinRegSlope(SD,X1),-1)<0 {Condition 5}
AND Stoch(20,3)>55 AND ADX(10)>30{Condition 6}
AND FVE>10 AND Fml("VFI")>-3 {Condition 7}
 AND C>Ref(C,-1) AND C>O {Condition 8}
```

Sell Order

```
D1:=Simulation.CurrentPositionAge; D2:=LASTVALUE(D1);
 zz:=Zig(Ref(C,-D2),17,%);
X:=BarsSince(ZZ<Ref(ZZ,-1)AND Ref(ZZ,-1)>Ref(ZZ,-2));
X1:=LastValue(X)+1; {flag duration}
c1:=LLV(C,(D2+40)); {pole base}
c2:=ref(hhv(c,22),-D2); {pole top}

BREAK1:= Simulation.CurrentPositionPerformance*100;
POLE:=(C2-C1)/C1*100; {pole height %}

{EXIT CONDITIONS}
BREAK1 >1.94* Power(pole ,.724) { Exit condition 1- profit target }
OR C<REF(LLV(C,X1),-D2) { Exit condition 2 stop loss on breaking
of lower flag trendline}
OR (D2>14 AND BREAK1<.25*POLE) { Exit condition 3-inactivity }
OR (D2>3 AND C<.9*HHV(C,4)) { Exit condition 4-trailing stop loss}
OR D2>24 { Exit condition 5-time exit}
```

To create this test, click on "Enhanced system tester," click on "New system," and type the buy and sell order code shown above. To run the test, click on "New simulation," add securities, and select the stocks you want to test. Then click on "Next," type in an initial equity of $10,000, select default size transaction cost 10000, select "only long trades," and check "Close all positions on the last bar." Click on "More…", fill in an interest rate of 3%, and fill in 10 points per transaction for the commissions. Click on "trade execution," uncheck "realistic market prices," and select "Buy price at open" and "Sell price at close." Fill in *one day* for the delay.—*MK*

Nevertheless, I did my best to design a system that identified an adequate number of flags and pennants, using only the formulas available in MetaStock (see sidebar 1, "MetaStock code: system test, flags & pennants"). I did so with only nine lines of code, as opposed to more than a hundred that would have been required had I used a lower-level programming language instead. I do not claim, however, that the system can identify all possible flag patterns that could be detected visually or otherwise.

I used mainly the zigzag and linear regression slope function to identify the patterns. The zigzag function identified the flagpole top, and the linear regression slope ensured that a steep and quick move was followed by a sideways or slightly down flag formation. The following test conditions were used to identify the pattern.

BUY CONDITIONS
Buy condition 1: Flag duration

FLAG & PENNANT STATISTICS

	Breakout %	Flagpole Height %	Formation Slope Total %	Formation Slope% Per Day	Volume Decline% Per Day	Breakout Duration Days	Flagpole Duration Days	Formation Duration Days
Average	45%	67%	-3.4%	-0.4%	-9.5%	11	13	10
Median	33%	54%	-2.7%	-0.2%	-5.1%	9	10	9
95% percentile	123%	160%	5.0%	0.6%	-47%	24	29	21
90% percentile	87%	125%	3.0%	0.2%	-25%	22	26	16
10% percentile	15%	24%	-9.7%	-1.2%	0.7%	3	3	5
5% percentile	12%	21%	-13.1%	-1.8%	2.0%	2	2	4

FIGURE 1: STATISTICS FOR BULLISH-ONLY FORMATIONS. The percent breakout is measured from the point at which the upper trendline is broken in an uptrend. The duration is in trading days and does not include weekends and holidays. The formation characteristics are divided by percentiles according to values below which certain percentages of cases fall. So for example, the 5% percentile of the formation duration is four days, which means that 5% of the formations will last for four days or less.

The flag or pennant duration was limited to 21 trading days. This was derived from the statistical results presented in my previous article and reproduced here. According to Figure 1, the maximum duration of 21 days included 95% of the flags in the sample.

The duration was measured from the latest reversal identified by the zigzag function.

Buy condition 2: Flagpole
A 24% rise for the pole would include, according to the statistics in Figure 1, 90% of the flags in the sample. However, after testing I found that this was not steep enough, as some nonflag formations were identified incorrectly. So I

increased the pole slope to 28.6% or 2.2% per day.

This I expressed mathematically in terms of the linear regression slope:

$$LRS(13)_{-X1} > 2.2\% * C_{-(X1+13)}$$

Where:
X1=Flag duration in bars or trading days.
LRS_{-X1}=Slope of the 13 bar Linear regression line X1 bars ago.
$C_{-(X1+13)}$ = Closing Price X1+13 bars ago.

Buy condition 3: Slope of flag
The slope of the flag or pennant is limited to no more than 0.2% and no less than -1.2% per day. According to the statistics in Figure 1, these values were at the 90% and 10% percentiles, respectively, and would include 80% of the flags in the sample. Flags or pennants declining by more than -10% (or -1.2% per day) were more likely to fail and, hence, excluded.

Buy condition 4: Volume
This condition ensured that volume was declining by more than -2% per day during the flag or pennant formation and was implemented in terms of the volume linear regression line during the formation. The linear regression slope calculation did not include the signal or current date, as this was usually outside the formation trendline.

These conditions identified stocks forming a flag or pennant pattern, but none ensured that it would actually break out from the formation.

To predict a possible breakout, I compiled a list of 100 flags or similar formations and noted the values and direction of a number of indicators just before the breakout. I carried out a frequency distribution analysis and found five indicators to have predictive power or persistent bullish readings for more than 90% of the time prior to the breakout from the formation. These were used in coming up with the following conditions.

Buy condition 5: Volatility
This condition confirmed that the volatility (as measured by the standard deviation) was declining during the flag formation. This was true for more than 90% of the cases before the breakout.

Buy condition 6: Stochastics and ADX
Both the stochastics oscillator and the average directional movement index (ADX) had persistently high values before the breakout, despite the sideways or slightly down price action. This condition made certain that the 20-day stochastic was above 55 and the 10-day ADX was above 30.

> **Specifying the optimum exit or stop-loss conditions is sometimes the most challenging and strenuous task of system design.**

METASTOCK CODE FOR VFI FORMULA

```
PERIOD:= Input("PERIOD FOR VFI ",5,1300,130);
COEF:=.2;
VCOEF:=Input("MAX VOLUME CUTOFF",0,50,2.5);
INTER:=Log(Typical())-Log(Ref(Typical(),-1));
VINTER:=Stdev(INTER,30);
CUTOFF:=COEF*VINTER*C;
VAVE:=Ref(Mov(V,PERIOD,S),-1);
VMAX:=VAVE*VCOEF;
VC:=If(V<VMAX,V,VMAX);
MF:=Typical()-Ref(Typical(),-1);
VFI:=Sum(If(MF>CUTOFF, +VC, If(MF <-CUTOFF, -VC,0)),PERIOD)/
VAVE;
Mov(VFI,3,E);
```

To recreate the VFI in MetaStock, click on the Indicator Builder (fx), click on "New…", type "VFI" in the Name box and paste this code into the formula box.—*MK*

Buy condition 7: Money flow
Money flow indicators also indicated high readings before the breakout. More specifically, the finite volume indicator (FVE) was above 10 for more than 95% of the time and the volume flow indicator (VFI) was above -3 for more than 90% of the time. (See sidebar 2, "MetaStock code for the VFI formula.") The FVE, as discussed in my September 2003 article, is a short-term money flow indicator. A simplified interpretation of the FVE is that values above zero indicate a bullish state and the crossing of the zero line is the buy signal. The interpretation of the volume flow indicator (VFI) (as discussed in my June 2004 article) is similar to the FVE; the only difference is the time horizon under consideration, as the VFI is a longer-term indicator.

This condition ensured that the 22-day FVE was above 10 and the 130-day VFI was above -3.

Buy condition 8: Price
From the standpoint of logic, the stock should break above the upper trendline of the formation before initiating a trade. On testing, however, this condition did not produce the best results, so I abandoned it. Instead, I used a condition that required the closing price to be higher than both yesterday's close and the opening price.

This confirmed that the stock was starting to wake up from the brief lethargic state during a flag, but a breakout wasn't mandatory.

EXIT CONDITIONS
As with all chart patterns, flags and pennants do not always perform as expected, so it was necessary to create exit conditions to preserve profits or minimize losses. Specifying the optimum exit or stop-loss conditions is sometimes the most challenging and strenuous task of system design. To maximize profits and minimize losses, I came up with the following five exit conditions.
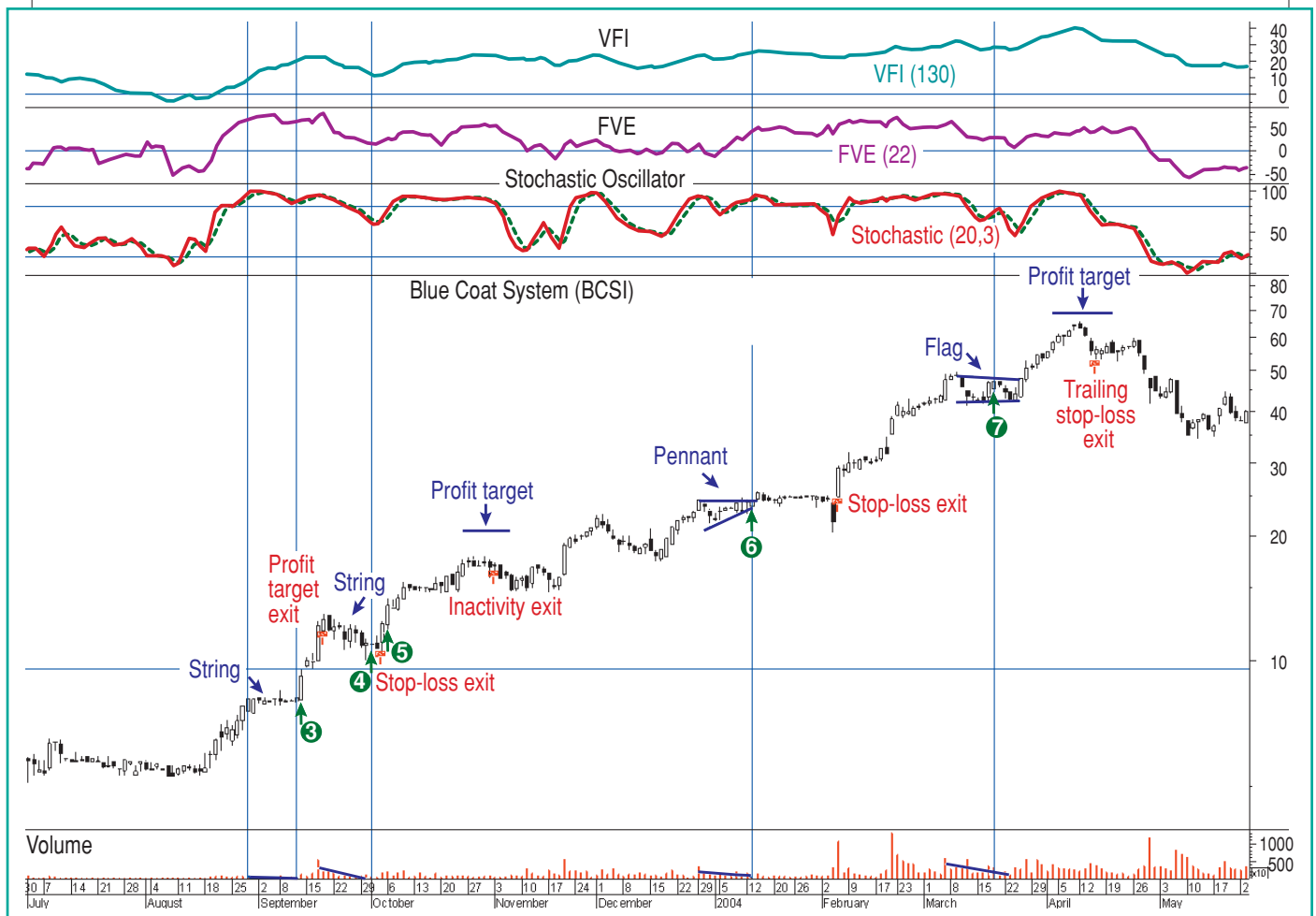
FIGURE 2: BLUE COAT SYSTEMS (BCSI). Note the high values of stochastic (third window from the top), the VFI (first window from the top in green), and the FVE (second window from the top) during each trade. Volume also declined during the formation (depicted by the linear regression line in blue). Trade numbers are in green circles. The first two trades are not shown.

Exit condition 1: Price target
I used the following formula derived in my April 2005 article to exit the trade:

Formula 1: Target= $1.94 \times pole^{0.724}$

The position was exited on the next bar if the profit percentage exceeded the value derived by this formula, in terms of the flagpole. The formula was derived statistically by means of linear regression on 100 flag and pennant samples. It was considerably less optimistic than the traditional measuring formula of equal pole and breakout percentages.

Exit condition 2: Stop-loss
I used a stop-loss to exit the trade if the stock broke the lower formation trendline on a closing basis.

Exit condition 3: Inactivity minimum change
This stop was included to stop out trades that did not perform as expected after a reasonable amount of time. It was triggered if the minimum favorable advance was less than 25%

of the profit target. This stop was set up when the position was held for more than 14 trading days.

Exit condition 4: Trailing stop-loss
The main reason for including a trailing stop was to preserve unrealized profits. It was particularly useful when stocks broke out of the formation but failed to achieve the predicted profit target and reversed to the downside. This stop was triggered if the difference between the highest value in the preceding four-day trailing period and the current bar on a closing basis was more than 10%.

Exit condition 5: Time exit
If none of these conditions were triggered, the trade was terminated after 24 trading days. According to the statistics in Figure 1, this allowed adequate time to include 95% of the formation breakouts.

If one of these exit conditions was triggered, all positions were exited at the next day's close.

FIGURE 3: APPLIED DIGITAL (ADSX). Only one trade was detected by the system. Note the dramatic drop of the volatility (as depicted by the 10-day standard deviation) during the formation (first window from the top), the FVE (second window from the top in pink), remained above 30 despite the 12-day selloff. Volume also declined during the formation (depicted by the linear regression line in blue)

DIAGNOSIS

Flag formations and their variations appeared more frequently in volatile technology stocks trading on the Nasdaq. Nevertheless, for the sake of balance, I chose a sample of four stocks, two trading on the Nasdaq and two on the New York Stock Exchange (NYSE).

The system did not compound profits and all trades were based on a maximum total transaction cost of $10,000. All orders were executed at the next day's opening price at the market, and the commission charged was $10. Interest was credited at an average rate of 3% when out of the market.

The duration of the test was five years (December 4, 2000, to January 14, 2005) and included a variety of market conditions, from the devastating 2000–02 bear market to the 2003–04 rally and the most recent sideways market.

TEST RESULTS

Example 1: The first stock I tested was Blue Coat Systems (BCSI), an Internet software company. I chose this stock because of the many diverse formation variations and exit conditions.

A buy and hold investor would have lost not only his coat but his shirt and socks as well when the stock dropped 91% from a high of $207 to $19. Nevertheless, the system was highly profitable (see Figure 5), yielding an annualized profit of 45% with no short-selling. The system detected seven formations including four strings, two pennants, and one flag. To refresh your memory, the string (as described in my April 2005 article) is a flaglike formation moving in a very tight range and making no visible peaks or troughs. The strings performed better than the pennants, which verified my statistical results.

Only one trade met or exceeded the profit target predicted by formula 1, but the elaborate exit conditions managed to keep the rest of the trades profitable. The first pennant (not shown in Figure 2) in December 2001 failed to break out, mainly because of bearish market conditions — and was exited by the trailing stop-loss (exit condition 4). The second trade also failed, as the stock was already overextended from a preceding flag not detected by the system.

The trade was terminated appropriately by the inactivity exit provision. The third trade (string) did reach the profit target calculated by formula 1 and was exited on time before the subsequent correction. The next trade was also triggered
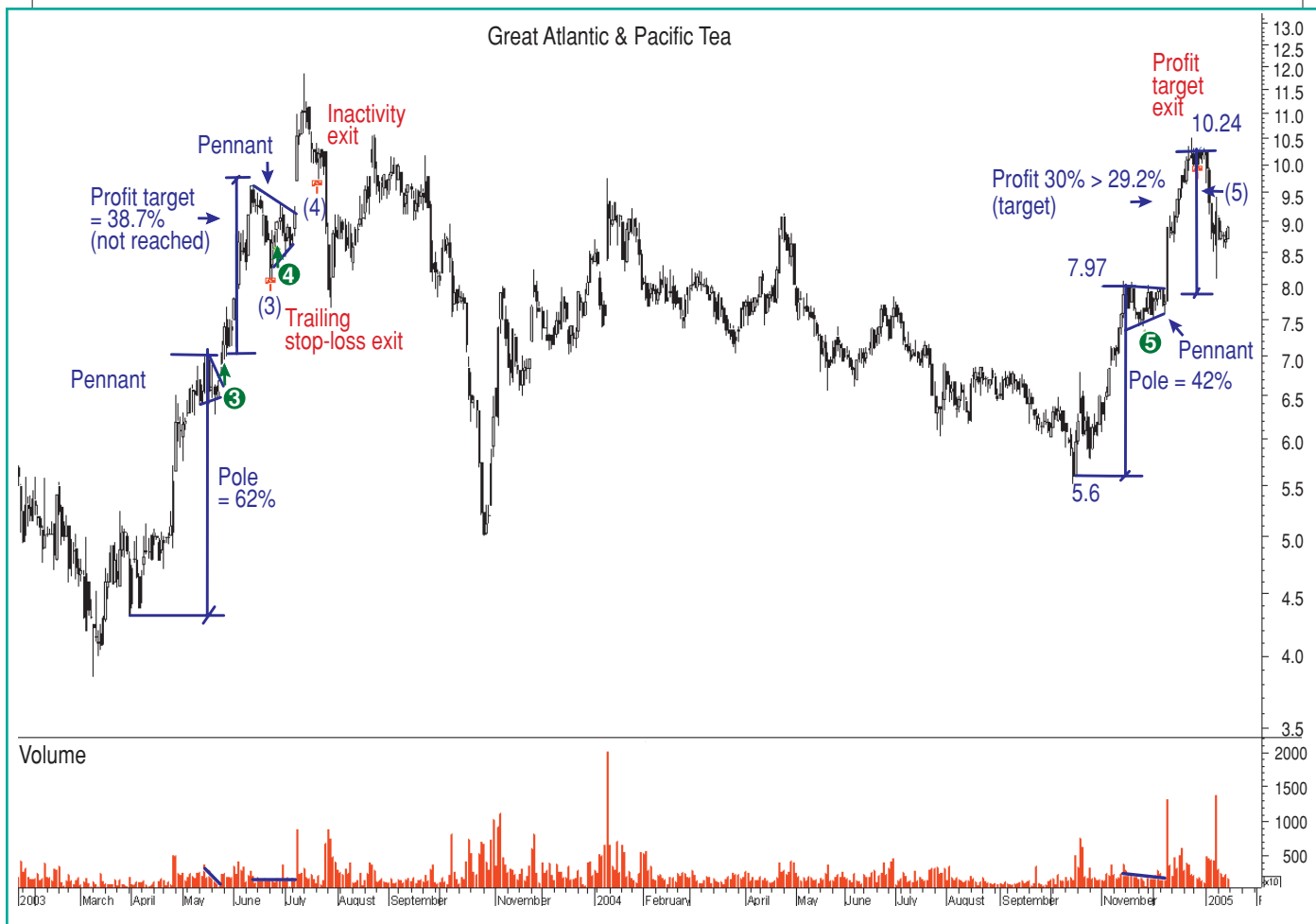
FIGURE 4: GREAT ATLANTIC & PACIFIC TEA CORP (GAP). Only the last three trades are shown. Trade 3 (first trade indicated) missed the predicted target by only 3%. The last trade managed to reach the predicted price objective and was exited in a timely manner, avoiding the abrupt and precipitous reversal that followed.

by a string but was exited prematurely by the stop-loss as it dipped below the string's lower trendline. Fortunately, it was reentered a couple of days later (but at a higher price). This trade was highly profitable but was a little shy from the profit target, exited by the inactivity stop.

The sixth trade, initiated by a pennant, was also exited prematurely by the stop-loss condition as it dipped for only a day below the pennant's lower trendline. This was very unfortunate, as it could have been the test's best trade had it not been stopped out. Finally, the last trade, triggered by a flag, also did not reach the price target and was stopped out by the trailing stop-loss condition.

Example 2: Applied Digital Solution Corp. (ADSX) formed a funnel (see Figure 3) after a vehement 118% rise in late October 2004. The funnel is a flaglike variation and looks like a mini–broadening formation or a pennant turned backward.

In the next 20 days, the stock broke out, exceeding the projected price target. The Great Atlantic & Pacific Tea Corp. (GAP) test in Figure 4 detected two strings (not shown) and three pennants.

Only two trades met or exceeded their price target, while the other three, although profitable, did not quite reach their respective price targets and were exited by the inactivity or trailing stop-loss exit provision. The fourth trade, which used the previous trade's breakout for a pole, did not reach the expected target, as the stock was already exhausted by the preceding successful pennant breakout.

Example 3: US Gypsum Corp. (not shown) produced relatively frequent flags or pennants, as it tended to move violently on news of asbestos litigation reform by Congress. This test, although the least profitable, produced a respectable 69% profit compared with a 17% loss for the buy and hold investor. In this case, the trailing stop was detrimental to the overall performance as it triggered a premature exit from the fourth

> **Selecting an exit is crucial to a successful trade. In designing this system, I tried to remove subjective human emotions by specifying automatic exit conditions.**

PROFITABILITY REPORT: FLAG & PENNANT SYSTEM

CHART STOCK SYMBOL	Fig 2 BCSI	Fig 3 ADSX	Fig 4 GAP	USG	Fig 6 Exploration
Total Net Profit	$18,725	$11,071	$14,304	$6,888	$26,182
Profit/Loss %	187%	111%	143%	69%	26%
Annual % Gain/Loss	45.5%	22.1%	28.6%	13.8%	735%
Buy and Hold Profit/Loss	-$9,094	-$9,339	-$6,934	-$1,705	
Buy and Hold % Profit/Loss	-91%	-93%	-69%	-17%	
Annual Buy and Hold % Profit/Loss	-22.1%	-18.6%	-13.8%	-3.4%	
Total Number of Trades	7	1	5	5	13
Winning Trades	7	1	5	3	11
Losing Trades	0	0	0	2	2
% Profitable	100%	100%	100%	60%	85%
Avg. Winning Trade	$2,368	$9,082	$2,346	$2,403	$2,522
Avg. Losing Trade	N/A	N/A	N/A	-$1,235	-$648
Ratio Avg. Win/Avg. Loss	N/A	N/A	N/A	1.95	3.89
Profitability Coefficient	100%	100%	100%	26%	64%
Best Trade	$11,598	$9,082	$3,284	$3,681	$6,410
Worst Trade	-$2,510	N/A	$1,538	-$2,030	-$717
Most Adverse Intraday Excursion	-$1,374	-$463	-$651	-$2,160	$0
Max. Equity Drawdown (below initial)	$0	$0	$0	$0	$0
Reference Bars Needed	260	260	260	260	260
Start Date/Loaded Data	11/22/99	12/31/98	12/31/98	12/31/98	5/16/02
Start Date/Test	12/4/00	1/13/00	1/13/00	1/13/00	6/2/03
End Date	1/14/05	1/14/05	1/14/05	1/14/05	6/13/03
Test Period (days)	1,502	1,828	1,828	1,828	13
Avg. Trade Length (bars)	12	21	18	12	10
Total Time in the Market (days)	125	32	137	78	13
Total Time % in the Market	8%	2%	7%	4%	
Stock Price at Start of Test	207.50	77.80	28.81	42.56	
Stock Price at End of Test	19.09	5.24	8.89	35.49	

FIGURE 5: PROFITABILITY REPORT. The system produced respectable profits with no short sales, despite abysmal buy and hold performance. Intraday drawdown was very low mainly because of the elaborate exit conditions. The stop-loss condition did not always perform as intended, and in the case of USG, it stopped out a trade that could have been the best of the test.

EXPLORATION RESULTS

Symbol	Entry Price	No. of Shares	Total Amount	Pole Top	Pole Bottom	Pole %	Target %	Target Price	Exit Price	Exit Date	Trade Duration (Bars)	Trade Duration (Days)	Profit %	Amount	Reason for Exit
ATPG	4.51	1,704	$7,685	4.75	3.1	53.2	34.5	6.06	6.75	6/11/03	8	9	49.7%	$11,502	Target
CVM	0.70	10,977	$7,684	0.47	0.21	123.8	63.5	0.74	1.27	6/4/03	2	2	81.4%	$13,941	Target
LNG	2.78	2,763	$7,681	2.89	1.76	64.2	39.5	3.77	5.1	6/11/03	8	9	83.5%	$14,091	Target
EMKR	2.89	2,658	$7,682	2.87	1.8	59.4	37.3	3.57	3.74	6/4/03	2	2	29.4%	$9,941	Target
GLBL	5.70	1,348	$7,684	5.71	4.38	30.4	23.0	6.80	5.27	6/16/03	5	14	-7.5%	$7,104	Stop Loss
GRIC	4.36	1,763	$7,687	4.35	2.35	85.1	48.4	6.09	4.58	6/16/03	11	14	5.0%	$8,075	Trailing Stop
HCR	23.70	324	$7,679	24	19.29	24.4	19.6	28.34	27.05	7/3/03	24	31	14.1%	$8,764	Time exit
MSO	11.03	696	$7,677	12	8.11	48.0	32.0	14.40	10	6/4/03	2	2	-9.3%	$6,960	Stop Loss
NOOF	1.26	6,097	$7,682	1.3	0.75	73.3	43.5	1.78	1.69	6/27/03	18	25	34.1%	$10,304	Target
PKD	2.77	2,773	$7,681	2.87	1.96	46.4	31.2	3.66	2.82	6/20/03	15	18	1.8%	$7,820	Inactivity
STEM	1.70	4,519	$7,682	1.82	0.66	175.8	81.9	3.13	1.96	6/17/03	12	15	15.3%	$8,857	Trailing Stop
TKO	2.54	3,026	$7,686	2.68	1.48	81.1	46.8	3.71	3.43	6/9/03	7	7	35.0%	$10,379	Target
USG	11.69	657	$7,680	12	4.98	141.0	69.8	19.76	13.05	6/20/03	15	18	11.6%	$8,574	Inactivity
		$99,870							average	9.9	12.8		$126,312	
Commission		+130											-130	
		$100,000										26.2%	$126,182	

FIGURE 6: RESULTS OF AN EXPLORATION RUN ON 6/1/03. Trades are entered at next day's opening price and exited manually according to the same exit conditions used for the test and described in the article. If one of the exit conditions becomes prime, trades are stopped at next day's close. All trades were limited to 5% of the trading day's volume. In case of illiquid stocks (like NOOF), the trade was extended for the next three days until the required amount of shares was accumulated.

METASTOCK EXPLORATION FOR FLAG AND PENNANT PATTERN-RECOGNITION SYSTEM

Go to the Explorer and choose the New button. Enter the following formulas for the columns and filter:

Column A
Name: Price
Formula: C

Column B
Name: Pole Top
Formula:
 zz:=Zig(C,17,%);
X:=BarsSince(ZZ<Ref(ZZ,-1)AND Ref(ZZ,-1)>Ref(ZZ,-2));
X1:=LastValue(X)+1;
c2:=Ref(HHV(C,(2+X1)),-1);C2

Column C
Name: Pole Bot
Formula:
 zz:=Zig(C,17,%);
X:=BarsSince(ZZ<Ref(ZZ,-1)AND Ref(ZZ,-1)>Ref(ZZ,-2));
X1:=LastValue(X)+1;
C3:=Ref(LLV(C,26),-X1);C3

Column D
Name: Pole %
Formula:
 zz:=Zig(C,17,%);
X:=BarsSince(ZZ<Ref(ZZ,-1)AND Ref(ZZ,-1)>Ref(ZZ,-2));
X1:=LastValue(X)+1;
c2:=Ref(HHV(C,(2+X1)),-1);
c3:=Ref(LLV(C,26),-X1);
POLE:=(C2-C3)/C3*100;POLE

Column E
Name: Target %
Formula:
 zz:=Zig(C,17,%);
X:=BarsSince(ZZ<Ref(ZZ,-1)AND Ref(ZZ,-1)>Ref(ZZ,-2));
X1:=LastValue(X)+1;
c2:=Ref(HHV(C,(2+X1)),-1);
c3:=Ref(LLV(C,26),-X1);
POLE:=(C2-C3)/C3*100;POLE
TARGET:=1.94* Power(pole ,.724);TARGET

Column F
Name: Target Price
Formula:
 zz:=Zig(C,17,%);
X:=BarsSince(ZZ<Ref(ZZ,-1)AND Ref(ZZ,-1)>Ref(ZZ,-2));
X1:=LastValue(X)+1;
c2:=Ref(HHV(C,(2+X1)),-1);
c3:=Ref(LLV(C,26),-X1);
POLE:=(C2-C3)/C3*100;POLE
TARGET:=1.94* Power(pole ,.724); (1+TARGET/100)*C

Filter
The filter formula is exactly the same used for the Enter Long Order of the System Test above

Run the exploration on the desired securities and display the report. Column A is the prebreakout price, column B is the highest point on the flag pole, column C is the pole base, column D is the % pole height, column E is the target % profit, and column F shows the target price. All prices are on a closing basis. Columns B–F are not essential for running the exploration, but they will help to calculate your exit price target. —MK

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trade, which could have been the most profitable of the test.

The system did not produce enough signals for frequent trading. This, however, need not be a problem, since scanning a large number of stocks will produce more than enough trades.

I tested the system further by scanning (using MetaStock's Explorer) a database of 1,250 stocks, which included all Standard & Poor's 500 stocks plus another 750 mainly small-cap stocks. The number of trades varied according to market conditions. The average number of trades was seven to eight under bullish market conditions, decreasing in sideways markets and drying out under bearish conditions. See sidebar 3, "Flag & pennant exploration."

I chose to present the results of the exploration run on June 1, 2003 (Figure 6), because of the relatively large number of trades generated by the
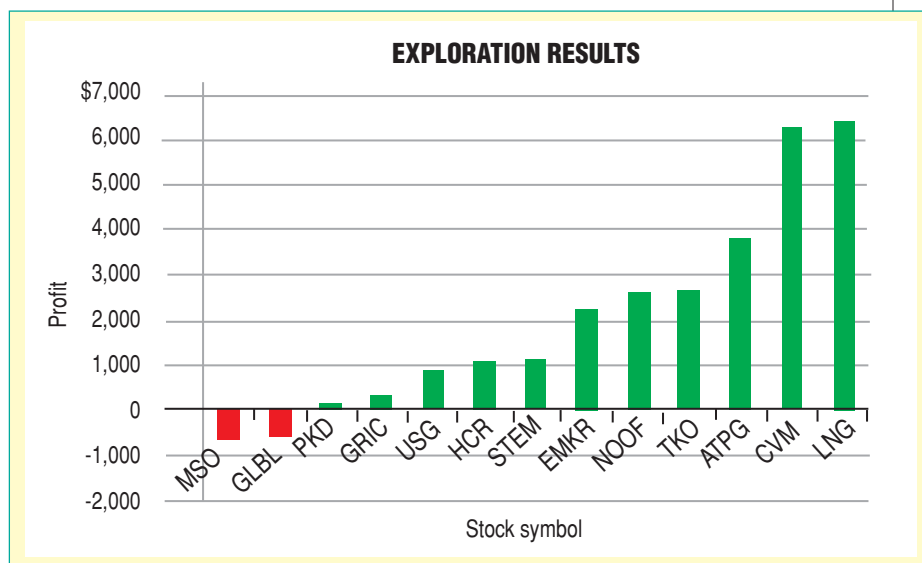
FIGURE 7: EXPLORATION RESULTS. Four of the stocks (ATPG, LNG, CVM, NOOF) exceeded their price target, EMKR and TKO were right on target, three stocks (HCR, PKD, STEM) missed their target and were stopped on time by the exit conditions, and USG was late to break out and was stopped by the inactivity exit condition only two days before the breakout. The GRIC trade was also stopped by the trailing-stop condition five days before the breakout. MSO and GLBL failed miserably and were appropriately halted by the stop-loss condition, thus averting heavier losses.

exploration. A hypothetical initial equity of $100,000 was used to purchase all candidates produced by the exploration at the next day's opening price. Trades were exited manually according to the exit conditions described earlier. The results were highly profitable, producing a total profit of $26,180 with 11 winning trades and only two losers (Figure 7), but at no point did the equity dip below the initial amount, because the losing trades were more than offset by the winners. This is a major advantage of trading multiple stocks at the same time. The average trade lasted 13 calendar days, or 10 bars.

CONCLUSION

No system I know of works 100% of the time. In this case, the usual reasons for failure were either adverse market conditions or an overextended state, due to a previous successful flag breakout.

However, considering the tests were conducted over a long period that included all market conditions, the presumption is that the relative post-performance results of the method used will continue to produce favorable results.

Selecting an effective exit is crucial to a successful trade. In designing this system, I tried to remove subjective human emotions like fear and greed by specifying automatic exit conditions. These did not always perform as intended, occasionally stopping out trades that could have had a propitious outcome, but in most cases they managed to keep losses to a minimum. Keep in mind that there is always a risk-return tradeoff, and exit conditions are a compromise between risk tolerance and profit potential.

Finally, I cannot emphasize enough the advantages of diversification. By opening multiple trades at the same time (as was demonstrated by the exploration trades) and assuming a profitable strategy, the occasional losing trades will always be more than offset by the remaining profitable ones.

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SUGGESTED READING

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†See Traders' Glossary for definition

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