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If you want to develop a system, here are some ideas gleaned from studying top performing day-trading systems. If you would rather buy a system, those that trade only the S&P 500 seem to do best.

By George Pruitt

S&P day-trading systems:What works and what doesn't

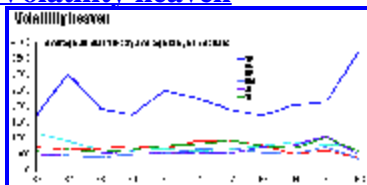
Of all the day-trading systems I've tested over the years, 90% of them trade the S&P 500. This is the market of choice for most day-traders because it affords enough potential to make it a worthwhile venture (see "[Volatility heaven](#)," below). By definition, day-trading means you exit at the end of the day, so your profits must at least cover your commissions and slippage.

Although a key difference with the S&P systems I've tested is their approach to entering the market -- they have ranged from basic breakout systems to systems based on the phases of the moon -- the exit signals usually fall into four categories: protective stop, profit target, trailing stop and, of course, market on close. Many of the systems use a combination of these exits.

Because the exit technique is as much or more important than the entry in day-trading the S&P 500, I'll demonstrate that different types of exits work with various types of systems.

Over the past eight years I've often been asked which exit technique is the best. The answer is it depends on the system; there is no black or white answer. However, through research, I've found the success of these exit techniques usually depends upon the frequency of trades a system generates: More frequent trading systems need tighter exits whereas less frequent trading systems need looser exits.

Volatility heaven



To demonstrate the success or failure of protective stops, profit targets and trailing stops, I've created two systems and tested them over the past 11 years.

These systems use basically the same entry technique, except one trades about five times as much as the other. Buy and sell signals are calculated by adding/subtracting a certain percentage of the 10-day-average

range to yesterday's close. In addition, today's range must be less than the 10-day-average range before a buy/sell signal can be placed. The only difference in the two systems is the percentage used to calculate the buy/sell signals. System A uses 50% and System B uses 120%. These percentages were determined by the frequency of trades I was trying to attain.

The systems were tested using five-minute bar data and deducting \$100 commission/slippage per trade. I ran three tests on each system, optimizing different dollar levels for each exit technique. None of the test results of these two systems includes any trades that took place during October 1987 and October 1989. Due to extremely high market volatility, these two time periods can skew performance data.

Protective stop If a system has a high frequency of trades, tight stops usually work best. My definition of a tight stop is anywhere between \$300 and \$750. Systems that trade frequently are trying to make money almost on a daily basis. If the system takes a small loss, then there is always tomorrow; why take a major loss when you know a trade probably will be generated tomorrow?

System A (see "[Protective stop comparison.](#)" right) shows the performance of the system using several different protective stop levels. Notice that too tight of a stop also degrades performance. A protective stop, at the right level, can turn a losing system into a winner. A system that trades less frequently usually will need a larger stop.

The image contains two tables side-by-side, both titled "Protective stop comparison". Each table has columns for "Stop", "Win %", "Loss %", "Max Drawdown", "Avg Profit", "Avg Loss", "Max Profit", "Max Loss", "Win/Loss Ratio", "Avg Trade Length", "Max Trade Length", "Max Trades", "Max Losses", "Max Wins", "Max Trades", "Max Losses", "Max Wins". The top table is for System A and the bottom table is for System B. The tables show that for System A, a stop level of \$1000 results in a positive win/loss ratio, while a stop level of \$500 results in a negative ratio. For System B, a stop level of \$1000 also results in a positive ratio, while a stop level of \$500 results in a negative ratio.

Unlike faster approaches, these systems are in the market for considerably less time and therefore need to make more money per trade. A larger stop prevents a premature loss due to market volatility. System B shows the performance of the slower system using different protective stop levels. As you can see, a larger stop is needed in this case.

Profit targets Pure profit targets generally don't work. A good portion of the profit that is generated by an S&P day-trading system comes from those days when the S&P takes off and keeps going in the same direction. If you limit these potential high-profit days, then you limit the overall profit of your system. System A (see "[Variation in profit targets.](#)" right) shows terrible performance using tighter profit targets. Due to its frequency of trades, the risk reward ratio is out of whack. Are you willing to risk trading the S&P 500 on a daily basis in hopes of a \$250 win? System B also shows degraded performance by using tight profit targets. This system trades so infrequently, it almost has to hit a home run on every trade.

The image contains two tables side-by-side, both titled "Variation in profit targets". Each table has columns for "Profit Target", "Win %", "Loss %", "Max Drawdown", "Avg Profit", "Avg Loss", "Max Profit", "Max Loss", "Win/Loss Ratio", "Avg Trade Length", "Max Trade Length", "Max Trades", "Max Losses", "Max Wins", "Max Trades", "Max Losses", "Max Wins". The top table is for System A and the bottom table is for System B. The tables show that for System A, a profit target of \$250 results in a negative win/loss ratio, while a profit target of \$1000 results in a positive ratio. For System B, a profit target of \$250 results in a negative ratio, while a profit target of \$1000 results in a positive ratio.

Trailing stops A trailing stop is a combination of a protective stop and profit target. This type of stop gives the market room to breath but at the same time tries to lock in profit. In this analysis, I trailed the high/low of the day by x-amount after a trade was initiated. The trailing stop did not help System A (see "[Hitting the trailing stops.](#)" below, left) as much as the fixed protective stop. The profit target aspect of the trailing stop was too limiting on the big profit days. Nonetheless, the trailing stop turned a losing system into a winner. System B showed a slight increase in performance at the high end of the trailing stop. This re-

emphasizes the need for a large protective stop and large profit target.

Hitting the trailing stops

System	Win %	Max Drawdown	Profit/Loss	Commission	Slippage	Volatility	Stop Type
System A	45.2%	12.5%	\$1,200	\$10	\$5	1.5%	Static
System B	52.1%	8.2%	\$1,500	\$10	\$5	1.5%	Trailing
System C	48.7%	10.1%	\$1,350	\$10	\$5	1.5%	Static
System D	50.3%	9.5%	\$1,400	\$10	\$5	1.5%	Trailing

All tests were done using static stop amounts. In today's market, \$500 is totally different than it was in 1986. I have found, in almost all cases, that self-adjusting parameters create a much more robust system. An alternative to static dollar stops, would be to use volatility-based, self-adjusting stops. For example, instead of \$500 fixed stop, use 10% of the past 10-day average range. This market-defined stop would change with market conditions.

There is no black or white answer to which type of stop is the best to use in a day-trading system. The results shown are consistent with my research; however, it is not a guarantee that all systems will follow suit. A large portion of S&P day-trading systems use a combination of these exits. I have seen systems that will use a protective stop early in the day and a trailing stop later in the afternoon. Whichever stop you pick, it should be based on thorough research. The longer time frame over which you can test, the more robust your parameter selection will be.

We are fortunate to have so much intraday data at our disposal, yet at the same time the data is somewhat skewed. We basically have been in a bull market ever since the S&P 500 futures contract has been traded. Close to 100% of the symmetrical S&P day-trading systems (buy/sell signals are mirror images of each other) have shown much more profit on the long side. With this fact, the question "Why short the S&P?" always arises. And of course the answer always is: "Who knows when a major retracement or bear market is going to occur." The second question is: "Is it okay for a system to have a bullish bias?" In other words, should a system try to buy more often than it sells? Again, there really is no correct answer. There won't be good answer until we have a good sample of bear market data on which to test.

Let's look at some before and after performance numbers on System A and System B (see ["Before and after,"](#) right). System A, without an exit, was a big loser. However, with a simple \$500 protective stop, the system turns into a winner. System B was a mediocre winner without any type of stop, but with a \$1,250 protective stop and a \$3,000 profit target, the system's overall drawdown decreased by about 60%. Notice the profit/loss that came from the long and short positions.

Before and after			
System A (before)			
Total P/L	\$-2,100	Max Drawdown	12.5%
Winning %	45%	Volatility	1.5%
Max Drawdown	\$1,200	Commission	\$10
Commission	\$10	Slippage	\$5
Volatility	1.5%	Stop Type	Static
System A (after)			
Total P/L	\$1,200	Max Drawdown	8.2%
Winning %	52%	Volatility	1.5%
Max Drawdown	\$1,250	Commission	\$10
Commission	\$10	Slippage	\$5
Volatility	1.5%	Stop Type	Trailing
System B (before)			
Total P/L	\$2,100	Max Drawdown	12.5%
Winning %	45%	Volatility	1.5%
Max Drawdown	\$1,200	Commission	\$10
Commission	\$10	Slippage	\$5
Volatility	1.5%	Stop Type	Static
System B (after)			
Total P/L	\$3,000	Max Drawdown	8.2%
Winning %	52%	Volatility	1.5%
Max Drawdown	\$1,250	Commission	\$10
Commission	\$10	Slippage	\$5
Volatility	1.5%	Stop Type	Trailing

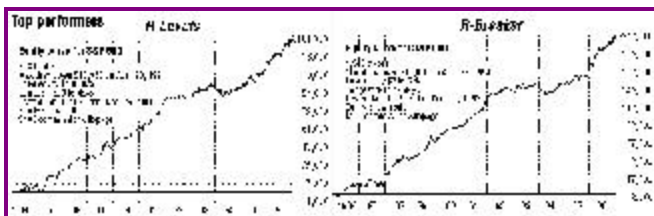
The changes we made look great, but I must warn you about curve fitting, which is when you historically back test to derive a parameter. Don't fool yourself into thinking you've found the holy grail, when in fact you had your 166 MHz computer run two weeks optimizing six parameters. You don't want history to have to repeat itself exactly for your system to make money. Never test the S&P with less than \$100 commission/slippage; in fact real-time analysis has shown slippage to be well over \$100. A system tested at \$50 commission/slippage looks totally different than one tested at \$100.

Table with 4 columns: System, Win %, Max Drawdown, Profit/Loss. It compares System A and System B before and after adjustments.

The lack-luster performance of System A and System B may lead you to believe that day-trading the S&P 500 is not your

cup of tea. I derived these systems for demonstration purposes only and didn't strive to make them profitable. *Futures Truth* monitors about 20 S&P day-trading systems, and about nine of them have shown a profit since they were released to the public (see "[Top S&P day-trading systems.](#)" above).

The best two systems, R-Breaker and R-Levels by Richard Saidenberg, have shown real-time performance similar to hypothetical performance (see "[Top performers.](#)" below, left). These systems were released to the public in July 1993. The equity curve after this date looks as good as the equity curve before. These systems have been successful because of Saidenberg's countertrend approach to entry and his exit mechanisms. He incorporates a combination of the exit techniques discussed here. His two systems took advantage of the heightened volatility in 1996. In the 1980s, any simple breakout approach seemed to work in the S&P. But during the 1990s, other types of entry and exit techniques have excelled.



Because no system wins all the time, exit techniques provide a form of insurance when the system is wrong. As with all trading, risk should be measured and taken into consideration before placing an order. Don't arbitrarily place some type of exit

technique without knowing the mentality of the system. I've been told that 40% of research should be spent on the system and 60% should be spent on money management. In day-trading, your exit is your money management.

George Pruitt is director of research of the independent system testing firm, Futures Truth Inc., in Hendersonville, N.C., which publishes a monthly review of the systems it tests. A top-10 system performance list can be found in Futures on a bi-monthly basis.

[Back to contents page](#)

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