MICHAEL CARR'S

SYSTEMS MASTERY

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Michael Carr's Systems Mastery

By Michael Carr

I'M lifting the curtain on trading systems to show you exactly how they are used to find trades. If you tend to think of trading systems as mysterious, you're not alone.

The mystery comes from the fact that systems are generally used by big money movers— hedge funds, high-frequency trading firms or large Wall Street firms.

Those individuals who do create trading systems are often programmers. They view the market as a coding project. Their strategies are often complex, and their results are rarely reported.

But as I'll reveal to you here, systems don't need to be complicated. They can be simple. In fact, so simple that they can be tracked in a spreadsheet.

To do all this, I will develop a trading system and walk you through the entire process. This way, you'll have a good grasp of the concepts to develop your own system.

I hope you try this, if for no other reason than to appreciate the sheer magnitude of research that goes into every system and trade that I recommend.

Now, before we get started, it's important to know where you stand on the spectrum of trading styles.

Understand Your Trading Style

In broad terms, there are two types of traders — discretionary and systematic. Discretionary traders base their decisions on news, industry trends or other information that is subjective.

On the other hand, systems traders follow prescribed rules that can be based on price action, fundamentals, economic information or other objective sources.

While there are some purists, many traders blend the two approaches. Here's some notable traders who exemplify these categories.

George Soros is a discretionary trader. In *The Alchemy of Finance*, he wrote that he sells positions if his back hurts too much. He views that as a sign of stress and believes that's reason enough to sell. He also uses the news, his knowledge of how economies work, sentiment and a variety of other factors in his decisions.

Warren Buffett is an example of a blended approach. He uses news and economic trends to identify potential investments. Then he uses a valuation system he developed to determine if the stock is attractive.

Jim Simons is an example of a systemic trader. Although less well known than the other examples, Simons is someone every trader should study.

After graduating from MIT, Simons worked as a cryptographer cracking codes for the Department of Defense during the Vietnam War. After that, he taught math at MIT and Harvard.

He worked with other researchers to develop a theorem for differential geometry, called the Chern-Simons forms. Experts say it's a valuable tool for theoretical physicists working to identify the smallest forces in the universe. (I take their word for that.)

In 1982, Simons left academia and decided to apply his math skills to the financial markets. He founded Renaissance Technologies, a hedge fund group that uses complex math tools to take advantage of inefficiencies in futures, currencies, and the stock market.

His firm now employs more than 300 professionals, many with PhDs in math and science. His benchmark Medallion Fund delivered annual returns of 35.6% at a time when the S&P 500 Index gained an average of 9.2% a year over 20 years.

That return is after fees and Renaissance charges, which might be the highest fees in the industry. The firm charges a management fee of 5% a year and also takes 44% of the gains above a benchmark.

Typically, a hedge fund charges less than 2% a year and retains 20% of gains above the benchmark.

Simons might just be the best systems trader in the world. He uses low-latency data and high-speed connections to trade. That infrastructure is beyond the reach of the average trader. Even if we can't copy Simons, we can still learn from him.

Like other great systems traders, Simons is disciplined. He follows a process for defining trading rules, thoroughly tests those rules, and then executes all trades that trigger signals.

Next, we'll walk through a process for developing a trading system that anyone can follow. That means we will rely on publicly available data and simple indicators that could be followed in a Google Docs spreadsheet.

Your 6-Step Process for a Trading System

To start, we must first define a trading system. It is a series of rules that unambiguously defines what and when to buy and sell. There is no uncertainty and no surprises with a well-defined system. You know exactly what will cause you to buy. You also know what will cause you to close a trade before you even open it.

Based on this definition, six key questions need to be answered:

1. What will I trade?
2. When will I buy?
3. How much will I buy?
4. What will I do if there are more buy candidates than funds available for trading?
5. When will I sell?
6. How will I change my trading size as my account balance changes?

We will examine each of those questions in turn to build a simple trading system.

What Will I Trade?

This is an important and often overlooked question.

A starting point is to ask how much time you have to trade. If you can dedicate all day and every day to the markets, then you can build a system that uses dozens of rules and monitors hundreds of stocks. If you are looking at managing your retirement account, you might have just a few minutes a week to dedicate to trading.

No matter how much time you have to trade, and no matter how complex your trading system will be, the process is the same.

In this report, we will create a system for an individual who wants to avoid the worst pain of the bear markets. They will run the system on a weekend, enter any orders at that time and go to work Monday morning.

To meet the simple goal of avoiding steep declines, they can run the system on a broad market index.

When the system is on a buy signal, they will invest 100% of their account in the stock market. In this case, that will be the SPDR S&P 500 ETF Trust (NYSE: SPY).

When the system is on a sell signal, they will reduce risk by adding iShares 7-10 Year Treasury Bond ETF (Nasdaq: IEF). IEF tracks the 10-year Treasury, which is an asset that often provides safety and returns in times of stock market turmoil.

A more complex trading system could use a group of exchange-traded funds (ETFs) or stocks. When the system looks at more securities, a trade allocation plan is needed. I will cover that in more detail in the "How much will I buy?" section.

For now, we must decide on the timing of the buy.

When Will I Buy?

The question of when to buy requires defining a trading philosophy. In general, a trading philosophy could be trend following or mean reverting. There are other philosophies. But just like with the idea of discretionary and systemic trading, other ones tend to fall between these two extremes.

Trend following's objective is in the name. The goal is to follow the trend. This means you wait for a trend to develop before acting.

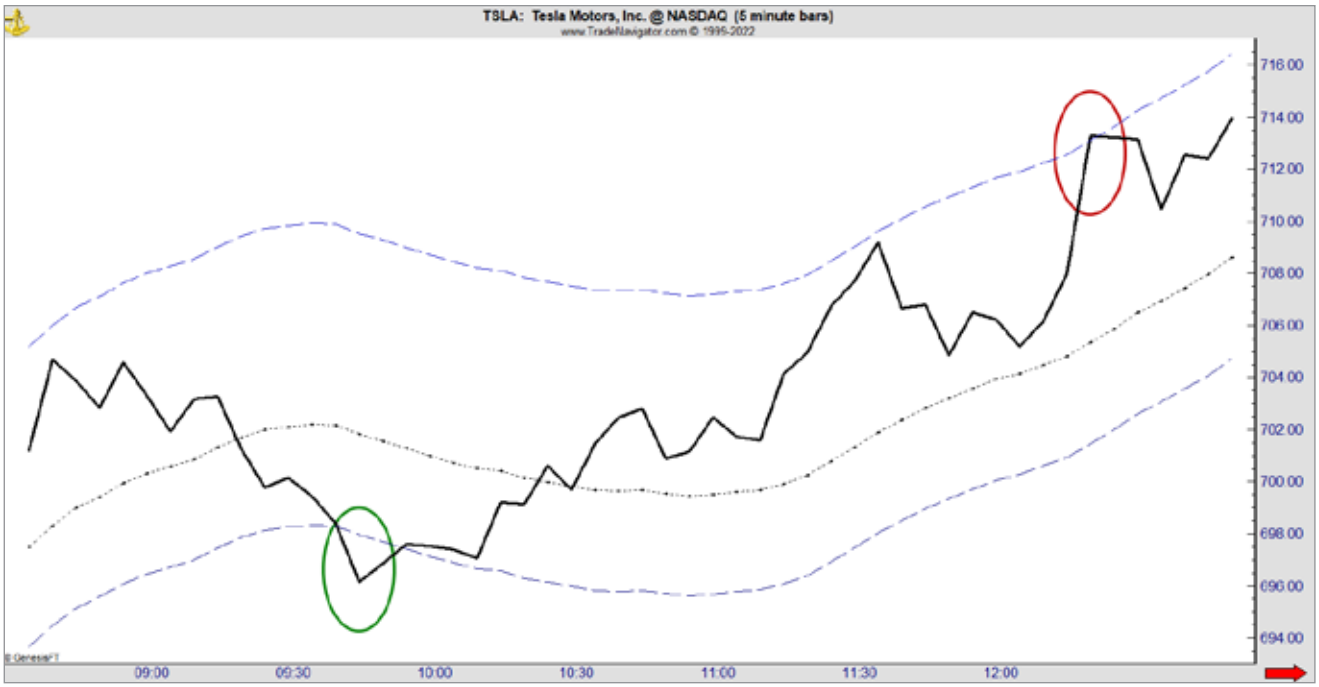
Trend followers tend to have a long-term perspective. Systems based on this concept often have few trades, sometimes just one or two in a year. Of course, there are many ways to define the trend. But no matter which tools are used, the system will identify fewer trade signals than a mean reversion system.

Mean reversion tends to be popular among short-term traders. To understand this concept, we can think of the market action as being similar to a rubber band at times. When a rubber band is pulled too far, it tends to snap back quickly after the ends are released. The same is true, sometimes, for price action.

After a very quick short-term price move, traders assume they are stretched too far. This is where the ideas of overbought and oversold come from. An overbought market is one that went up, too far and too fast. An oversold market declined too far and too fast.

Now, these are just descriptions. There is no guarantee that an overbought or oversold market will reverse. But reversals happen often enough that mean reversion strategies can be profitable.

To visualize a mean reversion strategy, look at the chart below. It's a chart of Tesla, but the stock isn't important. This idea works on any stock, ETF, index, cryptocurrency, commodity or price data.



The price is the black line. The black dashed line is the 20-period moving average (MA). The MA is the mean.

When prices move too far from the mean, we expect them to revert to the mean. To identify when prices

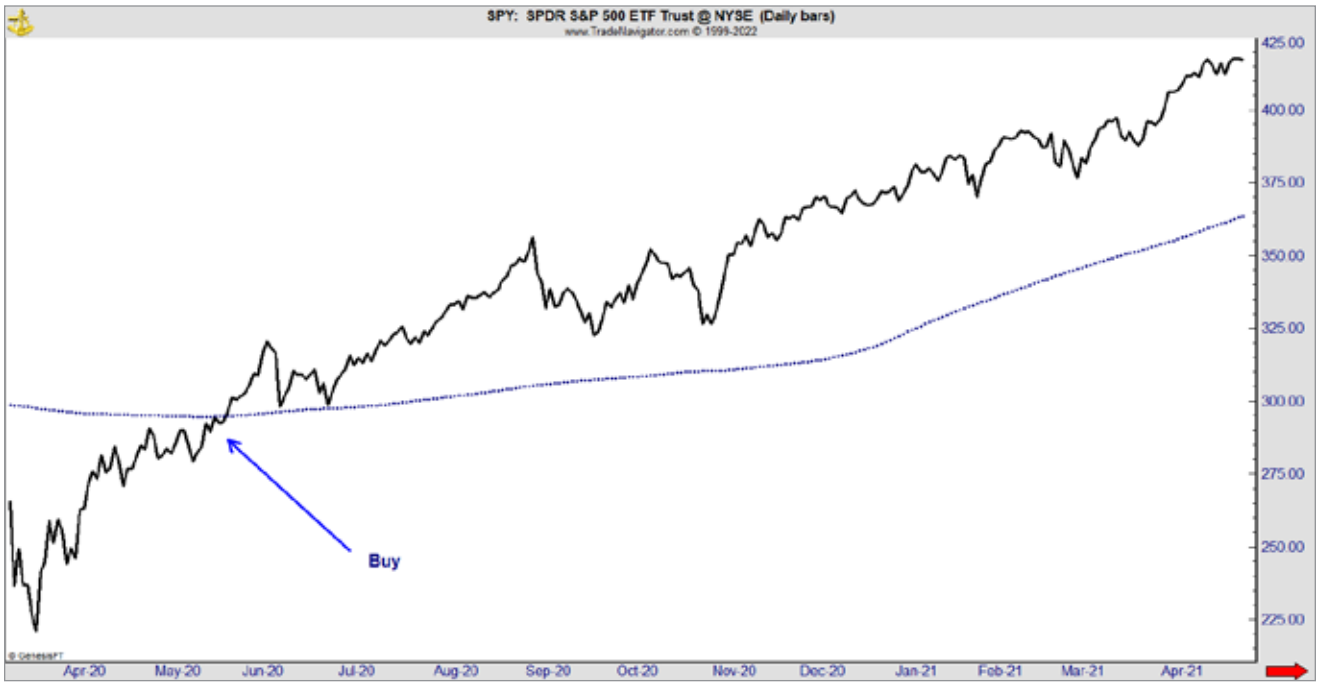
have moved too far, I added the blue dashed lines. They are 1% above the MA and 0.5% below the MA. I selected those values because the stock is in an uptrend on this timeframe.

When the price falls below the lower lowest line, it's a buy signal. That's circles in green. The sell signal, a break above the upper line, is circled in red.

This a mean reversion strategy. These work well for short-term traders.

For our example, we are building a long-term strategy that will be trend-following. The simplest long-term strategy uses an MA. A buy signal is given when the price crosses above the MA.

We're keeping it simple. We will buy SPY when it crosses above its 200-day MA. An example of a buy signal is shown below.



It's a straightforward, but effective signal.

How Much Will I Buy?

For this strategy, the answer to that question is easy. We will invest 100% of the account value in SPY. On the sell signal (detailed below), we will buy some amount of IEF. Often, the answer is more involved than that.

Formulas have been developed to answer the question for systems that hold multiple positions.

Maybe you want to follow an indicator and trade the stocks in the S&P 500. The ideal number of positions can be defined by a formula that considers the system's win rate and the result of the average trade. The formula might say you should hold 12 positions to optimize your results. You would then allocate 8.33% of your available equity to each signal.

There are other formulas and other strategies, but they are more advanced topics that could fill another report. For now, it's important to keep in mind that you'll need to answer this question before you start trading.

What Will I Do If There Are More Buy Candidates Than Funds Available For Trading?

No matter which trading philosophy you adopt, there will inevitably come a time when there are too many

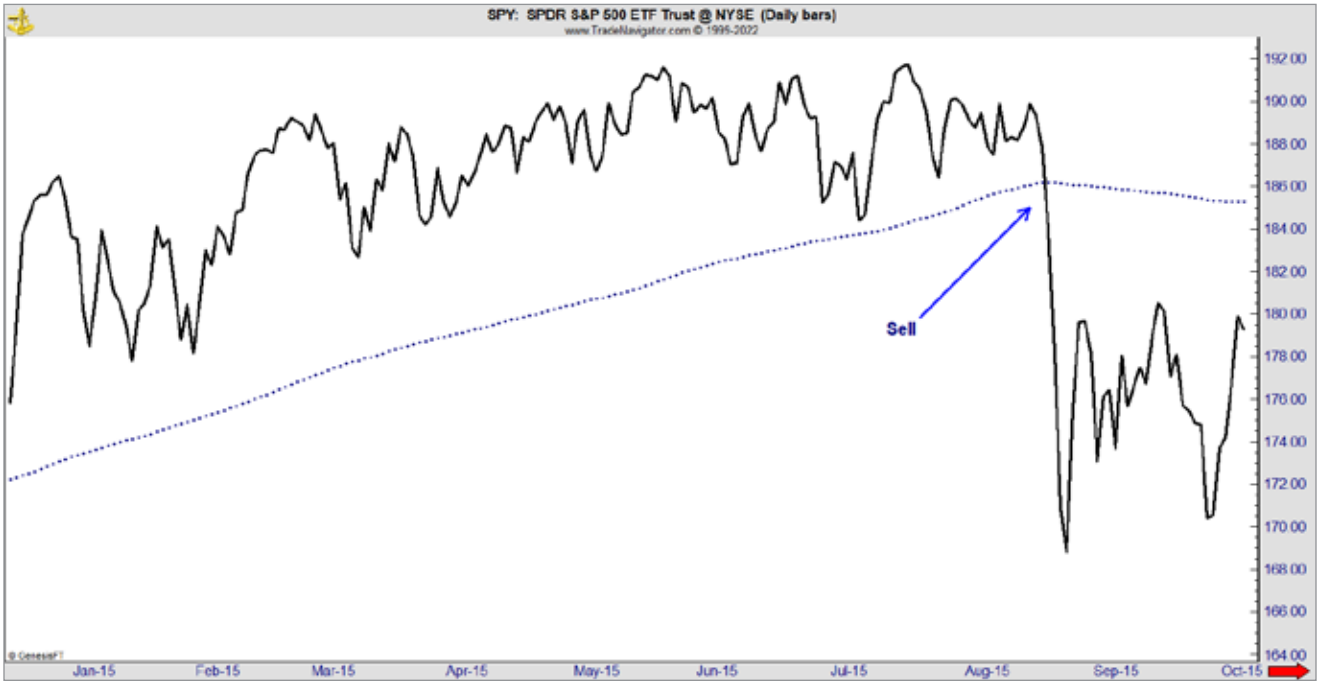
trading candidates. This will require a filter to eliminate some of the possibilities. For example, a fundamental filter could be applied and the stocks with the lowest price-to-earnings (P/E) ratios could be bought. A technical filter could be to buy the stocks with the lowest values of RSI.

This is another topic that calls for further elaboration that we won't get to here. But again, it's important to keep in mind that you will need to know how to answer this question before you start trading.

When Will I Sell?

For complex trading systems, this is really three questions in one. You need to define how you will handle winning trades, how to handle losing trades and how to address stocks that simply don't move.

For our simple system, there is only one sell rule. We sell when SPY falls below its 200-day MA. The following chart shows an example.



On this signal, the system sells half of the SPY position. Cash from that transaction is then invested in IEF. On the next buy signal, IEF is sold, and the proceeds invested in SPY.

For more complex systems, there are often multiple sell rules. There could be a stop-loss, often based on volatility rather than the popular percentage of entry price.

There may also be sell signals generated by indicators. Time-based exits, selling after the trade has been open for some defined amount of time, are also useful.

How Will I Change My Trading Size as My Account Balance Changes?

This isn't applicable to the simple strategy developed in this report.

In a more complex system, positions may need to be rebalanced at times. Position size can increase or decrease based on recent performance. These questions are answered by the mathematics of portfolio management. A detailed answer is a topic for another day.

Rules for a Simple Trading System

For the simple trading system that we just created, the rules are:

- What will I trade? SPY.
- When will I buy? I'll buy SPY when it crosses above its 200-day MA.
- How much will I buy? This system is always fully invested in SPY or IEF.
- What will I do if there are more buy candidates than funds available for trading? This isn't applicable to this simple system.
- When will I sell? We sell when SPY falls below its 200-day MA. On this signal, the system sells half of the SPY position. Cash from that transaction is then invested in IEF. On the next buy signal, IEF is sold, and the proceeds invested in SPY.
- How will I change my trading size as my account balance changes? This isn't applicable to this simple system.

We now have a complete trading strategy defined and can easily implement this strategy with free online tools.

Commit to Your System

With a trading system, you never know in advance which trade will be a win or a loss. You never know which trade will be a big winner, so the best performance requires you to take all of the system's trades.

Now, this can be challenging for many. So, plan to use a system that you have time to trade.

After committing to the system, create an implementation process. This can be something like collect data every evening (or every week or month); run the system to determine if there are any signals; place orders as dictated by the system.

This all sounds obvious and easy. But many traders don't commit the time to make a system work and then they suffer losses.

A Surprising Truth About My Favorite Systems

I've designed well over 100 systems that I still maintain. And I've discarded hundreds of others that simply didn't work.

Trading system designers often look to Thomas Edison for inspiration. There's a famous story that says Edison needed 10,000 attempts to find the right filament for the light bulb. When asked how he dealt with failure for so long, Edison supposedly said: "I have not failed. I have just found 9,999 ways that do not work."

There are millions of ideas that don't work in the markets. Most don't work. But I won't know until I've programed and tested it. I've been doing this for so long that I can usually test a new idea in just a few minutes.

It's amazing how many ideas shared on CNBC just don't hold up to testing!

Before I go, I want to share one last thing that might surprise you. My favorite systems all have low win rates — usually 30% to 40% … and there's a reason for that.

Many years ago, while I was talking about the market with an old trader one day, he told me that I was arguing with the market. I responded that I was right because the chart pattern was clear and confirmed by other indicators. His response was: "Do you want to be right, or do you want to make money?"

My goal, of course, is to make money. But I wasn't incorporating that into my market analysis when I first started trading. My analysis was based on me being right. I wanted to present evidence that showed I was correct, while I should have been using rules to prevent holding a losing position, instead.

Since then, that simple question has guided me for many years. But the reason it works isn't because it's folksy wisdom that's easy to remember. The reason lies in the relationship between risks and rewards.

You see, small risks carry low rewards. And large rewards are only possible with large risks. In testing, I've found the best balance between risks and rewards comes **when the win rate is about 35%**. That leads to large rewards and manageable risks.

If you design your own systems, keep that in mind.

High win rates (more than 80% or so) come with small average gains and large potential losses. There's just no way around that. They can be profitable, but they are active systems that require a great deal of expertise to develop.

While lower win rates can be frustrating, in the long run, they can be the most profitable.

Regards,

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