

# Your Guide to Guidance



  
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Questions and Answers to Today's Guidance Systems



*We've tried a lot of new technology, and this is easily our best investment. It allows us to cover more acres in less time, and that gives us more time, either to spend with our families or with other parts of operation.*

— Greg Goering, Kansas



DOING MORE... WITH LESS.

## Guidance Systems

Of all the current agricultural applications for global-positioning technology, few have had the impact of GPS-based guidance.

Whether they're using manual, lightbar-type systems or hands-free assisted steering systems, growers who have adopted the technology report reduced fertilizer, seed, chemical and fuel costs, as well as reduced wear on equipment – and operators.

But with a growing number of manufacturers, a wide range of products, and ever-improving technology, choosing the right guidance system can be a challenge.



**To help you choose a system you can start with and build on, the precision ag experts with John Deere Ag Management Solutions have put together this "Guide to Guidance."**



In it, you'll find answers to the most commonly asked questions about GPS guidance, as well as comments from producers who are reducing costs and increasing efficiency by using guidance technology on their own farms. After reading through this guide, you still may have questions about guidance applications. If so, visit your AMS-Ready John Deere dealer. We can help you get on the right track.



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WHICH ONE IS RIGHT FOR YOU?

# Systems & Signals

Even with all the different manufacturers, GPS-based agricultural guidance systems fall into one of two types: manual or assisted steering. Understanding the benefits of each, and deciding which type of system best suits your needs, is one of the first steps to take before you select a system.

## MANUAL GUIDANCE

Sometimes referred to as “lightbar” guidance, manual guidance systems typically use a visual indicator to show you where you are in relation to your intended path. You still have to steer the equipment, but the lightbar or other indicator tells you when and how much to correct. **In most cases, a manual system is less expensive and less elaborate than an assisted steering system**, making manual guidance a good choice for growers who want to try GPS guidance without a large initial investment.

## ASSISTED STEERING GUIDANCE

These are the “hands-free” systems. Though all systems are different to some extent, most require you to drive an initial pass; the system then steers the tractor through each subsequent parallel pass. You still have to steer at turnrows and around any obstacles, but passes are made without operator input.

**These automatic systems represent the “top of the line” in GPS guidance**, and are typically more expensive than manual systems.

*Go hands-free with an automatic guidance system like GreenStar™ AutoTrac Assisted Steering. You're free to monitor the machine, the implements, the crop, the weather, and more.*



**At this point, it's easy to think that most manual or automatic guidance systems are alike, and that all you have to do is choose the manufacturer that offers the best deal. But there are still enough differences among the same types of systems to warrant a closer look. Among those differences are the source, and accuracy, of the signal.**

Most people are aware that GPS works from a system of orbiting satellites. Each satellite transmits a directional signal on two different channels; since the signals travel through the atmosphere at different speeds, a GPS receiver capable of comparing both signals delivers higher accuracy than a single-frequency receiver.

But the raw GPS signal is only accurate to within several meters – not good enough for precision ag applications. To get that higher level of accuracy, the satellite signal is cross-referenced with a “**differential correction signal**” coming from a known location here on Earth. The John Deere SF2 correction signal, for example, uses our own network

of base stations throughout the world to provide cross-reference, giving producers a pass-to-pass accuracy of about four inches, accurate enough for most agricultural uses.

Even greater accuracy is possible using a system based on real-time kinematic, or RTK. With RTK, a base station provides the ground-based correction signal, allowing you to receive differential correction from a local reference, eliminating GPS “drift” and giving you much higher accuracy – usually less than one inch pass to pass, enough to comfortably work between subsurface irrigation lines or to plant in narrow strip-till furrows.



*The new StarFire™ ITC dual-frequency receiver gives you ‘scalable accuracy,’ meaning it can receive WAAS signal, as well as the John Deere SF1, SF2 and StarFire RTK correction signals.*

## Differential Correction Signals

**WAAS** – The StarFire receiver works with the U.S. government’s Wide-Area Augmentation System – a free differential correction signal. *NOTE: John Deere can’t guarantee the performance, reliability, or availability of WAAS.*

**SF1** – This **FREE** Differential Global Position Satellite (DGPS) signal provides +/- 13 inch pass-to-pass accuracy.

**SF2** – The most accurate satellite-based correction signal available with the StarFire receiver. It has a static accuracy of 10 inches, and a pass-to-pass accuracy of approximately +/- 4 inches at the receiver. (Required to use GreenStar AutoTrac).

**StarFire RTK** – Designed to work with the proven StarFire ITC receiver and GreenStar AutoTrac Assisted Steering, the StarFire RTK base station provides a ground-based correction signal, thus virtually eliminating GPS drift. *By eliminating GPS drift, the vehicle can be guided down the same tracks, day after day, month after month, or year after year.*

## Advantages & Benefits

Deep-till through subsoil irrigation systems. Spray with little or no overlap.

Run your combine into the night. Save fuel, chemicals, seed, time and money.

Too good to be true? Not at all – farmers across the globe are doing it right now, thanks to GPS guidance.

### ALL OPERATIONS

**Reduced fatigue and stress.** “I feel so much better at the end of the day.” This is the comment we hear most often from new guidance users. In addition to all the agronomic and efficiency benefits, GPS guidance just makes the job easier.

**BENEFIT:** Get the most from equipment, operators, and inputs.

### SOIL PREPARATION

**Reduce Compaction.** Use your GPS guidance system to assign “lanes” for machinery, limiting compaction to known areas.

**BENEFIT:** Increased yields.

**Work Faster.** Even with no subsoil obstacles, GPS guidance can usually drive the tractor more accurately at higher speeds than a human operator.

**BENEFIT:** Reduce overlap; save time, fuel, and machinery wear by doing the job faster and more efficiently.

### SEEDING

**Better Efficiency.** Place seed with more consistent row spacing.

**BENEFIT:** Increased yields, reduced skips, less overlap. Perfect for strip-till.

**Reduced Stress.** You’ll have more time to monitor tractor and planter functions if you’re not steering on each pass.

**BENEFIT:** Lower stress on your operators means they can drive longer into the day and keep the same level of accuracy and efficiency.

**Reduced Equipment Cost.** Make more efficient use of existing equipment; possibly eliminate markers.

**BENEFIT:** Lower equipment purchase and maintenance costs. Extend production seeding time. With no need to follow a marker furrow, you can plant at night or any low visibility condition. Plows more acres a day, increases machine utilization.



**Running an AutoTrac-equipped tractor and the 1890CCS air seeder, I figure we’re saving up to five acres worth of seed on every 120-acre pivot. I won’t seed another acre without it. — Mitchell Baalman, Kansas**

### SPRAYING

**Work Faster.** Twelve-hundred gallons of solution and a 120-foot boom are a lot to handle; a GPS guidance system can do the driving faster and more accurately.

**BENEFIT:** More acres covered in each day; reduced skips and overlaps.

### HARVESTING

**Higher Efficiency.** With GPS guidance, your operators can harvest longer hours without losing accuracy or efficiency. Plus, guidance allows new operators to drive like pros. And the John Deere AutoTrac Assisted Steering System ensures you always cut a full platform-width, maximizing efficiency.

**BENEFIT:** Get the most from your equipment and operators.

**Finish Faster.** Harvest in conditions that would slow a human operator down – in dust and wind or after dark, for example.

**BENEFIT:** Keep your combines running longer each day; harvest before unfavorable weather sets in; custom cutters, move on to the next field sooner.

### INFORMATION AND RECORDKEEPING

**Prescription Seeding.** Use previous years’ yield maps to create a prescription that puts the optimal amount of seed into specific areas. Plus, you’ll have an automatic record of which varieties went to which fields.

**BENEFIT:** Increased yields, more efficient use of seed and at-plant chemicals, more accurate information.

**Recordkeeping.** Your sprayer’s controller, along with a GPS guidance system, can keep a record of each application, including field location and name, weather conditions, chemicals and tank mixes applied, and more.

**BENEFIT:** Reduced paperwork, automated recordkeeping.

**Yield Monitoring.** Start planning for next season while you harvest this year’s crop. GPS guidance plays an important role in gathering and mapping yield data for individual fields.

**BENEFIT:** Build an accurate base of information to use when planning for next year.



*The John Deere Parallel Tracking system uses a tractor-shaped icon to show you where you are in relation to your intended path. The system also can be operated using audible tones to help make steering corrections. Other manual guidance systems can use lightbars or other visual indicators.*



## Parallel Tracking

**If you'd like a high-value, low-cost manual guidance system, look to the next generation of GreenStar Parallel Tracking.**

Parallel Tracking uses the new StarFire iTC receiver, the GreenStar display and mobile processor, along with your vehicle's 12-volt power supply, to give you an accurate, easy-to-use manual guidance system that's perfect for tillage operations, chemical applications, fertilizer treatments, or harvesting solid-seeded crops. You simply drive through your initial pass, then let the visual and audio alerts keep you parallel to this pass as you move through the field. Parallel Tracking can even keep you on curved or irregular paths.

Parallel Tracking also lets you save up to five points in the field, so if you run out of spray solution, just mark the spot and let the system guide you back once you've refilled.

Parallel Tracking uses the three common GreenStar components, along with any of four available signals — WAAS, SF1, SF2, or RTK.



*Go hands-free with an automatic guidance system like John Deere AutoTrac Assisted Steering. You're free to monitor the machine, the implements, the crop, the weather, and more.*



## AutoTrac Assisted Steering

**Reduce operator fatigue. Increase pass-to-pass accuracy. Save time, fuel, chemical, fertilizer, and equipment wear. Till, plant, spray, or harvest — at higher speeds, at night, or in other low-visibility conditions, all with the GreenStar AutoTrac Assisted Steering System.**

AutoTrac uses the three common GreenStar components to automatically steer your John Deere tractor, sprayer, or combine through each straight-line pass. All you do is manually set the first pass, and AutoTrac takes over from there. You still make headland turns and steer around obstacles, but with a push of a button, AutoTrac puts you back on track with the highest level of accuracy available — less than one inch pass-to-pass variation when you use the StarFire RTK base station and correction signal.

Guidance products and capabilities continue to evolve. Coming very soon will be implement guidance and headland turn management. Implement guidance systems will eliminate the affect of sidehills on towed implements. And based around the tractor's guidance system, headland turn management will consist of complete, hands-free end-row turns, along with implement raise/lower cycles, and even tractor speed adjustments.

### PARALLEL TRACKING

- Comes standard with FREE SF1 correction signal
- Easily upgrade to SF2 or RTK for greater accuracy
- Tractor icon and audible tones show track and location
- Compatible with any make or model of 12-volt equipment

### AUTOTRAC ASSISTED STEERING

- Reduced operator fatigue
- More efficient use of fuel, seed, chemical, or fertilizer
- Higher operating speeds
- Available on select John Deere tractors, sprayers, and combines



*Combine GreenStar AutoTrac and StarFire RTK for sub-inch accuracy and repeatability – ideal for strip till, strip fertilization and planting on beds.*

## Frequently Asked Questions

### “I’M A \_\_\_\_\_. WHAT CAN A GUIDANCE SYSTEM DO FOR ME?”

**Row-crop producer.** It’s an undeniable fact that many agricultural operations are performed in a straight line, especially in row crops. But even when you’re going in a straight line, you still have to steer, and that means you can’t pay as much attention to what the tillage tool, planter, sprayer, or combine is doing; a guidance system, especially an automatic guidance system, takes over primary steering duties, and lets you make the most of your time in the cab.

**Small grains producer.** Even in solid-seeded crops, you still want every possible benefit from each pass. And with extra-wide tillage and seeding tools, GPS guidance is becoming “must have” technology for small grain producers. GPS guidance can help you seed big acreage faster, apply chemicals to your crop with less overlap, and harvest with greater pass-to-pass efficiency.

**Dairy/hay producer.** Make hay while the sun shines! Put AutoTrac Assisted Steering on your tractor and mower-conditioner, and you can cut faster, reducing your drydown time. And since you’re not steering, you’ll be able to watch the field for rocks or other obstacles.

**Custom harvester.** Custom cutters, guidance is for you. Equip your combines with GPS guidance and even your greenest operators will drive like pros, cutting full platform-widths with each pass. Use an assisted steering system like AutoTrac, and operators will be just as efficient after a full day in the cab as they were at the start.

**Custom chemical applicator.** With university studies showing that most spray operators overlap by 5% to 10% even with foam markers, it doesn’t take long to realize that means you’re also applying 5% to 10% more chemical than necessary. GPS guidance can help reduce overlap (or skips) to near-nothing, reducing chemical costs while also enabling automatic record-keeping. Plus, guidance can allow your operators to spray at higher speeds, so they cover more acres in a day.



### “I HAVE HILLY, ROLLING GROUND. CAN I USE A GUIDANCE SYSTEM?”

Although hilly ground presents a challenge to any GPS guidance system, our new StarFire iTC receiver with integrated terrain compensation helps overcome these challenges by compensating for slope, thereby keeping the vehicle on the desired path.

### “MY ROWS CURVE. CAN I USE A GUIDANCE SYSTEM?”

Yes. John Deere GreenStar Parallel Tracking and AutoTrac systems can be programmed to follow curved rows.

### “WHAT ARE THE OTHER LIMITATIONS OF GPS-BASED GUIDANCE?”

Understanding the limits of GPS will help you make the best decision for your farm.

- No guidance system currently available will make headland turns or navigate over the road.
- Many assisted steering systems are unable to steer over curved or contoured rows.
- Because the signal comes from orbiting satellites, the receiver must have a clear view of the sky; RTK systems, which use a portable base-station, often have range or line-of-sight limitations.
- Guidance systems only control the vehicle, not the implement.
- Finally, remember that signal accuracy can be affected by a wide range of vehicle, implement, field, and system conditions.
- Make sure your dealer is familiar with your land and your operation before committing to a system.

### “SUB-INCH ACCURACY? REPEATABILITY? WHO NEEDS IT?”

With GPS guidance based on real-time kinematics (RTK), long-term repeatability and pass-to-pass accuracy of less than one inch are possible. Many farmers, however, may not need this level of accuracy. But if you have sub-surface irrigation lines, produce high-value crops that are sensitive to row placement, or plant in narrow strip-tilled furrows, RTK-based guidance can give you the accuracy and repeatability to work with confidence.

### “SCALABLE ACCURACY – WHAT’S THIS?”

The new John Deere StarFire iTC features what we call “scalable accuracy.” This means that the receiver can pick up the governmental WAAS signal, or any of the available John Deere signals – SF1, SF2, and RTK. So as your operational needs change, the accuracy of your guidance system can change as well. You simply upgrade your signal correction level – there’s no need to purchase a new receiver.



## Frequently Asked Questions

### “MY NEIGHBOR SAYS HIS SYSTEM PAID FOR ITSELF IN TWO YEARS. HOW (AND HOW FAST) WILL MY INVESTMENT BE RETURNED?”

The payback period for a guidance system can vary depending on the size and nature of your operation. However, consider this: experts agree that pass-to-pass overlap of 5% to 10% is common over the course of a day. So think about what 5% to 10% more fuel, fertilizer, seed, chemicals, equipment wear, and time might cost, and you'll see how a guidance system can pay off. And that's not even considering the reduced stress and fatigue.

### “IF I DON'T WANT TO MAKE A LARGE INITIAL INVESTMENT, HOW CAN I KNOW IF A GUIDANCE SYSTEM IS RIGHT FOR ME?”

A low-cost manual guidance system like John Deere Parallel Tracking is a great way to see if GPS guidance fits on your operation. You'll get the benefits of guidance – reduced overlap and increased efficiency – without the high initial investment of an assisted steering system. If you decide guidance is a good fit, the GreenStar system can be easily upgraded to higher accuracies or AutoTrac.

### “WHAT'S THE ADVANTAGE OF USING THE GREENSTAR SYSTEM OVER OTHER GUIDANCE PRODUCTS?”

When you go with a John Deere GreenStar guidance system, you know it's designed to work seamlessly with your John Deere equipment. While third-party systems “cannibalize” your equipment's electrical and hydraulic components, GreenStar guidance products – when used with GreenStar-Ready John Deere equipment – integrate with your equipment's systems and components.

But there are other advantages as well. Support for GreenStar guidance is as close as your John Deere dealer or our website, [www.StellarSupport.com](http://www.StellarSupport.com). The three common GreenStar components can also be used with any GreenStar-Ready tractor, sprayer, combine or other self-propelled equipment.

And the John Deere GreenStar system gives you “guidance you can grow with,” meaning you can start with the entry-level Parallel Tracking system and upgrade as your needs change.



*When you're spraying at 15 or 16 miles per hour, things happen pretty fast. AutoTrac allows you to look ahead, without concentrating on a little screen.*

— Jeff Hamilton, Kansas



With input costs on the rise, even a moderate size farm can see real dollars and cents benefits from a guidance system.



### “I ONLY FARM A FEW HUNDRED ACRES. WHAT'S IN IT FOR FARMERS WHO WORK LESS THAN 1,500 ACRES OR SO?”

An argument can be made that small- to mid-sized farms can benefit the most from GPS guidance. As a smaller-acreage farmer, you keep tight control over your fuel, labor, and input costs; a guidance system helps you make the most of every gallon of fuel, ounce of chemical, and hour of labor. And because in many cases you can operate faster with a guidance system, you may be able to add acres to your operation without drastically increasing the demand on your time or the cost of labor.

### “WHERE'S MY DRIVERLESS TRACTOR?”

We get this question a lot. The technology exists, and prototype units have been built and tested. What we can't build are eyesight and reasoning. In other words, we can make a driverless tractor, but it can't detect and avoid obstacles in and around a field.

### “I HAVE AN OLDER TRACTOR. WHAT HANDS-FREE GUIDANCE OPTION IS AVAILABLE FOR ME?”

As guidance system technology evolves, more and more tractors can be fitted with a bolt-on guidance system, such as the new GreenStar AutoTrac Universal Steering Kit. Using the same StarFire iTC position receiver as the factory-ordered AutoTrac systems, the AutoTrac Universal kit can also be installed on certain non-Deere tractors. See your John Deere AMS-Ready dealer for a list of approved tractors, combines, and sprayers.

### “I'M SOLD. WHAT'S THE FIRST STEP?”

Visit your John Deere AMS-Ready dealer, or log on to our web site at [www.JohnDeere.com/Ag](http://www.JohnDeere.com/Ag).





*You can move a sprayer right into top speed and not have to think about driving it. You can just concentrate on keeping the booms at the right height, and making sure everything else is working, while AutoTrac does the driving.*

— Colin Jackson, Edmonton, Alberta

## Taking the next step

If GPS guidance sounds like a good fit on your farm, congratulations – you'll be one of an increasing number of farmers who will see reduced cost of inputs, time, labor, fuel, and equipment wear, as well as reduced operator fatigue. But to make sure your experience is productive and profitable, there are still some decisions to be made. So before you choose one particular system, answer these questions.

**How far do you want to go?** You can try GPS guidance with a manual-guidance system like next-generation Parallel Tracking, or you can go top-line with an automatic guidance system like AutoTrac Assisted Steering. Once you choose a system, you can still choose the signal that fits your needs with the scalable accuracy of the new StarFire iTC receiver.

**What's your budget?** Your AMS-Ready John Deere dealership can help you determine an initial investment and an approximate payback period, based on your current operations and your intended uses for the system.

**What do you want the system to do, and what are its capabilities?** If you're just looking for visual help while making long passes with a spreader (for example), a manual guidance system like Parallel Tracking may be just the ticket. You'll get many of the benefits of GPS guidance, including reduced costs, increased efficiency, and more, and you can upgrade to AutoTrac Assisted Steering in the future. But if you're ready for a system that can take the stress and fatigue out of driving, that can help you make the most of every input, and that can help you do more with every hour and every day, take a look at AutoTrac Assisted Steering.

**Where will you go for technical support?** Some third-party guidance systems may look like a bargain – until something goes wrong, or you have a question after regular business hours. Install one of the John Deere GreenStar guidance systems, and support is available from your John Deere dealer, our customer website at [www.StellarSupport.com](http://www.StellarSupport.com), and our 24-hour tech center at 1-888-GRN-STAR.



**Online Productivity Calculator**  
[www.StellarSupport.com/calculator](http://www.StellarSupport.com/calculator)

**A John Deere GreenStar guidance system can help you make the most of your inputs, your equipment, and your time in the cab.** Whether you choose Parallel Tracking manual guidance or AutoTrac Assisted Steering, you'll improve the efficiency and productivity of your operators and vehicles, all while saving time, fuel, labor, seed and chemical costs.

To find out more about our guidance systems, our GreenStar agronomic information systems, or any piece of John Deere equipment, see your nearest AMS-Ready John Deere dealer, or visit us online at [www.JohnDeere.com/Ag](http://www.JohnDeere.com/Ag).