Whether your equipment needs are large or small, high or low tech – Stop by one of our six locations this season.

Aegis EZ-GUIDE 250 LIGHTBAR
Aegis EZ-GUIDE 500 LIGHTBAR
Aegis FIELDMANAGER DISPLAY

Serving your farming needs since 1932.

Website: www.agwestsupply.com
PRECISION FARMING BASICS

AG WEST SUPPLY - LOCATIONS
Increase your basic understanding of the Precision Farming?

Briefly cover GPS theory (*light version*)

Cover some of the popular Precision Farming applications

- GPS / Yield Monitoring / Sensing / Application Control / GIS
PRECISION FARMING BASICS

WHO ARE THE PLAYERS IN US PRECISION FARMING?
GPS BASICS

- **GPS** = **G**lobal **P**ositioning **S**ystem
- A collection of a minimum of (24) *orbiting* satellites that provide accurate position information worldwide.
- Currently (34) satellites orbiting & (31) operational
OPERATIONAL
+ 365 Days/Year
+ 7 Days/Week
+ 24 Hours/Day

OPEN SPACES
+ Good fit for ag
Who Owns & Operates the GPS

- Owned & Controlled by Department of Defense
- operated by US Air Force
- Worldwide Civilian use Free of Charge
- Paid for courtesy of the US Taxpayer
- That is you!

Precision Farming Basics
Satellites are used as reference points to calculate your current position.

GPS receiver times how long it takes a radio signal to reach us from a satellite and uses that time to calculate distance to the satellite.

At least 4 satellites needed to compute a 3 dimensional position (latitude, longitude, and altitude).
DISTANCE = MPH x TIME

Speed = 40 MPH
Time = 30 Minutes (aka \( \frac{1}{2} \) hour)

20 Miles = 40 MPH x 0.5 Hours

GPS uses this same approach. We know the timing and the rate of speed (light speed aka fast) therefore we can calculate distance and our position.
What is different about these two photos??
• Sunspot or Solar Storms are a big deal for electronics on Earth and *GPS no exception.*
• Earth is small in comparison to one of these solar eruptions.
• Thankfully we are not this close to the sun.
DGPS – Differential GPS

- Differential Correction – GPS Corrected
  - DGPS Base Station (Ground Reference Station) is Stationary
  - Base Station reads GPS position – calculates the error
  - Base Station transmits correction message
  - Correction Message received by satellite, tower or local radio
  - SBAS (WAAS), OmniSTAR XP/HP & RTK
10 Feet – No correction (No DGPS) (aka Autonomous)

3 Feet – WAAS correction

~8 Inches – L1/L2 Satellite Subscription (OmniSTAR)

1” – Local RTK Base Station – Precision Repeatable

These are all repeatable accuracy figures. 24 hours of continuous accuracy required. Pass-to-Pass figures are usually what we discuss unless we are expecting to repeat the exact same tracks.
~3 Feet – **No correction** (No DGPS) (aka Autonomous)

6-8 Inches – **WAAS** correction

2-5 Inches – L1/L2 Satellite Subscription (**OmniSTAR**)

1” – Local **RTK** Base Station

**Pass to Pass** requires the data points to fall within the distance listed for **15 to 20 minutes** instead of **24 hours**.
**APPLICATIONS BY ACCURACY**

- **WAAS**
  - (6 to 8” Pass-to-Pass) & (3 Feet Repeatable)
    - Broadacre Spraying
    - Primary Tillage & Seeding
    - Boundary maps
    - General location mapping
      - Weed areas
      - Drainage lines
      - Exclusion Areas for spraying
OmniSTAR XP/HP

- (2 to 5” Pass-to-Pass) & (8 to 10” Repeatable)
  - Satellite Subscription required

- Seeding (Small Grains & Beans drilled in)

- Row crop planting – no expectation of repeating for cultivating

PRECISION FARMING BASICS

APPLICATIONS BY ACCURACY
RTK (1” Pass to Pass and Repeatable)

- Row crop planting and cultivating (multiple passes)
- Drip Tape applications
- Tree Planting or Specific Plant / Tree ID’s
- Any application that requires high precision placement
Precision Farming Applications

1. Yield Monitoring (WAAS)
2. Guidance Systems (WAAS to RTK)
3. VRT - Application Control (WAAS to RTK)
   - (Spraying/Granular/Population)
4. Crop Scouting & Sensor Technology (WAAS)
   1. Collecting readings at a specific location
      - Plant Stress
      - Plant size or yield progress
      - Soil pH and other traits
5. **Who / What / When / Where** - Food Traceability
Yield Monitoring

1997 was at the beginning of large numbers of growers adopting this technology.

Works well in the primary commodities (corn, beans, wheat) while harvesting (combines).

Vegetable and specialty crop solutions have been slow to reach the market.

Yield Monitors can collect info tied to GPS or not. It only provides post-season data for the grower. It doesn’t allow for in season changes.
AutoGuidance (Steering Systems)

- **History**: The early systems were primarily installed in California & Arizona.
- High input costs and high value vegetable crops have a quick Return on Investment. Carrots, Lettuce, Tomatoes, Sugar Beets, Onions & Potatoes led the way initially.
- Precision bed placement allows for maintaining a larger population and less plant damage due to mechanical damage.
RTK AutoGuidance

- Provides precise bed formation & seed placement
- Tractor drives in a straight pre-determined path that is repeatable for multiple passes in the field
- During cultivation we are able to run closer to the seed line than with traditional cultivation, since the tractor knows within an inch the precise seed line location. This keeps the cultivator clear of the plants and enhances mechanical weed control efficacy.
“To date, we have thought that the more simple economics of reducing overlap and skips and the possibility of working longer hours have been the key drivers of adoption. But in the future, the economics of guidance will probably be more driven by what is possible agronomically, as repeatability and precise field operations will allow new and more efficient ways of growing crops, some of which haven’t yet even been devised.”

Bruce Erickson,
Director of Cropping Systems Management
Department of Agricultural Economics
Purdue University
What can you do if you start with a straight line?
- Increase rows by eliminating guess row spacing
- Skip to increase productivity
- Better mechanical cultivation
Variable Rate Technologies (VRT)

- Uses computer controllers & associated hardware to vary the application of:
  - Fertilizer
  - Lime
  - Pesticides
  - Seed

- Typically there are prescription maps that tell the computer what rate to apply at that specific position in the field.
Variable Rate Technologies (VRT)

- ‘On-the-go’ sensors are gaining popularity as well
  - These are sensors that take a reading on-the-go determining plant health/vigor and immediately calculate the appropriate amount of chemical or fertilizer to apply.
Variable Rate Technologies (VRT)
- Example for Vegetable Growers
  - GreenSeeker® Hand Held is a simple example of an optical sensor that can be used for reporting crop conditions.
Variable Rate Technologies (VRT)

Example for Vegetable Growers

- GreenSeeker®
- Integrating this onto a ATV or Spray unit would allow for ‘on-the-go’ VRT one-pass solutions.
This technology is designed to keep input costs at a minimum while placing the correct amounts.

**How the GreenSeeker RT200 System Works for Nitrogen**

- Sensor scans the crop using LED lights.
- Optically senses crop's health using vegetative index.
- Predicts yield potential.
- Prescribes optimum zone nitrogen rate.
- Delivers variable rate application.
- Zone size - 1/4 to 1/2 acre (dependent on speed and controller).
- Utilizes existing controller and plumbing.
- Can apply UAN, UREA and NH₃.

The GreenSeeker RT200 "listens" to the plants, who tell it how much nitrogen they require.
GIS Activities

- Utilizing the GPS System for marking out field boundaries, points of interest, lines & areas of concern.
- Many of the GPS Displays today allow us to mark points, lines and areas along with the other guidance features that are built-in.
Once you have enabled, configured and calibrated your Field-IQ crop input control system, the following items appear on the guidance screen:

1. Quick Access
2. Settings
3. View
4. Status
5. Field
6. Guidance
7. Automatic Setup
8. Mapping

Press ⌜ or use footswitch to engage.
• Display operation functions are on the left hand side of the display.
  - VIDEO FEEDS
  - SETUP
  - GPS STATUS

• The mapping functions are on the right hand side of the display.
  - ROCK
  - TREE
  - WEED
  - FENCE
  - AREA
  - EXCLUSION AREAS

To activate mapping functions, tap the button on the Run screen. The mapping tray contains icons that correspond to point, line, and area features that can be recorded and saved with the field. Area features can be used to map exclusion zones for section control.

To configure the mapping options for warning zone distance and recording position, tap , tap and then tap . Set the mapping preferences for point, line, or area.
• The user interface is relatively simple to operate.
• Once collected it can be used in any of the ag software that uses shape files which is most all packages.
AG WEST SUPPLY - PRECISION FARMING SERVICES
GUIDING YOU IN THE FIELD...PRECISELY

AG WEST SUPPLY - PRECISION FARMING SERVICES can help you deliver better control of your inputs, repeatable accuracy and a healthier bottom line.

- INPUT CONTROL
- EASE OF OPERATION
- INCREASED PRODUCTIVITY
- ACCURACY OPTIONS

From simple manual guidance, to row shutoff on your planter, yield and moisture mapping on your combine, to variable rate application with your sprayer and RTK sub-inch accuracy with your strip till rig – we’ll be there through all your precision decisions.

Even if you don’t run all red, AG WEST SUPPLY offers precision equipment for every machine – and a dedicated team of precision specialists to ensure everything works together accurately.

CONTACT

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CASE II
AGRICULTURE
Trimble
QUESTIONS