Farming by Satellite

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First 80 Years
1837 John Deere Makes Self Scouring Plow

Second 80 Years
1918 John Deere Buys Waterloo Boy Tractor
Next 80 Years…
In the beginning...

- GPS introduced on combines - Mid 1990s
  - Yield Documentation
Farming by the foot

- Variable Rate Applications
  - Seed
  - Chemicals
- Enhanced Documentation
  - Management
  - Compliance
High cost of implement overlap

- Up to 10% or more overlap on every pass
- Wastes fuel, chemicals, fertilizer, seed
- Drag on efficiency, productivity
- Under-utilization of equipment
- Environmental concerns
GreenStar GPS Guidance
StarFire™ DGPS System Overview

- Global GPS Tracking Network
- Two Hot Hubs
- Reliable Low Latency Data Links
- Uplink to Three Inmarsat
- Global Corrections Broadcast to Users
- VSAT, Internet & ISDN Links
The NavCom™ iTC StarFire Receiver

- Is a dual-frequency (L1 & L2) receiver with WAAS and Inmarsat StarFire correction channels
- The L1 receiver has direct access to the L1 signal
- The P-code L2 signals cannot now be directly accessed.
- Since the L1 signal also has the P-code present, the L2 signal can be accessed by cross-correlation with the L1 signal—with significant loss of signal-to-noise.
StarFire™ RTK & RTK Extend™

January 2004

• High accuracy and repeatability: ± 1 in (2 cm)
• Receivers on machine and base station
• Base station transmits radio correction signal to eliminate GPS drift
• Vehicle can travel same path or track
• Repeatability is the key advantage
• RTK Extend™ uses the StarFire correction signal to extend operation to areas where the communication signal from the base station is unavailable
Benefits of GPS Guidance

- Minimizes input costs
- Reduces operator fatigue
- Improves productivity
Guidance Payback

• “The pay off on a DGPS guidance system can be as little as a year to a year-and-a-half, so it holds the potential of being a high-return investment.” Purdue University Study
Benefit of the new L2C signal

• The recent launch of the first modernized GPS Satellite allows direct access to the L2 signal.
• This gives a much stronger signal tracking availability for the removal of ionospheric refraction effects upon the GPS signals.
• The direct benefit is to make guidance by GPS significantly more robust.
• Example: Signal and accuracy is often lost along field boundaries where trees interfere with the signal.
Benefit of the new third frequency (L5)

- The launch of modernized GPS satellites in 2007 with the L5 frequency will enable improved RTK performance. Three frequencies allow:
  - Faster initialization of the RTK whole-cycle ambiguities
  - Significantly longer operating distances from the reference receiver and therefore fewer reference receivers required to cover the same area
  - Unique Deere/NavCom method of using the three frequencies for RTK ambiguity resolution—Patent No. 6,934,632
John Deere Ag Management Solutions

Questions?

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