A satellite view of the Earth's surface, showing a blue ocean and green landmasses. A white circle with a crosshair is centered over a small orange rectangle, indicating a specific location or target area. The text "GPS systems give you an eye in the sky" is overlaid on the image.

GPS systems give you an eye in the sky

# Far Out

With help from above, you may soon be able to manage your golf course from your computer. You'll be able to oversee the location of equipment operators in real time and closely regulate the application of water, fertilizers and pesticides.

Welcome to the world of turf management via satellite.

Companies including John Deere, ProShot, ParView and ProLink are offering golf course information-management systems that utilize the Global Positioning System, a government network of 24 satellites

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BY LARRY AYLWARD, MANAGING EDITOR



orbiting the earth which track the location of moving objects on the ground. These products also feature interactive, computer-based maps of golf courses created from Geographic Information System software.

About 200 golf courses are currently using the technology to attract more business (as in golfers) and improve club operations. But suppliers say their space-age systems will also help superintendents better manage their golf courses, from treating turf to overseeing labor.

GPS was originally designed by the U.S. Department of Defense for military use, but is open to public access. Radio signals are sent from satellites to earth, where GPS receivers collect and convert the signals into latitude, longitude and altitude. GPS is used for navigation worldwide in airplanes, boats and cars.

"I have no doubt this technology will take off with superintendents," says Dana Lonn, the Toro Co.'s director of advanced turf technology. Toro is a strategic partner of ProShot Golf and a GPS/GIS system manufacturer.

While superintendents aren't currently demanding the technology, Lonn says they'll want it when they realize it can assist them in dealing with environmental issues, labor productivity and cost control. John Deere maintains that its SkyLinks system will help superintendents generate management reports that track and measure real-time performance data on every vehicle and every employee to assure optimal efficiency.

The technology has Steve Dorer excited about the possibilities of satellite golf course management. The superintendent at Methodist GC in Fayetteville, N.C., predicts the popularity of GPS/GIS will escalate because more superintendents are discovering the benefits of such progressive technology.

### Good for business

Suppliers are currently pushing the technology on the sticks-and-balls side. Nate Yoder, vice president of marketing for Sarasota, Fla.-based ParView, says its Course Management System helps make the game more fun for golfers.

Golf courses such as The Legends, a 54-hole course in Myrtle Beach, S.C., are finding the technology is good for business. The Legends encounters a whopping 800 golfers

daily — all under the watchful eye of John Deere's SkyLinks, which the course implemented about two years ago. Golfers enjoy SkyLinks because their cars are equipped with laptop computer-like screens that provide them with a synopsis of each hole, yardages and other features. Golf shop personnel like SkyLinks because they can monitor golf cars to better manage the pace of play.

"The system has helped us maximize our golf course," says Tim Jackson, golf pro at The Legends.

Jackson says more golfers are coming to The Legends because they've heard about the cars equipped with the cool electronic gadgets. Since they can use the gadgets to track yardages and survey hole layouts for potential trouble — rather than fussing around the course searching for yardage markers and scrutinizing shot angles — they're getting off the course in less time. That means more rounds are being played and more cash is coming in.

Jeff Levine, regional manager for Arnold Palmer Golf Management's three Texas golf courses, says ParView's GPS system has pared 25 minutes from average rounds at Tour 18 Dallas, Tour 18 Houston, and The Golf Club at Castle Hills.

Golf shop personnel can also monitor bottlenecks on the course through SkyLinks. If Joe Slow is delaying other golfers with his plodding play, the golf shop can send him a polite message to tell him to pick up the pace.

The competition for golfers is getting fierce, with rounds not keeping up with the

number of courses being built. Companies are marketing GPS/GIS technology as a means for golf courses to differentiate themselves from the competition. That's one reason why Birmingham, Ala.-based Sunbelt Golf Corp. opted to implement ProShot Golf in all of its golf and beverage cars at its eight facilities.

"We want to stay on the leading edge of where the industry is headed," says Russell Redford, Sunbelt's vice president of operations.

### I spy?

Managers can also utilize the technology to monitor car location and transmit messages to golfers if they drive carts on greens or wander into restricted areas. Superintendents can use the technology to play Big Brother by busting any workers who are sleeping on the job when they're supposed to be fertilizing the fairways.

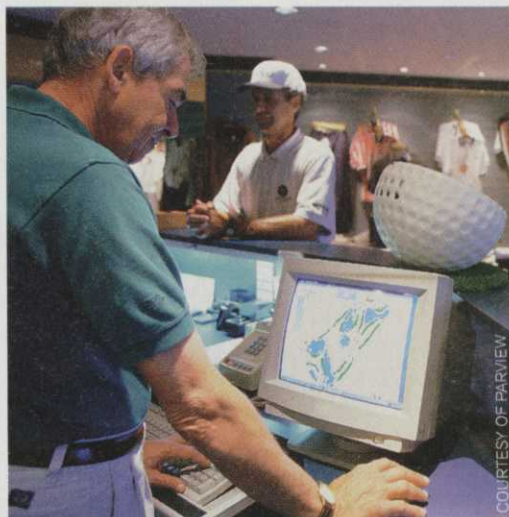
But the Orwellian aspect of GPS causes concern. While Yoder

claims that superintendents say they are interested in ParView's Course Management System for its Big Brother capabilities, others say they wouldn't use it as a live surveillance camera. That includes Dorer, who says that would be an "intimidation tactic."

But Lonn points out that superintendents can use GPS/GIS to log and replay data. That way, superintendents can monitor workers' efficiency by tracking where they have been and what they have done.

Dorer says he would use the system for that reason, which would be more constructive than spying. If he discovered a

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**If Joe Slow is delaying others with his plodding play, the golf shop can send him a message to tell him to pick up the pace.**



# Far Out

*Continued from page 29*

worker needed to spray the greens faster, he would offer him tips on how to do so.

It may be several years before the technology is popular among superintendents, Lonn predicts. It's in its early stages of development, and its capabilities are still being evaluated. Lonn says the technology is part of Toro's precision turfgrass management program within the advanced research group.

According to Toro, future applications of precision turf management will enable superintendents to equip sprayers with electronic controls and utilize GPS to detect and shut off its boons if it has entered a no-spray zone. Superintendents will also be able to

record and monitor pest infestation areas on hand-held computers by using GPS.

Dorer says such applications "would streamline things and make superintendents more efficient." But he doesn't plan on purchasing a system anytime soon. Cost is a concern.

GPS products are seen as high-cost items because they're seen as high-tech wonders. Lonn says about 100 ProShot Golf systems are in operation at U.S. courses. He says most systems are leased, and course owners charge about \$3 extra in green fees to pay for them. But Redford notes that courses charging \$30 a round may have more of a difficult time explaining a \$3 increase to golfers than a course

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## Cheaper, Via Satellite

There has been much hoopla about speeding play and increasing revenues by installing satellite-based Global Positioning System receivers on golf cars. Less known, however, are the potentially significant cost savings as a result of integrating GPS into construction projects on new or existing courses. Cost overruns associated with change orders can be avoided by digitally mapping course features before, during and after construction.

Larry Rodgers Design Group in Lakewood, Colo., was among the first to incorporate GPS mapping in irrigation system design. But the firm has expanded GPS use into many phases of course construction. Rodgers has developed numerous GPS applications in joint projects with D.A. Weibring/Golf Resources Group, a Dallas-based consulting firm specializing in course design and operation. Both groups have learned that construction is completed much closer to budget when designs are drawn with GPS.

"GPS gives owners a higher comfort level with the money being spent on big projects," says Don Armstrong, a Weibring/Golf Resources partner.

When construction is finished, GPS maps remain with a course's superintendent to serve as a precise as-built course survey. The maps become key to daily operations through integration with computer-controlled irrigation units or car-tracking course management systems.

Larry Rodgers, owner of the design group, invested \$50,000 to purchase a precise GPS system, including backpack-mounted Trimble

GPS receiver with mapping software and Fujitsu Pentop field computer. He also bought a differential correction unit to refine the accuracy of GPS positions to less than a meter.

"Real-time GPS makes our field work more efficient," he says. "We actually make the map on the computer screen while we walk the course. This lets us anticipate and correct errors before they happen."

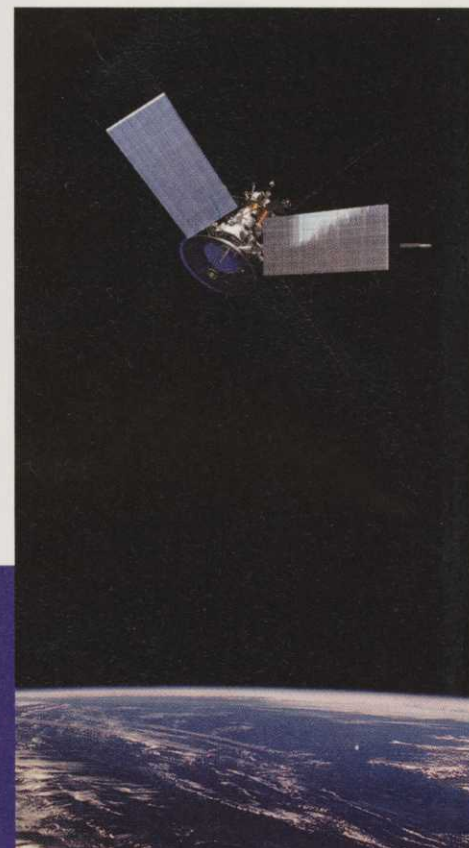
In preparation for an irrigation design, Rodgers' technicians map locations and perimeters of features — tees, greens, fairways, cart paths, bunkers and trees — with GPS. For new builds, they go on site to map planned features as the construction crew stakes them.

Making the GPS map is straightforward. With the receiver on his back, the technician accesses a menu on the computer and chooses from a list of features to map, such as green or fairway. The computer keeps track of what each feature is and maps locations on screen as the technician walks. The digital files are sent via e-mail to Rodgers' office in Colorado, where the points are re-created into a course map on the computer.

"I plot the precise location of where every main line, lateral pipe, tap, valve and sprinkler head will go right on the GPS map," Rodgers says.

Once the installation is complete, the technician returns with the GPS and maps the as-built location of components. This map is left with the superintendent.

During collaborations on several projects with Weibring/Golf Resources, Rodgers employed GPS in other phases of construction. One such project is Quail Creek in Oklahoma



City, where Weibring/Golf Resources created master plans for major renovations, with Rodgers designing a new irrigation system.

Before construction, Rodgers converted the paper architectural drawings to digital format and integrated them into AutoCAD. Eric Weiskopf, Rodgers' GPS technician, then mapped the existing course, including property lines and old irrigation components.

"We overlaid the digitized master plan on the GPS map in AutoCAD to make minor scaling corrections to the blueprint," Rodgers says. "Once the plan fit perfectly in the course boundaries, we drew in the irrigation design."

By making scaling corrections before construction, they reduced potential for change orders. Creating the precise irrigation design ahead of time enabled the irrigation contractor to begin work while general construction was still under way, minimizing course closure.

Golf Resources has begun introducing GPS maps for use in daily operations at courses it manages, including the Bridlewood Course in Flowermound, Texas. Managers there use Rodgers' GPS map to calculate surface areas of course features to more accurately plan budgets for fertilizers and other chemical applications. ■



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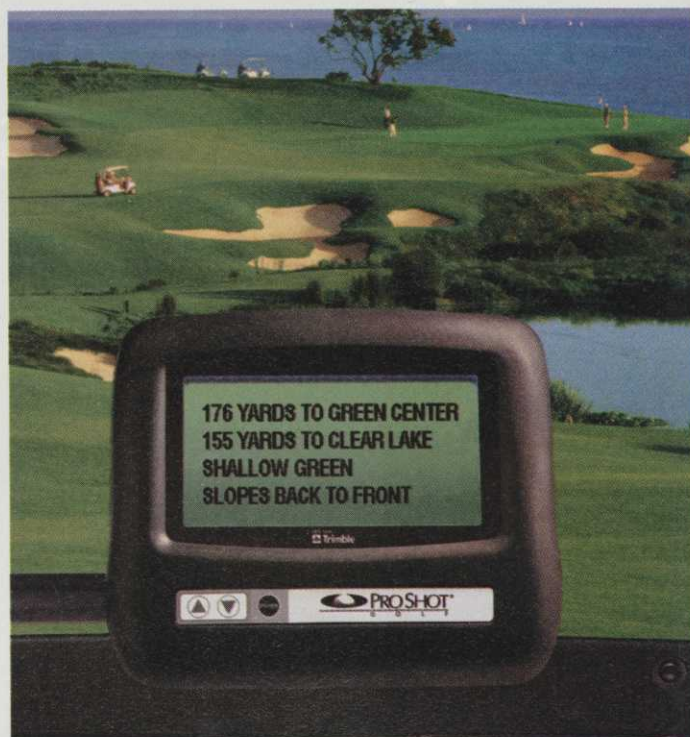
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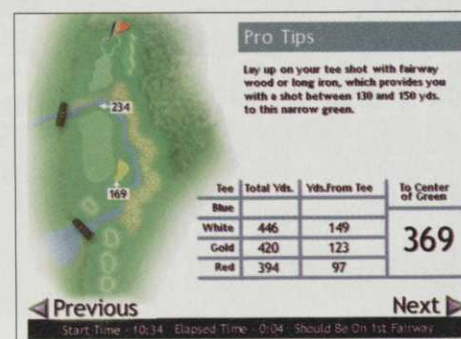
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## Far Out



Golf cars equipped  
with cool electronic  
gadgets to track  
yardages and survey  
holes layouts have  
piqued the interest of  
golfers, leading to in-  
creased business for  
course owners.



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that charges \$75 a round.

However, the price of a system for turfgrass management depends on several variables, including whether it's custom designed, says Shawn Phillips, general manager of John Deere Skylinks.

"It could range anywhere from \$100,000 to \$300,000," he estimates. "But as with any technology, I would expect the cost to come down."

A system would be cheaper to implement on the turf management side if it was already in place on the golf side because certain components of the system, such as a base station, would already be purchased and functioning.

Some wonder if it's possible that a system could falter if satellites malfunction. Experts believe that snafus are rare because a system needs only four of the 24 satellites to function.

"It would be a rare case," says Mark Schmidt, program manager for Deere's SkyLinks. "If it did occur, it would only be for about five seconds." ■