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Large, beautiful tree near the 8th green at Eagle Ridge Golf Club, Galena, Ill., was preserved in golf course design but green is positioned so it is mostly in the sun. BELOW: Irrigation can be a real problem when part of the course is in the sun and part is well-shaded. Automated, programmable irrigation system at Los Angeles' Bel Air Country Club helps overcome problems.

predispose the turfgrass plant to disease attack.

Late fall fertilization (after the tree leaves have fallen and are raked up) of cool season grasses is extremely important in shaded areas because this is essentially the only time of the year when the grass plants under trees can efficiently utilize the applied nitrogen in the absence of tree competition for soil moisture and sunlight. Soluble sources of nitrogen in the November/December time frame are most efficient and benecial. Slow release sources (more than 50 percent water insoluble nitrogen) applied at this time tend to remain available into spring and can cause overstimulation.

Maintaining an adequate pH (6.5) appears to be more important for some plants than others. Kentucky bluegrass, tall fescue, and perennial ryegrass appear to be favored by a soil pH near 6.5 while there is research evidence which suggests that Pennlawn fine fescue might do better at pH 5.5 than at pH 6.5 (see Pallazzo and Duell, Agronomy Journal, Vol. 65, pp. 678-682).

4) Raise the mowing height. In a reduced-light situation the objective is to maximize the health of the individual plant. Low mowing heights tend to increase plant density, but this occurs at the cost of the reduced health of individual plants. In other words, the increased mowing height provides less plants per unit area, but the individual plants are larger and healthier.





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heavily. An irrigation program which minimizes the amount of time shaded areas are moist will be beneficial in reducing disease incidence. Infrequent watering will also tend to minimize the probability of compaction and not favor shallow surface rooting.

6) Maintain strict traffic control. Maintaining traffic control is more important in shaded areas than it is in full-sun areas because of the lack of recuperative potential in shade and inability of the thin-cell-walled grass to bear traffic without injury.

In areas where traffic is uncontrollable, annual fall sodding is a reasonable solution. Fall sodding of these areas is preferred to maximize sod rooting and food storage before tree leaves emerge in the spring.

7) Maintain an adequate tree care program. Remove unnecessary trees that are not essential to the golf course design or landscape plan. Judiciously prune trees as much as possible to maximize light penetration to the turf. Periodic tree root pruning may be necessary where excessive tree root surface feeding is occurring. Utilize tree "spike" methods of fertilizing trees as opposed to surface area feeding of trees.

8) Provide good soil and air drainage to shaded areas. Installation of drainage tile is necessary in any situation where quality turf is desired and drainage is inadequate. Providing adequate channels for wind entry and passage through shaded areas is essential to reduce humidity and disease incidence.

9) Remove leaves and debris promptly. Quick removal of leaves and debris all year long is essential as they only serve to shade the turfgrass plant and reduce its food-making potential. Fall leaf removal is most critical to the production of quality turf in shade.

10) Provide appropriate pesticide protection. Powdery mildew on shaded Kentucky bluegrass and Helminthosporium diseases on the fine fescues are severe. Periodic application of fungicides for controlling these pathogens and others may be necessary. Control of weeds and damaging insects will improve the appearance of the turf and reduce the competition for light, water, and nutrients. □

Computerization updates municipal courses' irrigation

By using solid-state controllers instead of electromechanical models in the irrigation systems at its two municipal golf courses, the City of Everett (Wash.) realized a myriad of benefits: improved reliability, more versatility, precise control of the irrigation cycles, and substantial savings in initial costs, labor, water, and energy usage.

"The solid-state controller was very attractive to us for a host of reasons," comments Superintendent Patrick M. Russell, park/golf maintenance, of the city's parks and recre-ation department. "For example, its initial cost was about 40 percent less than electromechanical units. The solid-state design enhances reliability because less circuitry is required, a feature that reduces the possibility of malfunctions. This advantage, plus the fact that there are a minimum of moving parts, ensures a much lower frequency of maintenance than would have been incurred with electromechanical types."

"Versatility is another attribute that influenced its selection, remarks Jack R. Donis, irrigation consultant from Eugene, Ore. "Historically, separation of green, tee, and fairway irrigation usually required two or more field controllers per fairway. By contrast, all the electric valves and valve-in-head sprinklers for all three locations are wired to a single controller, enabling it to handle a complete golf hole. By simply 'assigning' the various irrigated areas to separately programmed 'groups' on the field controller, the desired control is accomplished at considerable cost savings over conventional systems."

"This ability to subdivide groups and subgroups means that we can water areas on demand without activating the entire system," adds Russell. "This pinpointed control can even be applied to a single sprinkler. Moreover, the irrigation timing cycles are extremely accurate. Since water usage is so precise, the demands on the pump are more evenly distributed. This enabled us to reduce the size of the booster pumps needed, effecting significant savings in energy consumption."

The city official further notes that



Rotary pop-up heads are controlled in pairs by individual electric valves (above). Controller operation is explained by J-M's Don Fosness (center) to Everett Maintenance Superintendent Patrick Russell (right) and Golf Course Supervisor Tracy Powell (left).

the use of one field controller per golf hole allows total visual control. "We can see what each station is doing when it is performing its particular function. Problems can be immediately spotted. To achieve the same degree of control with other systems, we would have needed at least 40 percent more field controllers."

A definite improvement

Previously, irrigation was achieved with quick-coupler systems at both the Walter E. Hall and the Legion Park Municipal Golf Courses. This technique was used to water the entire course at Hall, but only the greens and tees at Legion Park. This was a manual operation that involved a heavy amount of costly, time-consuming handling. Also, watering was not uniform because of the human error factor inherent in this method. Frequently, areas of the courses were either flooded or not watered at all.

The solid-state control system remedied these conditions. Consisting of a micro-processor that controls a wide range of irrigation functions and a calculator-type keyboard that, with a human input/output interface, feeds instructions and changes in programing to the controller, the control



system provides an automatic, precisely regulated irrigation cycle.

"The improvements afforded by the computerized system have had a substantial effect on our costs," says Tracy W. Powell, the golf course supervisor responsible for the maintenance of both courses. "At Hall alone. we saved \$10,000 to \$12,000 in labor costs. Materials costs were reduced by about \$700 to \$1,000. Furthermore, water coverage is consistent-which is of particular value at Hall because of its hilly terrain. We now get green grass without the problem of standing water. Repair work, especially on the fairways, is faster and easier. The system even changed our fertilizing program. Now we use a more economical fertilizer and can water it in immediately."

"The flexibility of the system allows us to do things we could not do before," continues Powell. "For example, we can punch in a syringe cycle



Two keyboards play a role in the Everett system. The desktop central processor (left) can be used to program any one of the field controlled groups or subgroups. The field controller (right) is situated by the part of the course it controls.

that will remove dew and reduce a fungus problem that is of particular concern in the fall. Also, we can put in a skip day cycle in the event of inclement weather. Watering schedules can be altered, depending upon need and season. In the spring, we provide an average 15-minute irrigation cycle, although some areas may have only a 10-minute sequence and others will be watered for as long as 25 minutes. Repeat cycles can be added on demand. In the summer, we increase the number of repeats. In the fall, we step down towards the spring schedule. All of these variations and much more can be easily and quickly programmed into the controller by simply punching the necessary data into the keyboard. No special skills are required to operate the controller."

Expeditious installation

The landscape contractor for the job also lauded the system. Cliff Paul of Paul Brothers, Inc., of Portland, Ore., noted that installation was so fast and simple that the courses did not have to be closed and player disturbance was kept to a minimum during the construction stage. "We were able to complete both courses in 90 days," says Paul. "Other systems would have required at least 10 more days, which would have increased our costs by about \$10,000."

A major assist in curtailing course disruption was the use of equipment that had been specially designed by the contractor for the project. For example, dual-wheeled, wide-flotation-tired trenchers and an auger-type back-filler were utilized to avoid tearing up the course or leaving unsightly marks on the turf. The pipe-laying technique employed by the contractor also kept course downtime and damage to a minimum. The main line was installed on the side of the fairway and all laterals were pulled across the fairway under the surface instead of being laid in an open trench.

Paul also pointed out that the flushing and testing sequences were facilitated by the controller. Continuous reprogramming was not necessary because the unit's simplified manual override supersedes the assigned program. After the tests are completed, the controller automatically resumes its designated program.

"Since the entire system — controllers, valves, sprinklers — came from one company, Johns-Manville," the contractor remarks, "We did not have to 'mix' or 'match' incompatible components. The delays, downtime and other problems usually associated with this practice were averted."

At the Legion Park course, the irrigation system consists of two parts. The fairways are arranged in a block pattern using 485 model 8350 rotary pop-up sprinklers controlled in pairs by 242 model 930 electrical control valves. Over 85 model 8750 rotary popup valve-in-head sprinklers are used on the tees and greens. Eighteen KCS-24FC field controllers are used.

The model 8750 sprinkler is used exclusively at the Walter Hall course.

In addition to the 638 sprinklers, 20 KCS-24FC field controllers are used. Both courses can be centrally programmed from the supervisor's office with a single central processor (KCS-CP). Conveniently sized for placement on top of a desk, the unit can be programmed to address any one of the field controller groups individually. In addition, all or any one station of the subgroups within a field controller group can be activated from the central processor., □



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Sod-growing blocks

Poly Forms, a division of Presto Products Inc., makes Sod-Saver landscaping blocks to provide wear-resistant sod in heavy-traffic areas on and around the golf course: golf car paths, tees, around drinking fountains, even parking lots. The blocks measure 12 by 36 inches and come in a normal 1%-inch thickness and a 2¾-inch thickness for heavy-duty use. They provide a load-bearing, nonsinking base for turf, distribute weight to keep soil from compacting, allow air and water to reach tree roots. Easy to install, the blocks can be cut to fit with an ordinary saw.

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Compact, nonriding trencher

The new Ditch Witch model 1500, manufactured by The Charles Machine Works, Inc., is a two-wheel drive, nonriding compact trencher equipped with hydrostatic ground drive and a mechanically powered digging chain. Hydrostatic drive provides quick, precise adjustment of mobile or trenching speeds to fit conditions. Engine options ranging from 9 to 13 horsepower enable you to pick the powerplant that will best fit your needs. Equipped with a wheel clutch, the model 1500 will dig to depths of 5 feet and widths of 8 inches, depending upon boom and chain selection. An optional wide pivot is available for digging widths to 12 inches. If more stability is needed for digging on slopes or in other difficult areas, the wheels can be reversed to obtain an additional 10 inches of machine width and wider tracking. The machine's controls are big and easy to reach; ground drive direction and speed are controlled by one lever. Circle 203 on free information card

Multipurpose off-road truck

HydraHaul, product of OME Inc., has an aluminum dump bed that operates hydraulically, controlled from the driver's seat; fenders, seat, cowl, and footboards are also nonrusting aluminum. The electrically started, 16-horsepower Briggs & Stratton engine not only moves the HydraHaul at 10 miles per hour, it also powers a 2,400-watt, 110-volt a.c. generator for operating trimmers, pumps, and other tools on the course. The transmission is hydrostatic-type. Circle 204 on free information card









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Automatic irrigation control

Three models make up the B series of automatic controllers introduced this year by Rain Bird: models RC-12B, RC-18B, and RC-23B manage 12, 18, and 23 stations respectively. All work in conjunction with optional Dual Program or Long Timing modules and feature an Instant Repeat cycle. Other key features: 14-day calendar, incremental timing from 2 to 60 minutes on all stations, and a rain shutdown switch. A moisture sensor switch can override the controller if desired.

Circle 218 on free information card



Personnel pager

The 600 series radio paging system was designed by Page Alert Systems, Inc. to meet the needs of users such as golf courses where a range of one mile is required. Receivers are small, weigh just 41/4 ounces, and can be worn in a shirt pocket or on a belt. Paging is tone only; receivers are selectively called, so the pro, superintendent, and other personnel can be paged individually.

Circle 212 on free information card



Stump grinder

A one-man machine called Little David will reduce a stump to an easily removed pile of fine chips in minutes. While able to cut a foot below ground, it has adjustable wheels to enable removal of stumps 2 feet high. Its 14inch cutting wheel has 12 carbide teeth and is powered by a 16-horsepower engine. From Promark Products West, Inc.

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Diesel tractor

A 25-horsepower three-cylinder diesel engine powers the Kubota L245 tractor, which has many big-tractor features: eight forward speeds and two reverse, front and rear PTO shafts, category I three-point hitch, hydraulic lift with position control. Shown here with optional mid-mount mower.

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Pipe detector

Locate underground water pipes, conduit, sewer pipes, and PVC water pipes with water in them by using the Tracker, a 33-inch device which operates on a 9-volt battery. The tracking unit weighs less than 3 pounds and works with a 1- by 1- by 2-inch transmitter. Progressive Electronics Inc. sells the Tracker. Circle 215 on free information card

Dutch elm fungicide

Elmpro, an injectable systemic fungicide containing Arbotect, is available from Hopkins Agricultural Chemical Co. to combat Dutch elm disease. Elmpro is mixed 1:1 with water, then injected into the vascular system of the tree by gravity or low-pressure injection equipment. Apply it once per season.

Circle 206 on free information card



Heavy roller

Brutus is the name of a ½-ton riding power roller made by Northeast Industries, Inc. for rolling turf, hot-tar surfacing, pavement patching, and compacting confined areas. Although low-priced, Brutus has a semiautomatic forward/reverse transmission and a center-pivot steering mechanism. Circle 208 on free information card



Pumping station

A pumping station with solid-state controls to take the guesswork out of time, flow, and pressure measurements has been developed by AquaTurf. It is available in capacities ranging from 250 to 5,000 gallons per minute. Circle 207 on free information card

Information service Directory

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AMF Harley-Davidson introduces a new light-weight, electric golf car: Master Glide IV. It offers increased battery life by virtue of a two-circuit system that switches from series to parallel operation at low speeds. Circle 128 on card

The Datono Products Division of Dayton Stencil Works Co. offers signs for efficient golf course marking. Features include: Construction of 14-inch by nine-inch heavy steel; high quality embossing, baked enamel finish, strong steel stakes. Over 100 titles are in stock and available. Circle 135 on card

One man can aerate a 5,000-square-foot green in less than 15 minutes with an aerator from Dedoes Industries, Inc. The manufacturer now has a pointed tine available for tees and greens which gives up to three-inch penetration in the turf. Circle 120 on card

John Deere 850 and 950 tractors are powered by fuel-efficient diesel engines that put out 22 and 27 PTO horsepower respectively. Though big enough for most any job on the course, the tractors will turn within a 10-foot radius. Circle 137 on card

Gilison Knitwear Co., Inc. offers its new 1978 line of Touring Pro golf sweaters. Circle 111 on card

Features of Emerald bentgrass, available from International Seeds, Inc. include: Exceptional uniformity, excellent vigor, disease resistance and competitive pricing. Circle 105 on card

Kohler Co.'s new Twin 17 four-cycle engine offers cast iron construction and 17 horsepower. Single and twin engines are available from 4 to 23 horsepower. Circle 113 on card

Milorganite, the natural organic fertilizer, offers a wide variety of advantages over other fertilizers but has nothing synthetic added to it. It's a product of the Milwaukee Sewerage Commission. Circle 106 on card

Oregon ryegrass will green up your greens and tees in winter and will make your fairways lush and green. The Oregon Ryegrass Commission tells how to do it with winter overseeding. Circle 110 on card

Pennfine perennial ryegrass, marketed by S.P.I.C., is able to stand up under heavy traffic and it also germinates rapidly, making it ideal for winter overseeding in the South. Circle 102 on card

Penncross creeping bentgrass is genetically uniform and disease-resistant and establishes more quickly than conventional bents. It makes a putting surface that putts true and has good color. Tee-2-Green Corp. sells it. Circle 115 on card

Mileage Master batteries, a product of Trojan Battery Co., boasts new design changes for better golf car power and longer discharge ratings. Call tollfree 800/423-6569 or Circle 140 on card

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