

Complete irrigation with central control

Electronic panel device, new pump and piping give St. George's Club "tomorrow's system today."

By MICHAEL O. MATTHEW

President, St. George's G&CC, Stony Brook, N. Y.



Central electronic control panel has color-coded course diagram, 23 timed rows of plug-in jacks, and time clock with pre-warning device.

A completely automatic irrigation control system, based on a central electronic control panel, has been operating flawlessly since we installed it at St. George's Golf & Country Club, Stony Brook, Long Island, N. Y., in mid-July, 1965.

Basically, our system consists of a central electronic programmer with more than 20 sequentially timed circuits to control irrigation of all fairways, greens and tees. Each component—pumping, piping and control center—is designed as a coordinated system. The action and reaction of each component is considered, and each is engineered to eliminate any adverse effects on another.

Major features of our system include:

- Unmatched reliability since only one programmer is used.
- Overall operating cost is less than that of manual or previous automatic systems.
- Flexibility and adaptability to additional features is unlimited.
- Central automatic control is adaptable to either new or existing piping systems.
- Pressure at each sprinkler head is maintained automatically within close limits to compensate for pressure drops and differences in elevation.

- Installation cost is less than that of semi-automatic systems with several automatic programmers at stations in the field.

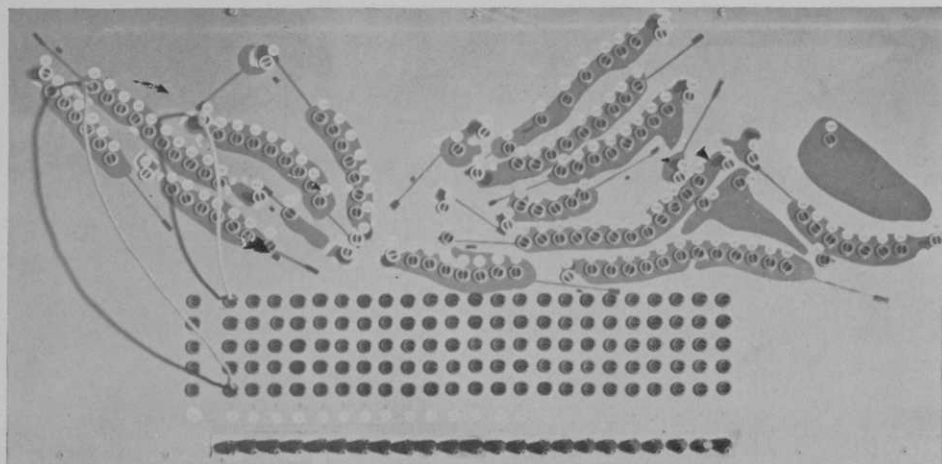
- Control panel can be operated easily by unskilled laborers because of color coding in panel and plug-in jacks.

This is how the new system came about. In July, 1964, members of our club elected to install an irrigation system to water the drought-parched fairways, and to replace the 1917 system which provided insufficient water for greens and tees. Because of my electrical and mechanical engineering background, I was given the job of Chairman of the Irrigation Committee.

I accepted the job as a real challenge and immediately set a goal to see that St. George's had the most advanced, simple, versatile and trouble-free system yet developed. It wasn't easy, but it was interesting. We formed a representative committee and used all of the technical talent available within the membership of the club, in addition to the experience of Sid Brown, our green superintendent.

First, without any pre-conceived ideas of what the automatic golf course irrigation design concepts were, our com-

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Schematic color layout of course has plug-in jacks at each sprinkler head location with pilot light and sprinkler head identification number above. Bottom row has variable time setting or adjustment knobs for each of the 23 circuits on the new electronic control panel.

COMPLETE IRRIGATION

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mittee outlined the features we thought desirable. I then sat down to design an electronic control center that would accomplish all of these features. To do this I had to call on many years of automation experience designing and servicing automatic control systems for various processes in power plants, water works and petro-chemical plants.

It was easy for me at once to see the overwhelming advantage and practicality of a central control center where all manual and automatic control functions could be programmed and performed. Today, almost every new power plant, water works, chemical plant and office building has only one central control center. Yet, most automatic irrigation systems installed in recent years still use automatic programmers grouped at several locations with the resultant lack of flexibility and coordination, and decrease in reliability.

We pooled our ideas with other committee members and unanimously agreed that we should have a central electronic control center. In addition, after an exhaustive analysis of several manufacturer's lines of irrigation equipment, we actually tore down and examined every manufacturer's control valve, sprinkler

head and programmer we could find. Thus, we became convinced that reliable components were available, and our combined experience with more sophisticated equipment assured us that we could build a trouble-free system. Next, we read every article we could find on automatic irrigation systems, listing the shortcomings and desirable features of each. Since we were not influenced by any source, we could take a truly objective approach. Shortcomings and potential trouble spots of previous systems were easy to see, and it was amazingly simple to overcome them. We were not satisfied with an adequate automatic system or one that was just better than a manual system. We selfishly and prudently wanted one with minimum operating and maintenance expense, and we wanted the simplest and most reliable equipment available regardless of how many different manufacturers we had to use. Not only did we want the best system, but the *best buy*, since we are a financially modest club.

Fortunately, we had designed our central electronic control system based upon the latest automation techniques prior to becoming exposed to limited multiprogrammer systems. We gave each of these systems an honest engineering appraisal, but since the entire club

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SUMMER RECIPES

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mayonnaise and parsley.

Chicken salad for four baskets: 3 cups diced cooked white chicken meat

1 cup diced celery

1 teaspoon finely chopped green onions salt and white pepper

Accent—to taste

several drops lemon juice and worcestershire sauce, and enough mayonnaise to make salad nice and moist.

Put one cup of solid pressed chicken salad in basket and decorate with fruit. Put a rosette of mayonnaise on top of salad and place strawberry on top. Sprinkle with sliced almonds and place sprig of parsley on basket. Serve on large plate with fancy folded napkin.

ERIC SEAGER, Manager
 Olympic CC, San Francisco, Cal.

POACHED MAHI MAHI TROPICANA

Mahi Mahi is a mild fish which is the filet of the dolphin, and a favorite fish in the Hawaiian Islands. It is now widely used in the San Francisco Bay area.

I have had great success by serving Mahi Mahi poached in white wine. I place each portion in an oval casserole and decorate it with seedless grapes and half a peach. This is coated with white wine sauce and glazed with a mixture of hollandaise and whipped cream.

ERIC SEAGER, Manager
 Olympic CC, San Francisco, Cal.

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membership was relying on our judgment to create the most practical and simple system, we couldn't settle for less.

During our surveys one installation contractor warned that the wire sizes and total footage would be so large that the costs would become prohibitive. This scared me, so I quickly put Ohms Law to work and found that we could use No. 14 wire for the control wires up to 2,500' and No. 12 wire over 2,500'. We scaled our footage, and including 25,000' of spare wire for future extension and insurance, our total footage came to 250,000'.

This came to \$3,000 in materials and labor more than the limited multi-pro-

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GOLFDOM

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grammer system, but to offset this cost we compared the cost of our one programmer with the installed cost of 12 to 15 programmers at \$400 each plus the additional cost of fencing or housing these programmers to keep out vandals.

Our estimates proved correct. Upon completion, we found that our centralized system had cost no more than the limited multi-programmer system, with a fantastic increase in flexibility and reliability. We also realized that the cost of the limited multi-programmer system would be far greater than a central one if it incorporated the same flexibility and reliability features.

A control valve manufacturer expressed concern about our getting 24 volts at each solenoid valve, since we had wiring runs of from 50' to 3,300'. I devised and built a "black box" that automatically balanced each circuit and instantaneously compensated for any line voltage variations at the power utility

lines. Having worked for a power utility, I was aware that over-voltage could be as damaging as under-voltage.

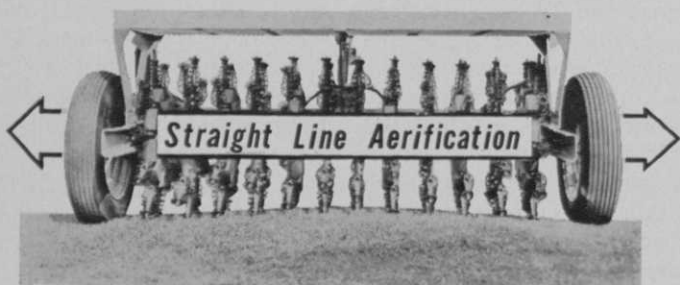
One green superintendent we interviewed had reservations about the operator being able to correlate all switches on all his programmers with all the sprinkler heads on the golf course. This prompted our use of the color-graphic control panel with the layout of the course to scale and in color. Different colors or shades were used for greens, tees, fairways and traps.

A numbered plug-in jack at the exact location of the sprinkler head was used to terminate the control wire from each sprinkler head. The plug-in jacks were color-coded to identify the sprinkler heads for tees, greens and fairways. This color-graphic technique used "human engineering" principles so that unskilled labor can operate the control center. These principles are also used throughout.

Circuitry of the central electronic programmer is "adaptive" so that any modification or addition can be made

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without upsetting the basic circuit. Only one timer is used with day, hour and minute settings in five-minute increments. There is a pre-start signal adjustable up to three minutes before the main signal is to start, which could be used to warn late golfers that the sprinkler heads are about to be activated.

More than 20 sequentially timed circuits are available, each variable from five to 60 minutes. Each circuit is capable of handling up to 10 control valves, and more can be added if required. A manual circuit selector is available, and several circuits can be used to water certain areas two or more intermittent short periods instead of one long period.

The entire program can be recycled one or more times to give light waterings instead of one long heavy watering. Any sprinkler head can be added or removed during the automatic operation without disrupting the sequence of operation. At

each green we have a switch independent of the electrical system, which activates that green at the flick of a switch. In addition we have a manual quick coupler at each green for manual syringing. Manual switching stations at elevated locations can be added later for manually controlling greens, but we have as yet found no need for this. For syringing greens during play we use a walkie-talkie system with one man roaming the course radioing instructions to another man at the central control center, who operates a series of switches with timers to keep track of the syringing time at each green. We thus keep interference with play to a minimum.

Our superintendent, Sid Brown, asked for a memory circuit to indicate the last circuit to operate and the time remaining on this circuit upon tripping of a pump safety relay. This feature was easily incorporated, and we added a time remaining indicator for the circuit in operation. All switching contacts are

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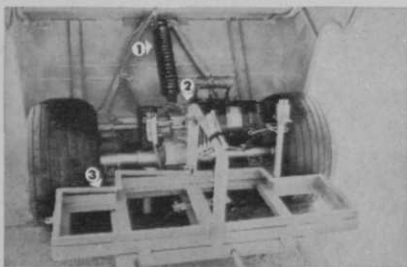


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"Champagne" Tony's death is great loss

The untimely death in a plane crash of one of the game's most colorful stars is particularly sad in an era when often the only way to identify a player is to read the name off his bag. The gap Tony Lema has left in the PGA ranks will be indeed hard to fill.

Tony was born in Oakland, Calif. on Feb. 25, 1934, and started in golf as a 13-year-old caddie. After his discharge from the Marines in 1955 he took a job as shop assistant at the San Francisco Golf Club. While at the club, he qualified for the U.S. Open at the age of 21.

Lema joined the Tour in 1957, but did not break through to the top until 1962, when he won four tournaments. The best vintage year for Tony was undoubtedly 1964. He won the Bing Crosby, the Thunderbird and Buick Opens, the British Open and finished the season by taking the \$50,000 first prize in the World Series.

Tony's wife, the former Betty Cline, whom he married in 1963, died with him in the Illinois crash several hours after he had competed in the PGA Championship at Akron, O.

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conservatively rated and are located in a low-moisture atmosphere for long service.

We also added a quick changeout terminal strip to change out the programmer in case of trouble, since none of our green crew is an electrical technician. We also carry a spare programmer, and any radio repair shop can repair it because only one electronic tube is used.

The entire program schedule of sprinkler heads can be set up by use of plug-in jacks in a half hour. Once the program is carefully thought out and set up, there is no need to change it. Future provision for adding pre-programmed printed circuits for rapid change of sprinkler sequence is provided.

We have provided the superintendent's house with circuitry so that when any safety relay is triggered, an alarm is sounded and he can take appropriate

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action. Provision is also made for starting and stopping the irrigation system manually from the super's house.

Moisture indicators are installed at several locations and at several depths to indicate a representative moisture content of the soil. Time settings on the programmer can be adjusted to maintain ideal moisture content and depth.

Since water pressures exceeding 150 lbs. psi will damage valves and fittings in most piping systems, shock pressures above this value must be controlled. We used larger pipe sizes to reduce water velocity to 3'-5' per second. For a small increase in pipe cost we got the bonus of less pumping costs due to pressure loss, less erosion of pipe walls, more ideal pressure at the sprinkler heads, and we can operate several heads on one hole for special situations.

We arranged our piping so that the 50°F. well water could be used in the clubhouse air conditioning system prior

to being used for the golf course.

To match and complement our revolutionary design for the irrigation system, we devised an equally advanced automatically controlled pumping system. We connected to a nearby natural gas main and installed a natural gas-driven engine on our deep turbine well pump.

This gave us two fantastic bonuses. First, we developed a special modulating pressure control system that throttles the engine to speed up or slow down to maintain a constant water pressure throughout the entire range from zero to maximum flow. No surges or shock pressures are put on the system, eliminating the need for a hydropneumatic tank. We are able to maintain a higher pump pressure for sprinkler heads in remote locations or high elevations and lower pressures for those closer to the pump or on lower elevations.

Second, during the period when our system is in full operation, our average pumping cost is less than one cent per 1,000 gallons of water pumped. •

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