Taking Your Pulse; Maintaining the Heart of Your Golf

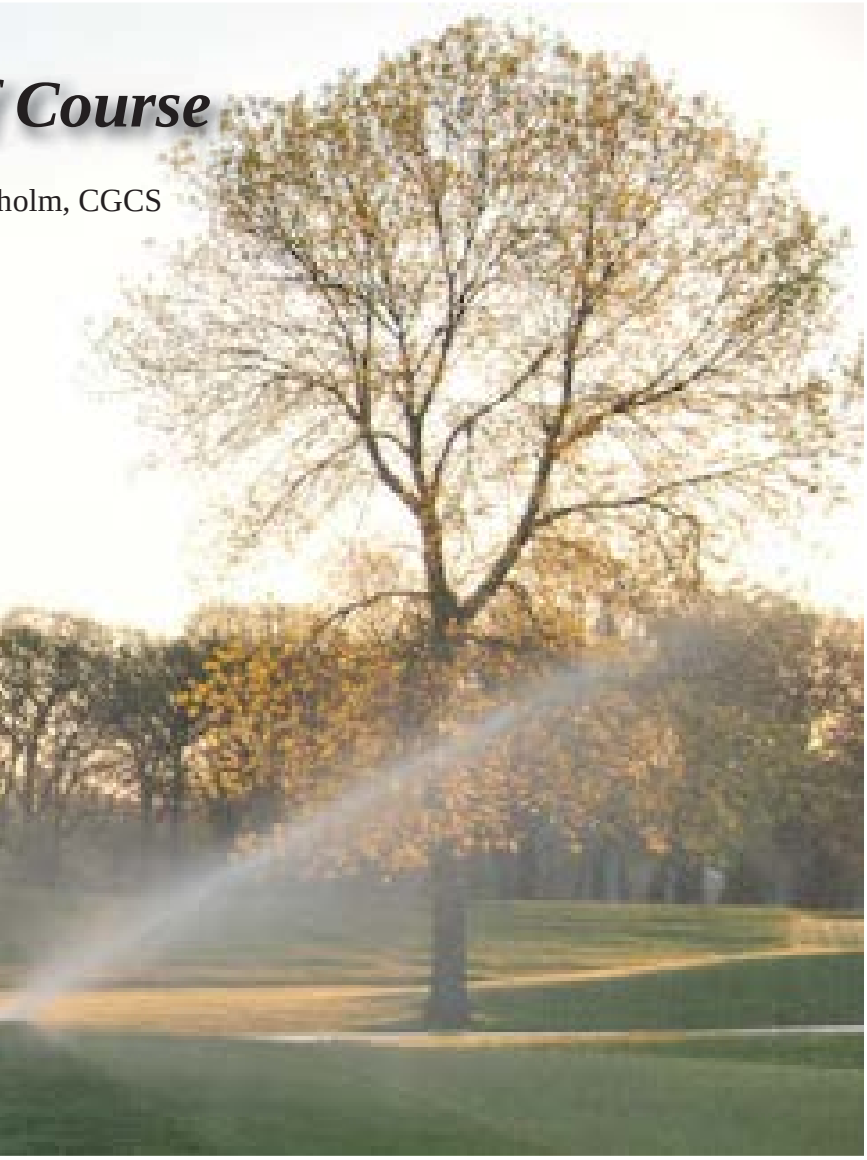
By E. Paul Eckl

In previous articles we have looked at the underground sections of the irrigation system and the things that influence the performance of those parts. In this article we will be looking the control system. If the pump station is the heart and the pipe and sprinklers are the body, the control system is the brains of the operation.

As with the other parts of the system, there are many different types and levels of control out in the field in our area. All of these systems can work well if the operator knows how they work and takes the time to maximize the efficiencies. Let's start with a description of the control types.

Quick Couplers:

When attached to an impact sprinkler, these were the first advancement from pulling hoses to specific areas. This type of a system requires a person installing the Quick Coupler into the system and timing how long it is at a specific spot. It also requires the operator to know how many sprinklers can be operated at a specific time without overtaxing the piping system.



Many of these types of systems have a "night water man" who operates the system throughout the night.

Electromechanical clocks:

These were the first attempts to automate the irrigation system. Clocks, much like the ones used to turn on Christmas tree lighting, are connected to the valves in the ground to turn on the sprinkler at a predetermined time. These systems eliminate the labor of actually turning on the individual sprinklers. The systems initially did not

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have any type of central control and were operated as a number of individual stand alone units.

This required the Superintendent to manage the system water flow through calculations and knowledge of how many and of what type of heads could be operated at a time. Central control eliminated the need for the Superintendent to go to each location for programming, but still requires the operator to know how many

and which type of sprinklers can be operated at a time. These systems are quite reliable and really are only subject to failure through power outages and wear over time.

Solid State Control:

The next evolution required the field controllers to move into the solid state era. This put a computer chip into the field boxes. This was a transitional stage for the industry as they technology advanced. With solid state field controls the systems would eventually be able to be moved to electronic control from other locations. The controllers would then be able act in either a stand alone or central control configuration. This meant that each field box could hold a number of programs and operate independently.

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Computer Control:

Originally these first computers were used to replace the electro-mechanical central control, while the clocks in the field remained. This gave the system the ability to start to think about flow control. Granted these early systems were large, expensive and honestly just fancy starters. Eventually the field clocks were also computerized so that communication between the central and the field became more effective and efficient.

Today's systems have the ability to not only start and stop the sprinklers, but determine which heads should come on and when, to maximize the flow capacity of the system. Additionally, as the software became more and more advanced, things like ET, soil moisture and other factors

began to be figured into the equations used by the system to more fully automate the irrigation cycles.

Goals of Control

As control systems evolve they become not only more complicated but easier to use. This would seem like an oxymoron, but it is not. As I alluded to above, the first systems provided a computer controlled switch to turn things on and off. As large computers turned to personal computers the user interface became more of an issue. Manufacturers need the user to be able to easily do what they wanted to do. These systems continue to evolve today and manufacturers continually try to make it easier for the user.

In the background of the software operation, however, the systems get ever more complicated. As I mentioned the first ones were a fancy switch. The latest software is able to consider so many factors that it seems almost incomprehensible. For example some of the factors that now are able to be factored into the software are pipe system sizing and the actual piping tree; soil types, head type, nozzle size, spacing, ET, soil moisture data, weather station data, pump station data and much more. The goal of all of this data is to more ac-

curately put the water where it is supposed to go and in the quantity that is needed. Along with that the systems are designed to maximize the system without breaking it. By this I mean that the computer is trying to match the pipe size and piping tree to turn on as many heads as the pipe will allow without affecting head performance. While it is doing this it is also trying to maximize the pump station output so that the pumps do not cycle on and off, thus shortening the motor life and using more electricity. All of this is taking place within the software to maximize efficiency, shorten the irrigation cycle and put down the proper water in the proper place.

The problem with these systems is the same as with all computers: garbage in, garbage out. All of the new computer systems are designed to operate with some efficiency with minimal data input. While certainly better than anything achievable without central control, there is so much more can be done if a person is willing to take the time to input all of the data the system can handle to give you the best control, and efficiency. Programming of new systems is getting easier all of the time, but filling in spreadsheet after spreadsheet can be a long and boring proposition, best done with a clear head and lots of caffeine available.

Even though many people feel that these systems will eventually be able to run themselves that seems unlikely. In the end, turf systems are a living and respirating thing, that will always require a human hand to oversee the machines.

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