

By TED WOEHRLE, Superintendent
Oakland Hills Country Club
Birmingham, Mich.

Irrigation by Computer?

IT IS ESTIMATED that 90% of all irrigation engineers and golf course superintendents who ever lived are now alive. New ideas and inventions come nearly every day. By combining all that we know, we could create a "supermachine" of any kind within a given field.

The computer is an example of a supermachine. Look what it has done for the space program and for medicine.

In medicine, the computer aids in diagnosing what ails a patient. Why can't we use the computer to help us diagnose factors affecting our patient—the turf?

At present, we are our own computers. We are always taking into consideration the variables of the day or hour to determine what, when and how much to water, spray or fertilize.

We take into consideration the present weather conditions and tomorrow's forecast—temperature, humidity, wind velocity and direction, light intensity, cloudy or clear, chance of precipitation.

What is the long-range forecast? Weather forecasting at its best is weak, but improving. ESSA satellites help a great deal. Perhaps our own weather recording devices or stations would be an improvement.

Soil conditions have to be considered—soil temperature, moisture, compaction (which changes during the summer), and soil porosity.

We look at the turf. What is the height of cut, root depth, grass temperature, rate of growth (fertility and health are related to rate of growth), when was it last mowed,

and when will it be mowed again?

One sensing device we could use to better judge soil and turf is the tensiometer. It determines evapotranspiration, the loss of water from the soil by evaporation and by transpiration from the plants growing from it.

Infrared photography, used to measure the heat or temperature released by the plant, could predict grass that is about to wilt.

Agriculture is using this machine, called a spectrometer or a spectrophotometer, for detecting varying temperatures between healthy and diseased plants. Many times this can be done before noticeable damage is observed by the human eye. The information is then transferred to a thermograph and then read from a color picture.

A wilt-warning device could provide computer data by recording conditions when wilt last occurred. A computer programmed with this information and linked with the sensing device could then warn when these conditions, even though made up of different variables, was about to reoccur.

Some predetermined constants must be considered. These concern soil, turf and the physical layout and design of the system. Soil porosity can be determined mechanically in the laboratory. Percolation rate can be determined in the field, with variances noted between areas.

All USGA greens built with the same set of specifications should be similar enough to get by with the use of one tensiometer for the greens. Most courses would need

more. The effect of diseases on the plant would have a direct bearing on the needs of irrigation. Now, the tendency is to over-water. A computer would lessen this tendency.

Some of the limiting factors such as amount of water, pipe and pump sizes, money available could be handled more efficiently by a computer.

Another variable to know is whether the soil can absorb the water as fast as it is being applied. Should we split or repeat our application, in other words recycle?

The more variables we encounter the more difficult it will be to program a computer.

Imagine reading your various sensing devices, taking the constants, then placing all this information into the computer at the day's end to obtain in a few seconds your instructions for watering that night. It may say something like this:

Water Numbers 9, 1 and 18 greens 1½ hours in three split applications. The approach and the tee end of Number 5 needs an extra 20 minutes. The remainder of the greens and fairways need 45 minutes. One constant application will do. Start the program on the greens at 7:40 p.m. Do the fairway program after the greens. The tees should be started by 3:15 a.m. because you have a shotgun start at 6:30 tomorrow morning. This will still give you enough time to syringe all areas by 5:30 and begin mowing greens and fairways. Have a good night's sleep.

Until all this happens, we can cut a program on a card or tape and place it into the controller for the nights program which you would have to make up from information from our own computer (our head).

If the housewife can have 14 different selections on her modern washing machine, why can't we have a similar dial or programmer built into our controllers? Maybe one setting would be for tees and greens, another for just fairways, or another for greens and half the fairways.

Turf irrigation is full of magical things patiently waiting for someone to discover and apply them. We as superintendents must keep on top of the equipment available and apply them as we see fit. We and we alone can tell the designers and the installers what we need and what we want. They are capable of doing just about anything.