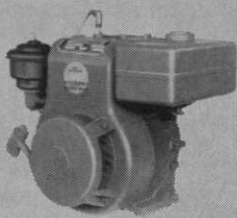
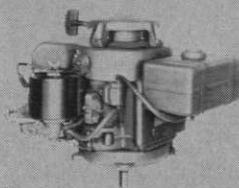


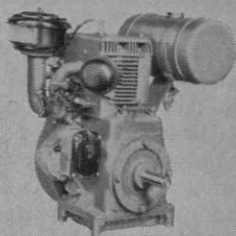
6-hp ACN 7-hp BKN



**INTERCHANGEABLES**  
7 1/4-hp S-7D, 8 1/4-hp S-8D

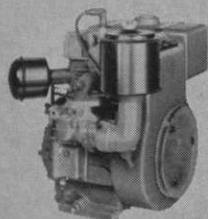


**NEW INTERCHANGEABLES**  
7-hp HS-7D, 8-hp HS-8D



9.2-hp AENL

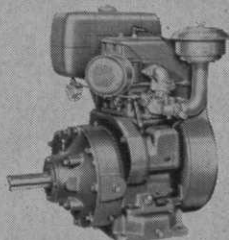
## WISCONSIN offers you 17\* powerful solutions



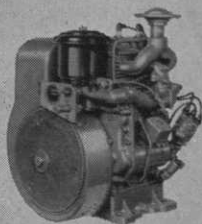
**FOR TRACTORS**  
10-hp TR10D



**NEW INTERCHANGEABLES**  
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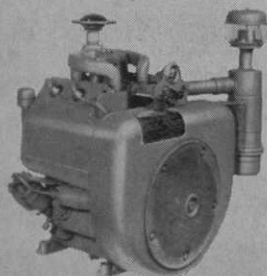


12.5-hp AGND

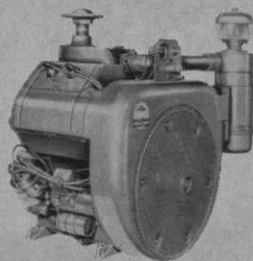


18-hp THD

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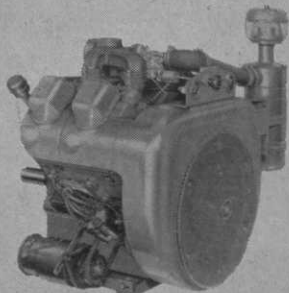


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37-hp VG4D

\*Marine Models not shown



60-hp V-461D

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P-734

101

## IRRIGATION

Continued from page 99

a double fairway row, electric automatic system, that would give artificial rain of one inch per week on all fairways and roughs and two inches per week on all tees and greens. Not only this, but it was to include several acres of range area and all the club grounds. This watering was to be accomplished only during the dark hours or at night.

After these decisions were made, came the actual designing of the system. The only map available was a semi-accurate map of the old water system, with a scale of 1 inch = 200 feet, which is rather small to use and accurately draw a system. The next decisions were which sprinklers, which valves, which pipe, which controllers, what size lines, what spacings to use and not have voids and most important, how much water was required and where as it to come from.

Having worked with automation for several years, I had in my own mind eliminated some of the equipment available, because it wouldn't do what was

needed for this course. This system was designed not around any one brand name. I feel that by choosing the best equipment from each manufacturer and combining into one system, then you have the best, but make sure that all the equipment is compatible.

We decided to place all controls in one central location, which happened to be in the maintenance shop rather than out on the course for vandals to destroy. It is also unlikely that many superintendents would get up during the night, go out into the rain and cut the controllers off; whereas he might get up and walk into the control room and cut them off.

On this point I might add that I am in the process of devising a rain gauge with a mercury switch so that when a certain amount of rain falls into the gauge it will automatically turn off the controllers.

The controllers are "Febco Model ICM 12E 24 Volt." I chose this controller because its timing mechanism is extremely accurate, it's very simple to operate, it

Continued on page 104



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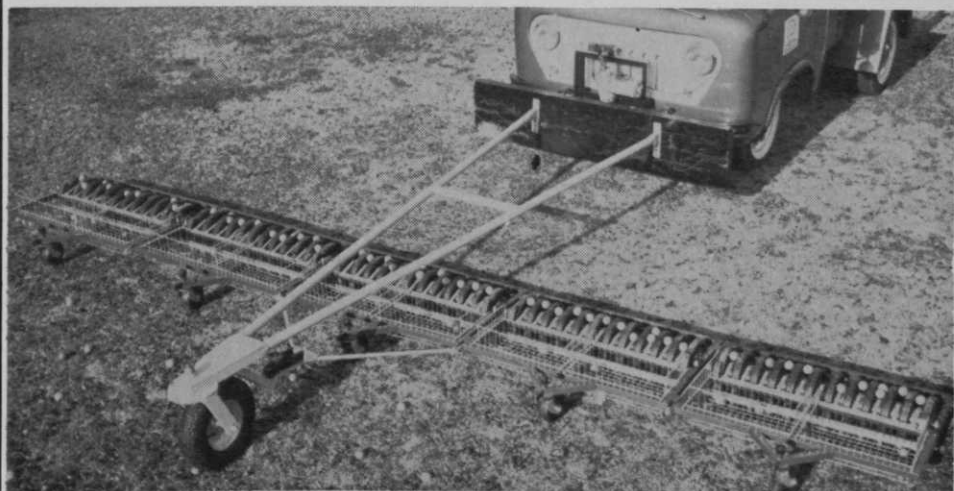
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can be recycled any number of times, it can be turned on automatically at any 15-minute interval of the hour. This is very advantageous if you are working on a close schedule, and it is economical in its original cost.

I have added one additional feature to this controller which is a switch that will turn on our south pump, north pump or both north and south pumps. This was done to be able to use the pump closest to the sprinklers in use and also to obtain better efficiency.

Our system had twelve, 12-station controllers or six for each nine holes. There are three controllers for each nine fairways. Each station on the fairways operates two fairway valves. One control wire comes from each valve to the control panel. At the panel, a series of jumper wires are used to connect the two valves to the one station.

This system is used because the two valves chosen to be connected must have areas of similar characteristics to be

watered. It is impossible for anyone to choose these similar areas with 100% accuracy, so after a few months when a change must be made, because one area is receiving too much water and the other area is too dry, it is a simple matter of just switching a jumper wire back on the control panel.

Some systems have these valves or several valves connected out on the course and one wire from all these valves goes back to the controller. With this design, you must dig up the course to make changes.

All wire used was the UF or the direct underground burial single strand, except the common ground which was a number 4 soft, bare, copper. The common ground went to every valve and was connected to be one continuous length. The individual wire to each valve was number 10, 12, 14, or 16, depending upon distance from the controllers. All wire was laid in the same ditch as the pipe. After the pipe was installed it was back-filled to within 12 inches of the surface. The wire was laid in and checked out

Continued on page 106

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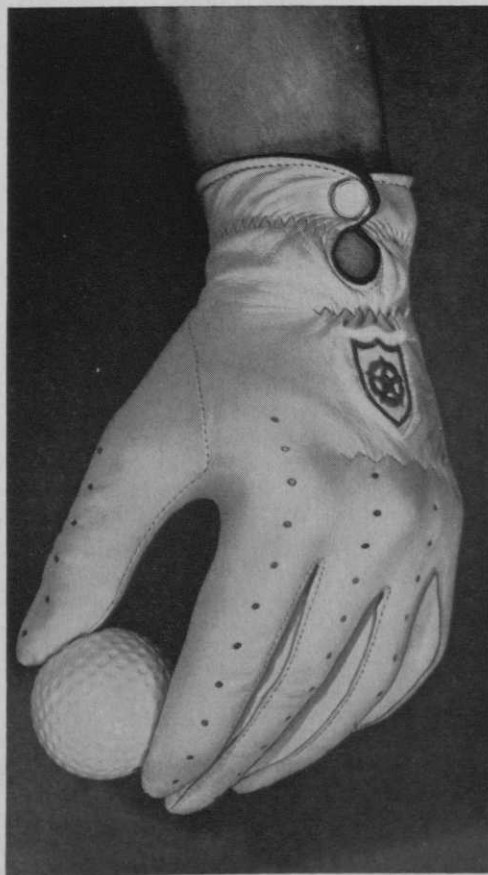
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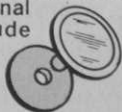
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## IRRIGATION Continued from page 104

before backfilled. If at all possible, lay the wire on a cold day so it will be contracted as much as possible. If you are laying it in hot weather, you better be a good church member because you will be praying about all those breaks. It would be preferable to dig another ditch approximately 18 inches parallel to the mainline ditch to lay the control wires. This is expensive but it is also very nice not to have all these wires in your way when repairing a water leak.

The pipe used for all main lines was asbestos cement. Transite in 10 lengths, class 150. All lateral lines were PVC schedule 40 which passed a two-hour acetone test. All tapped fittings on the Transite line were cast iron. The existing openings were plugged on the 3,000 feet of old line used from the old system.

To install the new valves in the old line, a hole was drilled directly in top of the pipe and a two-strap saddle was installed. This gave the same opening as the cast iron fittings.

The valves used were the Moody angle valve operated by a diaphragm and a 24-volt solenoid. The angle valve comes equipped with a union for the outlet connection. The valve is brass, can be operated manually, automatically, has a throttling stem and will operate at any angle. The valves were connected directly on top of the cast iron fitting or saddle with a short nipple and with the angle type valve. This provides an excellent way to connect with the laterals. The only other thing necessary to operate the valve, after the lateral is connected, is to connect one wire of the solenoid to the common ground and the other one to the single wire going back to the control panel.

Before backfilling around the valve a concrete meter box was placed over the valve. Later if you must go back to work on the valve, this will give a clean dry valve to work on. The tops of these boxes were at least 4 inches to 6 inches under ground level so that grass would grow over them. Be sure to leave a finger hole

*Continued on page 108*

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For more information circle number 202 on card

## IRRIGATION

Continued from page 106

of some type in the lid because when the soil packs around it, it becomes very stubborn to remove.

To each valve on the fairway were attached four sprinklers. The sprinklers used were the Rainbird 81. This head is operated by an impulse type kicker and it will cover approximately 190 feet diameter, operating at 100 PSI. We have had very little trouble with it. I chose this particular head because it is simple, efficient and economical.

As anyone with an automatic system knows, some heads will not close back to their rest position and will be broken by mowers. One advantage that this head has is that when hung by a mower, generally the only thing broken is the threaded portion of the spindle. This can be replaced for about five dollars.

The green sprinklers chosen were the Toro 662 series for the full circle and the Toro 657 series for the part circle. The Toro and the Moist-O-Matic head is one and the same. This head is gear

driven and is small in diameter. It will cover approximately 180 feet diameter.

The water comes from a large nozzle for the long range, an intermediate range nozzle and a short range nozzle. With these three nozzles giving almost perfectly uniform coverage, the positive gear turning action and the economy of cost are the reasons for my choosing this sprinkler. Around each green was placed five or six sprinklers and two control valves operated by separate stations on the controllers. Two or three of these sprinklers on the north side of the green are connected to one of the valves, with the same arrangement for the south side of the green. Under windy conditions this is a must in design.

All sprinklers were placed on swing joints fabricated in our own shop. We feel that they are uniquely successful. We bought 1½ inch type "K" soft copper in 60-foot rolls. These rolls were cut into 4-foot lengths and were bent into a semi-ell shape. On each was sweated a male

Continued on page 110

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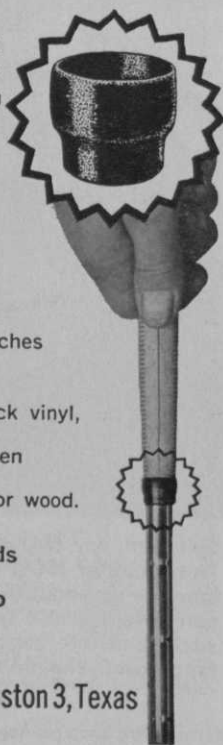
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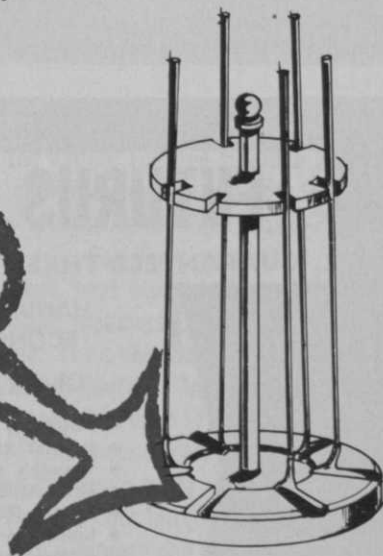
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adapter, with one end being attached to the sprinkler and the other end to the PVC pipe. This swing joint is flexible, yet rigid enough to hold the sprinkler and has a lifetime second to none. Its cost is equal to or less than any other.

Some other miscellaneous items connected with our systems at Quail Creek are drain valves, pressure relief valves, quick couplers, pressure pump and radios. Taking them one at a time, I will tell you why we felt we needed them, even though the system could have operated without them.

A drain valve is simply a ½ inch valve with a small ball check that closes when pressure of more than 3 PSI pushes against it and is opened by a small spring at less pressure. They were used at the lowest level of pipe in each sprinkler section of each valve and around each drain valve was placed a pit of gravel about 2 cubic feet in diameter. The reason for all this was to guard against freezing. When the pres-

sure is on the sprinklers the valve is closed, but when the pressure goes off the valve opens and drains the water out of the heads. These cost less than \$1.00 each and are a good investment.

I don't believe a system is complete without a pressure relief valve capable of handling at least 80% of the capacity of the pumps. It will protect the lines and keep a constant pressure on the system. I might add that the relief valve can be placed almost any place in the system. If you have a lake or stream going through the course, this is an excellent place to put the valve, because it will keep the lake full or the stream running with the excess water pumped.

Another extra we added was a quick coupler at each green from the live water line. It can be used for watering flowers, trees, syringing greens, filling the spray rig or any number of reasons. This might seem to be a minor item, but it will prove useful. We used the type "K" copper for all lines necessary to connect the quick couplers.

For a quick coupler to function, nat-  
Continued on page 153

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