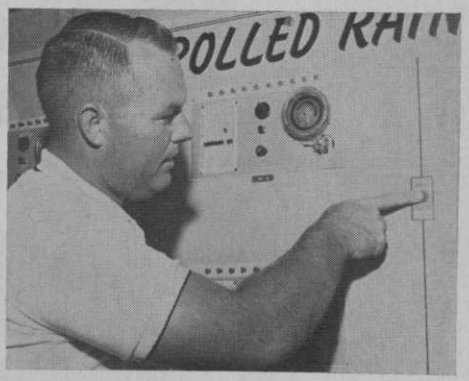
Irrigation a la carte

Installation of automatic sprinkler setup with selected component parts prove successful at Oklahoma club.



Herman R. Johnson

By HERMAN R. JOHNSON

Superintendent, Quail Creek G.&C.C., Oklahoma City, Oklahoma

When Jim Latham called me, I had just walked into the office from an inspection of my irrigation system. He asked if I would talk to you concerning "Modern Irrigation Design." I thought of the many times in past years that I had told my waterman to water a certain way, then went back later to find he had overwatered one nine, underwatered the other nine and stuck the pick-up in the middle of a tee while changing sprinklers. So, I decided that if I could help any club obtain a properly designed automatic irrigation system, then surely I could talk about it for a while.

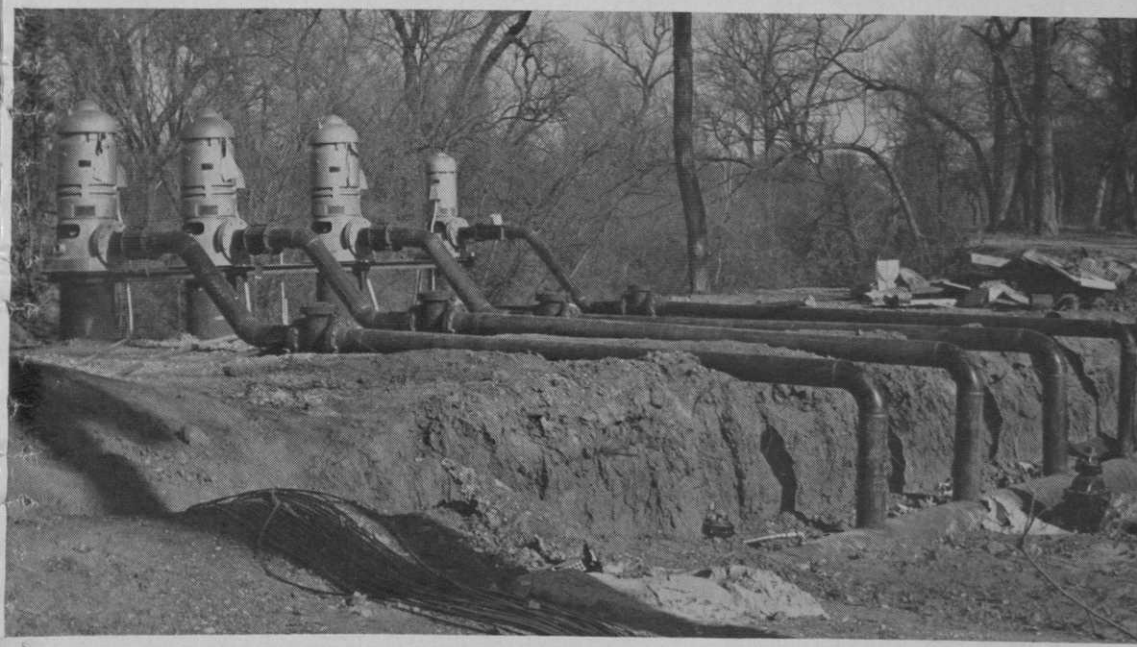
I would like to begin with a demonstration of what the acetone test actually does to plastic pipe. In containers holding anhydrous acetone I place samples of PVC pipe, all coming from well-known manufacturers. The acetone test determines the extrusion quality of the pipe. Any pipe that won't pass at least a 30 minute test is considered inferior. I would recommend that pipe pass a *two-hour* test.

Modern irrigation system design means "automatic" to me. There are several ways in which you can get an automatic system. Your green chairman can decide that you should have one, you can obtain reliable information and prove to your club you need one or you can let someone come in and sell your club a system. I don't know which will happen to you and your course, but if you continue in the turf field, you will be involved with automatic irrigation sooner than you think. I have seen many automatic systems installed in the last few years and at least 50 per cent of those I have seen are not satisfactory.

It is likely that some superintendents might say they don't need an automatic irrigation system. It could be true, but some of them could also get by with the old hand-push mower. I'm sure that when they began to motorize greens mowers, some golfers and superintendents didn't want them because one might leak a few drops of gasoline on the green, streak with a little grease on the roller, cause excess compaction, due to the excess weight of the motor, or extra noise might not be desirable. Automatic irrigation has kindred problems.

Some irrigation system problems might be excess water in the sand traps, watering too heavily in one area and leaving voids or dry spots in other areas or accidentally turning on the wrong valve and soaking the club president's wife while she is putting on the 12th green.

Automation is wonderful if properly



Heart of the system.

engineered, properly installed, properly operated, and it operates properly. The key to knowing when your system is working properly is when you can go to bed at night and not even think about it until the next morning when you arrive at work. The first time I operated an automatic system, I got up twice during the night just to see if everything was all right.

I would like to explain how we at Quail Creek decided upon an automatic system and why we chose our system. The first decision made was that Quail Creek had a two-year-old golf course with an expensive and new manual irrigation system that would not do the job. Labor, to keep the course watered only to a minimum, cost over $10,000 per year, not counting the labor required to repair from two to five leaks a week.

This sounds like a lot of leaks and it is, especially since a leak generally costs from $35 to $50 to repair. One of the main causes was that there weren't any swing joints in the system. The quick couplers were connected directly to the main lines without any type of swing joint and cemented connections were used. On some of the asbestos cement lines, two street ells were screwed into each other, forming a swing joint that would move very little. Naturally, when even the lightest equipment ran over a quick coupler, it would break, especially if it were cold. When we began to remove the old quick couplers, I sent two men out and by hitting the plastic riser underneath the quick couplers with a pick, they were able to remove all 300 within four hours.

September 15, 1963 I was asked to visit Quail Creek and design a system for the course. Checks were made with neighboring superintendents concerning weather conditions as well as other peculiarities that are found at each course. No two courses ever present precisely the same problems.

There are differences in soil, terrain, maintenance background and possibly most important, the type of course demanded by the members. After these determinations were made, I decided upon

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IRRIGATION

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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

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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 backfilled to within 12 inches of the surface. The wire was laid in and checked out

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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 diaphram 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

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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 1¼ 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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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 pressure 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-

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urally there must be water under pressure and to obtain this we installed a small 75 GPM pump. It maintains approximately 60 PSI on the line at all times. This is adequate for almost any quick coupler operation and it also keeps the lines full so that when a large pump is turned on, the sprinklers will operate immediately.

One of the newest items on our course is a complete short wave radio system. I could talk from now on of the many uses that these radios have. Our system consists of a base station which has a range of many miles and four walkie-talkies which have a range of approximately 1½ miles. The base station is in the maintenance shop where our shop mechanic stays. The irrigation system control room connects to the shop, so you can see it is convenient for the shop man to operate the irrigation if needed during the day.

At Quail Creek, I have Cohansey bent greens which average 8,000 square feet each. The high wind and temperatures in Oklahoma mean syringing greens as much as five times per day. As you know, syringing greens is very costly and a problem. The radio system we have makes this problem much easier.

Days when syringing is necessary our experienced men alternate in checking the greens. It is just a matter of the man riding around the course and calling on the walkie-talkie to the base station where the shop man turns on the sprinklers needed. With this method the schedule is controlled so that golfers on a green will not get wet.

We have another method of syringing but it is seldom used; one blast on the siren and all golfers know that the greens are about to be watered. We have a siren for each nine holes. It takes several minutes for the cycle to be completed, so by the time the last greens are watered in the cycle, some golfers have forgotten about the siren and the results are obvious.

The radios are used by all of the crew when contact might be necessary with the shop.

You might say well and good but my

Continued on next page

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IRRIGATION Continued from previous page

course can't afford the Quail Creek type of system, or we don't need that much irrigation. A system can be designed that will water anything anyway you need it watered. You can have anything from a single row down the middle of the fairway, to four rows down the fairway; from one large sprinkler placed out in the middle of the green, to several valves and sprinklers placed around each green. You can have whatever you can afford, but make sure it is properly designed and installed.

My contention is that you can't afford not to have a good irrigation system. As comparison, a good manual system that would cover the same area will cost approximately $70,000 and the automatic system approximately $100,000. The $30,000 difference can be paid for in less than five years in labor costs alone. Our system at Quail Creek originally cost approximately $100,000. This includes everything I have just described. •

HERB GRAFFIS Continued from page 24

ing a bad mess and in protecting as well as substantially aiding and directing borrowers is to get examining, budgeting, building and operating guidance established by a joint committee of men who know what these new club propositions involve . . . Representatives of the American Society of Golf Architects, the National Golf Foundation, the Golf Course Supts. Assn. and the PGA in a few sessions with FHA men could get the golf part of this loose use of money corrected to the benefit of all concerned. . . . What's going on now could explode with political damage that Sec. of Agriculture ***Orville Freeman*** and FHA Administrator ***Howard Bertsch*** certainly don't want and with embarrassment and material damage to golfers and golf business.

A year ago GOLFDOM relayed warnings about dangerous generosity in FHA loans and tried to get FHA or Department of Agriculture information on how, why and where these loans were studied, approved and handled but got the brush-