A Guide to Irrigation Repairs

Irrigation system repairs can usually be kept to a manageable level if you follow a few simple but orderly steps. The first is to do what John Wayne did in his low-budget cowboy movies of the early 1930s—head them off at the pass.

We spoke to some experts on the subject—*real* experts, in that they either spend their days repairing systems or have gone on to become consultants based on their years of experience in the field. They agree that a regular maintenance schedule to *avoid* repairs should be first on anyone's list of things to do.

In order to make such a schedule most effective, however, you first need to know which components in a system are most likely to need periodic maintenance—and, should the varmints still get through that pass, which are most likely to need repairs.

You also have to know how to detect problems when they occur—hopefully before they become serious, though this isn't always possible.

These three stratagems have been applied by each of our experts to some or all of the following elements, depending on their particular expertise and interests: electrical, hydraulics, pressure, flow, controls, sensors, valves, and pump systems.

Bill Derryberry spoke to us from his office in Scottsdale, AZ, where he has a thriving practice as an irrigation consultant and has written and published a book, "Troubleshooting Irrigation Control Systems," which he sells by mail.

Derryberry began very modestly by saying, "People often ask me what kind of maintenance I recommend for avoiding problems in irrigation systems. And, frankly, I don't see a lot that you can do! It's not like changing the oil regularly in an automobile engine." Then he proceeded to tell us *plenty* that you can do. . . .

"Check to spot solenoids that are about to fail. Make sure your splices are correct. Keep your clocks clean, dry, and bug-free. Adjust and set all heads to their correct height to avoid their being broken off by a mower. Seek out broken heads frequently and repair them promptly. When you do repair them, install flexible swing joints in order to head off future damage. And, of course, use swing joints on all new heads.

"Most problems involve breakage caused by incorrect installation. Ninety percent of that involves failure to use swing joints, or failure to use them properly, plus setting the heads improperly. Few people appreciate how critical it is to set a head within a half-inch of level, and flush with the finished grade."

Getting down to details, Derryberry had this to say about the various elements of an irrigation system and what can go wrong with them:

"Electrically, probably the biggest and least-understood failing is deteriorating solenoids. Most of the time you can anticipate early failure of solenoids by a simple ohmmeter test at the clock, instead of walking

continued on page 30

Technician checks resistance for each valve at controller.

Sprinkler heads should be flush with the surface to avoid damage by maintenance equipment.

Irrigation System Repairs

continued from page 29

all over to check the whole system personally. Ohmmeters directly measure electrical resistance in ohms, so you can see at a glance if something's wrong."

Simply comparing the resistance in various stations will disclose which solenoids are shorted or partially shorted, Derryberry explained. When you do find a solenoid in either condition, "Change it *now,*" he urged, "to avoid a future service call. Don't try to talk yourself out of it. Don't let it go!"

Turning his attention to components most likely to fail, he said, "Aside from ordinary pipe breakage and vandalism, the single greatest cause of service calls—perhaps 90 percent of the remainder—is for remote-control valves, or RCVs."

His maintenance advice in this regard: "Ohmmeter readings every six months would probably be the most important thing you could do. Inspect all valve pigtail splices, and replace those which are not properly waterproofed. If you have just inherited a large project, don't fail to go through and check all those RCV pigtail splices—because electrical shorts cause confusing symptoms and misdirect repair efforts. Therefore you should at least eliminate such symptom confusion by seeing to it that you have good splices first.

"On the ohmmeters, you'll get different

continued on page 32

Irrigation System Repairs

continued from page 30

resistance readings at different places, depending on the distance from valves. Without going into all the details, let me just say that the greater the distance from the valve, the greater the resistance will be."

For hydraulics, 90 percent of callbacks are for remote-control valves. And I would say that 50 to 75 percent of those RCV callbacks are due to contamination in the valve. "This can be prevented by using contamination-proof valves. They have been around for more than 25 years . . . even though they have only become fashionable in the last four or five years."

Derryberry then confided, "We are so concerned in our industry about running out of pressure, that we overlook the ramifications of *excess* pressure. Yet it will consume more excess *water* if it's not controlled than most people realize!

"That's the reason why so many manufacturers, recognizing this fact, have recently begun to provide pressure-regulating RCVs. I feel that their additional cost generally pays back within one or two years," Derryberry declared.

In discussing flow, he observed, "There is a trend to low-precipitation sprinklers, with shorter radiuses and spaced closer together. Low-precipitation heads do an excellent job of compensating for site conditions, soil, slope, and sun exposure.

"However, another cardinal sin which we too often commit in this industry is not considering the poor devil who must *manage* this system for the next 30 years," Derryberry warned.

"When the Little League lights go out at ten o'clock at night, and the joggers start using the park at five o'clock in the morning, we have only seven hours in which to get the entire site watered. And if these low-precipitation heads don't truly give us *considerable* reduction in flow, then we cannot increase the size of the valve section sufficiently. Consequently our total run time may still exceed the seven hours allotted."

Moving on to the subject of controllers, he observed, "Solid-state controllers are getting quite foolproof. And, as a result, there's not much maintenance to be done there. Keep them clean and keep the bugs out of them, as I said before—and put them in the shade if possible. Heat deteriorates solid-state circuitry quickly."

Derryberry has mixed feelings about sensors. "Most sensors are relatively new, and relatively unproven," Derryberry noted. "When they *are* proven, then we will have the most important tool that the irrigation industry has seen in many, many years."

The reason, he explained, is simple: "Regardless of how many multi-thousand-dollar computerized control systems, weather stations, and peripheral equipment we might want to throw at our turf, that turf could care *less* how we get the water to it—so long as we can provide a soil structure which is 50 percent solids, 25 percent oxygen, and 25 percent water.

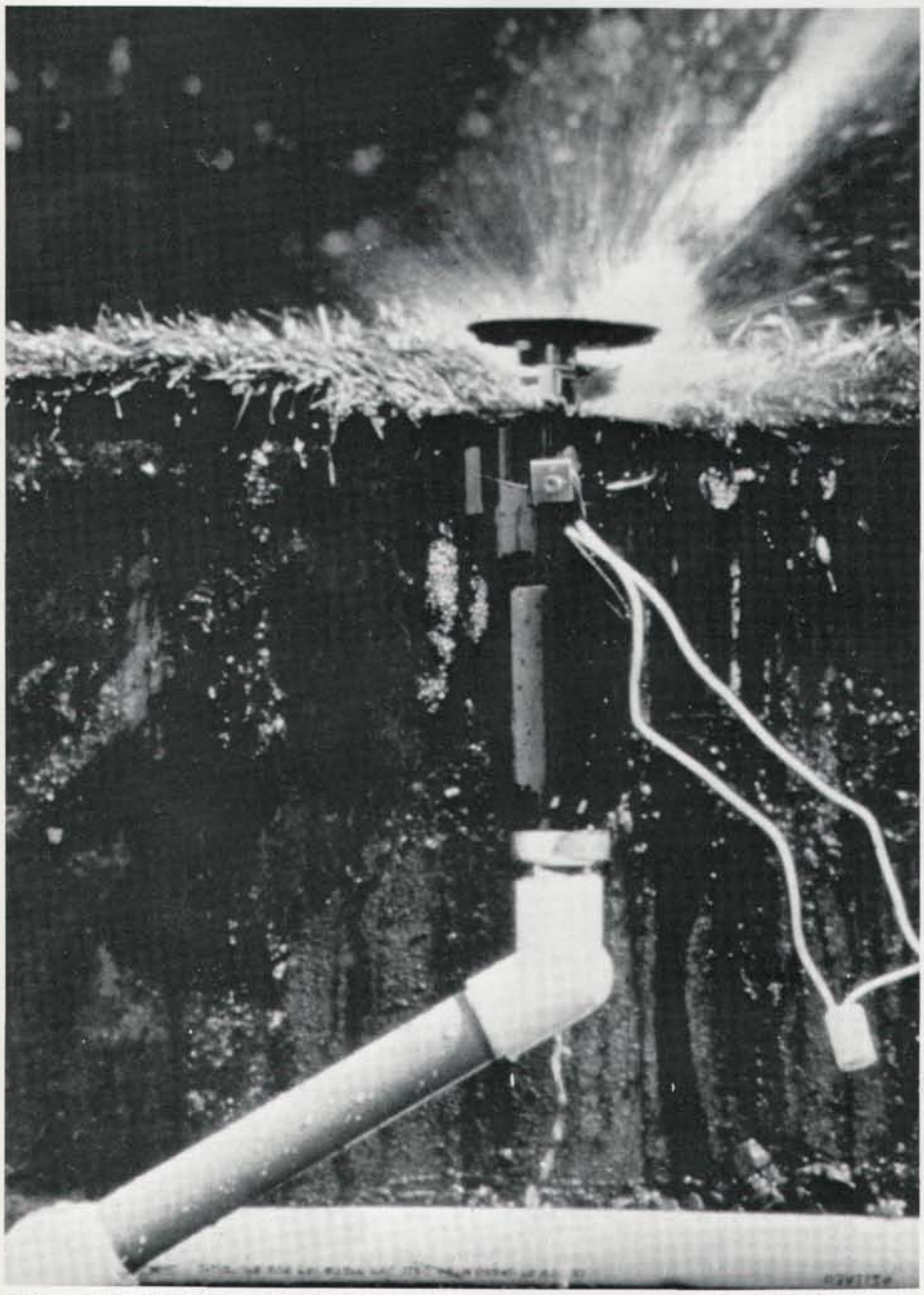
"When we can avoid feast-or-famine watering schedules, our turf will thrive. And that's all that a moisture sensor has to do," Derryberry concluded.

John Skidgell, marketing manager for golf at The Toro Company Irrigation Division in Riverside, CA, has been with the company for 26 years. He began his discussion by focusing on inspection. "Take a look at your pump stations, controllers, and sprinkler heads at least twice a month, at the very outside. You never know when you're going to spring a leak in a pump house, or some control valve is not working properly, or a strainer may be clogged up and getting false readings.

"So inspect the pump station for leaks. In most irrigation systems, the pump is the heart of the whole system, and it needs to be well taken care of.

"Make sure the contacts are not burned. These are the starters for the pumps. If they're arcing, they cause burn spots, and the pump doesn't operate properly if there is a high degree of heat. You need to have a good inspection of the pump station twice a month—the pump panels, regulating valves, and low-level sensors especially. There are a great many things in the pump stations that always need to be checked."

Skidgell continued, "On the electrical end, you should make sure that all the connections are made up properly and nobody has loosened any wires from the controllers and forgotten to replace them. Also look for corrosion. If controllers are in very wet areas, corrosion can cause problems in not making good connections. Therefore you're not getting the power you need to make things work. You should also look for any kind of



Swing joints and waterproof electrical connections assure proper operation of sprinkler heads.

debris that might be getting into the controller unit."

It's difficult to tell whether a hydraulic system is functioning well unless you go through a total irrigation cycle, Skidgell cautioned. Only then can you see how everything works, and that the sprinklers have the correct pressures for proper operation.

In regard to pressure, he added, "These systems are all designed to operate in a certain manner. If someone should decide to change that program and load one side of the system with all the sprinklers he wants to run, he may overload it from a hydraulic standpoint, and cause heavy friction losses on the line from the high velocities. This in turn would reduce the pressure, and the sprinklers would not function properly."

He pointed out, "The question of flow is also included in that last statement. If someone has a six-inch line and tries to flow 800 gallons through it, he loses a lot of pressure and he's in trouble!

"The best way to check out both controllers and sprinklers is to go to each individual satellite controller and step it through each station. That way you can tell whether or not the controller is actually turning the sprinklers on properly. And then you can watch each sprinkler to make sure it's rotating correctly," Skidgell explained.

If someone has a rain sensor on his system, he should keep it clean and make sure it does indeed trip and cause the proper alarm to go off. Debris can keep the sensor from tripping properly, and when it does ring it won't shut the system down.

Turning to valves and sprinklers, he advised, "Check the system for low sprinklers that cause improper coverage because they're too low to perform in the manner they should. These sprinklers are on swing joints. If you happen to have the sprinklers in relatively soft soil, and if you're running over them constantly with tractors, this slowly pounds them down into the ground. So they wind up being an inch or two too low. This blocks the spray coming from them, and that in turn destroys the pattern of the sprinklers."

Skidgell concluded his remarks by stressing the importance of checking the entire sprinkler system on a periodic preventive-maintenance basis. "The irrigation system is a maintenance tool that must be kept in good condition to do the job it was assigned to do," he emphasized.

David Ferron, field product application engineer for Rain Bird's golf division in Glendora, CA, is always on the move, going out on product problems and fixing them. However, he found time recently at his office in Seattle, WA, to review some of the highlights of irrigation system repairs for us.

"For general troubleshooting," he said, "here is how to detect problems: First, isolate the problem. Then look for information leading to the source of the problem. Find the point where good information ends and bad information begins. The industry calls this the Good In-Bad Out Method of

continued on page 34

Irrigation System Repairs
continued from page 33

troubleshooting and repair, or GIBO."

Ferron explained how to recognize that point "where good information ends and bad information begins." His advice: "Maintain a thorough knowledge of the irrigation equipment at your park or golf course. Read repair manuals put out by the manufacturers to assist in your repairs. And attend schools or seminars to stay up-to-date on any new developments."

In other words, it takes instinct based on sound training and thorough information. When you add experience in the field to information and training, you can tell at exactly what point the system goes wrong and the trouble signals—the "bad information"—begin.

Once in possession of the proper data, Ferron discourages delay. He urges, "Repair the problem quickly and effectively. Do not let it go unrepaired for a very long time. If you do, the problem can only get worse; it may very well escalate."

To avoid such problems in the first place if possible, Ferron agrees with our other experts on the necessity for periodic inspection and maintenance. Specifically, he advised, "Inspect your complete irrigation system each spring and make the necessary repairs at that time."

He recommended these specific things be done during spring inspection: "Turn each valve on and inspect the rotors on the heads. Inspect each controller for any winter damage. Clean the insects from the motors, gears, or printed circuit boards."

In regard to that last item, Ferron warned, "When handling a printed circuit board, be sure the power is off." He also advised using a spray-type contact cleaner to clean the controller.

"Repair any wire problems immediately," he stressed. "Do not let power leak to ground, because this may cause the controller to overheat and develop into other problems."

In closing, he repeated the need for preventive maintenance: "Keep to a regular schedule to avoid repair. Spring and fall is the best time to do the system inspection. If you have not done all repairs immediately as I have recommended, or if new problems should arise after spring inspection, then summer is the time to repair the irrigation system and keep it operable. Don't put it off any longer than that."

Tom Lockwood, vice-president of sales and marketing for Valcon Automatic Irrigation Company, headquartered in El Monte, CA, advised that the controller can be useful in handling some problems. Some controllers are specifically designed to detect such irrigation system problems as electrical faults, downstream pressure losses, and excess moisture. Aside from this, he made the following inspection-and-repair recommendations:

To detect electrical problems, check the circuit-breaker lights; the station outputs; the voltage at the valve; and the solenoid coil (for continuity).

In regard to hydraulics, check the remote-control valves for full opening; check for closed gate valves and for plugged sprinkler heads; and be sure to check the backflow device. The same procedures apply for pressure and flow inspection.

On the controls, check the 115 VAC source and the low-voltage output. Check to see if the controller is keeping the correct time of day or is in the backup program. Also check the ground.

On the remote-control valves, check for manual operation; flow control; voltage at valve; and the solenoid coil.

In discussing what is most likely to need regular maintenance to avoid potential problems, Lockwood briefly covered the following system components, the likely troublemakers for each, and some recommended preventatives:

Electrical—provide good grounding at the controls and good waterproof connections; hydraulics—backflow device; flow—backflow device and gate valves; controls—check control cabinet for moistureproof integrity; check grounding; check for insect or rodent encroachment; valves—check waterproof electrical connections; check for leaks at fittings and around diaphragms.

"Do not let power leak to ground because this may cause the controller to overheat and develop into other problems."

Lockwood recommended the following maintenance "musts": Check controls on a monthly basis. Check remote-control valves on an every-other-month basis.

He added a tip on how to achieve electrical savings: "The most costly item in any landscape, as far as electrical consumption, are the booster pumps. Use controls that will selectively utilize the pumps only when they are absolutely needed. Use of flow/pressure sensors on the pump station is very necessary."

Lockwood concluded with a useful list of recommendations for saving irrigation water in today's water-conscious environment, based on his experience in building, maintaining and repairing irrigation systems:

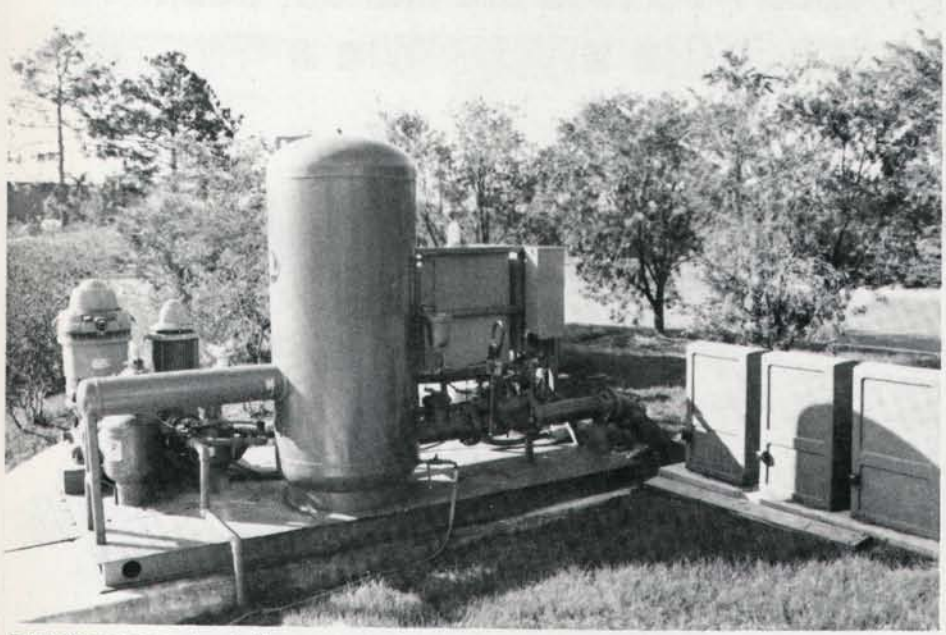
Use anti-drain valves on all heads that are lower in elevation than the remote-control valve.

Program controls so that only enough water is applied at any one time without runoff. Try to water during a time of day when wind or evaporation is minimal.

Use rain sensors to shut off irrigation controls when sufficient rain has fallen and use soil-moisture sensors whenever possible. On slopes, design the irrigation system so that the top, middle and toe of the slope can be irrigated on separate valves.

Use controls that can be programmed for individual stations, so that shade and sun areas can be valved separately. Choose controls that have easy-to-use water-budgeting features, so water reduction can be easily performed.

Each in his own way, on the basis of his own hard-won experience, these irrigation experts have shared their knowledge with us—not only on how to repair irrigation systems, but how to make them work better in a time of growing water shortages. If selectively applied to your own situation, these tips can be true lifesavers—not only for your system, but for your prize turf as well.



Pump life can be extended by proper staging and regular care.