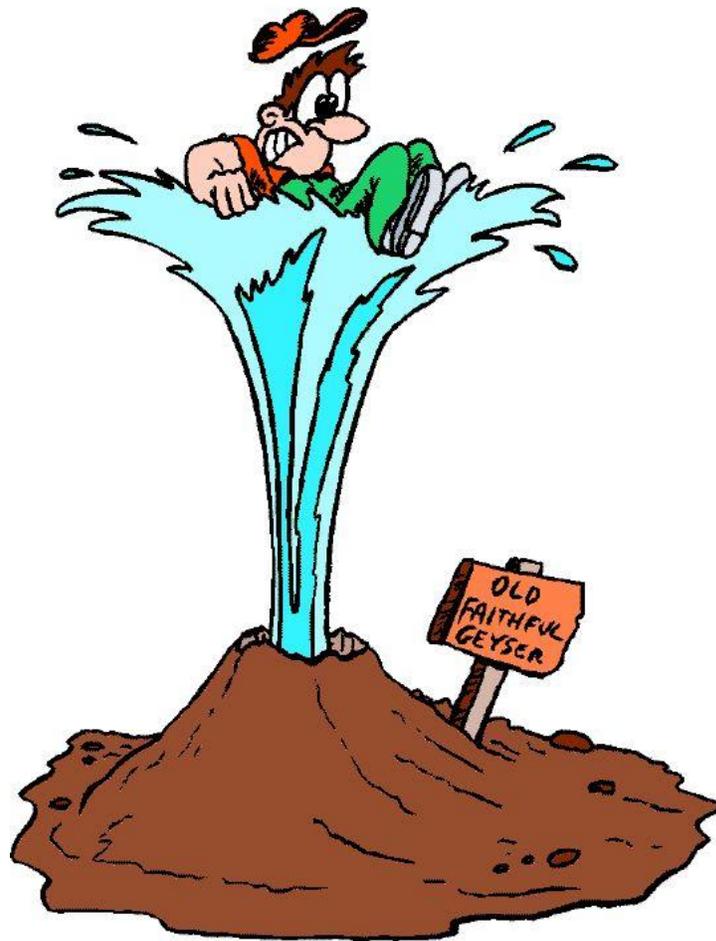


Maintaining, Troubleshooting, And Repairing Irrigation Systems



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Here in the desert, we want our landscapes to shade us, cool us, and comfort us. Many times, we want to bring in plants that don't come from here. Even when we use native or even desert adapted plants, we want to give them a little extra water at times to keep them looking healthy though the long hot summers.

To achieve this, we need something called irrigation. In wetter climates irrigation is different. Rainfall is regular enough that irrigation is mostly unnecessary. Here, we have irrigation *systems*. These systems can let us water our plants more efficiently and when connected to a timer, the watering will happen automatically.

Automatic irrigation systems are mechanical in nature however and just like cars or air conditioners they need to be maintained. And sometimes, things just plain go wrong.

Maintenance solves problems before they become problems

We tend to think that once we install our landscapes and the irrigation systems that help them thrive, our work is done. It is really only the beginning. The irrigation system is a kind of life support system for our plants. If we don't keep it running optimally we can waste water and some of our plants can suffer, especially the delicate ones.

There are different kinds of irrigation systems

There are the pop-up heads that we use for our lawns. There is drip irrigation that is commonly used for our shrubs and trees. Some older homes, or plants that are very high-water users may have bubblers. All of these different types of irrigation components have different considerations as far as maintenance. To make things more difficult, we often have different types of systems together in our yards. It doesn't matter what type of system you have, the number one rule of maintenance is inspection. If you don't turn it on and see what it is doing, you may not be aware of a problem until you have dead plants or a very expensive water bill.

Maintenance common to all types of systems

While there may be multiple types of irrigation delivery types in the irrigation system there are components that are used in all of them. There are also maintenance practices that are needed with the different types of irrigation.

Daily system maintenance

This is simply being observant.

Look at the plant material, they will show signs of over or underwatering.

Signs of underwatering	Signs of overwatering
Older leaves turn brown and drop	Leaves turn light green or yellow
Leaves are dull or drooping	Young shoots are wilted
Leaves curl	Excessive growth
Stems or branches die back	Algae or mushrooms around plants

Look at the grass for signs of over or underwatering.

Signs of underwatering	Signs of overwatering
Grass turns bluish gray	Water is puddling
Grass doesn't spring back after walking on it	Grass has a musty odor
Screwdriver will not penetrate	Soil is soft and mushy
Still feels warm after sunset	Algae or mushrooms present

The best way to find out how much water is in the soil is to use a soil probe. It will not penetrate our soil when dry but will penetrate with little resistance in our soil when it is moist. Grass only needs to be watered to a depth of 6-10" so a long screwdriver works well. For shrubs and trees a longer metal rod will show the true depth of water.

Look at the ground. Look for wet spots where there aren't any emitters. Look for washed out areas from leaks. They can be spotted without the system even running.



Look at the hardscape for staining from the minerals in our water. Sidewalks, pool decking and patios, and walls and fences will show signs of overspray from irrigation systems.



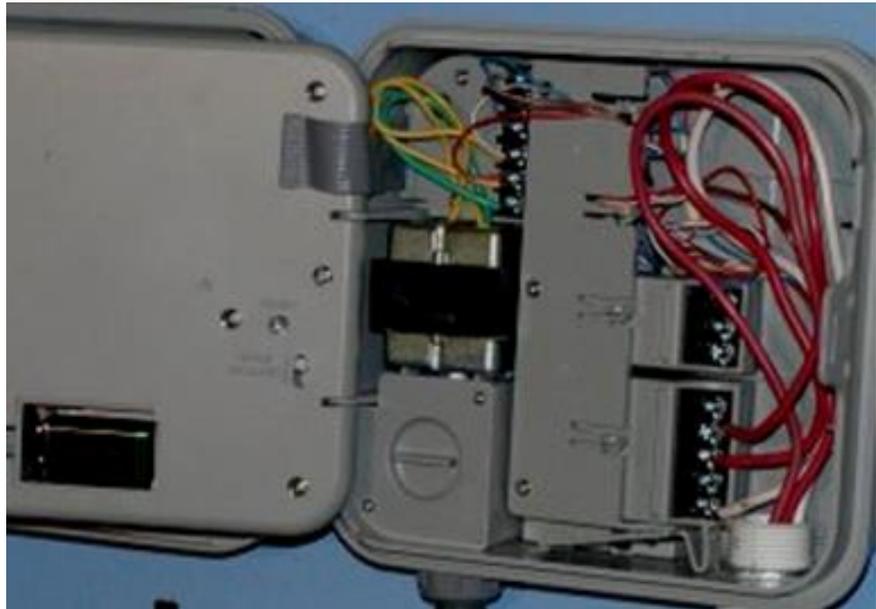
Monthly system maintenance



We run our irrigation at night so problems are often undetected. You want to turn it on during the daytime so you can observe the system when it is running. This is best done at the irrigation controller. This is a good way to verify that the watering schedule is correctly programmed for the season. Additionally, wiring problems will go undetected if the irrigation checks are done by manually opening the valves.

Semi-annual system maintenance

Replace the backup battery in the controller. These keep the watering schedule that is programmed into the controller in the event of a power outage. Many controllers use a standard alkaline 9-volt battery. Some use a rechargeable 9-volt battery. Check your controller manual to see which type of battery to use. Never put a standard alkaline battery in a controller that uses a rechargeable battery.



If your controller uses a rechargeable battery, then every two years is the recommended replacement interval. Some newer controllers have internal back up batteries that are not replaceable.

Inspect valve boxes. Small leaks can go undetected for a long time inside of the boxes. Clean out any excess dirt that has infiltrated into the box, the valves should not be buried.



Be sure to check the wire connections. A very common irrigation system failure is when regular wire nuts are used. There is a high level of moisture inside of the boxes from condensation and corrosion on the wires will stop the valve from opening when the controller sends the signal. Use waterproof wire connectors. These can be as simple as wire nuts that are pre-filled with silicone.



Commercial irrigation systems use a different type of connector, commonly referred to as Dri-Splice or Pentite connectors. These are preferred as they must be cut off when replaced and they cannot be re-used. This makes it necessary to install a new connector whenever a repair is done.



Annual system maintenance

It may be time to consider having the backflow preventer tested. The backflow preventer keeps the water from returning to the drinking water side after it has moved into the irrigation system. A backflow preventer is required on any irrigation system. Commercial irrigation systems are required to be tested every year, this is more often than needed for a home irrigation system. If it has been three to five years since it has been tested this may be a good idea, a malfunctioning backflow preventer will give a false sense of security. Contact your water provider to get a list of the state certified backflow testers in your area.





Your system may be using a different type of backflow preventer, they are called anti-siphon valves. Each valve has a type of backflow preventer built in. While these are compliant with codes, they cannot be tested so they are not the preferred method. Over time the gravity operated seal can become stuck in the closed position giving a false sense of protection. These valves are also installed above ground and need to be protected from the sun and any other accidental damage.

Make sure you don't have one of these anti-siphon valves and regular irrigation valves installed downstream. This device cannot provide backflow prevention if there are any kind of shutoff valves after the device. Unfortunately this is done too often. If your system is installed like this replace this device with a pressure vacuum breaker (shown in the first photo of this section).



Drip irrigation

The things that make drip systems so easy to install also make them more susceptible to damage. If you can cut the tubing with a pair of pruning shears, just think what a shovel may do. A rake, or curious child/dog can pull an emitter off the end of the micro tubing. Also, the very nature that makes drip systems so efficient can also make any problems that can happen more subtle. A broken sprinkler head is far more noticeable than a “blown” emitter.

Monthly maintenance

Make sure the emission points are visible, above ground, and flowing at the proper rate.

Bury any exposed tubing.



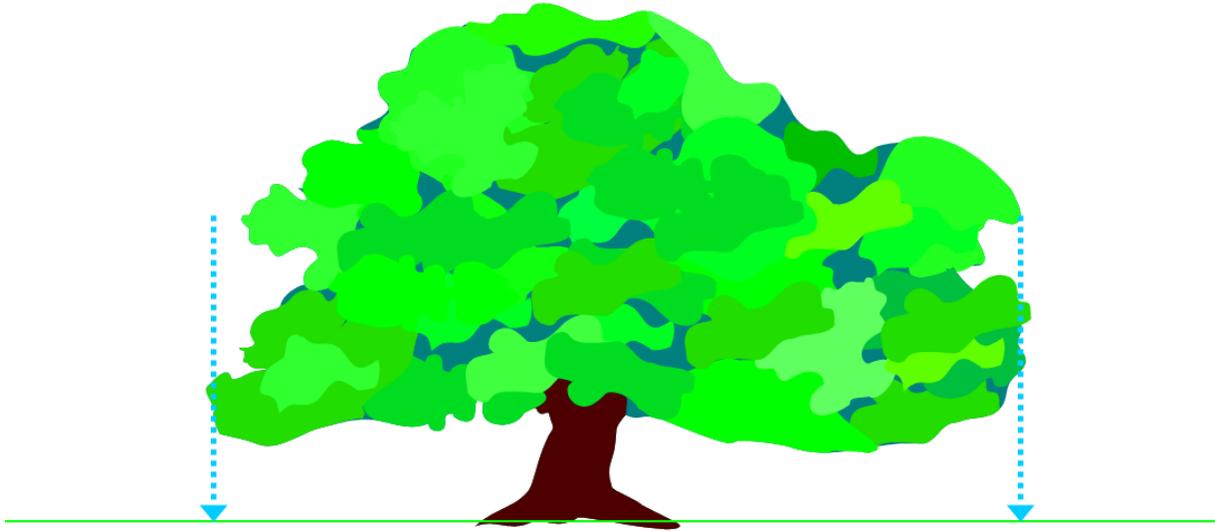
Cap off any emitters where plants have died. Before doing this look around and see if the emitter may actually be in the right place for watering a nearby tree. Even if the emitter is on the shrub line it will still provide beneficial water for the tree is located in the right spot.

This is done with a “goof plug”.



Semi-annual maintenance

Ensure the emitters are correctly placed for the plant material they are watering. As the plants, and especially the trees, are growing the emitters should be moved outward from the original location at the bases of the shrubs and trees. That was the right place when the landscape was first installed but gradually moving the emitters out will encourage a wider root zone. Keep the emitters located at the edge of the canopy, what is referred to as the drip line.



On woody shrubs and trees the water absorbing roots are at the ends. The structural roots at the bases do not absorb water. Remember, when you are running the irrigation you are not watering plants. You are watering roots. The lack of proper root development is the number one reason why trees fall over in our storms. This is recommended even with the shrubs. Developing a better root system makes the plants much more tolerant to the heat of summer. Additionally, if the emitters are buried under the shrubs it's difficult to inspect them.

Annual maintenance

Flushing the filters. Most filters have a flush cap that can be opened so when the valve is opened it will flush out any debris that may have been caught. Sometimes they are installed too close to the sidewall of the irrigation box and they fill it up with water very quickly. The threads on those caps are hose thread, not pipe thread so a short section of garden hose can be attached to adequately flush the filter and keep the box dry. After that they can be opened, and the screen elements inspected for tears.



Flushing the poly tubing lines. The minerals in our water will over time accumulate in the lines that can cause pressure problems if the system is not flushed out. If left too long it can become impossible to flush the lines and a new system will need to be installed. Flushing the lines will ensure that the system lasts for its full expected lifetime.

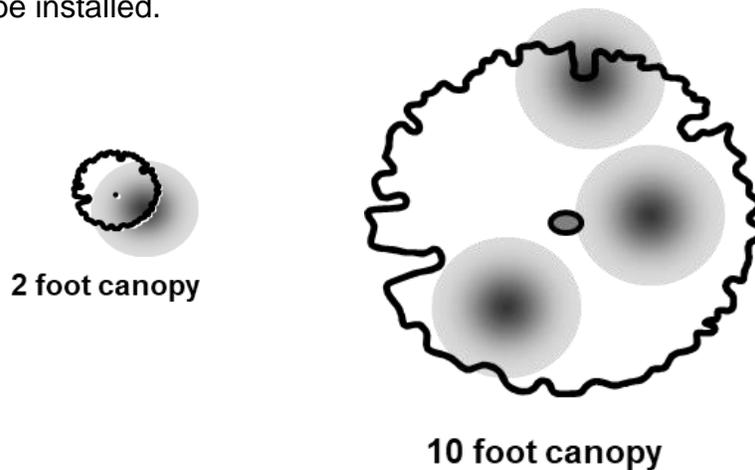
If the figure eight closures are used at the ends of your poly lines simply slide the fitting down to open the tubing and turn the zone on. Let it flush for one to two minutes after clear water can be seen coming out.



If your system has the threaded caps inside of pit boxes, unscrew the cap before turning the zone on. The water will be at a lower pressure and will fill the box with water. Just like the filters, they have hose threads, not pipe threads so use the short piece of garden hose to keep the box dry like with the filter flushing.



Adding emitters as the plants grow. Larger plants, and especially trees, should have larger root systems. To encourage and support these larger root zones more emitters should be installed.



Bubbler irrigation

Bubblers are basically miniature flood irrigation systems. A berm is constructed around the plant material to hold the water in place until it can soak into the ground. The parts that these systems use may be more durable than drip irrigation, but the bubbler heads are above ground on risers and are susceptible to damage. Also a broken bubbler or riser can lose a lot of water in a very short time.

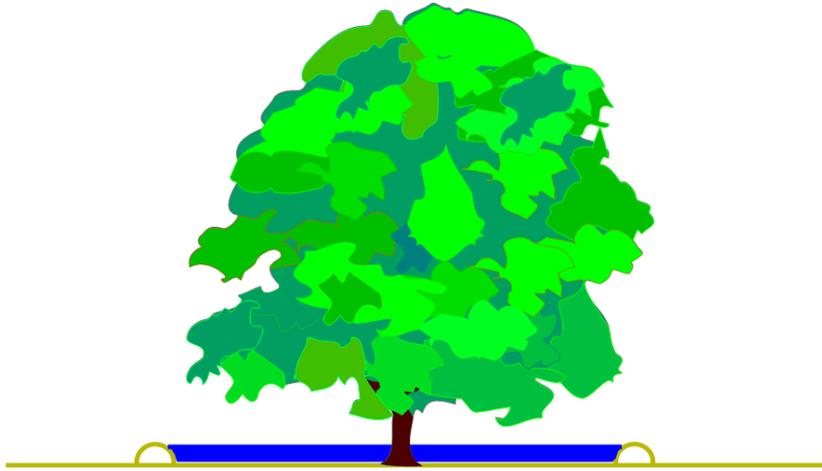
Bubbler irrigation systems do lose more water to evaporation than drip irrigation systems, but they are the best way to water large high water use plant material such as citrus trees. Delivering the right amount of water to a mature citrus tree with drip irrigation will require a large number of emitters.

Monthly maintenance

Make sure the bubblers are flowing at the proper rate. The adjustable bubblers can get out of adjustment very easily. The preset pressure compensating bubblers are recommended because they stay at the same rate. They also provide the water to each of the trees evenly. This will also make it easier to develop a proper run time. If the amount of water coming out of the bubblers is unknown, you can't calculate the right amount of time to run them.

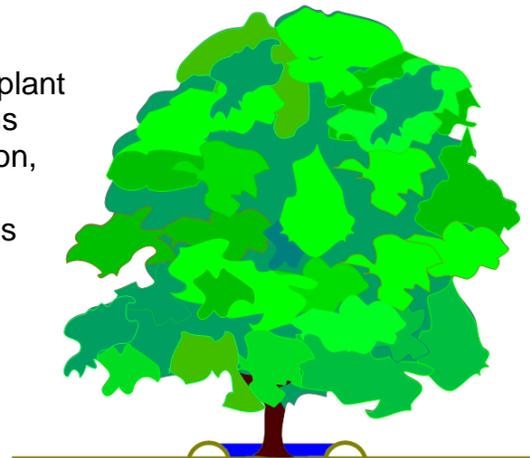


While the system is running inspect it for leaks or damage to the bubblers, risers, or piping. Timing the inspection to when the zone needed to run can allow you to run the full run time and make sure the water doesn't overflow from the berms.

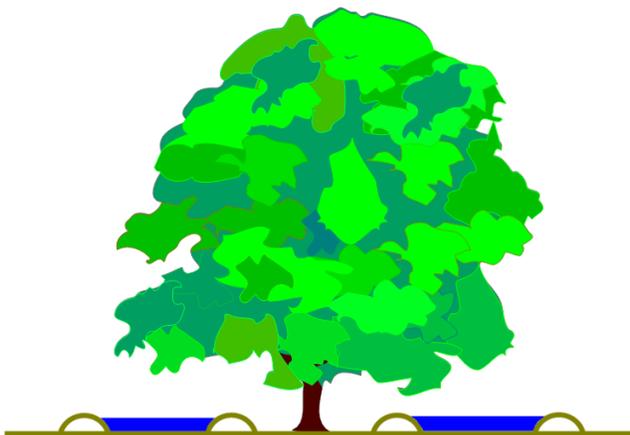


Semi-annual maintenance

Ensure the basin is properly sized for the plant material. Too often the original basin size remains while the tree grows. Just as with the drip irrigation, when you are running the irrigation you are not watering the tree, you are watering the roots. This is especially important for trees that are susceptible to crown rot.



Instead of continually expanding the berms, install a second berm and move the bubbler(s) out to the new area between the original berm and the new one.



Sprinkler irrigation

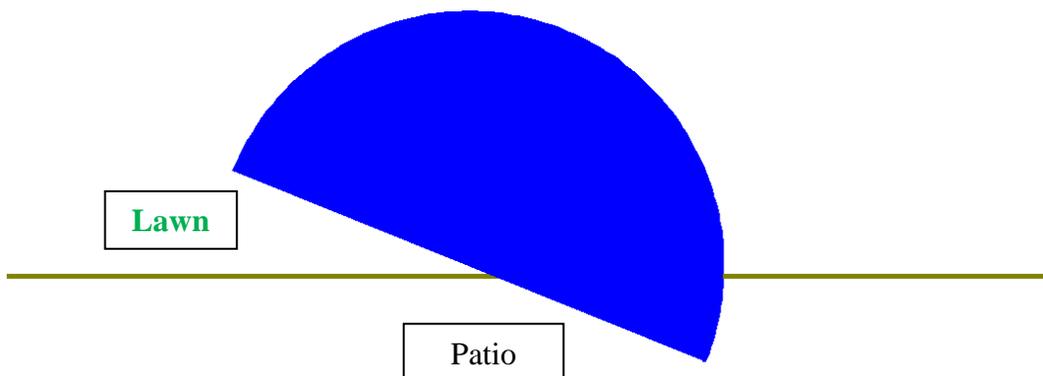
Sprinklers are used to water lawns. While grass is a high-water use, and high maintenance, landscape choice it is the only plant material that tolerates foot traffic. Having a lawn area for a play area is not bad, just make sure it is appropriately sized and located where it will actually be played on.

Weekly maintenance

Do a quick check to make sure the heads or nozzles have not been damaged. This is referred to as geyser checks.

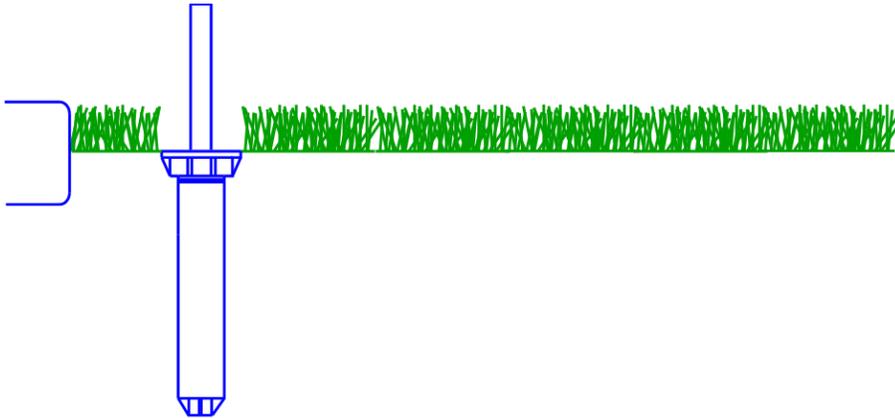


Also make sure the nozzles are properly directed. Sometimes they get knocked out of alignment and water areas other than the grass. This is called edge control.

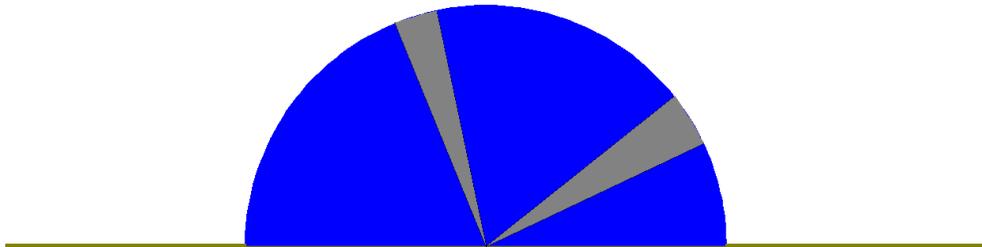


Monthly maintenance

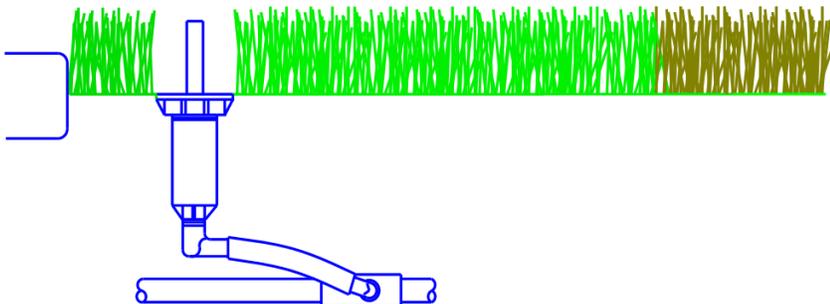
Check for leaks or damage to the heads, risers, or piping. Ensure there is no run off or puddling. If there is use the cycle and soak controller programming technique to control this.



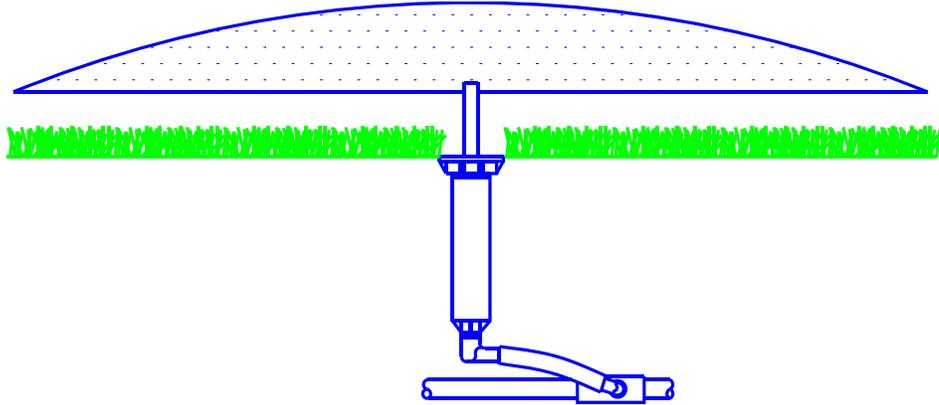
Check to make sure the nozzles are not partially clogged. They should be spraying a full even pattern without gaps. These are referred to as fingering nozzles. Don't try and clean them, replace them with the appropriate nozzle.



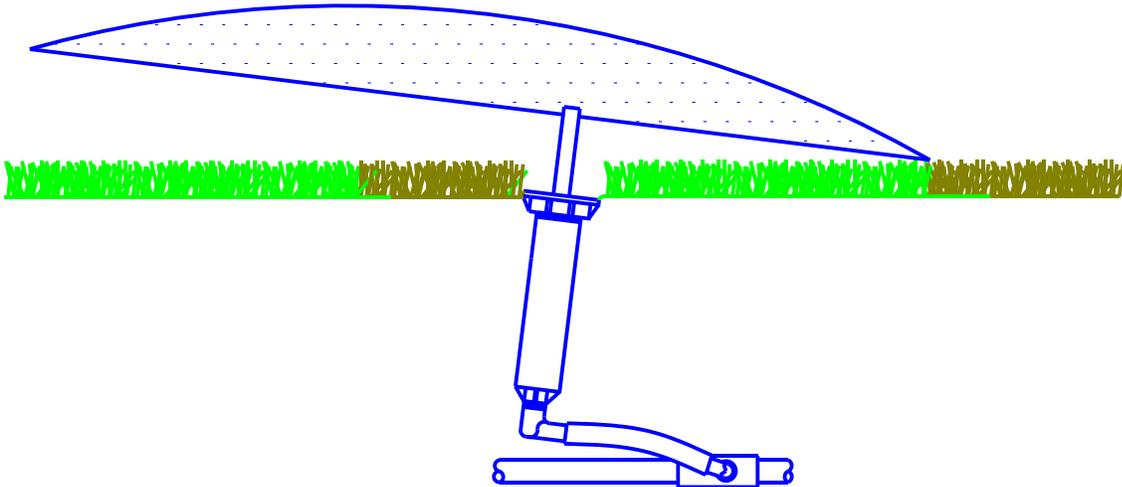
Use sprinkler heads that will pop up above the height of the grass. Short popup heads have the water blocked by the grass keeping it from properly covering the intended area. Always use at least 4" popup heads to prevent this.



Ensure the heads are perpendicular to the grade and are at grade level.



Tipped heads significantly affect the efficiency of the irrigation, how evenly the water is applied across the grass.



If the sprinkler heads are too low the wiper seal on the cap will become damaged. This is often seen as heads that don't retract after the zone shuts off. If the sprinkler heads are too high then they may be damaged by the mowing and edge trimming equipment.

Troubleshooting

A good maintenance regimen will handle most of the problems that can occur with your irrigation system. Most of the problems are fairly obvious if you're inspecting the system regularly but some are a little more subtle and require extra investigation.

Leak detection

Most leaks in irrigation systems are pretty easy to spot. A broken sprinkler head doesn't take much troubleshooting to locate. The ground can absorb smaller and slower leaks and go unnoticed for some time and leave you frustrated with your water bill. Here is how you determine if your irrigation system is the culprit.

1. Make sure the controller is properly programmed. Many times programming errors are the cause of high water bills.
2. Make sure that no water is running in the house or the landscape. This includes things that have auto-filling mechanisms such as evaporative coolers, swimming pools, and spas.
3. Mark on the water meter with a felt tip pen where the dial is pointing.
4. Wait for 20 minutes to an hour and check where the dial on the meter is. It's very important that nobody uses any water during this stage.
5. If the dial has moved you've got a leak somewhere.
6. The Smart Home Water Guide shows how to read a water meter.

<http://www.smarthomewaterguide.org/>

To see if the irrigation system is where the problem is, shut off the isolation valve to the irrigation. This is usually located at your backflow preventer. Then wait again to see if the dial on the water meter still moves. If it does, then the leak is somewhere else. If the meter stops moving then the problem is in the irrigation and more than likely a problem with a control valve or a leaking irrigation mainline.

Why is my controller acting so crazy?

When things start going wrong with an irrigation system, the controller is usually the first thing people blame. Over the years, irrigation controllers have become much more dependable. This isn't saying that the controller isn't the problem, it's just that the real problem is often elsewhere. There are some simple steps to narrow down the source of the problem depending on the symptom.

The irrigation keeps starting over again after it's finished

This is almost always caused by extra start times being accidentally entered. Check the programming to be sure that it contains only the start time you want. Delete any unwanted start times. Duplicating information in more than one program can also cause this. Remember that a dual program controller is like two controllers in one box. If you have the same information in two programs for the same stations, you have told it to run them twice. This can be an easy mistake to make by not noticing which program is showing in the display when entering information.

The irrigation seems to run at strange times

Again double check to make sure that only the start times you want have been entered. Remember to check in all of the programs that your controller has available. Also double check that the start times are correct as to A.M. and P.M. If this seems to be OK then check to make sure the controller is displaying the proper current time and day. If this is incorrect re-set it and check on it the next day. One of the most common reasons your irrigation will run at strange times is if you've lost your programs and the controller has reverted to the factory default. Occasionally the timing portion of the digital processor will malfunction and cause the controller to either run too fast or too slow. If this is the case, contact the manufacturer to locate a service center.

The irrigation runs longer than it's supposed to

Check the station run times and make sure that they are correct. If they are, check to see if your controller has a water budgeting feature. If for example you have ensured that the run times are entered as ten minutes but they always run for twenty, the water budget may be set to 200%. This feature won't physically change the run time you have entered, but it will run the percentage of that time. Most controllers that have this feature will have an icon or symbol in the display to alert you when it is different than the normal 100%.

One station won't stop watering

For some reason this always seems to happen on the Friday afternoon of a holiday weekend. When you leave for work in the morning, the irrigation is running just like it's supposed to and all is well. Then when you come home in the evening it's still running and there's a river running down the street! In most of these cases the problem isn't with the controller but in the valve. Irrigation professionals refer to this as a "stuck-on" condition. Just to be sure check your controller. Most of the electronic styles whether they are digital or hybrids will show in the display if they are running any programs. Others may have an indicator light on the faceplate to show what station they are running. If the display is showing just the current time, the controller may be as unaware of the problem as you are. The easiest way to tell if the controller is malfunctioning is to simply remove the power to it. This is accomplished by turning off the circuit breaker in your electrical box, or with some, you can simply unplug them from

the wall outlet. If, when the controller goes dead, the irrigation doesn't stop, the problem is with the valve. At this point you need to shut off the water supply to the irrigation system and fix the valve.

One station won't water

Many times this problem isn't in the controller but in the valve or the wiring connecting the controller and valve. The first thing to do is verify whether the problem is electrical or hydraulic. The easiest way to do this is to try and open the valve that controls that station manually. Different valves will have different methods so consult the operating guide for your particular valves. If the valve doesn't open manually, then the problem is most likely in the valve itself and needs to be repaired. If it does open manually, then the problem is electrical.

Since the different controllers have different configurations for testing, it is best at this point to either call in a contractor or contact the technical services department of your controller's manufacturer. The output voltage is relatively low for irrigation controllers so you're not likely to hurt yourself, but improper testing procedures can damage your controller and/or your meter. This is a very important consideration if your controller is still under warranty.

None of the stations will water

There are several different scenarios that can cause this problem. The first thing to do is check the controller and make sure it is running. This means that it has power and is reading the proper display. Next make sure that you haven't accidentally set it to the rain-off function. Then you will want to double check your program and make sure it is correct. Many times a landscape has been toasted or flooded by a simple programming error. If you have a rain shut off device on your system, make sure the catch pan isn't full, or the device isn't malfunctioning.

After you have verified these things, try turning on a station manually at the valve. If the irrigation still doesn't come on, make sure that the water supply to the irrigation system hasn't been accidentally turned off. If the irrigation turns on by manually opening the valve, then the problem is probably electrical.

No matter where I turn the dial or what button I push the controller won't respond

With electronic type controllers, a power surge can cause them to freeze or lock-up. Don't panic most of the time there isn't permanent damage. All you have to do is remove the power to the controller for a short time to allow the microprocessor to "re-set" itself. If your controller has a back up battery feature, make sure you unplug this as well. You don't want the processor to hold any information that may be causing the problem. Usually one to two minutes is sufficient for this process. After that re-apply power to the controller and re-program as usual. If the symptoms don't go away after this procedure, contact the manufacturer to locate a service center to repair the controller.

Why aren't my valves valving?

Sometimes the problem with a system is in the valve itself. A valve is basically an on/off switch for water. A problem can either cause it not to turn on, or not to turn off. Even though these valves are connected to the controller with wires and receive an electrical signal for when to turn on and off, they are really opening and closing using hydraulics. There are very few parts to a valve and they can be easily repaired. Many times it is just a matter of some debris in the valve that needs to be cleaned out.

The first step is to determine whether the problem is electrical or hydraulic in nature. If the problem is that the valve won't seem to run, try and open it manually. If the valve opens manually, then the problem is more than likely electrical. If it won't open manually, then the problem is most likely hydraulic. If none of your valves will open manually, check to make sure that the water to the irrigation system hasn't been shut off. It happens sometimes.

Electrical valve problems

The valve receives a low voltage (24VAC) electrical signal from the controller when it is time to open. The controller supplies this signal for as long as the controller is programmed to run the station. When the programmed run time is finished, the controller stops supplying the electricity to it. This signal comes into the solenoid of the valve. The solenoid is basically a small electro-magnet that lifts a spring-loaded plunger up and opens a port in the valve.

If your valve is not opening from the controller's signal there are a few possibilities.

1. The wire connectors are not waterproof types and the connection is corroded. This is one of the most common electrical problems in irrigation systems.
2. The controller is not supplying the voltage.
3. The wiring between the controller and the valve is damaged. This can be the hardest problem to locate.
4. The solenoid is bad. This can be purchased separately and replaced.

If your valve is not closing because of your controller and it's constantly supplying voltage to the valve, there are only two possibilities.

1. A programming error that means the controller thinks it's supposed to be running the station.
2. The controller needs to be repaired or replaced.

Hydraulic valve problems

There are only a few possibilities for hydraulic problems causing the valve to either not open, or to continually run. The most common one is that dirt or some other debris has gotten into the valve and clogged a port. Opening the valve and flushing it out can usually solve this.

If the valve is not opening manually on an existing system, and it used to work, the possibilities are as follows.

1. There is dirt or debris in the valve that needs to be flushed out.
2. The valve is a reverse flow type and there is a hole or tear in the diaphragm. Check with your valve manufacturer on this or just inspect the diaphragm.

If the valve is not closing and the problem isn't electrical, there are three possibilities.

1. There is dirt or debris in the valve that needs to be flushed out.
2. There is a tear or hole in the diaphragm.
3. There is an internal crack in the lower body of the valve and it needs to be replaced.

There is another type of problem where the valve won't shut off completely. It will close most of the way but continue to allow a very small amount of water to pass through. This is called a "seeping" valve. This is one of those subtle problems that can go unnoticed for a long time. The leak detection procedures described earlier can usually spot this type of problem. If the valve that's seeping is for lawn sprinklers, you can usually see the water oozing out of a head. You will usually see this on the last or the lowest head on the zone.

If you have this problem there are just a few things that may be wrong with the valve.

1. There is dirt or debris in the valve that needs to be flushed out.
2. There is a very small tear or hole in the diaphragm.
3. There is an indentation on the diaphragm where it meets the seat of the valve. A rock or other hard debris that got in the valve usually causes this.

Why aren't my pop-ups popping?

The only thing that will cause pop-up heads to not pop-up all the way is lack of pressure. The trick is to find out what's actually causing the low pressure. If the system has never worked since it was installed, it is one of two things that is causing the problem.

1. Trying to run too many heads on a valve
Each head uses a certain amount of water. This is measured in gallons per minute. You only have so much flow capacity to start with. If you exceed this, the pressure will drop and the heads won't pop up all the way or they won't spray their full radius. To fix this, you will have to split some heads out onto another valve.
2. Using too small of a pipe size.
Each size pipe can only carry a certain amount of flow through it. If you exceed that amount, the water moves faster through the pipe trying to meet the demand. The faster the water moves through the pipe, the more pressure loss you have. To fix this, you will either have to re-pipe the zone or split some of the heads out onto another valve.

If the system was previously working, finding the problem can be more of a challenge. Something is causing either a pressure loss or flow restriction that wasn't there before. Some of the possibilities are as follows.

1. Someone has turned down the flow control knob for the valve or has partially closed the shut off valve for the irrigation system.
2. There is dirt or debris in the valve causing it not to open fully.
3. There is a broken pipe in the zone that needs to be repaired.
4. All or most of the wiper seals on the heads are leaking.
5. A large piece of debris such as a rock got into the piping at installation or during a repair and is now restricting flow in the pipe.
6. The incoming water pressure has changed.
This usually happens when someone designs a zone to absolute maximum capacity. If new construction in the area causes a higher demand on the water providers system, the pressure may drop.

There is another pressure problem that can happen with sprinklers, particularly the fixed pattern spray heads. That problem is too much pressure. This causes the water to come out of the nozzles in a fine mist rather than droplets. You can lose up to 70% of the water to the air in a system that's misting, especially if you're watering in the middle of the day. There are a few things you can do to correct this.

1. Install a pressure regulator at the valve.
2. Change the sprinkler heads to pressure regulating ones.
Some manufacturers make heads with built in pressure regulators.

Don't try and fix this by adjusting the flow control knob on the valve. It cannot react to pressure changes on the city water system.

Why aren't my rotors rotating?

If you have a large lawn and use rotor type sprinklers, sometimes they stop rotating. There are only two things that will cause this.

1. Pressure.
Rotors are made to operate within a specific pressure range. Too high of a pressure will cause these heads to not rotate just as much as low pressure. Check with the manufacturer of your heads to find out what that range is. See the above section on pop-ups to find out how to correct pressure problems.
2. Dirt or debris in the heads.
This can gum up the drive system of the heads. If you can't flush it out, you'll have to replace the head.

Why aren't my bubblers bubbling?

Like sprinklers, bubbler systems use a lot more flow than drip systems. If you try and run too many at once, they won't put out the right amount of water. Using pipe that's too small for the flow rate will also cause this. Fortunately, since you are just running these systems until the basin fills up, you can just increase the run time for the station in all but the most extreme cases. Using lower output pressure compensating bubblers may fix this.

Why aren't my drippers dripping?

The most common problem you can have with drip emitters is clogging. When you slow the output down to rates of one-half gallon per hour, it doesn't take much to clog up that little hole. If you have a single emitter that isn't flowing, the answer is simple. Replace the emitter.

If you have a whole section of emitters not flowing there could be a couple of things going on.

1. There was a cut or tear in the poly tubing that allowed a lot of dirt into the system. Flush the line and replace the clogged emitters.
2. There is something pinching or kinking the tubing.
Maturing tree roots can do this. Start digging between where the last flowing emitter and where the first non-flowing emitter is. You should find the problem. Simply cut out the bad section and replace with new tubing.
3. There was a small leak underground that allowed roots to invade the tubing. The way to find this is the same as point two above.

Sometimes emitters will put out too much water. If it is one or two of them they have just worn out and need to be replaced. If all of your emitters have high flow rates then the problem is most likely the pressure regulator has failed. There is no way to repair these, so it has to be replaced.

Pipe repairs

Sometimes pipes will be broken when digging around them. Also joints at the fittings can fail.

Copper pipe

Copper pipes are connected together with fittings that are soldered together with a torch. These torches burn at temperatures of 2,000 degrees and above. You may want to hire a contractor for these types of repairs. If you want to do this yourself remember the two most important points of using a torch.

1. Never wear sandals and shorts. Boots, jeans, eye protection, and gloves should be the minimum.
Hot solder is well, hot after all. Solder burns are very painful to say the least.
2. Always, and I mean always, have a fire extinguisher **next** to you when using a torch.
Having one under the kitchen sink doesn't help when you're outside.
3. If dirt or debris got into the system, flush it out immediately.

There are repair fittings available that don't require the torch and solder. They are commonly known as shark or gator bites. They are expensive but not having to use a torch for a repair makes them worth it.

PVC pipe

PVC pipe is connected together with fittings that are glued together. This makes repairing them a little easier than copper pipes. It is important to remember that the pipes are dry and clean when gluing them together. A little bit of water will cause the glue to fail. There are glues out there that claim to work when wet, but in the long run it's really best to glue the pipe when it's dry. In an emergency repair, you can get the water to stop dripping out of the pipe by wadding up a ball of white bread (remove the crust) and shoving it into the pipe. After you make your repair and turn the water on, the bread will dissolve and flow out through the system.

When gluing PVC pipe you should make sure of the following things.

1. Sun burnt pipe and fittings should not be used.
2. Pipe should not be dropped.
3. Pipe cuts should be straight.
4. Burrs from cutting should be removed before gluing.
5. Pipe and fittings should be clean before gluing.
6. PVC primer should be used on pipe and fittings before gluing.
7. Use the right glue for the right pipe type and size.
8. Old solidified glue should not be used.
9. Apply a light even coat of glue to both the pipe and fitting.
10. Insert the pipe into the fitting and twist one half turn to ensure glue is even.
11. Hold in place until the glue forms an adequate bond (sets).
12. Wipe off any excess glue around the new joint
13. New glue joints should be allowed to cure before system is re-pressurized.
14. If dirt or debris was allowed into the system, flush before running.

Poly tubing repairs

This type of piping is the easiest of all to repair. It can be cut with regular pruning shears. The couplings just compress the tubing as you push them together. No torches, glues or solvents are required. It's like legos for big kids.

There are a few things to keep in mind when repairing poly tubing.

1. Don't kink the tubing when inserting it into the fitting.
2. Ensure that you get the tubing far enough into the fitting.
3. When using "tee" and elbow fittings don't push the tubing in too far.
4. Flush the poly lines afterward to remove any more dirt or debris.

When all else fails

This document can't possibly cover all of the problems that can happen with irrigation systems. There is other help out there however. One of the best sources of information is the counter sales people at the irrigation stores. These people usually have field experience with irrigation systems. These stores have branches in most of the Phoenix area cities.

The local stores names are:

1. Ewing: ewingirrigation.com
2. Horizon: horizononline.com
3. Sprinkler World: sprinklerworld.com
4. Site-One: siteone.com

Most of the major manufacturers will also have technical service departments specifically to help customers with any problems. They can walk you through some troubleshooting and repair procedures over the phone. Cell phones really show their value here. Some of the major manufacturer numbers and web addresses are:

1. Rain Bird: 1-800-724-6247 rainbird.com
2. Hunter: 1-800-733-2823 hunterindustries.com
3. Toro: 1-800-367-8676 toro.com
4. Irritrol Systems (formerly Hardie): 1-800-634-8873 irritrolsystems.com