

**Maintaining,
Troubleshooting,
And Repairing
Your Irrigation System**



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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 through the long hot summers.

To achieve this, we need something called irrigation. In wetter climates our idea of irrigation is different. It's called patience. Sooner or later irrigation falls out of the sky. 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 on its own without us dragging a hose through the yard.

Automatic irrigation systems are mechanical in nature however and just like cars, air conditioners, and vacuum cleaners 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 sprinkler 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 hard to irrigate with drip, 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.

Daily maintenance for any system

- Look at the plant material.
The plants will tell you if they are receiving too much or too little water.
- Look at the ground.
Washed out spots will tell you if there are leaks.
- Look at the hardscape.
Calcium stains on the sidewalks, driveways, houses, or walls let us know we are putting the water where it isn't needed.

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 during installation, just think what a shovel may do later. 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 drip system maintenance

- Make sure the controller is working and the schedule is properly set.
[The controller runs the program you put into it.](#)
- Turn the system on.
- Make sure emission points are visible.
[Buried emission points are easily clogged.](#)
[Buried emission points cannot be inspected.](#)
- Check for leaks or damage to emitters, connectors, or tubing.
- Inspect each emitter for clogs or high flow (blown).
[Replace any emitters that are clogged or "blown".](#)
- Plug emission points where plants have died, or replant.
- Bury exposed lines.
[Exposure to sun damages tubing.](#)

Semi-annual drip system maintenance (every 6 months)

- Replace back-up batteries in controllers.
Controllers can lose programs and revert to default program if power is lost.
- Ensure all flush cap locations are visible.
- Ensure valve boxes are visible and can be opened.
- Inspect valves, filters, and pressure regulators for leaks. Clean out excess dirt and debris in box. Check wire connections.
- Ensure emitters are placed correctly for the plant they are watering.
Move them away from the bases of the plant to the canopy edge (drip line).
Emitters that are buried under the plant are hard to inspect and repair.
The water absorbing roots are at the drip line or beyond.

Annual drip system maintenance

- Flush filters.
[A garden hose can be attached to most filters flush caps to keep water out of the valve box.](#)
[Filters must be flushed prior to opening the filter to keep debris out of the system.](#)
- Inspect and clean filter elements, torn filters should be replaced.
- Flush poly tubing at the flush caps.
- Ensure plants have enough emitters for their size.
[Bigger plants need more water.](#)
- Have backflow prevention assemblies tested.
[Pressure vacuum breakers and reduced pressure assemblies can and should be tested.](#)
[Atmospheric vacuum breakers cannot be tested.](#)

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.

Monthly bubbler system maintenance

- Make sure the controller is working and the schedule is properly set.
[The controller runs the program you put into it.](#)
- Turn the system on.
- Make sure the bubblers are flowing at the proper rate.
[Some are adjustable and some let the water out at specified rates.](#)
[If one is clogged, most have a small filter screen under it. Unscrew the bubbler from the riser \(turn the system off first\) and check it.](#)
- Check for leaks or damage to bubblers, risers, or piping.
- Ensure that the water doesn't overflow the basin when allowed to run for the time programmed into the controller.
- Bury exposed pipes.
[Exposure to sun damages piping.](#)

Semi-annual bubbler system maintenance

- Replace back-up batteries in controllers.
[Controllers can lose programs and revert to default program if power is lost.](#)
- Ensure valve boxes are visible and can be opened.
- Inspect valves for leaks. Clean out excess dirt and debris in box. Check wire connections.
- Ensure that the basin is sized appropriately for the plant material.
[The water absorbing roots are at the drip line or beyond.](#)

Annual bubbler system maintenance

- Have backflow prevention assemblies tested.
[Pressure vacuum breakers and reduced pressure assemblies can and should be tested.](#)
[Atmospheric vacuum breakers cannot be tested.](#)

Lawn irrigation

Lawns are one of the highest water using plants that we use in our landscapes. With proper scheduling and good maintenance practices we can minimize the amount of water that we apply to them that isn't necessary.

Weekly lawn system maintenance

- Ensure that mowing didn't damage any heads.
- Make sure that heads that are supposed to rotate do so.
- Ensure that the water is directed on the lawn.
[Watering the sidewalks or driveways isn't doing the lawn any good.](#)

Monthly lawn system maintenance

- Make sure the controller is working and the schedule is properly set.
[The controller runs the program you put into it.](#)
- Turn the system on.
- Check for leaks or damage to heads, risers, or piping.
- Ensure that the water isn't running off the lawn when run for the time programmed into the controller.
- Make sure the spray pattern on fixed pattern nozzles isn't distorted or has any gaps in it.
[Dirt or debris can partially clog a nozzle and affect system efficiency.](#)
- Ensure that the heads pop up above the grass height and isn't being blocked.
- Make sure that the heads are perpendicular to the grade.
[Tilted heads don't spray their full radius.](#)

Semi-annual lawn system maintenance

- Replace back-up batteries in controllers.
[Controllers can lose programs and revert to default program if power is lost.](#)
- Ensure valve boxes are visible and can be opened.
- Inspect valves for leaks. Clean out excess dirt and debris in box. Check wire connections.

Annual lawn system maintenance

- Have backflow prevention assemblies tested.
[Pressure vacuum breakers and reduced pressure assemblies can and should be tested.](#)
[Atmospheric vacuum breakers cannot be tested.](#)

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.

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.

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

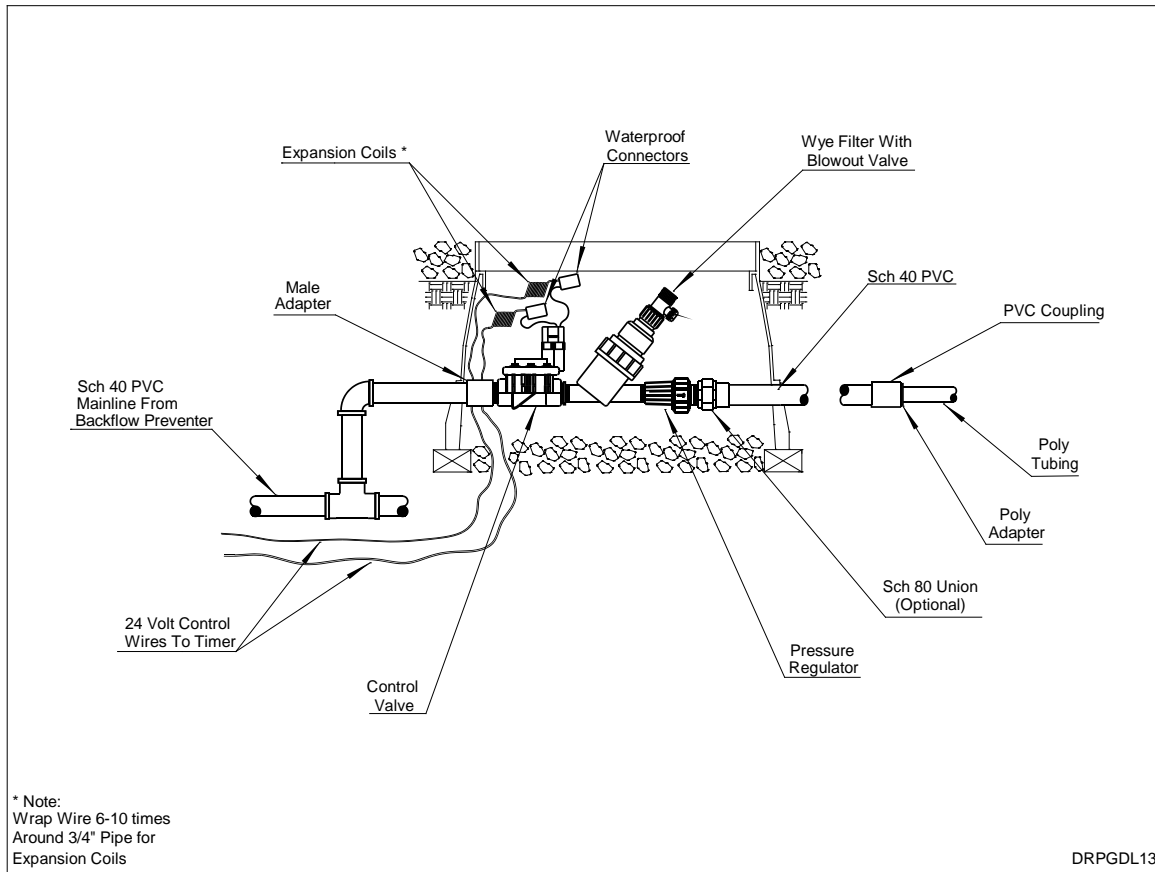
There are several different scenarios that can cause this problem. The first thing to do is check the controller and make sure it is running. This means that it has power and is reading the proper display. Next make sure that you haven't accidentally set it to the rain-off function. Then you will want 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 alone 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. This is a very rare problem with valves.

There is another type of problem where the valve won't shut off. It will close most of the way but continues 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 on page 5 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 will not pop up all the way or they will not 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.
This is rare, but it can happen.
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. Turn down the flow control knob on the valve until the mist becomes a spray. This is a quick fix and can have some problems. You are purposely burning off pressure by restricting the flow through the valve. This can shorten the life of a valve. This method also won't take into account pressure fluctuations on the city's system.
2. Install a pressure regulator at the valve.
3. Change the sprinkler heads to pressure regulating ones. Some manufacturers make heads with built in pressure regulators.

Why aren't my rotors rotating?

If you have a large lawn and use rotor type sprinklers, sometimes they stop rotating. There are really 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. If your bubblers are the adjustable type, you can set these accordingly for the basin size and the pressure at that point on the system. Adjustable bubblers aren't pressure compensating and the more pressure they have, the more water they will put out.

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 like one 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, 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.

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. Open the flush caps and get any dirt that got into the system out.

When all else fails

This document can't possibly cover all of the problems that can happen with irrigation systems. However, there is other help out there. 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. You can find these stores in the yellow pages under irrigation. The local stores names are:

1. [Ewing](#) (there are two in Mesa)
2. [Horizon](#)
3. [Sprinkler World](#)

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. Cordless phones and cell phones really show their value here. Some of the major manufacturer numbers are:

1. [Rain Bird](#): 1-800-724-6247
2. [Hunter](#): 1-800-733-2823
3. [Nelson](#): 1-800-405-1400
4. [Toro](#): 1-877-345-8676
5. [Irritrol Systems](#) (formerly Hardie): 1-800-634-8873
6. [Rachio Help Center](#)