HOW-TO BOOKLET #3093

UNDERGROUND SPRINKLERS

TOOL & MATERIAL CHECKLIST

- ❑ Tape Measure
- ❑ Hammer
- ❑ Spade Shovel
- ❑ Sandpaper
- ❑ Control Valves
- ❑ Stop Waste & Drain Valve
- ❑ Adjustable Wrench
- ❑ Miter Box & Back Saw
- ❑ Try-Square
- ❑ Utility Knife
- ❑ Pipe, Glues and Thread Sealers
- ❑ Wood Stakes
- ❑ Flat Shovel
- ❑ Tube Cutter
- ❑ Rolled Plastic

Read This Entire How-To Booklet for Specific Tools and Materials Not Noted in The Basics Listed Above.

A sprinkler system is a self-contained water displacement system. It is installed underground safe from activities and obstructions. It can increase your leisure time and property value.

This booklet describes the major steps connected with most types. When you choose a particular type of system, you must adhere to its standards to maintain the warranty.

Sprinkler systems conserve water by placing water where it does the most good with little or no waste.

The key benefit to systems is controlled watering with the following advantages:

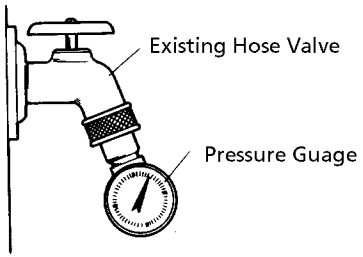
- evenly distributes water to the ROOT ZONE.
- maintains a COMPLETE SATURATION of the root zone.
- PREVENTS OVERWATERING, waste and erosion.

Erosion is a major concern in “hard to water” locations such as rockeries, terraces and steep terrain. Some systems can match head patterns to match the slope and conditions.

GETTING STARTED

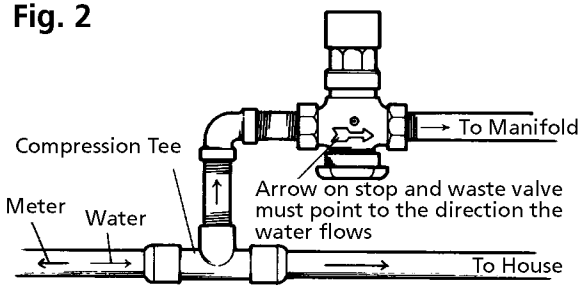
1. Check your local codes to determine if you must comply with any regulations. The building, water, sanitation, and health departments should be able to tell you what codes exist.
2. Pick up the free design-layout booklet that most brands include with their product displays. It should include a grid with a scale of about 1 inch = 10 feet.

Fig. 1



To determine your water pressure, attach a pressure gauge to each exterior hose bib and take various readings. Use the highest.

Fig. 2



You will need to measure the size of your main supply pipe to obtain your water volume (gallons per minute).

3. Acquire a water pressure gauge to attach to your outside hose bib. These are usually available free from your retailer if you leave a deposit. Otherwise, an inexpensive gauge costs about $10. (**Fig. 1**)
4. Attach the pressure gauge to an exterior hose bib. Turn on the water and record the static water pressure on the gauge, usually in PSI (pounds per square inch).
5. Repeat the process until you have tested every exterior hose bib. Use the highest reading.
6. Record the time and repeat the test at least 3 more times for morning, midday, early and late evening.

NOTE: Your water pressure changes during the day and evening with the overall demand placed on your water system.

DETERMINE "GALLONS PER MINUTE" (GPM)

1. Determine the size of the water meter. Open your water meter access and inspect the pipe connecting the meter to the house. A size may be stamped on the meter stem, or wrap a string around the pipe, record the measurement and the type of pipe you have; e.g. copper, steel, PVC SCH.40. Match to table (A), or take it to your retailer.

NOTE: Sometimes meters are located on property corners, in front of the house, or even grouped with other meters. The water department may help you determine your water meter size.

2. Determine the size of your main supply pipe. If your pipe is the same size at the meter as it is to the house, the pipe size is already determined from step 1. If the pipe is smaller at the house, measure the outside of the pipe and compare to table (A) to determine its size. (**Fig. 2**)
3. Match the control valve size to the size of the supply line; e.g., 3/4" valve on a 3/4" pipe; a 1" valve on a 1" pipe.
4. Match 1) water meter size, 2) supply pipe size, and 3) static water pressure readings to table (B) to determine your GPM (water volume expressed in terms of gallons per minute).
5. Compare the available GPM for different days and times to determine your optimum watering schedule. The greater the GPM the greater the delivery to an individual circuit.

PLOTTING WATER PATTERNS

1. Draw the house, garden and lawn on the scaled grid. Include rockeries, driveways and other structures to include/exclude in the spray pattern.
2. Draw the sprinkler patterns available from the product brand you bought onto the grid. Minimize the overspray on walks, drives, patios and other such areas. (**Fig. 3**)
3. Locate on your plan a point between the house and meter to place the cut-in tee to provide the main line.
4. Draw lines connecting the main water supply line to the control valves.
5. Group the sprinkler head patterns so that they do not exceed the GPM limits.

NOTE: Some planning guides do not show GPM, but chart the number of heads their style can fit on a given circuit for given water pressures. It is the same concept.

6. Label each group as a separate water circuit #1, #2, etc. Each circuit is controlled separately by a valve.
7. A group of control valves is called a manifold. Locate the manifold in easy access areas.
8. Count the number and type of heads, circuits and measure the pipe runs. Take this information to your dealer for a final estimate.

MATERIALS

Choose the type of pipe/tubing to be used. Remember that pipe is the measure of the inside opening, tubing is measured from outside to outside.

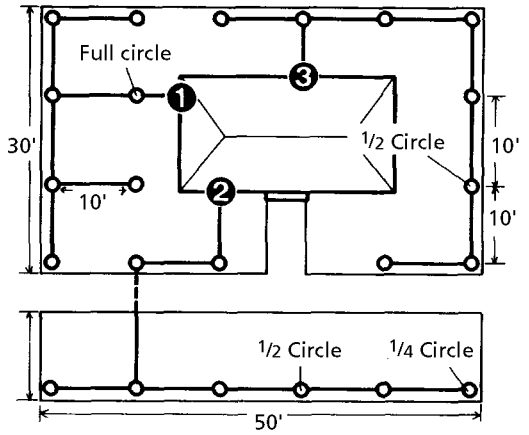
Step-up to the next pipe size if you have a long pipe run to increase the net water flow.

Schedule 40 PVC is one of the most popular types of pipe for use in the ground. It is easy to cut and glue, but needs connectors to splice lengths or to change directions.

Galvanized pipe is used to support pipe that extends above ground, such as for raised heads or manifolds. Supports may be added to plastic pipes for strength.

PVC pipe requires primer and glue to make a proper bond, and teflon tape to insure that threads are sealed. Follow the directions of the glue to clean, prime and glue.

Fig. 3



Plot your landscape for the spray pattern being careful to minimize overspray on walks, drives, patios and the like.

Purchase positive drain valves if you live in an area subject to freezing. These valves relax when a circuit is off and allows water in the pipe to drain; preventing freezing then cracking pipes. (**Fig. 4**)

NOTE: Be sure your main valve has a positive drain to allow for water in the main supply line.

The main control valve may be called the stop waste and drain valve. Even if codes do not require a permit for your system, they may specify the type of valve to be used in connection to your main water supply line.

NOTE: Check-valves and anti-siphon valves prevent water from backwashing into the general water supply in case of line rupture in your area or system.

INSTALLATION

1. Locate the cut-in-tee point after the meter on the main supply line. Uncover if underground.
2. With the water supply off at the meter, measure and cut the main pipe. Refer to dealer for exact measure.
3. Slip the compression nuts over each end of the cut line, and then slip the tee onto the line. Connect the tee with the compression nuts on the tee. (**Fig. 5**)

NOTE: Be careful not to strip the threads or to rupture the tee with excessive force. Start with hand-tight pressure and then add 1/2 turn, then test for seal.

4. Insert and connect a length of pipe into the free end of the tee and connect the main control valve.
5. Slowly turn on the water meter valve with the main control valve "OFF", and check for leaks in any connections. Re-tighten as needed and turn the water back on to the house when all seals hold.

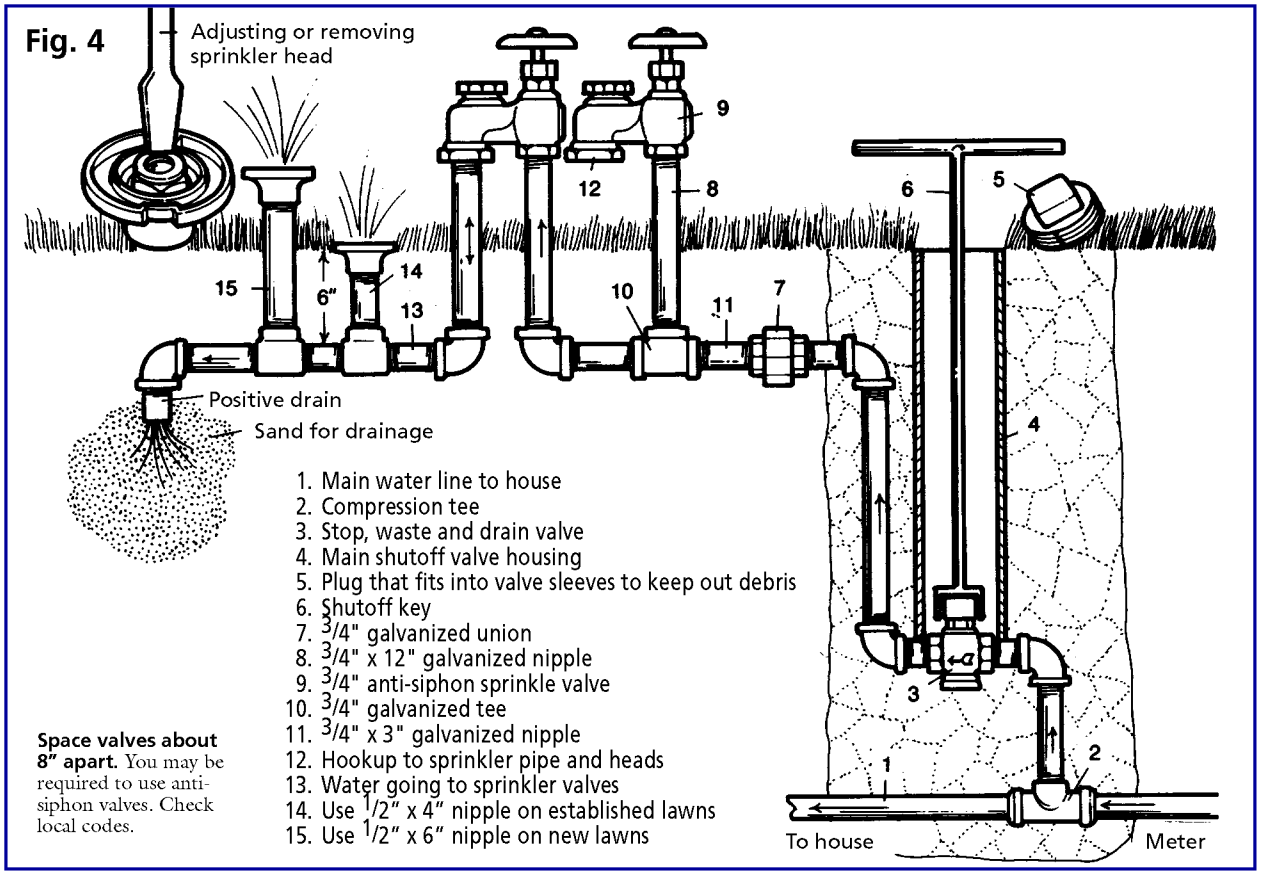
THE SUPPLY LINE & MANIFOLDS

1. Assemble circuit valves on a workbench for manifold assembly.

NOTE: You may be required to use anti-siphon valves. They are not recommended for drip-irrigation systems, however.

2. Place valves on pipe stems long enough to be about 6"-12" above ground. Either use galvanized pipe for rigidity, or plan on some stake-supports for each stem. Space valves about 8" apart. (**Fig. 4**)

Fig. 4



Space valves about 8" apart. You may be required to use anti-siphon valves. Check local codes.

1. Main water line to house
2. Compression tee
3. Stop, waste and drain valve
4. Main shutoff valve housing
5. Plug that fits into valve sleeves to keep out debris
6. Shutoff key
7. 3/4" galvanized union
8. 3/4" x 12" galvanized nipple
9. 3/4" anti-siphon sprinkle valve
10. 3/4" galvanized tee
11. 3/4" x 3" galvanized nipple
12. Hookup to sprinkler pipe and heads
13. Water going to sprinkler valves
14. Use 1/2" x 4" nipple on established lawns
15. Use 1/2" x 6" nipple on new lawns

3. At the end or low point of the manifold supply line, install a tee with a threaded end facing down. Install positive drain valve at the low point.
4. Cap the other ends of the tee for future valves in case you need to add circuits.
5. Dig a shallow trench from the main control valve to the manifold for the manifold supply line.
6. Place the manifold in position and install the main line between the manifold and main control valve.
7. Inspect all joints, turn off all individual valves, and fasten manifold to supports or to the house.
8. Slowly turn main control valve on and inspect manifold line for any leaks; also turn it off again to inspect the positive drain action.
9. When you are convinced that the lines and valves are leak free, cover the trench and repeat the process for the remaining number of manifolds your system needs.

INSTALLING PIPE RUNS & SPRINKLER HEADS

1. Install a pipe run to each sprinkler head on top of the ground.

NOTE: At the low point of each pipe run be sure

to install a threaded tee where a positive drain valve is installed.

2. When a pipe run is completed, remove the actual head to the sprinkler; usually a brass fitting that unscrews.
3. Turn each circuit on in order to A) check the connections for leaks, B) flush the heads of any dirt and debris, C) check the positive drain actions when off.
4. With the systems off, reinstall the actual head, and turn each run on again to check the spray patterns.

NOTE: If a pattern is a little off you can adjust the entire pipe run now, before digging the trench.

5. Stake the head in position and repeat the process until all pipe runs and heads are built, flushed, tested and staked.

DIGGING TRENCHES

1. Leave the stake in place where the head is to be located, and move the pipe run slightly to either side. Be careful not to stress the pipes while moving.
2. Lay some plastic down about 24" opposite the pipe run to lay the sod and dirt on.
3. Remove the sod by cutting a strip about 12" wide parallel to the pipe run, with a hoe or flat shovel. Roll the sod up exposing the dirt and lay onto plastic.

NOTE: It may be easier to cut the sod into 8' lengths and then roll them up due to their weight. Keep them moist.

4. Dig a "V" shaped trench about 8" deep the entire length of the run. Place the dirt on the plastic tarp. (**Fig. 6**)
5. Place about 2" of sand/gravel in the bottom of the trench for drainage.
6. Slide the pipe run into the trench, remove any obstructions or boulders and repack the soil around the pipe.

Fig. 5

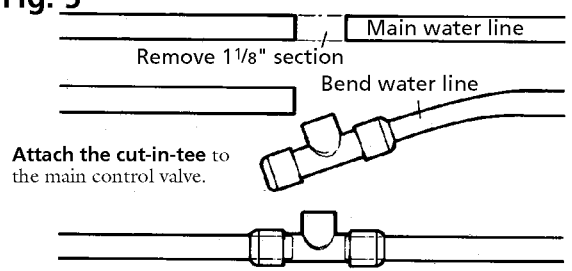
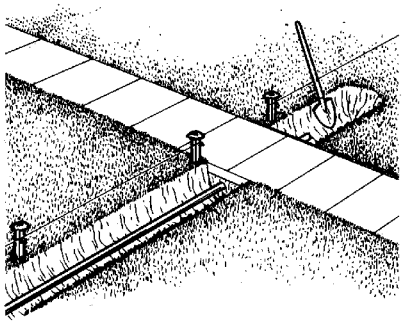


Fig. 6



Trenching under drives/walks is done by attaching your garden hose to a length of galvanized pipe with a hose bib-to-pipe thread adapter.

NOTE: To place the head flush with the sod level you must take into account the depth of the sod. For a new lawn you need to determine how thick your sod will grow and set the heads at the appropriate height above the dirt, usually 2".

7. Remove the actual heads and flush each line again to remove any dirt in the heads.
8. Replace the actual heads and test each head pattern and adjust the patterns at the heads as before.

NOTE: Look for any wet spots on the dirt before returning the sod, these may indicate a pipe rupture in the trenching/placement process.

9. Replace the sod and water the entire area with each circuit to help the sod regrow.

NOTE: Cut an "X" pattern in the sod to place back around the sprinkler head. Trenching under drives/walks is done by attaching your garden hose to a length of galvanized pipe with a hose bib-to-pipe thread adapter. This produces a sluiced tunnel.

USING & MAINTAINING YOUR NEW SYSTEM

1. Operate each circuit for about 1/2 hour and then measure the depth of moisture in flower gardens, and the saturation of lawns.

NOTE: Each circuit is operated independently; only one at a time.

2. This will help you determine the length of time each circuit should run and the order to run them in.
3. Program automatic systems and record the reaction of the lawn and garden to over/under watering.

   When the system is not needed for extended periods of time, be sure to turn the main control valve off.

   Also, additional heads may be added to underutilized circuits and additional circuits may be added to the end of a manifold as needed.

   You can change head/spray patterns after operating the system.

NOTE: If sprinklers do not work, check: •Main control valve on •Water meter open •Individual circuit valve•One valve open at a time •Power on to electric valves •Station controller programmed •Flow adjusters on/stuck •Evidence of leaks •Bad solenoid

TABLE A–APPROX. PIPE SIZES

Outside measures	Size & Material
4-3/8	1" Galvanized pipe
3-1/2	3/4" PVC SCH.40
2-3/4	1/2" Galvanized pipe

TABLE B–SAMPLE GPM CHART

Water Pressure	Meter	PipeSize	GPM
50	1"	1"	19.5
50	1"	3/4"	15
50	3/4"	3/4"	12