

# Home Made Grassinator

## Construction tips

The Grassinator article on the ZTrains web page contains step-by-step instructions, so they will not be repeated here. I will comment on their construction steps in some cases, and these comments will be keyed to their numbered step. I suggest you lay the parts out on your work surface before you begin, so you have an idea of what goes where, and how they will connect. Some parts, such as a lit rocker switch, may have specific instructions for how they must be connected. Be sure to read and follow these.

### Specific Comments on The Grassinator Article procedure:

- Step 1:** Their first step is to cut the 12" pipe down to 6" in length. There are two things about this:  
1) you may not be comfortable with the 6" length; or  
2) if you are, you can buy a 6" pipe and save this step.  
**DO NOT** remove the lip. Place the lip against the "hopper" and use as a gluing surface, for added strength.
- Step 2:** You may or may not need two holes in the pipe, depending on what ion generator you're using, and where you want to locate the on/off switch (also what type of switch you use – consider your situation before drilling). Furthermore, you may need a larger hole for the power cord if you build the 115vac model.
- Step 3:** If you use the rocker switch from Radio Shack on my parts list, the hole in the PVC test cap should be 24mm (if you don't have a 24mm bit, use a 15/16" bit, and file the hole a little bigger as needed. The switch snaps into the 24mm hole. (You only need one test cap.) If you use the switch from ACE Hardware, the rectangular hole should be 1' x 7/16" and again, the switch snaps into the hole.
- Step 4:** You don't need the hole in the bottom of the bowl to be big enough to pass the PVC pipe, or the test cap. It only has to be big enough to pass the charging wire. (The final step of assembly will be to seal this hole with hot glue. The hole in the lid should be as large as possible while still allowing the wire screen patch to completely cover it.
- Step 5:** Test fit the ion generator into the PVC pipe before trimming it. If you're at all nervous about attacking it with the sander, try scoring the back with a hobby knife and snapping it off. (This method also avoids the possibility of removing too much material.) Remove only as much material as necessary (this may be NO material with the new generators) to allow the generator to slip into the pipe.
- Step 7:** If you're not using the 12vdc wall wart, you won't need to follow the "tricky" part instructions.
- Step 9:** Replace these short bits of wire with the fuse holders.
- Step 10:** As above.
- Step 12:** If you're building the 12vdc model, the ground clip wire is connected to the neutral (black) lead from the ion generator.
- Step 13:** If you're building the 15vac model, you'll want to feed the high voltage pigtail out of the PVC pipe far enough to work with, then you'll need to work it back in as you insert the ion generator into the pipe.
- Step 14:** Omit unless building the 12vdc wall wart model.
- Step 16:** There is no test cap on your "hopper" (bowl), and you don't need one. You do need a hole for the wire, and after you insert it fully, you should hot glue it or silicon caulk it in place. Hot glue or silicon caulk the flange on the PVC drain pipe (you didn't cut it off, right?) to the bottom of the "hopper" (bowl).
- Step 17:** I used Ziplock brand bowls, because they have a screw top. You can use whatever is available that you prefer. Buy extra bowls (the Ziplocks come in packages of three). You can use the extra bowls for storage, mixing custom colors and lengths, and a solid lid can be screw back on the hopper to retain unused flock.
- Step 18:** Rather than attach a spade lug, I simply tinned the end of the wire, to prevent it from fraying, and insert the wire into the lid screen.
- The electronics for the unit are connected outside of the PVC pipe and then slid into the pipe at final assembly.
  - Holes will have to be drilled for the power cord, the switch and the green ground wire that goes to the alligator clip. The Ground Wire MUST be drilled in the PVC pipe, the other two may be in the pipe or the test cap. You may want to buy a grommet suitable for the ground wire you use, or secure it with a little silicon caulk to prevent the edge of the hole from wearing off the insulation.
  - The 115VAC power plug is put on last after the cord is pulled through the PVC pipe and Grommet. (If you buy a pre-made cord, feed the butt end of the cord into the hole in the PVC pipe before connecting to the ion generator.) Be sure to fit the grommet over the cord in the proper alignment. Depending on your grommet, this may or may not be possible after the connections are made.
  - Connect the line cord to the fuse holder, and insert a 1 amp fuse. Use heat shrink to cover all exposed wires and conductive surfaces. You'll need to remember to put the heat shrink tubing on the wires before making the connections.
  - Solder wires to switch and negative ion generator.
  - Use hot glue to attach the screen to the lid of the container and to attach the container to the PVC pipe.
  - A small hole will also have to be drilled in the base of the container to allow the High Voltage lead to pass through and be connected to the screen. Since the lid will come off to fill with grass material just poke a hole in the screen large enough for the high voltage wire to stick into. (No permanent attachment of the high voltage wire to the screen) If you use a bare wire end, be sure to tin it to prevent it from unraveling.

**The Grassinator**, as conceived by Joe Fugate and Richard Cooke  
 Modified and adapted by Gary Robinson and Ron Walker

**Parts List**

<b>Part</b>	<b>Source</b>	<b>Part # (SKU)</b>	<b>Price</b>
Negative Ion Generator			
12vdc	Oatley Electronics	IONA or IONB	\$12.00 (AUS) or
✓ 120vac	Electronic Goldmine	G1783	3.95 (sale)
— PVC pipe (12")	Lowe's	24628	4.86
— Test Cap	Lowe's	23405	0.53
— Screen Kit	ACE Hardware	50523	4.99 pkg 5
— Plastic bowls	Wal-Mart	710156	2.37 pkg 3
— Rocker Switch	Radio Shack	2750021	3.99
— Fuse holder	Radio Shack	2701238	2.69
— 1 amp fuses	Radio Shack	2701063	2.99 pkg 4
— Clips/probes	Radio Shack	2070374	2.99 pkg 10
— Wire (22ga)	Radio Shack		
— Shrink tubing	ACE Hardware	34378	3.99 pkg 8
— Suitcase clips	Radio Shack	6403053	1.99 pkg 7 (optional)
For 120vac version:			
— 120vac cord	Lowe's	070305	6.63
— Cord grommet	Lowe's	139355	1.04 pkg 2
For 12vdc version			
9v Battery	Wal-Mart	MN1604B2	5.50 pkg 2
Battery clip	Radio Shack	2700324	2.69 pkg 5

**Tools Needed**

Hot Glue Gun and glue  
 Drill, with assorted bits  
 Hobby or Utility knife  
 Pliers  
 Assorted Screw Drivers  
 Heat Gun  
 Soldering Iron, flux, and solder (optional)  
 Drum Sander (optional)

**Web pages from the Grassinator Clinic**

Noch Gras-Master: <http://www.youtube.com/watch?v=3K-qWXJhRkU> (You Tube demo)

Micro-Mark: [www.micromark.com](http://www.micromark.com)

Ztrains Magazine: <http://www.ztrains.com/pages/tech/grassinator/grassinator.html>  
 (Grassinator article, updated June 2009)

Electronic Goldmine: <http://www.goldmine-elec.com/>

Oatley Electronics: <http://secure.oatleyelectronics.com//index.php> (Australia)

Woodland Scenics: [www.woodlandscenics.com](http://www.woodlandscenics.com)

Scenic Express: <http://www.scenicexpress.com/>

# Ztrains<sup>SM</sup>

## Z scale (1:220) model railroading

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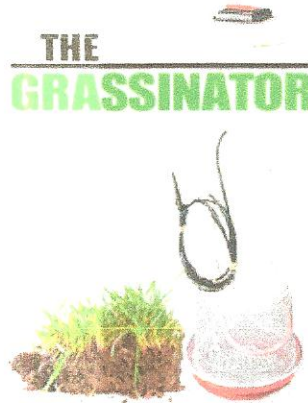
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## The Grassinator The Static Grass Applicator

### Why Static Grass?

In this article we'll show you how to build your own electric static grass applicator, or as we like to call it around the Ztrains office... The Grassinator. For right around \$35.00 and a trip to your local hardware store and nearest Radio Shack, you'll be ready to build your own Grassinator in an evening.

To see a similar device in action you can [watch this video](#) by Joe Fugate at the Ztrains Theater: Our design is based on a 12 VDC negative ion generator. Negative ion generators provide an electrical charge to individual static grass fibers and the Grassinator design takes advantage of this charge by supplying a convenient path to ground... in this case your layout. The result is static grass that stands upright.



**UPDATED: JUNE 2009**

### Parts List

We've listed specific parts and part numbers as well as vendors, when possible, to make buying the Grassinator components a bit easier for you. Bear in mind these are the parts we've used on our Grassinator and not your only options.

The photographs of the negative ion generator in this article show a unit that is no longer available. We have found a good replacement unit from Oatley Electronics in Australia... thanks guys! The Oatley unit actually comes in two varieties. They are identical in their operation and vary just slightly in their physical dimensions. Either unit is fine to use in this project. The photos in this article show the old negative ion generator, the new unit is slightly smaller but is wired the very same way. **This parts list is accurate as of June 2009.**

On a related note... here at Ztrains we've received requests for a pre-built, ready to roll right out-of-the-box Grassinator. In response to these requests we will begin selling an updated version of the Grassinator within several weeks time. We're working out some new components and techniques for these units and will post back here when we have these new units ready for sale. We'll also pre-announce the Grassinators in our [Ztrains Newsletter](#).

Part Name	Where To Buy	Part #	Price
12VDC negative ion generator	Oatley Electronics	IONA / IONB	\$12.00
12VDC 100mA power supply	Surplus Shed	M2758	\$1.50
Panel mount coaxial power jack, Size M	Radio Shack	274-1582	\$3.29
SPST rocker switch	Radio Shack	275-694	\$2.99
Mini alligator clips	Radio Shack	270-380	\$2.79
Dremel 1/2" drum sander	Home Depot	407	\$5.00
Package of small spade lugs	Home Depot		< \$1.00
1-1/2" PVC drainpipe, 12" long	Plumbing / Hardware		< \$3.00
1-1/2" PVC test cap (2)	Plumbing / Hardware		< \$2.00
Rubbermaid, 4 oz. container	Supermarket		< \$3.00
Metal window screen	Hardware		< \$3.00

In addition to the parts listed above, a few basic items such as a saw, electric drill with assorted bits, hookup wire (we recommend 22 gauge stranded), soldering gear, wire nuts

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Monday, September 14, 2009



[How To Make A Stone Wall](#)

Good stone walls are available in the other scales... so why not Z? Come on... don't complain about it, design and build your own stone walls.

Here is a cool looking tutorial that shows you just how to do it.

[Previous Coffee Break Topics](#)

and epoxy would be useful.

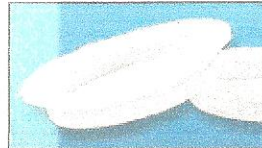
## Step-By-Step

**Step 1:** Cut the 1-1/2" PVC drainpipe down to 6" in length. These drainpipes have a small flange, or lip, at one end. You'll want to cut this part off.



PVC pipe and test caps

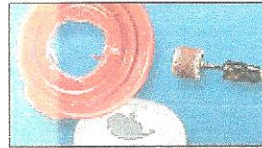
**Step 2:** You'll need to drill two holes in this 6" length of pipe. Use a 21/64" drill bit for this first hole, this will be for the panel mount jack. Make this hole 1-1/4" from the top of one end of the pipe. For the second hole use a 1/16" drill bit and make this hole 2" from the top of the same end of the pipe. This will give you two holes on the same end of the pipe with 3/4" of space between the holes.



PVC test caps

**Note:** There is usually a visible mold line on these PVC pipes, use this line as a guide so your two holes will line up vertically.

**Step 3:** A single hole must be drilled into each PVC test cap. Let's drill the hole for the on/off switch first. In the center of one PVC test cap, drill a 3/4" hole. In the other test cap drill a 1/8" hole. You can make the hole in this second test cap off center a bit, though hole placement is not critical here.



Dremel sander

**Step 4:** Two holes, each approximately 1-1/2" must be made in your Rubbermaid container, one in the center of the lid, and one at the bottom of the bowl. I say approximately 1-1/2" because the exact size will be determined by the size of the PVC test caps you buy (these can vary a bit in size from manufacturer to manufacturer). I use the Dremel 1/2" drum sander to make these holes, sanding the hole a little bit at a time to insure a snug fit with the PVC test caps.



Grass bowl cleaned up

**Step 5:** Now we get to use the Dremel 1/2" drum sander again to modify the housing of the negative ion generator. The generator has a molded tab on one side for mounting. We need to remove this tab in order to fit the generator inside the PVC drainpipe. You want to get the tab side flush with the top of the generator. Also you'll need to gently sand the other corners of the generator to remove some of the plastic housing.

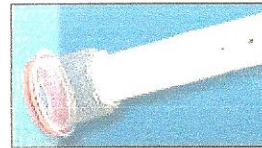
**Note:** Be **very careful** when sanding down the edges of the generator... we only want to remove enough of the housing to allow the generator to fit snugly into the PVC drainpipe. We don't want to sand so much that we breach the generator housing. Remember... go slow!



Negative ion generator



Sand the mounting tab

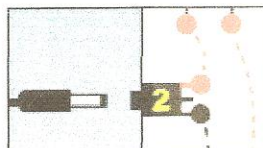


Test fit your work

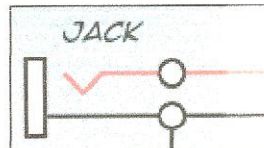
Ok, the hard work is over and we're very nearly done. Before we begin wiring the up the Grassinator, do a "dry fit" of all your components to insure everything fits as it should.

**Step 6:** Insert a long length of your hookup wire into the small hole in the PVC drainpipe. Make this length of wire approximately 2' long, we can cut it down later if you'd like. Fish, or push / pull, this wire through the small hole and up through the top of the handle. The wire should be a snug fit, which is why we're pushing this wire from the outside into the handle. It's important to get this wire in place right now before we begin attaching the other components.

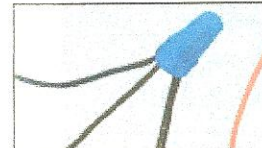
**Step 7:** Insert the SPST rocker switch into the PVC test cap with the 3/4" hole and tighten it down with the included lock washer.



Grassinator pictogram



Simplified wiring diagram

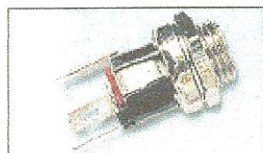


Actual wiring harness

This next step is really the only "tricky" bit of wiring you'll encounter. The panel mount power jack has three solder tabs, one is for the tip, one is for the sleeve and one is for an optional switch... we don't use that tab. Now the power supply I suggest here is a Panasonic model

no. KX-A10. I chose this power supply because it meets the power requirements of the ion generator with a 12VDC / 100mA output. We need to make a total of 4 solder joints now. I use red wire for positive (+) and black wire for ground (-) just to keep things visually clear for myself.

**Step 8:** Solder a 4" piece of (black) wire to the ground (-) tab on the jack. Let the other end of this wire alone for a moment.



Panel mount jack

**Step 9:** Solder a 3" piece of (red) wire between the positive (+) tab on the jack to one side of the SPST rocker switch, either side is fine.

**Step 10:** Solder a 3" piece of (red) wire to the unused side of the SPST rocker switch. Let the other end of this wire alone for a moment.

**Step 11:** Now we tie up the two loose wires from our soldering job. The ion generator has three wires attached to it. A red and black wire on one side, a thicker red wire with a PC board / needle assembly on the other side. Leave the needle assembly wire alone for a moment. Attach the loose end of the positive (+) wire from the rocker switch to the red wire on the generator. I use small wire nuts for this.

**Step 12:** Attach the loose end of the ground (-) wire from the jack, along with that first wire we inserted through the pipe, to the black wire on the generator, again use a small wire nut to bundle all three wires together.

**Step 13:** Ok, time to assemble. You can now cut off the PC board / needle assembly. Gently push the generator onto the pipe with the thick red wire going in first. Push it down to about 1" from the far end of the pipe.

**Step 14:** Next, unscrew the round nut / collar from the jack and insert the jack in to the pipe and push it through the hole we drilled earlier. Once through, screw the round nut / collar back on to the jack to secure it.

**Step 15:** Fit the PVC test cap with the rocker switch onto the pipe.

**Step 16:** Push the red wire through the hole in your PVC test cap / Rubbermaid bowl assembly. You'll want to work this wire through until the pipe and the test cap mate up. Fit the pipe and cap together.



Lid with metal screening



Spade lug in grass bowl



Completed Grassinator

**Step 17:** Cut a round piece of aluminum screen material for the Rubbermaid cap. Depending on which Rubbermaid bowl you buy... many of the lids have an inner "lip". If you cut your screen material just a little large it will "press-fit" inside this lip and hold firmly.

**Step 18:** Add a small spade lug to the end of the wire coming out of the Rubbermaid bowl. You can coil your wire just a bit in the bowl in order to make the wire act like a spring. When you place the top of the container back on the bowl the lug will make sufficient contact with the screen material to give you a good electrical path.

### You Now Have A Ztrains Grassinator!

Congratulations... you're now ready to create grassy fields. Operating the Grassinator is simple. Fill the Rubbermaid bowl with static grass, brush on a high strength adhesive to your base then place a nail into the ground through the adhesive. Attach the alligator clip to the nail, turn on the Grassinator then gently shake the grass from the bowl. Allow the adhesive to dry, and you have upright static grass!

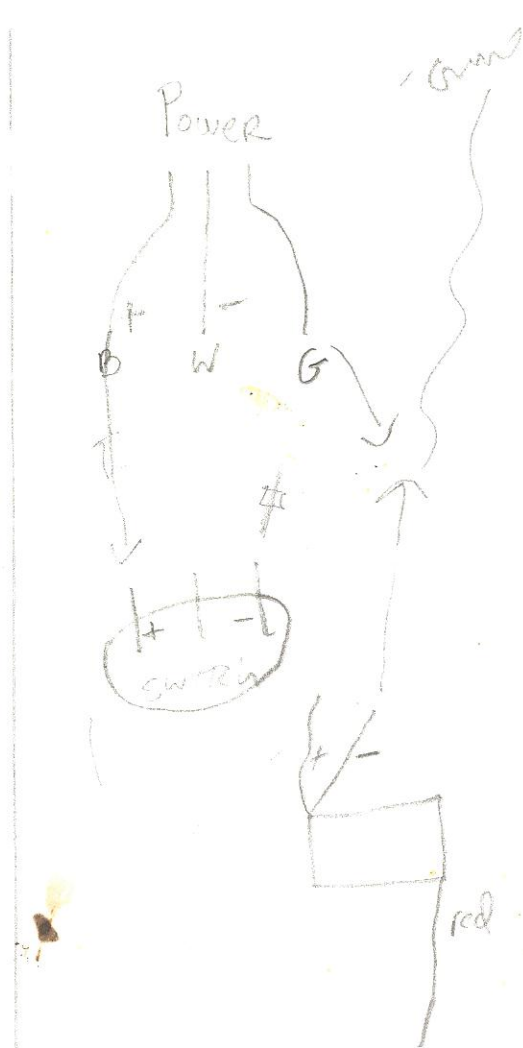
#### IMPORTANT NOTES:

This static grass device is based on a 12VDC negative ion generator and produces 8kV of electricity, the utmost in care is required when dealing with any high voltage device.

Oatley Electronics also suggests the possibility of using this negative ion generator with a lower voltage power supply with lower output voltages.

Oatley Electronics: [www.oatleyelectronics.com](http://www.oatleyelectronics.com)

Radio Shack: [www.radioshack.com](http://www.radioshack.com)

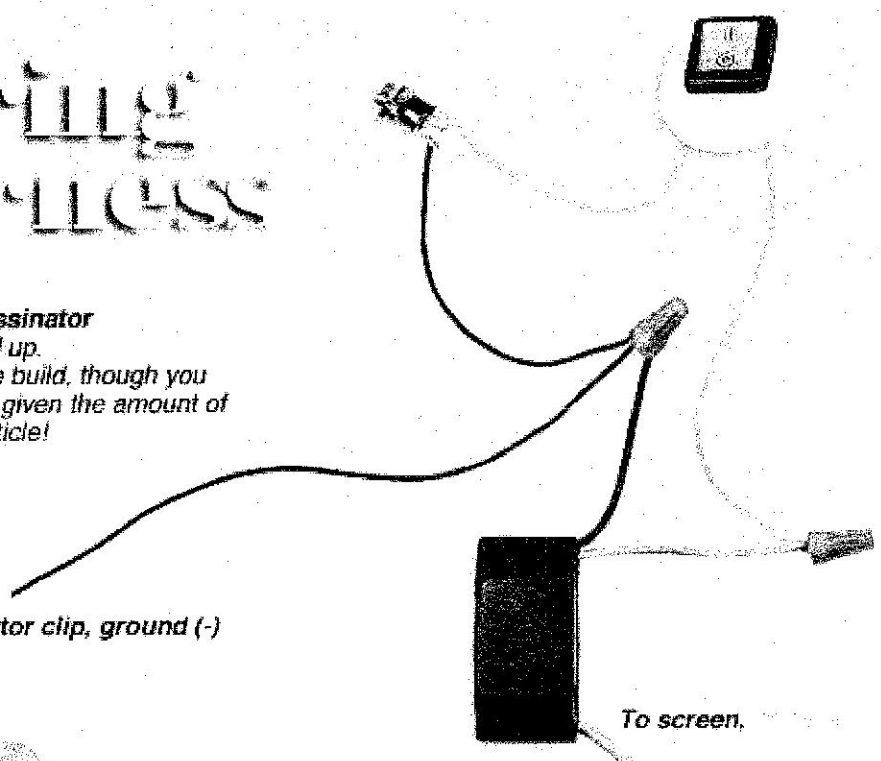


# Wiring Harness

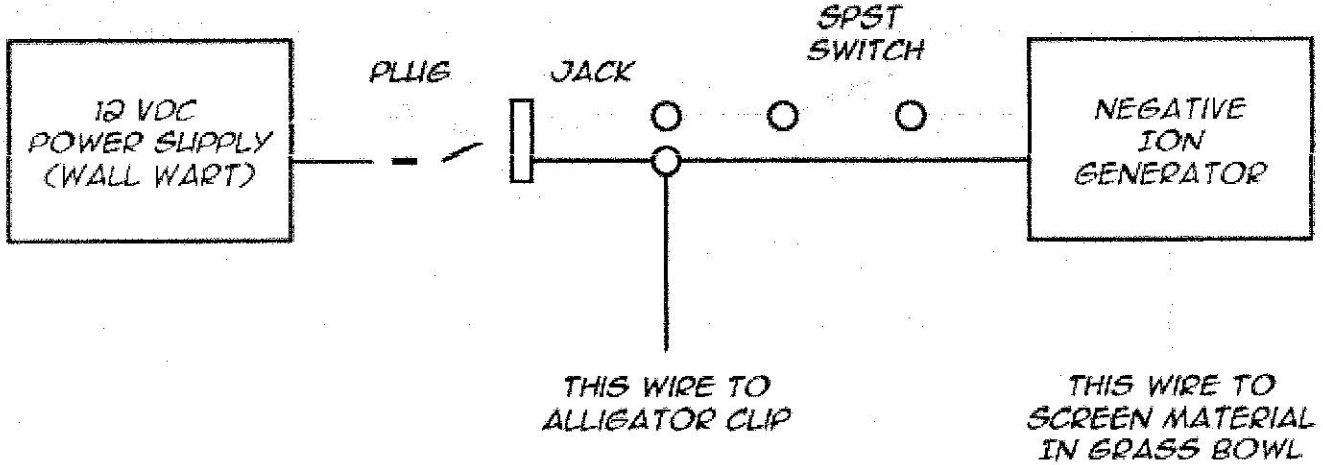
**Here are the Grassinator components wired up.**  
*It really is a simple build, though you might not think so given the amount of text in the build article!*

To alligator clip, ground (-)

To screen,



# GRASSINATOR



# GRASSINATOR PICTOGRAM

- 1) 12 VDC power supply
- 2) Panel mount coaxial jack, Size M
- 3) Negative ion generator

