Garden Trains
From A to Z

G is for Glue

Better Information - Better Railroad

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Garden Trains - A to Z

What you will find in this document.

Discussion groups are a great way to share information. One thing that is unique to LSOL.com is our Tuesday Topic. Each week, for almost six years, we have discussed a specific group topic. It could be about bridges, or maybe you like steam vs. diesel engines. Many times it is about how people solved a problem, or what they think about a current issue or product. My favorite was several years ago. "If your railroad was a candy bar, what would it be." (Good and Plenty, Milk Dud, etc.) We have fun at LSOL.com as well as help each other with serious issues on our railroads.

Now with almost 300 different weekly discussions online we wanted to make it easier for you to use this vast knowledge base of topics. We are taking the time to edit the best answers on a specific Tuesday topic into PDF documents. We have also added photos as available so you can see just what was being talked about from each of the users.

This paper is different than one written by just one author on a topic. You are getting dozens and dozens of years of combined experience from some of the smartest people running Large Scale Trains today. Save this document and start building your own personal reference library on your computer today.

What is LSOL.com? (Large Scale Online)

Large Scale Online has been providing information for Large Scale Garden Train enthusiasts for almost 15 years. We are the oldest, largest, and most professional web site on the Internet that is exclusive to Large Scale Garden Trains.

LSOL.com provides information in many different ways. We have online articles, videos for you to watch and photos for you to see how it is done. We also have organized and secure online discussion groups. We are the only site that requires people to use their real name. No hiding behind your keyboard making anonymous posts. Join Us.

Glues

Glue was used as early as 3000 BC in wooden furniture construction in Egypt. Their stuff is still holding together, so why is it that the stuff I have glued together on my railroad is falling apart after only a few years?

There are so many types of glues: Super Glue, Rhino Glue, Gorilla Glue, Epoxy and more. What have you been using with great success? I have some Aristo Building kits, back when they made kits, which have reverted to their original state of just a box of parts.

I am sure you use different glues in different situations. Tell me in detail what you have used – when and where. Plus, please tell me what you have used that did not work.

Here are some links to help us build a reference base of information.
Adhesives: http://en.wikipedia.org/wiki/Adhesive

This to That: http://www.thistothat.com/

Glue Guru: http://www.gluguru.com/

Wordworking.com Best Glue: http://www.woodworking.com/ww101glue.cfm

Rhino Glue: http://www.rhinoglue.com/

Gorilla Glue: http://www.gorillaglue.com/

Liquid Nails: http://www.liquidnails.com/home.do

Stephen Auslender - "Rubber cement" is a real no-no

I use different glues for different materials and different environments.

White glues like "Elmer's" is fine for indoor wood or cardboard; but not for outdoor use or indoor use in an environment of high humidity. So I use "carpenters glue", an off-white colored glue for wood to wood, paper, cardboard. This is cream colored glue like white glues in consistency and application.

I try not to use "contact glue" because I have seen them lose adhesiveness over time. "Rubber cement" is a real no-no because it will lose its holding power over a shorter period of time.

For gluing plastic I try to find the type of material it is and then I use an adhesive that is a solvent for it. One brushes the solvent onto the edges of the plastic parts and it melts a thin layer thus "welding" the pieces when they are brought together. I prefer to "weld" the materials rather than to just "adhere" them to each other. I like permanent bonds. When bonding plastics I first have to find out the type of plastic that was used and then I use the internet to find a supplier for the solvent. Not everything can be found at the local hardware store. Often times I have to "Google" it.

When joining dis-similar materials I prefer a two part slow setting epoxy adhesive on a roughed up surface (use sandpaper, files on the material first). I avoid "super glues" for a couple of reasons. First the fumes are harmful and leave my eyes hurting. I do not want to think of what they do to my lungs! The other reason is sometimes they degrade over time and lose their adhesiveness.

In other words, I prefer to "weld" similar materials. I use an adhesive only when joining dis-similar materials and then I prefer the epoxies.

Mike Evans - I really like Titebond III

I really like Titebond III for outdoor use. Also use a lot of Weldbond white glue for attaching trim pieces and dissimilar materials. A new product called 'Garden Goop' appears promising, especially to strengthen buildings from the inside.

One problem is that trim pieces become saturated with moisture under heavy rains. It's not so much that the glue fails but the wood piece itself begins to crumble. Have also found that Liquid Nails hardens to a brittle point under hot summer sun (we have temps up to 115 degrees and ultra dry air).

Good mechanical fastening can help as well as use of caulk to seal joints from penetrating moisture. But nothing is fool proof - Mother Nature always seems to win.

Rick Henderson - I've used most of the adhesives

Perhaps it was easier 5,000 years ago when all they had to work with was natural products in the constant aird climate of the Egyptian delta. Just in the continental US today, the environmental conditions can run from very dry to extreme humid tropical conditions and from below zero to 120°.

We also have a much wider variety of building materials to work with in the varied environments so I don't think there is a magic material and adhesive combination yet developed that will work in all conditions. I accepted long ago that any structure I put outside would, like a real house, require upkeep and have a limited lifespan. For that reason I tried to use less fine details and products like the Pola line that came with its own glue. That actually held up better outside than most other products available.

I've used most of the adhesives mentioned for various applications and cannot say that any is best over a long period.

Jon D. Miller - there is no one "right" glue

As others have stated or implied, there is no one "right" glue, adhesive, solvent, or cement for all applications. Seems to me it is necessary to select the bonding agent depending on the material that is being assembled or repaired, as well as the environment to which it will be subjected.

Digging through the mess on the work table here is what I found.

Slo-Zap CA, Tenax-7R, Ambroid Proweld, Quick Grab, hot glue, GE Silicone II, Titebond III, Goo, Ambroid Liquid Cement, Testors Plastic Weld, Devcon 5 minute Epoxy, Plastruct Plastic Weld, and Liquid Nails.

At that point I stopped looking. I use mostly Slo-Zap CA, Testors Plastic Weld, Titebond III, Devcon 5 Minute Epoxy, GE Silicone II, and Goo.

It's the fumes that I like!

KC Marshall - use Tilebond xx, Liquid Nails and marine glue

I do not use pre-made or plastic structures on my layout; everything is custom made, other than my galvanized windmill, and all items are made for outdoor use. Most my rolling stock stays outside (covered but subject to temp variations) so I need a bond that holds in all weather types.

I use Tilebond xx, Liquid Nails and marine glue offered at our local ACE hardware store, the only place I can find it, it comes in a tube. I also use glue that I got at a fair, which is like an Acetate (like Rhino), very fast bond, but works very good so far for wood and railcar parts bonding. It all depends on what I am trying to bond together, that determines the type of bonding agent used.

One thing I will always do, if it is possible, is to back up every glue joint with a nail or small screw. The glue holds it together in the first place and the hard connector keeps it there, usually drill pilot hole first. My buildings will first have the sidings glued on, and then each board is then nailed on, with corner molding nailed on to back it up. It won't always work, but I will always try. The most common nail I use is a ½" – 1", 18- 20 gauge brad to solidify the joint (they rust outside and adds realism).
On my truss bridge I used no glue or nails at all; I used only threaded stock, washers and nuts cut to fit to hold it together, it took longer, but I am happy with the results. I then used plenty of wood seal to keep it waterproof and it seems to be working. I then put a bit of clear nail polish on the nuts to hold it there, if a nut comes loose, I can always tighten it up.

Brian Donovan - I really like the Hobby Lobby brand

Liquid Nails / PL adhesives -
I use the heavy duty LN for reinforcing joints on large buildings. I use the PL landscape block adhesive for gluing together hardibacker board for buildings. I use Foamboard LN for gluing foam boards.

Loctite PowerGrab (exterior)
I use this for adhering plastic veneers to foam board or hardibacker. Very easy to use and fills gaps well. Easy water cleanup.

Household GOOP
I use this stuff for all sorts of things. It's especially good for quick, touch up building repairs.

DAP Clear Flexible Sealant
It's kind of a cross between silicone and GOOP with no stringiness. I used this the first time recently to adhere a corrugated aluminum roof to a coroplast sub roof. I really liked this product and will be using it more.

Ambroid ProWeld / Plastruct Bondene
Both are plastic welding reagents. They work and set fast (10 secs.) They can melt or warp thin plastic if used in excess. These make very strong joints. I used it for plastic structures and rolling stock kitbashes. Plastruct PlasticWeld works equally well with a longer set time of around 30 seconds.

Cyanoacrylates
I typically only use these for gluing on detail parts or bonding metal to plastic. I keep bottles of thin and thicker gap filling around.

Epoxies
I use it for reinforcing joints on plastic structures and reinforcing structural pieces on rolling stock kitbashes. I really like the Hobby Lobby brand. I was disappointed with a recent purchase of the Loctite brand as the set time is more like 10 minutes.

Phenoseal Vinyl Adhesive Caulk -
Another product I really like. It's good for gluing on cedar shingles and for gluing in plastic veneer windows and doors in wood structures.

Titebond II and III -
Both have worked well for me. I use type II for gluing exterior wood where the joint is not directly exposed to the elements. I use type III for the exposed joints.

John B Pedersen - My glue of choice is Titebond II

My glue of choice is Titebond II, I have yet to have a single joint fail, only the wood around it. I built a "temporary" bridge that was totally untreated and it lasted 4 years outdoors before sagging and broken wood forced its replacement. I have used some Gorilla glue for different things when I don't mind waiting the additional time for the recommended time the pieces should be clamped together. My 10 foot bridge over my pond was built with Titebond II and has served very well for many years, and should last many more. For roofing I have used clear Silicone II was great results. I had only one failure with it and found out that I had a defective tube which GE replaced. I have left most of my buildings outside for almost a year now and only the one had a problem. Those are my 3 most used glues for my projects.

Phill Lowe - Worst choice was trying hot glue

I've tried MANY but keeping it simple I've narrowed it down to these:

JB Weld - when I'm not impatient. Elmer's Ultimate - basically Gorilla.

Loctite Super Glue - (so called "Professional") Use most of the time. Again, that impatience thing!

Elmer's Probond Interior/Exterior Wood Glue (Yellow)

Liquid Nails - primarily clear for Small Projects & Repairs.

Worst choice was trying hot glue. I generally try to paint over or weatherproof (liquid or sealant) in addition to all of these.

Paul Roberts - You can't over-build enough

Along with all the other adhesives I love using Plastruct weld cement. It seems to work best on all styrenes and has held up for years (including plastic fire escapes to name one). My buildings go thru a lot of damp and temperature variations but no matter what I use for glue, everything gets reinforced with Silicone. You can't over-build enough when it is going outside!!

Glenn Habrial - Roofs and walls get heated unequally

I use the pretty much the same stuff Jon, the eastern one, uses (Slo-Zap CA, Quick Grab, GE Silicone II, Titebond III, Goo, Testors Plastic Weld, Devcon 5 minute Epoxy, Plastruct Plastic Weld, and Liquid Nails.)

But I also use the PRC products since it has a shelf life and the quality department tends to throw it out when it is expired. The sealant is 2 parts and hardens into a rubbery consistency that does not deteriorate. The price (free for employees) is right, too. There is a whole line of PRC products. Since it is not being used for airworthiness it is ok to use on garden structures.

Surface preparation and constant contraction / expansion from the sun are the two main reasons glue does not hold up outside. When a bonded part is heated and cooled on a partly cloudy day, I can hear them make popping sound as one piece expands over the other pieces not getting direct sunlight. (Roofs and walls get heated unequally)

Steve Seidensticker - I use a product called Lexel

I use a product called Lexel a lot. Get it at the Dixieline chain of stores here in San Diego. It is a high quality silicone. I build my own turnouts and track by gluing rail to redwood ties, no spikes, and then glue the track to a foundation of bricks. I recently dug up bricks that have been glued together and buried for 12 years. The Lexel bond was still holding. The only drawback I have found is curing time. It takes an hour or two to set and 48 hrs to fully cure. The bond stays flexible and holds well in expansion/ contraction conditions.

Ray Turner - Lately I'm using construction adhesive

I use 5 minute epoxy for a lot of things due to fast set-up time. I also use silicone glue, Walther's Goo, Titebond II on wood and ballast, Urethane glue, MEK for (some) plastics. I have found that Piko kit glue fails after a few years - don't understand why since it's supposed to weld the plastic together. As others have said, wood itself deteriorates, so I have sworn off using wood outdoors.

I have found that silicone comes loose on horizontal plastic surfaces that collect water even though it's sold for use in aquariums. Goo dries out and cracks after some years in the sun. Lately I'm using construction adhesive and Urethane glues with pretty good results - so far. For ballast I mix my fines 50/50 with stucco mix. Note that this creates a roadbed UNDER the track. The track then floats on top of it.

Dave Clarke - Liquid Nails

At this point in time, I have only used two types of glue on my outdoor railroad:

Liquid Nails...I used this to construct the post and rail roadbed. I have had great success with this product when I constructed a bridge across the creek. The bridge still looks in great shape and does not show any wear. Keep in mind this carries full size people, not 1:25 scale people.

Selleys water proof PVA...I made my first structure for the garden railway with this product and have left it outside over the last 12 months to test its durability. I am happy to find that the glue as held up to the elements quite well. I will now make all of my structures with this product.

Elaine Haggenbottom - I had a lot of success with Weldbond

I just came back from Joanne's with 2 tubes of glue. Mostly it depends on WHAT I'm putting together. I concur with everyone else here that the wood pieces need Titebond II or III to keep them together and weathertite for outdoors.

I built so many of the original Piko and Pola kits (one or two Aristo too) and used the normal glues that came with them, except for Korber, the density of their plastic was superior and required a Krazy glue (which I hate) or a Goop (Marine was best, harder to find now) with pretty good success. Not sure IF Aristo ever offered glue, mine were second-hand, but my gripe is: IF you buy the large tubes, they are HARD to deal with the onslaught of glue that comes out at one time. Therefore, the German glue with the tiny tips was so much easier to use on tiny details.

Quick Grip and Quick Hold are okay substitutes from the local craft shops. Last year I tried the Omni-stick from Precision Products @ SELSTS as their plastic sheets were never easy to put down. It works well, with only a couple of minutes wait time. (I'm way too impatient for the "wait till it dries" variety!). I had a lot of success with Weldbond and still use it on occasion, what is excellent is "long shelf life", and diluted it really works well for adding dimensional items (grasses, dirt, etc) to Plexiglas.

I tried the Liquid Nails, and had an awful mess. Will NOT be using it again EVER! Plus controlling that big gun was awkward for me. However, that said, the only thing I do believe in using in the Gun is Silicone. It has proved to keep most buildings together in all kinds of weather, IF added to the interior joints.

Dick Chapple Sr - Elmer's Model + Hobby Cement

A glue I have not seen mentioned is Elmer's Model + Hobby Cement. It comes in a 1 fl oz tube for about $3.50. I bought it in desperation about two months ago after trying all my glues on hand to glue LGB railings back together on a bunch of center depressed cars I had bought. The railings were busted in dozens of pieces during shipping. The biggest problem I encounter is gluing together plastic parts on the rolling stock. I've used so many of the mentioned glues, some with limited success, most not working at all.

But this seemingly old fashioned glue works great. I've glued Aristo coupler shanks together on my heavyweights with success, as well as gluing broken truck bolsters together, and many broken handrails and stirrups on freight cars with great success. I just use a toothpick to apply. This glue appears to weld the parts together, so it looks to me like there is some softening of the mating parts, but not enough to create any problems.

David Maynard - O' Tay plastic solvent

Well I have built several pieces of rolling stock out of wood and I use Titebond for wood to wood joints. When completed if the item is to sit outside it needs a good sealer on it. I built a wooden bridge with CA (super glue) and next spring I had a lot of loose boards. I won't use CA on anything to be left outside again. Also I built a trestle with CPVC pipe for the pilings and redwood for the other bits glued with 5 minute epoxy. That trestle required 2 repair sessions each year for loose parts, yea I roughed up the pipe, yea I mixed per the directions, and yea I securely clamped the parts till dry.

So for wood to wood, I use either Titebond (II or III whatever I can find) or goop (outdoor, marine or camping). For wood to metal or plastic its goop (after roughing up the surface of the metal or plastic)

For plastic to plastic I tend to make tack welds with Tennex then make a full weld with the all purpose O' Tay plastic solvent from the hardware store. The O' Toy is for gluing pipe together and they have an all purpose variety that will glue ABS/PVC and a few other types of plastic.

Dave Marecek - Polyurethane Building glue

For the Lone Firr, the glue selection is based on the materials being glued. Everything stays outdoors 365 days a year, so the glue needs to withstand moisture and UV rays.

For Plastics, I use a Plastic Weld glue to ensure a strong bond. The weld is always on the inside of the structure. All my plastic buildings sit outside year round, so this keeps them together.

For Wood, Brick, Stone I use Polyurethane Building glue. It actually gets stronger with moisture. This is the same stuff they used when building my house, so every joint gets a dab. Also for any wood structures, I always use a brad or screw to hold the joint together.

For everything else, Epoxy is the solution. I use 5 minutes drying Epoxy and apply liberally. It is strong and can hold a lot of weight.

Joe Fotschky - I use Amazing GOOP

For wood I use Elmer's Ultimate, they say it is a High Performance Glue and is 100% water proof. While at the NGRC in Vegas I bought some glues from the Sinbad line of glues, I have used it on plastics and am very pleased with it. I use Amazing GOOP for areas that have a gap since this glue is thick it is very good and I have bonded plastic to plastic and plastic to wood successfully with this glue.

I use liquid nails on my Jig Stone Buildings because they recommend it and I have had no problems with it. All of the Jig Stone buildings I have built are still together. For setting items out on the layout I use Elmer's rubber Cement on items that like to fall over or move when a small breeze passes by.

MEMBERS ONLINE STORIES ON GLUES AND BUILDING HOW-TO'S

Here is a small sample of the articles that are online for members of LSOL.com

Useful Adhesives in Large Scale

There are many adhesives on the market, but there is no one glue for every situation. Keeping a variety of fresh glues on hand will be helpful. Come learn what to use when and how to best use it!

Kitbash a Piko Building

A few years ago Piko introduced a series of small houses called their "Gingerbread" series. These small inexpensive house kits easily lend themselves to kit bashing.

Scratching Buildings With Foamboard And Plastic Sheeting

I have been scratch building structures for my Greenbriar Cheat & Elk garden railroad since 1993. I wanted to have buildings that were not available, so I began building them myself. I also found this alternative to be more economical in most cases.

Make a Large Scale Billboard - Part 1

Billboards of all shapes and sizes have blighted the American countryside for decades. Now you can build your own to blight your garden railway in ways never before imagined.

Make a Large Scale Billboard - Part 2

Billboards of all shapes and sizes have blighted the American countryside for decades. Now you can build your own to blight your garden railway in ways never before imagined.

Make a Large Scale Billboard - Part 3

The final step in adding this bit of nostalgia to your railroad is to put some kind of advertisement on your billboard you have made. You have two options. Make them yourself, or find images of old billboards to use.

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