

RIDING RAILWAYS NEWSLETTER



Grand Scales
Quarterly

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Greetings from Red Bluff! The weather has been GORGEOUS here the last few days. Spring is in the air! So now is a great time to make plans to work on your railroad. To help you out, this issue is devoted to an article by Harvey Hawkens on how he is building his railroad, the Crystal Creek, Puget Sound & Pacific. It is a good primer on track laying, which is the most common information request we receive.

Also, all three volumes of the Grand Scales University series are now shipping. If you have pre-ordered your copy of volume three, it went in the mail on Monday. We hope you enjoy it.

Warm Regards,

A handwritten signature in blue ink, appearing to read 'Susan'.

BUILDING THE CRYSTAL CREEK, PUGET SOUND AND PACIFIC RAILROAD

by Harvey Hawkens

Back when the world was young, my family lived in Alpena, Michigan. I remember the heavy snow one particular Christmas and the cold winds howling in off Lake Huron. Christmas morning was a sight to remember when I walked into the front room and train track everywhere; into the adjoining room, around the tree and all over the floor.

There were little houses, buildings, a station, and several loading ramps with barrels and cattle. There were signals, crossing gates, sound effects and switches with red and green lights. There was the smell of electric motors and smoke pills. But the most important thing was the black Pennsylvania steam turbine locomotive pulling a string of cars and puffing white smoke. across the room. The sights, sound and smells of that day will be with me forever!

My Dad was a train buff and after the Korean war took a job with the Milwaukee Railroad in Seattle, Washington. He built some "O" gage rolling stock and then switched to "HO". I helped him a little but with school and college, he did most of the work. When I returned from Viet Nam and got a place of my own. I built a small "HO" layout on a piece of plywood. I remember making some cardboard grade crossings and gluing down a couple of lichens to resemble shrubbery when the thought occurred to me "It's probably easier to make the real thing". That thought stayed with me for several years until one day I heard about



Harvey helping set boulders for the waterfall below Dam Jan. One day Harvey's wife Janet was standing on the dam that backs up Crystal Creek, forming lake Leona (named after his mother) when she asked if he intended to name something after her. Thinking quickly, Harvey said "You're standing on Dam Jan!" and the name stuck. Crystal Creek is an intermittent stream and doesn't usually run in October.

a riding railroad "meet" nearby. One look at those 7 1/2" gage trains and it was all over. I was hooked! The entire family got to ride the trains; most importantly my wife, Janet. She was pretty enthusiastic as she "engineered" several F units through the bushes and over the bridges. Sometime later we visited the **Burnaby Central Railroad**,



The railroad goes around Lake Leona and crosses Crystal Creek on a bridge.

near Vancouver, BC. It was very impressive and I got lots of ideas. Too many ideas!

I'm kind of a practical guy so I reasoned that the 7112" gage would be too small to carry my customer's Christmas trees on our farm. I moved up to 15" gage. However, after a little research and some advice from the **Romney, Hythe and Dymchurch Railway**, in England, I settled on 24" gage.

THE VISION

In 1988 I planted my first trees and joined the Puget Sound Christmas Tree Association. Being a novice, with just a few acres, I kept my eyes and ears open and gleaned as much information as possible from the "big boys". They were most helpful getting me off to a good start. During association farm-tours I saw a lot of ideas and principles put into action, such as crowd control, traffic flow, safety, etc. One particular farmer, Walt, became my mentor and a family friend. A problem Walt had on his farm was the tremendous acreage taken up with roads. Since his U-cut customers had to get to the trees easily, Walt built one-way roads 20 feet wide to accommodate one lane and a parking strip. This all had to be graded, graveled and ditched. Once in a while someone got too far off the road and got stuck, necessitating a tow. And, this all cost money, lots of it. Walt never solved this problem, but I knew how to avoid it on my place. A train!

I could picture a black steam locomotive, puffing white smoke pulling a string of cars loaded with families headed out to the fields to get their tree. There would be red and green lights on the switches too. Once they cut a tree I would give them an orange plastic ribbon on which they would write their name and then tie it on the leader (that's where the star goes). By the time the train got back to the depot, a flat car behind the locomotive would be filled with trees. Customers would pick out their trees and put them on their cars. Before leaving they would be treated to hot cider and they could purchase a fresh wreath if they so desired. I could almost see the bright headlight of a locomotive com-

ing through the trees on a snowy December day.

While looking for equipment, my friend Bill, who has a 24" gage railroad in Oregon, told me about his success with pumpkins. His soil is as poor as mine so he trucks them in from "The Valley", and places them next to the track at the far end of the line. My mind went to work and behold, Pumpkin Junction. It's tucked into a natural area about 1/2 mile from the depot so the kids can't see it. They must first climb a hill, cross the creek and go around the lake before getting there, so it comes as a surprise. My friend Bo has a pumpkin stand and he's given me lots of good retailing ideas.

PREPARATION



Rod, from Royal Towing, lifting a bundle of 12 lb. rail off of a flat bed truck. Rail is 30 feet long and there were 32 rails per bundle.

One of my goals when I began the project was to limit grades to 1%, and have a minimum radius of 50 feet. In order to accomplish that, I measured out a 20' x 20' grid over the entire farm. Then, with the help of my sons, Jason, Daniel and Tom, we surveyed about 20 acres, gathering enough field data to make a large, detailed topographic map on graph paper with a scale of 1" to 40 feet and a contour interval of 1 foot.. This was done in pencil. When completed, I ran each sheet through the copier and got duplicates in ink. I then began laying out the railroad with a ruler, compass and pencil. Early on, the compass began ripping the paper so I used a narrow-mouth Mason jar lid for "50 foot" curves. The lid is just about 2 W' in diameter, or 1 1/4" in radius and on a scale of 1" to 40 feet it's just about right. I made a lot of 90 degree turns so I could align the track, as best as possible, either parallel or perpendicular to the rows of trees in the fields.

Figuring out trackage distance is easy with a ruler but difficult on curves. So, I marked out distance, in feet, around the edge of the Mason lid, on the rubber seal. Knowing where I started and where I wanted to go determined the difference in elevation. If I started at 10 feet and my destination was 15 feet, I knew I had to cover at least 500 feet to maintain a minimum grade of 1% (rise over run = % or 5' I 500' = 1%).

One place was particularly difficult to plan because at one end there was a fixed culvert I had to cross and at the other end was my neighbor's property corner. This was a distance of 400 feet but an elevation drop of 10 feet. That's 2 1/2 %. To make things more difficult, I had to go partway around Lake Leona to get there and cross a small stream as well. I worked this problem a long time. Then one night it came to me about 3:00 am. I made a shallow cut through a hill, near the lake, made an "s" curve around a swamp, established a small fill around the corner and at the same time traversed the stream. Believe me, laying out the track on paper takes time, even on flat ground. But, like my Dad always said, "paper's cheap".

ON THE GROUND

About 8 acres of my place was cleared when I started the project. Over the course of several years I cleared off another 10 or so. The remainder was either too steep to farm or just too beautiful to disturb, so it remains natural.

SURVEYING

When I surveyed the farm, I noted and measured landmarks. In addition, I established a significant number of "monuments". These were simply wooden stakes with a painted fluorescent-orange top. With a felt-tip permanent pen I noted, on the stakes, the distance north, south, east or west of the property comers. We were particularly careful while clearing and grading to avoid these monuments. Sometimes they had to be pulled out but they were quickly replaced as close as possible to their original locations. After figuring out the route of the track on paper, these monuments are very helpful in laying out the route on the ground, especially the centers of the curves. Sometimes, things didn't come out exactly as planned but I was usually within a foot or two.

Once the center of a curve was established we swung an arc using pink upside-down paint to mark the ground. Then we pulled out the long tape to the previous curve and touched it to the edge of that arc. Next we touched the tape to the edge of the arc we just established, and connected the points with a straight line beside the tape.

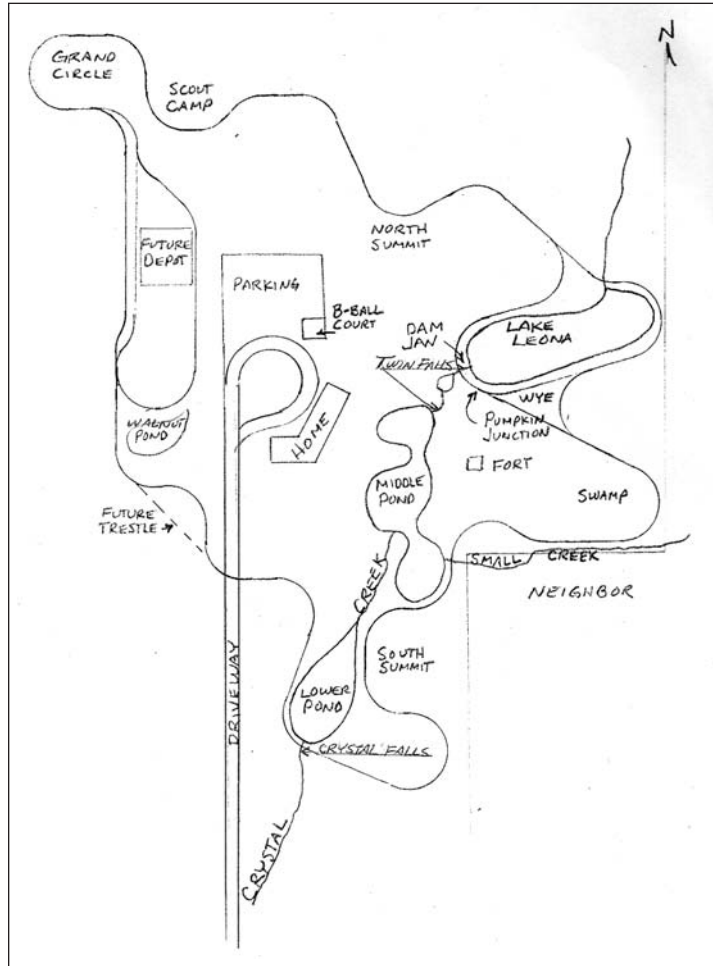
It was 10th grade geometry class all over again. If you try this, make sure and pull the tape well past each curve so it's easier to tell when the straight tape comes tangent to the curves. And, remember to connect appropriate rails. If you connect a right curve to another right curve there's no problem. But, if it's a right curve to a left curve or vice versa, the last arc must be a 52' radius. If you don't do this, your radius turns out to be 48' on the inside rail. Remember too, compound curves need a straight section of track between them, at least the length of a car.

GRADING

As most people know, us folk around Seattle don't tan, we rust! Dallas, Texas gets more rain than we do but our skies are cloudy and it drizzles from November to April, if not longer. That's what keeps things green. With that in mind, my cat-skinners are given just two hard-and-fast rules: When they're done, the ground must be smooth enough to run a lawn mower across and there can be no standing water.

I mention this because I've had problems in the past. Realize that I'm operating a tree farm. I use a minimum of chemicals. In the spring I spray herbicide on the rows of trees to kill grass and weeds. The aisles I mow with a small John Deere tractor. There are many places I can't use the tractor so I mow these with a Dixon zero-turning-radius mower. Therefore, the ground must be smooth. In addition, customers keep from hurting themselves when the terrain is smooth. Standing water on a Christmas tree plantation drowns the trees, breeds mosquitoes, causes tire ruts from the tractor, and encourages swampy vegetation. I want everything to drain, including the railroad grade .

Terry is my logger. He brings in the trac-hoe for clearing and stump removal. He also gets the permits and bums the slash. Terry is truly gifted when it comes to clearing. Billy operates the big cats when needed. He can accomplish more in an hour with a 14 foot blade and rippers than my grading artist, Paul can get done in a day with his JD450. In the interim between Billy's big cats and Paul's pussycats, is when the railroad is laid out on the cleared





Harvey with a load of broken, pressure treated 4x4 traffic posts from the county auction.

land.

With the route established on the ground, Paul's work begins. However, considering he would be dozing right where we marked the grade, we offset the marks by 10 feet, plenty of room for him to work his magic. Armed with my tape, surveyor's rod, transit and plans I work along side Paul on the cat. Cutting, filling, leveling and back blading, across the fields we go. When we look back, there is a finished grade about 8 feet wide, complete with drainage, exactly like it looked on paper. With this done, I let the grade settle for about a year. Grass and weeds grow on it; the boys ride their motorcycles on it; I drive my truck on it, and Janet jogs on it.

Before we go any further, let me explain something about gravel. Gravel comes from a gravel pit and is usually somewhat round with a smooth surface. Trying to compact gravel is like trying to compact marbles. It doesn't. Crushed gravel is like trying to compact crushed marbles. It does a little. In a quarry, rock is dynamited and then crushed. There are no smooth faces. It really compacts. The railroads are always looking for ballast. It's a premier building material and the railroads haul it long distances to ensure their roadbeds remain stable. So few people know the difference that around here I buy 5/8" minus crushed rock for less than the inferior product! Minus means the fines (rock particles less than 5/8") are in the mix. You can get straight 5/8" but it is more expensive and doesn't pack as well.

Now that my grade has settled for a year or so, I go back and spray it with Roundup to kill all the vegetation. Then Paul comes in and gives it a final dressing. Jim, then brings in his dump truck and Layton box. A Layton box is a contraption that hangs on the business- end of a dump truck. When the bed is raised, the contents, usually hot asphalt, slide into the Layton Box whereby it lays down a continuous layer of asphalt about 8' wide. Of course, Jim fills the Layton box with 5/8- and spreads it only 5-6' wide and 2" deep, for a perfect roadbed. The ballast fills in a multitude of sins and can even be slightly tilted for a little super-elevation. A vibrating Bomag roll-pack completes the job. The finished product looks like a perfectly smooth gray path

meandering across the fields. Janet really likes to jog on this! God help the boys if I find a motorcycle track on it!

PREPARING FOR RAIL

I guess I was like most people when I first started looking for rail. I had seen it around and assumed it was readily available. Was I in for a surprise. It's not around and it's not readily available. After talking with lots of people I learned that straightening old rail is nearly impossible. Not that it can't be done but it is very time consuming. Darrel in Marshall, Wisconsin gave me some valuable advice when he suggested that my first priority on the railroad was the rail, roadbed and switches. He, and many others, advised using new rail, if at all possible. I took everyone's advice and eventually ordered new rail and switches from Harmer Steel in Portland, Oregon. has really been great getting me the product I've needed. If you decide on new rail, plan ahead. There is only one mill remaining in the world, I'm told, that roils 12 lb rail (12 pounds per yard) and that is in Japan. George will gladly sell you rail but it's much less expensive to order it if you don't mind the wait.

It's the day you've been waiting for when your rail shows up on the back on a semitrailer. My friend, another Terry, brought over his Ingersoll articulated fork lift and we unloaded the bundles of rail. 30 feet long and 32 rails to the bundle makes for a heavy load. If you plan on off-loading by hand, take my advice: DON'T. Please get a machine of some sort to assist. The first batch of rail I unloaded, I used a tow truck! This stuff is really heavy! Remember too, that a tractor- trailer rig needs plenty of room. I stacked the bundles of rail about a foot outside, and parallel to, the outside of my parking lot for easy access. Bruce also fixed me up will rail connectors and bolts which came loaded on a pallet.

SWITCHES

Like I said earlier, Darrel was pretty emphatic about building good roadbed. I remember him asking me this question, " On any model train layout, where does the train usually derail? Everyone knows that happens at the turnouts. He again suggested I take the extra time, effort and money to secure good solid equipment. Again, I took his advice and purchased the turnouts from Harmer Steel. Bruce put me in touch with Doug in their Vancouver, BC, facility. Doug and his crew put together some #4 mining switches, the turnout of which is about a 50 foot radius. I say about, because if one examines the geometry of a switch you will notice once the turnout rails get past the frog, they are straight. Therefore, a #4 switch can't be superimposed on a 50 foot radius curve exactly. That's why I said earlier that the centers of the curves landed within a couple of feet of what I planned. Turnouts are heavy, about 800 lbs, because they are mounted on 5" channel steel. You will need a fork lift to get these off the semi-trailer too. They are



Lifting a switch off of a flat bed.

20 feet long, and very clumsy. When placing the turnouts on the ground remember there are at least 4 bolts protruding beneath each channel so your ties must still go immediately under the rails. Needless to say, turnouts look a little cluttered with a channel iron and a tie every foot or so but man are they strong. By the way, all of my turnouts are spring switches for ease of operation and safety.

RAIL CONNECTORS AND BOLTS

Rail connectors are about 16" long with 4 oblong holes that match the 4 holes on the ends of the two rails they join. They are cupped and contrary to popular belief, they DO NOT nest into the depression between the rail head and bottom flange. Rather, the cups face inward and the edges of the connectors are cut to fit this configuration. The two opposing connectors are thus two opposing arcs that are anchored on the edges. When the bolts are tightened, it's like squeezing down on a circle. The joint becomes very rigid and strong. By the way, my bolts have a short oblong shank just below the carriage head that fits into the oblong hole in the rail connector, thus relieving me of holding a wrench on it while it's being tightened. What a great idea!

TIES

I knew I would need about 4,000 ties. I went to lumber yards looking for an inexpensive way of doing so. I did not succeed. Somebody told me the County auctions off broken pressure-treated 4x4" street sign posts so I purchased a couple of bundles. But, by the time I transported them home, took out extraneous nails and staples, cut out the 42 ties needed and then dipped the cut ends in preservative, the cost was better than \$2.00 a tie. I tried a big national retailer but they told me all of their rejects were returned to the wholesaler. I followed this lead right to the preservation plant where I was told all the reject was sold to a salvage company, which wanted an astronomical amount for the few 4x4s they had .. I went back to the preservation plant and begged them to sell some reject 4x4s to me but they refused. I harassed them almost weekly and about six months later, they relented. Did I still need ties? You bet. About how many? 4,000. They stuttered for just a moment

and then said they wished to GIVE them to me. I was shocked. It turned out that they were getting so much returned product that they decided to begin grading their lumber before it was treated. They found that at least 10% and as much as 50% was cull, depending on where it came from. Believe it or not, I talked them into incising it (punching thousands of small slits into the wood as it travels between the incising rollers), cutting it to length, and then putting the ties on pallets, banding them, stacking them in their yard, and allowing me to pre-drill the bolt holes, prior to treatment.

Don, my machinist, made me an aluminum jig with 4 holes to the exact bolt pattern I needed on each tie to maintain 24" gage between the rails. Each of the 4 holes was enhanced with a pressed-in hardened steel bushing so the holes couldn't elongate. Because of wear-and-tear to our wrists, Jason, Daniel and I could only drill about 200 ties at a crack. It took us about a year and a half to drill the necessary 16,000 holes. We broke twenty nine 17/64 drill bits and wore out one electric drill motor. The drilled ties were again palletized and then pressure treated. I carried two pallets a load back to the farm and simply raised the dump and out they came. Later, Terry stacked them with his fork lift. Pre drilling the ties REALLY worked for me! Not only was all the bare wood treated, but all the ties were pre-gaged, saving me a ton of work.



Terry, my logger, on the excavator, and Roy, on the skidder, clearing future site of the depot.

TOOLS

The tie jig explained above was indispensable. There was one other hole drilled exactly in the middle of the jig which allowed us to spot a line drawn on the center of each tie. This line was drawn on each layer of ties while still stacked on the pallet. We simply measured a tie on each side of the stack and connected the marks with a straightedge. By doing this all of the holes in the ties were drilled equidistant from the center.

Other tools I used are common to just about everybody's tool box. Several handy items included one-gallon plastic pails to carry rail-connector bolts, lag bolts and

beveled washers. Another was a small jig used to locate holes in the end of a cut piece of rail. Put the jig on the end of the rail with a pair of vice-grips, making sure the top of the jig is pointing up. To operate the jig you need a 3/8" transfer punch. This is a special punch that fits into the 3/8" holes in the jig. When you strike the punch, it transfers the exact center of the hole in the jig to the exact center of the new hole on the rail. Remove the jig from the rail, locate the marks on the rail, and then strike both of the marks with a center punch. Now you can drill a 1/8" pilot hole. Enlarge the pilot hole with a 1/4" drill. Now, enlarge this to 5/8" but do not try using a twist drill. Believe me, it doesn't work. Try using a "bridge" reamer instead. It costs about \$30.00, and it goes through rail like it was cheese. It looks like a carrot with cutters on the perimeter. It chucks right up in a 1/2" drill motor. Use it at slow speed and lots of cutting oil. You will love it!

When drilling holes in rail, save yourself a lot of trouble by leaning or laying the work on a solid surface about waist height so you can get your body weight behind the drill motor. I found the bucket on my tractor did me well on this exercise.

Speaking of tractors, I have a friend that is absolutely indispensable. He never complains, is always ready to go, and is completely reliable. I'm speaking about my friend John. John Deere. For years, I've done everything by hand. But, in October of 2001, with this project in mind, I purchased a 4100, brand new, bright and shiny. It's one of the best investments I've ever made! Not a day goes by without it getting used. My friend Kenny, a "big boy" Christmas tree farmer, told me why all his machines are green. I'm glad I took his advice!

Remember, before picking up anything heavy in the bucket, make sure you have some counter weight. Speaking of buckets, mine has a grab hook on each of the top outside corners and a slip hook on the top center. To pick up a rail, simply wrap a chain around the center, or balance point. Then raise the bucket so it's about a foot directly over the rail. Attach the chain to a corner grab hook. When you raise the bucket, the rail should be perfectly balanced, dangling on the chain. Now rotate the rail 90 degrees so it's parallel to the length of the tractor. Jump into your seat, reach out with your hand, grab the rail to steady it and away you go. It may look funny but you can carry both straight and bent rail quickly and easily right to the railhead. My boy Daniel came up with this bright idea.

My rail bender is a thing to behold. The idea is the same as the 3 roll sheet-metal benders we all used in shop class. Turn the crank and the metal began to bend. Tighten the rollers and we got more bend. Imagine taking those 3 rollers, standing them on end, and shorten them so they are only a couple of inches long. Next, cut a profile of the rail into each roller. Take an electric motor, hook it up to a gear

box and attach it to the rollers. Put the 400lb machine on casters and it rolls down a 30 foot rail, bending it to a 50 foot radius in just over 2 minutes. This is just another creation put together by Don which I could not do without. As an added bonus, it leaves an 8" flat spot at each end of the rail, just right to attach the rail connectors.

CONNECTORS

When I found out rail spikes designed for 12# rail cost about \$.25 each, I started checking out lag screws. Screws can also be easily removed. I settled on the plain 3/8"x3" variety at about \$.08 each, when purchased in quantity. Directly under the head of the screw, I use a square beveled washer which matches the angle on the rail flange. Cost about \$.10. I apply a small dab of red grease to the screws before inserting them into the predrilled holes.

I thought a long time about how to screw 16,000 screws. My mind really got screwed-up just thinking about that much screwing. I had nightmares about lugging generators and air compressors around. I could envision cords and hoses in the mud and dirt. Wasn't there another way? About that time, I stumbled into Todd at DeWalt tools. He suggested I try their new 18 volt cordless impact wrench. Since I already had a DeWalt 18 volt cordless drill motor and reciprocating saw, I was sold on the brand and the batteries were interchangeable. What a deal! Somehow, the impact wrench showed-up underneath the Christmas tree that year. It will insert 60 to 80 lag screws on one charge. I have batteries that I rotate through the charger and it's all I can handle. Believe me, It's the tool for the job!

The 18 volt cordless drill motor is used primarily to drill and ream the holes for the rail connectors. The reciprocating saw and a 24 teeth-to-the-inch blade are used to cut the rail to length. One blade cuts one rail I never dreamed of building a railroad with battery operated tools, but DeWalt has made it possible. I can't say enough about these three tools. They're a pleasure to use and tough as nails. Absolutely indispensable!

LAYING RAIL

When talking about your railroad, do you notice how many people think you're nuts! Do you notice how many want to take a ride when you get it completed? I've noticed a lot of ladies, not men, who want to drive the train. However, when it comes to laying the rail, you're on your own. I've laid rail for the past two summers, and during that time only Jason, Daniel, Jan, and my in-laws, Terry and Gloria have given me a hand. Believe me, I'm not complaining. My friend John takes up the slack. I've learned to work by myself so I'm explaining this as if it's just me and John. If you have help, great. But if you don't, you can do it by yourself. On my best day, I laid 8 rails, but 4 rails in about 6-7 hours is more like it. I can't imagine 10 miles of rail a

day when they built the Union Pacific in the late 1860s.

Let's start out with a straight section of track. The ballast was just put down and compacted by Jim. Load up John's bucket with ties and transport them to the work site. Drive up onto the ballast with your butt facing backward and begin unloading the ties, holes up, about every 18". Sometimes it's hard to see the holes but remember that mark you made at the center of the tie? It's real easy to see. Back-up the tractor and off-load 5-6 more ties. Repeat the process.

Proceed to the stack of rail but before doing anything, take out your tape measure and mark-off multiples of 18" with a broad-tip felt pen. You know, 18", 36", 54". At 15 feet I also put a "c" for center., and if you haven't done so yet mark the entire stack at 15 feet so it's easier to position your tractor when you drive up. As explained earlier, chain-up a piece of rail, take it over next to the ties and lay it down on the ground, not on the ties. Position the rail so all you need to do is place it on the ties. Now position each tie right next to an 18" mark. With this done. flop the rail onto the ties. It's a lot easier to move the ties into position using this method than trying to move them with the rail holding them down. You'll probably have to adjust each tie slightly before screwing down the rail. And don't worry if the rail isn't perfectly straight. We'll get to that later.

The most important thing is getting the ties centered under the 18" marks, with the rail between the two pre-drilled holes. Now, drop 4 lag screws and 4 washers between each tie.

It's now time to strap on your kneepads and grab 2 rail connectors, 4 bolts and 4 nuts. Apply some red grease to the cupped or concave surface of each connector. Put one on each side of the rail, convex side out. Line-up the holes in the connectors with those in the rail and insert the bolts, head toward the inside of the rail. Remember to allow about a 1/16" gap between the rail ends if it's a warm day, a little more if it's a cool day, to allow for expansion and contraction. Spin on the square nuts and tighten with a large Crescent wrench, but not too tight; again, allowing for expansion and contraction. If the gap between the ends of the rail gets too close, just insert a small screwdriver and, with a hammer, tap it in until the gap is to the proper opening. Imagine moving an entire rail with a screwdriver. Of course, you must loosen the nuts first.

Stand up, take a short break, and while doing so, chuck-up the socket adapter to your impact wrench and attach the 9/16" socket. Back on you knees, kneeling one tie behind the one you wish to attach. Position the square washers over the 2 holes, bevel down. My washers have "3/8"

cast into the beveled side and nothing on the top side, so it's easy to tell. Otherwise you have to look closely. Now, dip the tips of the screws into the grease can and insert them through the washers and into the pre-drilled holes. Move your knees forward onto the tie you're working on to hold it in place. Turn on your impact wrench and turn in the screw. Repeat this procedure 39 times. Now go get another rail. Remember the rail joints must be staggered and the joints must rest on a tie.

To install a curve, I start by transporting a rail to our concrete basketball court, home of the rail bender. The rail is placed on four 6x6 blocks and one end is inserted into the machine. The rail is bent and checked against a 50 foot radius arc painted on the concrete. John is chained-up to the rail at the "c" and carried to the railhead. The curved rail is a little harder to carry and during transport, the ends tend to droop a little, thus reducing the radius. Once it's on the ground, I tip it, convex side up, and push the center down, flattening it out a bit. Then I attach it to the ties just like a straight piece. Do it a couple of times and you will find a way that works just right for you.

After installing 4 rails, or 60 feet of track, it's time for horizontal alignment. Don't go much further because the track (with ties) gets real heavy, real fast. Remember the centers of the curves you staked? Go back to them as needed and measure off 50 or 52 feet, depending, and mark the ballast between the ties with your pink paint. Run your long tape out and place it tangent to the arcs, again marking the straight sections of track, on the ballast, between the ties. Now, before you start shoving things around, anchor down your last section of track. I use 2 foot steel concrete stakes, (re-bar is too soft and too rough) pounded into the ballast on both ends of a tie to keep it from moving laterally.

Usually, I do this about every 10 feet. I keep them in place for about 40 feet (that's 8 stakes). As I move forward, I pull the stakes furthest away and place them in front. This way, the track ends up exactly where I want it, perfectly straight Vertical alignment, taking the humps and bumps out of the track, comes later once ballast is dropped between the ties.

CONCLUSION

At the time of writing, I'm about two thirds done. Hopefully next summer it will be complete. If not, the loop out to Pumpkin Junction is almost ready to go so I'm pretty sure we can do our harvest festival. Of course, that depends if Don has the engines and coaches ready. I think you get the idea. This is a work in progress. Guess what I tell my wife when she says we need a budget? ~~***~~



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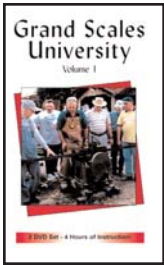
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Building a Grand Scale railroad requires a great deal of time and effort. And it requires a great deal of knowledge. Wouldn't it be great if there was an affordable way to learn from the professionals to, in effect, have your own private education? And what if you could receive this education in your own home? NOW YOU CAN! Starting now you will learn:



Why and how you should pre-bend rail before laying it
The tools that are most useful for bending rail
When are plastic ties most useful?
How to lay rail quickly
Tips on rebuilding locomotives and machining new parts

You will learn the ins and outs of laying track the way the professionals at the **Hillcrest Shops** do it. **Ed Youngling** will share thoughts on **rebuilding locomotives and many of the shop tips** he has learned through years of experience and hard work. All delivered directly to you.

Why is it harder to insure your railroad than your home?
Does your club insurance cover you?
What questions do you NEED to ask your agent?

Mike Deeble can and does answer these tough questions in his information packed seminar! Plus Mike shares many more points of vital interest to railroad owners and operators.

Paul Garin of Roll Models steps up to share with you knowledge that he uses in his business every day when he teaches you about **Fluid Drive Systems**. Watch and listen as Paul teaches

How to plumb hydraulic systems
How hydraulics work
How to run a locomotive with a fixed displacement pump system
What formulas you can use when designing your system

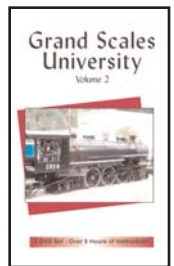
Another person who you will learn a great deal from is **Cagney historian and mechanical engineer, Don Micheletti**. Don shares some of his vast knowledge on the history and operation of Cagney locomotives. For instance,

When did Cagney begin production?
What is the difference between a class D and E engine?
What gauges did they build?
What makes a Cagney unique?

Grand Scales University Vol 2 features Paul Boschan, owner of Boschan Boilers and Restorations, holds a question and answer discussion on **boilers and boiler safety**.

The ASME stamp - what does it mean?
What steps are involved in building a boiler to code?
Should the tubes be welded or rolled in?
What is the best way to maintain your boiler?
What water elements can damage a boiler?

Robert Frank, owner of the world-famous **Sonoma Traintown**, shares his ideas on **making your commercial operations profitable**.



How to drastically cut track maintenance needs
What materials work best for wheels?
Do you need to pre-bend rail?
How can amusement rides complement a railroad?
How do structures add to the experience?
How can animals add to your bottom line?

Sean Bautista of the **Hillcrest Shops** teaches you **how to build a switch from the ground up**.

How much room do you need to leave on either end of the switch?
What can you do to prevent your pointes from rolling?
Why don't you want to put heat in the rail?
Why would you want your rail to be able to move?
Should you gauge the switch wider in a curve?
How do you build a switch? Where do you begin?

Plus **Ed Carnegie** gives a humorous pictorial history of the **Swanton Pacific Railroad** and the **Overfair RR** equipment. The late **Fred Kiesel**, a founding member of the **Wabash Frisco & Pacific**, also gives a brief history of that historic railway.

Grand Scales University Vol 3 features even more great railroad information.

Join **Ellen Thomsen** as she shares with us the history of the famous 15" gauge **Redwood Valley Rwy** in

Berkeley, CA. Ellen's pictorial history sheds light on how to build a first class public railway.

- Why did Eric Thomsen choose to build his railway in such a remote location?**
- What has the railway learned over the years that can save you many hours of frustration and help you build a successful railroad of your own?**
- Why is water quality important?**
- What makes record keeping essential in this business?**

Next, **Sean Bautista of Hillcrest Shops** joins us again with a brief seminar on building **air brakes**.

- What makes automatic breaks truly automatic?**
- Why are glad hands important?**
- What is an effective way to build an air brake system?**
- What formula can you use to determine proper PSI and cylinder bore?**

Ever dreamed of building your own steam engine? **Chris Allan**, owner of Historic Railway Consultants, thought that there should be a basic locomotive for people to build on a budget and designed "Eric's Basic 0-4-0". Listen in as **Chris and his pal Sean Bautista share the story and photos of the design and construction of the No. 18.**

Diesel fans will enjoy **Andrew Juggle's photo essay on the history of the Miniature Train & Railroad Company**. The MT&RC (MTC) built some of the most durable and good looking railway equipment. Andrew shares the following and much more.

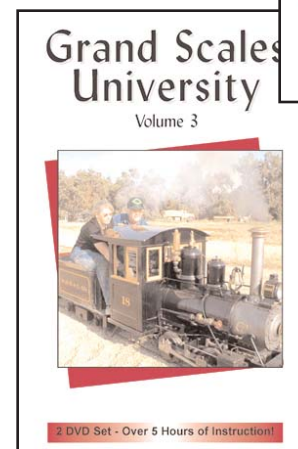
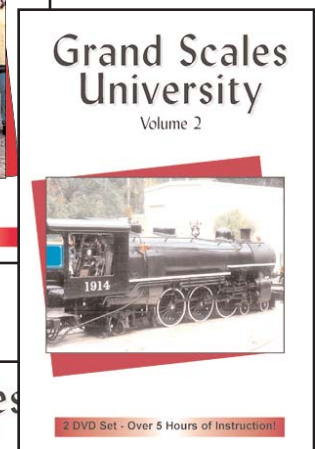
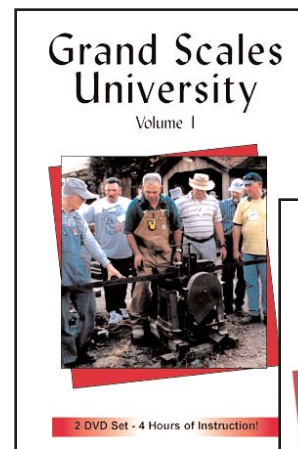
- What was the first engine built by the company?**
- Why were the trains modeled after the E series locomotives?**
- Why did the company build diesels instead of steam?**
- Who was MT&RC's biggest competitor?**
- What gauges were the trains built in?**
- When was the S-16 released?**

And finally, an interesting look into making movies and **special effects with the late Jack Sessums, founder of Sessums' Engineering**. See footage of Jack Destroying Trains and **learn how he designed locomotives for use in the movies** and various tricks of the trade. **Plus, you get to see cool things EXPLODE!!!**

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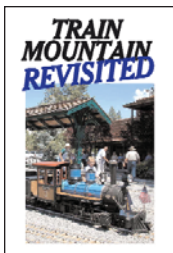


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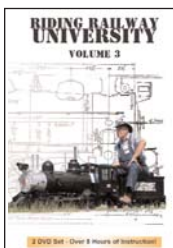
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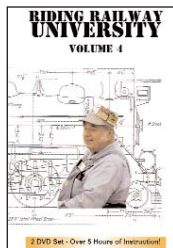
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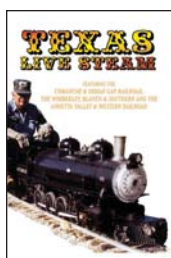
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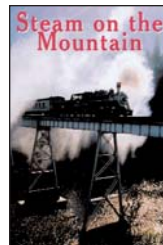


Come on y'all and visit three of the nicest 7.5" gauge railroads in the glorious state of Texas! You'll be impressed with the size and quality of Nick Edward's newly built **Wimberley**

Blanco & Southern. You'll learn about large scale Operations at Roy Pickard's down-home **Comanche & Indian Gap.** And you'll really enjoy the welcoming atmosphere at Terry McGrath's **Annetta Valley & Western.** A must for Texans and for anyone interested in seeing how live steam railroading should be done. **\$29.95**

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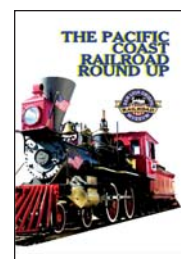
ful drive rods and steel wheels. You'll enjoy the dramatic scenery and hearing the engineer describe what it's like to run a steam engine over a railroad he has worked on for decades. And there is no sound in the world like a lonesome steam whistle echoing through the pine trees.



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PACIFIC COAST RR ROUND UP DVD

The Pacific Coast is a private railroad on the Central California coast. It is opened to the public only once each year, as a fund raiser for the San Luis Obispo Railway Museum. This DVD takes you aboard the charming narrow gauge train. It features vintage steam engines (including the one that was in the opening shots of Dr. Quinn, Medicine Woman TV show with Jane Seymour). The coaches are genuine Disney coaches - the first coaches to be used in service at Disneyland. Great for railfans, narrow gaugers, families, Disney enthusiasts and anyone else who would just enjoy a good show. Approx. 1 hour with bonus features. **\$19.95.**



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