

Tips & Tech #04

- LAYOUT MAINTENANCE -

Building A ZERO Maintenance Layout
Track Cleaning

Building & Maintaining a large Model Railroad

Clinic - October 2005 – By Bob Hartle (*Updated 2007- 2008*)

Having a large layout presents a number of problems to the owner.

1. Can I afford to build this large of a layout?
2. Will I be able to finish this layout in my lifetime?
3. Will I have enough operators to run the layout?
4. Will I be able to maintain this large of a layout?

There are many other questions but number 4 is the one that we will talk about.

How does one make a layout low maintenance?

ROOM PREP

One of the first things is to prepare the room before the layout is built. This is not easy, as most modelers want to jump right into building the layout.

Making the room dry if it is in the basement (which most layouts are) is most important. If the room is not dry then the layout will never be stable, as the humidity will keep the wood swelling and drying out as the excessive humidity changes and this can affect the level of the layout and the subroadbed. Painting the block walls with waterproofing paint will go a long way in keeping the room dry. A dehumidifier will be needed to control the overall room climate. Insulating the walls helps with the wetness of the room.

Insulation

Insulate the basement walls by putting furring strips and Styrofoam up. Yes there will only be ¾” of insulation but it is better than nothing. The furring strips should be attached to the walls with **Tap-Con** cement screws. This needs to be done if you are going to have a multi-level layout and want to attach the upper levels of the layout to the walls. Using cement nails and/or construction adhesive has been known to fail after a few years. There is nothing worse than

seeing your layout fall off the wall or have the wall panels come loose from the wall. It is more expensive but you will only have to do the job once! Now put up the drywall. As for the basement windows, if you have them, covering them up would keep the sunlight off the layout and it will keep the backdrop continuous. Besides the light coming in from most windows is minimal at best. But making the windows accessible is probably a good idea.

Lighting

Adding good lighting to the room will allow the operators to actually see the layout. But finding the proper placement for the lights before the layout is built will not be easy. A way around this is to have the lighting circuits end in outlet boxes. This will allow the lights to be placed anywhere on the ceiling and be plugged in. The ceiling boxes will then not have to be located exactly.

Drop Ceiling

Adding a drop ceiling will go a long way to eliminate dirt and dust from falling on the layout from the floor above the layout. Walking on the upstairs floor will cause the dust to slowly filter down on the layout as people walk on it. And besides it gives a finished look to the basement.

Outlets

Adding power circuits along the walls below the level of the layout is a must as trying to run the layout with extension cords is just asking for trouble. The wall circuits should be switched so that leaving the room the owner can turn off all of the power to the layout and not have to worry if they unplugged the soldering iron or heater.

Benchwork

Finally we are ready to begin building the layout. Use standard building principals. Build the benchwork with the joists on 16" centers max. It has been found that the use of 1x2 material will hold weight in excess of 250lbs. So using material larger than this may be wasting money but it will make the benchwork stronger. For the subroadbed the use of OSB board will work and is a lot cheaper than plywood. The use of Homasote on top of the OSB is used to help reduce the sound that would be made by the trains when the track is laid directly on the wood. It also is easy to nail the track down before it is ballasted. The OSB should be painted and then when the Homasote is put on, it should be painted also. The paint will help keep excess moisture from affecting the wood and keeps wood glue and water scenery mix from causing problems.

Benchwork legs only need to be 2x2s. Ripping a 2x4 in half will yield legs 1 3/4" square. It is not a good idea to space the legs over 4 feet apart when using 1x2 material for the benchwork.

Drop Wires

When laying the track put drop wires on every piece of rail and solder every rail joint. Now why do we need to do this? Reliability and reducing resistance to the rails. Nickel silver rail has a lot

more resistance per foot than brass. So expecting the layout to run properly with 1 or 2 wire drops is again asking for trouble down the road. And using code 100 rail will have less resistance than code 83 because it is larger overall. Now this resistance difference is small but every little bit helps. Remember ZERO Maintenance!

Buss Wires

The buss wires should be #12 stranded. Why? Again the resistance thing. DCC signal is a form of Alternating Current and as the length of the wiring run increases the resistance begins to increase. With the resistance increase it causes the DCC signal to decrease (actually more noise is generated and eventually the noise level ends up being greater than the DCC signal). It will also slow down the trains and could cause the track short detection not to function properly and melt plastic parts which are in contact with a shorted train. If the runs are long (over 50 ft) then #10 or #8 wire should be strongly considered. Use the quarter test around the layout to make sure that the command station will trip out instantly. Then you will know that the wiring is adequate.

Shielded 120v Wiring

When adding regular 120v outlets out into center peninsulas, the wiring run under the benchwork it is highly recommended that the BX type (metal shielded) cable be used. The reason is that you will not end up cutting the wrong wire thinking it is track wire and the BX metal shielded will keep any 60 cycle hum from being transmitted into the DCC track wires or the Loconet buss. Again noise is the biggest problem that can be introduced into the DCC signal. It is also the hardest thing to find, as we don't have the proper equipment to determine if there is actually noise on the DCC signal.

Now, this noise on the DCC signal, what does it cause? Loss of engine control or sluggish engine response to commands as it can cause missed DCC packets on the rails or the Loconet. But is it really noise or is it the system being overloaded with running trains. One will never know!

Rerailers

When laying track in tunnels or long areas of staging track it is a good idea to put the sectional track rerailers in at the beginning and end of the hidden areas. It just may keep the train together long enough so it will be out of the hidden trackage so it can be rerailed or it may just rerail itself and keep on running. It is not fun having to get up inside a mountain to fish out the cars or hearing them hit the floor!

Ground Throws

Most all of the turnouts have manual ground throws installed on them. Reason zero maintenance! It seems that the powered turnouts need some kind of adjustment periodically. With the manual throws there is no excessive pressure exerted on the turnout or any of the snap action with the old snap turnouts. Also there is no wiring or toggle switches that will need

worked on in the future. When attaching the ground throws to the layout, use long enough nails. I have found that using 1" brads are long enough to go through the Homasote and just start into the subroadbed as I usually have the manual throws sitting on top of 1/4" cork. Most of the ground throws are removed to the edge of the layout.

This eliminates the need to reach through the scenery, which will after a while start to break the delicate trees and shrubs from rubbing past these items. (Remember ZERO Maintenance)

Rolling Stock & Kadees

All of the rolling stock has three things checked before it is ever placed on the layout.

Weight: All cars are weighted at least to NMRA specifications, or as close as we can get. (Flat cars and Gondolas are a problem, removable loads help). Using lead shot, metal nuts and panel box knockouts are some of the many items that can be used for weight. Be sure and glue the weights in good if you are putting them inside a closed car. There is nothing worse than having the weight come loose and not being able to get back into the car

Kadee Couplers: All cars have Kadees installed and the height checked as well as freedom of movement if the coupler itself. Always set the couplers a little high as over time the wheels will wear into the side frames. The coupler will also droop over time. *(2007 update - The newer #148 Kadee couplers with incased whisker spring are now the standard coupler replacing the old #5's)*

Wheel Gauge: All of the wheels are checked for gauge. Most of the time the wheels are out of gauge from the factory. This includes the metal replacement wheel sets! The wheel flanges should slip freely into the NMRA gauge, to be considered in gauge!

Replacing the wheel sets with metal will cut the amount of dirt tracked around the layout and will help in easing the load on the engines (*2007update - all new cars and any cars due for maintenance are getting metal wheels*).

Doing this makes the cars track properly and stay coupled.

Plaster Scenery

Using plaster over wire screening may be a bit sloppier to work with but it is a lot more permanent as it is a form of rock. It doesn't leave much to burn and we do not know what the long term effects of foam deterioration will be. Again for my part plaster is really low maintenance.

Yes I am also doing Foam and Glue Shell scenery but am not happy with the progress so far. But it does go a little faster. If it does not work out I will replace it with Plaster. *(2007 update – Using the Red Rosin paper and making clump foliage blankets is speeding up the scenery progress – I still use the chicken wire sub-base).*

Digital Command Control (DCC)

The DCC systems have eliminated a lot of wiring that would have been needed in a DC control system. This goes a long way to eliminate any maintenance.

If using wire ends on the buss wires, crimp and SOLDER the ends. Yes a properly crimped wire end is very reliable but can we guarantee a perfect crimp every time?

Now for the drop wires, they should be soldered to the buss wires. Using the Insulation Displacement Connectors (IDC – suitcase (3M) connectors) do work but then again in the high humidity environment of a basement they will begin to give problems in a few years.

With the DCC control system there are some set CVs (Configuration Variables) that are used to lock the command station into certain modes. Having these CV's posted near each of the DCC modules with the proper CV values makes reprogramming the unit faster as you do not have to spend time looking for the book each time for the values.

We have these sheets laminated and permanently affixed to the units. This also goes for the programmable Reversing units, Signal Controller boards and the Switch controllers if you have them.

If you are using Radio system, mount the radio receiver as high in the room as possible. Also try and get it as close to the center of the layout room. This will minimize the distance the signal needs to travel. Remember that this signal is easily lost with bodies standing between the transmitter and the receiver. If the layout room has a lot of full height backdrops you may have to add additional radio receivers in the far corners of the room to eliminate radio dead spots. Just because the manufacturers' literature says it will cover a 300 sq. ft area doesn't mean it will work in your situation *(2007 update – Several Mfg. are recommending the radio coverage of 15 ft radius be used. Changes to the layout radio placement have begun – testing continues).*

Use a computer fan to blow cool air on the Command Station cooling fins. If your transformer is not sized properly (voltage & amp rating) the command station will have to dissipate the excess voltage in the form of heat and will cause it to overheat much sooner. During a big operating session with a lot of equipment running (sound equipped locomotives and lighted cars) it will be required to put out more power, which will again increase the heat produced. *(2007 update – Two additional boosters have been added to the layout due to the number of sound engines being used – be sure to use fans on these extra units too!)*

(2007 update - The layout has also had two PM42 Power Managers added to break up the booster sections into four additional blocks each. There continues to be too many sound engines congregating in one place and the booster/power managers continue to trip out unnecessarily. – Plans are being formed to be able to shut off certain tracks in the yard/engine house area to keep idle engines from loading the system upon the current inrush when resetting from a turnout being run and the system trying to reset.)

Use the Loconet tester and check the Plug Panels around the layout periodically. Do this just to be sure that the wiring of these panels has not failed. Having a problem with the plug panels during an operating session sure takes the fun out of the day. Don't forget to check the Radio and IR panels too!

Ease of operation (lack of things to carry – car cards)

We use the modified pin system of car movement. This eliminates having to carry around a handful of cards a radio and your Keypad. One of these items will eventually fall to the floor as trying to juggle all of these items and uncouple the cars at the same time. Using the pin system keeps the car movement info on the car where it should be.

Yes we still have to try and hold the radio and the keypad and uncouple the cars but at least we have taken away one thing to carry.

Wax the track

Last but not least is cleaning the track. Put out of your mind all of the old ways, using an abrasive block, cleaning fluids or cleaning cars. Just use metal polish and the track cleaning thing is done, Period!

To apply the wax I use pieces of old HO cork roadbed and put the wax on the cork and then just rub it on the rails. I usually do a 6 to 8 ft long section. Then using a clean piece of cork go over the waxed section. This is to remove the wax film (similar to auto paint wax) and that is it.

When doing scenery, etc. I usually vacuum the area and just wipe the rails down with a clean rag.

(2007 Update – The layout continues to run well and the track has yet to require any additional cleaning – other than the above wiping the rails of any dust or plaster/glue during scenery work – The initial cleaning of the layout was done in July 2003. – The only time any track gets waxed/polished with metal polish is when a new section of rail is initially installed – That is it

(2008 Update – The layout has had it's first cleaning since July of 2003. I was finding large areas of Black Goop on the rails which was away from any areas having any Scenery work being done. I decided to just do a re wax of the whole layout but this did not work out as I ended up with 4 hours in it and still had large areas of staging to do yet.

The largest Staging areas got the re wax done to them first and the mainlines, passing sidings as well as all of the industrial spurs as I moved around the main line. As of this time I really have not seen any major degradation of operations nor have I seen any major improvement. The engine wheels still get dirty as they did before the latest re wax job.

I am replacing the plastic wheels with metal on the rolling stock is on going and any NEW cars get metal wheels before ever being set on the layout!)

- Track cleaning -

I have been model railroading for over 30 years and have built or helped build at least 20 layouts for the Club, friends and my own and the biggest problem with any of them has been maintaining them.

This was and still is a major concern for me on my latest layout. I have made every effort to have a Zero Maintenance layout. The room is dry; all of the time, well lighted and has carpet on the floor to control dust. The benchwork is sturdy and the wiring was done with #12 stranded house wire for long life and low resistance. All sections of the track and turnouts have drop wires connected to the buss wires. Track is code 100 nickel rail to again keep the resistance to a minimum and make the trackwork as sturdy as possible.

Scenery is the tried and true plaster on metal screen wire so it will last a lifetime. All of the rolling stock (500+ cars) have been weighted, had the wheels checked for gauge and metal Kadee couplers installed on them. They also undergo periodic rechecking of coupler heights and wheel gauge. A Bad Order report is generated every time a car has a problem on the layout. If it derails for any reason other than a turnout thrown against it then the car has a report made out and it is looked into. The engines are all converted to quality motors if needed and quite a number have been hard wired to the trucks to eliminate any possible intermittent electrical pickup problems.

The decoders have been updated to include the latest advances in DCC technology, which includes Back EMF, switching speeds and slow speed motor control. This has made slow operations and switching a reality.

But the biggest problem still with us after all of these years and innovations is still dirty track!

What can be done to eliminate this problem?

It has been around, well since the beginning of time and I personally don't think it will ever really be eliminated just like the common cold!

I think I have tried just about every type of cleaning car there is - Track drags, liquid cleaner cars and even vacuums and nothing really eliminates it. The Black Crud is still there!

Replacing the plastic wheels with metal has helped quite a bit. And not having replaced all of the wheels yet I can not say for sure that it will not eliminate it all together, but from what is stated on the Net-forums it does not.

Cleaning the engine wheels is a ritual that just about everyone performs every time they want to run a layout. I have used Wal hair clipper oil on the rails and it has went a long way in keeping the engines running smoothly but the Black Crud build up on the car wheels was unbelievable. I could scrape it off the wheels in strings. So this was stopped.

Next was using different types of liquids, regular track cleaner products, alcohol, paint thinner, 2-26 contact cleaner, acetone (much to aggressive), rail-zip and Goo-Gone. They all worked but the engines were soon back to the intermittent operation.

Even the trusty Bright-Boy block worked great but the jerky operation was back again!

With over 2700 feet of track and climbing something needed to be done. The track cleaning/engine cleaning was cutting into the operations time!

Then in a model railroad magazine an article about trying metal polish on the rails was suggested. Now this sounded quite different from the conventional ways but I went ahead and purchased a bottle. The bottle had set around the layout room for about 4 months maybe longer before I tried some. We had used some on another layout but I had not really kept track of just where we used it on the layout and it seemed that it had not really helped.

But on a whim I decided to try some on one section of the layout that did not get run every time during operations. It was a fairly short section maybe 25 to 30 feet of track and I applied the metal polish on an old piece of cork and just rubbed it along the railheads. It definitely removed the tarnish on the rails as the cork was black! I then used a clean rag and wiped off the rails just as you would wipe off the polish on an automobile paint finish. I then cleaned the engines' wheels that run on this section and ran the trains for the evening. The next time the layout was run was 2 weeks later. The engines were run and never had the wheels cleaned the whole evening. The third time the layout was run (which was in another 2 weeks) the engines just ran smoothly and again no wheel cleaning. After this session I was beginning to be impressed with the metal polish on this section and decided to try another section of the layout that saw even less operations on any given night. It was a little longer in length (40 to 50 feet) and the same procedure was again used using the cork and rag. I then began running this section. The engine I was using was known for being able to find any dirt on the tracks. But this night it ran smoothly all over the area that I had polished. I had quite a bit of switching to do and then had to run the train down to the interchange. When the engine reached the interchange with the CR mainline it started to run jerky and I thought that I would have to clean the wheels. I figured that I would do this as soon as I had it back at the tipple and put away. But as I started back up the hill on the branchline the engine smoothed out and remained running smooth the rest of the time I ran it on the branchline. I never did clean the wheels. Now the CR mainline had not been polished and this is where the engine would not run smooth.

As the Mini Ops Saturday was fast approaching a decision to polish all of the track on the layout was made the Thursday before the session. That night the regular operators were helping out and I put them to work in polishing all of the track. It took about 2 hours with about 6 people but it was done all except the 4 track reverse loops staging. The Saturday Ops session went well and the layout seemed to run and there did not seem to be many cleaning their engine wheels other than the operators that brought their own equipment. Then they only cleaned their wheels once during the session, which was 7 hours long.

On Thanksgiving Day all of the little kids wanted to see the trains run. So Bryan, Aric and I went down and proceeded to get three trains running and handed the kids the controllers. The

kids kept the speed down to a reasonable level and the engines had not been run for a week or more. Everything moved around the layout smoothly, no stalling or jerky operation. It is now late December and the layout has still not been cleaned!

Have we found a cure for the common dirty track?

Bob H