The MOC Builder Issue

Issue 2 - Winter 2008

RAILBRICKS™

BRICK RAILROADING MAGAZINE

BRIAN DARROW'S LAYOUT OF PEAK INTEREST

INSIDE:

The BrickMiner Shows Us How the West Was Won

The Tale of the Catfish

Pierre Normandin's SW1200 Instructions

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CONTENTS Issue 2 - Winter 2008

RAILBRICKS

BRICK RAILROADING MAGAZINE

All Aboard!

Well, here we are, the second issue finished, even if it's a bit later than we'd planned. We hope we made up for that delay by packing a bit more into this issue. Hopefully the wait was worth it. As you can see, I've had my hands full lately. I must say that I truly have a great team, even when I got busy with life, they pushed forward. I want to personally thank Didier Enjary, Benn Coifman, and Jordan Schwarz.

We also realize that the challenge email was not working, so if you got discouraged by your contest entries not getting to their recipient, rest assured that we have fixed the problem. Benn has put together another great Reverse Engineering Challenge, so take a look and get those entries submitted.

As we begin a new era of LEGO trains and say goodbye to the 9V system, we here at RAILBRICKS will strive to keep the LEGO train community active. I feel that, even though the new system may not be what we wanted, it will provide us with many opportunities to further blur the boundaries between LEGO and traditional scale railroad modeling. As always, this is a community built around sharing ideas, so if you have an idea for an article, submit it to submissions@railbricks.com.

Play Well!

-Jeramy Spurgeon

Printed issues of RAILBRICKS will be available at http://www.lulu.com.

Instructions and Tips & Tricks articles within RAILBRICKS fall into one of three categories:

B Beginner I Intermediate A Advanced

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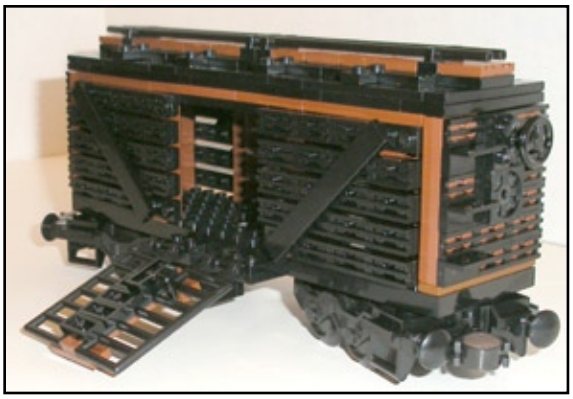
Mark Assi shares with RAILBRICKS the inspiration behind his custom sets.

To purchase these and other sets, visit http://www.bricklink.com/store.asp?p=Opie

Gondola - Santa Fe
100+ pcs. - $35.00USD

Grain Hopper - Santa Fe
200+ pcs. - $75.00USD

Refrigerator Box Car - Santa Fe
400+ pcs. - $70.00USD



Cattle Car
400+ pcs. - $60.00USD

I started building LEGO trains by building the refrigerator car from the instructions in Jacob McKee's "Getting Started With LEGO Trains" book. This is still the basic design for the current refrigerator cars I build, but I changed the side details to better accommodate my stickers.

I have always favored box cars, so I adapted the refrigerator car design to build my custom freight cars. This freight car was intended to be a less costly design that also looked a little more contemporary, while the refrigerator car was meant to have a more classic look. This allowed me to go to a much cheaper sliding door, which is also more readily available. I would prefer to use a black door, but due to cost and availability, the gray door is a compromise.

Next, I started looking at what to build, and I saw that people seemed to like gondolas, so I first created a MOC gondola on a 6 x 28 train base. I didn't find this design to be very popular, and the gondola always seemed a bit too large to me, so I took the design and adapted it to the shorter 6 x 24 train base. This design lowered the cost and seemed to be a hit. I have to admit, I was a bit surprised, but happy. This design is not really based on any Santa Fe designs, but I tried to give it some real detail on the ends, which I felt was not very well done on other MOC gondolas I have seen. I also chose to use reddish-brown LEGO parts, because I always imagine gondolas to be rusty and well used. The reddish-brown brick selection allows you to capture that rustic look, but still look good.

My latest MOC was inspired simply by the fact that it seemed that the rest of the world, unlike me, is crazy for grain hoppers. I still prefer box cars, but I started looking around for a Santa Fe grain hopper design, and found exactly what I hoped for. I don't think reality could have provided a better design for me to recreate as a LEGO MOC. It was also very fortunate that LEGO came out with its large space shuttle set a while back, and that they went on clearance at all the Targets about a year and a half ago. This created a massive surplus of the required parts at super good prices! I couldn't believe my fortune. So I ordered the parts I thought I would need and wanted to try using, and after getting my first couple of BrickLink orders, sat down to build. With a picture of the real grain hopper in hand, and a pile of parts in front of me, the design came together in about 2 to 3 hours; it felt like it almost put itself together. This has been the design that I think really started to get my trains noticed out there, so needless to say, I'm really pleased with it.

PfTRAINS

by Steve Barile

There has been much discussion about LEGO's train system transition from 9v AC to 9v Battery (9vBatt) and now on to 9v Power Functions (9vPf). This article will try to clarify the details of this transition and describe exactly what the new 9vPf train system is.

First, what is LEGO's Pf system? It is a new (electro - mechanical) system designed to span all LEGO themes; space, train, town, technic, creator, etc… This is a fantastic business decision because it amortizes the cost of R&D across multiple themes' budgets. It also lessons the likelihood of element cancellation. The current Pf system is made up of a 9v battery box (6 AA), IR receiver with two outputs and 4 selectable channels, 2 motors (large and medium), polarity switch, extension wire, (that is old 9v system compatible) and a "bang-bang" (full-on forward or full-on reverse) remote control with two outputs and 4 selectable channels. There are also some kinetic and passive elements: a linear actuator, string wench, stand along self powered light and sound elements. This list of elements is planned to expand in the future. Great news is that the costs of the Pf elements are generally lower then the old 9v system; check http://www.lego.com for pricing.

What is the LEGO 9vPf Train system? In a sentence, a battery box, an IR receiver and a train motor all running on plastic rails and a IR transmitter to control the train(s). Now the details; in order to make the "generic" cross theme 9vPf system compatible with LEGO trains, there are a few train specific elements needed: a train motor, a speed/direction IR controller, and train track.

The train motor (and cross axle plastic wheels) will come from the now discontinued 9vBatt system and there may be some small functional enhancements for the wired connection in the future**. Just to be clear, the unwieldy IR receiver/battery box all-in-one train base plate will NOT be used any longer. There have been some discussions about the viability of the 9vBatt train motor. AFOLs have tested the pulling power of the 9vAC motors vs. the 9vBatt motors and determined that the electrical motors are similar in mechanical pulling power. There is however an issue with the traction pulling power which is due to incorrect gripping "O" rings on the wheels that were installed on the first 10,000 9vBatt train sets. LEGO attempted to correct this, but unfortunately they miss it a second time. The new wheels are available via LEGO Customer Service, but snipping off the "O" rings and replacing them with white LEGO rubber bands makes an amazing difference.

The current "bang-bang" IR controller will not work for trains, so obviously LEGO will have to release an IR controller with stepped power settings and a "set & go" mode (as opposed to the existing continuous line of sight IR stream)**. However, for now, Bob Kojima has recently posted how to turn our old RCX into a Pf IR controller that exercises all the Pf commands including the "set & go" PWM stepped power settings! (see http://www.lugnet.com/trains for details). The NXT can also control Pf trains with stepped power settings and a "set & go" mode. (see the IR add-on for the NXT from http://www.hitechnic.com/).

Lastly is the train track. Like the train motor, the Pf train system will be adopting the existing plastic "L-gauge" track from the 9vBatt system. Since the gauge remains the same, Pf system trains can run on any of the past track systems including 4.5v, 12v, & 9v AC. Heck, trains can even run on two "L-gauge" grooves cut into the top of a train module! Remember that one of the benefits that LEGO mentioned is that with no metal components to the track it would be easier (less development cost) to make new track elements.

We have already seen this with the double slip switch track (aka points). The opportunity for new track geometry is ripe**.

In addition to the three main train system components mentioned above, here are some updates on the rest of the train system migration. Wheels-sets - The new wheel-sets that shipped with the 9vBatt sets will continue to be used. These are gauge compatible and functionally the same as the 9v AC wheel-sets but require assembly. The only difference is that the needle bearing is now plastic, not metal. The good news is that they roll great and no longer have the flaw that the more recent 9v AC wheels had with rubbing! Battery box - The battery box that ships with the current Pf can accept rechargeable "AA" batteries but obviously is not optimal. LEGO is looking into a rechargeable battery box with features that are train theme friendly.** And a couple final tidbits… both 9vPf and 9vBatt trains can be used together to increase the number of simultaneous controllable trains on a single layout. 9vAC motors are 100% usable in the 9vPf train system when using plastic track. Since the 9vPf medium motor can pull ~5 AFOL (aka heavy) coaches when directly coupled to a geared train wheel assembly, I wonder what the large motor is capable of !?

In summary, did any of us 9v'ers want this? I can safely say, "NO WAY!" I spent a good year of my life in 2005 trying to "Save 9v" with several other AFOLs. We prepared briefings, spoke to various groups inside of LEGO. Heck ,I even flew to Hong Kong (NOT on LEGO's dime) to try to get cost reduced metal rail track produced. Unfortunately the fruits of our efforts did not produce. But what I can say is that LEGO will make the best decision they are capable of making to remain a profitable company, and at the same time strongly consider the AFOLs needs by at least listening and working with us. It is what it is… each AFOL will make the best of it in which ever way is right for them. I hope that you all continue to enjoy LEGO railroading as I plan too.

Be sure to read in the next RB issue: Automating 9vPf trains: 9vAC/RCX/NXT integration innovations!

Play well!

** I cannot say more at this point on this topic. But suffice to say that the train AFOLs that have been working on this matter have very clearly articulated ALL the concerns that have been enumerated on LUGNET and in other forums. Best I can tell the decisions LEGO makes are based on resources and costs (monetary or other, i.e. customer satisfaction) vs. potential sales, as any prudent company would do.

review by Jordan Schwarz

THE LOAD N' HAUL RAILROAD 4563

Growing up in the United States during the 1980s, I marveled at the 12V train sets pictured in my LEGO catalogs. That was all I could do, since purchasing a train in the U.S. typically involved tearing out the order form in the catalog and mailing it to LEGO Shop at Home in Enfield, Connecticut. Mail-order goods were still a fairly new concept then, and my parents weren't very excited by the idea of me sending off for an expensive train set. Instead, I spent my childhood building LEGO towns and space stations, while my train set was of the common 'HO' variety.

To my delight, the 1992 catalog introduced the 9V system in earnest and offered the ideal union of LEGO bricks with electric trains that picked up power from the rails just like my 'HO' trains. Moreover, these new trains were available from local retailers. That winter, I had no problem deciding what to request at Christmas: the Load N' Haul Railroad.[1]

Also available was the fabled 4558 Metroliner[2] passenger train, which in essence was the flagship model for the first generation of 9V trains. However, this set carried a hefty price tag ($150 USD) and required the speed regulator as a separate purchase. At $120 USD for the complete set, the Load N' Haul Railroad was the most affordable entry into the world of 9V trains. This price was achieved by keeping the rolling stock for the set small and fairly simple. All cars in the set had 2 axles, in the style of older European stock. The locomotive, reminiscent of a German diesel shunter, could be adapted to use a functional headlight even though this element was omitted, presumably to keep the cost of the set low. The locomotive's paint scheme was also reminiscent of that worn by Austrian and German units. The new generation of 9V train sets also introduced the logo used by all subsequent LEGO trains and marked the retirement of the logos of Deutsche Bahn and other national railroads.

Perhaps it is a reflection of their relative popularity that the Metroliner was re-released[3] as a LEGO Legend and the Load N' Haul Railroad was not. Even so, the Load N' Haul Railroad encompassed superb playability, with two containers and three different styles of cars. There were also several sets that made excellent pairings with the Load N' Haul railroad: the 4536 Blue Hopper Car and the 4543 Railroad Tractor Flatbed, as well as the

4537 Twin Tank Transport, 4544 Car Transport Wagon, and the 4549 Road and Rail Hauler, released slightly later. When combined, these additional sets compensated for the relative simplicity of the Load N' Haul Railroad's rolling stock and made it possible to build a diverse and complete freight train. Most freight containers of this era used the same 4-by-8 footprint, making it possible to carry containers from other sets on the Load N' Haul Railroad and vice-versa.

The Load N' Haul railroad itself consisted of a locomotive, a boxcar, a blue gondola car, and a flatcar. The latter two cars were each capable of accepting a standard 4x8 container or pallet. The set also included two loads - a pallet of barrels and a container holding a mini-tractor, plus a rather futuristic-looking forklift to handle such loads. The set included only three mini-figures, again a testament to the selective inclusion of parts to keep costs in check.

Even with these modest resources, the Load N' Haul Railroad managed to encompass superb play value and a number of rare parts. Each of the cars had some degree of functionality: engine access panels in the locomotive, sliding doors on the boxcar, folding sides on the gondola, and folding "clips" on the flatcar. Rare parts include the blue hinged panels of the gondola (found in only one other set), the sliding doors of the flatcar (found in two other sets), red 1x2x3 train windows (seen in hardly any sets since the early 1980s), and the red locomotive front and red train doors with white stripe (seen only in the 4551 Crocodile Engine set of the same era). It was not until the introduction of the battery-powered 7898 Cargo Train that the one-piece faceted train front elements again become available, this time in green. The Load N' Haul Railroad included a track oval (two straight and 16 curved tracks) and speed regulator. An extra box of straight tracks to go with the set made an excellent investment.

"The Load N' Haul Railroad managed to encompass superb play value and a number of rare parts."

Several decals were included that could be used to decorate each of the train cars, although the train also looked quite respectable without decals. Most stickers were small and covered only one brick. One exception is the black-and-yellow safety stripes for the front and rear of the locomotive, which cover two plates. The white decals for the locomotive front never stayed on well because of being applied across an angled surface.

The Load N' Haul railroad was the only complete freight train set offered until it was superseded by the similar 4564 Freight Rail Runner set in 1995. It has the smallest diesel locomotive of any LEGO train set except for perhaps the 7755 Diesel Locomotive set from the 12V era. Its $120 USD list price makes it the lowest-priced complete 9V freight train set released by the LEGO Company (although this may no longer be true if prices are adjusted for inflation). It was also the only 9V train set to include a forklift; later sets included trucks of various designs instead. As a unique bonus, the early LEGO train sets (4563, 4564 and 4558) included full instructions for an alternate model.

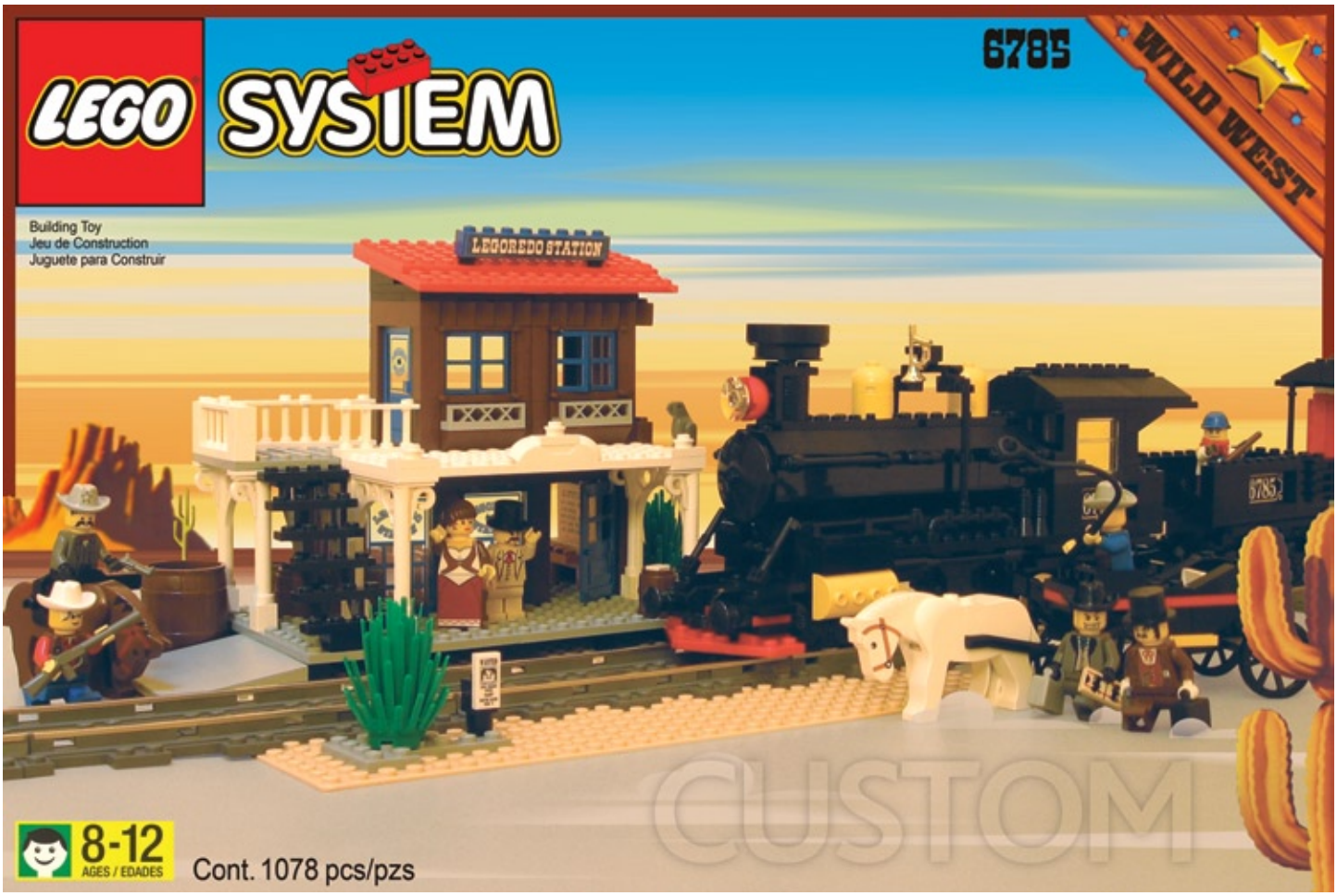
The early 9V train sets were accompanied by a number of splendid sets in other themes. Contemporaries of these sets in other themes included the introduction of Blacktron II in Space, in Town, the Nautica line of boat-themed sets and the Octan-themed gas station sets, the first of several Paradisa sets, and the first Wolfpack sets for Castle. It was also the height of the Pirate era, and in Technic, a number of sets featured sophisticated pneumatic functions.

The Load N' Haul Railroad will be remembered by many as the set which first sparked an interest in 9V trains. Designed for builders on a budget, its modest offerings still provided great enjoyment and were complemented by the availability of several other individual freight car sets.

1. Set 4563 was referred to as the Euro Freight Line outside of the U.S.
2. Set 4558 was referred to as the Euro Express outside of the U.S.
3. The Metroliner re-release (set 10001) was identical to the Metroliner in most respects but substituted decals for certain printed pieces. The box art was grayscale instead of full-color and featured the then-new "Just Imagine" slogan on the back side.

Westward Expansion

On The Legoredo Express With...



Justin Carmien

by Didier Enjary

RailBricks: One thing I'd like to hear about first is the theme, Wild West. Most of the adult fans are into Star Wars, Robotics or City/Trains. Pirates and Adventurers, for instance, are less represented among the community. Could you tell us how you discovered and chose the WW theme as a fan and builder?

Justin Carmien: My interest in the WW theme stems from my style of MOCing. Personally, I love feeling like I am a toy designer for LEGO. For me, that is why I love LEGO MOCing and why all of my MOCs are conceptualized and published in the manor of an official LEGO set. All of my MOCs conform to the restraints of a realistically marketable product (piece count, playability, a very traditional SYSTEM style of building, etc).

The official WW line created a rich atmosphere, full of well developed characters and settings/playsets. Each set in the line explored a

common theme of a traditional Hollywood Western. However, the LEGO Western line feels incomplete. This is where my MOCing style really shines. I love fleshing out the ideas that LEGO missed, and creating those sets to blend seamlessly with the official releases. This really satisfies me creatively, and personally gives a sense of purpose to my MOCing.

RB: As RailBricks is a train related magazine, we focus on train related content - that seems a far stretch from the WW as a theme.

JC: In looking at the official LEGO Western collection there are obvious holes to fill. A Western themed train is one of the most promising components missing from LEGO's line up. A Western themed locomotive also happens to be one of the most exciting pieces of the puzzle. It's actually a prefect environment for exploring train building.

One of my secondary objectives in MOCing in the WW theme is to "fill out" the urban landscape of the western town of LEGOREDO. Officially, we are given a bank, general store, and Marshall's office. In expanding the gold mining town, what I am doing is actually not far from what a LEGO city or LEGO train fan is doing – just in a different time period. Almost every structure within the theme has a component in the other - residential buildings, a commercial district (downtown), industry and transportation.

RB: What is it about trains that appeals to you, both in real trains and LEGO trains?

JC: Well, I like to think of myself as

"what I am doing is actually not far from what a LEGO city or LEGO train fan is doing – just in a different time period. All the same elements exist within the two themes. Almost every structure within the theme has a component in the other."

an “emotional builder.” That is to say, I like exploring the emotion that something gives you, rather than the reality of it. Trains evoke a feeling of power and speed. Those are immense emotions, and fun to capture in LEGO. Rendering emotion out of LEGO has a lot to do with the conceptualization of the MOC, which is another reason I’m so fond of this style of building.

RB: Do you have any background with real trains?

JC: Before this MOC, I actually had little experience with either real trains or LEGO trains. This MOC was quite different for me, as it was one of the few in which I felt direct reference was essential, because of that lack of knowledge in train aesthetics and function. Researching period trains was one of the largest endeavors in designing this MOC. And now, while I’m no expert, I definitely feel more comfortable in the area of trains. This process is another very rewarding aspect I have found to the hobby – LEGO MOCing acts as a vehicle for driving inspiration and feeds a desire for knowledge in the world we live in, past and present.

RB: What did you discover by building trains out of LEGO?

JC: I discovered how cool it is when your LEGO bricks move on their own, free from your own hands. Having a train in your LEGO display breaths life into the scenes; it really is something magical.

RB: Do you have any comments about the end of the 9V, and about the future with Power Function System trains?

JC: Personally, I really don’t have a preference to any LEGO train system over another.

However, one thing I'm not fond of is a building environment with two or more systems that are incompatible with one another. There is a lot to be said for commitment, and LEGO needs to prove they are committed to compatibility and consistency. Personally, I'm very weary of investing dollars into new products that may be short-lived, such as the now defunct RC trains. I was disappointed to hear that LEGO dropped both 9V and RC in one fell swoop. Again, not that I care for one over the other, but decisions like this speak very loudly about TLG's commitment to compatibility. I recognize the fact that each new train system is backwards compatible with the previous. However, I think the LEGO product really only shines when each element in the system is completely compatible with one another, forward and backward – like the LEGO stud, it's a constant.

"It's more like I'm trying to 'convince' the idea of the set to the viewer. So that someone could say, 'Yes, I could see that as an official set' or a head at LEGO could say, 'Yes, I could see that as a marketable product.'"

However, I feel very positive about the future. I was very impressed with the design of both RC trains… I mean wow! Both the passenger and freight were solid looking sets. That, coupled with the spectacular set designs put forth in 2007, I have a lot of anticipation for what the PFS trains will bring, design-wise. Hopefully we'll see a new Metroliner styled set, updated from the town-style to the current, city-style. That would be the best.

RB: Your models are not as tricky as, say for instance, James Mathis' models. As you explained, you have a traditional SYSTEM style of building. However, what makes your creations appealing is the presentation. Could you enlighten us on this?

JC: As well as building in emotion, I'm also very cartoony/animated in my work (which is an excellent platform for emotion). This is why you see my MOCs published in the vibrant colors and with the "cartoonesque" digital backgrounds seen in official LEGO SYSTEM box art. This style of MOCing is rooted in my professional career as a comic book illustrator. I'm well acquainted with the Adobe software (Illustrator,

Photoshop, etc.) which has come in handy for the type of MOCing I like to do. Designing decorative decals and box art to look like official LEGO imagery is half of the work for me.

RB: You create fake LEGO art box covers using trademarks, why? Is this a dream for you to be hired as a LEGO designer?

JC: Ha! Well, I don't like to use the word "fake" when referring to my work – maybe we could say it is a "homage." Let me see if I can explain. To me, my MOCs remind me of the preliminary designs that surface all over the internet of recently (or yet to be released) official LEGO products. In looking at these preliminary designs, I imagine the set designers using them to "sell" the set concept to the heads at LEGO (or whoever makes the official call on what is to go into production). I like to think that I am "selling" these in a similar fashion. And I don't mean "sell" in the manner of exchanging money for product. Maybe replace the word "sell" with "convince." It's more like I'm trying to "convince" the idea of the set to the viewer. So that someone could say, "Yes, I could see that as an official set" or a head at LEGO could say, "Yes, I could see that as a marketable product."

As for using the trademarks of LEGO, I think it just helps "convince" the idea. And yes, it would

be my dream to be a product designer for LEGO. Of course I would love for someone at LEGO to see my work, and with help of the presentation, be able to see it as a marketable product.

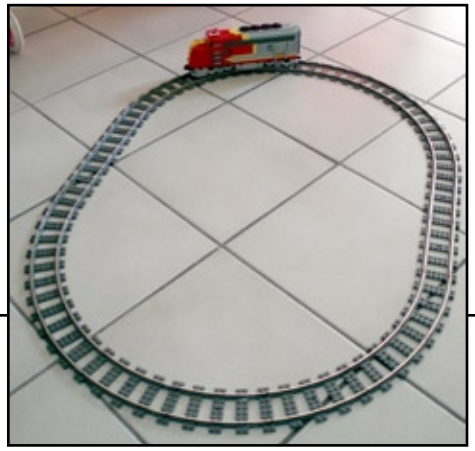
Of course, I could also get the other end of it. A head at LEGO could see my work, and not be too happy with me using the trademarks on my unofficial designs. However, I feel my work is done purely for the good of the hobby, and I have no interest in monetary gain. In fact, I hope we share the same goal - to inspire creativity through custom LEGO model building.

For more information on Justin's creations visit his BrickShelf.com or MOCpages.com galleries. Search screen name, BrickMiner.

TRACK LAYOUTS

From the basic oval loop to the largest exhibition layouts

by Didier Enjary



The basic oval

Here we are - you bought your first LEGO train kit and played a while with the basic track: quite possibly a small loop, a basic oval made of 16 curved tracks, and 4 straight ones (set #7897 for instance).

There's no miracle; such a track layout rapidly becomes boring. The train runs endlessly around this loop and the playability is shortened to forward/backward moves. The maximum speed can't even be experimented with, due to the lack of a long straight line.

So now what? Adding another set to your collection is not necessarily something you can afford immediately. But you've noticed tracks are available separately. The #7896 set for instance is 8 curves and 8 straight tracks. What can we do with this that would add fun to the initial layout?

The track layout featured to the right is 10 straights and 24 curves. It represents a good ratio between distance and surface. It is also a track layout you can setup in a small room and that offers fun by alternating straight runs and curved portions.

Ratio between distance and small area

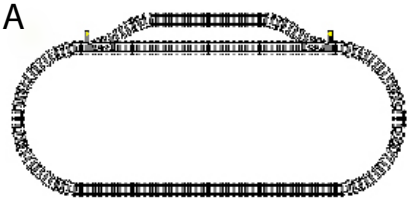
After adding another 7896 set, you will reach 20 straights and 32 curves. Only then will you be able to test your train at full speed, enjoying two 10-track long straight lines, as shown on the right.

However the playability is still pretty weak, and the track layout allowed by your sets of track pieces is still limited to one unique loop.

You have to purchase one 7895 set: two switches (points) and 4 curved tracks. You now have 20 straights, 36 curves and two points (one left and one right switch).

Suddenly, the tracks layout possibilities have increased incredibly. Below are just a few examples of track layouts you can now set up:

A



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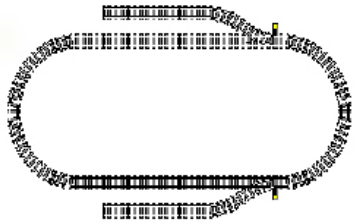

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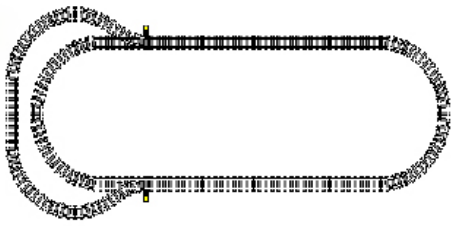
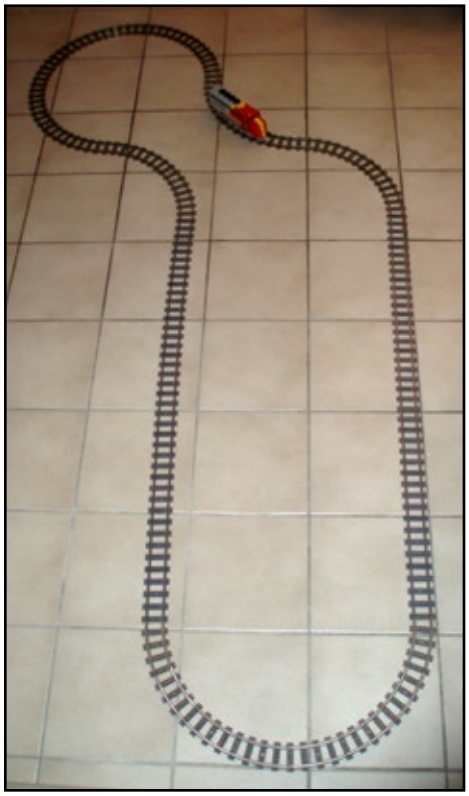
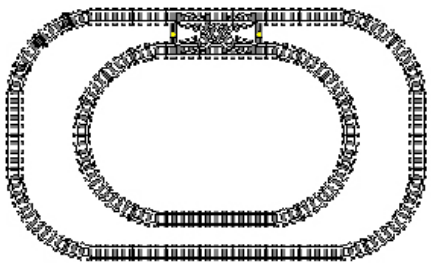


These examples are still one loop only, but the fun comes from the branches, allowing you to park some extra engines or to pick up some passengers at the station while another trains still runs the loop. You will notice that the one straight side branch track layout (**B**) is nearly the same you can set up with the 7898 set, just a bit smaller.



Now, how could we setup a two-loop track layout in order to make two trains run at the same time? There are two solutions: add one 7895 set, (switches) or one 7996 set (dual crossing) and two 7896 sets (straight and curve track) as seen below. If you reach this level, you will certainly no longer be limited by track availability and space. So have a try, for instance, at railyards.

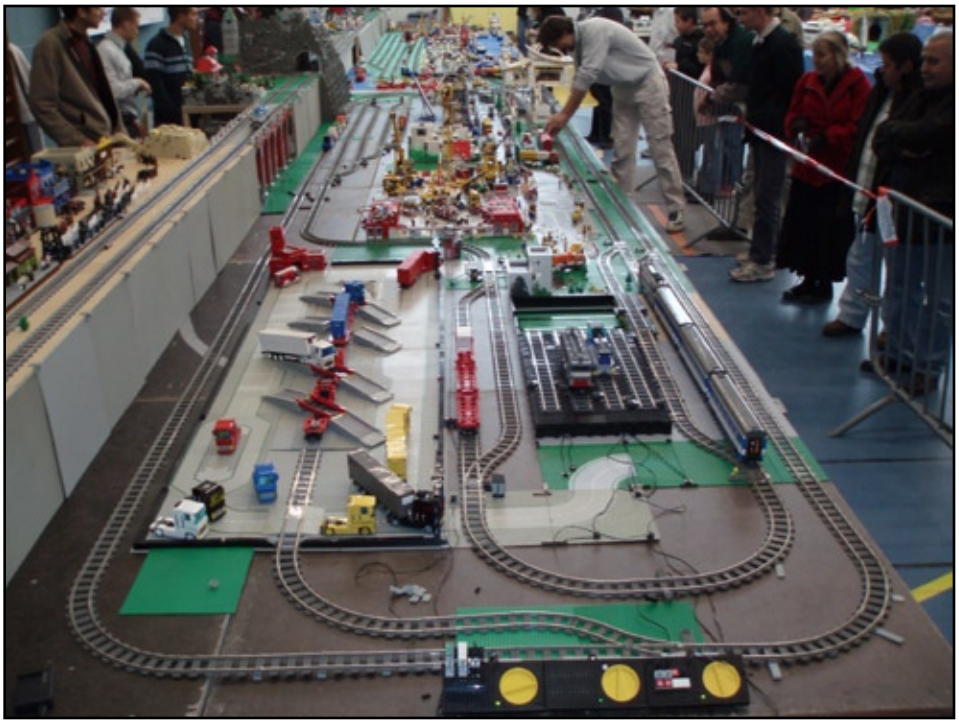


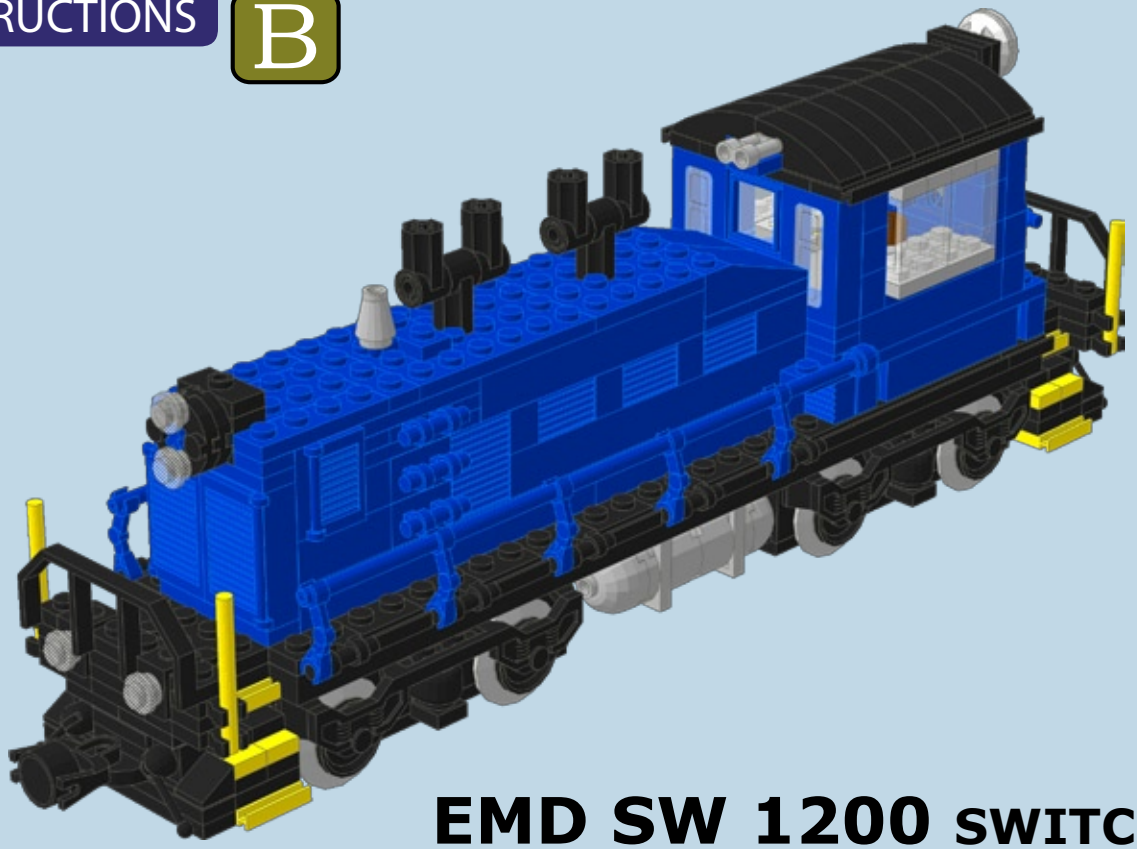
LEGO tracks are not limited to closed loops; you can also choose to make two-way linear runs (funicular, tubes/subways, tramways).

In the same way, LEGO tracks are not limited to one-level layouts; you can also create elevations. Note that this requires large amounts of space to setup smooth a transition between levels.

Do you want more fun but you are out of track? Join a LEGO Train Club. Every year around the world, LEGO train fans combine their skills and present track layouts that cover up to hundred square meters at shows and exhibitions. They use the internet, and software such as *Track Designer* to coordinate their efforts.

Hope to see you join us soon.

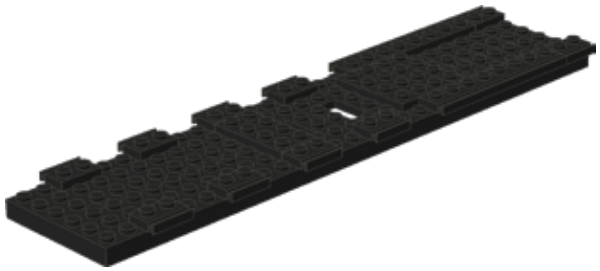




EMD SW 1200 SWITCHER

by Pierre Normandin

photo by Julien Boily



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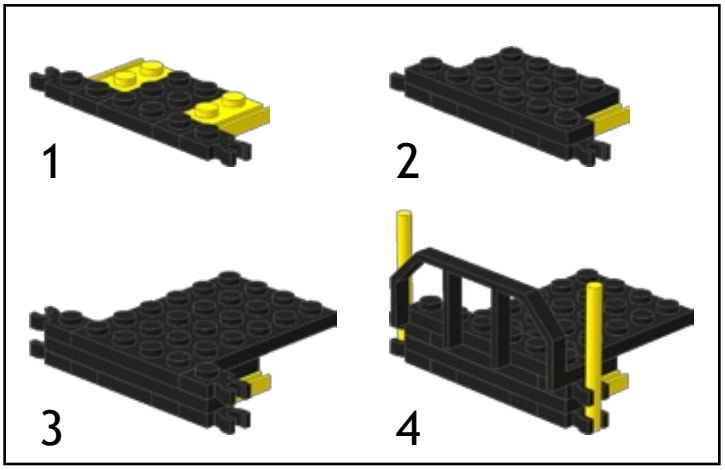

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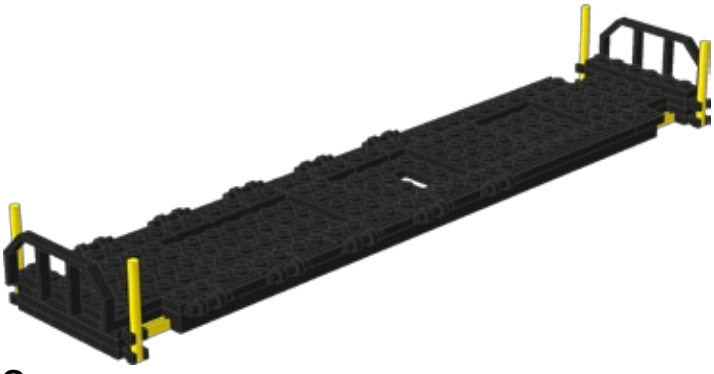

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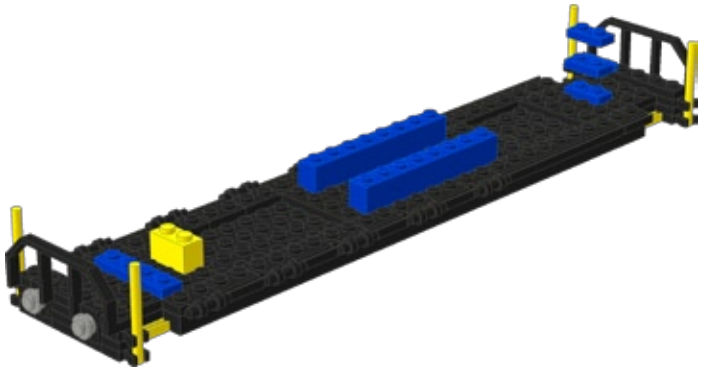

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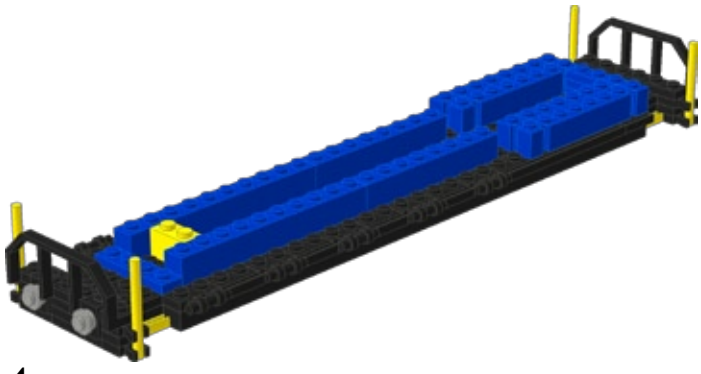

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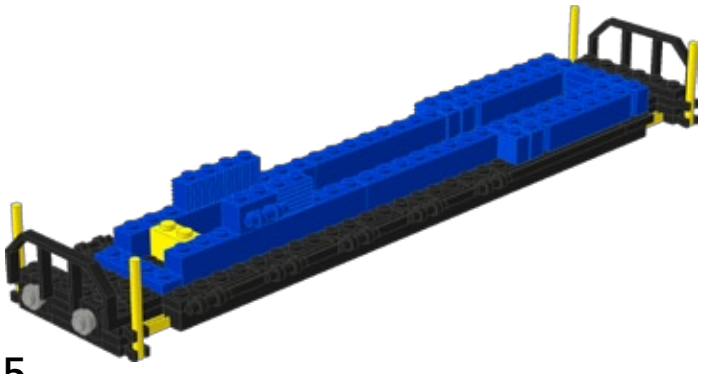

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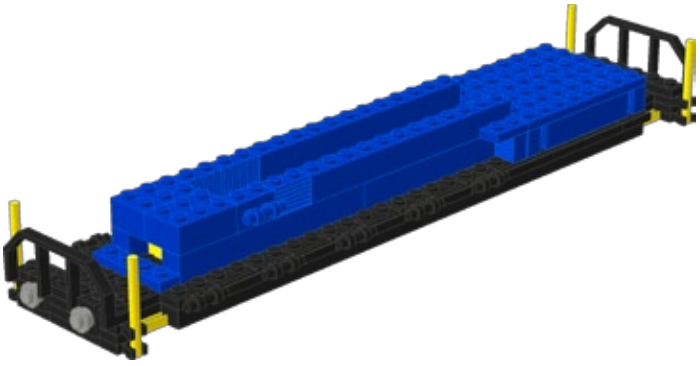

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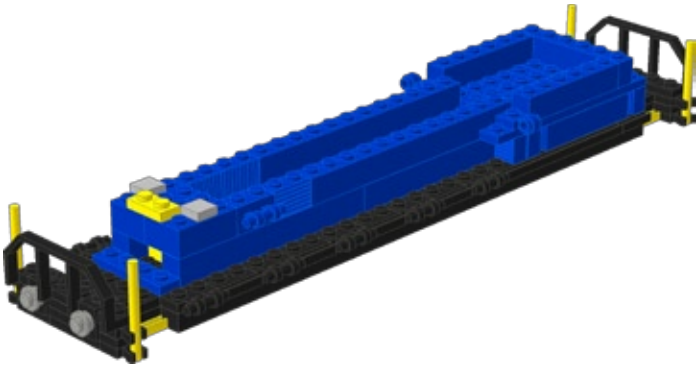

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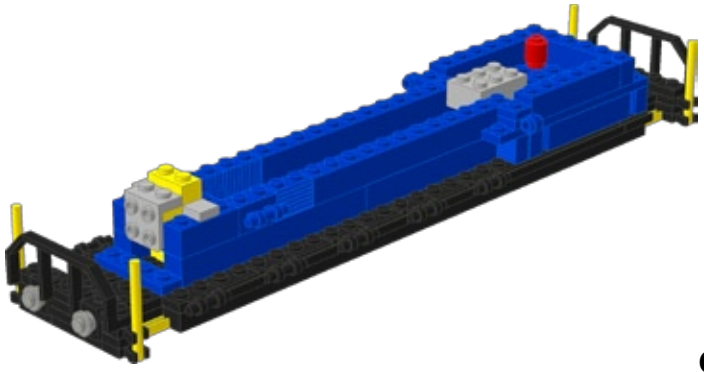

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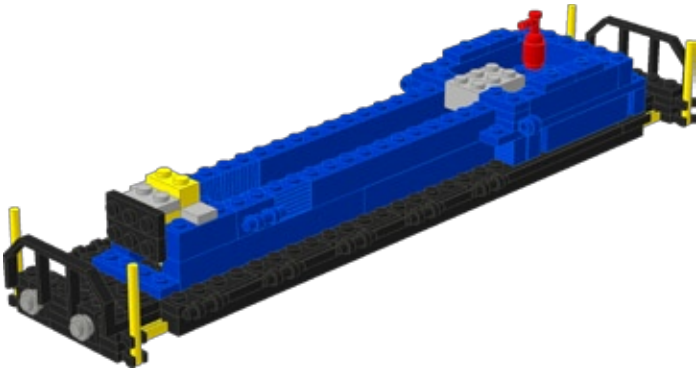

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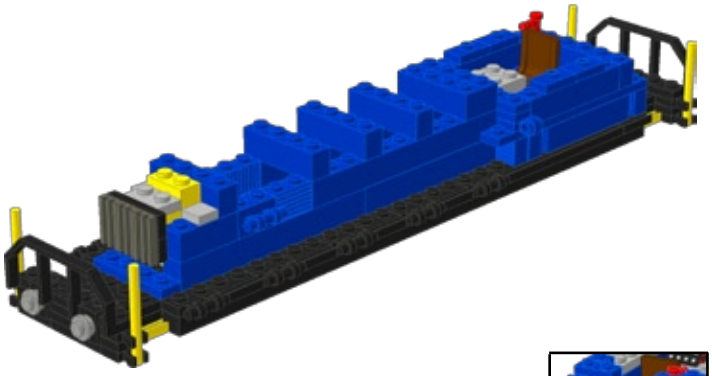

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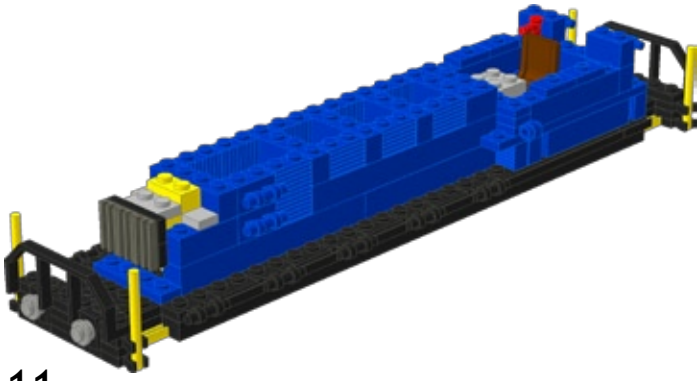

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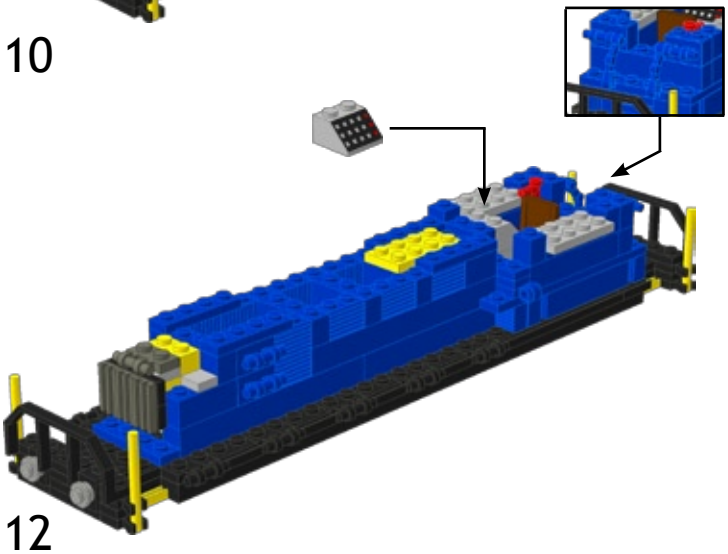

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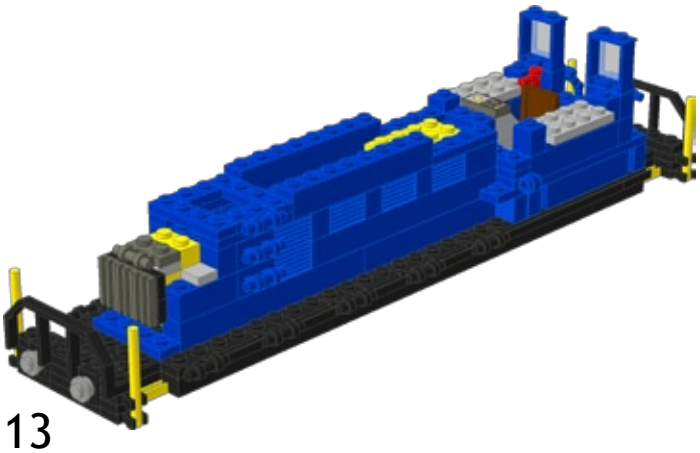

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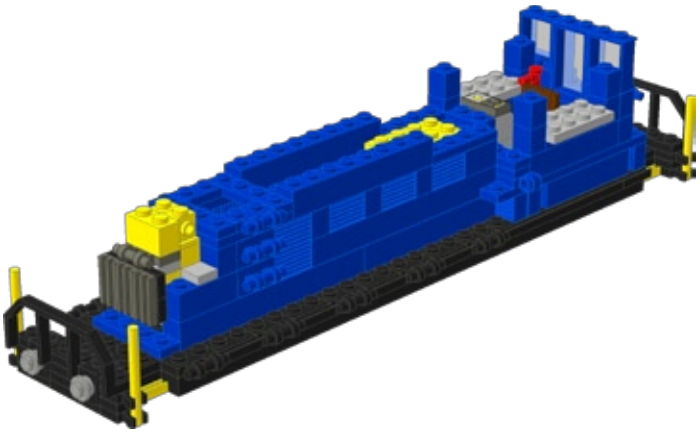

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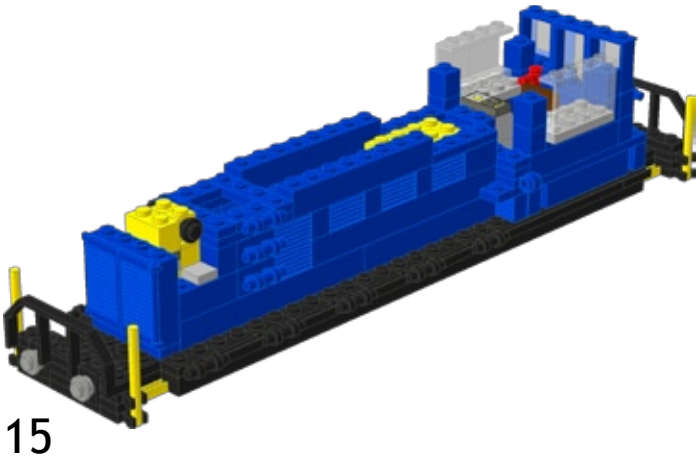

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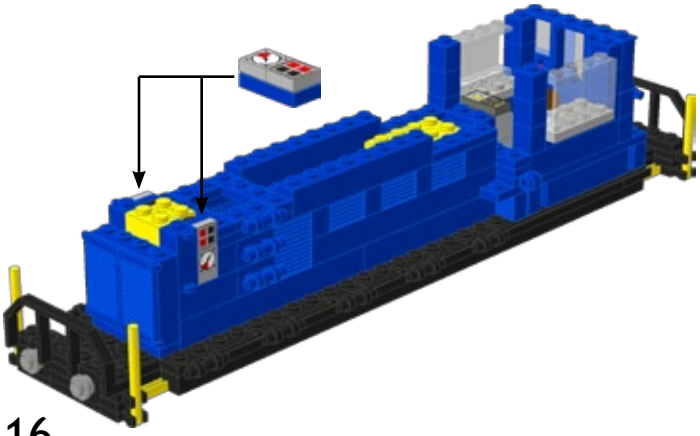

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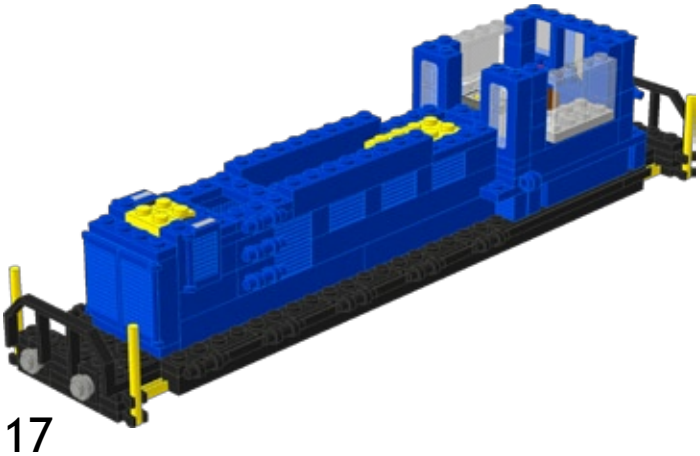

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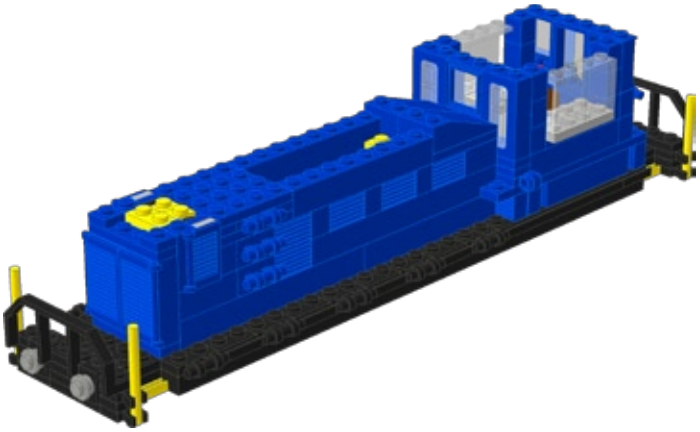

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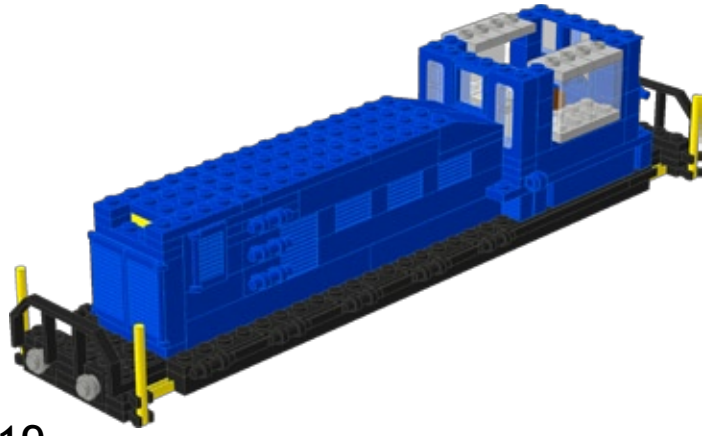

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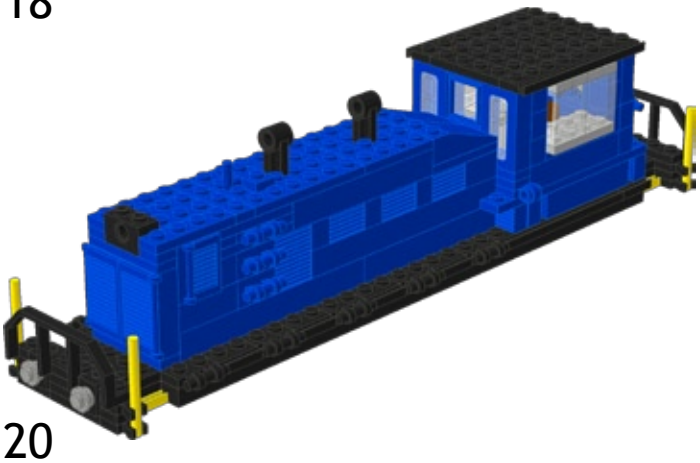

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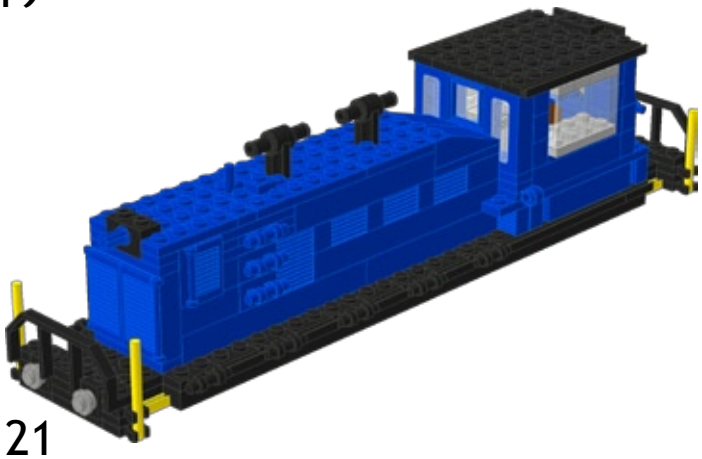

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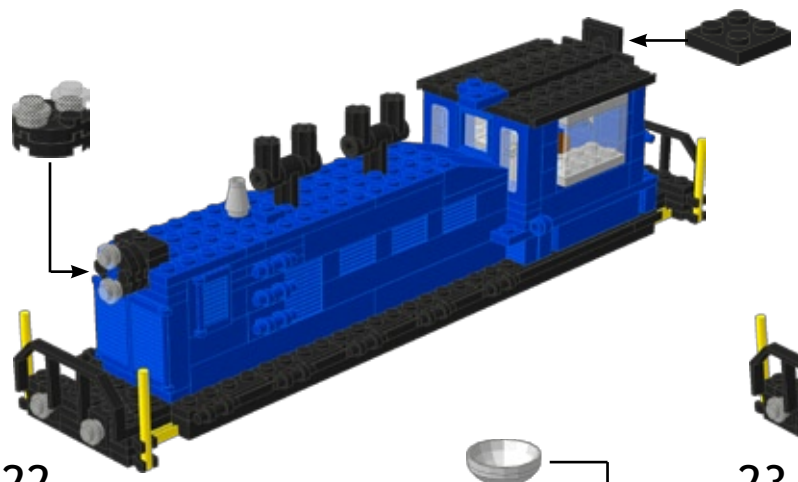

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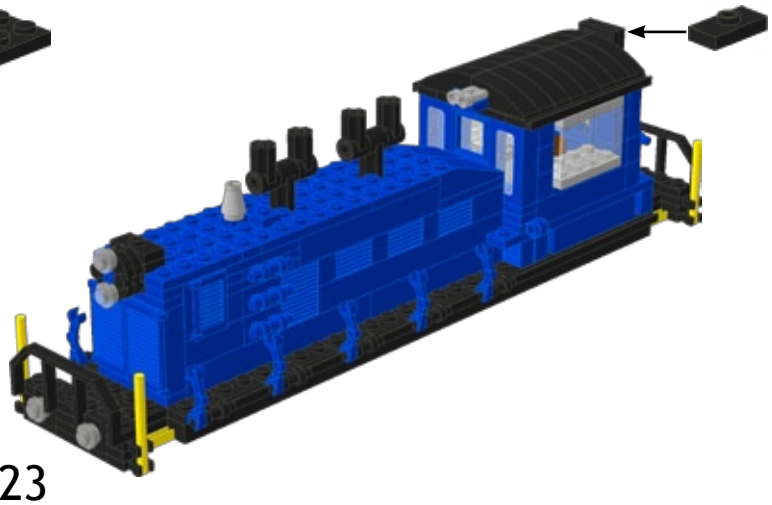

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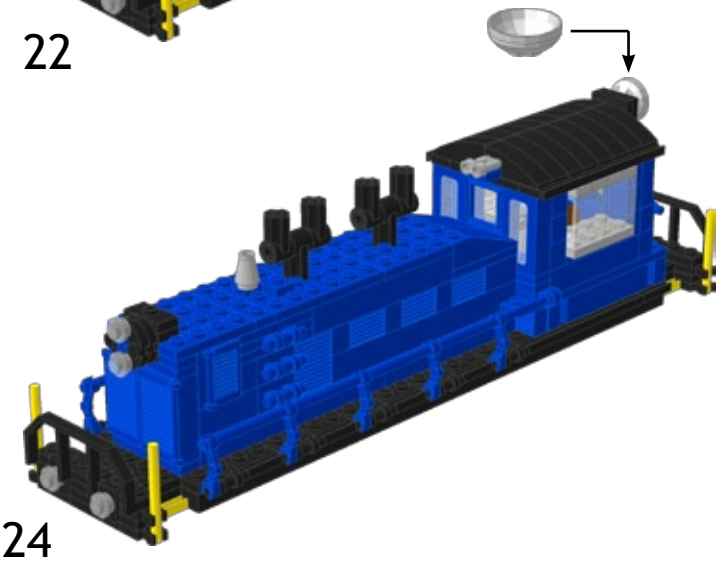

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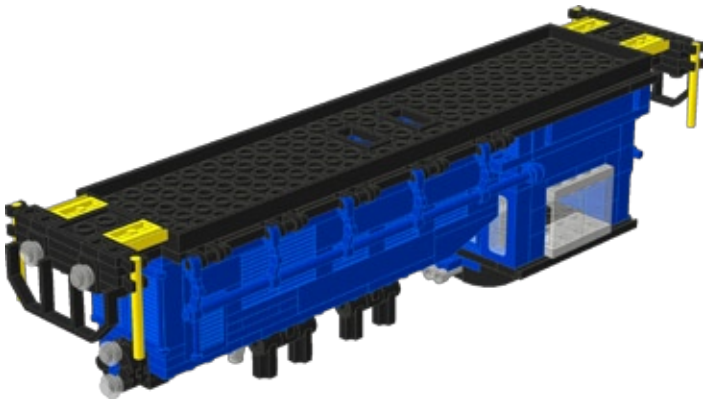

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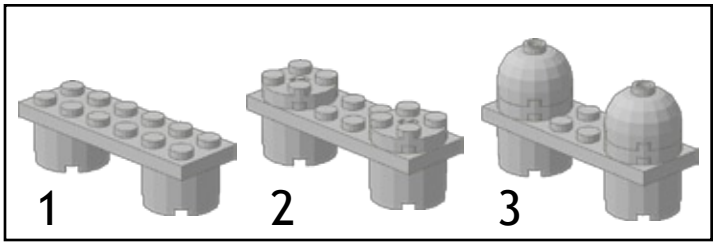

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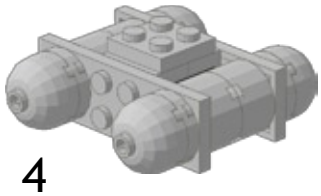

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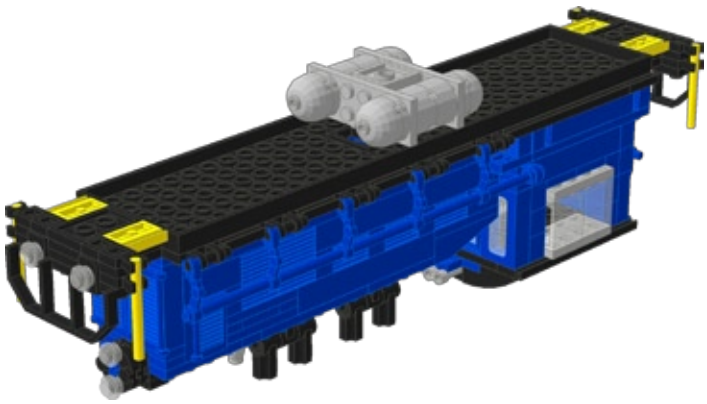

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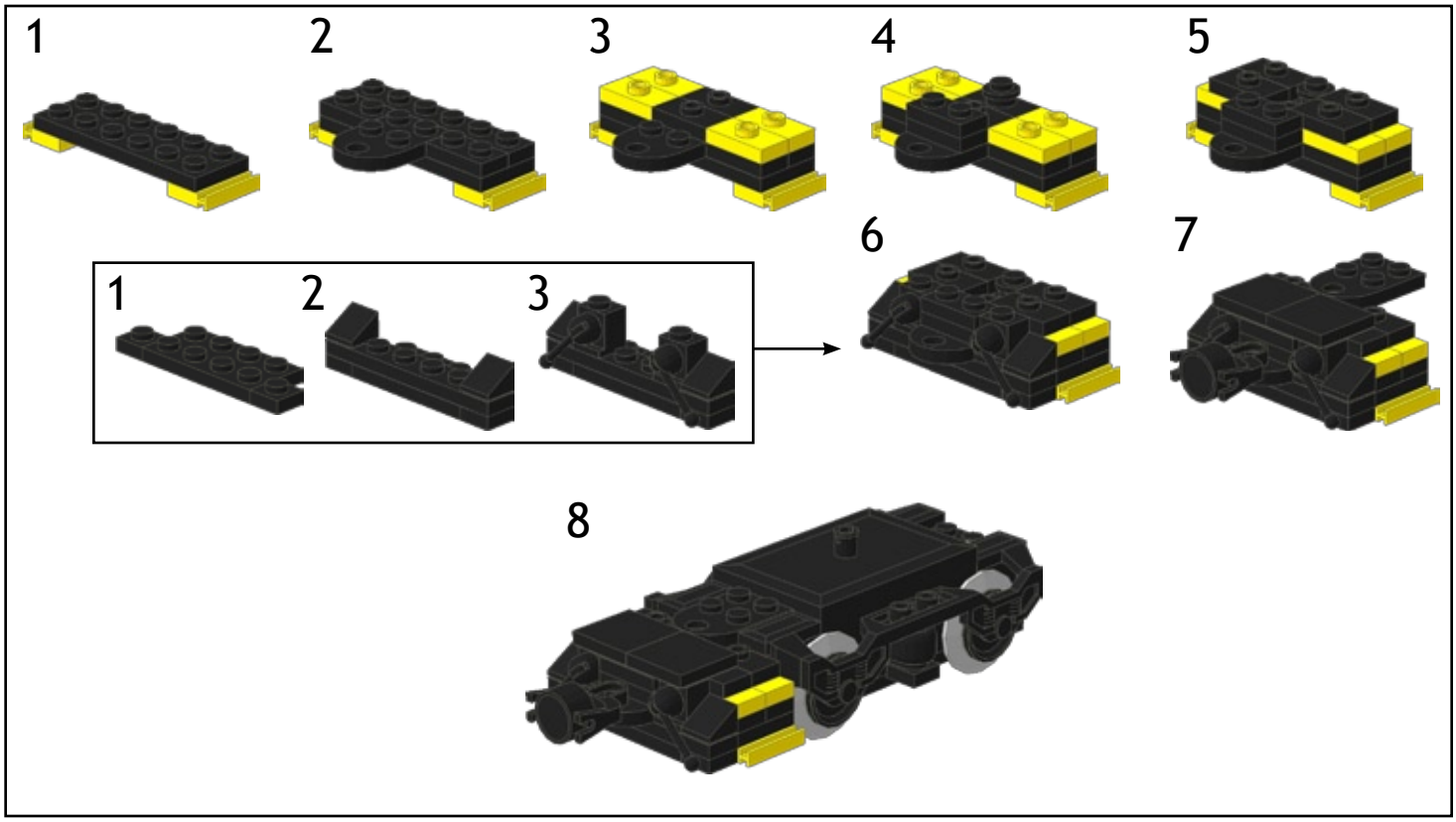

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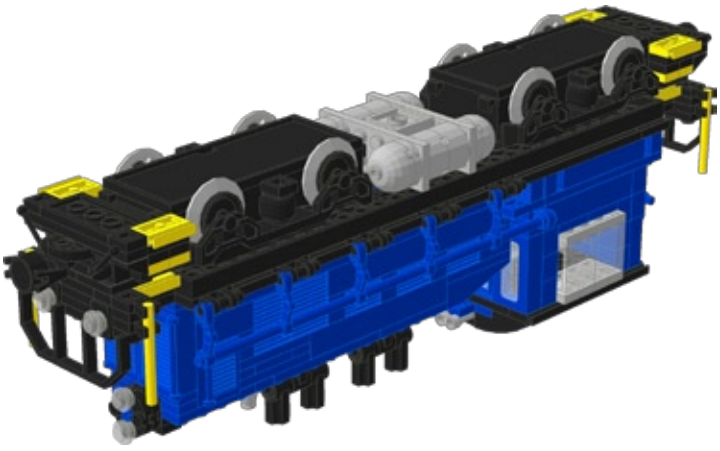

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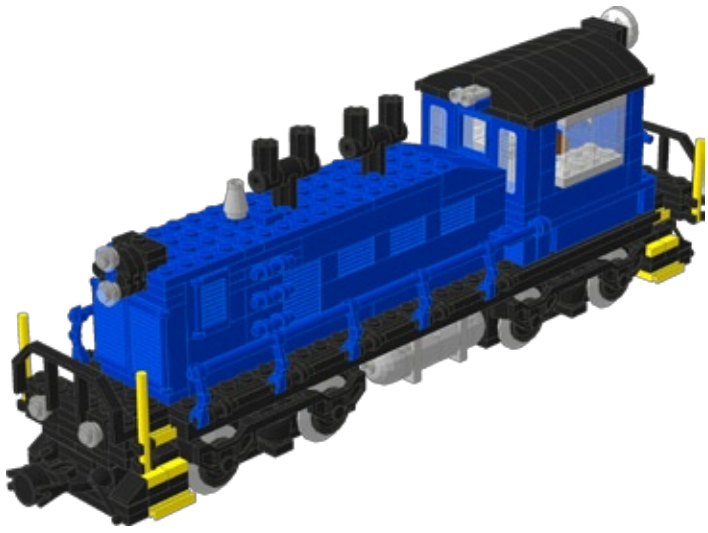

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John Stephen Foster

TALE OF THE CATFISH

by Tom Paul

I like to build 8-wide "L" scale diesel engines using photos I find on the internet or in books. So while surfing the web, when I came across "Resin Unlimited's" webpage describing their HO scale Ingalls Shipbuilding's model 4-S Diesel, I was immediately interested. First, because it was Ingalls Shipbuilding, but more importantly because of the unique appearance of the 4-S.

More intensive investigation on the web for photos yielded only one additional site, http://www.geocities.com/wbd641/SuperiorDiesels.html, which describes the primary power system and has three J.P. Lamb photos of the 4-S. I also came across Bob Hayden's "Diesel Locomotive Cyclopedia—Volume 2, 1980", which I obtained and found to be an excellent resource.

With the photos and information I had gathered, I thought it would be possible to build an 8-wide that would duplicate the look of the 4-S. While modeling in LEGO presents unique challenges and requires compromises, it is also easy to dismantle and start over. The first iteration took about 5 hours. Revisions occur randomly, usually when I pick it up because I should be doing something else!

By the mid 1940s, EMD's covered wagon car body styling was the most widely accepted design for road units. ALCO and Baldwin had similar offerings and later GE shopped a clone. While Ingalls Shipbuilding's

Specifications			
Length overall, body	56'6"	Starting tractive effort, 30% adhesion	72,000
Length inside coupler knuckles	59'1"	Minimum track curvature radius	150'
Width, over body	10'0"	Diesel engine, four cycle supercharged	(8cyl.) 1500 HP
Width, extreme	10'7"	Wheel diameter	42"
Height, to roof, above rail	15'0"	Traction motors	4
Height, extreme, above rail	15'0"	Maximum speed	65 MPH
Truck wheel base	9'6"		(gear ratio 15:63)
Distance between truck centers	33'0"	Supplies	
Total wheel base	42'6"	Fuel oil per unit	1000gal.
Weight, loaded	240,000 lbs.	Lubricating oil	150gal.
Weight, on drivers, loaded	240,000 lbs.	Cooling water	280 gal.
		Sand	28 cu.ft.

proposed 2000hp was similar to EMD's, the 4-S road switcher was unique.

The 4-S was a cross between the covered wagon and what would later be known as EMD's BL series. The whole Ingalls diesel line was based on old technology. However, they did incorporate innovative ideas. The 4-S had a high turret-like cab which allowed almost 360˚ visibility. Portholes along the sides provided light and added to the boat-like appearance. Behind the cab there was a clerestory, or raised section in the middle of the roof which provided additional room for the prime mover and cooling equipment, and improved visibility to the rear. The rear of the locomotive was also unique with a vestibule, windows, and footboards for crew comfort and safety.

The prime mover, supplied by Sullivan Diesel, was an adapted marine engine design which ran at a relatively slow 660 rpm. The 8 cylinder turbocharged diesel sounded like a Baldwin to some. Only Baldwins, with their modified De La Vergne marine engine, ran slower.

Ingalls Shipbuilding is a well known builder of commercial and naval vessels, with the US Navy providing the bulk of their work since 1938. With the onset of World War II the yard was running at capacity, but by 1944 the end of the war was in sight and government contracts would be fewer and harder to obtain. Management began searching for other opportunities where its heavy metal fabrication capabilities could be profitably employed. In 1944 both locomotive and

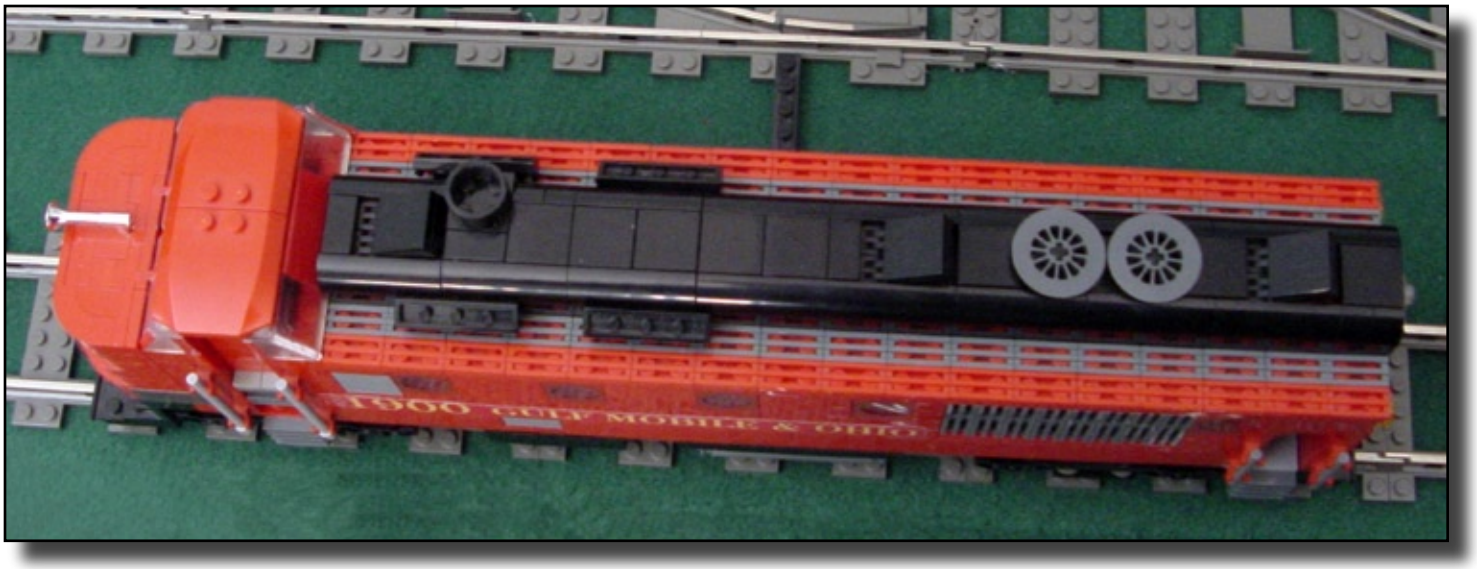
freight car builders had large order backlogs.

Ingalls assumed that established railroad manufacturers would not be able to supply pent up demand when the War ended. Market studies however revealed there were already too many freight car builders for a new entry to succeed. The locomotive market, in contrast, was undergoing a revolution and thus appeared to be a real opportunity. Ingalls felt they could get some of this growing market. The early 1940s was a period of transition from steam to diesel. The build up for WWII and the War years had used up Depres-

sion Era excess capacity. Many of the steam engines were worn out, and urban governments were legislating and pressuring railroads to switch to diesel to rid cities of pollution.

During the War years, the railroads were nationalized and the government controlled manufacturing. Old established producers such as ALCO, Baldwin, and Lima were restricted to producing mostly steam engine and diesel switchers. They could not produce new passenger diesels and were allowed to do very little diesel research. Since GM's EMD built only diesels, and during the war years marine diesels, they were allowed to continue development and thus had a huge advantage after the War ended.

It was in this competitive atmosphere on March 22, 1946 that the Ingalls Model 4-S No. 1500, painted a two tone red and maroon scheme reminiscent of the Alton, was built and introduced to the market. Initial testing was conducted by Mississippi Export, a local short line, which served the Pascagoula area. The 4-S performed as expected and was sent off-line for tests and demonstration trials by the L&N, Tennessee Coal & Iron, Seaboard, Southern, and finally the GM&O railroads. While the #1500 4-S was found to be versatile and reliable no railroad ever placed an order.



Perhaps because it was a major shipper on the GM&O through Mississippi Export, GM&O had expressed some interest and they wanted to dieselize the road to modernize it. They were quickly rewarded with a special deal. GM&O accepted and purchased the 4-S for $140,000. The unit was refurbished and repainted in the current GM&O color scheme and numbered 1900, entering revenue service in June 1946.

The 4-S served for twenty years and was a favorite of yard crews. Called the "Catfish", for reasons unknown, Roy B. Price relates that there was a slight inconvenience in boarding and entering the cab. However, "the slight inconvenience was greatly overshadowed by its performance". The 4-S was a powerful puller and received few modifications over its lifetime.

The most unusual modification was to the exhaust system. A 55 gal. drum with its ends removed was placed over the stack as an extension, probably to improve the gas draft to lift it above the roof for visibility. This change was made shortly after receiving the unit. Another change occurred in 1959 when the roster paint scheme was simplified. The 1900 was repainted in solid red with yellow lettering which remained until she was scrapped.

Traded to EMD for the 2nd batch of SD40s in 1966 she was offered to the Illinois Railway Museum for $3,000 but they could not raise the money and the 1900 was cut up for scrap by the Pielet Bros. in 1967.

Ultimately, it appears Ingalls' plan to rely on subcontractors with an extended two year wait to get all the necessary components, the lack of interest of the railroads, and GM's massive investment in EMD's new manufacturing facilities made the decision easy. Ingalls quietly abandoned the diesel train engine market and returned to shipbuilding. No mention of the foray is made in the official corporate history.

http://www.geocities.com/wbd641/SuperiorDiesels.html
MR Cyclopedia—Vol 2 Diesel Locomotives, Compiled by Bob Hayden, 1980
GM&O Historical Society News, Issue No. 42, 1986,
The Ingalls Diesel-Electric Locomotive http://www.gmohs.org
http://www.pcrnmra.org/coast/contest/contest_sep_2006_ingalls_diesel_info.shtml

FACTORY BUILT

PART I: Building Trains the LEGO Factory Way

by Jordan Schwarz

The LEGO Company has reduced its offerings of 9V Train sets significantly as it makes its transition to the new Power Functions standard. In the interim, the LEGO Factory system of online ordering of custom models offers a way to obtain new train sets. In this article, we address the effectiveness of the LEGO Factory system as it applies to train builders, as well as the usefulness of the CAD software on which the Factory relies, LEGO Digital Designer (LDD).

FIRST IMPRESSIONS

Within the LDRAW community, it has been an uphill struggle for LEGO Digital Designer (LDD) since its introduction. Such difficulty may be attributed to the manner in which LDD was introduced. It seemed at the time like the LEGO Company was offering a replacement for LDRAW that had been developed without consultation from the LDRAW team. It did not help LDD's reputation that early versions of the software were plagued with a variety of bugs that made using the software annoying at least, and at most, impossible.

With the benefit of hindsight, it is now clear that LDD is not intended as an LDRAW-killer, as it will never possess the range of capabilities that the LDRAW tools have. LDD has had several years to work out its preliminary quirks, and the program has come a long way since its initial release. LDD has evolved into a unique program that can coexist with LDRAW, as LDD was designed with young users in mind, while LDRAW offers nearly unlimited possibilities for the experienced grown-up user. It is therefore the aim of this article to reflect on LDD in its present form and to address its usefulness to the LEGO train builder.

THE 'PALETTE'

The most significant difference between LDD and LDRAW has to be the limited palette, or selection of available bricks, used by LDD. Part of LDRAW's attractiveness lies in its ability to model in virtual bricks nearly anything that can be modeled physically. For builders who crave this freedom, LDD creates a claustrophobic user experience. But for those who are open to the palette concept, LDD creates a pleasant challenge: to create the most realistic, varied, and imaginative models given a limited selection of bricks.

In fact, this is the same challenge increasingly faced by designers at the LEGO Company. As part of the transition to a more streamlined corporate structure, designers are encouraged to be frugal with their designs. No longer do designers choose from a nearly unlimited supply of elements and colors; rather, they must consider the cost of the elements in their designs and adjust the bricks accordingly to meet the desired price point of the model. In this sense, building using LDD is very much like being a "real" LEGO designer in the modern era.

The challenging nature of the LDD palette also serves to emphasize what remarkable feats builders are able to achieve given the limited brick selection. A selection of LEGO Factory train models follows this article, showing just a few of the many, varied LEGO Factory models that have arisen from this limited palette.

As it pertains to trains, the LDD palette has a sufficient assortment of parts, although there are some curious omissions. For example, the 9V train motor can be included in a model, but missing are the 9V motor decorative sides. Also, white train windows are available, but matching train doors are not; likewise, red doors are available but not red windows. Other

standard train parts are present, and it is certainly possible to create a varied assortment of trains even using the limited parts assortment.

USER INTERFACE

The graphical interface of LDD is quite different from those in LDRAW tools, such as MLCAD. LDD is set apart by its collision detection methods; virtual bricks cannot occupy the same space, just as real bricks cannot. Its "Click-and-Stick" user interface is unique and lends itself well to rapid prototyping of models. LDD excels for the design of small models; in earlier releases of the program (up to v.1.6), designing large models was cumbersome and required vast CPU resources. This resource-hungriness has been improved upon, and users can now design models using sub-models, just as in LDRAW, to make the construction of large models more tractable. With LDD's on-the-fly rendering, large models can still become difficult to work on, but things are much better than they once were.

The principal disadvantage in LDD's user functionality is that there are certain brick orientations and connections that are prohibited by the program's collision detection. Connections to some Technic elements are still problematic thanks to overzealous collision detection. Building, even using SNOT, is straightforward as long as bricks are oriented at right angles to one another. Trying to build at other angles becomes difficult and is doable but frustrating. This will aggravate some train builders, since it may be more difficult to capture the particular angles and facets of locomotives and rolling stock.

RENDERING

Recent reports suggest that the very latest releases of LDD may include the ability to reliably import and export LDRAW files, making it possible to create high-fidelity renderings of models. If such is the case, it would be excellent news, since presently, LDD lacks a high-quality rendering tool of its own. You can take screenshots within the program, of course, but the quality is not nearly as convincing as those images rendered using the LDRAW tools.

The rendering of instructions is an area that needs substantial improvement if LDD is to become a key player in the world of brick CAD software. The automated instruction generator does a reasonable job of creating instructions, at least compared to the early versions of the software (where "floating" bricks made following the automated instructions impossible). The new instruction generator offers several different modes – for structures, vehicles, and Technic. For most train models, the "structures" mode seems to do a good job since it typically builds a model from the ground up. Experimenting with the different modes can yield better results.

Unfortunately, the automated instruction generator offers no way to tweak the instructions or to add rotation steps, the result being that the automated instructions from LDD are never easier to follow than those designed with some human insight. Nor do they look as good as those generated using LPUB. Lack of high-quality instructions is a major blow to the Factory system, as it precludes less-experienced builders from purchasing and constructing other builders' custom models. There is presently no way to guarantee that the automated instructions will be helpful to someone building a LEGO Factory model.

LEGO FACTORY

Finally, there is the chief distinction of the LDD system: that you can order your finished model directly from LEGO. For some, half the fun is scrounging up parts for a model using BrickLink, but there is also something nice about being able to tell someone who inquires about a model that they can actually go online and purchase it as a kit. With this convenience comes a somewhat higher model price than for a standard LEGO set, and shipping times for LEGO Factory orders can be notoriously slow. Still, LEGO Factory is unique in the realm of customized products and it brings the dream of being a "real" LEGO designer just a little closer.

Another nifty aspect of Factory is that there are train models designed by builders from around the world utilizing many different building styles. There are also a number of well known train builders who have made creations for LEGO Factory available to the public.

FACTORY BUILT

PART II: Models by LEGO Factory Builders

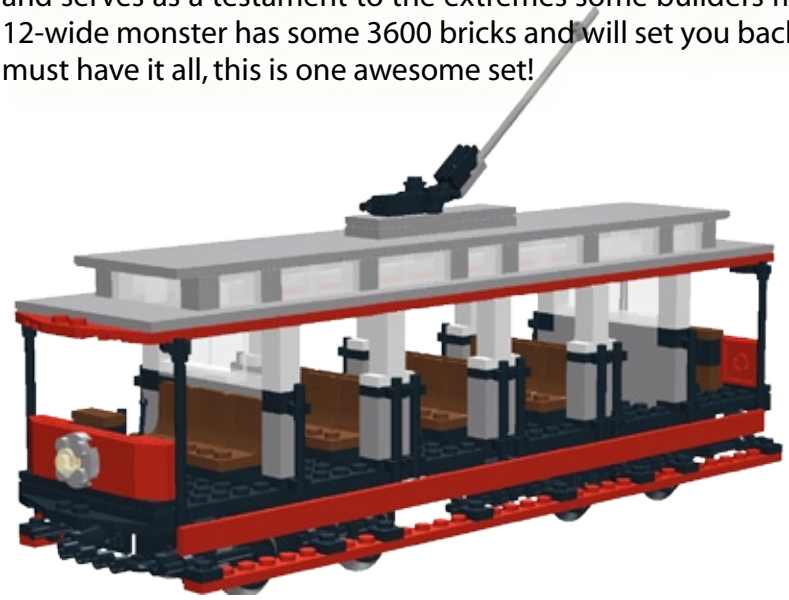
by Jordan Schwarz

As the LEGO Company makes their transition away from 9V trains and toward the new Power Functions™ system, quality LEGO train sets are becoming increasing hard to come by, or rather, impossible to find, unless you're in need of an extra holiday train set or another Hobby Train Box. The good news is that even with the retirement of 9V trains, LEGO Factory still provides a way to obtain new train models. Although it takes a while to sift through all the creations, there are some excellent models available from builders around the world, encompassing a range of building styles and techniques. A few of these creations are shown here as examples of the many unique train designs LEGO Factory builders have developed. The models shown in this article must not be taken as a comprehensive list, given the large and ever-growing number of very talented LEGO Factory builders.

At the LEGO Factory website, http://factory.lego.com, you can see more models by these and other builders, and you can download electronic building instructions for any model, viewable using the LEGO Digital Designer software.

UNION PACIFIC CENTENNIAL by blade8050

The Centennial locomotive stands as one of the largest and most powerful locomotives of all time. Fittingly, this LEGO rendition of the locomotive is simply enormous and serves as a testament to the extremes some builders manage to reach with LEGO Digital Designer. This 12-wide monster has some 3600 bricks and will set you back some serious cash. But for the train builder who must have it all, this is one awesome set!



8-WIDE OPEN AIR TROLLEY by acjmasi

Many Railbricks readers will already be familiar with Chris Masi's work in the world of LEGO Trains. Perhaps less known is that Chris has a number of excellent models available from LEGO Factory! There are several different freight and passenger cars available, a number of which are 8-wide models. The Open Air Trolley is an example of an excellent stand-alone 8-wide model Chris designed.

FRKX AGGREGATE HOPPER by Brickbuilder711

The LEGO Factory system is designed with young builders in mind, and this young builder is an especially impressive one. He has designed a large number of freight cars for LEGO Factory, and this Aggregate Hopper stands out as a design that makes clever use of simple details, resulting in a car that is straightforward to build and looks great.

GE C30-7 by dan_147

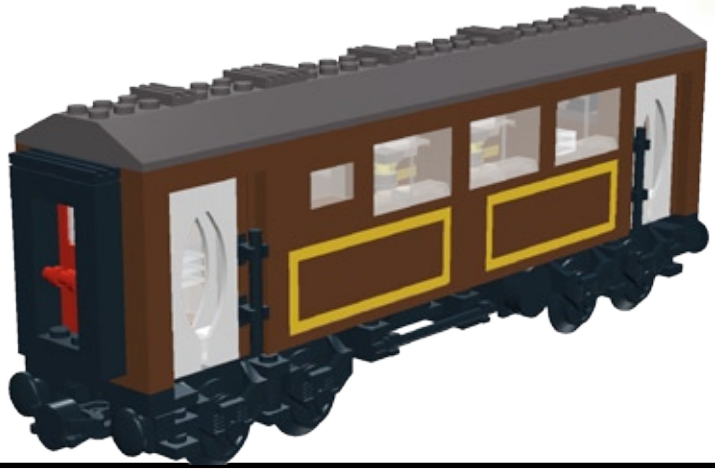
Daniel Aubin has faithfully recreated engines and rolling stock from his neck of the woods, the area served by the Montreal, Maine & Atlantic Railway. Some of his creations bear the MMA livery, but all are at home on any freight train. One of his recent models, an ex-Burlington Northern C30-7, is shown here. If you enjoy GE motive power, Dan's LEGO Factory gallery is a good place to start.

'KROKODIL' LOCOMOTIVE by erawars

This noteworthy young builder has created a broad range of rolling stock and locomotives, including a very nice adaptation of the 'Krokodil' engine design for LEGO Factory. Also in his gallery of models are old steamers, new electrics, and everything in between, plus the coaches to match.

EARLY 1900s PASSENGER CAR by JamesMathis2pt0

There are certain builders whose names are universally known in the LEGO Trains community, and James Mathis has to be one of them. The designer of the Super Chief coach sets, James is one of the most prolific and best known LEGO Train builders. Now, through LEGO Factory, you can purchase additional designs of his, such as the passenger coach depicted here and a number of other models online. Count on plenty of innovative building techniques and great looking results.

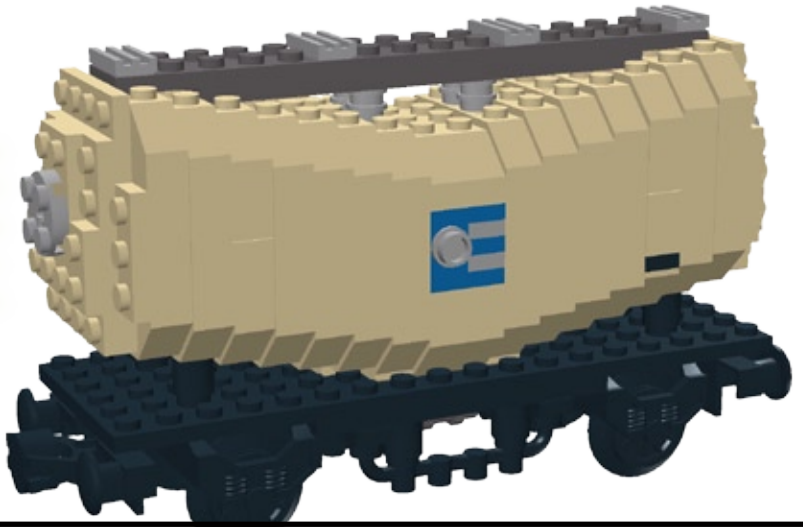


CSX SD40-2 and LEE HALL DEPOT by the author, jbschwarz

In designing my train models for LEGO Factory, I always try to look for a void in the official LEGO product offerings and design creations to fill that gap. That philosophy led me to design a "UCS"-style train set, and I thought that the classic SD40 would make a good choice and, as a small diesel-electric, would help to keep the cost of the model in check. I have developed many other models for LEGO Factory, including a variety of freight cars, streamlined coaches for the Metroliner and Super Chief sets, and various buildings and trackside structures. My favorite Factory creation thus far is my LEGO adaptation of the old rail depot at Lee Hall in Virginia.

CEMENT WAGON by jjrailton

Jason Railton does a great job of bringing trains of the United Kingdom into the realm of LEGO Trains. His cement car is particularly unique among LEGO creations and utilizes some sophisticated building techniques to achieve its characteristic "broken-back" look.



BR 103 by lytly

Yet another builder who incorporates a regional flavor into his train designs, this builder from Switzerland expertly captures a number of German and Swiss passenger trains. There are several different coaches and locomotives available, including the famous BR 103 shown here.

MALLET 2x2 LOCOMOTIVE AND SIGNAL TOWER by UR59

For being only 12 years old, this German builder shows remarkable talent and attention to detail. For example, the Mallet locomotive pictured packs every inch of the model with detail and replicates the compound piston mechanism of the original. Other models by this builder are equally good, such as the beautiful and realistic Signal Tower model, also shown.

CHALLENGE I

Reverse Engineering Challenge 2

by Benn Coifman

This column seeks to challenge readers to look around at other builders' work and tease out how they achieved a specific effect, an important skill as you wander off the instruction sheet and into your own creations. This issue, we look at overcoming limitations in the seemingly unlimited parts selection provided by LEGO. While you can find LEGO train doors in red, gray, and blue these days, what if you are building a Great Northern coach in Omaha Orange and Pullman Green?

LEGO never made train doors in orange or dark green, much less in a combination of the two colors. And for that matter, most North American passenger cars had doors that opened in, while the LEGO train doors open out. So you are left to build your own door.

In the nature of trade-offs, this door does not open. Some clues are evident, can you figure out how it's built? The window is a single brick. Although not shown, the six-wide car is (roughly) symmetric, with a similar door on the opposite side of the car from this one (same end). Be sure to account for the pallet of available bricks, e.g., at the time of building, orange 1x3 plates and 1x1 dark green bricks were unavailable, so don't use them in your submission.

See:
http://www.bricklink.com/catalogList.asp?v=2&pg=1&colorPart=80&catType=P

http://www.bricklink.com/catalogList.asp?v=2&pg=1&colorPart=4&catType=P
for a list of available parts in each color.

Submit your solution to challenge@railbricks.com with the title SECOND REVERSE ENGINEERING CHALLENGE in either ldraw format or provide sufficient digital photos on how to construct the door and integrate it into the car by April 1st, 2008. If you build a physical model, you can use more common colors to represent orange and dark green, but you will still be limited to the available pallet in these two colors. Be sure to include your name and contact information.

Expert builders, if you think it is way too easy (e.g., you worked on the hobby train), let us know with your submission so that we can give the self-reported intermediate builders first shot at the prize.

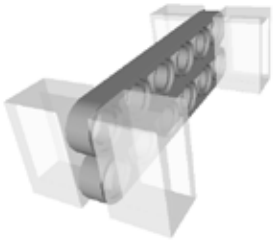
The editorial staff will select the best design from all of the buildable submissions that achieve this effect and winner will receive a "RailBricks Challenge" engraved brick. We'll publish the solution in the next

issue. All submissions become the property of RailBricks and by submitting an entry you will allow us to print your submission in whole or in part.

If you have ideas or suggestions for future challenges, contact us at submissions@railbricks.com.

Reverse Engineering Challenge 1 REVEAL

Matt Hamann's REC1 Entry



As you can tell from the reveal, there is a lot going on behind the scenes in this design. There are six floating elements that are wedged in against one another to produce the windows. This particular feature was chosen so that the details of the technique could be presented in the reveal. In the judging, we were looking for you to get as far as nesting the 1x2x1 panel (step 8) inside the 1x2x2 panel (step 9) to get the center of the frame. For this challenge, the engraved brick goes to Matt Hamann for finding a completely different and much simpler solution. He used a pair of 1x6 thin technic lift arms (part 32063) to form the center of the window and then pegged in two trans 1x2 bricks on their side for the windows. Congratulations Matt!

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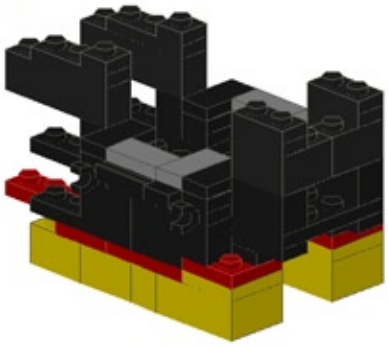

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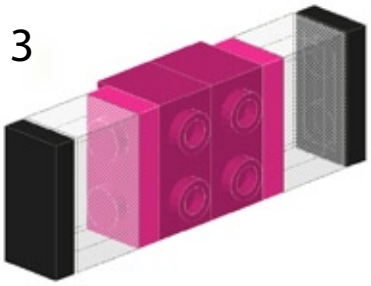

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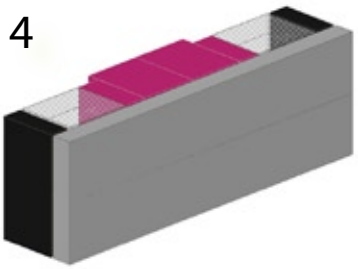

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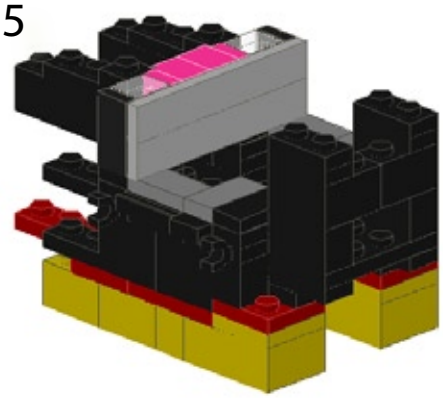

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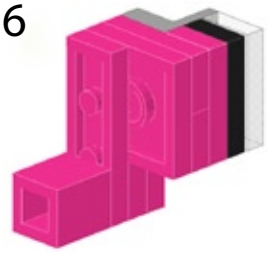

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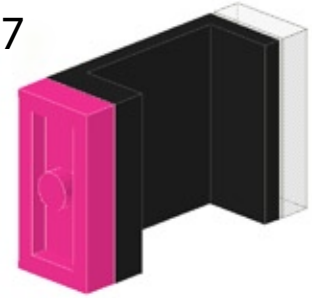

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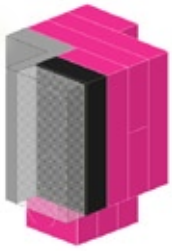

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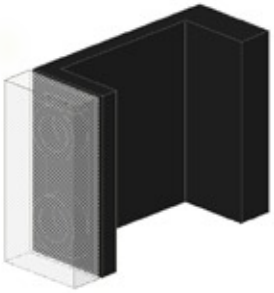

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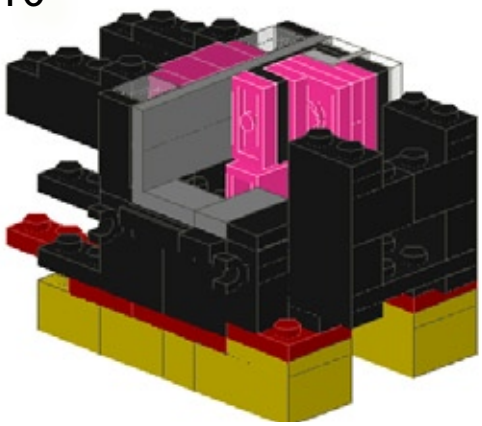

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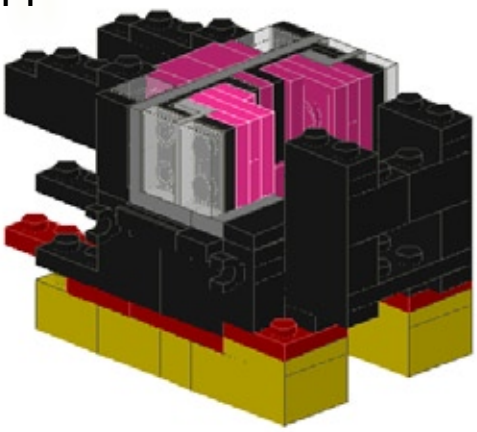

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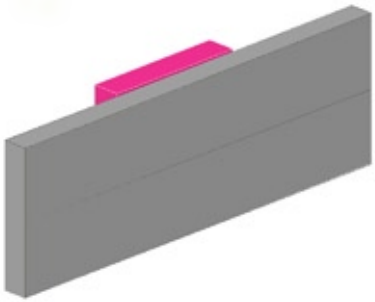

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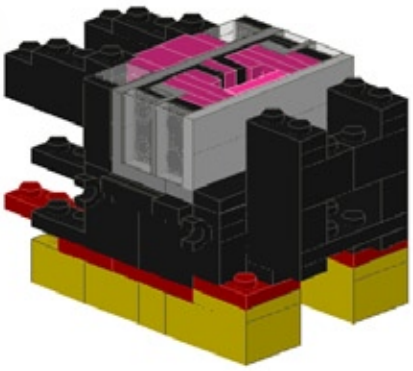

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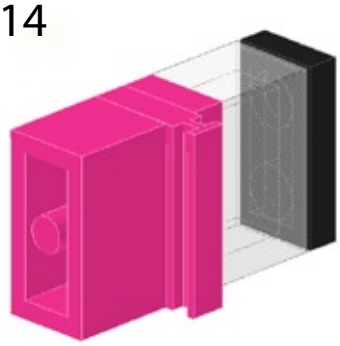

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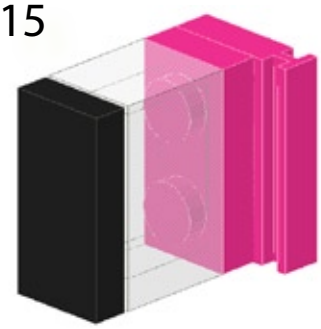

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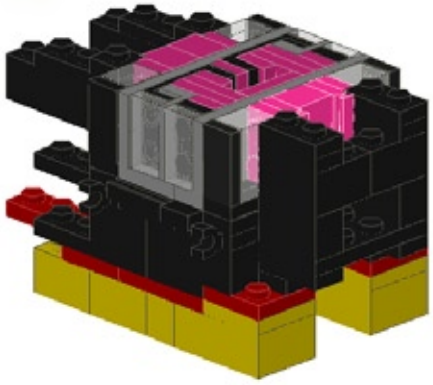

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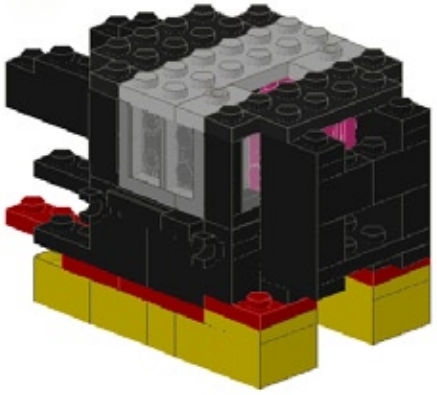

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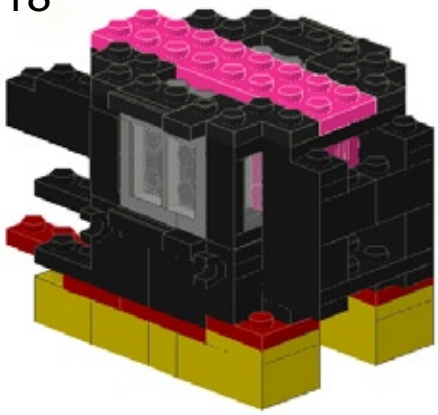

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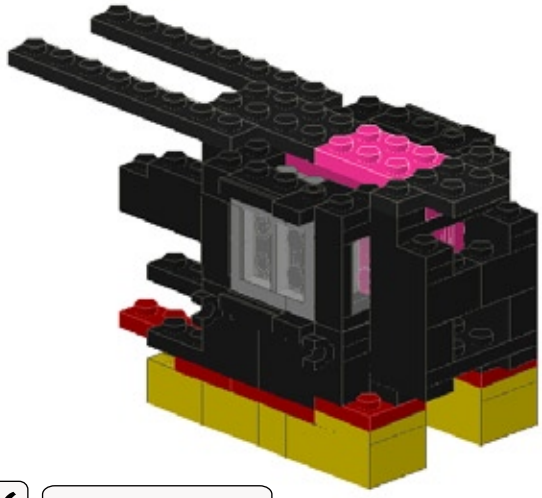

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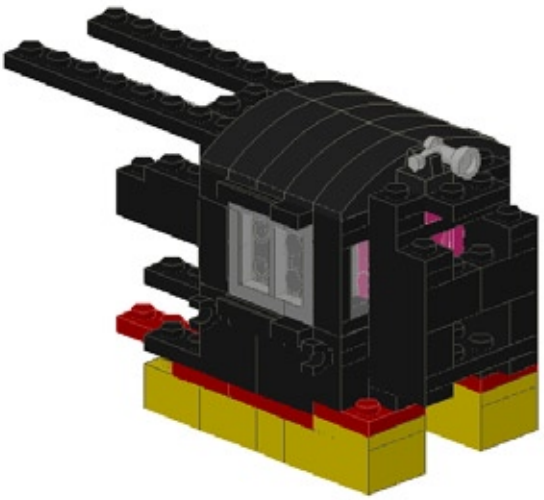
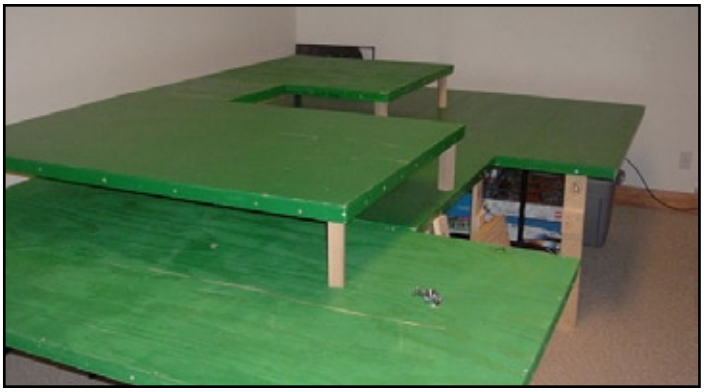


Brian Darrow is
MOVING MOUNTAINS

by Jeramy Spurgeon

When I first met Brian Darrow, I would have classified him as one of those AFOLs that simply collected LEGO sets. He was what is considered 'town complete' or 'space complete' (and probably complete in several other themes as well). He could rattle off the names and numbers of sets from the top of his head. Although this feat has not eluded him, after joining IndyLUG (Indiana LEGO Users Group), he was changed forever.

He had built a few MOCs (My Own Creations) here and there, often as an interactive activity with his two boys, but nothing comparable to his future endeavors. After seeing what other like-minded individuals in his area were doing, he decided to take part in the collaborations. He didn't start with a house or vehicle to add to the next IndyLUG layout, but instead set his sights for something a little bigger. That first mountain module grew from a roughly 4 baseplate by 4 baseplate creation to about 5 times that size by the time his second showing of it rolled around. The layout would grow in size at each subsequent public display thereafter. Today



the layout is nearly 30' (9.1m) by 6' (1.8m) in size and requires the help of an additional person and nearly 12 hours to set up.

Brian has developed a very efficient method to building large scale models. His layout breaks apart into manageable pieces, none with a larger footprint of more than 2 baseplates by 3 baseplates. He then builds custom cardboard boxes that are very sturdy and easily stackable. The cardboard pieces are acquired from a home improvement store in sheets that are often up to four feet in width and height and often very thick. This cardboard offers much more durability when transporting the modular pieces to shows.

When building creations this large, you learn that each brick can be valuable. To conserve on brick usage, Brian first created his basic elevation changes using tables. Each table is hand built and conforms to the size of a standard 32 stud baseplate, which is roughly 10" (~25cm). By creating the tables to conform to the size of the baseplates, modules can be slid into place with virtually no seam showing. Another one of Brian's tricks is to utilize the preschool-sized DUPLO bricks. LEGO created an inherent compatibility between its junior and senior building systems that allows for the standard LEGO 2x4 brick to be attached to a standard DUPLO sized block. Not only does this help reduce the amount of standard LEGO brick usage, it helps reinforce the creation by adding an extra amount of support that the standard LEGO brick cannot provide on its own. He also creates braces across his vertical columns as seen in the above picture. This allows him access to the inside of the creation from the back, in case an unlucky train derailment occurs within the depths of the mountain.

To create the rock faces, Brian uses an estimated

400-500 BURPs (Big Ugly Rock Piece) and LURPs (Little Ugly Rock Piece)., although upon first glance, this may not be apparent. Many builders that use these pieces for mountainous landscaping usually cannot escape the repeating patterned look that many BURPs and LURPs stacked together create. Brian overcomes this by adding many thousands of slopes to the rock faces. This creates a nearly studless effect. By mixing the two tones of dark and light gray, he manages to coax a very organic, natural look to the mountainside.

To further break up the 'bricky' look to which LEGO lends itself, hundreds of custom built trees are used to obscure the background. Brian also uses a technique called forced perspective to add a sense of enormity to his display. Wikipedia defines forced perspective as follows: *it is a technique that employs optical illusion to make an object appear farther, closer, larger or smaller than it actually is. It is used primarily in photography, filmmaking and architecture. It manipulates human visual perception through the use of scaled objects and the correlation between them and the vantage point of the spectator or camera*. Brian achieves this by placing larger structures closer to the front of the layout while nestled further back are the smaller buildings. Notice the trees up on the higher elevations of the mountain? They are much smaller than those in the foreground, tricking the viewer into thinking that the

area is much further away than in reality.

As if the sheer size of the layout weren't enough, Brian manages to pack detail into nearly every stud on the display. Much of the ground is covered in plant growth and the minifigs seem to almost spring to life with their action poses. The waterfall, though stationary, appears to flow down the hillside as lucky canoers catch a glimpse of the rumored parrot tree.

Brian's building style can most appropriately be classified as 'classic'. He feels that the golden age of the LEGO town theme was in the early eighties and nearly every structure on his layout reflects that. His seaside hotel, with its red roof and dormers, echoes a time in the LEGO catalog when European inflection was evident.

Several pieces of the rolling stock and locomotives in his train yard are 9volt conversions of classic Eurpean 12volt sets. The Inter-City train (set 7740) is one of his favorites. These classic trains are not, however, the highlight of his train roster. The little locomotives that get the kids beaming and pointing are, instead, his cutom built Thomas and Friends. Becasue of this, he often refers to the layout as "The Thomas Mountain". He frequently sets a controller outside of the display for children to control their favorite little Peep Peep. Because of the compression of the mountain, these smaller trains lend well to navigating its tight curves and narrow tunnels.

Today, Brian employs the help of long time friend, Eric Bell. Occasionally they will collaborate on a new area of the massive layout, but for the most part, Eric sees this as an opportunity to display his true passion, sea planes or flying boats. When I caught up with the two at the Great Train Expo this past January in Indianapolis, Indiana, they had already begun planning the next phase of the layout. This phase includes the expansion of the waterfront area and the addition of a volcanic, native filled island.

The mountain is not the only large creation Brian has built. He is the creator of the massively impressive Blacktron Intelligence Agency as well as a scale replica of the Indianapolis Motor Speedway. To view more of Brian's creations, visit his Brickshelf gallery at: http://www.brickshelf.com/cgi-bin/gallery.cgi?m=bdarrow or his MOCpage at http://www.mocpages.com/home.php/1797

This British Railways 'Black Five' loco was designed by Andrew Harvey using mainly LDD

COMING OF AGE

RAILBRICKS writer Tim David talks to four talented teen builders

Andrew Harvey is a 16 year old builder from the UK. He has recently joined the Brickish Association (http://www.brickish.org). As well as trains he also builds LEGO Technic vehicles, pneumatics, and the occasional Mindstorms robot.

Railbricks: How long have you been building LEGO trains?
Andrew: I got my first LEGO train set (set No. 4559-1) when I was about 8/9 years old, and I've always stuck with 9V. As well as collecting the official sets, I soon started to experiment with creating MOCs. I made a tram complete with catenary (although only a short bit), and my first steam train model was a 4-4-0 with truck exhaust pipes for cylinders!
Railbricks: What attracts you to building trains?
Andrew: I'm a huge fan of real trains as well as conventional model trains. I occasionally visit my local preserved railways, and always find one while we're on holiday! I was also a big fan of LEGO from a very early age, so putting the two together formed the perfect hobby.

Railbricks: What is your design process?
Andrew: When building a train from scratch I first find lots of pictures of the prototype. If it's an old train I especially look at ones that have been preserved, and if I get the chance I will go and look at the real thing in action. Pictures of Hornby (http://www.hornby.com) models are also good as they give a perfect side view of the whole thing. Eventually I start trying out varies features using loose bricks from my collection, and also using LEGO Digital Designer. I haven't got into any other CAD software yet, even though I know LDD has many limits. For steam locomotives I build a mock-up of the chassis first, to make sure it will work, and then build the body around its dimensions. If it's got a tender then I'll design that at the end. For some parts of the model I'll do sketches and diagrams, to work out how the pieces will fit together. Once I've finished the overall model I'll check over it to add strength and detail (I'm a bit of a perfectionist here). Finally I'll order the parts and use the computer as instructions when building it. If I haven't designed the model on the computer, then it gradually comes together without instructions.

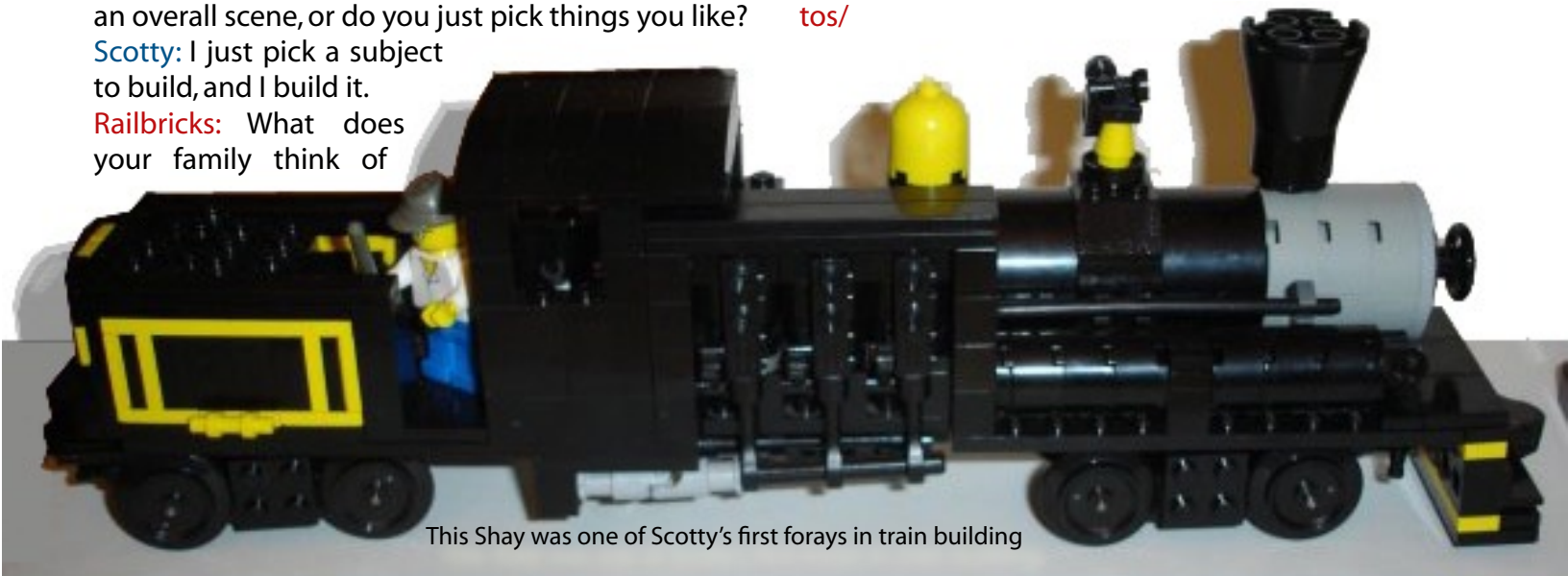
Railbricks: How important do you think techniques such as SNOT are?
Andrew: Very important. They are what make a model stand out, and show off the skill of the builder. They also make models a lot more realistic. The only trouble is how to make them stay together.
Railbricks: How long does it take you to make a model?
Andrew: If I'm making a model without a computer design, then I'll only take an evening or two to put it together. Here, what takes the time is finding the parts from my collection. If I've got a CAD design and specially ordered parts, then it could take me half an hour, or it could take every evening in a week to complete; it depends how large the model is! The main factor that slows down a build is being distracted by other projects.
Railbricks: Which LEGO builders inspire you?
Andrew: The people who inspired me most are the members of the Brickish Association, especially Jason Railton, for their outstanding models. I also gained inspiration from foreign builders, like Ross Neal who showed what younger builders could achieve. Like many, LEGOLAND is a major inspiration as well.
Railbricks: Do you choose your prototypes as part of an overall scene, or do you just pick things you like?
Andrew: I build whatever takes my fancy. I don't really care what era or region of Britain it's from, as long as it's British. I may change my mind just as I'm starting a project, whereas others I've planned to build for months or even years. My favourite trains are obviously steam locomotives, but diesel and electric do have their appeal.
Railbricks: What does your family think of you 'playing with LEGO'?
Andrew: They all accept it as my hobby, and certainly don't comment on it being 'too childish'. I'm sure they find it a bit weird, but I don't particularly care.
Railbricks: Do you friends know about your hobby? What do they think?
Andrew: Those I've told are fine with it, and show some interest in it. One of them actually bought some LEGO off me, albeit Bionicle. They too probably think its weird, and most other people in my school who find out find it very strange, but I don't care. Why should I stop doing it to please them?
Railbricks: Do you find it hard to source the parts you need? Are/were your parents willing to let you use Bricklink?
Andrew: Sourcing bricks for me is fairly easy, as I have access to LEGO Factory and Bricklink, as well as my existing collection. I don't hoard parts; I order them especially for a project. I either pay for them myself or get them as presents at birthdays and Christmas. My parents don't mind me spending money on LEGO.
Railbricks: Can you see yourself having a 'dark age' in the future?
Andrew: If I go to university (which I probably will) then LEGO will become a much smaller part of my life. I won't lose complete interest (I hope), and may continue the hobby into adult life. As for a dark age, I don't think so. I certainly won't lose interest in trains.
Railbricks: Do you have a dream MOC you aim to build one day?
Andrew: I have a wish list of all the trains I would like to build, but a dream train? Perhaps a fully detailed, realistic, pneumatically powered A4 Pacific, in BR Green Livery (not the usual Mallard)? Or perhaps a streamlined Princess Coronation in blue with white stripes. I'll have to wait and see what inspires me.
Railbricks: Describe your best MOC and how you built it.
Andrew: My best MOC at this point has definitely got to be my BR Black 5. It started out when my dad said to me; "you know what you haven't got, a good black steam engine". I had seen the perfect engine already, and immediately set to work. I was determined that this engine would be another level up from my previous MOCs. Almost all the design work was done on LDD. I did a mock-up of the chassis to ensure it would work well and get around corners. It of course has *Big Ben Bricks* wheels. I received the parts I had ordered for my 16th birthday, and built it in 3 consecutive evenings. First I built the loco body, then the tender, then finally the chassis. The chassis was not designed beforehand. So this took longer to figure out. Finally it was finished, and looked better than I had expected! To give the motor extra traction I used up a few spare pennies, filling the tender to give a much better performance.

Andrew has more trains on his MOCPage at http://www.mocpages.com/folder.php/11676

Scotty Whitesell is a 16 year old builder from the USA who has only been building LEGO trains for around a year. He is a member of the LEGO Users Group of LA (http://www.lugola.org/), Keithlug (http://www.flickr.com/groups/510510@N21/) and KeithLTC where he is treated as one of the team (or not in the case of Keithlug, where everyone is a minion!) As well as building trains he also builds in the SPACE! Steampunk, Post Apocalyptic and Floating Rock themes.

Railbricks: What attracts you to building trains?
Scotty: Mostly all of the fun, neat little fiddly-bits on steam engines.
Railbricks: Are you interested in trains outside of LEGO? If so, which came first, LEGO or trains?
Scotty: Same time, my dad used to sing "Daddy, what's a train" while I played with LEGO.
Railbricks: What is your design process?
Scotty: I get an image of the loco I want to build, and then sit down and work for an hour or so, or until I'm satisfied for that session .
Railbricks: How important do you think techniques such as SNOT are?
Scotty: Essential.
Railbricks: How long does it take you make a model?
Scotty: My first train took me about 6 hours, but it was on and off over about a month.
Railbricks: How much time do you spend building a week, on average?
Scotty: Up to 20 hours, maybe more.
Railbricks: Which LEGO builders inspire you?
Scotty: I'd have to say builders like Ryan Wood, Gary McIntire, Jon Palmer, Ley Ward, Kevin Blocksidge, and Swoofty, off the top of my head, but many, many more.
Railbricks: Do you choose your prototypes as part of an overall scene, or do you just pick things you like?
Scotty: I just pick a subject to build, and I build it.
Railbricks: What does your family think of you 'playing with LEGO'?
Scotty: They think It is a great way for me to express myself.
Railbricks: Do you friends know about your hobby? What do they think?
Scotty: Yes they know. For the most part, they think it is pretty cool/don't care.
Railbricks: Do you find it hard to source the parts you need? Are/were your parents willing to let you use Bricklink?
Scotty: My parents couldn't have stopped me using Bricklink, even if they wanted.
Railbricks: How much do finances limit what you can build?
Scotty: Not much, I have a good-sized collection.
Railbricks: Can you see yourself having a 'dark age' in the future?
Scotty: Maybe during college, but I will surely try to make it to NWBC every year, and hopefully my LUG meetings.
Railbricks: Do you have a dream MOC you aim to build one day?
Scotty: My dream MOC would probably be a 200+ stud ship, or a long logging train.
Railbricks: Describe your best MOC and how you built it.
Scotty: I really don't know what my "Best MOC" is. If I had to pick one, it would be my Spyglass Recon steampunk plane, and for that,
1. Sat down and looked at WWI Era Bombers and Fighters
2. Picked two colors, and a few random parts to try and use
3. BUILT!

Scotty has a Flickr account with more of his work at http://www.flickr.com/photos/onetruescotty_photos/



This Shay was one of Scotty's first forays in train building

Samarth's WDM2 ALSO diesel loco of Indian Railways. This model uses SNOT for the chassis.

Samarth Moray is a 19 year old train and space builder from India. He has been building LEGO trains since he got his first set at around the age of 10.

Railbricks: What attracts you to building trains?
Samarth: It's challenging to accurately replicate models to some sort of scale in LEGO. Getting one that looks as accurate as you can get it feels very rewarding. Also IMO there are a lot more restraints and parameters within which you have to build when you're making a train in LEGO than if you were making say, a spaceship.
Railbricks: Are you interested in trains outside of LEGO? If so, which came first, LEGO or trains?
Samarth: Yes, but not really. I enjoy seeing the models of others more, especially for interesting techniques and tricks. I also like the freedom to play with form that Space provides, so I dabble in that occasionally.
Railbricks: What is your design process?
Samarth: I start out by looking for (or being shown) pictures of interesting things to model, this can be anything from interesting liveries to maybe something as minor as difficult undercarriage details. Then I sit on it for a while... weeks, months... using it as my desktop wallpaper so it's completely fixed in my mind, or if I'm in the mood, taking a print and marking off different sections of the model that I think would work well with a specific brick. If there are any bits that I feel would be dubious to try directly in real life I CAD them out first, although these days I limit myself to CAD only. If I feel confident enough of being able to replicate the model as accurately as is humanly possible, I go for it. If I can't do it, I leave it and try and find something else. It's probably not a very efficient way of working but on the few occasions I do manage something good, I feel quite fulfilled.
Railbricks: How important do you think techniques such as SNOT are?
Samarth: I look at it as a tool. When it comes to solving a particular design problem, SNOT is a very good thing. Personally I enjoy building with my studs sideways, or whichever direction a particular model happens to have the most tricky detailing in. Locos usually have a lot of greebling on the sides so it makes sense to me to build that way.
Railbricks: How long does it take you make a model?
Samarth: My models are usually never fully complete until the second before I start tearing them apart. I'm never happy, so it's a continuous process.
Railbricks: How much time do you spend building a week, on average?
Samarth: It varies a lot. I'm in a grey age right now; I check Brickshelf occasionally and Stajinaria everyday, but barring the help I gave to some guys participating in the World Robot Olympiad some weeks ago I haven't been building at all. But back when I actually built regularly, if you included CADing I'd say it was probably around 20-30 hours a week.
Railbricks: Which LEGO builders inspire you?
Samarth: There are a lot of them. I'm only going to mention some who deal with trains… I think I'd forget too many if I included the other themes, and I've probably already forgotten quite a few, but here goes:

James Mathis, John and Ross Neal, Ross Crawford, pinguim, misterzumbi, Tim Gould, Tim David, Crashnet, Christopher Masi, Jason Railton, and Ben Beneke.

Railbricks: What does your family think of you 'playing with LEGO'?

Samarth: They look at it as an idiosyncrasy, but other than that they're quite encouraging.

Railbricks: Do you friends know about your hobby? What do they think?

Samarth: Some think I need to grow up. Others want to come over and join in the fun :D

Railbricks: Do you find it hard to source the parts you need? Are/were your parents willing to let you use Bricklink?

Samarth: It's quite hard. My parents are reluctant to order online since they don't trust the system (I don't blame them, especially since we're sort of geographically isolated from most BL dealers) which is why I'm only waiting until I start earning…

Railbricks: How much do finances limit what you can build?

Samarth: Let's put it this way: About 80% of the reason I'm in a grey age right now is because I'm no longer comfortable asking my parents to finance my hobbies and indulgences. At the same time I'm not earning, so I'm in a sort of forced LEGO exile.

Railbricks: Can you see yourself having a 'dark age' in the future?

Samarth: Once I'm hooked onto something, I never leave it. I might take long breaks from it during which the people around me may even forget I was ever addicted to that thing, and then all of a sudden after ages, I'm back at it again. The only way I see myself never ever playing with LEGO again is if an NLSO prevented me from it, or if I was too busy with work... which may or may not happen because I am just as lazy about things I don't like doing as I am passionate about the things I do like doing.

Railbricks: Do you have a dream MOC you aim to build one day?

Samarth: Probably a very, very large, painstakingly detailed diorama. I mean I'd want it so detailed that it'd be like a photocopy of the real thing. It would likely be a large, busy station, or a mountainous pass where there's been a train crash, or a dock… something along those lines.

Railbricks: Describe your best MOC and how you built it.

Samarth: Probably my WDM-2. Even though it's probably been a year since I made it, there isn't much I would change in it even today, even if I had the parts. I built it pretty much the way I described my design process.

More of Samarth's work can be seen at his MOCpage at http://www.mocpages.com/folder.php/1542

Matt Hamann is a 17 year old builder from the US who has been building LEGO trains for a little over a year. He is a member of the Central Ohio LEGO Train Club (http://www.coltc.org/)

Railbricks: What attracts you to building trains?

Matt: I enjoy the challenge that building trains in LEGO presents. It is very rewarding to see your MOCs running around a layout and having the public instantly recognize them. Another benefit of building trains is the nearly infinite amount of inspiration on the Internet; one can never run out of things to build.

Railbricks: Are you interested in trains outside of LEGO? If so, which came first, LEGO or trains?

Matt: On occasion, I do enjoy "railfanning", as you can see in my MAJ and flickr galleries, but it is not nearly interesting to me as building LEGO trains. For me, LEGO came first. I was only interested in joining my local LTC but seeing Benn Coifman's trains in real life really got me interested in making my own LEGO trains.

Railbricks: What is your design process?

Matt: Usually I will browse various sites that host pictures of trains looking for interesting things to build. Once I find a prototype that I like, I will open up MLCAD and do a rough sketch of the model. After refining it several times and making sure techniques work in real life, I will try to build it with my non-digital collection. If I don't have a part that I need, I will try to temporarily substitute it for one in another color and make a wanted list on Bricklink of things I will need. After I have looked at various stores, I will buy the parts I need and finish my model.

Railbricks: How important do you think techniques such as SNOT are?

Matt: SNOT and other techniques are vital to making LEGO trains. Without them, it would be very difficult to accurately depict the prototype you are building.

Railbricks: How long does it take you make a model?

Matt designed Indiana and Ohio Railroad GP9 no. 56 after building a IORR GP7

Matt: It takes me about one to two months to finish a model depending on what I need or if I lose interest with it.

Railbricks: How much time do you spend building a week, on average?

Matt: I usually spend four to five hours a week building.

Railbricks: Which LEGO builders inspire you?

Matt: Benn Coifman, Tim Gould, and "Swoofty"

Railbricks: Do you choose your prototypes as part of an overall scene, or do you just pick things you like?

Matt: I choose almost all of my prototypes because they are interesting or unique. When I built my Northern Pacific SW1200, however, it was because Benn Coifman, a fellow member of COLTC, had built an NP GP9. I felt it would be cool to have another NP loco running around the layout with it.

Railbricks: What does your family think of you 'playing with LEGO'?

Matt: My family is very supportive of me 'playing with LEGO'.

Railbricks: Do you friends know about your hobby? What do they think?

Matt: Some of my friends know about my hobby and the ones that do think it's very interesting. Once they have even come to one of my train shows.

Railbricks: Do you find it hard to source the parts you need? Are/were your parents willing to let you use Bricklink?

Matt: I do not find it very difficult to find the parts I need. A lot of the people in my LTC have a Bricklink store so I can just send them an email if I need something and get the parts at the next meeting or show, along with a nice discount. My parents don't mind me using Bricklink at all. In fact, they see it as a way for me to get my chores done so I have money to buy bricks!

Railbricks: How much do finances limit what you can build?

Matt: My finances are very limiting on what I can build, but it has helped me be come up with cheaper and better solutions to problems.

Railbricks: Can you see yourself having a 'dark age' in the future?

Matt: When I start college next fall, the small size of my dorm will not permit me to take my collection with me so I can see a 'gray age' in the future. Hopefully I will have to the time to stay active in the community and build models on my laptop.

Railbricks: Describe your best MOC and how you built it.

Matt: My best MOC would have to be my Indiana and Ohio Railway GP9. I used a lot of techniques from older MOCs and improved on my IORY GP7 that I had made earlier. I made the grilles near top of the hood simpler and made the 7 stud tall hood flush with the slopes on the nose. Before there was a half-plate gap but that has been eliminated with a bit of SNOT. I am still not entirely happy with it and constantly tweak the littlest things to try to improve it.

Matt has a Flickr gallery at http://www.flickr.com/photos/jastermereel08/

photo by Sean Lamb

THE LONG HAUL

by Benn Coifman

What is going on when your train won't go around the track? Can you make a lighter train or a different locomotive go around the loop? If so, then you've likely pushed the limits with the heavier train that won't. This article examines many of these limits to help you pick and choose where to focus your efforts to get your trains moving.

Let's begin with a little perspective; take a look back at most of the 9v line and you will see lightweight train sets with two to four cars, and often the cars did not have bogies. A good example is at the beginning of the line in 1992. The Load N' Haul Railroad (set 4563, profiled in this issue) had three cars, each with only two axles. This tradition continues to the remote controlled Cargo Train Deluxe (set 7898) released in 2006. Another trick you see in the 9v train sets is the fact that they often make use of panels and windows to increase the volume while keeping the weight down (e.g., sets 4559 and 4561). The LEGO train motors and controllers were made for these lightweight trains. The choice made sense since the sets only came with a small oval of track and many kids would not add to it, so the trains would be short and the motors did not need to be powerful.

A notable exception to the trend is the Super Chief locomotive and cars (sets 10020, 10022, 10025) released in 2002. In comparison to the 9v trains that came before them, they weigh a ton. After these sets came out I set up a small layout in the corner of my apartment. While the floors looked level, the Super Chief made it clear that they were not: uphill slow and downhill fast. To pull five cars and two locomotives I needed two motors and they seemed to be straining at their limits.

Since those days I've gone on to pull very long and heavy trains using the 9v system. My personal record is 51 bogied cars and four locomotives over uneven track at NMRA 2007. There are many challenges to running such long trains, the first of which is simply having enough cars and track to do it. But along the way I had to overcome many other challenges that you'll likely encounter with just six or seven cars. In fact at home, I can only comfortably run trains with 6 or 7 cars, it is only by joining a LEGO Train Club that I am able to occasionally have a venue with so much track.

COLORING WITHIN THE LINES

No matter what the size of the layout is, weight will always be among your top concerns. If your surface is even a little uneven, as it was back in my apartment, the motors will have to pull the weight of the train uphill. So generally speaking, the lighter you can make the train cars, the happier your motors will be. Even if you are able to find a completely level surface, weight still comes in to play by increasing friction and inertia, which we will get to in a moment (no pun intended). Keeping the weight down is always a good starting point. But generally, the more realism you strive for, the

heavier your cars will be. As a result, I personally prefer 6 wide cars for operational reasons, but I drool at the detail you can put into 8 wide. Sometimes you can figure out tricks that give you the realism with little or no weight penalty; it just becomes one more factor in your designing process. Some of my first MOCs were boxcars, and as a result of my linear thought process the sides wound up being composed of alternating rows of plates and bricks. Needless to say, the density of plates is higher than bricks and much higher than panels, so these original cars weigh a lot. Later, when I wanted a few more boxcars, I redid the design, and built the walls out of panels. The new cars are about two-thirds the weight of the originals, but look virtually identical from the outside. While balancing aesthetics, weight, and functionality, it is hard to beat the train base for its ratio between weight and longitudinal strength.

Friction increases with weight and it crops up in several locations on a LEGO train - most importantly the wheel-sets, and secondly bogie rotation. Looking through the Lugnet archives, I clearly was not the only one having problems with the weight of the Super Chief cars. The wheel-sets (part 2878) are designed to have a needle bearing, riding only on the points at the end of the axle and thereby minimizing the friction surface. In a discussion started by Reinhard "Ben" Beneke, various AFOLs quickly found a design flaw in the wheel holder. Apparently at some point a third party manufacturer of the train wheel holder changed the design without telling LEGO, and as a result, the wheel flange would rub at the 10 o'clock and 2 o'clock positions. Older versions of the wheel holder were measured to be 0.9 mm thick, but by 2002 the thickness had grown to 1.1 mm and these thicker holders were the source of the problem. Reportedly the design problem has been fixed, but even in a brand new LEGO set a given brick may have been manufactured many years ago.

As already evident, the train wheel-set has evolved since 1992 in small but important ways. Another big change came in 2006. Prior to that year, a metal axle passed through the plastic wheels and provided the needle in the needle bearing. So the exact position of the wheels on the axle was variable. With these older wheels you may have to adjust the spacing to make sure the wheels do not rub on the wheel holder when they spin. If you notice any problems, you may also want to check the wheel spacing to make sure the wheel-set rides well on the track, particularly if your layout includes switches or crossovers. The easiest way to check is to simply put the wheel-set on the most restrictive type of track you have, i.e., crossovers and switches if you have them, otherwise, straight track is fine.

Starting in 2006, LEGO eliminated the "floating wheels" on the axle. Now the metal axle stops at the backside of the wheel and the needle is molded into the plastic on the front of the wheel. This change should eliminate the positioning problems on the axle, but the plastic on plastic bearing will likely have different performance over its lifetime than the old style metal on plastic.

Whether you have old or new wheel-sets, inevitably the needle bearing will wear away the plastic in the wheel holder. As this wear-and-tear occurs, the wheel flanges are more likely to start rubbing on the wheel holder. So every now and then flip your cars over, give each wheel-set a spin to see how long they keep spinning. A new good wheel-set will continue spinning for up to 10 sec. But even after a little use the duration of spin on a good wheel-set will drop to a few seconds. If you get almost no residual spin, then you know it is time to repair or replace that wheel-set. And of course keep an ear out for rubbing sounds that might be easily fixed by repositioning the wheels. If you do have a sluggish wheel-set, don't throw it away. As of this writing, you can purchase individual black wheel holders in the United States from the on-line Pick-A-Brick. But even if you don't do anything to a sluggish wheel-set, you can always use it under cars in a shorter train where friction is less likely to be a limiting factor, for static displays under a car that you don't run, or even detailing as train parts around the shop building or payload on a flatcar.

Some builders do away with the wheel holder and build trucks that are more aesthetically appropriate for the given car or locomotive. From everything I've read and seen first hand about such custom trucks, the friction is higher than the LEGO wheel-sets. I've found that a simple bogie consisting of two train wheel-sets, a 2x6 plate, a bogie plate, and buffer is hard to beat for longitudinal strength (though its use may mean putting function above form). But experiment and see

what works best for you.

Returning to the entire train car, curves slow LEGO trains down just like they slow real trains down. There are two forces acting on a train car in a curve, the first being momentum trying to force the train car straight ahead, pressing against the outside rail that is forcing the car in a new direction. The second force being the friction on the bogie plates as they rotate. In my non-scientific experiments I can't say which of these forces dominates, but both appear to contribute. Aside from making your trains lighter, there is little you can do about momentum, since you have to turn sometime. In fact, at times the momentum will help your motors past dirty spots in the track. For reducing the impact of the bogie plate friction, you want the contact between the rotating truck and the car body to be as smooth as possible, e.g., using the bogie plate (part 4092) or tiles for your contact. Based on my experiences I've found that LEGO trains slow more in "S"-curves than they would in an equal number of curve sections all bending in one direction. Since LEGO track has fixed radius curves, this rotational friction only comes at the junction between curve track and straight track, or curve track in opposing directions. Reducing the number of these transitions will also reduce the drag. For both momentum and bogie plate friction, you can reduce the impact of curves on your train simply by reducing the number of curves your train might be in at any given moment, spacing the curves far apart, with long straight-aways in between. If you think your track layout is causing significant slow downs, a good rule of thumb for shorter trains is to never have the angle between the front and rear of the train exceed 180 degrees at any time, and for longer (heavier) trains, try to get it down to 90 degrees.

If you suspect weight is dragging your train down, try to make sure you are always pulling the train from the front rather than pushing from the middle or rear. If the slack is not pulled tight from the front, all of the cars ahead of a pusher motor will wobble, creating extra drag, as they are forced by the rails to go forward.

While friction is your enemy in train cars, it can be your friend in the locomotive. Increasing the weight on the motor keeps your wheels from spinning. A purist can use the LEGO train weight (part 73090) or simply build your locomotives as solid as possible. Or if you don't mind concealing non-LEGO within your model, you can use coins or other metal as ballast (here in the US I prefer nickels since copper pennies are more likely to oxidize). But be careful not to over do it, since in the ballast is still weight the motor has to pull.

You may also encounter friction in some unexpected places. The train buffer beam with plow (part 45708) introduced in 2003 has very close clearance with the track. On a perfectly flat layout it is not a problem. But as soon as you encounter uneven track, the bottom of the plow can drag across the top of the rails. At best, it will simply result in a high-pitched squeak, but it can also result in a derailment.

After balancing all of the various weights and frictions, once you assemble the train together, perhaps the most critical point in your heavy train is at the rear of the last locomotive. Just like real trains, the longitudinal force on the drawbar is the largest here. Likewise, with a long train, you will need cars and locomotives with sufficient longitudinal strength to withstand such forces. While the front cars need to be strong, you can still use the weaker cars, but they'll have to ride toward the rear of the train, a technique that is also employed by real railroads. One advantage of LEGO trains is the fact that it is so easy to swap out bogies (unless they've been carefully integrated into the model). So you can motorize a few cars and thereby distribute motors throughout a train to reduce the longitudinal forces. For e.g., returning to the Super Chief for a second, I often wondered if the extra space under set 10025 was provided to allow you to insert another motor. In any event, distributing motors throughout the train does add the risk that if the locomotive derails, the rear of the train will continue pushing cars off the track. This fact might not be important if your layout is on the floor but it could be disastrous if your track hugs the edge of a table.

In the end, everything comes down to power and the need to get the electric power to the motor to move the train. If you are having problems, first check to make sure there are no breaks in continuity either due to an unplugged wire, switches being lined incorrectly, or two track segments pulled apart.

The controller is supposed to put out a fixed voltage, $V_{controller}$. Each segment of track the current has to travel through before reaching the motor will drop the voltage seen by the motor. There is a miniscule voltage drop along an individual track segment, with a greater loss at the joint between two track segments,

and a net resistance per segment, $R_{track\_segment}$. The greater the number of track segments between the controller and train, the greater the power loss. If the voltage at the motor is too small, the motor will not move. After *n* track segments, the power reaching the motor is roughly:

$$p_{motor} = \frac{V_{controller}^2 \cdot R_{motor}}{\left(R_{motor} + n \cdot R_{track\_segment}\right)^2}$$

In other words, power roughly drops inversely proportional with the square of the number of track segments between the motor and power connection to the track, i.e., $1/n^2$. Be sure to see things from the electrons' perspective. If there is a switch lined in the opposing direction then current can't flow that direction around your loop. A diverging switch next to the power connection can make for a very long distance that the electricity has to travel before reaching the motor; it has to flow all the way around the loop to get to the train, losing power with each track segment. So make sure to check that all of the switches are lined correctly.

Does your heavy train stop in spots? Can you improve performance at these spots by moving the power connection closer to them? If so, you are probably losing too much power along the track. When I have a choice, I try to put the power connector on the up-hill side of the layout, to ensure the least power loss when the train needs it most. If you have a large enough loop, there might simply be too much of a power drop to overcome through conventional methods.

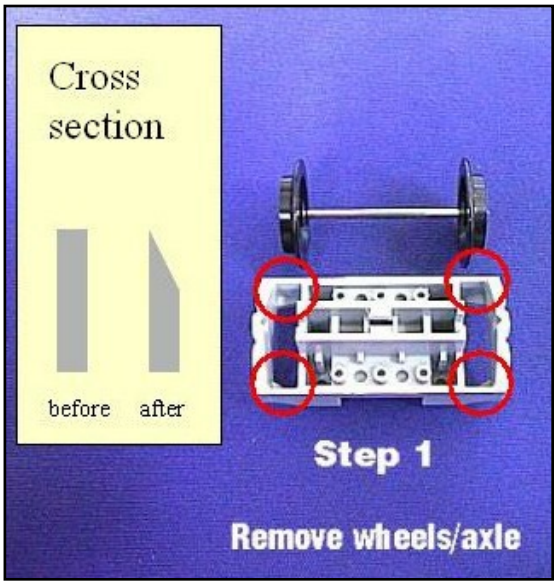
You can do some quick experiments to determine where the problems lie. While adding a headlight on the locomotive is extra power loss from the motor, it is a great indicator as to whether the motor is getting power and the intensity of the light should show you just how much power. Next, does a single locomotive make it all the way around the track? Then you should have continuity. Does it do so at slow speeds? If not, you might have dirty track (that darn inertia helped you get past at faster speeds).

A pencil eraser should help clean the track but be sure to clean the right part of the rail. The 9v motors are a little odd compared to most model railroad motors. They do not take power from the top of the rail, they take it from the inside of the rail. From the shape of the motor wheels, the most critical spot is the inside-top corner of the rail. I've found a single sweep with an eraser across this corner on each rail is usually sufficient to clean the track. If your eraser leaves a lot of dust and droppings, follow it up with a soft cloth to clean them up. On a side note, I have also found that my locomotives with two motors under one baseplate seem to dirty the track quicker than two motors under separate locomotives. Assuming it is not simply due to a small sample size, my hypothesis is that this problem arises because when two motors are under a single baseplate they are rigidly fixed together and fight one another more than when there is the extra slack in the couplers between two locomotives with one motor each.

BURSTING OUT OF THE LINES

So far the discussion has been straightforward. But I was not able to pull that 50 car train without bending the rules, or <gasp> literally cutting corners. Any deviations from LEGO guidelines are done at your own risk, and most of what follows deviates from LEGO guidelines. So exercise proper judgment and precautions.

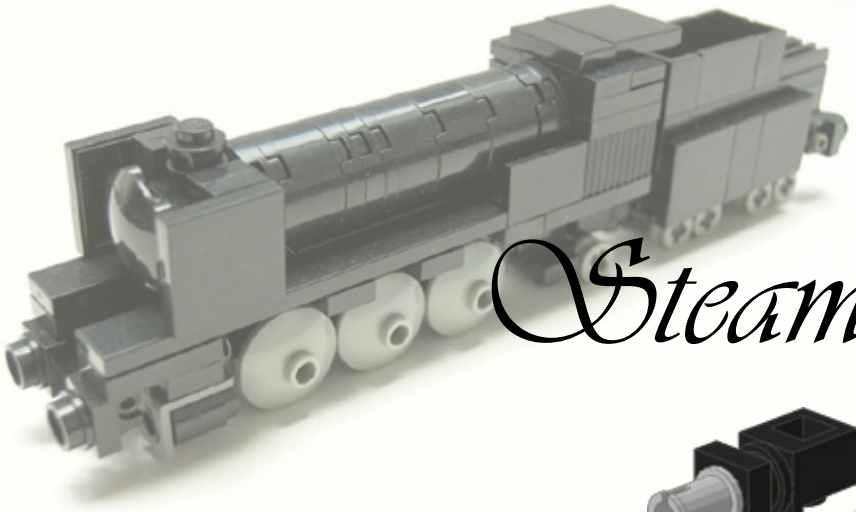
First, let's return to the wheel holder. Whether you have a new wheel-set that drags from the first day or an old one that has worn out, the AFOLs also devised a solution, namely using a hobby knife to notch out the plastic where the wheels would otherwise rub on the wheel holder. I've used this trick on almost of my rolling stock.



If the train gets too heavy, the LEGO magnets can pull apart. Assuming you are running on a loop and don't catch it in time, the front of the train can smash into the rear. You can eliminate the magnets altogether and use drawbars or shared trucks (e.g., the center of the TTX car, set 10170), but assembling the train becomes a lot more difficult. Another alternative is to use rare-earth magnets. On Lugnet, Mathew Clayson suggested using D61 3/8" x 1/16" from K&J Magnetics. Noting that "this size works very well, and isn't too fragile." (http://www.kjmagnetics.com/proddetail.asp?prod=D61&cat=10). On many occasions I've inserted these magnets between the standard LEGO magnets on adjacent cars to reinforce the coupling. When placing all of the motors at the front of the train, the forces drop off as you get further from the locomotives because there are fewer and fewer cars being pulled by that coupling. So you only need to reinforce the couplers in the front of the train, e.g., my 50 car train had these magnets between every car for roughly the first 30 cars. Rumors of other AFOL's using glue to stick the magnets together have floated around, but "glue" is a four letter word.

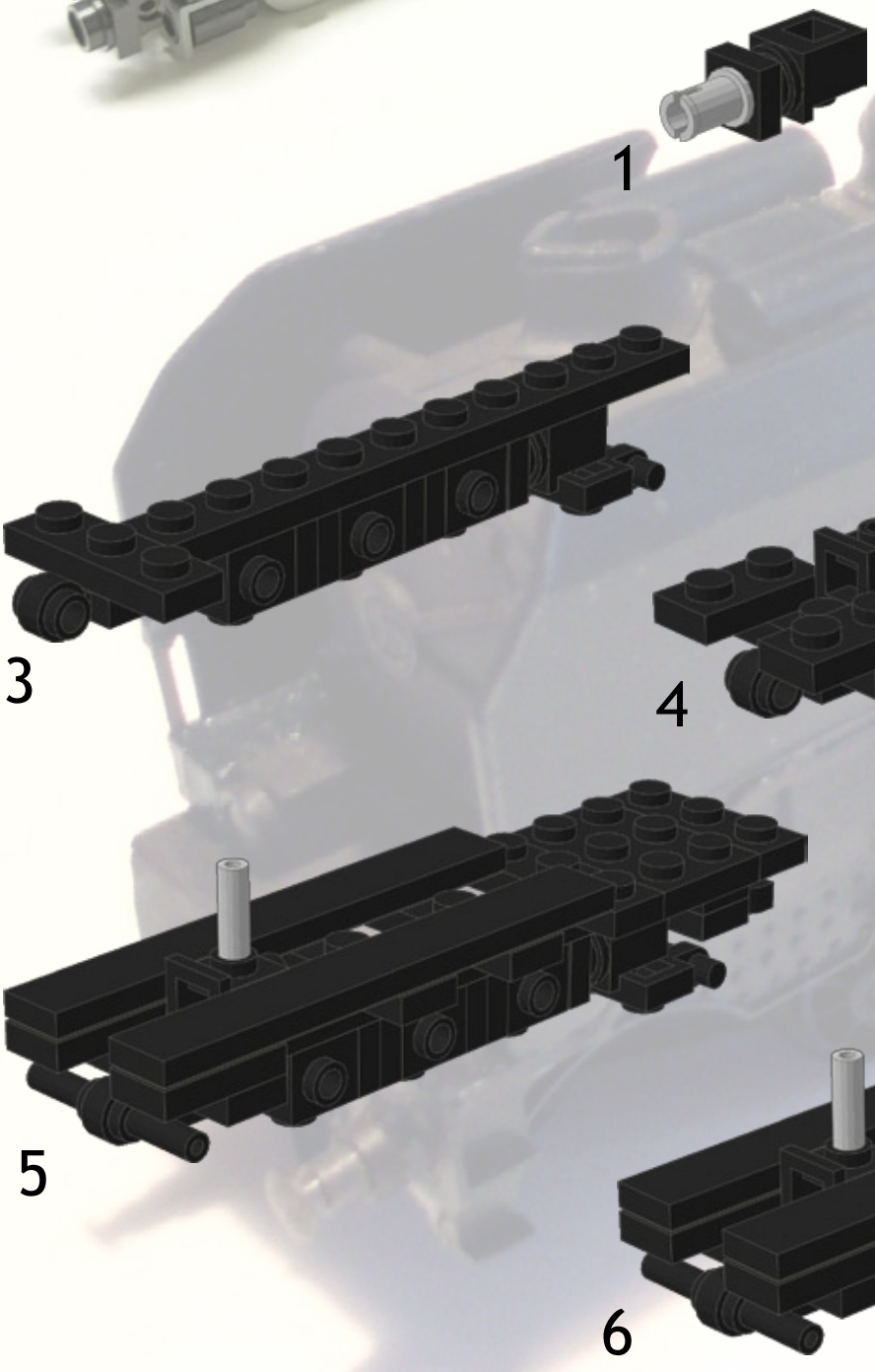
Now let's return to that power equation. There are other ways to keep n small without shrinking the size of the loop of track. If the problem is simply a long loop of track, and not a heavy train, two or more power connectors (part 5306) from the same controller to opposite ends of the loop can shrink n in the denominator of the equation and reduce the power lost to the track. But care must be taken to get the polarity correct between the two power connections. Using multiple power connections also helps keep the train speed more even around the loop. When the train is really heavy or has more than two motors, a single controller probably cannot supply enough power. So instead of using multiple power connectors from a single controller, two (or more) separate controllers on a single track will increase the available power. But it becomes that much more important to have the polarity correct with the power connectors, and all of the controllers should be set to the same level and same direction. All four of the engines pulling my 50 car train had a single motor and power was supplied by two controllers connected on opposite sides of the layout. While the train made it around the loop under its own power, I had even more operational success when I cut back to 47 cars and added a fifth locomotive. In between, I added a third controller to supply enough power to the motors. The 47 car train ran for an hour before we replaced it with another train.

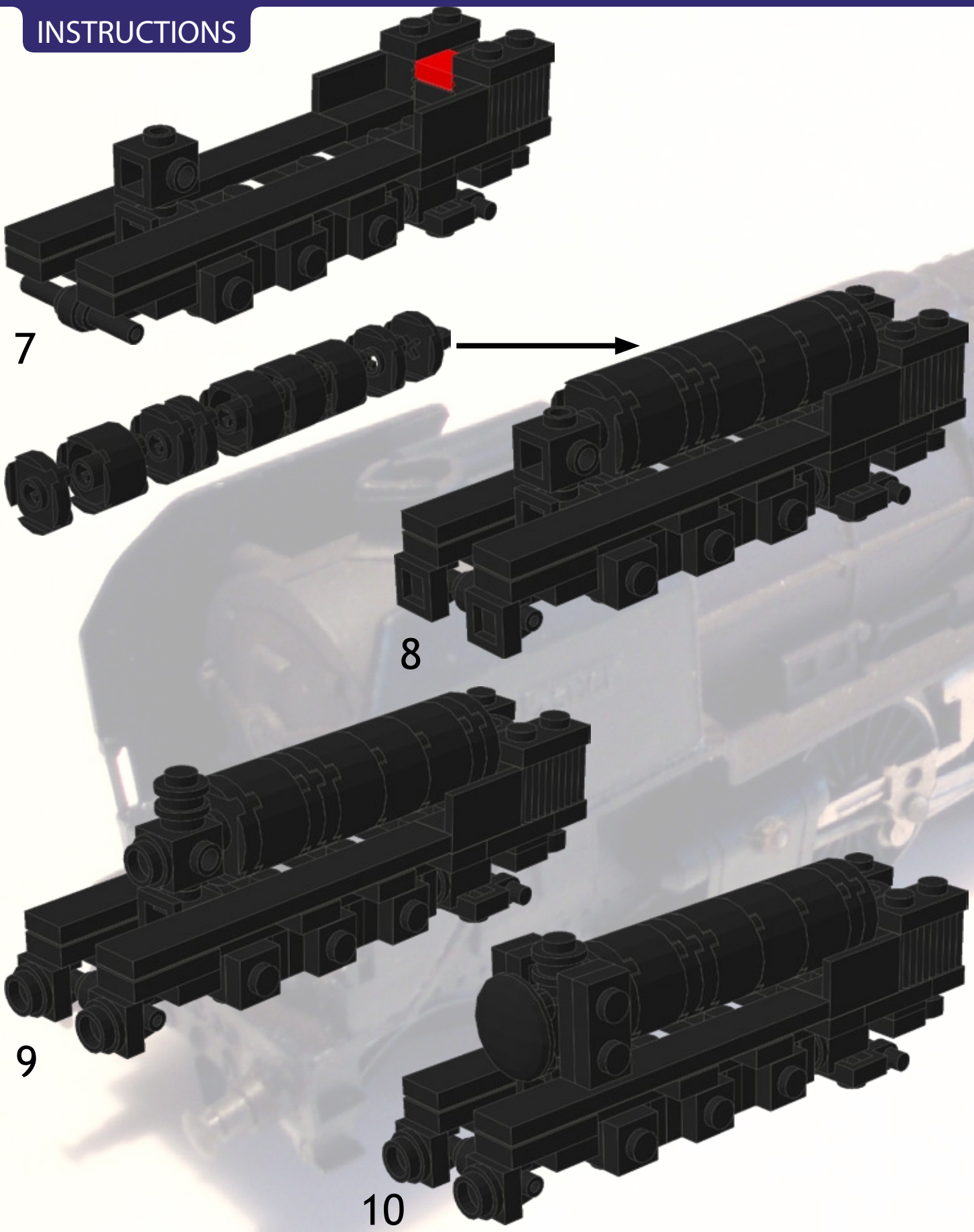
More tips and tricks
http://www.lugnet.com/~330/FAQ/Trains/tracks
http://www.lugnet.com/~330/FAQ/Trains/twofer



Steam engine

By Richard Lemeiter

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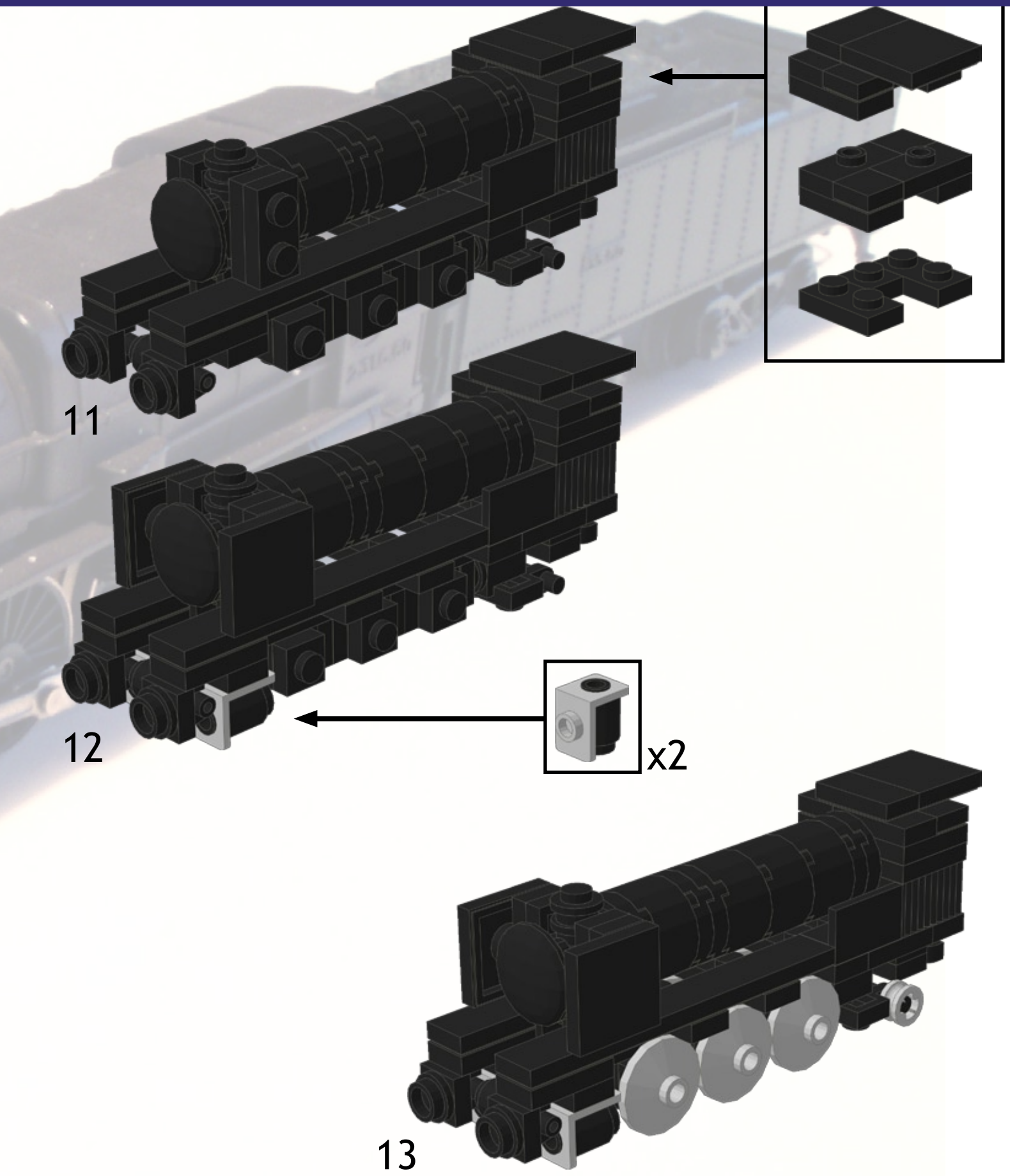
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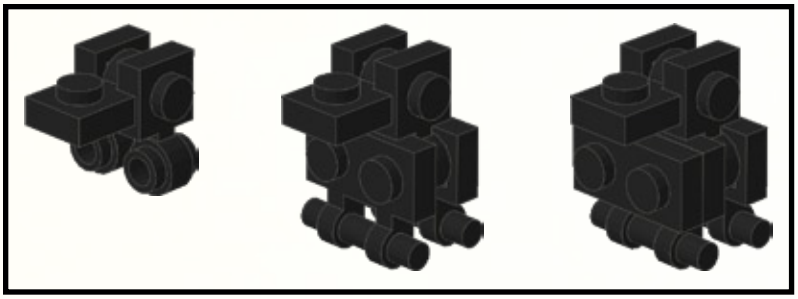

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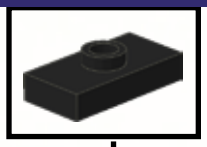

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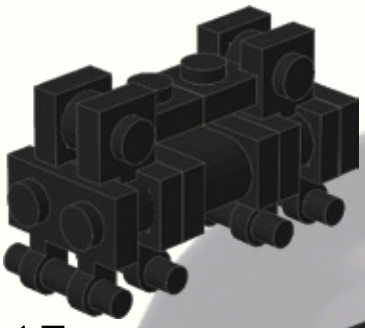

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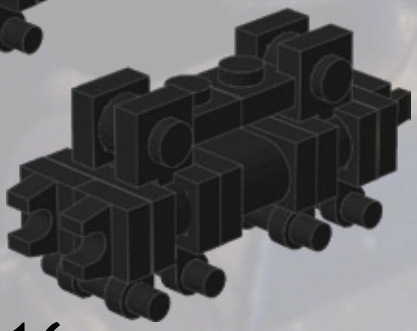

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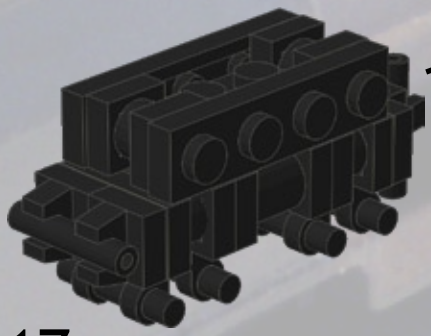

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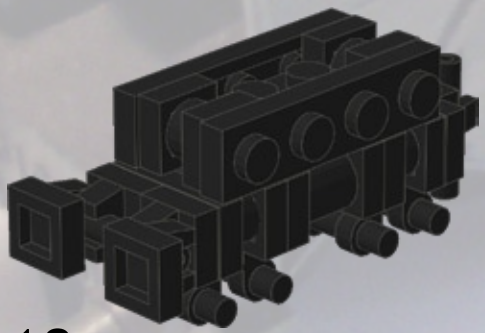

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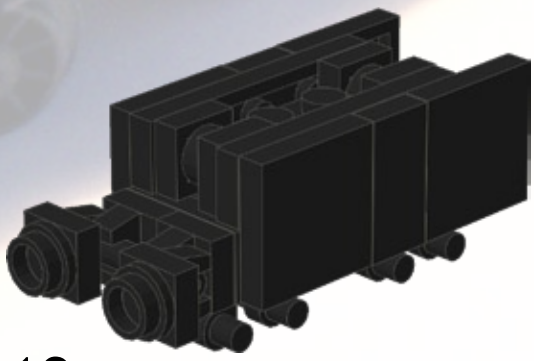

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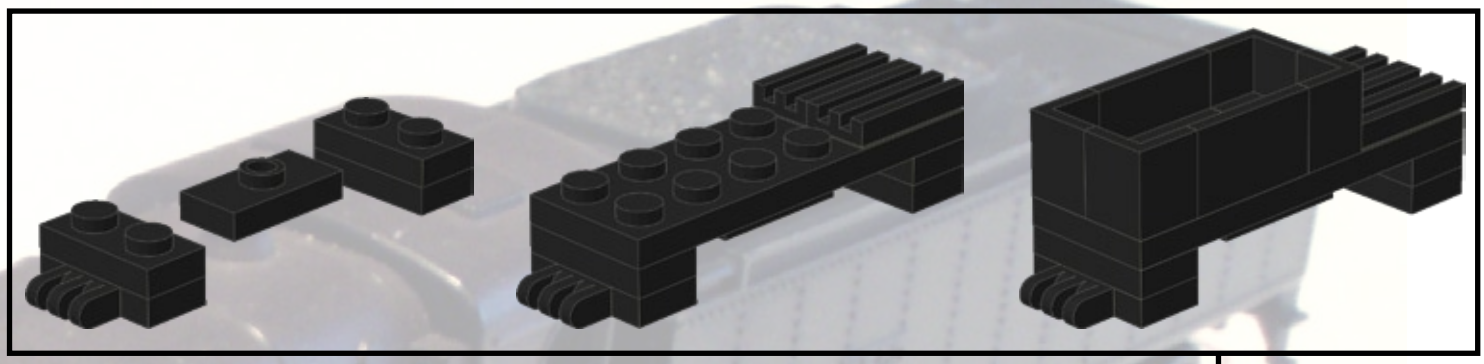
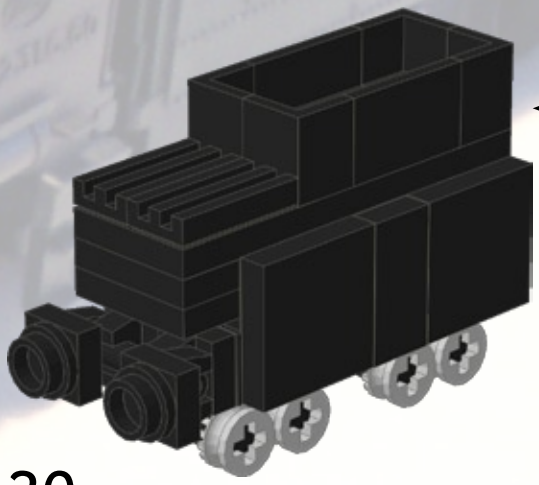




20

A Track Modification 101

by Mark Peterson

Disclaimer: *I am not the authority on track modifications.*
I am just passing on what I have tried and what I have learned from others.

Since time has begun men have always wanted what LEGO wouldn't make, until you make it yourself. Until recently, train fans saw no hope in new track, but with the RC and new power functions with plastic only track, that may be a reality. Modifying 9 volt track is relatively simple and with practice anyone can do it.

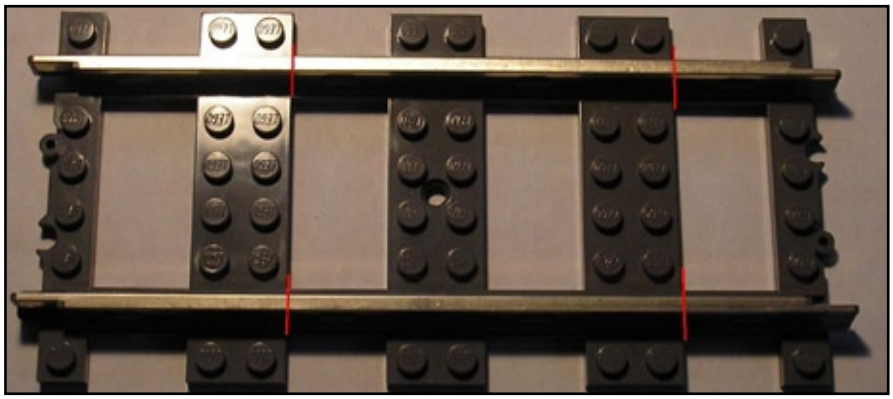
TOOLS

1. Screwdriver set, mainly flat bladed
2. Small Point Pliers
3. Hobby knife set
4. Razor saw, superfine teeth 52 TPI, ultra thin blade .008 Zona Brand www.zonatool.com
5. Glue—I use Plastruct general glue which works with multiple plastics or you can get a specific glue if you only use ABS
6. Styrene Strips- .040x0.156" www.evergreenscalemodels.com or cut up LEGO bricks
7. (not pictured) Large pair of pliers sometimes comes in handy
8. (not pictured) Spare LEGO bricks

STEP 1

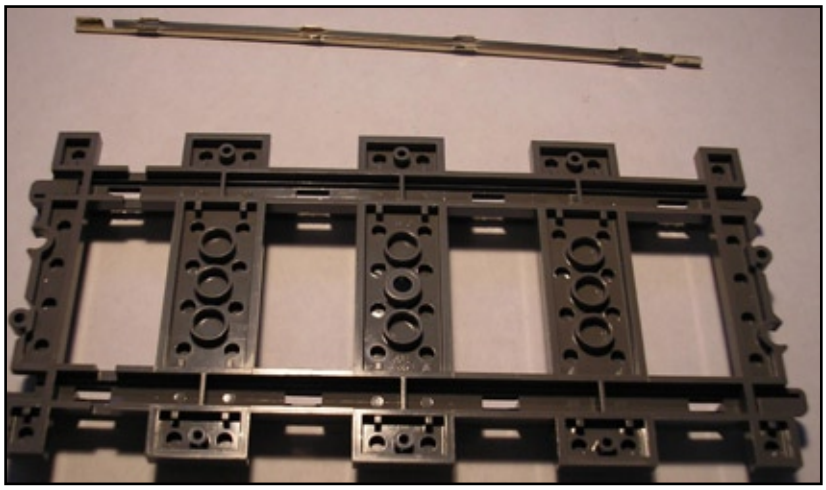
Select your piece of track and what it will become. In this article we will make a ½ piece of straight track.

Notice the red lines on the picture; those will be the cut lines later. It is beneficial for complicated modifications to layout the cuts before you do anything.



STEP 2

Remove the Metal Rails



Using a medium sized straight screwdriver, gently pry back the 8 tabs per rail.

Gently pull of the rail and set aside. Repeat for the other rail.

Do not force the rails off the track, and do not bend the rails, you will need these later.

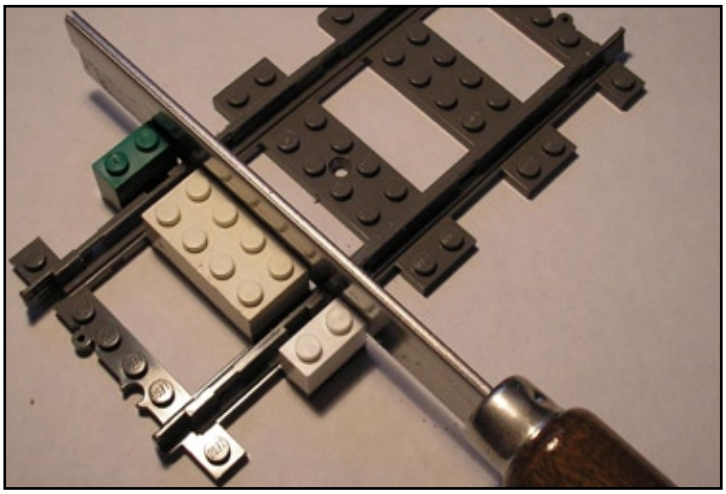
STEP 3

Cutting the Track

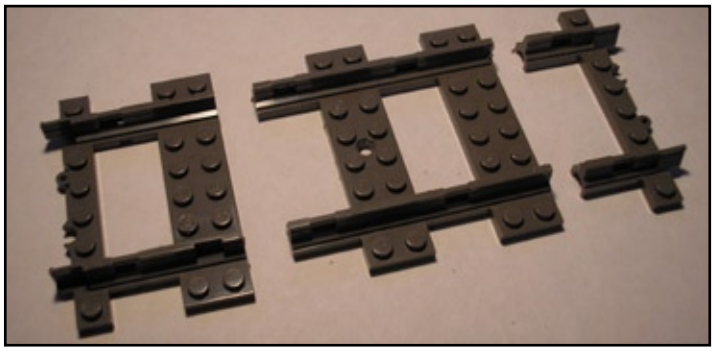
Use a LEGO or clone brick to mark where your cut is going to be.

Cut through the track using the bricks as a guide.

Make sure to protect the surface you're cutting on.

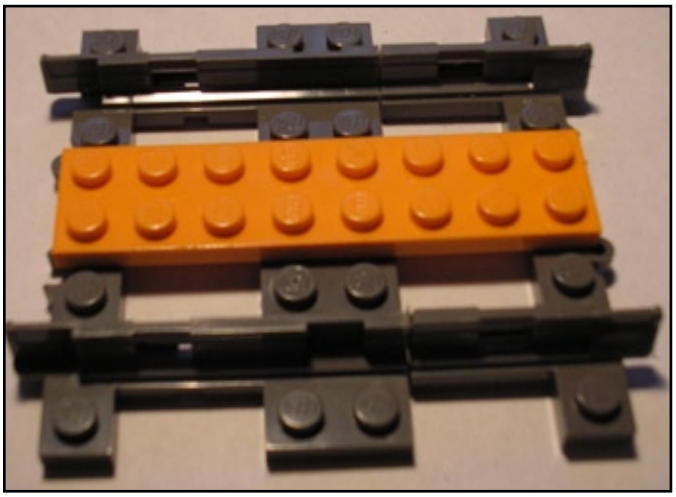


STEP 4



Set aside the middle piece and join the two ends together with bricks or plates.

If you're modifying a curve track use another piece of curve track as a jig to build from.



STEP 5

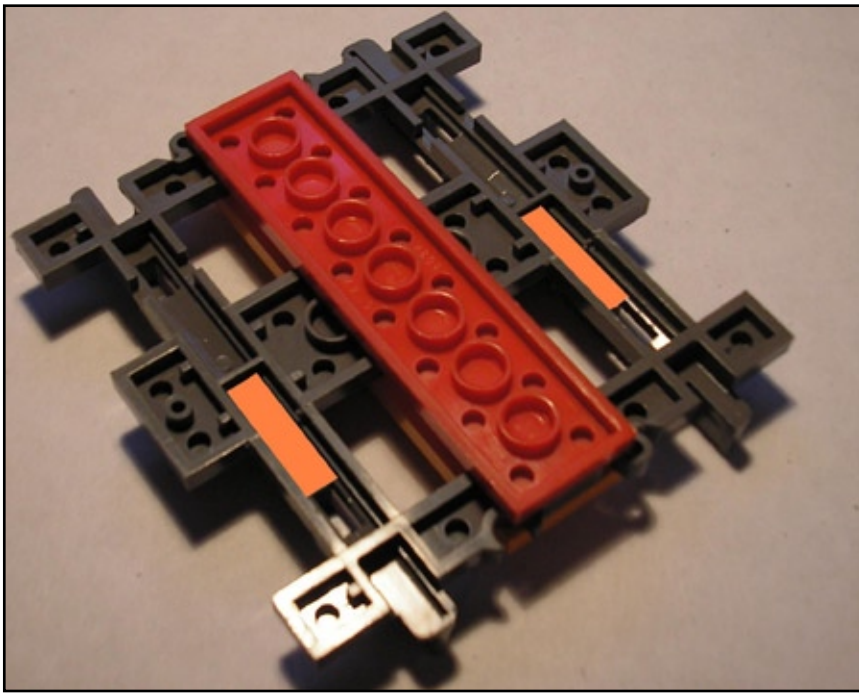
Flip track over and prepare for gluing.

Cut styrene strips or LEGO to fit highlighted area.

The Styrene size mentioned in the tool section fits perfectly.

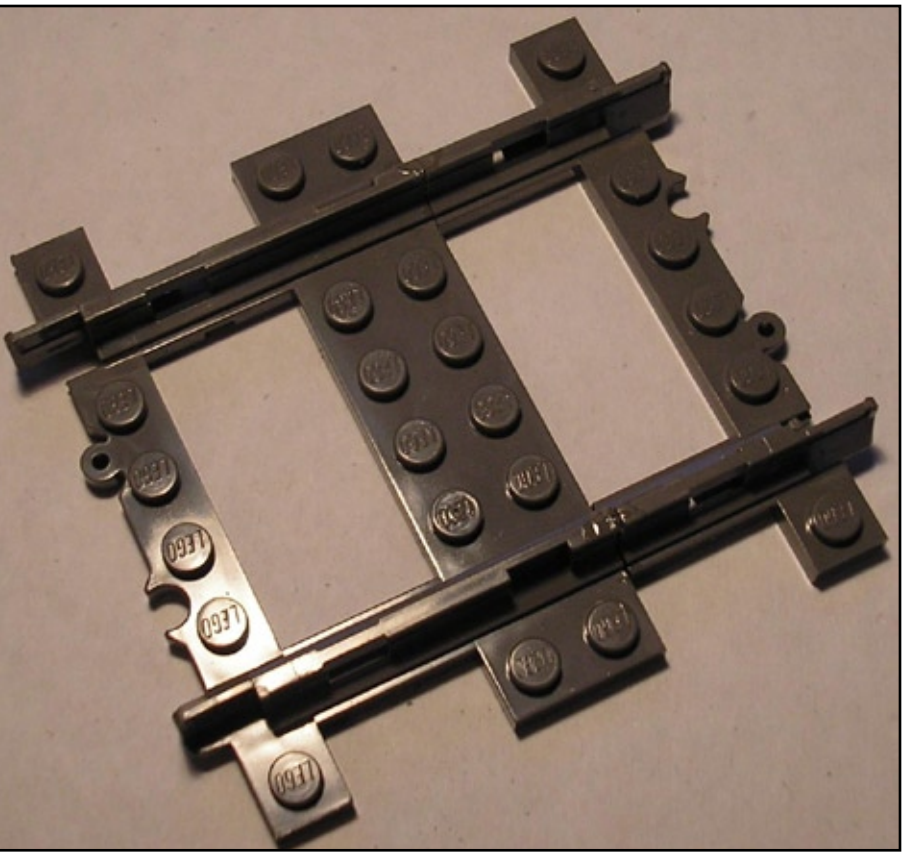
It is best when gluing not to block the notches in the track where the metal attaches, for ease of assembly later, but might be unavoidable in some circumstances.

By using the saw, your cut ends should line up perfectly. If they don't, clean up the edges so they meet. (sand paper or a file works great for this)



STEP 6

Gluing



Test fit your styrene strips of LEGO pieces.

Apply glue to the cut ends of track and stick together. Using other LEGO again for bracing also gets the sizing right.

CAUTION, do not get excess glue onto the other LEGO, they will bond to the track.

Next apply glue to the filler strips and insert into the track. Coat the joint with glue.

Set aside to cure overnight.

After curing overnight, remove the LEGO supports and make sure any excess glue is removed and the rails are nice and clean.

STEP 7
Reattaching the Rails

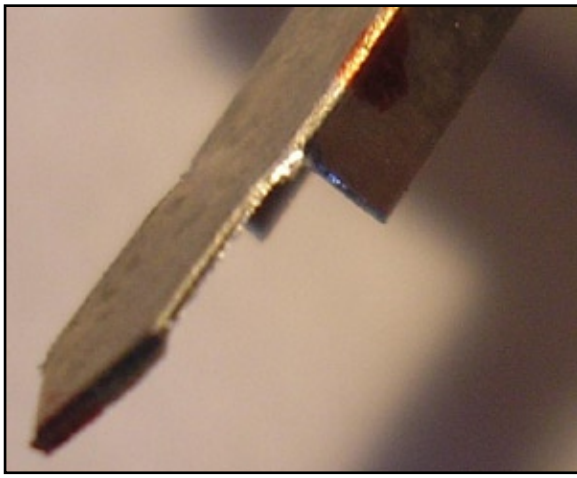
You don't want the seam in the rail over the seam in the track.

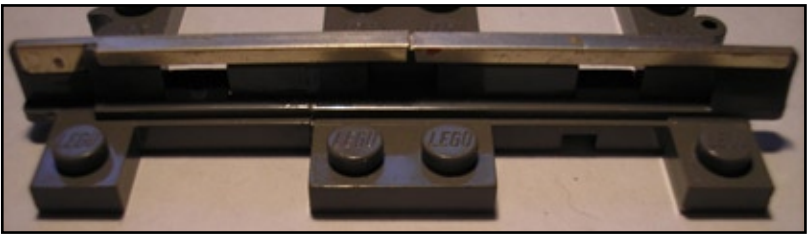
Cut the first piece of track like shown.

You're creating a tab for the track to remain conductive.

Shave a little off the plastic where the tab will go under the second part of the rail, as this keeps the track from forming a ridge.

Place rails over plastic and turn over.





Now, taking a small standard screwdriver, press the two tabs back on to the track.

Now cut the rest of the rail so there is overlap on the tab we just made and not on the sides of the rail.

Secure rail using the two tabs.

Now use your small pliers to crimp down the rail so it doesn't move.

Repeat for the other rail.

FINAL

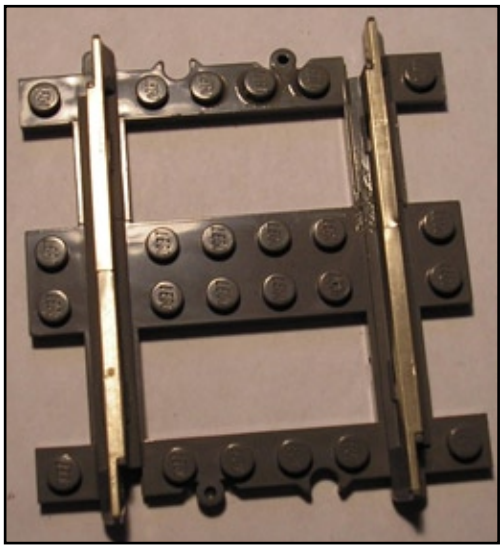
You are now finished.

Test your track to make sure it works

Use extra care when handling your modified track as they can be fragile

These same steps involved will work on any track modification. Take your time and "measure twice cut once" as 9volt track will be no longer made.

The straight piece is the simplest and with time and practice you will be able to modify anything.



http://www.brickshelf.com/cgi-bin/gallery.cgi?m=danden

http://www.brickshelf.com/cgi-bin/gallery.cgi?m=steggybean

http://www.brickshelf.com/cgi-bin/gallery.cgi?m=cale

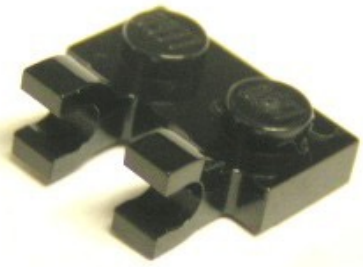
http://www.brickshelf.com/cgi-bin/gallery.cgi?m=buchi

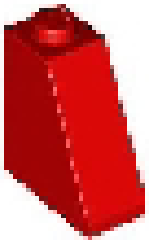
http://www.brickshelf.com/cgi-bin/gallery.cgi?m=zephyr1934

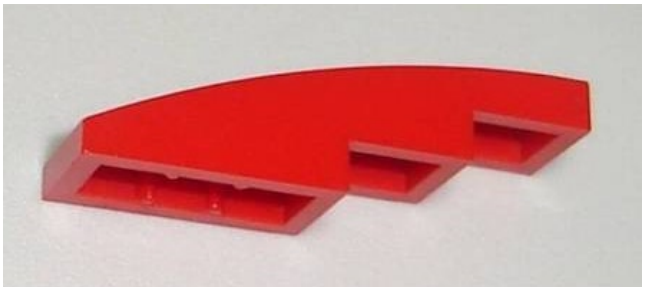
Ben Beneke

Well, there's another issue in the bag. I hope you enjoyed it. We hope to get back on track and have issue three out in record time. Remember that you too can be a contributor to RAILBRICKS. As you close these pages and use your new found inspiration to pull a chair up to your building table, take a look at the new pieces that will become available in new sets in 2008. Many of these will be useful in our future train and town MOCs and I look forward to seeing them displayed here in RAILBRICKS. See you next issue!

Images taken from the Bricklink Catalog
http://www.bricklink.com







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