Aster Berkshire Kit Building Log
A Compilation of Several Threads
Part A

Part I - Berkshire: building journal- pilot trailing truck

Original Topic URL: http://www.mylargescale.com/forum/topic.asp?TOPIC_ID=34593

Topic author: Charles
Posted on: 14 Nov 2005 20:19:48

So, the box arrives. On the box is Ga #1. Ryan opens the outer box and the inner box cover has a #1 on it. Then to the green lid there is a #1. Well, duh we all know it's gauge one 1:32....nope that was for #001 of 249.

Now the story of building the Berkshire begins. I am sure that our good friend John will be in the forefront and a great help to us (we will need it). Our log will be an effort to indicate how from beginner to experienced live steamer approach this kit:

Here we are at a stand still, as most will be until the instructions arrive! Unless one is going to freelance. At the same time we are thankful with the earthquake and pending conditions in Japan at least the kit in the engine shed.

Replies:

Reply author: Towne Comee
Replied on: 13 Nov 2005 07:19:58

Man, for a mainline engine that is one BEAUTIFUL beast! Almost makes me wanna have one! Is there soldering involved with the kit construction, Charles?

Reply author: Charles
Replied on: 13 Nov 2005 09:44:29

Towne
Have not found it necessary thus far as with most kits. The brief on this one does not indicate it as such. Enjoy

USEFUL TOOLS REQUIRED TO ASSEMBLE ASTER LIVE STEAM KIT
No machine tools are necessary. Just a set of DIY tools are more than enough.

Necessary Tools

* Wrenches
* Nippers and pliers
* + and - drivers
* Fine files (flat & round)
* Flat bench or a mirror
* Knife/cutter and/or scissors
* Grease and machine oil
* Air compressor or a pneumatic pump

Indispensable Equipment

* A suction fan (an electric fire intensifier) available from Aster dealers
* Steam cylinder oil

Useful Equipment

* Rollers for test bench

Other Useful Tools

* Pencils
* Wooden plate and nails as a jig. for easier job in bending dummy pipe lines.
* A vise(or vice)
* Metric Taps and its handle
* Drill(metric size)
* Touch-up paints for plastic models
* Rags
* A plastic or wooden hammer.

Reply author: John Allman
Replied on: 14 Nov 2005 05:49:52

You wont have much trouble building the kit. Just read the directions several times before you do anything. Do not open any package, except when you must use a part. Each stage of construction has its own packaging, and if you stick to that, you will not not mix up anything.

A few other things. Go out and buy brand new metal files. You just spent 6 grand on a kit, spend an extra 20 to get clean, sharp files. I use Nicholson files, but that doesn't matter. What matters is they are sharp and clean. The easiest way to ensure that is to buy good quality. Sharp files will make your life easier, incase there is a part that needs cleaning up.

You will need Loctite 222MS. That can be hard to find. And I use Loctite 515 as sealant for all gaskets and steam parts. Those two bottles are usually available at a place like Graingers - an industrial supply company.

You can use something other than Loctite 515 - which is specifically designed as a gasket elimator in the temp range that our locos use. Some people use Loctite 520, which is higher temp rated but similar. Do not settle for anything less that Loctite 222MS however. It is in a red bottle, and is remarkably expensive. And Critical. Use it on every, I mean every bolt, screw or nut on the locomotive used to attach any part. (please dont use it on the steam chest and valve parts, that is what the Loctite 515 is for) I have not had to touch my engines to tighen anything for several years. But the 222 variety can be loosened without heat, and just using hand tools.

Go to an autopart store and buy 1500 and 2000 grit sandpaper. The kit comes with 1000 grit. When you lap the cylinder parts, start with the 1000 supplied. Then use the 1500, and then the 2000. Lap (think sand) in one direction only. NOT back and forth. I lap about 300 strokes on the (wet) paper per part, per grit. You will know when you are done because you dont see any marks left on the faces of the valves and steam chest. And you will have sanded the skin off your fingers too. Do not be in a hurry here. I can promise you, the more time you spend on this, the better, and louder, your engine will run. Once done, the parts properly lapped will virtually stick together - because they are so smooth.

Lastly, I found that having a 2mm tap was a life saver. Sometime the prethreaded parts will have paint, or dirt in them. The tap cleans the holes. Virtually all the parts use 2mm bolts or screws, so you only need that one tap. I dont even have a handle for the tap. I clean threads with it by hand, to make sure I dont overdo anything.

I have several hundred pictures of the building of an Aster Mikado and BR 52. I will take plenty more of the Berkshire. I will post some, if you have any questions on how to complete a step.

But like I said, just read the directions. Read them again. And again. That is really the only secret. And enjoy. I find the building at least as much fun as running the locomotive.

John

Reply author: Charles
Replied on: 15 Nov 2005 16:46:30

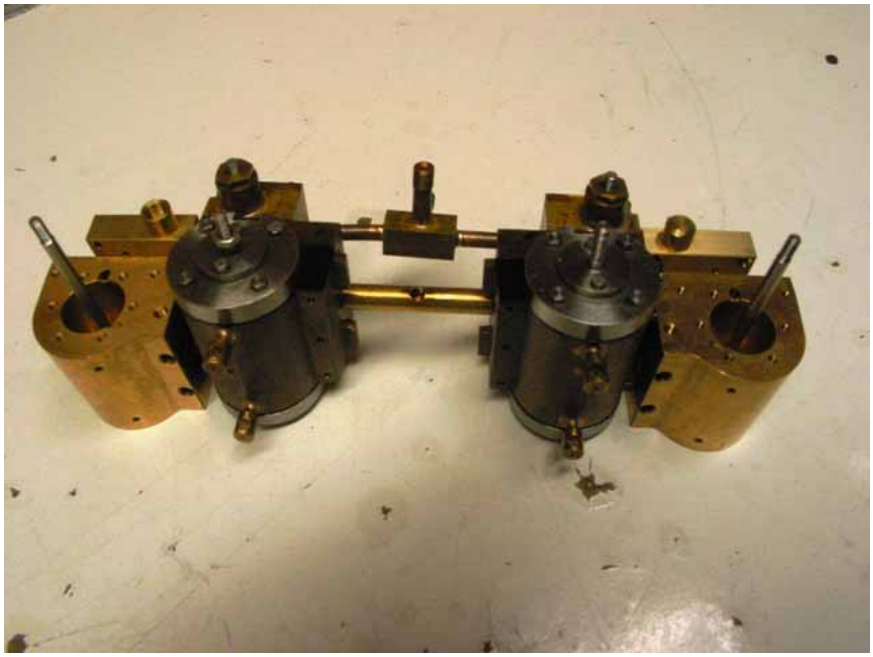
The first step in building a kit is to ensure that the kit has all it's parts. Started to go through the various parts boxes and decided to make a layout similar to the famous Aster K4 of the parts to the kit. I did not utilize all the parts since there has not be a complete inventory but it enough to make it interesting:

Reply author: Charles
Replied on: 16 Nov 2005 18:52:32

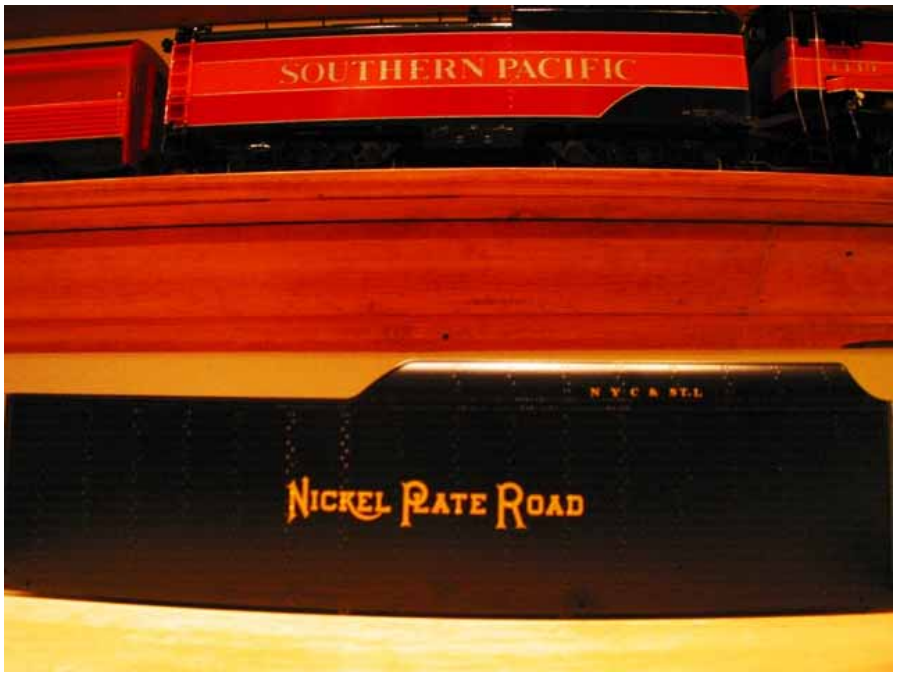
A general idea of how this engine relates to others that have been seen around the steamups:

Boiler: Berk on left and K4 on right- which is bigger?

Cylinders: GS4 set finished complete unit and basic parts of Berk on outside, which cylinder and/or pistons are bigger?



Finally, the size of the tenders, be careful with this comparison:



Well, I just had to touch, handle and do something with the Berk as we await the instructions and I find the time to work on the cylinders...

Reply author: clifforddward
Replied on: 17 Nov 2005 10:38:19

John:
Thanks for the tip on Loctite 222MS....I've been using Permatex Green in the past but have always been a bit leary of penetrating grade thread lockers for our applications. I'll be ordering a few bottles of Loctite 222MS from the following location I found online:

http://www.hmcelectronics.com/cgi-bin/scripts/product/4675-0006/

I also concur with your lapping technique progressing up to 2000 grit...gaskets are rarely needed once parts are lapped to this degree. With light oil the mated parts literally stick to one another....In some model engineering circles I have heard this called "Stiction". BTW, if paper gaskets are to be used, anything beyond about 600 grit is overkill.
Cliff

Reply author: SailorDon
Replied on: 17 Nov 2005 11:38:25

> quote:
>
> *Originally posted by clifforddward*
>
> With light oil the mated parts literally stick to one another....In some model engineering circles I have heard this called "Stiction".

I've heard "stiction" used when gauge blocks (used for calibrating micrometers, etc.) are placed together such that they will "stick" to each other. It is not a good idea to pry them apart since doing so destroys the surface finish of these gauge blocks. (Slide them apart to avoid damage.)

I'm not experienced in live steam model building, so I don't know what surface finishes go where, but I'm surprised that lapping would be required on sealing surfaces where gaskets are used. Usually a 32 RMS finish is sufficient for gasket sealing. Lapping is only required for "mirror" finishes 8 RMS or smoother. If you want to lap with 2000 grit paper just to prove you can seal without a gasket, I guess that's OK too.

I assume the lapping is only for static seals. You wouldn't want to use a lapped finish on the dynamic sealing surfaces of the pistons, cylinders and valves. There should be some micro roughness to the surface to allow the steam oil to lubricate. In gasoline engines the cylinders are honed with an angled cross hatch pattern to trap lubricating oil to keep the piston ring sealing surfaces lubricated. I think that steam engines would benefit from that same suface lubrication desgin.

Reply author: clifforddward
Replied on: 17 Nov 2005 16:41:09

{SailorDon wrote: I assume the lapping is only for static seals. You wouldn't want to use a lapped finish on the dynamic sealing surfaces of the pistons, cylinders and valves.}

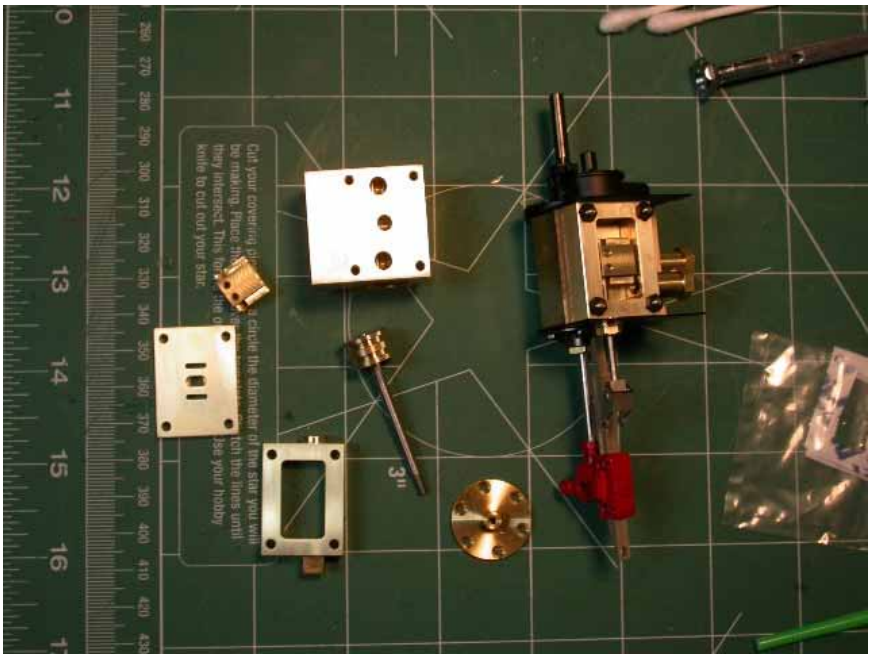
Right so Don...Your clarifications are spot one...sorry I did not point out the difference in my description. Right too that the term stiction refers perhaps originally to gage block use...and potential mis-use!

Perhaps I made an incorrect assumption that most here would already be aware of the nature of a honed surface for dynamic sealing surfaces....perhaps an explanation is in order?

I don't know about the Aster kits...do the dynamic surfaces already come with a finished surface?

Reply author: John Allman
Replied on: 17 Nov 2005 13:11:02

Look at this picture again:



You sand/lap/whatever the machining marks on the face of the cylinder inlet, the cross ported slide valve cover, and the bottom of the side valve. The D slide valve moves back and forth on the top of the cylinder. There is no gasket, nor gasket substitute there. There are paper gaskets (dollar bills work as well, or better, because of the way the paper is made) that go between the main parts to form the steam chest. In the picture, thats the parts from 6 o'clock to 12 o'clock that assemble into the cylinder on the right.

Reply author: Charles
Replied on: 17 Nov 2005 16:25:11

This building log has in mind how it is for an average modeler to be able successful in building a steam engine in kit form. The process shown will be to help other gain confidence in learning about steam engines inside out. References to the real engine will be done in hopes to enhance the history and overview of how and why the design was developed. Finally, it is hoped that all that follow can acknowledge that it does not take the skills of a machinist, the knowledge of an engineer or the understanding of thermodynamics to get from kit from to steam up.

Another reference about the 1:1 Berk and the kit itself can be found on Southern Steam Trains web site:

http://www.southernsteamtrains.com/nkp%20berkshire.htm

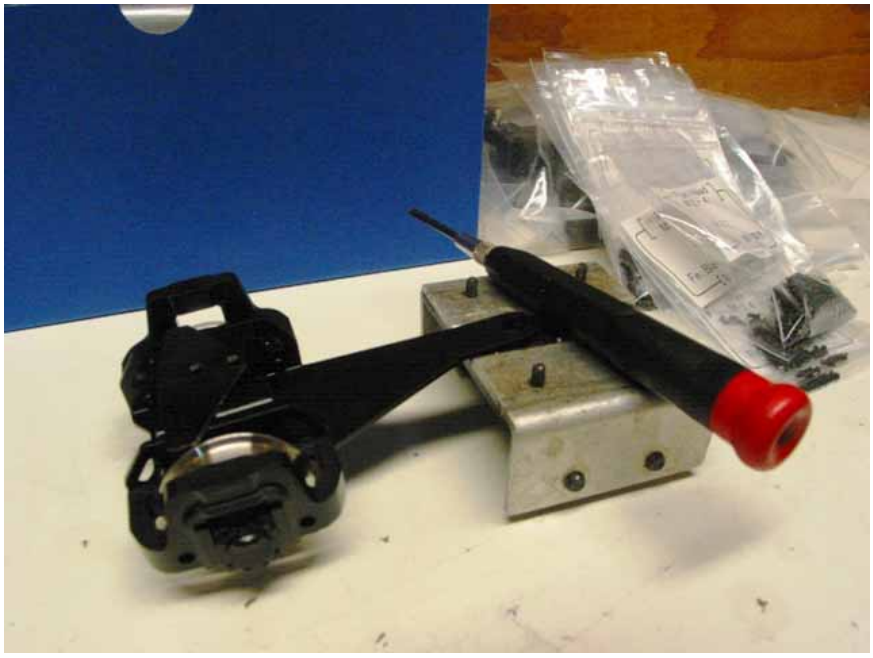
"Thinking out side the box" while waiting the opportunity to start, something was missing but now we begin.

The opening of the box and building this excellent Aster model commenced:

The kit is labeled both in boxes and the respective parts with regards to the various items to be built(e.g.cylinders in box "AA"):

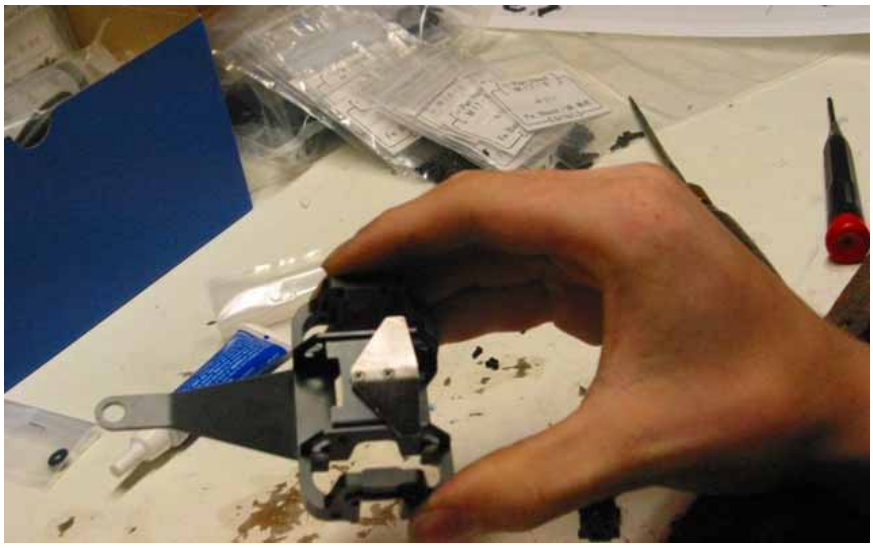
Our choice was to complete this part first and it is:

We will continue to "pilot" this building log as we piece locomotive parts together:



This shows the basic steps and applications needs to build the pilot truck:

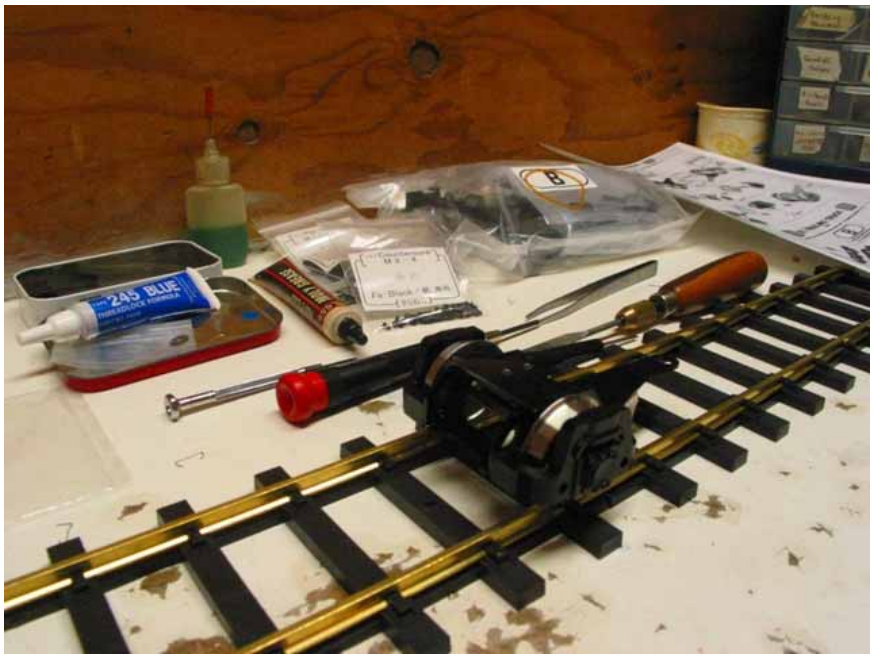
Four screw hold the "H" pattern piece under the "arrow" shaped piece with 2 screws (all screws have a touch of loctite.



Next turned over the pilot truck to place the springs, then greased the journal boxes to be put onto the wheel axle.

Then loctite and screw the journal boxes secure with a long thread screw on each side:

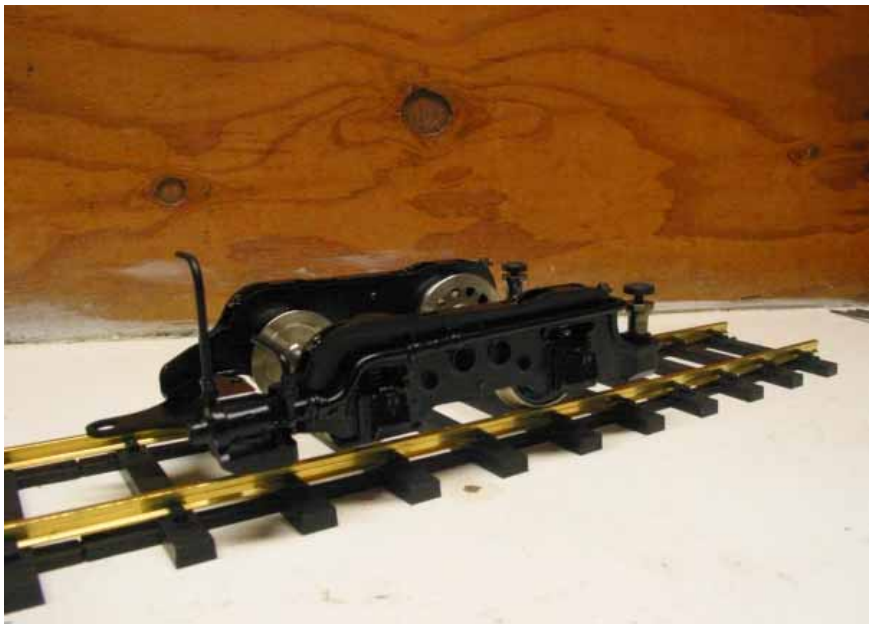
First complete component for the Berk:



Reply author: Charles
Replied on: 17 Nov 2005 20:16:17

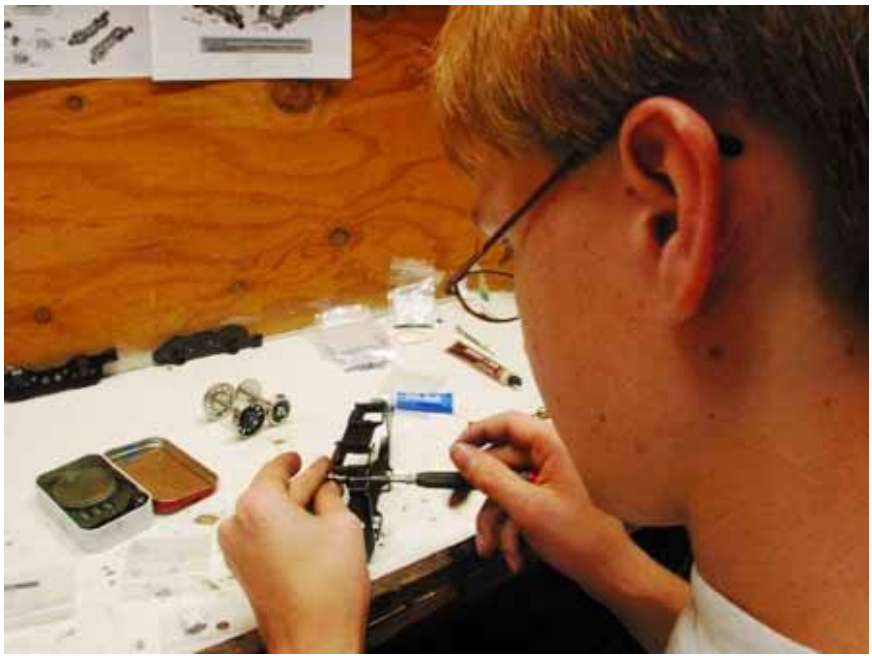
In about an hour and a half we were able to complete two items this evening:

The trailing truck (sits under the firebox/cab) will be highlighted tomorrow for the basic steps:



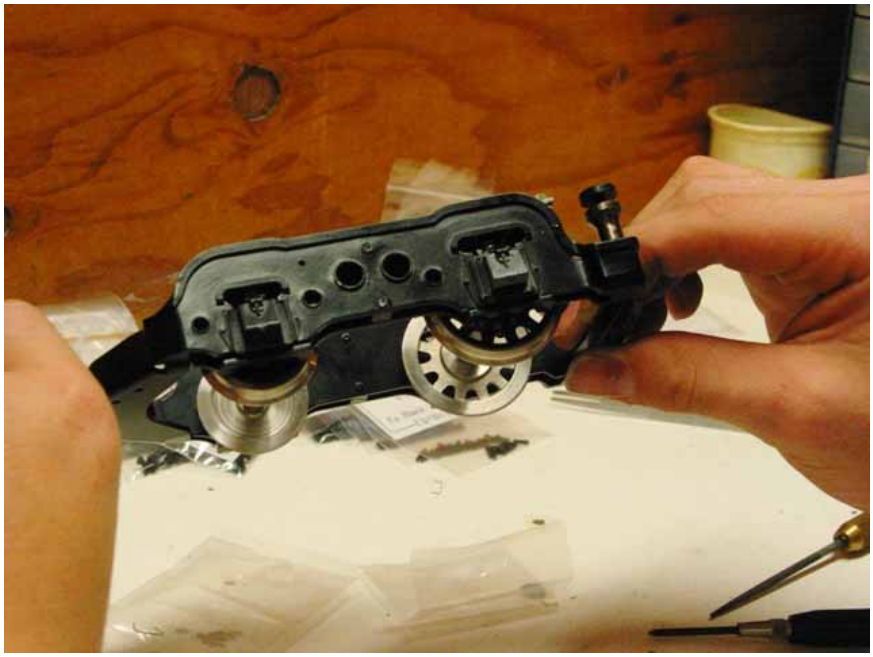
The package of components for building the trailing truck:

Ryan setting the screw in place for the basic parts:



The assembly of the outside frame/journal boxes that are "equalized" with springs:

Attached via screws the outside frame to the trailing truck body. The journals and springs all for the truck to ride up and down with the flow of the track:



Next in a new thread will be the main frame of the engine.

Reply author: Mike O
Replied on: 17 Nov 2005 20:19:24
Message:

What is the length of the tender body?

Reply author: Charles
Replied on: 17 Nov 2005 20:26:02
Message:

Mike
If I remember my measurements about 16 inches, same as the GS4.

Reply author: GNSteamer
Replied on: 18 Nov 2005 16:00:44

As a first time kit builder of anything live steam, the Aster Mikado kit was quite the learning experience in terms of patience and "blind faith" that this whole thing would eventually run. The tube of packing compound or latex sealant that is included with the kit or in my case I had to buy because the one included was rock hard, you will only use a very small amount of. Use it sparingly as it is like the teflon tape that you use when you connect threaded plumbing connections. Apply it with a toothpick onto the male fitting level to the top of the threads is sufficient. There are warnings about using too much, that will end up blocking up the lines is true as there is no where for the stuff to go on the fine threads. Tighten each fitting snuggly as you get everything aligned properly. The more attention here will lessen the numbers of fittings that will inevitably leak when you fire the locomotive up the first time.

I lapped my cylinder mating faces to a mirror finish using up to 4000 wet and was amazed at the amount of adhesion the two blocks of metal achieve with only a few microns of water between them. The valve events will be more precise and smooth the more attention that is spent in this area. Otherwise nothing else seemed to require an advanced degree.

I would imagine your Berkshire kits have arrived to you packed with the proper components. Aster packed the wrong cylinder studs with the Mikado kit, yet it seems no one has made any comment to that fact. Also the post production modifications to the Mikado kit were not communicated for instance the meek tender pump kit was revised to use a larger bore pump where the holes in the tender floor don't match up requiring drilling new holes.

Having a set of metric taps helped clean up the threads of paint in a couple of areas during assembly. Use plenty of oil and oil frequently when you get to the part of steam testing. Wear old clothes and do your testing where you don't care where the vaporized oil lands.

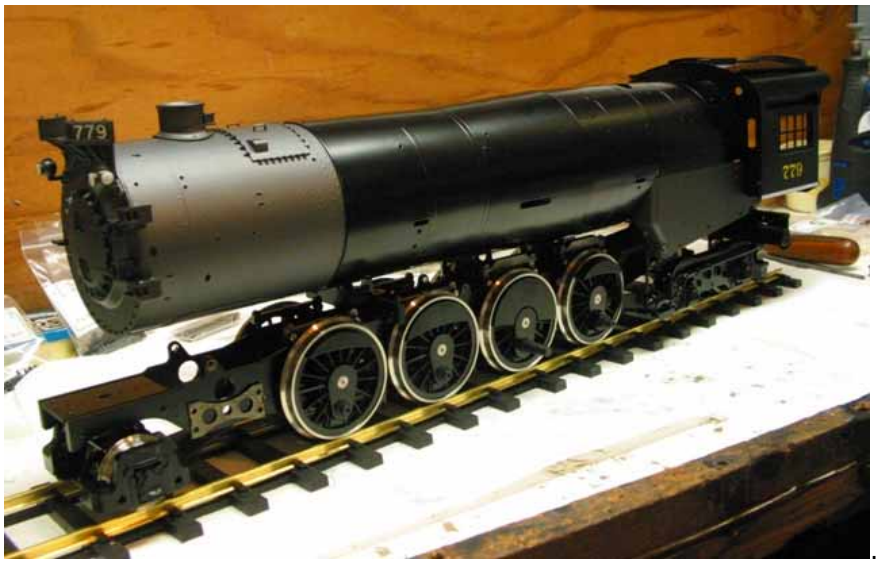
I look forward to building another Aster kit some day if I find a Big Boy or a reasonably priced K4.

Part II - Berkshire: building journal main frame

Original Topic URL: http://www.mylargescale.com/forum/topic.asp?TOPIC_ID=34798

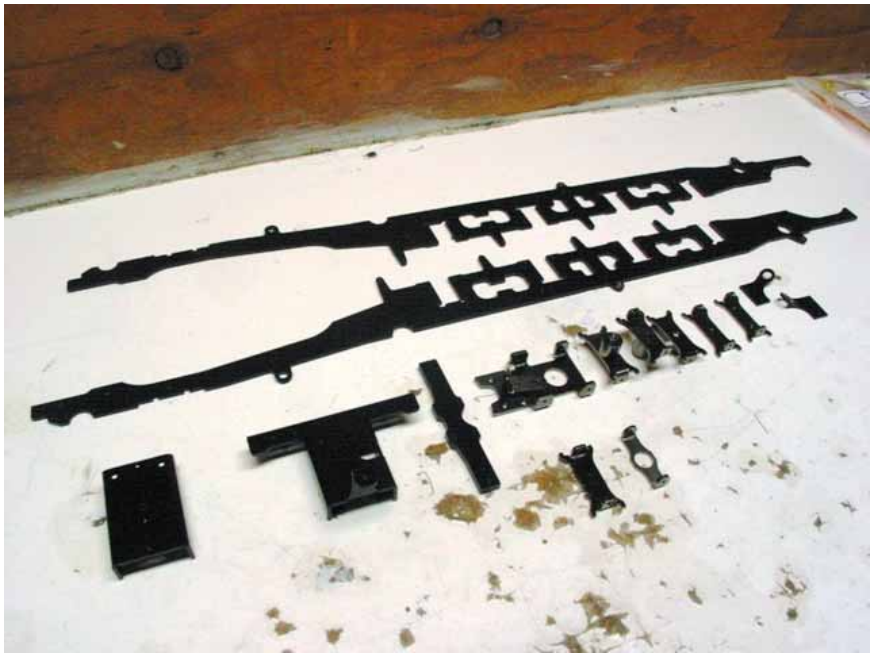
Topic author: Charles
Posted on: 18 Nov 2005 19:28:58

To labor on requires one to have vision and encouragement. Many aspects are routine and rather boring to read about. The completion of this image took 3.5 hours over the course of this past week(less some large pre-made objects).

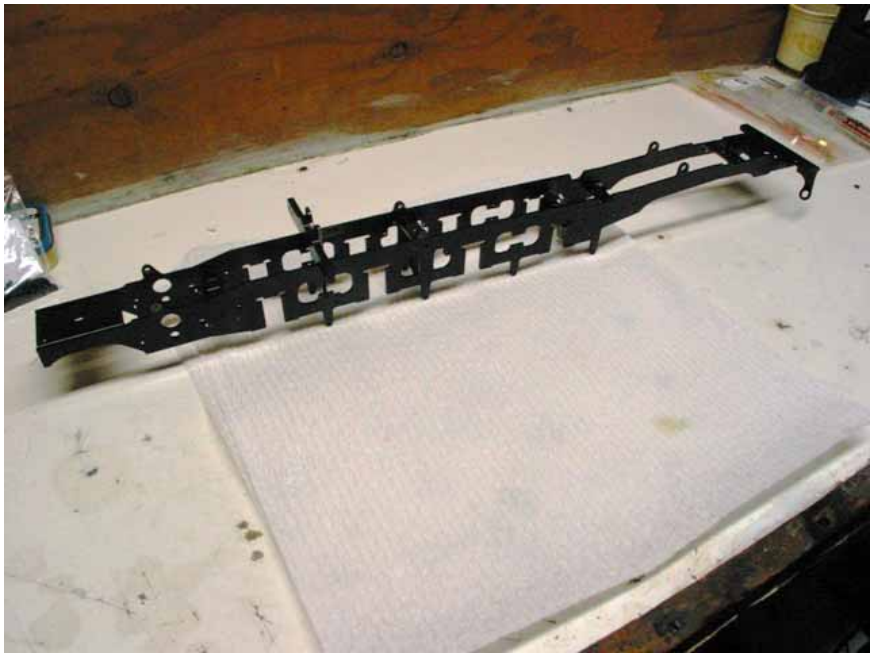


The main frame components had over 44 main parts (large pieces) and over 144 small pieces, not counting screws, washers, or skin!

Here is a sample layout of some parts to the main frame at the starting point:

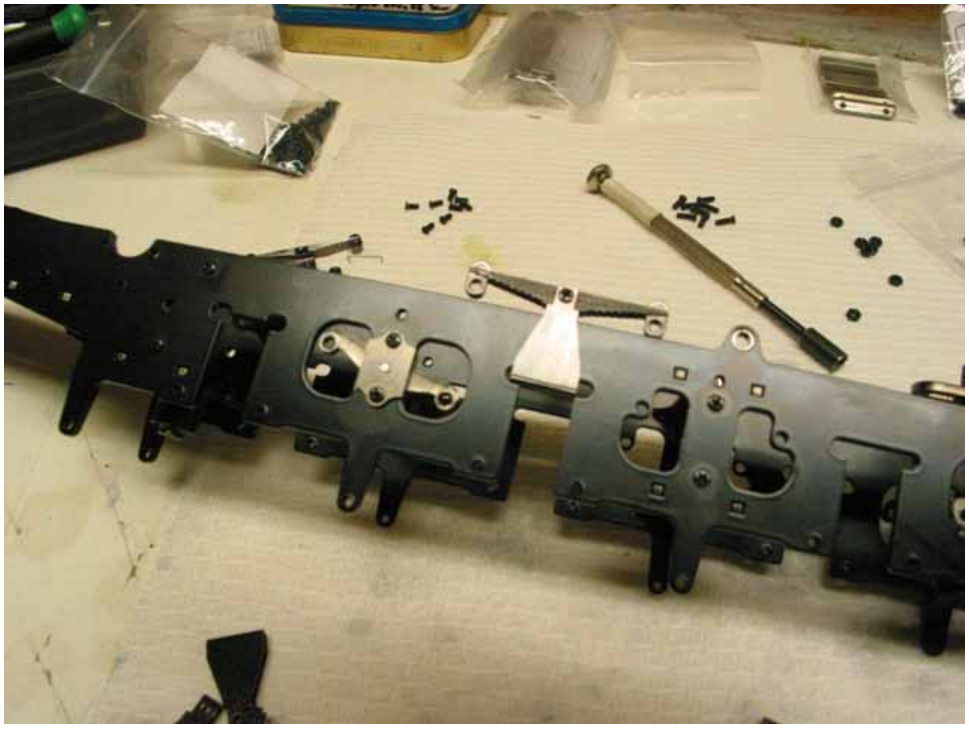


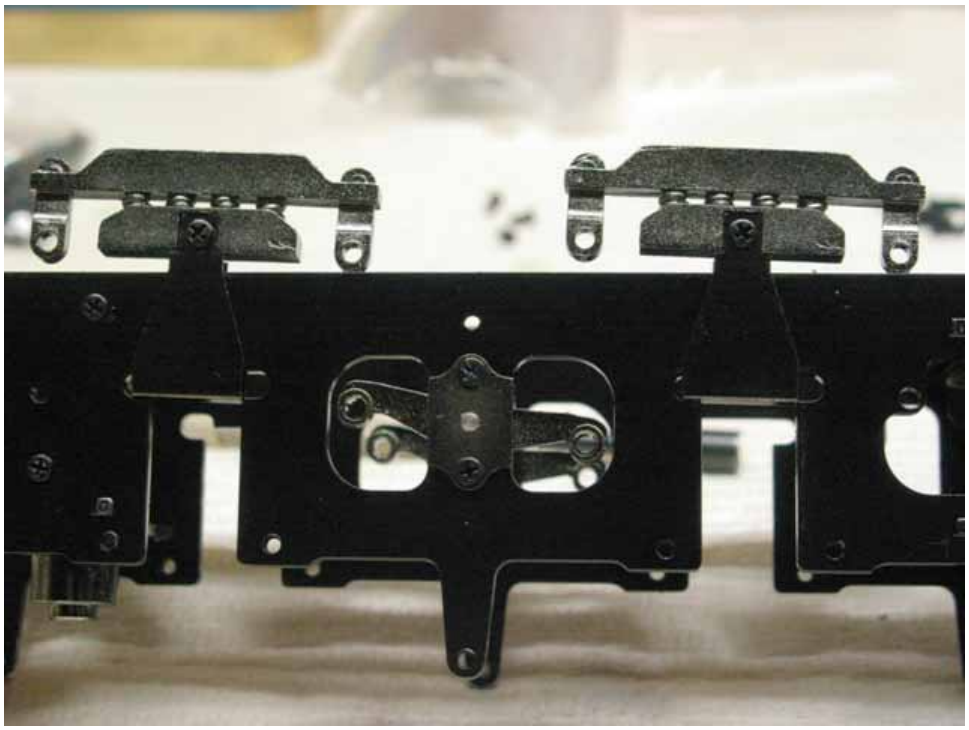
The frame will be the saddle on which all things ride, are hung, get channelled through or supported by. Missing a part, screw or misalignment here might require the engine boiler off correction later on.



There are vehicles noted for their smooth ride and then there are rides that rough due to the lack of suspension. The Aster Birk is fully equalized so that it can allow for variation in the track and travel of each wheel:

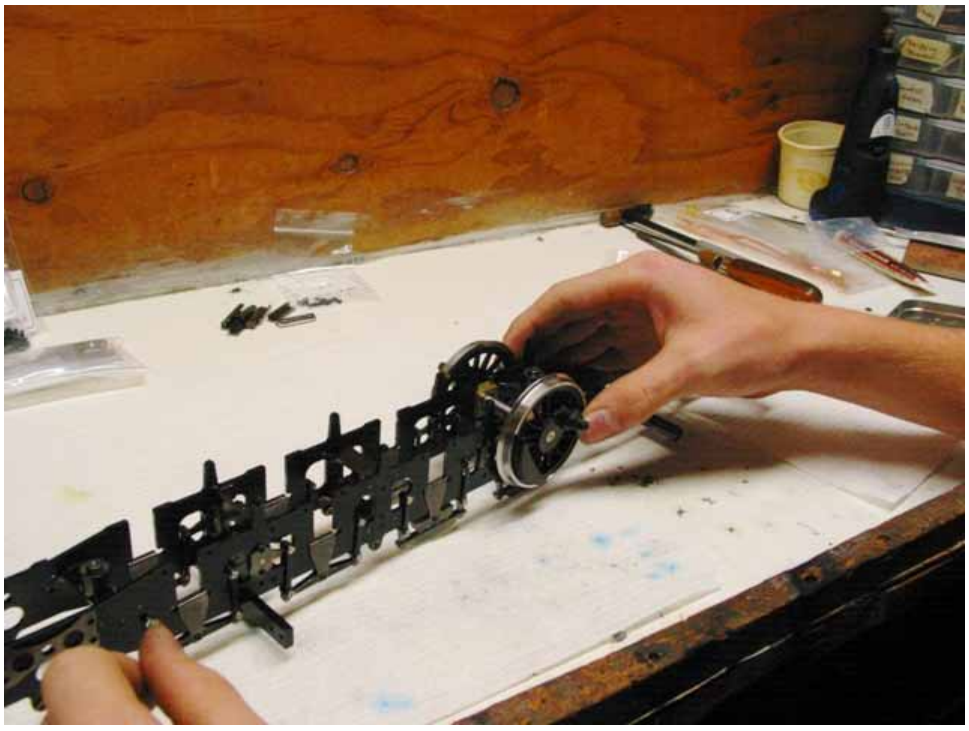
The installation of the equalizing springs requires quite a few parts but it is critical in the performance of the engine related to the track:





Having complete the frame, it was time to put the wheels in motion:

Interesting about the wheels, the counterweights keep the motion of the wheel going when spun and each wheel had a specific design in spokes along with the amount of weight:



Hmmm... how about a trade secret from Aster, you got to lock the wheels in place to the frame. Just two little screws and a bracklet is all that does it:

Once all the wheels are in proper order and the brake rigging is set then it's off to some internal components that move radical fluid through and to some hot pistons.

Well, that does it. My camera battery needs recharging and we are a bit worn ourselves. So, off to a steam up tomorrow for a break and keep the motivation going...

Replies:

Reply author: Charles
Replied on: 22 Nov 2005 16:47:20

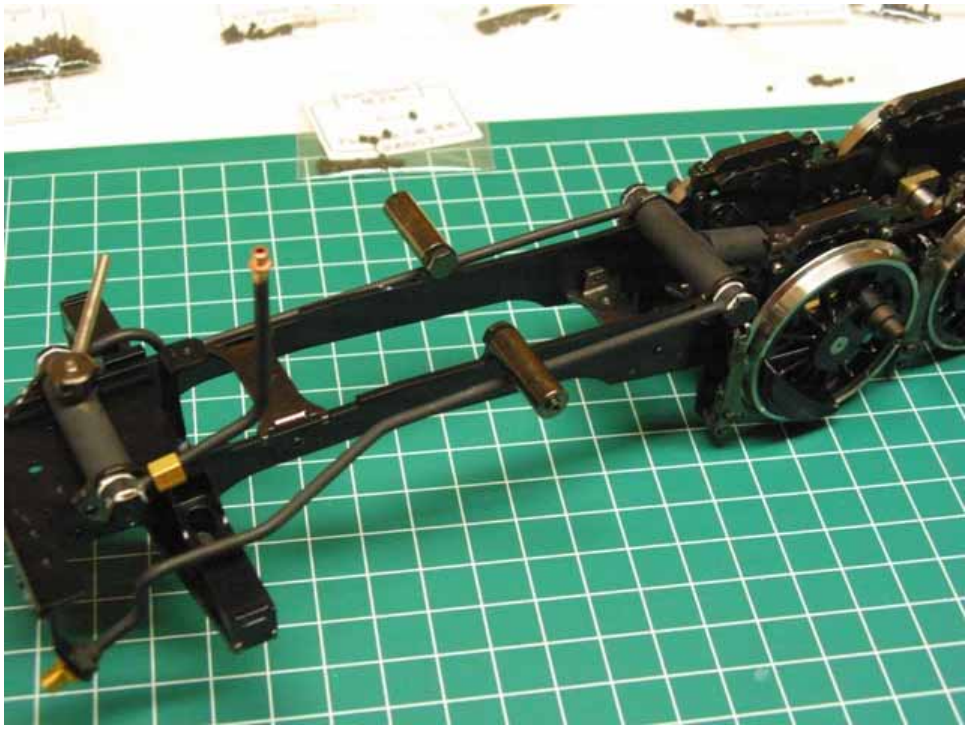
While continuing the finishing process on the cylinders we moved onto the other end of the main frame. Here we worked to install the axle pump and bypass.

The main components of axle pump, bypass, lines and screws are indicated in this layout:

The eccentric and the axle pump are jointed by a rod:

The axle pump body is angled on this engine:

Placement of the lines to the body of axle pump and bypass requires to ingredients; oil to moving parts and sealant to prevent leaks:



You will note that we painted the parts instead of having them showing.

Next we plan of finishing the cylinders with photos.

Reply author: Charles
Replied on: 27 Nov 2005 07:25:00
Message:

Total building time for this portion 2 hours and completed kit thus far(frame reverser/drain cocks) with tender and this portion of the frame 14.75 hours.

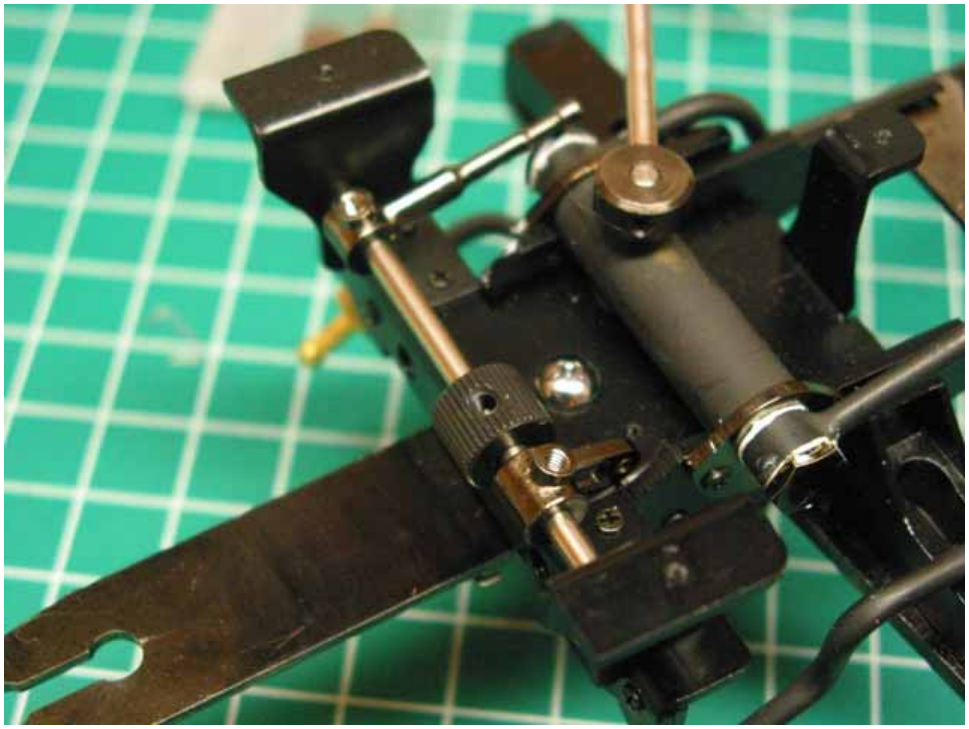
Installed the following items:

Draw bar
Drain cock "cog"
Reverser "cog"

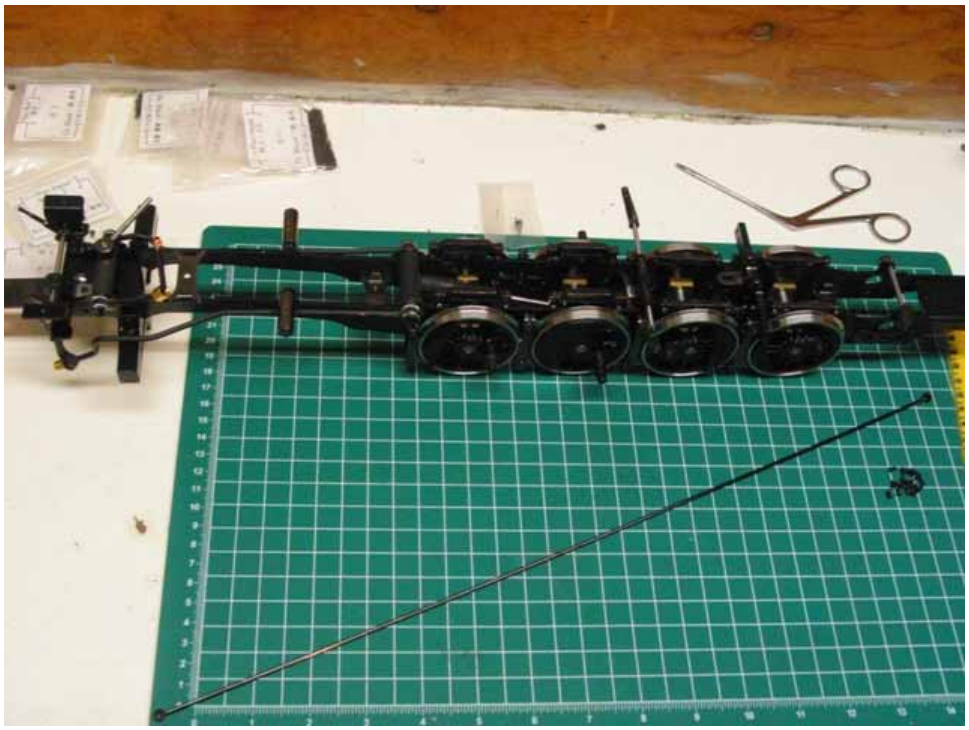
Interesting with both the drain cocks and reverser the operator can notch the lever so that it is set not allowing it to slip from the desired setting.

Over all parts for this portion:

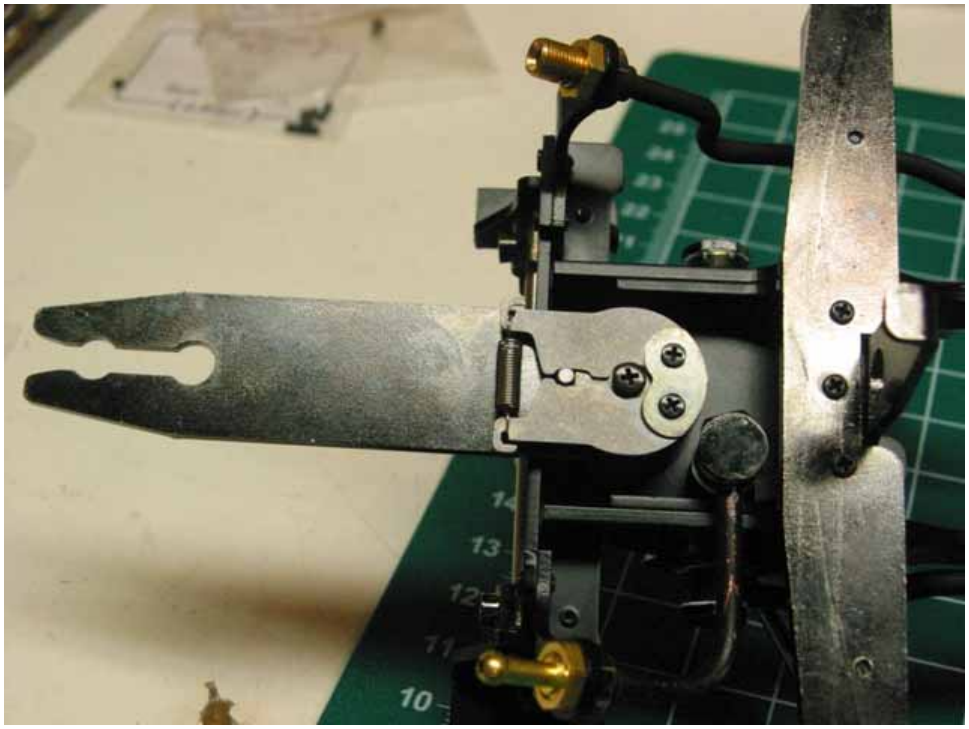
Here is the drain cock cog and lever to set the opening to relieve cylinder condensation:



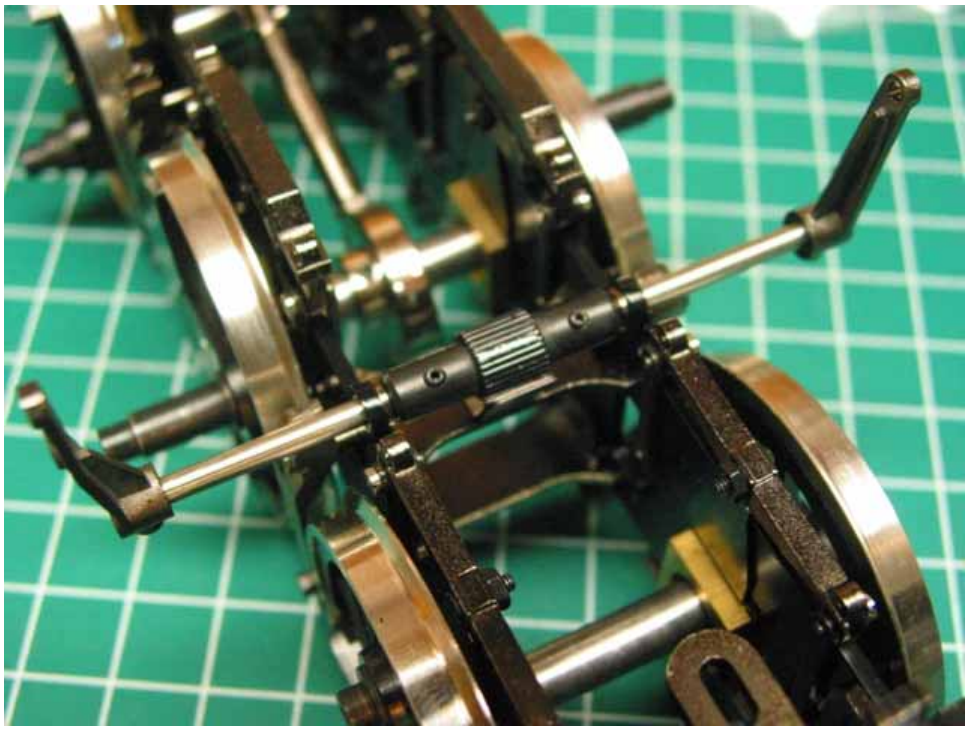
The long rod is the link between the cab and the tie in at the cylinder area:



Here is the draw bar which swings well, quick release and spring activation:



The reverser mechanism portion is the component in the main frame, nothing yet in the cab:



Part III - Berk Kit: Tender Detailed & completed

Original Topic URL: http://www.mylargescale.com/forum/topic.asp?TOPIC_ID=34931

Topic author: Charles
Posted on: 24 Nov 2005 08:35:57

Simple....one would think with only two trucks, a shell and attaching part such as fuel and water bunker. So, if the main frame with two trucks, eight wheels, axle pump and by pass took 3.5 hours this should be an evening work.

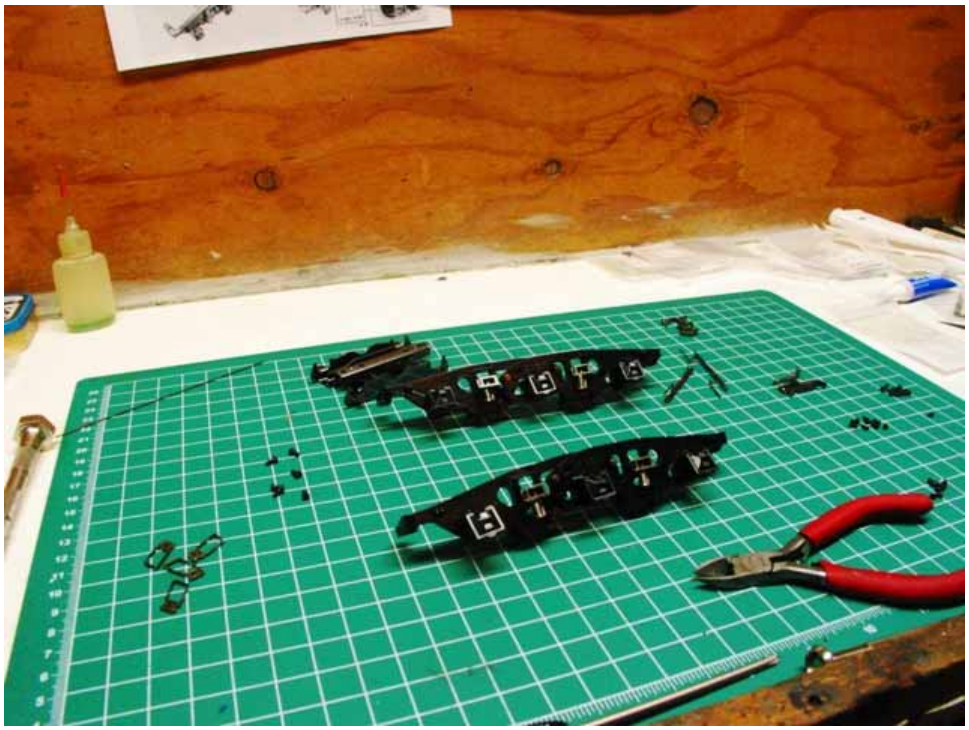
Well, two evenings and an extended day (Ryan had half day of school) for a total 12 hours) here is the result (less detail parts on the tender shell):

The start point with the parts laid out for the wheels and the tender frame:
Wheels:

Tender frame:

The frame for the trucks are two part along with springs, journal boxes(working lids), brake rigging and chains:

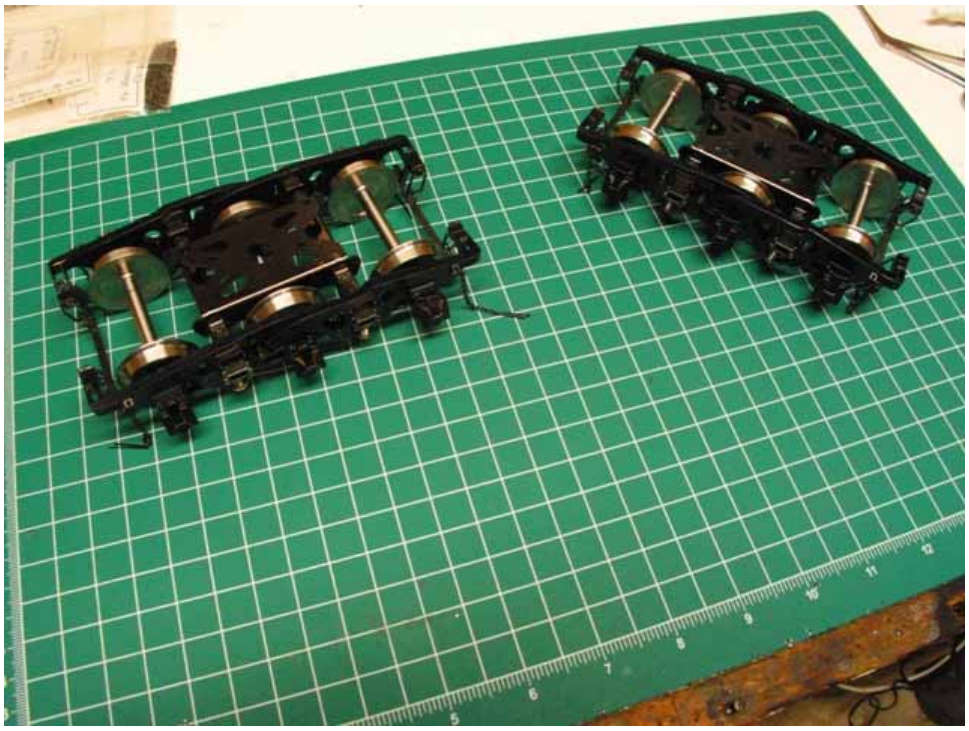
The two parts of the frame allow for flexibility along with the equalizing springs for smooth ride over the rails:



The most trying components to fitting the truck parts together were the brake rigging straps and hangers:

Journal box lid hanger wire process-

View from the outside with complete parts:

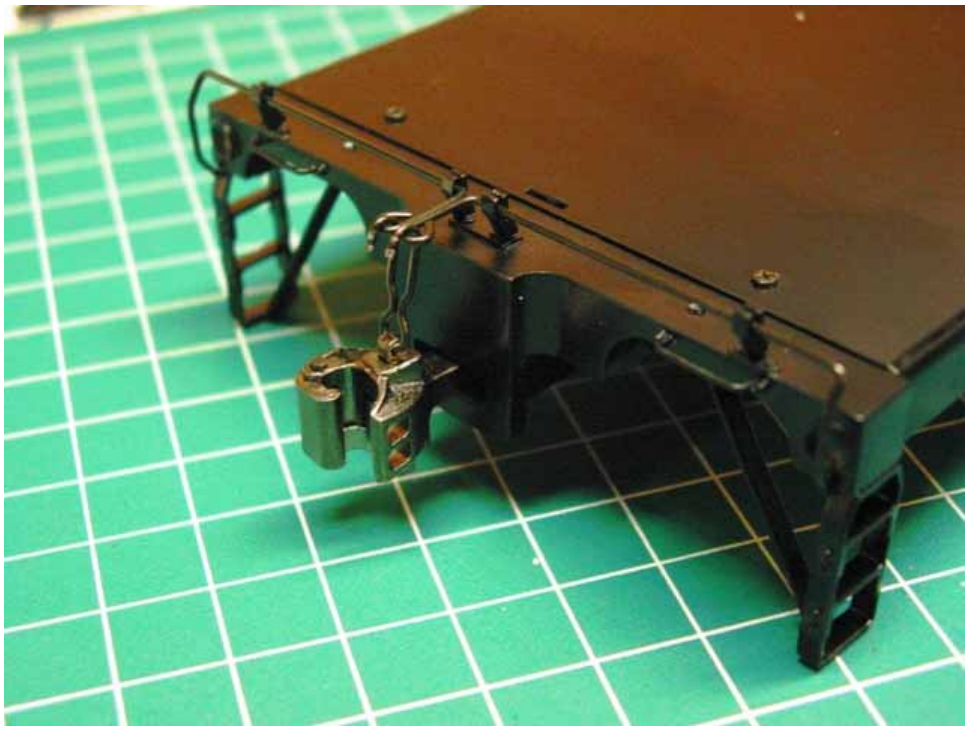


The connecting frame for the wheels to joint onto the frame of the tender were next:

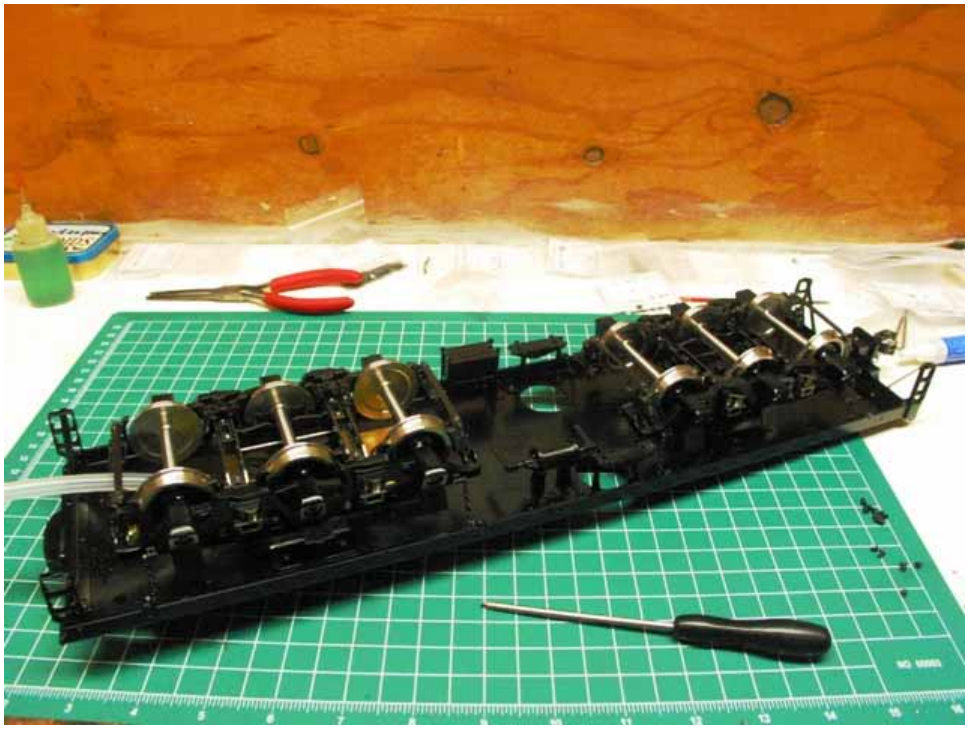
The frame is the base for wheels, water and fuel container along with the fuel delivery:

On the underside are the supports and connects for the wheel/trucks:

And of course the main piece the coupler (fully functional):



The wheels/truck on place onto the tender frame:



Right side up and rolling very well (having adjusted several time the truck frames along with oil, grease in the journal boxes):

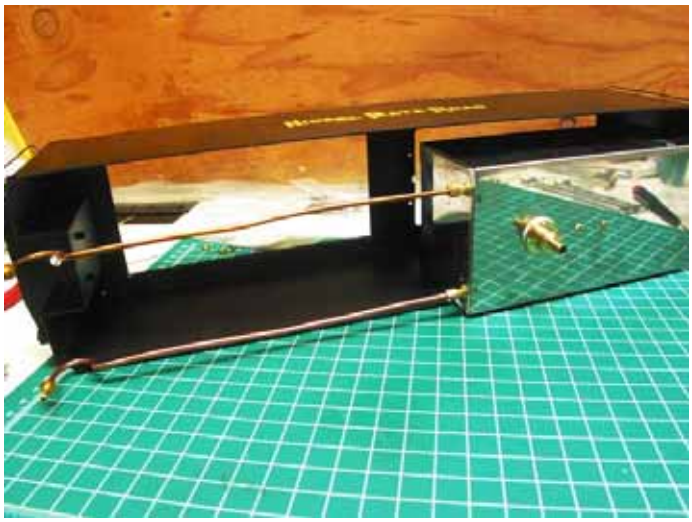
Additional 2.75 hours on the tender included all the detail parts, fuel sump and water tank with lines and hand pump.

Rear view of complete tender:

Along with the details of the all threading all the hand rails, once we cleared the eye holes to receive the rod came:

Fuel tank- adding the valve and port screw:

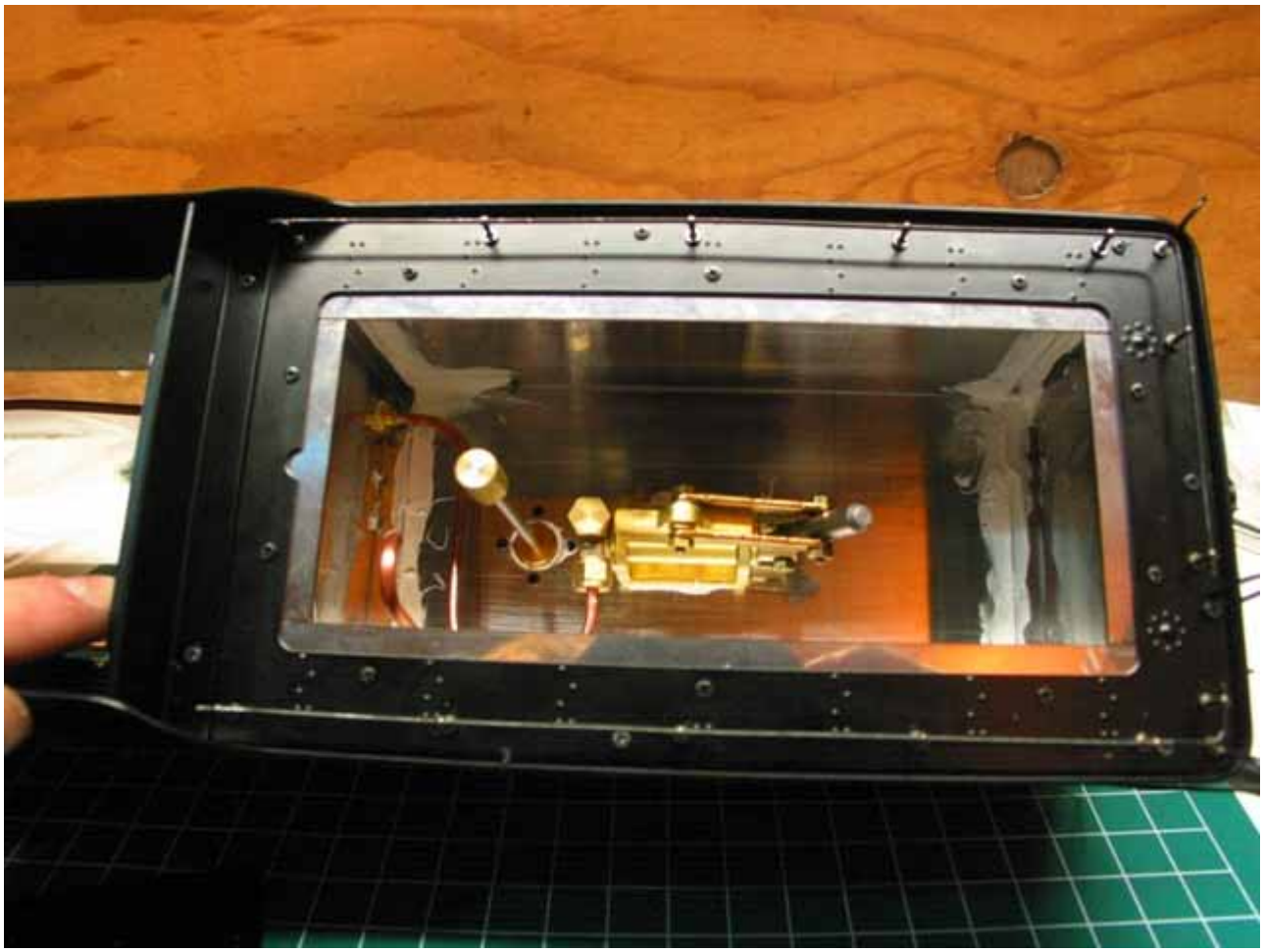
The water container and pump was quite involved:



Numerous parts were required in making the hand pump function:

Making sure that the working parts are properly cared for and set up correctly:

The water tank inner liner/container needs to be sealed-



Then we constructed the tender latch so the engine frame continues with the tender. This design is very innovative and works smoothly.

Off to T-Day steamup tomorrow then to cylinders and back head.

Next we plan on finishing the cylinders with photos.
