Pacific Northwest On30 Modules Project
Module Standards, Sources for Bench Work, Hardware And Modeling Suggestions

Issue Date: March 25, 2011

Revised: August 29, 2011

Section 1 - Introduction

The original purpose of the Pacific Northwest On30 Modules Project was conceived during the 2008 National Narrow Gauge Convention in Portland, Oregon. The original goal of the project was to construct, display and operate a modular layout depicting Pacific Northwest narrow gauge railroading at the 2012 National Narrow Gauge Convention to be held in September at the Meydenbauer Convention Center Bellevue.

Since then, many members of the On30 Modules Group have been constructing modules. On February 5th and 6th, 2011, five members of the group assembled seven modules at the Monroe Train Show. Modules were in various stages of completion, but it gave the group some experience in setting up a set of modules, working out wiring problems and getting the railroad underway. We anticipate that the PNW On30 Modules Project will participate in at least two train shows between now and the National Convention: the Boeing Train Show in November 2011 and the next Monroe Train Show in February 2012

Several groups and individuals have expressed an interest in joining the group both during the show and since then. The following standards should give them a good foundation for joining the group while making the assembly of their module(s) straight forward and

The objective of this standard is to provide a platform for modeling in a flexible, modular environment. The design goes beyond the traditional NMRA closed loop set up in by creating a truly universal “free-form” operations orientated modular design with a emphasis on reliable track-work, realistic operations and plausible high quality scenic elements.

The Pacific Northwest On30 Module Standards are based upon a set of minimal standards originally developed by a European HO-Scale modular society. The standards are minimal; just 24-inch and 30-inch wide end plate set at a standard height. Between the two end plates, a modeler can build what ever they desire as long as they have the ability to transport their modules to a meeting place.

Both European “Fremo” and North American “Free-mo” groups prohibit the use of permanent backdrops as modules are required to rotate 180 degrees and fit into a group layout in either direction. Free-mo style layouts are designed to be operated with a single-track main-line, point to point. There is no limit as to the configuration or size of a Free-mo style layout.

Quoting Free-moo’s web site, “Free-mo takes the boredom out of running trains monotonously around a double or even a triple-track main line. With Free-mo, less is more”.

The Pacific Northwest On30 Module Standard is an adaptation of the North American Free-mo standard. Changes were made to address the size differences between 1:48 scale narrow gauge models and 1:87 scale standard gauge models and the short-term objective of creating a On30 modular layout for display and operation at the 2012 Bellevue Washington Narrow Gauge Convention.

The following is provided as a guide to standardize the components of the modules and to aid new modelers in building their first module and include:

Section 2 – The Official Pacific Northwest On30 Module Standard

Section 3 – Building Realistic Narrow Gauge Track

Appendix A – Construction Hints and Material Sources

Appendix B – Module Benchwork Plan

Appendix C – Anatomy of a Micro Engineering Turnout

Questions on these standards should be e-mailed to Alan Murray, at ramsplace2@aol.com. If you would like to discuss any questions you have by phone, please call (206) 794-9283 during evening and weekend hours. Do not be afraid to leave Alan a message as he cannot always answer his phone. He will return calls as soon as possible. Responses that will benefit all modelers will be posted on the Yahoo Groups Site PNW-On30-Modules@yahoogroups.com.

Section 2 - The Official Pacific Northwest On30 Module Standard

2.1 - Definitions

The Standard — A collection of requirements for building scale model railroad modules that can work together with little effort, even when they have never been assembled together before. The beauty of the standard is that it allows builders to replicate any freelance or prototype track-plan within your modules boundaries, yet can be combined for maximal interoperability with other modules built to the same standard.

A Module: — A free-form module that conforms to the standard outlined below. A module can be any length and the endplates can be at any angle to each other. A module can be one section or a set of two or more sections that form a module.

2.2 - Benchwork

2.21 Endplates shall be good quality ½ inch or ¾ inch plywood or equivalent (birch plywood works well) to provide sufficient strength for clamping to adjacent modules. Dimensional lumber should not be used for framework. It has a tendency to warp and "cup" with age, throwing off track alignment.

2.22 End plates shall be 6 inches tall and be 24" or 30" inches wide; Module End Plates shall be 24 or 30 inches, including fascia. (If using a 1/8" fascia, then that must be factored into module construction to result in the 24- or 30-inch dimension at End Plates. We evaluated the 36" width as not being very practical, so it has been eliminated.

2.23 Roadbed shall be mounted on ½" thick plywood or directly on rigid foam insulation, if braced to prevent sagging or flexing.

2.24 The top of the track, at the end plate, shall be 48" from the floor.

2.25 Roadbed and track shall not exceed 3/8" above the top of the frame unless the track is on a grade.

2.26 The maximum height of the rail-head, at the end plate, is 62" from the floor.

2.27 Individual modules shall have at least four (4) legs.

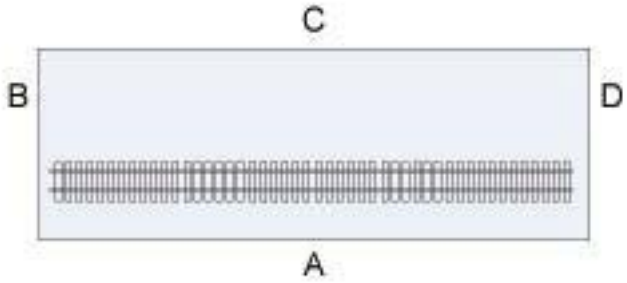
2.28 Modules, with multiple sections that will always be connected together, may be configured with four legs on the first section and a minimum of two legs on each additional section. See sample plan showing a configuration for a single 5-foot long module is attached.

2.26 Legs are not required for any module that is 24 inches or less in length.

2.27 Legs shall have continuous minimum adjustment of plus or minus 1 inch.

2.28 The bottoms of the legs should have rubber or Teflon tip for floor protection.

2.29 For the purposes of wiring and troubleshooting, the front of the module or section should be identified and marked with the designation “A” on the inside of the frame. Proceeding clockwise, as you look down on the top surface of the module or section, label each side consecutively “B”, “C” and “D”.



2.3 - Track

2.3.1 The standard flex track shall be Micro Engineering On30 Code 83 or smaller. The standard for factory built turnouts shall be Micro Engineering On30 #5 or larger. Micro Engineering On30 turnouts are DCC compatible (see appendix B).

2.3.2 The standard for hand laid track will be Micro Engineering Code 83 or smaller rail, weathered or non-weathered rail spiked to Kappler, or equivalent, 6’0” narrow gauge ties.

2.3.3 Track on the through or mainline route must be code 83 nickel weathered of painted rail. A mainline track is defined as a “primary track” that stretches from one end of a module to the other for the purpose of moving through trains between modules.

2.3.4 Smaller rail can be used on sidings spurs, but shall be no less than code 55 and shall also be weathered or painted.

2.35 Turnouts shall be at least #5.

2.3.6 The centerline for a single, mainline tracks that cross 24” and 30” wide stand alone modules shall be located 6” from the front or “A” side of the module.

2.3.7 Double tracks, intended as passing tracks, will cross the endplate centered at 6 inches from the A” side and the passing track centered at 9 inches from the “A” side of the module.

2.3.8 The centerline for all tracks shall be 4 inches or more from the side of the module.

2.3.9 Not used.

2.3.10 Track on the mainline or through route must be perpendicular to endplate for 6” from each end of the module.

2.3.11 The points of a turnout should not be within 6” of the endplate.

2.3.12 The minimum permitted mainline radius shall be 28” and the radius for sidings should be at least 24 inches. Bigger is better.

2.3.13 The minimum center to center spacing between parallel tracks is 3 inches for parallel installations and 3.75 inches on parallel curved sections.

2.3.14 The maximum mainline or through route grade is 2% or about ¼” per foot. Gradual vertical curves are critical for smooth operation and should be carefully built.

2.3.15 Rail shall be cut off 1” from the end of the endplate. Ties and ballast shall be continued to the modular end for good appearance and matching with the adjacent module. Ties shall be notched under the ends of the rails to the module end to clear bridge rail joiners and adjustment of bridge rails.

2.3.16 To enable DCC power districts, your module must be able to accommodate insulated rail joiners at each endplate.

2.4 - Wiring

2.4.1 Wiring consists of 2 pairs of buss wires (track buss and accessory buss) and a 6-conductor LocoNet buss cable.

2.4.2 12 AWG stranded wire shall be used for the track buss (solid wire may be more practical with some types of terminal strips).

2.4.3 14 AWG stranded wire shall be used for the accessory buss (solid wire may be more practical with some types of terminal strips).

2.4.3 The LocoNet buss shall be telephone-type 6-conductor cable.

2.4.4 Track feeder wire shall be no smaller than 20 AWG wire.

2.4.5 Turnout frogs shall be isolated and may be powered. Turnouts shall not rely on switch points to power the frog.

2.4.6 Each module will have a minimum of one dual flush-mount "6 conductor 6 position" modular jack (RJ12-7) faceplate on each exposed side of module, for throttles. (**NCE UTP Cab Bus Panel** or equivalent). For convenience, yard modules or in other areas where operators may congregate, additional throttle jacks should be considered. Note: Digitrax UP-5 throttle jacks are not compatible with NCE.

2.4.7 For those planning a group of modules, consider having a dual-use section of track for programming the locos.

2.4.8 For a given turnout, turnout controls should be on all sides of the module or module section, excepting any endplates. Turnout controls should be located on the fascia, and not on the horizontal or vertical surfaces of your scenery

2.5 – Main Buss

2.5.1 The red feeder wire shall be attached to the front rail and the black feeder wire shall be connected to the back rail of each branch on a module.

2.5.2 Install the screw-type dual row barrier strip (for use with spade connectors) or European-style terminal strip (jumbo size which accept up to 10-gauge wire) near the center of the module end plate to allow clamping near the mainline and passing tracks. A minimum of four positions should be available on each strip, two reserved for the main bus.

2.5.3 Provide a 12-inch pigtail for each buss wire from the terminal using stranded 12-GA wire. If barrier or European-style strip is installed vertically, the internal bus wires should be connected towards the "A" side of the module and the pigtail connected towards the "C" side Install red and black Powerpole connectors for the main buss power. Suggest tinning the bare ends of the wire for insertion into the European-style connectors.

2.6 - Accessory Buss

2.6.1 Accessory power shall be approximately 16 volts AC or DCC. The buss is wired straight through. A bridge rectifier and filtering capacitor may be used to convert AC or DCC signal to DC. Applications that require AC or DCC signal may utilize power directly from the buss.

2.6.2 Use the green and white Powerpole connectors for the accessory power. Since this is AC current it does not matter which wire is coded white and which green. If the group decides to run DC power (NOT DCC) on the accessory line then the green connector should be used on the positive wire and the white connector on the negative wire.

2.6.3 The same barrier or terminal strip mentioned in 2.5.3 can be used for the accessory bus using stranded 14-GA wire, two positions reserved for accessory bus. Suggest tinning the bare ends of the wire for insertion into the European-style connectors.

2.7 - LocoNet Buss

2.7.1 Each module will have one dual flush mount "6 conductor, 6 position" modular jack (RJ12-7) faceplate mounted on each exposed side of module, for throttles. (**NCE UTP Cab Bus Panel** or equivalent)

2.7.2 Consider adding additional modular jacks on sides of modules where operators may congregate, such as yard modules.

2.7.3 On a Multi-Section Module, each module section should have a dual flush mount "6 conductor 6 position" modular jack (RJ12-7) faceplate mounted on each exposed side.

2.7.4 All of the LocoNet connectors and associated cables need to be connected together straight through (i.e. pin 1 - pin 1, pin 2 - pin 2, pin 3 - pin 3, etc. ...note standard telephone cables are NOT wired straight through).

2.7.5 An RJ12 to RJ12 type straight through cable is utilized o connect daisy-chain the DCC buss between throttle jacks within and between modules. (If LocoNet connectors are centered on each exposed face, then a six- or seven-foot cable should be adequate to interconnect modules).

2.7.6 To connect a DCC booster to a module, there are two connections that have to be made; (1) The LocoNet and (2) The Track Power.

2.8 – General Scenery

2.8.1 All bench-work shall be covered by basic scenery. Minimum basic scenery is defined as a textured landscape painted with (earth color latex paint.).

2.8.2 Module fascia (Side "A" and Side "C") may be made of 1/8" tempered hard board or the Baltic birch plywood. The fascia shall be 6" tall adjacent to the endplates and flush with the top and bottom of the endplates. With the exception of the endplate requirement, the fascia can vary in height to accommodate scenic elements such as rivers or streams, cuts and fills, or even tunnels.

2.8.3 Modules shall not include any permanent backdrops.

2.8.4 The module fascia color shall be Granite Boulder (790D-4) Behr Interior Semi-Gloss Enamel. This color has been chosen to compliment the scenery standards and not draw attention away from the scenery.

2.8.5 The module leg sets color shall be Rust-Oleum Painters Touch Enamel, Hunter Green (12 oz spray can (249111), quart (1938730).

2.8.6 Track Rail shall be painted.

2.8.7 Ballasting of mainline track is up to modeler.

Section 3 - Building Realistic Narrow Gauge Track

Here is a quick and easy procedure, for commercial flex track, that can be used to create good-looking narrow gauge track.

Paint your plywood or foam roadbed with earth colored exterior latex house paint. Allow it to dry overnight. Pre-painting will seal the roadbed and protect it from moisture. In the case of foam roadbed, it will also eliminate the possibility of pink or blue foam showing through the finished scenery.

Start by marking your track centerline on the plywood or foam roadbed. I like to use a black "Sharpie" for marking centerlines but any pen will do. Glue down HO-Scale cork roadbed with "yellow" carpenters glue. If you are using plywood roadbed, you will want to drill a hole below the turnout's throw bar to facilitate the installation of a switch machine. (Tortoise or Blue Point). If you are using some other type of switch machine or throw mechanism, prepare the roadbed appropriately before installing the track. If you are using foam roadbed, you will want to check out Keith Thompson's method for installing switch machines.

You may be tempted to eliminate the cork and lay the track directly on the roadbed but I wouldn't recommend it. Your track will be noisy! In addition, I don't like using Homosote or similar materials. While they a great sound deadeners, they are heavy and tend to absorb moisture.

When using flex track, I like to solder two pieces of track together before I put it down. This gives me a six foot long piece of flex track to go around most curves without having to install a rail joiner on a curve. I also like to solder my leads to the bottom of the rails before I glue down the track. Make sure you install a lead to power the turnout frog (See Section 3.4 on wiring turnouts). Installing the leads this way makes them virtually invisible. Many people install the leads after the track is down. If you decide to wait, try to solder the leads to the side of rail where it can't be easily seen. A blob of solder, painted or not, detracts from good track-work.

I use clear Acrylic Latex Adhesive Caulk to hold down the track. An acrylic is water soluble caulk with usually a latex base in them. You can use water to clean them up and work with them. Make a much better looking caulk line. Polyseamseal has an All-purpose Adhesive & Calk in One which dries clear and is available at your nearest Do It Best Hardware Store. Dap also makes a similar product (Dap77016 Do It Acrylic Latex Caulk (Dries White) which may also be available at your nearest Do It Best Hardware Store. Make sure you get the right stuff as most other caulks will either attack the plastic ties or not hold the track down. Make sure you

smooth out the top of the cork with a sanding block and pre-drill the holes for leads before you glue down the track. Remove the resulting bits of cork or other debris with a vacuum as you don't want it between the track and the cork roadbed. Use the caulk sparingly, evenly spreading it along the top of the cork roadbed. Using a very thin layer will prevent the caulk from oozing up around the ties. It will also make it easier to remove the track, from the cork roadbed, if you want to make a change or fix a mistake.

You will probably need to cut a few insulating gaps in the rail. After the gap is cut, fill it in with a small piece of styrene held in place by ACC. This will eliminate the possibility of a gap closing up and causing a future problem.

Before going on to the next step, test the track thoroughly. Do not go on to the next step until you are absolutely sure your track is trouble free.

Once the track is in place, put a strip of masking tape across the top of all switch points and place a small drop of light oil on any pivot point. The masking tape will keep ballast away from the switch points and the oil will prevent glue or paint from mucking up the pivot points. You can go back later and carefully fill in the areas around the switch points with ballast.

Spray paint the track, ties and roadbed, with a light coat of Floquil #110081 "Earth" (#130081 Spray Can). Clean off the top of the rails. Remove the masking tape and hand paint the earth color around the switch points. For even better looking track, you can paint some individual ties a contrasting color. Floquil Weathering Markers #3801 and #3803 work great for coloring individual ties. There are 3 different colors in each set. Remember that ties tend to gray over time and that narrow gauge railroads rarely used treated ties. The traffic density of most narrow gauge railroads was very light so the right of way should generally take on the color of its immediate surroundings.

Next, paint the sides of the rail with Floquil #110007 "Rail Brown". Adding Floquil #110070 "Roof Brown" will darken the Rail Brown and adding Floquil #11081 "Earth" will lighten the Rail Brown. While I prefer to paint the rail with a brush, the Floquil Weathering Markers #3801 can also be used to color the rail. Clean off the top of the rails again. Put another strip of masking tape back across the top of the points.

For the most part, ballast was minimal or nonexistent on narrow gauge railroads. Sometimes cinders, especially around engine terminals, or mine tailings were used for ballast. More often than not, it was just dirt. Keep this in mind when you are selecting a color for your ballast. I like to use HO-Scale Highball brand ballast for most of my O-Scale track work. It is heavier than

most commercial ballast so it doesn't float around when you are trying to glue it down. I normally use a combination of #224 "Cinder", #225 "Brown" and #171 "Light Brown-Fine.

You can also use locally gathered decomposed granite for ballast. It can be found in a wide range of colors and textures but it needs to be cleaned and screened to the proper size before it can be used.

Spread the ballast dry making sure to keep it off the sides of the rail and the tops of the ties. An inexpensive 1" paintbrush works well for spreading the ballast. After you are satisfied with the placement of the ballast, you need to mix up a batch of "wet water". I make my wet water by mixing a 50-50 blend of water and 70% isopropyl alcohol. The exact ratio is not really important but there needs to be enough alcohol in the mix to break the surface tension of the ballast and allow the "wet water" to penetrate the ballast without moving it around. Use a misting spray bottle to apply "wet water".

Next, apply Woodland Scenic #191 Scenic Cement to the ballast with a syringe or eyedropper. If the scenic cement "balls up" on the surface of the ballast, you need more "wet water". Make sure the scenic cement saturates the ballast. The ballast should take on a milky appearance from the scenic cement. Don't worry. The cement will be absorbed and the milky appearance will disappear as the cement sets up. When the scenic cement cures, the ballast should look loose but be held firmly in place. And, it should not crumble when touched. If the ballast crumbles, the ballast was not saturated with scenic cement and you will have repeat the process starting with an application of "wet water".

Regardless of what anybody tells you, do not use diluted white glue for gluing down ballast. The scenic cement is made from acrylic matt medium that is more flexible than white glue and as a result is more resilient and transmits less noise than white glue. Some modelers make their "wet water" by adding a few drops of liquid dish soap to a bottle of water. This method works but I think the Alcohol and water mix works better.

I like to add a little vegetation to the ballast to give my track a more neglected look. While the ballast is still wet I sift on a bit of Woodland Scenics blended turf, green and/or earth blend along the outer edges of the ballast. Don't get the blended turf on the rails or the tops of the ties. After the ballast has dried, I like to go back and add a bit of yellow or burnt grass course turf here and there to add additional texture. Use an eyedropper to apply a drop or two of scenic cement over the course turf to hold it in place. Don't go overboard with this type of vegetation.

After everything has set up, I like to brush on some earth tone Bragdon powdered pigments to blend things together. I apply it down the center of the track and along the outer ends of the ties.

This section was compiled by Steve Depolo, Inside Gateway (425-747-2016).

Appendix A – Construction Hints and Material Sources

A2.2 - Benchwork

- We recommend that the ½" Baltic Burch described in S2.1A be used for framework. Compton Lumber will cut this material in 6" widths if you don't have a table saw. Several 5-foot long modules can be built from 1 sheet.
- Modules, 5" long, or shorter, will fit in just about any SUV or pick-up truck. Other good sources for Baltic Birch Plywood are Dunn Lumber (check to see if they have stock) and Midway Plywood on HWY 99 near the SR-525 Interchange.
- Two-inch pink or blue rigid foam insulation, available from most lumber stores like Home Depot and Lowe's, makes an excellent top. It is light-weight and easy to work with.
- Pre-cut 2" x 2" x 48" long Poplar makes excellent legs or one can purchase a larger board and mill pieces to size.
- Suggest International Equipment Components http://www.iec-corp.com/index.html for detailed catalog information, and http://www.levelingmounts.com to make your order. They want you to use PayPal as payment guarantee. Minimum order is $20.00; minimum shipping is $9.00 and no tax. It should be noted that the foot is ¾" tall and should be considered in determining the height of leg sets (See Appendix B).

  - IL9-62H @ $1.70 each (will only provide plus or minus 3/4" correction)
    3/8-16 x 2" leveler with 1-3/8" dia. white nylon base, nickel plated shell.
  - **IL9-63H @ $1.90 each**
    3/8-16 x 3-1/2" leveler with 1-3/8" dia. white nylon base, nickel plated shell.
  - **You will also want to order the inserts – IL29-6T @ $0.70 each**
    3/8-16 Tee Nut 4 prongs, 1" flange dia, 7/16 barrel height, zinc plated

- A note regarding leg location, we recommend leaving 8 inches from the end of the frame to the face of the legs, this will allow room to manipulate installation of clamps, bolt-up and/or furniture connection hardware (Note conflict in photo above, prior to installation of rigid foam insulation). Braced-frame leg sets as shown above and in Appendix C add rigidity to the modules and allow for simple mating with the module frame. The addition of a stretcher between pairs of leg sets will further stiffen the assembly. Russ Segner tried hinged legs and found it added weight and made the module wobbly.
- Stretcher members can be secured with insert nuts in stretcher and connecting bolts (exposed knock-down type or standard ¼" bolts available at Tacoma Screw Products or home depot.
- Consider pre drilling end plates for connection bolts to eliminate use of C-clamps. Best if all end plates drilled using a common template. Especially useful for larger, multi-sectional modules.
- Furniture registration pins are available if you are considering several module units as a single module http://www.vandykes.com/product/table-top-leaf-dowel-socket

A3.3 – Track

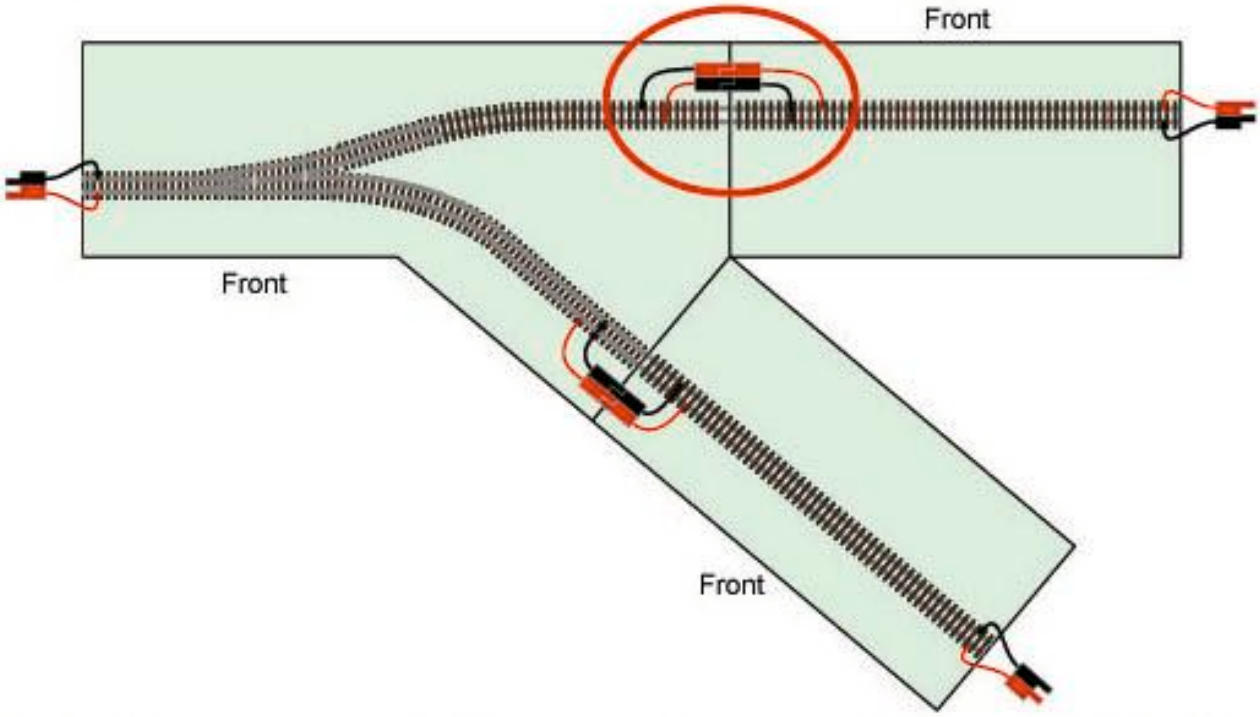
- Micro Engineering rail has a scale profile and is not compatible with Atlas. While Shinohara is closer to scale, the profile is still different (larger rail head) and more expensive than Micro Engineering.
- It is recommended that the last inch or so of rail be soldered to printed circuit board ties for strength and to maintain gauge. Printed circuit board tie material is available through the mail from Clover House. Clover House Web Site is not very user friendly. A newly discovered source is: http://www.handlaidtrack.com/On30-Scale-PC-Board-Pre-Gapped-Crossties-2-5mm-p/pb-x-on30.htm They can provide a bag of 200 full thickness narrow gauge PC ties for $21.75 plus shipping. You will note by the description that everything is ready to solder and paint.
- It is recommended that the last inch or so of rail be soldered to printed circuit board ties for strength and to maintain gauge. Printed circuit board tie material is available through the mail from Clover House. Clover House Web Site is not very user friendly. A newly discovered source is: http://www.handlaidtrack.com/On30-Scale-PC-Board-Pre-Gapped-Crossties-2-5mm-p/pb-x-on30.htm. They will provide a bag of 200 full thickness narrow gauge PC ties for $21.75 plus shipping. You will note by the description that everything is ready to solder and paint.
- Hand Throws and/or Tortoise and Blue Point switch machines may be used on all turnouts. The Tortoise switch machine can be powered off the accessory buss. Both types have auxiliary contacts that can be used to power the switch frogs.
- Keith Thompson has developed a clever way to mount switch machines when 2” thick foam is used on the top of a module

A3.4 – Wiring

Note: I'm assuming that the turnouts are not power-routing so that the polarity for each branch of the turnout is the same (front to back). In other words, on both sides of the turnout, the red feeder wires are attached to the front rail.

Y Module for Single-Sided Wiring

Let's say that instead of using the wiring described above, you have the wire color always matching the color of the PowerPole connector. In this case, a Y module requires special wiring that violates this principle for one set of connections:



I've circled the one area where, on the Y module, the track power wire colors are opposite the PowerPole colors.

References

Here is a file that shows using the Anderson PowerPole connectors with red to black as outlined above:

http://www.vif.com/users/r-rhurlbut/On30-Modules/Free-MOn30/Free-MOn30.pdf

Here is a diagram that shows the Free-Mo standard for wiring, which you can see is more complicated:

http://www.trainweb.org/freemoslo/Free-Mo-Module-Wiring.htm

- European-style terminal strips are a nice idea as they accept bare solid wire or tinned stranded wire without installing spade connectors. Jumbo sized, 12-position strips can be cut into three blocks each and are of sufficient size to accept up to 10-gauge wire. They are available at Radio Shack (2740677) and Vetco Electronics, 12718 Northrup Way, Suite 100, Bellevue (CES-64-8029).
- Powerpole Connectors in the four necessary colors (red, black, green and white) are available from www.powerwrex.com . Order a sufficient number of colored housings of each color required: 30-amp Powerpole contacts (1331). Red and black connectors are available as a bonded pair (WP-30-10) to allow easy registering of red/black zip cord or individual pigtails. Roll pins (ROLL-30-25) are also available for custom configurations that can be changed. Vetco only stocks red, black and white Powerpole connector housings.

A3.5 – Main Bus

Reserved Space

A3.6 – Accessory Bus

Reserved Space

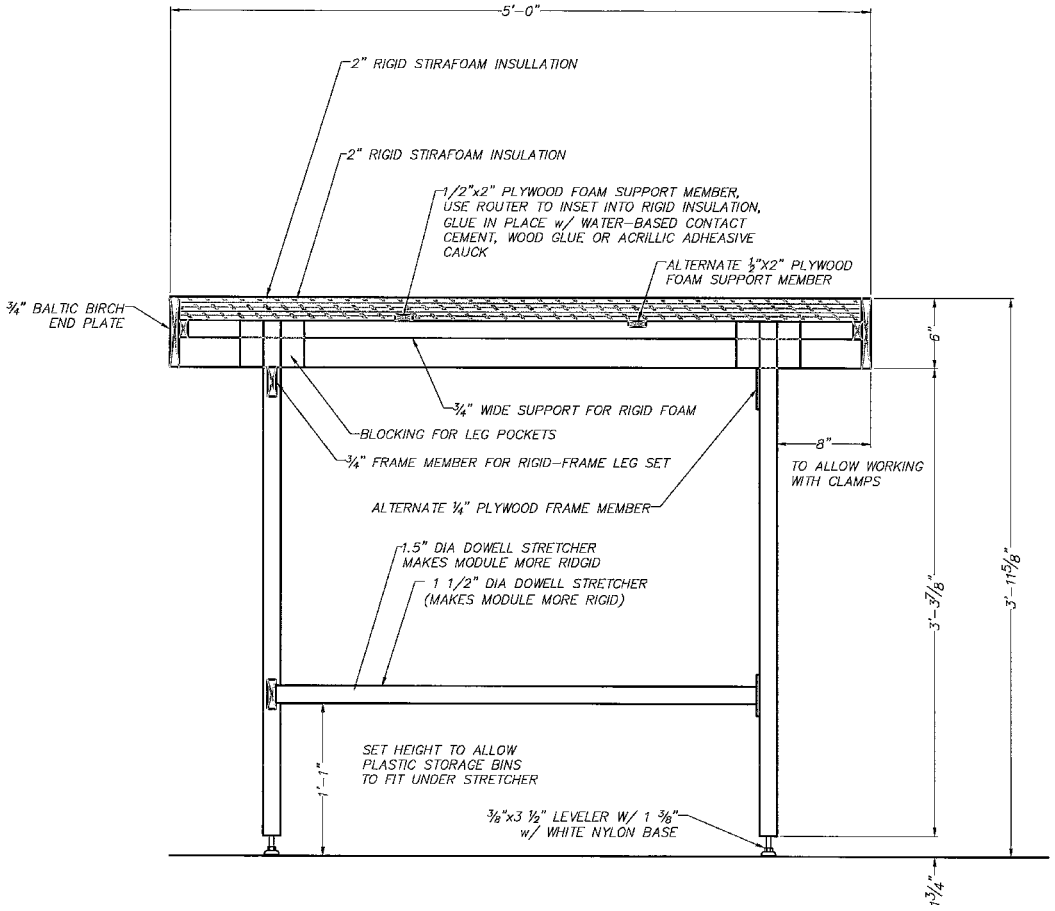
A3.7 – LocoNet Bus

Reserved Space

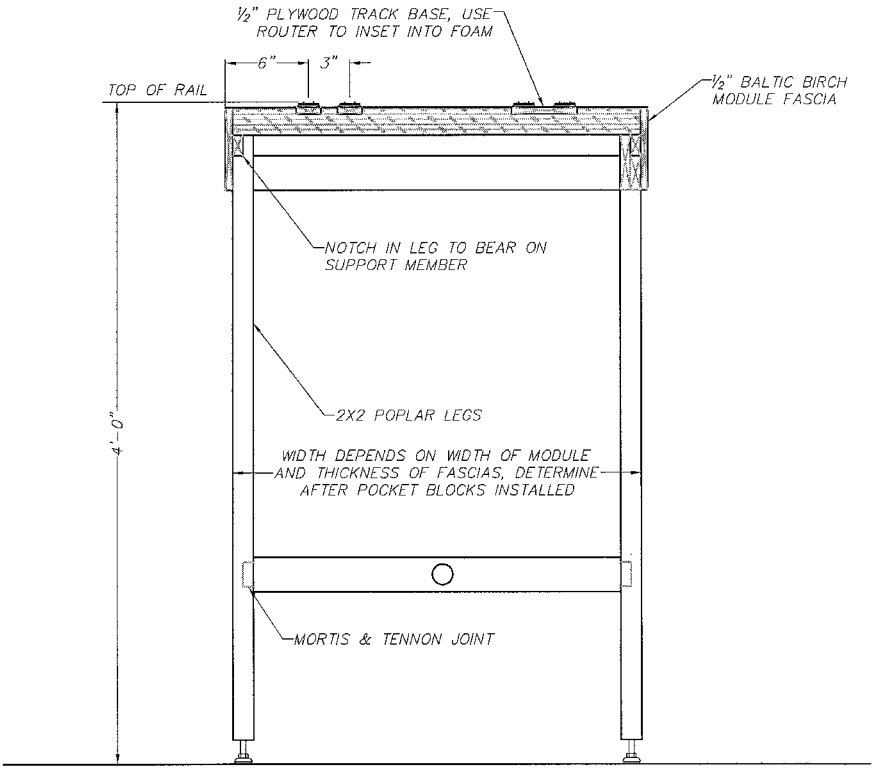
A3.8 – General Scenery

- Within 4-6” of the module endplate, ballast should be blended to a mix of 75% Highball Brand #224 HO Cinders and 25% Highball Brand #225 HO Brown ballast. If you prefer to blend your own ballast or use some other brand of ballast on the rest of your module, small amounts of the above reference Highball ballast are available through Steve Depolo at The Inside Gateway (425-747-2016).

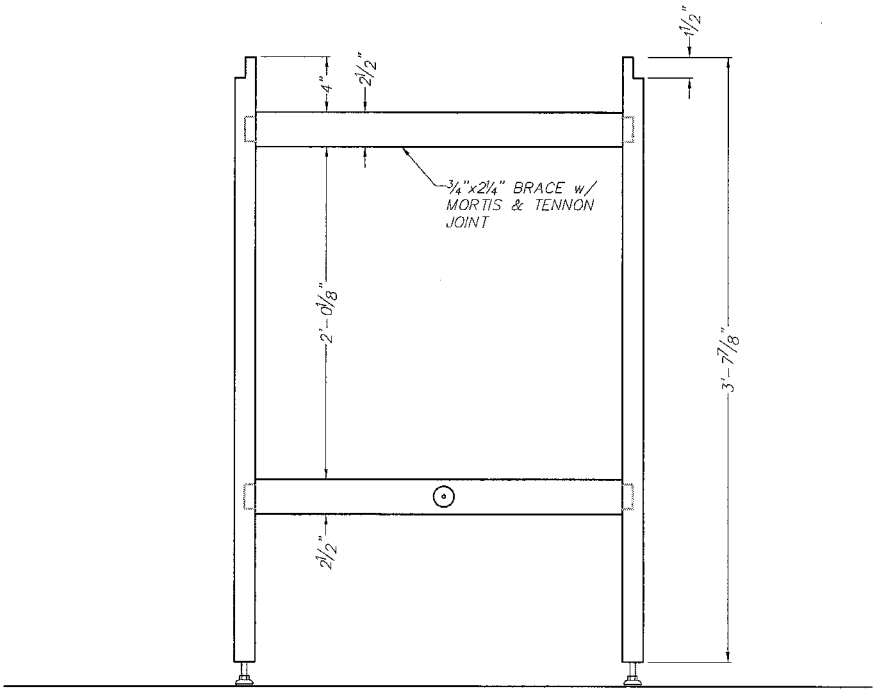
Appendix B – Module Benchwork Plan



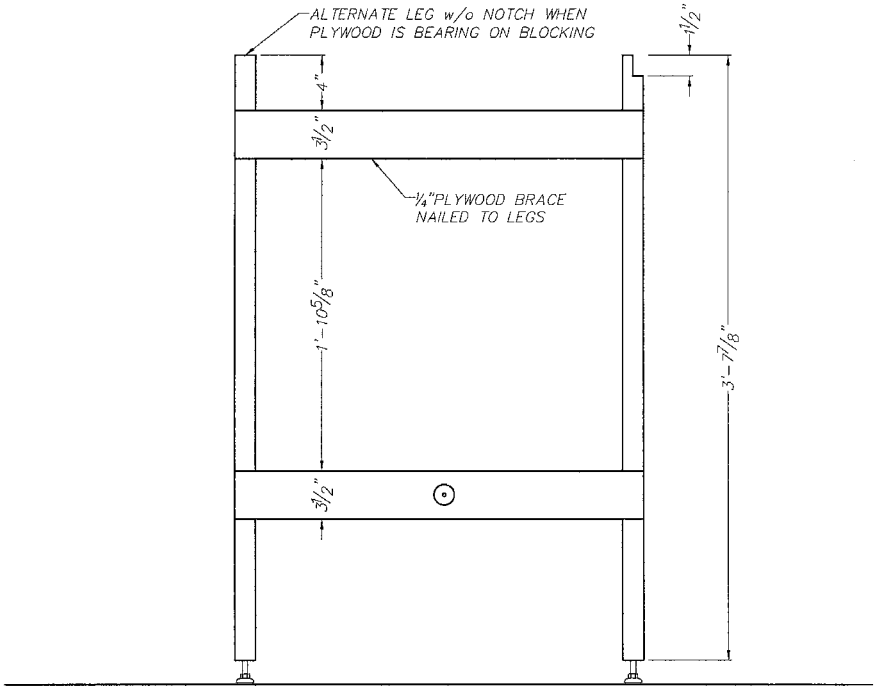
SECTION 1–STANDARD MODULE
PNW On30 MODULES
NTS



SECTION 2–STANDARD MODULE
PNW On30 MODULES
NTS



DETAIL A–BRACED FRAME
LEG SET (FURNITURE GRADE)
PNW On30 MODULES
NTS



DETAIL B–BRACED FRAME
LEG SET (FUNCTIONAL)
PNW On30 MODULES
NTS

Appendix C – Anatomy of a Micro Engineering Turnout