

# Northern Virginia NTRAK "How-To" Article

MODULAR HOME LAYOUT  
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BY  
JIM DAVIS

## *Should your Home Layout be Modular?*

Wanting to expand my modular home layout with additional show modules, I recently moved it through a 30-inch door to a larger room. The move was completed in less than a day, even with time spent dusting, vacuuming, and cleaning track. Anyone starting a new home layout may find a modular approach worth considering. First, using the "scientific method", consider the need to eventually move the layout.

### BACKGROUND

**Thesis:** Every home layout must, at some point, be removed from the dwelling. When this will happen is not always predictable or controllable. Therefore, the layout design should facilitate the ultimate removal process.

**Research:** About 15 years ago at a National Model Railroad Association (NMRA) MINICON I was introduced to the problems of moving a fixed home layout. Attending a breakout session titled "Legacy Systems", I expected to find out about some of our "fallen flags". It turned out to be a briefing by two O-Scale modelers on their effort to move a large, very nice, O-Scale layout from one house to another. Remember that in O-Scale if it is less than 40-ft. by 60-ft. it is small.

The discussion of the challenges they faced was interesting. There were issues of wires that were cut, that should have been marked first. The use of a Sawzall, a term new to me at the time, received a lot of attention on optimum places to make cuts. It also seemed that measured geometry and what fit up the stairs were different, resulting in extra cuts having to be made. There were problems fitting the layout into the new house. The closing remarks were most telling; "In retrospect, it would have been easier to build a new layout from the ground up."

Over the years I have had this in mind while looking at the various railroad periodicals that frequently feature the two-level full basement layouts. Sometimes I wonder how they have access for furnace maintenance or replacing a hot water heater. Sometimes an author is working on his third layout. What happened to the first two?

About every six months there seems to be another article on the use of "L-girders" or hanging a layout from the studs in the wall. Even when the article starts with the layout base being built in sections, the best I can determine is that the track, wiring, and scenery are laid out continuously across the boundary. From what I have found, it seems that moving a layout is not a popular topic. An internet search finds some discussion of modular layouts, including the question, "Will you ever move?" Then the focus quickly shifts back to other issues.

**Field Study:** Working with the club's Company Store, we frequently retrieve donated layouts from homes. In some cases, the layout is well beyond its useful life so there is not much to salvage. A door layout should be easy. The door obviously went in, but in one case it would not come out until the mountain in the middle had been cut down.



Will your home layout fit through a 30-inch door?

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For a nice built-in layout, it is a good day if one third of it can be salvaged intact. Timing is sometimes an issue. In one case the club got a call on Monday with a request that the removal be completed before sale closing later that week. To get it done, the layout was removed in a driving rainstorm and was thoroughly soaked and damaged beyond repair. In another case, the house was going on the market and painters were already working in the living room and needed to get to the room the layout was in. There was not much time for planning, much less dealing with gaggle of unmarked black wire under the layout. So out came the Sawzall, and with little plan the cuts were made.



A reciprocating saw, better known as a Sawzall.

**Conclusion:** If you are building or modifying your home layout, you should at least consider a modular approach before you start making those “L-girders”.

**Definition of a home layout module:** To be considered, modular the following criteria should be met:

- Each module is sized so that it can be taken out of the space it is in. The scenery on the module must remain intact. For example, in a garage the module can be bigger than one in the basement that must come up a set of stairs.
- Each module is self-supporting and rigid enough to not flex when handled.
- The legs must be adjustable to allow easy setup in a new location. Few floors are truly level.
- Modules are connected to each other using bolts, clamps, or other reusable means. Nails and screws are not allowed.
- Track does not need to be cut to remove the module. Track ends may align at the boundary or use connecting track.
- All wiring between modules must use reusable connectors. Wire may not be cut or need to be removed from a terminal strip.

**Note** that meeting NTRAK requirements for show modules is not part of this definition. The issue is strictly mobility, not how or where you lay track.

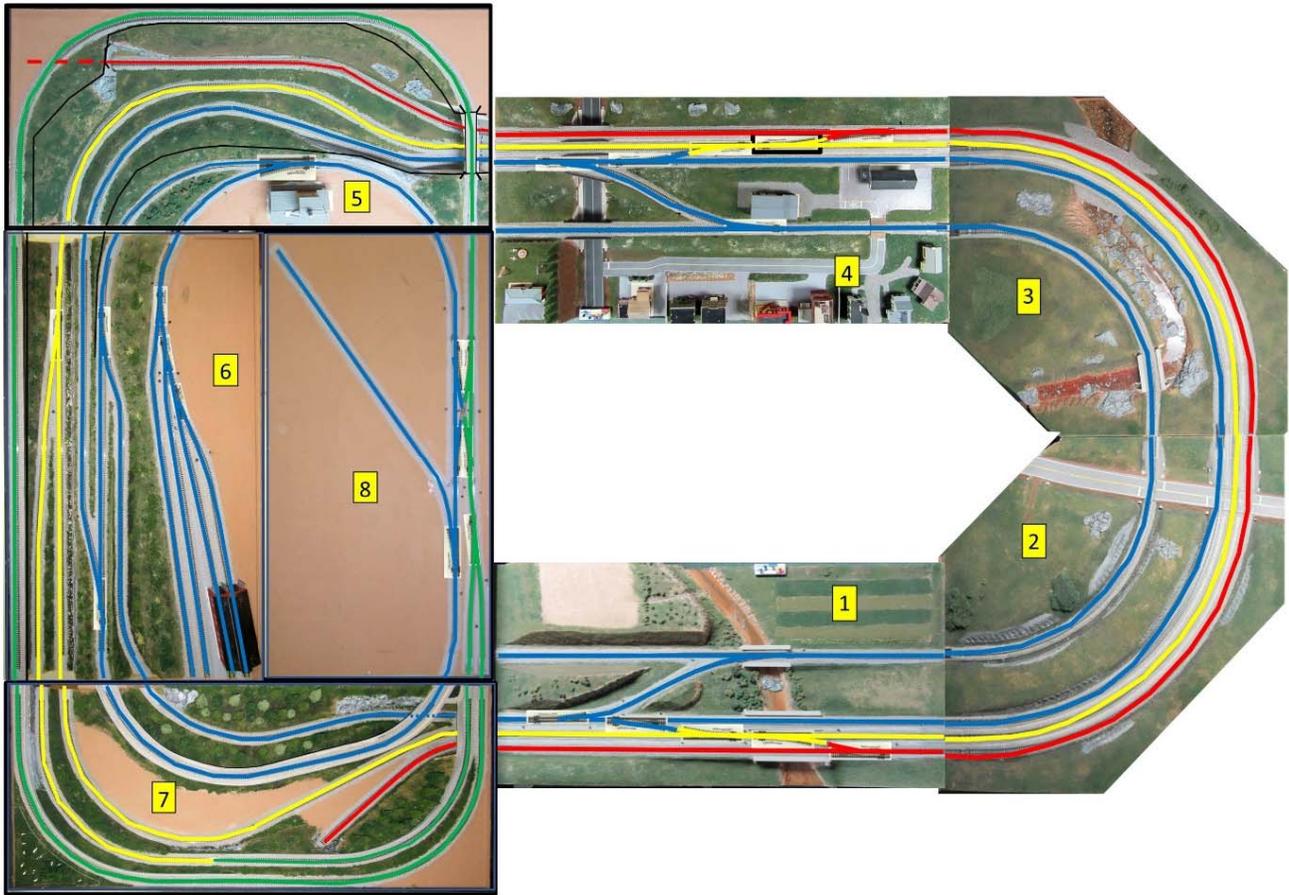
For those of us in modular railroading clubs it is easy to set up a home layout using show ready modules. Several NVNTRAK members have done that. Of course, that limits design flexibility.

## A MODULAR HOME LAYOUT

The rest of this article shares my experience building a modular home layout. My old layout was a modest 6-foot by 10-foot and used the L-Girder design. It was starting to have track issues and some curves were too tight for the larger SD-70 locomotives I had acquired. Working under the layout was getting too difficult for some of the electrical upgrades being considered. It was time to start over with a totally new design.

No layout design is ideal, and there are always trade-offs that need to be considered. Building a modular home layout in sections offers mobility, but construction of the layout is much more complicated than building it as a single unit. My layout design has eight modules. Four are non-standard modules, shown on the left, in the diagram on the next page and will be the focus of the rest of this article. They connect to four or more standard show modules, shown on the right, that meet NTRAK standards and need no further discussion in this article.

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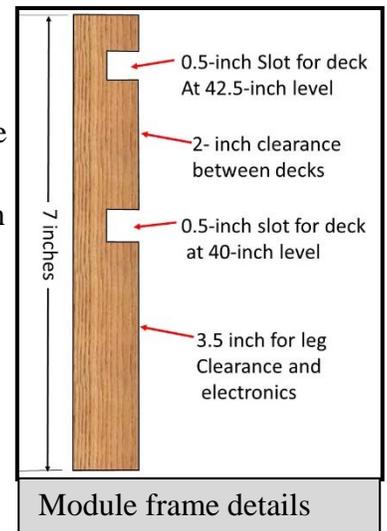


**Design:** Before construction started a detailed track plan was developed for a nominal 4-foot by 8-foot layout. Key considerations included:

- Track at 40-inches above the floor to mate with the NTRAK show modules on one side of the layout and track at 42.5 inches to provide needed clearance for overpasses.
- A minimum radius of 14-inches to handle large diesel engines such as SD-70s. The width of the layout had to be expanded to 52 inches to meet this criterion.
- Grades of no more than 2 percent. This presented a challenge to get the 125-inch run needed to get the 2.5- inch change in elevation desired.
- The layout is wired for DCC with four power districts. Track power in any district can be DC.

**Module Frame:** The frames, deck, and sub-roadbed were made from top quality one-half inch birch plywood. The outside edges of each module were seven inches high. This provided:

- 3.5 inches at the bottom to accommodate the leg blocks for EMT legs and clearance for the tortoise machines for turnouts.
- 0.5-inch groove for the deck at the 40-inch above the floor level.



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- 2.0-inch clearance for overpasses between the levels.
- 0.5-inch groove for the upper deck located at 42.5 inches above the floor.
- 0.5-inch extension above the upper deck. Since some track was laid close to the module edge, this lip was needed to ensure derailments stayed on the layout.

The inside edges between modules were shorter with height adjusted base on the track plan. Using grooves in the frame for the decks ensured exact positioning so they would provide proper alignment between modules.

Ten alignment pins were used to clamp the four modules together to maintain the close alignment needed. A 0.5-inch plywood backing plate was added to each module to increase the clamping area to 2-inches. The modules were leveled and clamped, and a hole was drilled for a nominal 1-inch diameter piece of PVC pipe. The PVC pipe provides both horizontal and vertical alignment.

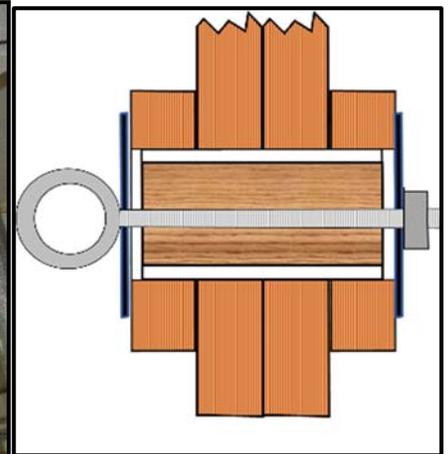
An eyebolt with large washers was used to clamp the modules together. Any bolt would work, but the eye bolt can be tightened by hand without the need for tools. The only purpose of the dowel rod in the middle is to center the eyebolt and washer combination. Both the PVC pipe and dowel rod are slightly less than two inches, so they do not interfere with the eyebolt clamping the modules together.



Ten alignment pins needed for the four home layout modules.



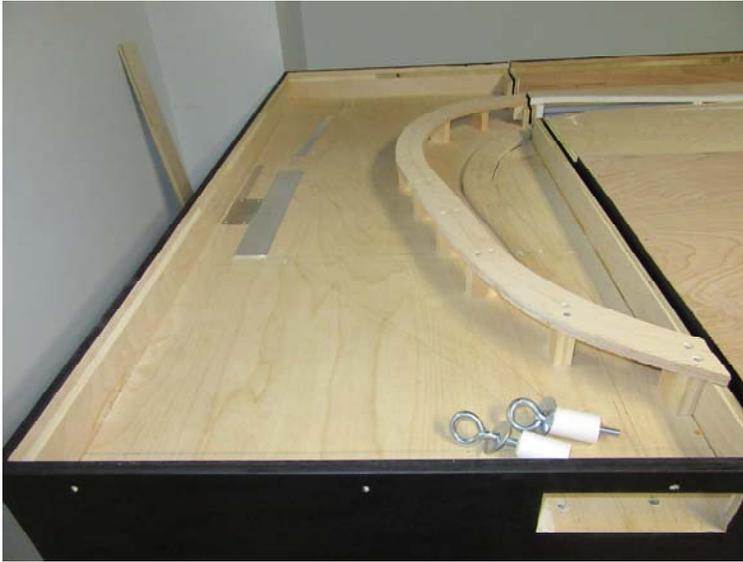
View under the modules, ready for alignment pin installation.



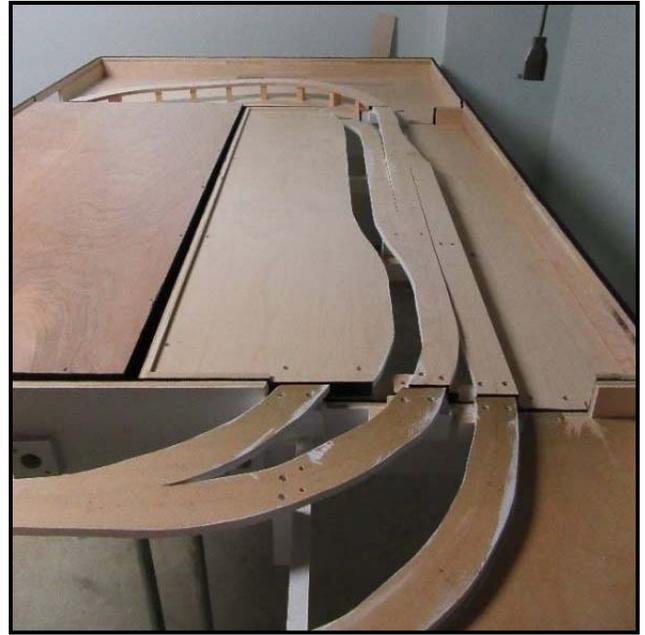
Module alignment pins.

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Full deck at the 40 inch level.



Sub-roadbed across module boundaries.

### Deck and Sub-roadbed:

The modular arrangement requires a little extra planning on how to install the sub-roadbed so there will be a smooth transition between modules. Where the tracks are level the deck serves as the sub-roadbed and the alignment between modules is not a problem.

For the grade between levels, the sub-roadbed on each module is cut from a continuous piece of plywood, avoiding joints in the middle of a module that make it more difficult to achieve a smooth transition into the grade. The sub-roadbed is shimmed so the slope is constant across module boundaries and where turnouts are installed. Much of the work could be done with individual modules on the workbench, where there is good access.

**Track work:** One advantage of the modular approach is track work can be done on individual modules, at a convenient height, on a workbench or sawhorses. A disadvantage is the need for connecting track between modules. There are always tradeoffs that need to be considered.

With the modules connected the centerline of the track was carefully marked on the sub-roadbed with close attention to ensuring it was matched across module boundaries. Track was then laid as it would be for any NTRAK module, so the process does not need any additional discussion here.

The layout has 21 pieces of non-standard connecting track to connect the four home layout modules and the adjoining show modules. Connecting track on curves was curved to the same radius as the track it was connecting. Atlas straight and curved track, as well as Peco straight track were used. Flex track rail connections are weak, so it is not acceptable for use as connecting track.



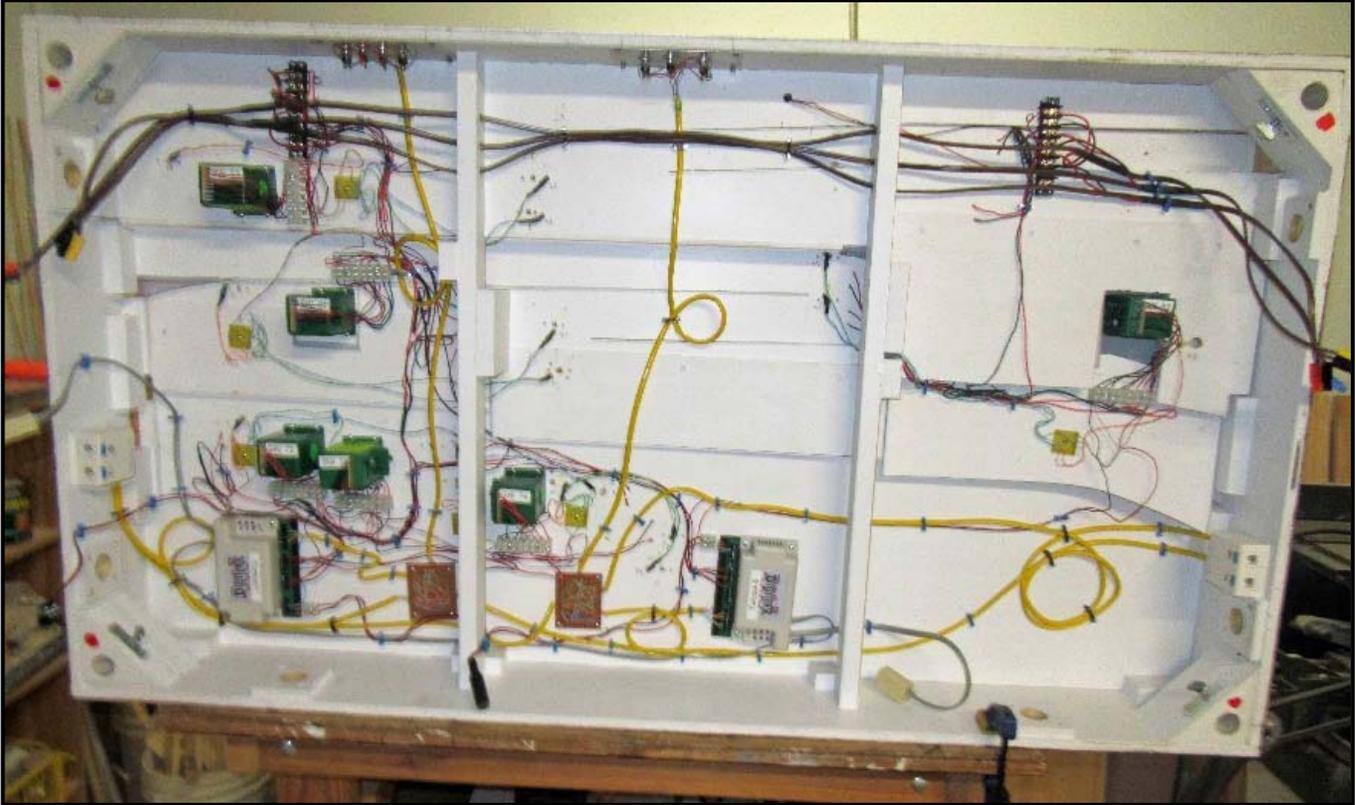
Connecting track.

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To achieve the desired radius on curves, every other web on the inside of the curve of a section of curved track was cut, allowing it to be bent to the right radius. When properly shaped each piece of connecting track was glued to a thin piece of styrene sheet with CA and ballasted to match the rest of the layout. Each piece of connecting track was marked on the back for its unique location.

**Electrical:** the electrical work on this layout would have been difficult to achieve working under a regular layout. I had trouble with the access under my old layout for the few changes made.



Module 6 clamped on a workbench to show electrical work details.

The wiring of components on the four show modules that are normally part of the layout is the same as the four home layout modules. Electrical discussion applies to all eight modules.

The eight-module layout has 25 turnouts, each with signal lights and switched by a tortoise stall motor. There are 5 DS64 DCC stationary Decoder panels mounted on the layout.

The layout is “grandchildren friendly” with six push button turnout control panels so turnouts can be operated from any side of the layout. On any side of the layout, if the engineer can see the signal lights of a turnout there is a push button to control the turnout.

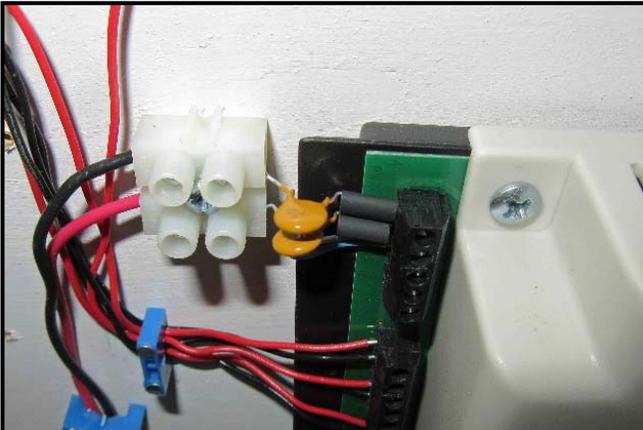
A UR92 Duplex Radio is installed in the side of one of the modules. Although the radio range may be reduced slightly, it is more than adequate for a home layout. All panels in the sides of the layouts are recessed so the module can still be clamped on edge on a workbench during maintenance.

DC power to components on all modules is provided from a 12 Volt, 5 Amp, switching power supply located on the underside of module 8. Since the 5-Amp trip setting is too high to protect individual components, a pair of 0.5-amp or 1.0-amp resettable fuses is wired in the power input to each device.

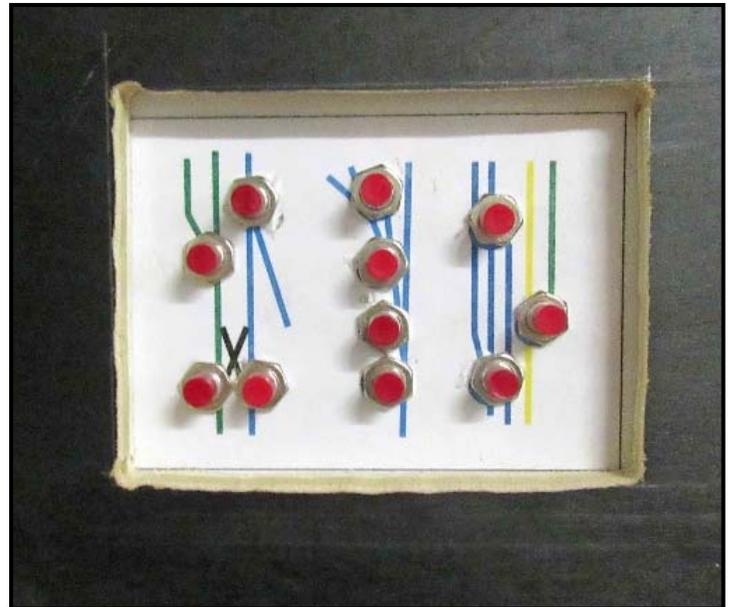
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LocoNet wiring is included on all the modules.



Resettable fuses look like capacitors.

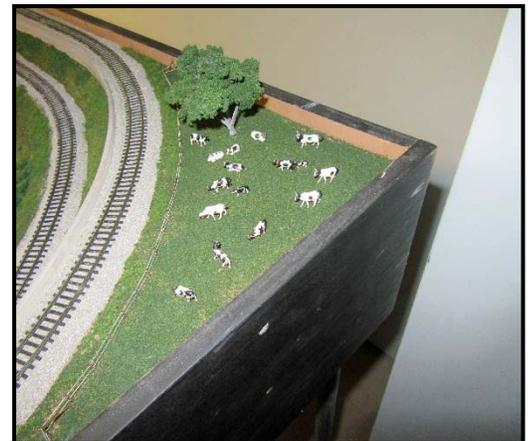


Turnout controls on Module 5 can operate all 13 turnouts on the home layout section.

**Scenery:** Continuing the theme of easy access, a small field with cows on one corner of the layout was next to a wall and hard to access with the layout set up. Of course, with the module out of the layout access was easy.



All scenery work was done with the modules out of the layout.



Access is a problem with the module in the layout.

**Finally:** I have found that the convenience of being able to take a module out of the layout for track, electrical and scenery work, more than made up for the extra effort involved in constructing the basic layout frame. It also allowed moving the layout from one room to another, in about four hours, so some extra show modules could be added.

