FREMO: Large Modular Layouts in Europe

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1 Introduction

Image
Caption: FREMO logo

FREMO stands for "FReundeskreis Europäischer MOdellbahner", translated Friendship of European railway modellers. In the USA there is another club, the Free-Mo for Free form Modules. Both clubs, the European and the American, are absolutely independent, but joined by common goals.

We are aiming at operation as close to prototype as possible. We use modules, as this allows to temporarily set-up large layouts requiring space, which can't be rented permanently. As no unprototypical circles are formed, the modules may have almost any size and shape. Only the faceplates need to meet some basic standards. This allows even the largest radii you can think of and stations may be built fully to scale. The only limit is the amount of bench work, tracks and scenery you are prepared to build and carry around. But you don't need to go that far. Modules allow starting with a small piece of layout to practise your skills.

As one difference to the Free-Mo, we at FREMO usually do not participate in train shows. We want to do our way of operation, not just many trains rolling to keep visitors happy. Of cause visitors are welcome and may participate in the operation, I will explain later.

FREMO members are from different countries: Germany (675), The Netherlands (98), Switzerland (27), Norway (13), Austria (11), Czechia (6), Belgium (4) and 17 in ten other countries. In total there are 851 members as of January 2004. As the FREMO was founded in Germany there is little surprise to find most members there. But the small groups like in the Netherlands, Switzerland, Norway and Czechia are very active.

At this point I intended to show also some statistics of members sorted by scale and gauge, etc. But as several members are active in multiple scales and as there is no list, where this can be found, I can just list the different scales and gauges. Most model European prototype. The largest group is H0 standard gauge (H0-RE), followed by H0n30 (H0e), H0n40 (H0m), Proto 87, N scale, fine scale N, 0 scale, fine scale 0, 0n30 (0e), 0n40 (0m) and TT. This is list is not sorted in any way. Additionally some are modelling USA prototype in H0, and an N scale group has just started. But even when modelling in different scales, gauges and levels of perfection we share our type of operation.

On the other hand even when modelling the same prototype in the same scale, modules may look quite different. Just plain track, straight or curved, including features like semaphores, set of segments forming one big module, stations and yards from small to large. The only restriction is the standardized face plate, allowing to put together the modules in any sequence.

As you can image from the member count our larger meeting have reached quite some size. Layouts with more than 1000 foot of modules have become relatively common. There are about two meetings per year of this size.

Image
Caption: Meeting at Garbsen Autumn 2003

2 The Modules

2.1 Module Ends

For each scale and gauge there is a standard for the face plate. Actually for H0 standard gauge there are multiple different, flat, sloped and on a flat dam plus a double track mainline. Except the last one all define a single track only. Multiple faceplate designs are possible, as there are transition modules and there is a large enough module pool, to get the resulting problems solved. However, all face plates have a common set of holes to make the modules physically fit even when the scenery does not match. This may be disguised by some bushes or other material temporarily added.

In any case there are three or more holes for the bolds connecting the modules. The holes are several millimetres larger then the bolds, to allow some space for adjustment. We use bolds and nuts with wings avoiding the need of tools for the set-up of the layout. The tracks go right to end of the module. No extra pieces of track to be inserted, no rail joiners. The modules are simply adjusted to make the tracks fit.

Image
Caption: Standard module end

Some modellers believe that this would be possible only in larger scales. But our experience shows that it does work in any scale. Including Proto 87 and fine scale N. And it looks better than the extra piece of track and set-up is quite fast. There is no chance to damage the modules when they are shifted relative to each other due to a person coming up too early after a duck-under. But the tracks going right to the edge need some support not to be damaged when the module is placed on the faceplate. One method is to put brass screws into the faceplate the rails are directly soldered to. If the screw head is reduced in size, it can be easily hidden by the ballast.

Image
Caption: Proto 87 module transition

With the track firmly fixed at the module ends, there are some gaps needed within the module to allow for thermal expansion and contraction of track. A module may have to face quite some temperature and humidity variations during transport and may heat up, if placed behind a window on a sunny day.

Image
Caption: Fixation of track ends with brass screws between sleepers

2.2 Electrical interface

As with the mechanical interface we try to keep things as simple as possible. Therefore there are just the two wires running in parallel to track. Each piece of track is connected to these wires. We do not rely on track joiners. To connect the modules we use simple 4mm banana plugs. Initially we had just two sockets on each module end, placed in a way to easily identify which is for the near and the far track. This requires two extra cables with plugs. We changed this to have on each module end one line with a cable and a plug and the other with a socket, optionally on a cable as well. This insures correct polarity and no extra cables are needed.

Image
Caption: Wiring a module

All other wiring we have on a layout – LocoNet for the DCC system, telephone wires, and lines for interlocking between stations and for the clocks – are not included in the modules. This reduces the number of interconnections within the cable runs. Also not everything is needed everywhere. Not everybody is able to produce a perfect wiring. And in case of failures a separate part may be replaced much easier than something integrated into a module.

2.3 Leg construction

Each module, except for very short ones, is required to stand on its own legs. The top of the rails shall be at 130cm (about 51 inch) above the floor, with the possibility to adjust the height by at least +/- 1cm to allow for uneven floors. The legs may be of any material, where most use either wood or aluminium. For the aluminium legs there are special holders with guide the leg in a square pipe and fix it with a clamping bold.

There are also similar constructions for wooden legs, with simple pockets the legs are inserted in. Height adjustment is done at the lower end with bolds in nuts at the leg end. Wooden legs are usually built as a pair with connecting thin plywood or hardboard, to enhance stability.

2.4 Transportation

All modules have to be carried to and from each meeting. Therefore modules need to be constructed with the transportation in mind. What is the larges piece I can move by myself? How much space is in my car, truck or trailer? How do I protect the scenery during transport and loading? One technique has proven to be quite useful, the so called "Double Whopper". Two modules are mounted "face to face". Place the modules on a

side and fix a board to the two faceplates on each end. The holes for the module connection are usually also used to fix these transportation boards.

Image
Caption: Two modules ready for transport

Some don't like their modules to be transported upside down. They stack the modules in special frames the modules are inserted in like a drawer. Another method is to add two transportation boards to the modules. These boards have some extra boards at the top, allowing to slot in the board of the module between them. This allows the modules to be stacked at any height depending on the size in the vehicle.

3 Planning

3.1 The layout

Each meeting needs careful planning of the layout. Space is usually limited compared to modules available. And the main aim is good operation sessions. Planning for operation is the key point. So stations and yards need to be placed in a way that there is no single bottle neck and the large stations get enough to do.

With large meetings some members have quite some distance to travel. The modules of these members need to be placed within the layout, to allow a late arrival and to leave first. So those modules will be placed towards the end of a branch or mainline, allowing other modules to be set-up and aligned before the late modules arrive. Remember, meetings are short and we don't want to loose too much time for the set-up.

Initially planning was done with 1:10 drawings of the modules and the hall. A great puzzle. While this method is very intuitive and good for planning with several people, there are some drawbacks. It is not very precise, making it often necessary to do some fine tuning of the layout at setup time. And all planning has to be done at one place.

Image
Caption: Classical layout plan

Today most layouts – especially the larger ones – are planed using CAD software. Most modules have been carefully measured and entered into AutoCAD. Don't trust the intended size of a module. Always measure the real one. When different scales or gauges are involved the drawings may be easily mailed or placed on an internet server to let multiple members to plan their part of the layout. This allows more effective and precise planning.

Image
Caption: CAD Layout plan

There is also some planning for the set-up sequence of the layout. For each module the time when to be ready to be attached to the neighbour is specified. Groups of modules may be put together before being attached to the main layout. This saves time as larger blocks are added to the main layout; the preparation of blocks can be done in parallel.

3.2 Time Table

Once the layout planning has (almost) finished the time table needs to be constructed. In Europe most trains are running according to a time table. There are very little "extras". As local fright trains are most operation intensive they are a major part of the time table. But passenger trains are also carefully panned for pupils travelling to school and commuters. Long distant trains are also part of the game. Also some long distant freight may be needed to either serve special sites or to exchange cars between the fiddle yards.

Especially with the larger layouts it gets difficult to keep all stations busy without overloading the yards, where cars have to be switched between trains, i.e. which have to do more than handling the local freight.

Image
Caption: Part of a graphical time table

A special program has been written to allow easy planning of a time table. But after about eight years there are new more powerful programs being tested. There is the graphical time table, to allow an overview. A list with departure and arrival times together with some notes is prepared for each train crew. And each station

has a list of trains and which track they normally use. This is a lot of work, considering that meetings last for just 3 to 5 days. But good preparations improve operation a lot.

4 The Meeting

4.1 Setting up the Layout

Image
Caption: Setting up a smaller layout

(Sorry, this section is based on a lot of images, which are not all ready jet and can't be all printed)

4.2 Finished Layout

Image
Caption: smaller layout finished

(Sorry, this section is based on a lot of images, which are not all ready jet and can't be all printed)

4.3 Operation

In the previous sections there are already several hints towards our way of operation. The trains are following a time table, where freight trains may leave early, but passenger trains may not. Of cause many trains are late. ;-) To compensate for the shorter than prototype distances we use clocks with a model time. These clocks are running at about 6 times the normal speed, allowing to model a full day within 4 hours. As there is little traffic during the night, an operation session takes about 3 hours. Obviously this time factor may vary – mostly between 4 and 10.

Image
Caption: Front and back of a car card

For each fright car there is a car card describing the prototype and the model. It includes a clear plastic bag to hold the waybill. Both local traffic and traffic into the world i.e. fiddle yard is possible. On larger meetings there are multiple fiddle yards to represent the different directions.

All stations are connected to a telephone system. Radio communication is used only in very few places in Europe and was introduced relatively late. Especially in eras we mainly model the all communication was done using different telephone systems. Therefore radio is not used for our operation.

The exact way of operation depends on the prototype. On mainlines and branch lines operated by the state railways there is no central dispatcher and most stations are manned. The train movement director is also responsible for the setting of points and signals at small stations, "offering" and "accepting" trains based on telephone calls to the neighbouring stations, operating any interlocking system if implemented and keeping track that all fright cars get to their destination. The actual switching is done by the train crews. At larger stations there may be multiple operators for local switching, coordinating the switching and assisting the station master in setting of points and signals. On privately owned railways most stations are unmanned and the train crew has to call the dispatcher for departure, arrival and allowance for switching.

Image
Caption: Operating the layout

In any case we try to come close to the prototype. E.g. we train ourselves to use the official wording on the telephone. We started to implement the interlocking between stations. These systems help to insure to have only one train in a so called block – a piece of track between two signals.

This all makes up for a very interesting operation, which is hard to describe. And it is still surprising to see so many people – 78 needed on the meeting in Garbsen last autumn – operating according a single scheme on a single layout. You have to try it!