

INGAnetNG

N Scale Narrow Gauge Modular System



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Introduction

Within the INGAnet organisation, standards exist for building narrow gauge modules which can be connected together at exhibitions, however these standards did not exactly meet the wishes of some members, who wished to make modules with highly mountainous scenery. At the Modellbahn Süd exhibition in 2006, a group of INGAnet members decided to produce a modular design that was prototypical of mountainous narrow gauge lines, in N scale.

The intention is for this document to allow modellers to build modules which can be connected together to produce a realistic looking mountainous narrow gauge system at exhibitions. For many modellers, the inspiration for this system is the RhB in Switzerland, but this standard can be used for any mountainous narrow gauge railway such as the HSB or Paese Basco or Côtes de Provence. It can also be used for gauges other than Nm, such as Nn3, Ne or Nf.

The first modules were built for the Modellbahn Süd exhibition in 2007, and it is hoped to exhibit a working Narrow Gauge line attached to other INGAnet narrow gauge modules, and the standard gauge modular system in future.

Specification

Common Features

Modules may be of any length since there is no intention for them to connect together as a continuous circuit. At the end of the line could be a terminal station (with run around), or a loop.

There is to be no additional rear sky board or scenic background within the vicinity of the module interface. If there is a scenic detail such as a valley, it might be desirable to add a background. This should not be higher than the rear of the end profile at any point.

It is intended that curves are present in the majority of modules to get away from the straight lines as found in most other exhibited modular systems. This is even more important with this document, due to the characteristic nature of mountainous narrow gauge lines, and also the very narrow and tall profile of the modules will be subject to toppling unless curved sections are joined together.

Note Please note that a single module may be composed of multiple sections that are always be used together. On such a module the internal interfaces between the sections are not required to meet the interface standards

Module Height:

Floor to Rail Top Adjustable between 900mm to 1300mm

It is intended to allow $\pm 200\text{mm}$ coarse adjustment in the legs of the modules. This will allow modules with features such as spirals or hard mountain climbs to be built.

It is also required to have $\pm 25\text{mm}$ fine adjustment, to allow for variations in the floor, and fine alignment of modules. An example of how this may be achieved is shown in Figure 1.

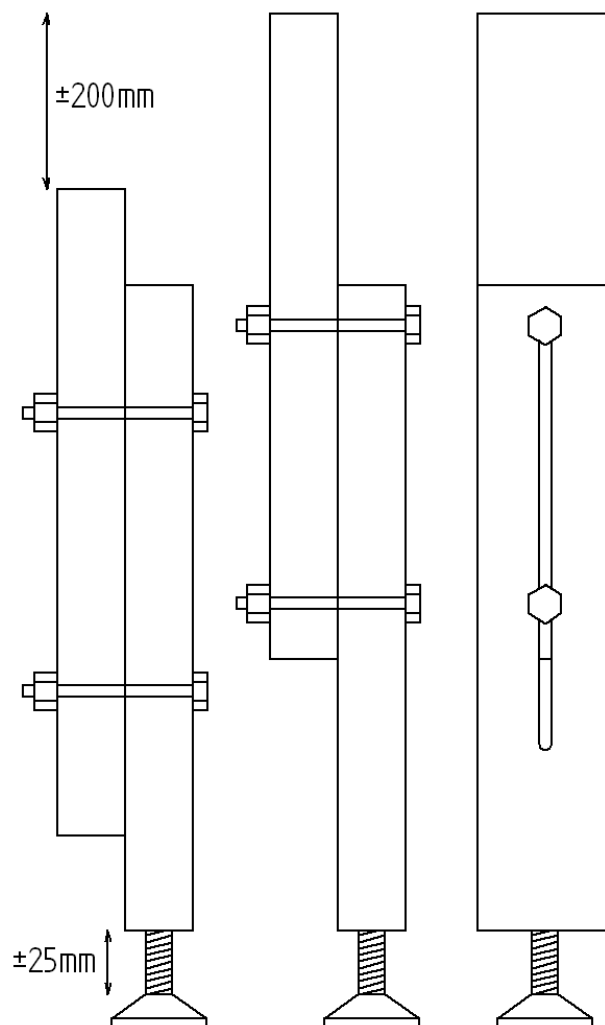


Figure 1 Example Leg Design

Profile End

Two end profiles are available: one for mountainous scenery, and one for flat scenery. Although they will fit together, there will be an obvious scenic break, so this should only be done in an emergency. It is intended that interface modules should be used to change from one profile to the other.

Standard dimensions of Mountain End Profile (Issue 0F):

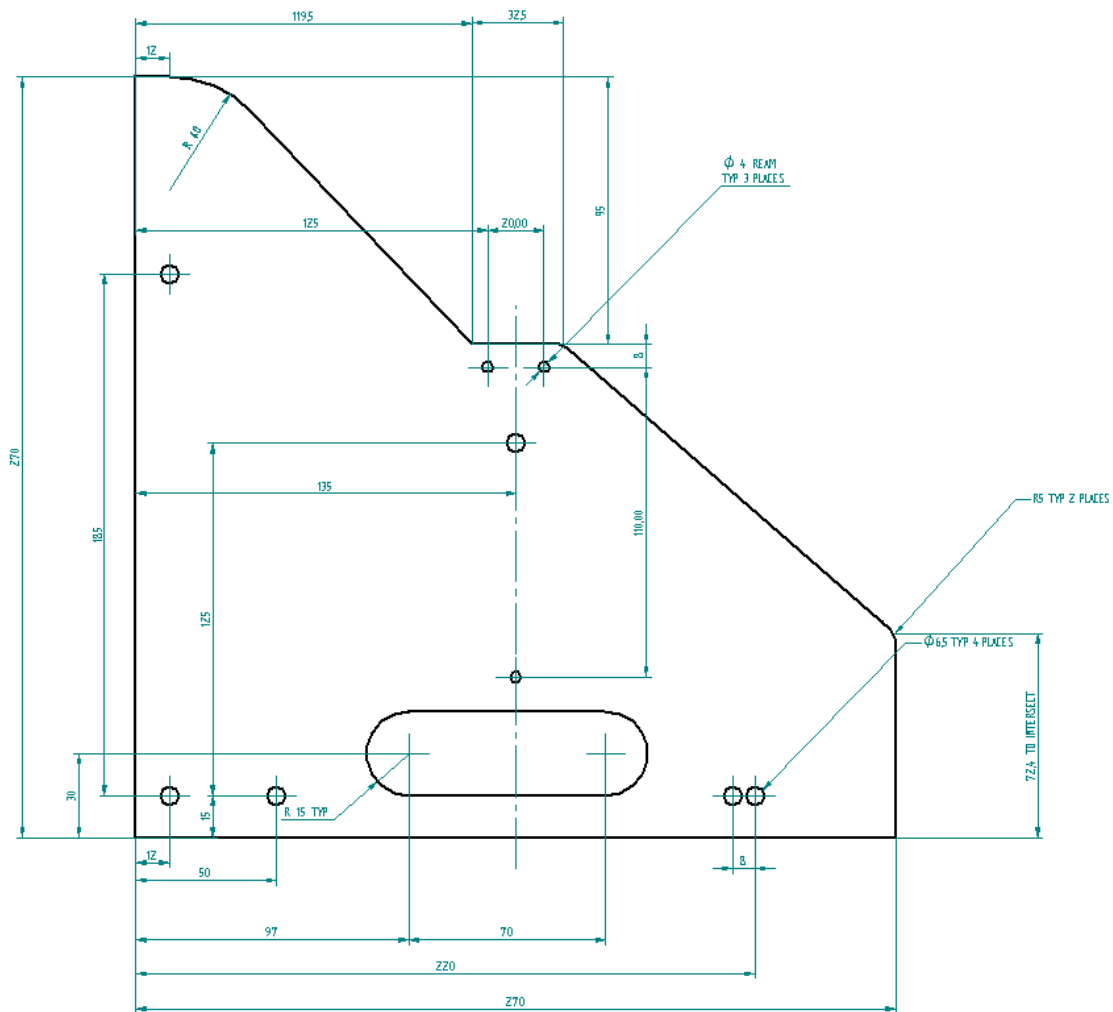


Figure 2 Mountain End Profile Dimensions

Standard dimensions of Flat End Profile (Issue 0C):

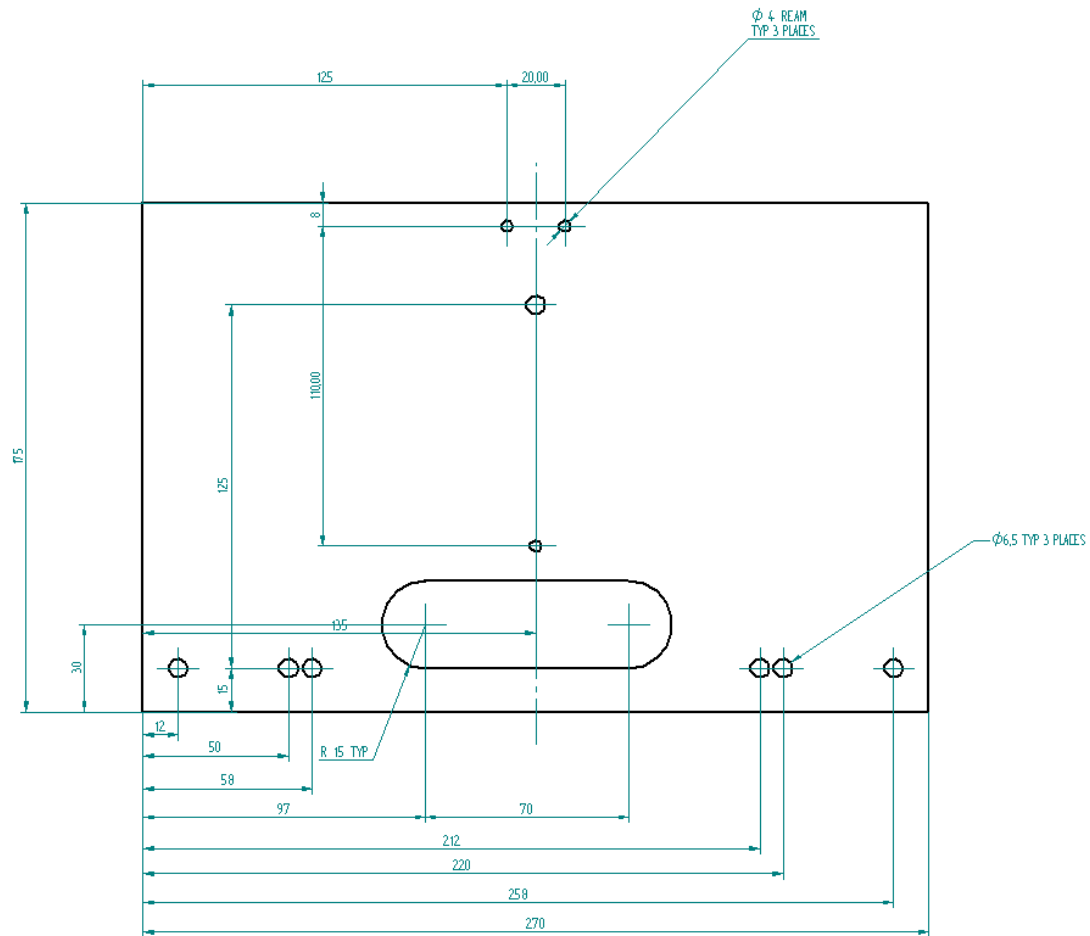


Figure 3 Flat End Profile Dimensions

Profile ends in 10mm acrylic are available from Antonio Rampini.

Neighbouring modules are held in alignment by three 4mm diameter steel dowels below the trackbed. The modules can then be held together using screws and nuts through the holes provided in the end profiles. Access must be provided for the use of these screws on all modules.

The large slot at the bottom of the profile is to aid lifting. Its use is optional and can be blanked off if desired.

Due to the scenery extending above the trackbed, **it is vitally important that the end profile is mounted as close as possible to 90° to the track in the vertical plane.** If not it will be very difficult to join the modules without an unsightly gap.

Base Board

Individuals may have modules (or groups of modules) of whatever length suits their plans. Depth of module may increase providing they each start and finish at 250mm without using sharp angles.

No part of the module (e.g. legs or trestles) must protrude beyond the end profile.

Modules can be made by any method (wood, foam, aluminium etc.) but access must be provided to use all the dowels and screws for module connection.

The module legs must allow each module to be set to any height between 900mm and 1300mm to allow for the different heights of exhibition layouts, and also to allow climbing/falling modules (e.g. spirals) to be built. If a gradient is built, it must be less than 3% at all times. On top of this coarse adjustment, screw feet allowing $\pm 25\text{mm}$ of fine adjustment are required, to allow for uneven floors.

The maximum gradient should be 2%, to allow for reliable running of trains.

Track Bed

The trackbed should conform to the standards of NEM123 as shown in figure 2 below.

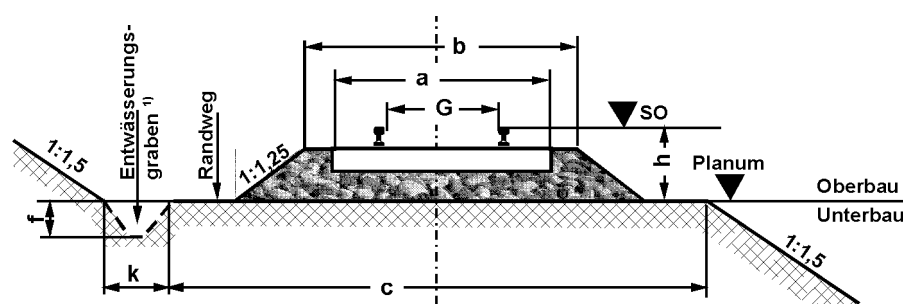


Figure 4 Trackbed Profile

Dimensions for Nm (in mm)

G	a	b	c	k	f	h
6.5	12	14	26	2	1.5	4.6*

*Overall height deviates from NEM123 to allow the use of commercial cork trackbed and Peco track.

It is not expected that all modules will build the gutter defined by k&f. The important details are the width and height of the trackbed b&h

Track to be laid on 2mm thick cork, which must finish flush with outside edge of profile end. This should be cut down from sheet or roll product to 14mm wide, and the sloping shoulders filled when ballasting.

Track

Peco Streamline code 60 Z Gauge flexitrack to be used on mainline running tracks. Märklin track can be used, but is not preferred. It is possible to cut the plastic beneath the rails, and increase the spacing between the sleepers, if this is desired. The last 50mm of track at each module end must be a separate piece of straight Peco track, aligned with the standard jig. This allows for more rigid alignment, and easier replacement of damaged track at exhibitions. This track at the module ends must be securely fixed with pins or screws to reduce the chance of damage. Alignment jigs are available from Duncan Bourne. Märklin track should not be used at the module ends, as the rail is loose in the sleepers, making it impossible to keep to correct gauge.

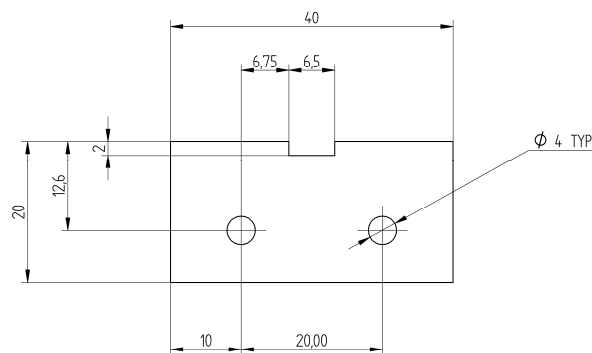


Figure 5 Alignment Jig (Issue 0C)

Points are preferred to be either Märklin (easily available, reliable but not prototypical) or Aspen Models (Harder to obtain, more expensive but better looking). Track and points may be handmade, but must be capable of running any rolling stock at exhibitions, including standard Z Gauge mechanisms.

Quality of tracklaying is of prime importance, to give the best running quality. Ideally curves should be no less than 300mm radius, with an absolute minimum of 250mm. When track is laid in

an opposing curve (i.e. An 'S' bend), there should be a 50mm straight section between the curves.

Ballast

ASOA Diabas, part number 1409 or Woodland Scenics Gray Fine (B75 or B1375). Ballast to cover the trackbed cork, and provide angled shoulders.

Scenic Material, Profile Ends

In order to avoid sudden changes of scenery at module joins, 100mm at either end of each module or group of sub-modules should use Woodland Scenics Fine Turf Burnt Grass, T44 as ground cover.

Scenic Material, Mid Profile

All scenic detail is to be a free choice for the module builder. Ensure there is a gradual transition of colour from module ends if required

The intention is for all modules to represent mid summer so appropriate scenic materials should be chosen to reflect this.

Loading Gauge

It is expected that standard gauge stock will run on the modules using transporter wagons, so the minimum loading gauge for tunnels, bridges etc. should be accordingly larger. The maximum loading gauge is as defined in MOROP NEM102 for standard gauge trains, with an additional 6mm height to allow for the transporter wagon.

Catenary

It is not essential to use catenary, but if fitted the choice of style is left to the module owner. It is not intended to run stock with pantographs up, so the catenary is for aesthetic purposes only. For this reason, a post should be mounted very near each end of the end of the module, so there will be a small gap to the post on the neighbouring module. By this method, the scenic effect can be achieved without needing precise alignment.

Layout Protection

Clear polycarbonate (not acrylic) to be fitted at front for exhibition protection. Maximum thickness to be 3mm (1/8"). Edges to be clean and deburred. This is very important to

protect against rolling stock rolling off the front of the modules!

It should project 125mm above the base of the end profile. Fixing to be at the builder's discretion, but must be secure. The plastic should finish 50mm above the underside of the module, to allow fixing of curtains and layout badges.

It is recommended that tracks to be protected on ends of modules for storage and transit

Electrical Requirements

Controller

Electrical connections can be left unmade in order to separate groups of modules into blocks. Each of these blocks can be controlled by an individual controller, which is designed for Z Scale operation.

Alternatively it will be possible to enable DCC operation in future, by making all the connections and powering the whole layout from a single point.

Note Any electronics that are not dual function DC/DCC must be provided with a disconnection method

General Requirements for Wiring

Note There must not be any voltage higher than 16V present on any module.

The following requirements should allow the use of DC or DCC (in future), and avoid voltage drops through the modules:

All wires are required to be minimum of 0.75mm², such that they are capable of carrying a constant current of 5A. All interboard wiring to be single wire running from one end of module to the other, then tee off wires to tag strip or direct to track

Each piece of rail requires a separate feed dropper from a copper bus that is be 0.75mm² minimum. The droppers may be smaller than 0.75mm² and suitable for 5A supply. No reliance is allowed for making electrical connections by using fishplates

All electrical connections to be made by soldered joints. Wiring to be tidy, with all runs documented. Interboard connection wiring to be kept separate from board owners wiring requirement and feeds.

Connection Between Modules



Figure 4 Banana Plugs

Modules are to be electrically connected using 4mm 'Banana' plugs, as these are easily available worldwide. The following rules apply:

- Required connectors are: Red for the front rail, Black for the rear rail, and two blue connectors for 16V AC.
- Looking from the front side, sockets are used on the left end, and pins on the right.
- Both plugs and sockets are mounted to 'flying lead' cables.
- The cables must extend at least 30cm from the end of each module, to allow for easy connection.
- Connectors should be soldered to the wire in preference to screw types.
- Due to the lower voltage, gold plated connectors are preferable.

16V AC Facility

Two connections are provided to pass 16V AC power through the modular system. To avoid overloading this supply, it is intended to be used only by low power devices, such as level crossings or small lights. If any module requires power for lighting and / or additional features then it is the responsibility of the individual operator to provide a power source capable of safely powering all features and isolating the module from those either side.

Even if the AC facility is not used on a module, it must pass the wires through to the next one.

General Requirements

Front and Rear Facia Panels

Front and Rear fascia panels will be visible at exhibitions, so should be tidy and painted matt or satin black throughout. Also paint black all internal parts that may be viewed from rear ensuring clean and uniform appearance.

The front fascia is used to secure both the plastic layout protection and the front curtain. Provision must be made for both parts to be securely fixed to the module.

Curtains

Black curtain material is preferred to be fitted to front of all modules, extending down to the floor. Due to the different heights available for the modules, the curtain should be long enough for the tallest possible height (1300mm).

Each owner should provide enough curtain to cover their modules, and overlap by at least 100mm onto neighbouring modules, to ensure no visible gaps between curtains.

Rolling stock

All stock when being run during an exhibition must be in good running order. Stock to be removed at the first sign of a problem. Couplers should ideally be of the microtrains type.