



Jean-Louis Rochaix introduces possibly the shortest, and certainly the highest, tramway in Switzerland.

Photographs by the author, unless otherwise noted.

The Riffelalp tram

An unusual line high in the Swiss alps

The Riffelalp Tramway (RiT) was built to connect a station on the metre gauge Gornergratbahn (GGB), the rack railway which runs from Zermatt to the summit of the Gornergrat, with the five-star Riffelalp Hotel. Of 800mm gauge, it is just 675.31m long, and is the highest tram line in

Europe, with the maximum elevation being 2,222 metres. Journey time is around five minutes!

The line opened on 13th July 1899, one year after the opening of the Gornergratbahn. It was originally 480m long and electrified at 550v 40Hz three-phase AC via overhead.



Inset
Running under the catenary,
c.1950.
Anonymous postcard.



Above
One of the two trams on the loop outside the hotel.
23rd June 2001.

Left
The trams running in multiple round the loop by the hotel.
21st July 2012.

Below
Outside the hotel there is a crowd ready for boarding.
24th June 2001.

From the outset, the hotel was much frequented by British customers, proud of the achievement of the mountaineer Whimper, conqueror of the Matterhorn.

Over the years, the hotel has hosted a wide range of customers from Britain, among them Archbishop Benson of Canterbury, who was perhaps responsible for the construction of the Anglican chapel next to the hotel. It still exists, and hosts many concerts. It also houses the tomb of Bishop Lefroy, Dean of Norwich. In 1920, Prime Minister Lloyd George and his daughter, with a host of security guards, had a short stay in Riffelalp. After the fall of Mussolini in 1943, 1,600 British prisoners-of-war, fleeing over the passes, were welcomed in Zermatt and Riffelalp.

The tram operated in the summer months until 1960. A fire on the night of 14/15th February 1961 destroyed the hotel, so the service was suspended and the vehicles which survived were taken to Zermatt.





Above
The Matterhorn makes an impressive backdrop to the hotel in this promotional postcard from the early twentieth century.



Right
The area of the Riffelalp hotel before the fire. Old postcard.



Above
Railcar Ba2/2 1 (the one rebuilt on the pattern of the former Ce2/2 1) is being followed by Ba2/2 2 with the Kkl 11 trailer. 23rd July 2012.

Left
Trams leaving the resort. The annex on the left survived the fire. On the right is the Anglican chapel. 20th June 2004.

Right
Leaving the GGB station, trams running in multiple head towards the hotel. 19th June 2004.





Reconstruction of a new hotel, the Riffelalp Resort 2222, did not begin until 1998, and it was decided to put the tramway back into operation.

The original route was retained and the track (which had been lifted) relaid using 26kg/m flat bottom rail on steel sleepers. New track was added, with a return loop (190.36m) around a garden in the middle of the resort. Unlike its predecessor, the tramway also has a link to the cargo ramp at

Above
Hotel staff welcome two guests at the GGB station. 26th June 2001.

Riffelalp GGB station and a track into the depot at the hotel, with room for two trams.

The restoration of the original overhead contact line would not have been possible due to numerous new safety regulations.

Time had also left its mark on the tram vehicles, which made a re-commissioning of the originals too costly.

After several options were developed, it was decided to re-establish the service with two motor cars for passengers and one trailer for goods and luggage.

During the reconstruction, the focus was on rebuilding the trams according to their original appearance. The electrical equipment was supplied by Stimbo in Zermatt, while Visp-based Zurbruggen + Kreuzer provided the wooden superstructure. The cars are now supplied by batteries (80v, 400Ah) and driven by two 10kW DC motors. The battery is partially recharged during electric braking. A hydraulic disc brake is used for stopping and mechanical braking. The parking brake consists of a spring-loaded brake. Maximum speed is 10km/h.

The GGB was responsible for coordination, engineering, arranging the authorisation with the Federal Ministry of Transport, and for the actual construction.

Above
The trams passing a group of walkers between the GGB station and the hotel. 23rd June 2004.

Below
Riffelalp station as it is now. 24th July 2012.

The line was re-opened on 15th June 2001 after forty years of 'retirement'.

The service operates from the first half of June to the second half of September, from 11:00 to 16:00.

Hotel guests can now commute in a leisurely manner in true 'Belle Epoque' style between Riffelalp station and the hotel. Luggage and other goods are transported on the state-of-the-art trailer.

Summer and winter, the hotel is very popular despite the fact that it is the only five-star hotel in the world which you cannot reach by car.

Riffelalp Resort 2222m, CH-3920 Zermatt, Switzerland.
www.riffelalp.com

Above
Ryffelalp station on the Gornergratbahn, c.1950 – note the old spelling of the name. On the left, the baggage railcar Fe2/2 2 and on the right railcar Ce2/2 1. The three-phase AC electricity was derived from the GGB supply.
Photo: J.Sager



Left
Luggage trailer Kkl 11 by Riffelalp station on the Gornergratbahn. 15th September 2012.

Below left
Shunting the luggage trailer at the resort. 23rd July 2012.

Below right
Railcars Ba2/2 2 and 1 arriving at the hotel. 26th June 2001.





Jean-Louis Rochaix models the rolling stock described in the July issue.

Photographs and diagrams by the author.

The Riffelalp trams

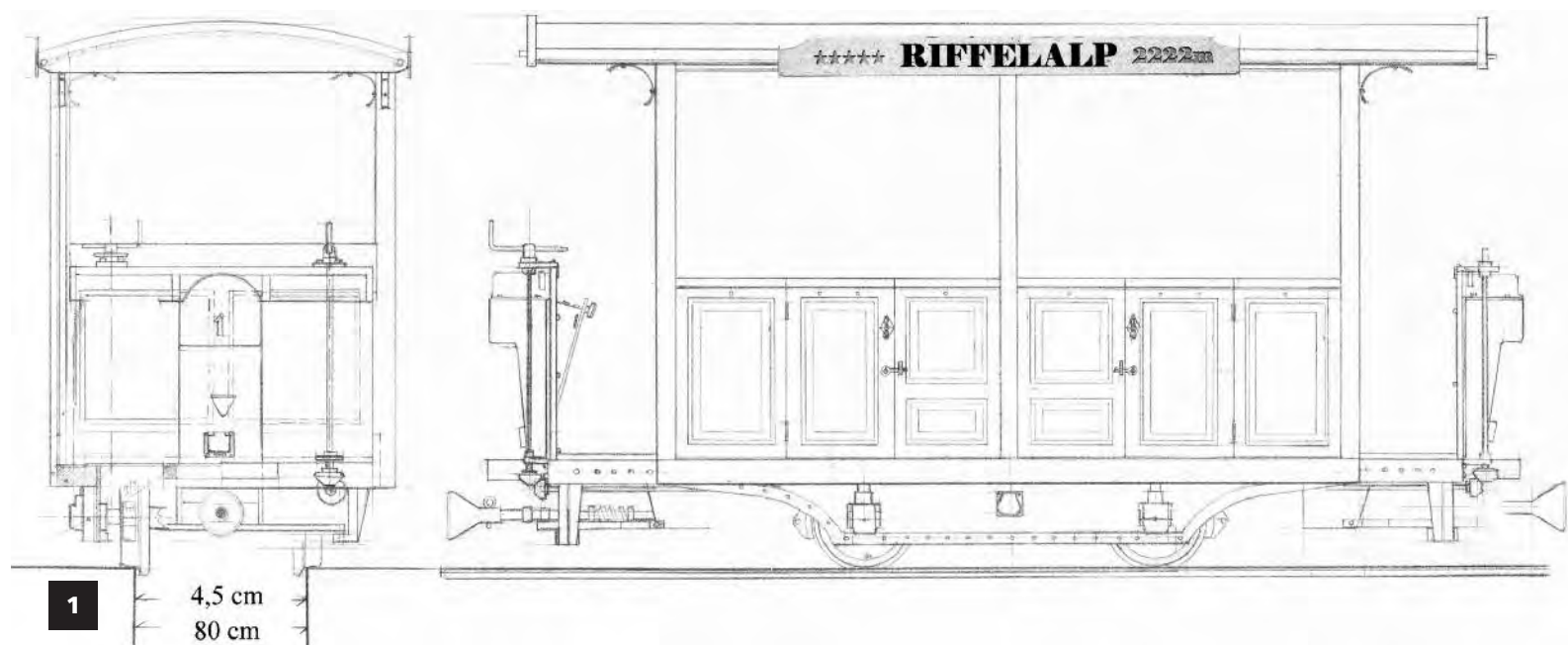
Vehicles for an unusual tramway high in the Swiss alps

Because the line does not operate in winter (it is replaced by snowmobiles with trailers), the hotel management wanted to show the tram to winter guests. As a result of a discussion with Hans-Jörg Walther, director of the five-star Riffelalp Resort 2222, I was asked to reproduce in model form the three vehicles used on the tramway.

The model of the tramway would be installed in the main lobby of the hotel and was due to be unveiled on 24th June 2013. It will run back and forth over a length of over 20m.

I decided to use Peco G (45mm gauge) track; as the prototype is 800mm gauge, this determined the scale at 1:18 for an adequately accurate reproduction.

1
First it was necessary to prepare working drawings based on the principal dimensions and available photographs. Reproduced to half model size.



Left
The two finished trams.

Construction of the vehicles was spread over a year, and took nearly 400 hours.

Construction

Having only the main dimensions (length, width, height, and wheelbase) of the trams Ba2/2 1 and 2, but thankfully with many detail photos, I had to start by drawing plans.

Then I made brass masters for the repetitive parts needed in some quantity. They were cast in brass using the lost wax process by Panier (D-22926 Ahrensburg).

When I received the 22mm diameter wheelsets ordered from Modellbau Werkstatt Bertram Heyn (D-37081 Göttingen), construction could begin.

The vehicles had to be robust, so it is for this reason that they have a chassis and superstructure made of brass. The main frame members (6 x 3mm) are soldered along the entire length. The sides were cut from hard quality 0.5mm brass and bordered by 3 x 3mm square section, soldered and rivetted (using rivets with 1mm diameter heads).

The four fasteners for the coupling supports were soldered to the chassis. The cab guardrails were made with 3 x 3mm brackets soldered to the protective plates and the switching cabinet. The 'skeleton' of the body was made of 0.5mm thick brass sheet sandwiched between 5 x 2mm brass section.

The cladding is Evergreen 1.5mm thick plasticard glued to the brass with cyanoacrylate (superglue). The mouldings were made using Evergreen 1 x 1mm strip. The benches are also made from grooved plasticard.

The roof framework is edged with guttering (U section brass 3 x 3mm), to which are soldered the boards intended for the hotel advertisements.

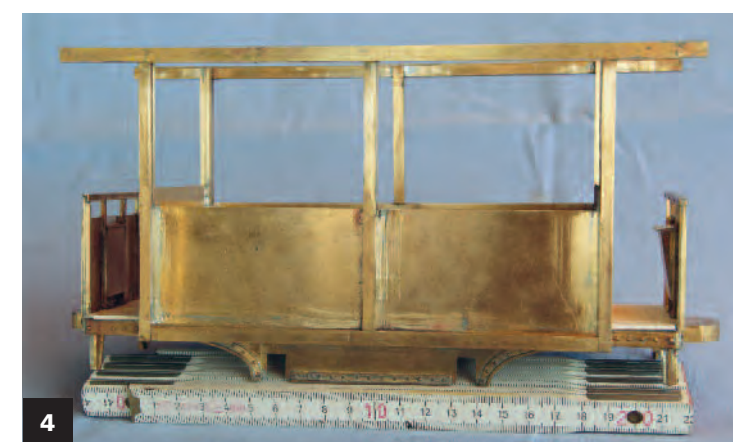


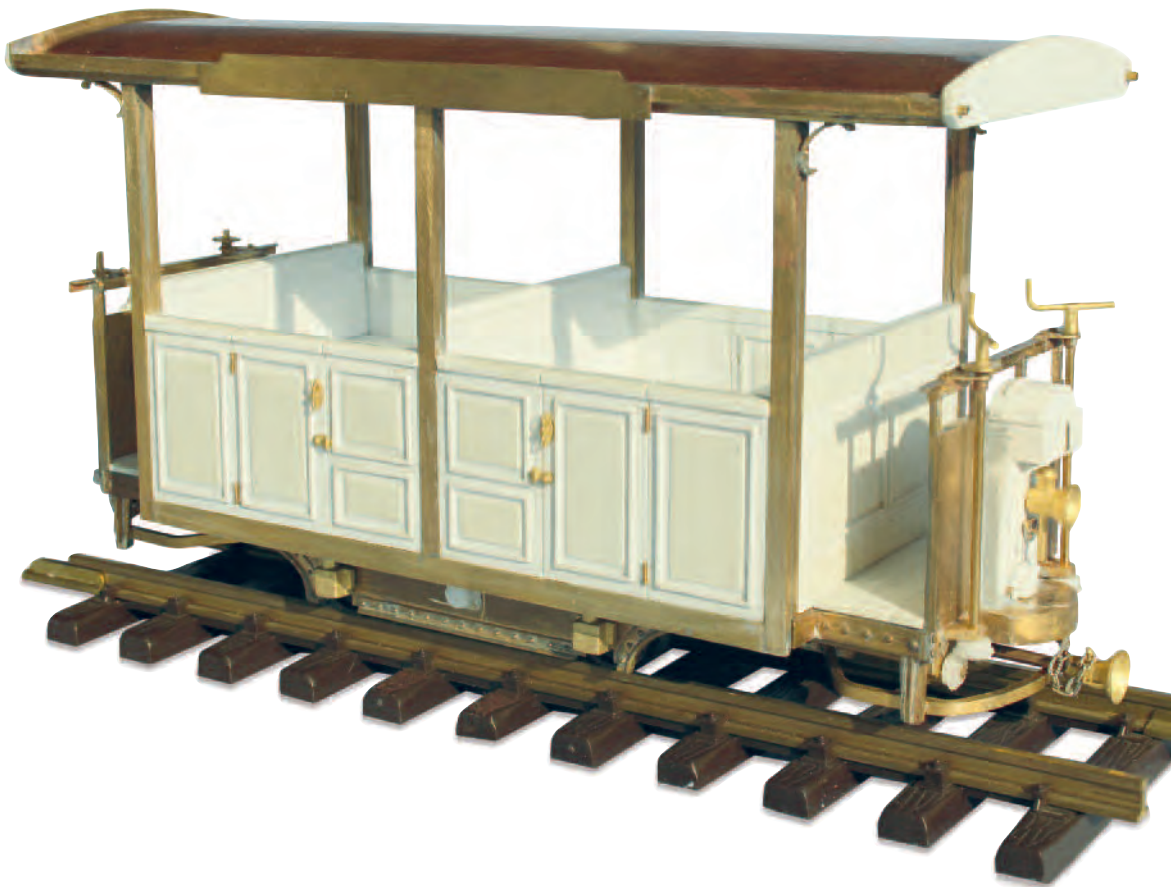
2
Brass masters were made to cast parts which would be needed in multiple.

3
For strength, the main frames are made from brass.

4
The body sub-structure uses brass sections and sheet.

5
Plastic body panel overlays in place, and roof boards added to the guttering.





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6
A completed vehicle,
ready for painting.

7
The stages in making the
curtains – a lot of work
for a little feature!

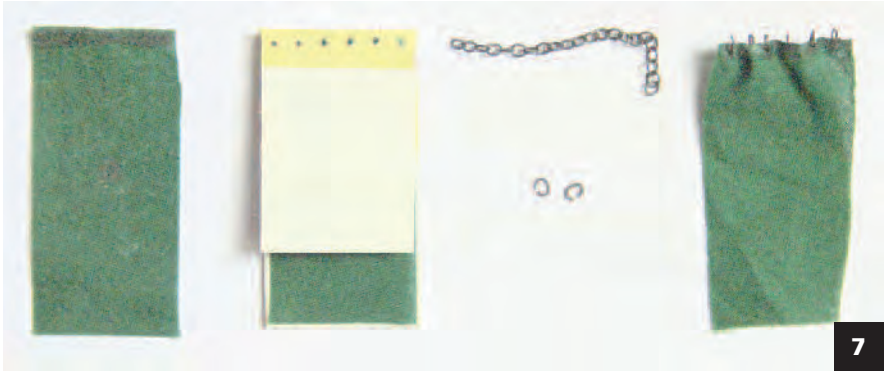
8
Ba2/2 2 complete,
with the curtains hung.

The roof is 0.5mm copper, fixed with two screws into the top of the inner front walls, on the centre line. It is lined with 1mm grooved plasticard to simulate boards.

I could then begin the detailing phase – fixing handles and latches on the doors. The hinges are simply pieces of 1.5mm diameter brass glued with cyano. Platforms are complemented by the driver's controls, which in reality were recovered from the original trams. The models are completely scratch-built in plastic. The brake linkages and control rods were made with Delrin bevel gears. After installation of lanterns and couplings, the vehicle is ready for painting.

Next the lining and markings are applied, then the billboards for the hotel are put in place – these are colour photos printed to exactly the right size, glued to the metal panels provided.

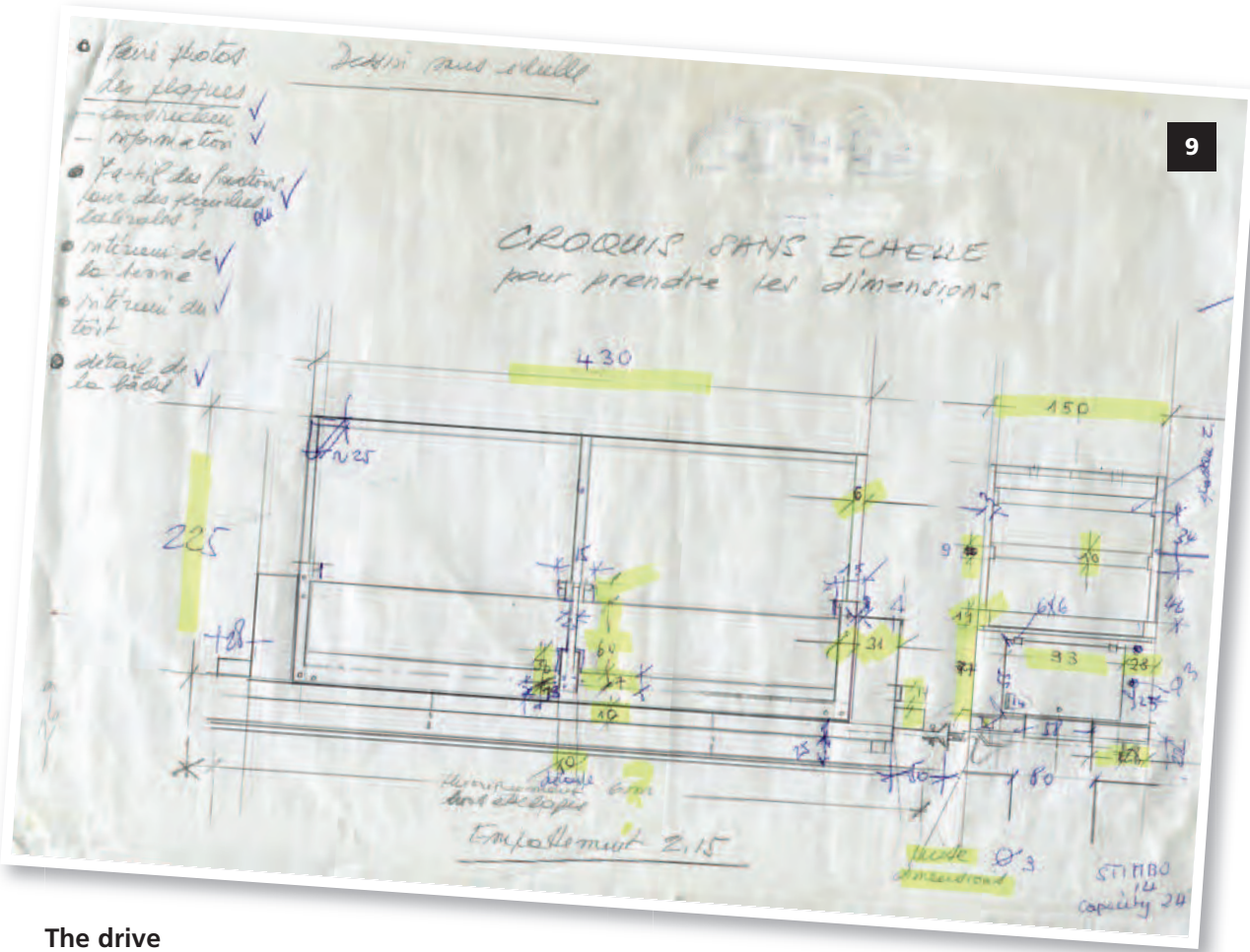
- The manufacture and installation of the curtains was a very big job! Here are the details:
1. The fabric (as thin as possible) is treated with matte lacquer spray for starching which allows it to be cut.
 2. A light 'border' of cyanoacrylate is applied to the top edge and allowed to dry.
 3. The curtain is placed between the two plates of the drilling template, and then drilled with a metal 0.8mm bit.
 4. Some rings were cut from the chain.
 5. One by one the rings are fitted into the holes in the curtain and then closed up.
 6. The top of the pleated curtain is then threaded onto 1mm brass rods.
 7. After putting them placing, a piece of brass 2 x 0.3mm is folded around the bottom of the curtain and attached to the vehicle by a rivet, stuck with cyano.
- This process must be repeated eight times per vehicle!



7



8



9

9
The preliminary diagram of
the trailer, prepared in
advance, with the notes and
measurements made on site

The drive

To allow for future intensive use of the models, it was decided not to motorise the Ba2/2 trams, not least because a large motor would have prevented the correct reproduction of the interior. Instead, a motor can be easily integrated into the luggage trailer Kkl 11, which becomes a locomotive!

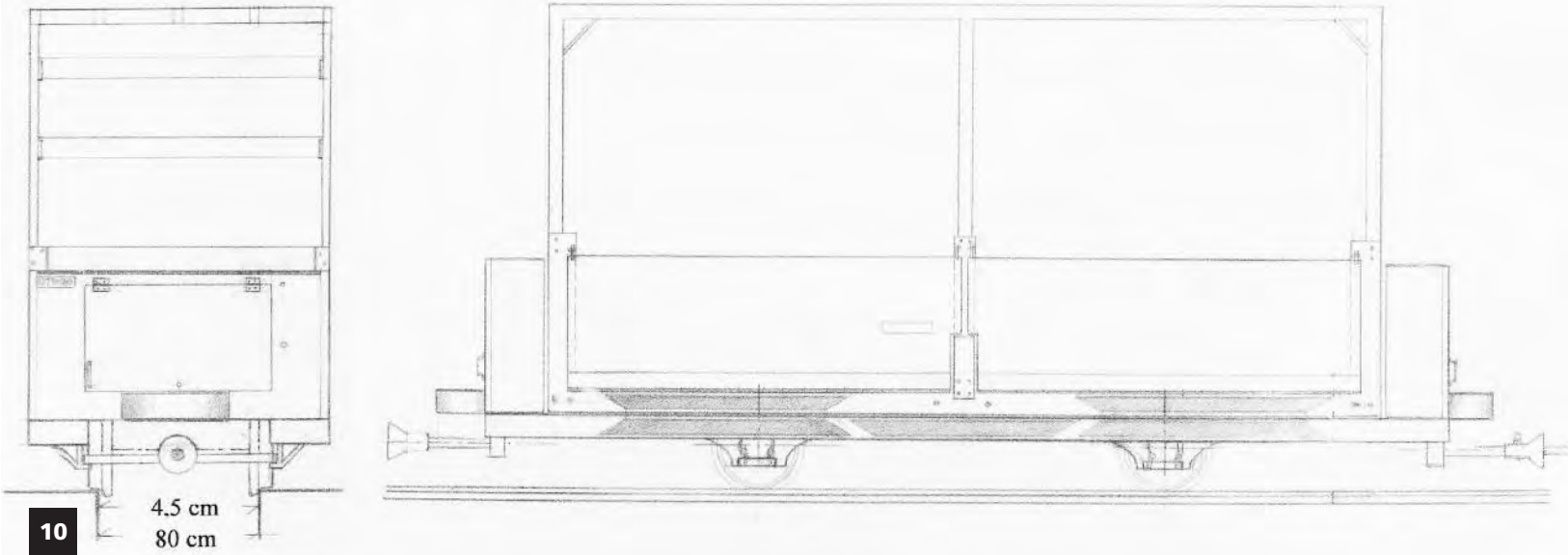
The motor block comes from the LGB Rhätische Bahn shunting tractor, which was selected as it is relatively low, so it was easy to fit in the double floor of the trailer, and its wheelbase is exactly right for the model. The diameter of the wheels is a slightly too large, but this detail is hidden by a very low chassis.

The trailer

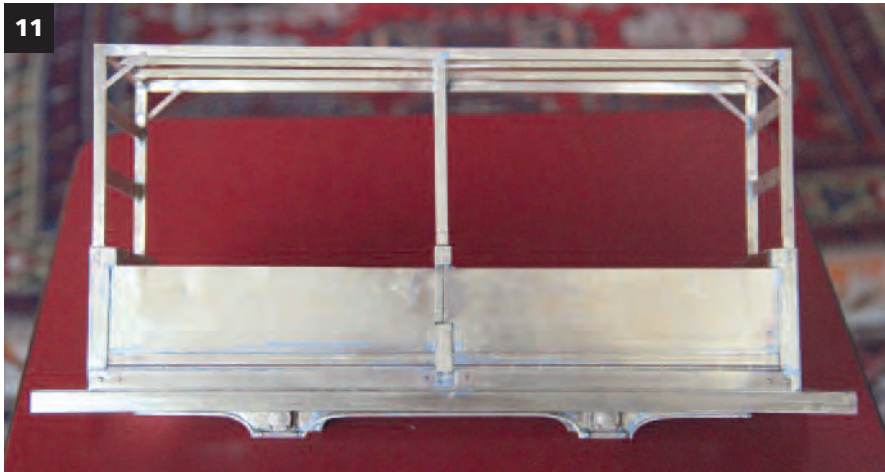
Before being able to start the construction of the vehicle, it was first necessary to draw up the plans, which were completely lacking. Using photos, I made a chart for noting all the dimensions. The task of measuring the vehicle was performed on site with the help of my wife, and drawings were then made.

The process of construction was very similar to that of the tram cars. The frame is also made of brass. The chassis itself consists of four roller-bearing axleboxes on a frame, and the body is mounted on it. It is made of 0.5mm hard brass sheet

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The working drawings which
were produced as a result.
Reproduced to half model size.



10



and brass sections. Using hard brass has two advantages:

- when sawing, the teeth of the goldsmith's 0.4mm blade do not get clogged with metal swarf.
- for cutting straight pieces, you simply mark the metal strongly with a scribe and the pieces can be easily separated by bending and breaking – a big time saver compared to the saw. A little use of a file perfects the piece obtained.

Rectangular sections 3 x 2mm are used to support the sheets. The main difficulty in their assembly is getting them to meet exactly at right angles. Once soldered together, the pieces are drilled and pinned with 0.8mm diameter rivets, the head of which is filed down after further soldering, which ensures the solidity of the whole.

The actual vehicle is equipped with a double floor. The first is secured to the frame and the second can be moved to adapt to various platform heights; the lifting mechanism is hidden in two boxes at the ends of the vehicle. I have reproduced these using Evergreen styrene sheet with details (hinges, handles, etc.) in brass.

The folding sides of the vehicle and the top of the boxes are covered with a sheet of 0.5mm Evergreen chequer plate to reproduce the surface of the anti-slip aluminium.

Straps for securing the roll-up covers are 2 x 0.2mm brass and have a certain flexibility. They are soldered and rivetted to the side supports.

Only a very small part the motor block protrudes above the second floor, and is easy to hide with a some loaded goods. The bolts holding the movable sides have been reproduced, rivetted and glued with cyano.

To be complete, the vehicle needs its cover. The fabric was treated with a clear matte spray and, after drying, was cut to the shape of rectangle (for the main 'roof') with four extensions, two sides and two ends – a sort of irregular cross.



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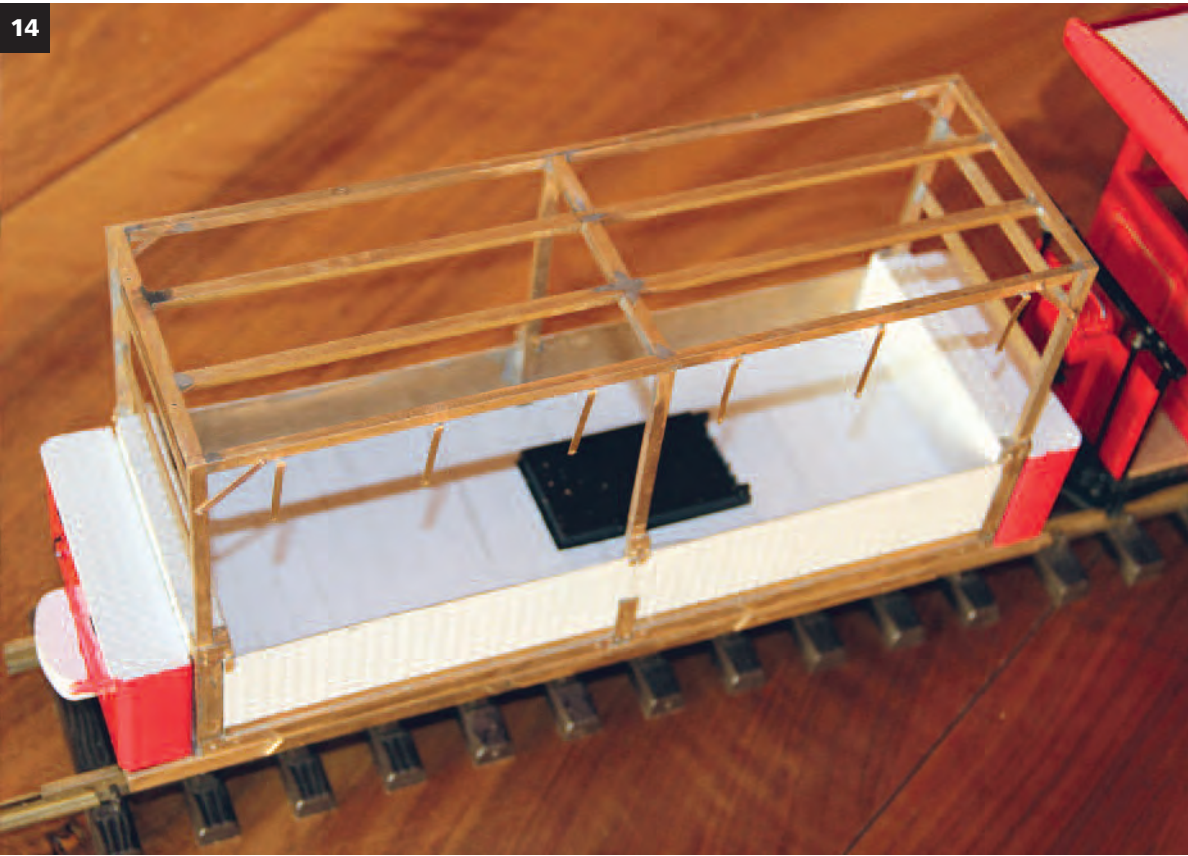
11
The trailer body shell, made of 0.5mm hard brass sheet and brass sections, mounted on the chassis.

12
The floor lifting equipment boxes at each end were made from styrene sheet.

13
The folding sides were made with chequer plate material. The straps to hold the roll-up covers are thin brass strip.

14
Just a small part of the black plastic cover of the drive unit protrudes into the body; it can only be seen from an elevated viewpoint, and is easily concealed with a load.

15
The finished model of the trailer, with canopy in place and a suitable load on its way to the hotel.



Across the ends of these four extended sections, I glued 4mm diameter wooden sticks round which, after the glue had set, I wrapped the fabric; the wood should not be visible at the ends. It only remained to bend the cover retaining straps and attach them to the top frame using flush rivets

fixed with cyanoacrylate. The Kkl 11 markings were made with dry transfers. The (now motorised) wagon only had to be loaded with merchandise to be finished, and the fleet for the 1:18 scale Riffelalp Tramway model was complete.



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