

# MALKY'S N-SCALE S.A.R. MODELS

## Adapter Kit to use TM-12R Mechanism with Bluebird

**The Kit:** This kit consists of two components, printed in Shapeways Smoothest Fine Detail plastic. The intention is to allow modification of the Tomytec TM-12R chassis for use with the PBW Bluebird kit, in lieu of the originally intended TM-04 mechanism. The TM-12R has the advantage of two driven bogies, increased weight and possibly a superior motor. The kit components are used in a similar way to those of the original PBW kit: the chassis is cut, a lengthening filler piece is glued in, and the underframe detail piece is added for strength as well as appearance. In all other aspects, assembly of the Bluebird remains the same as for the original kit. The modified chassis is a drop-in replacement for the earlier chassis based on the TM-04.

**Modifications to Chassis:** Figure 1 shows the unmodified TM-12R chassis.

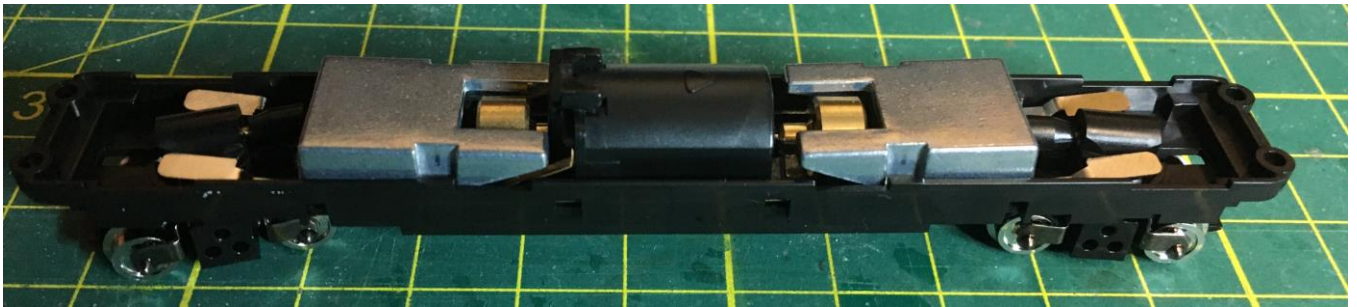


Figure 1 Unmodified Tomytec TM-12R mechanism

Firstly, disassemble the chassis by removing the weights and the motor complete with drive shafts. Then remove the two horizontal bars which hold the metal contact strips in place along the sides. Finally remove the weight in the bottom of the centre block. Store these components carefully – they will all be reused.

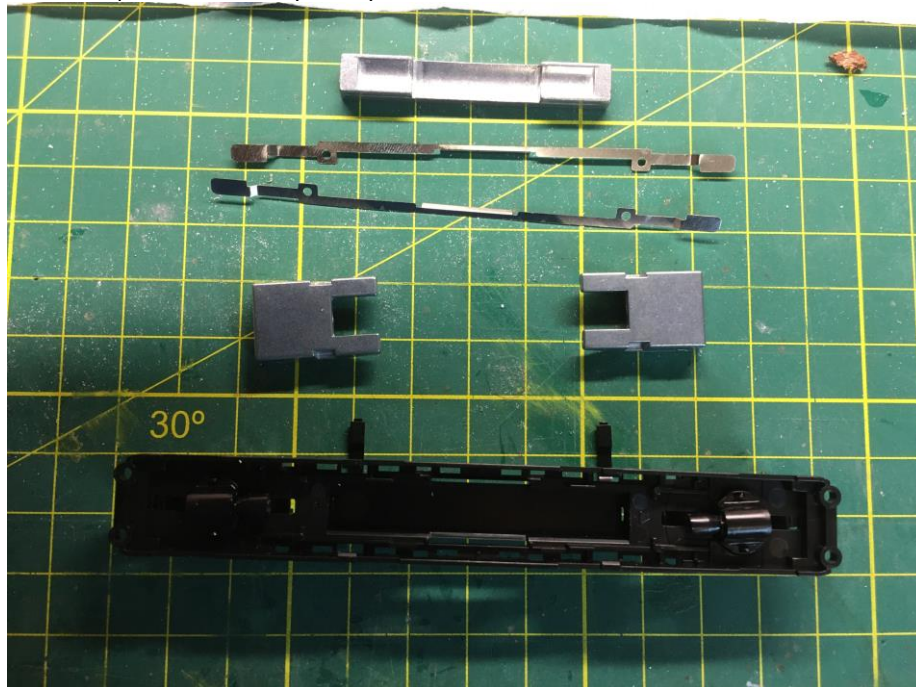
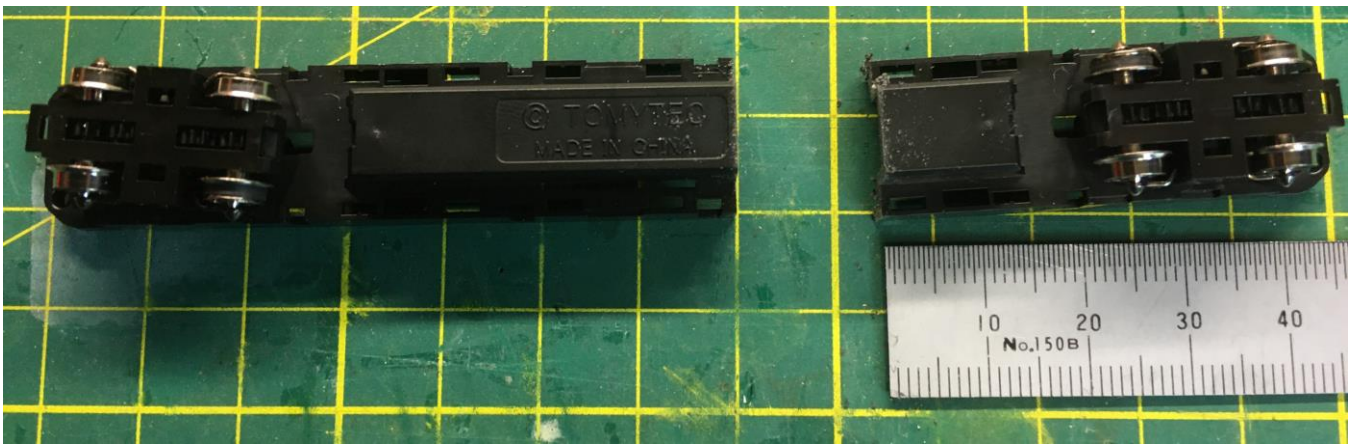


Figure 2 Chassis stripped of all components except bogies

The chassis needs to be cut to allow the introduction of the 17 mm lengthening piece. The cut should be made 13 mm from the rear end of the block in the middle of the chassis, as shown in Figure 3. Note that the upper side of the chassis has a small arrow indicating the direction of forward travel. This becomes visible when the weights are removed.



**Figure 3 Showing location of cut – 13 mm forward of rear end of central chassis block, just behind the Tomytec logo**

The cut should be made carefully with a razor saw in a mitre box to ensure a square cut. Clean up the edges with a fine file.

Next fit the chassis extension piece so that it aligns with the upper edge of the chassis, and also with the lower chassis block. Note that to achieve this, the chassis should be located upside down on a piece of 1 mm styrene or similar, so that you can press down firmly on the upper edge of the chassis, without interfering with the worm drives on the bogies. When satisfied with the fit, apply cyanoacrylate superglue to one end of the extension and join it to one end of the chassis. When cured, apply glue to the other end and join to the remaining chassis end. See Figure 4.



**Figure 4 Extension piece glued into chassis halves – note support on 1 mm spacer to clear bogie worm boxes**

When the joints have cured, check the fit of the underframe detail piece over the central block and ensure that it sits up snugly under the chassis top plate. Noting that the large battery box is on the left hand side, apply cyanoacrylate glue to the upper edge of the piece and locate it over the chassis – see Figure 5. Note that the Tomytec chassis has a small arrow to indicate the direction of forward travel, as does the motor.



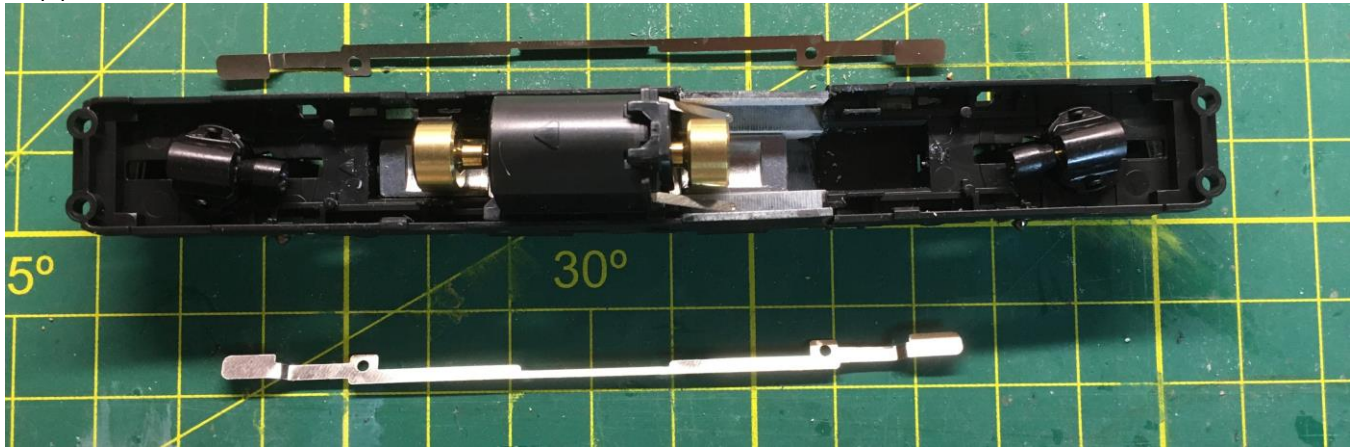
**Figure 5 Underfloor detail in place**

At this stage, check the fit of the extended chassis into the body. It will be necessary to trim approximately 0.5 mm from each end. Then spray the chassis matt black, masking the bogies to prevent paint entering the mechanism.

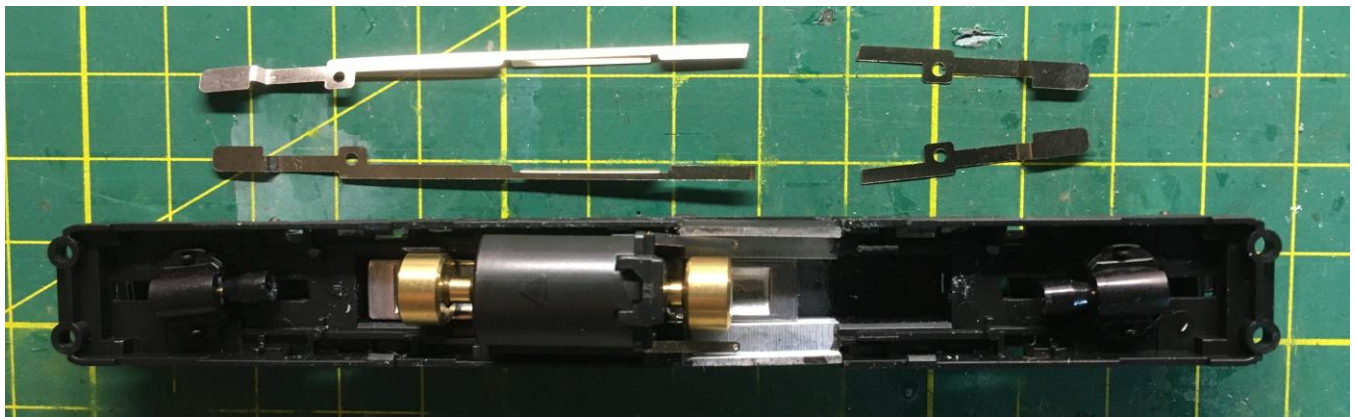


It is now time to commence reassembling the lengthened chassis. Replace the weight inside the centre box, at the front, so that the motor and flywheels clear the weight as in the original. It is possible to add another piece of weight in the space behind the original. This can be up to 16L x 6.5W x 4D.

Next locate the two side contact strips. They should be cut at a point approximately 10 mm behind the front of the extension piece – see Figures 6 & 7. This is appropriate if you intend to fit a DCC chip to the model. If you intend to run it on DC, then the cut should be made 5 mm or so further to the rear, so that the original motor contact arms can land on the flat strip portion.



**Figure 6 Side contact strips laid out with the front portions at their original locations**



**Figure 7 Strips cut approximately 10 mm behind the front of the extension piece**

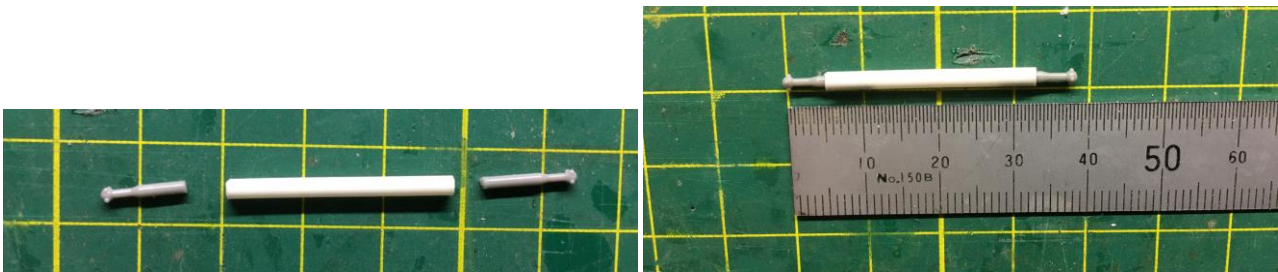
Then tin the ends of the strip halves. Cut two pieces of wire about 24 mm long, strip and tin each end. Solder the wires to the shorter, rear portions of the contact strips. Then fit the contact strip portions into their original locations on the front and rear chassis portions, and secure in place by replacing the two black retainer pieces. It would be possible to use flat phosphor bronze strip instead of wire, particularly if you are planning a DC model. Then solder the wires to the forward portions of the contact strips.



**Figure 10 Contact strips reinserted and held in place by retainer pieces, final solder joint of wire to forward portions made inside the extension piece**

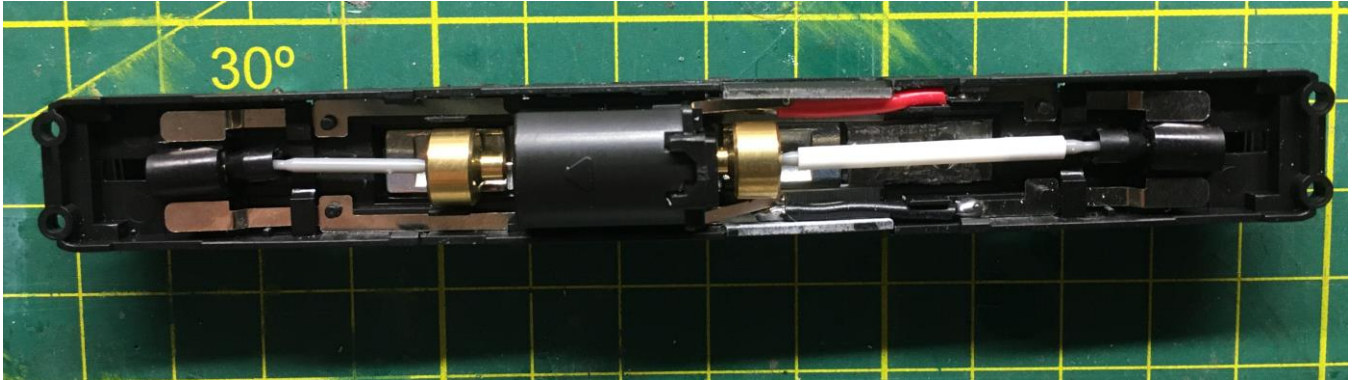
Next it is necessary to extend one of the two motor drive shafts to suit the rear end of the mechanism. It is necessary to increase the length between the universal joints from 20 mm to 37 mm. To achieve this, one of the original drive shafts is cut in half. The halves are then pushed into a 27 mm piece of styrene tube, which has been bored out to 1.5 mm diameter to take the drive shafts. The tube used was Evergreen 223 3/32" OD, which is about 2.5 mm OD with about 1 mm bore. Note that it is important to maintain the relative orientation of the two universal joints at each end of the shaft.





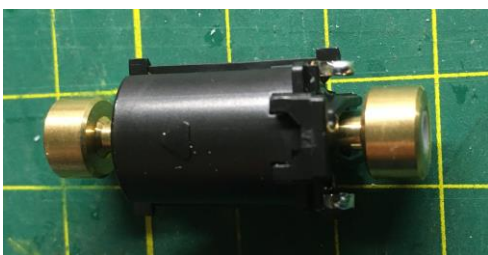
**Figure 11 Drive shaft components and completed extended drive shaft**

With the extended shaft at the rear and the original shaft at the front, the motor can be reinserted into its location.

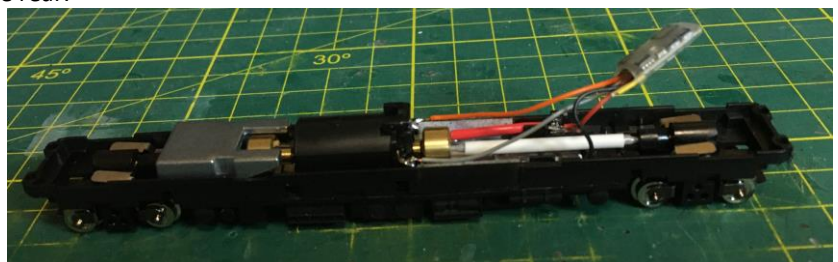


**Figure 12 Chassis reassembled with extended drive shaft**

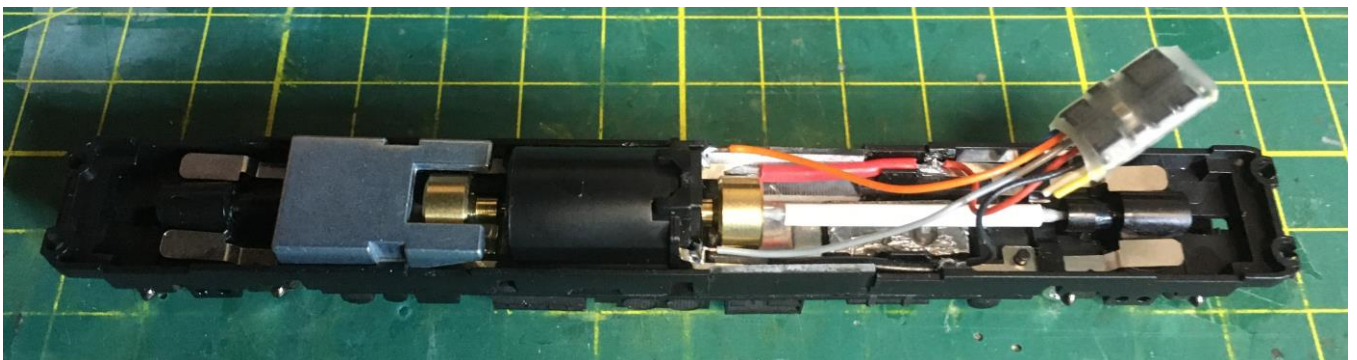
If it is intended to run the chassis on DC, ensure that the two motor contact arms make good contact with the contact strips on each side. If it is intended to fit a DCC decoder, the easiest way is to trim the two motor contact arms, leaving approximately 5 mm as shown in Figure 13. This effectively isolates the motor from the track contacts, and provides a convenient location to solder the two motor leads (grey and orange) from the decoder. The red and black leads should be soldered to the side contact strips towards the rear.



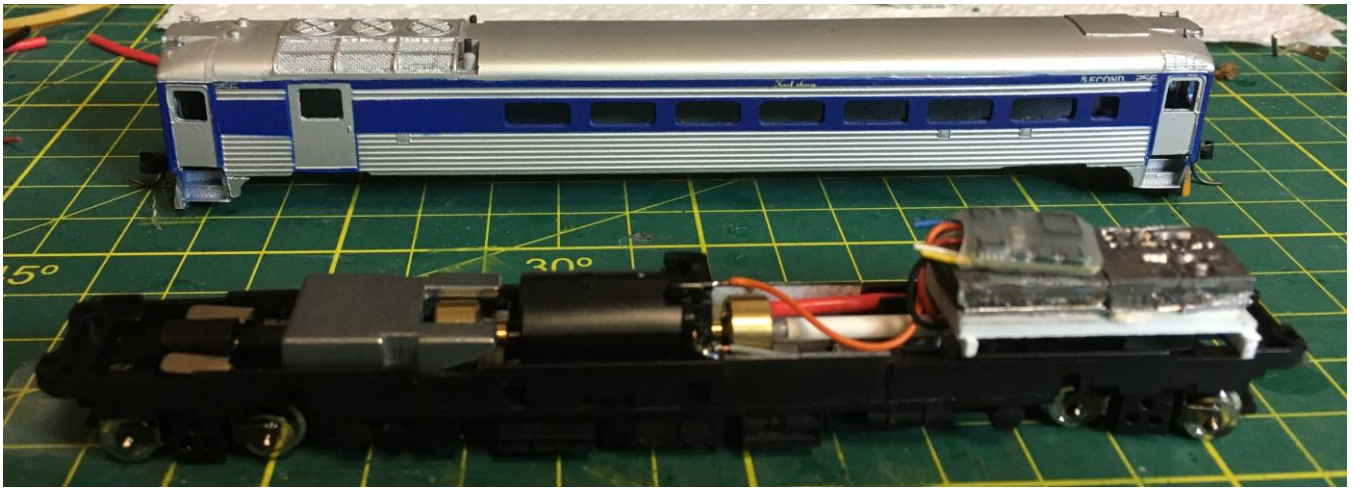
**Figure 13 Motor contact arms trimmed**



**Figure 14 Completed chassis with decoder installed**



**Figure 15 Chassis showing decoder connections**



**Figure 16 Completed chassis with added weight platform at rear**

Test run the chassis. If all works well, replace the weight at the front of the motor. More weight can be added to the rear end by building a small platform to lift the weight above the drive shaft and worm box. This platform needs to be 1.5 mm above the upper edge of the chassis – see Figure 16. Ensure that the tabs inside the body can still rest on the original black upper edge of the chassis, by making the platform no more than 13 mm wide. The chassis assembly is completed by adding the bogie sideframes as per the original kit instructions. With the newer bogies it is not necessary to drill the extra hole, however, the upper hole needs to be enlarged to 1.6 mm diameter. It is also necessary to file approximately 0.3 mm from the tops of the bogie sideframes, to maintain adequate clearance from the chassis.