

B-TYPE LONDON BUS



PAPER MODEL V1.1

Scale 1:32

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The London General Omnibus Company B-Type Motor Bus



The B-type was the first successful motor bus designed and built by the London General Omnibus Company (LGOC or just "General"), mainly for its own use. From the beginning of the twentieth century General had been experimenting with motorised buses to supplement its large fleet of horse-drawn omnibuses, and by 1909 had built up a varied collection of vehicles from several manufacturers. However the Metropolitan Police, who were the licensing body for all London public service vehicles, introduced increasingly stringent construction rules which the majority of buses in use could not meet. In 1909 LGOC chose to design and make its own vehicle which became known as the X-type. Sixty of these were constructed and put into service, but they were quickly found to be unsatisfactory. Details of the defects are not known, but it is clear that they would have been overweight and underpowered.

Almost as soon as the first X-types came into service a new design was started which resulted in an order for 60 B-type chassis in May 1910. The first were delivered in early October 1910 and put into service later that month. They proved much more satisfactory, and large numbers were built over the following three years, over 2500 being delivered to LGOC itself. With the outbreak of war in Europe in 1914 many were impressed for military service in France, mainly for troop transport, and many more chassis were built to receive lorry bodies. By 1919 the design was very outdated, and the new K-type with much increased passenger capacity began to replace it on busy services. However, B-types continued to service more lightly-loaded suburban and country services well into the 1920s.








There are four B-type buses in working order today:

- B43, preserved by the Imperial War Museum as one of the first buses to have been shipped to France for war duty,
- B340, owned by the London Transport Museum,
- B1609, privately owned and restored,
- B2737, rebuilt by the London Transport Museum using pieces from many different remains of B-type buses, and completed in 2014. Repainted and modified in 2014 to represent a bus in the war zone, to attend centenary commemorations 2014-2018.

The Model

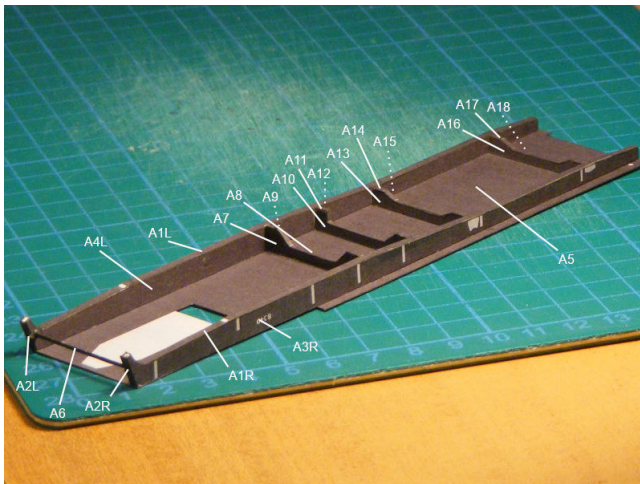
My model is based on the appearance of B340 in 2018, though with some detail omissions and minor modifications for the sake of buildability. It is to scale 1:32, though cannot claim to be precise, being mostly designed from photographs. The main material is 160g/m² card (0.2mm thick), but small use is made of other thicknesses of paper and card for laminating parts to specific thicknesses, thin glazing material and 2mm diameter wooden sticks (e.g. toothpicks). Parts are provided for a simple lower saloon with opaque windows and entrance, and for a full one with glazed windows and a full, if simple, interior. For the first, print page B1 and omit C1, C2 and C3, for the latter option print C1, C2 and C3 and omit B1. In either case, print all the remaining pages.

On the part sheets symbols are used to indicate cutting, scoring and folding options, as follows:

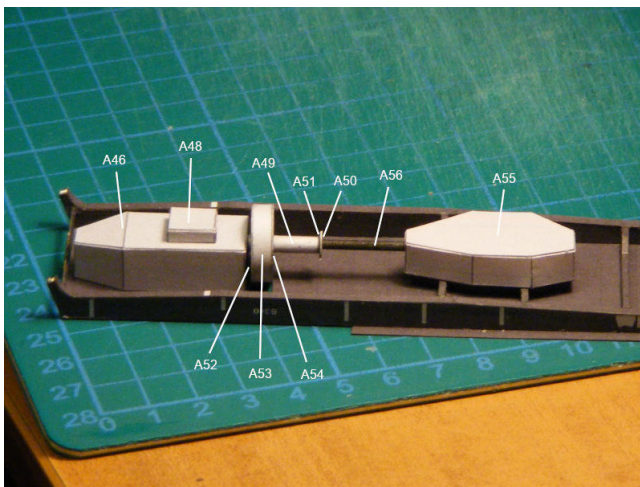
	Score on front, mountain fold
	Score on back, valley fold
	Cut slit
	Do not cut or score
	Draw pencil line on rear between markers
	Laminate on card to given total thickness
	Cut out internal shape

Note that in a few instances the photographs which follow reflect a different building sequence from that suggested, but I hope that this will not be too confusing.

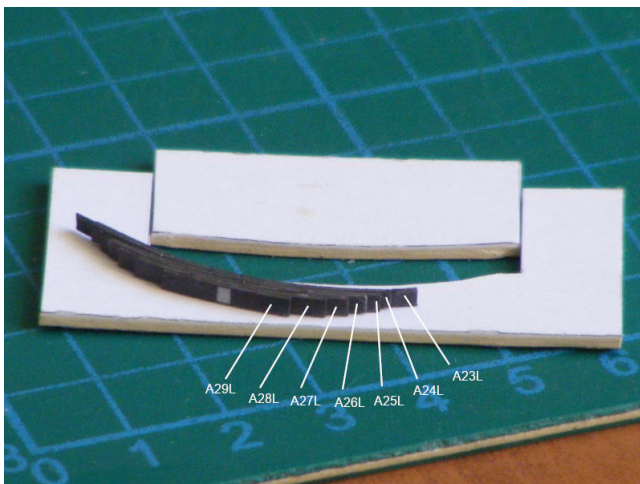
A. Chassis



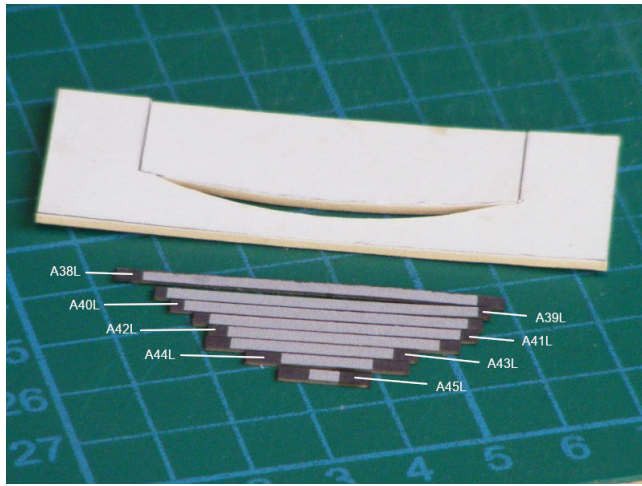
Laminate the chassis rails A3 and A4 and cross-members A7, A9, A10, A12, A13, A15, A16 and A18 to suitable card, then glue them back-to-back in pairs. Cover the edges with A1, A2, A8, A11, A14 and A17, then glue all the pieces to the floor plate A5. Double A6, leaving the end tabs free, and fit between the chassis rails at the front.



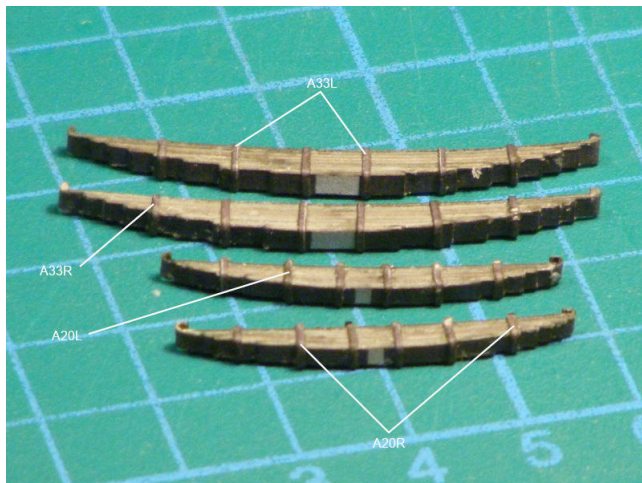
Construct the engine block A46, A48-54 and the gearbox A55. Fix the engine to A5 and the gearbox to the cross members A8 and A11, bridging the gap between with A56. The holes in the ends of the gearbox should be central between the chassis rails.



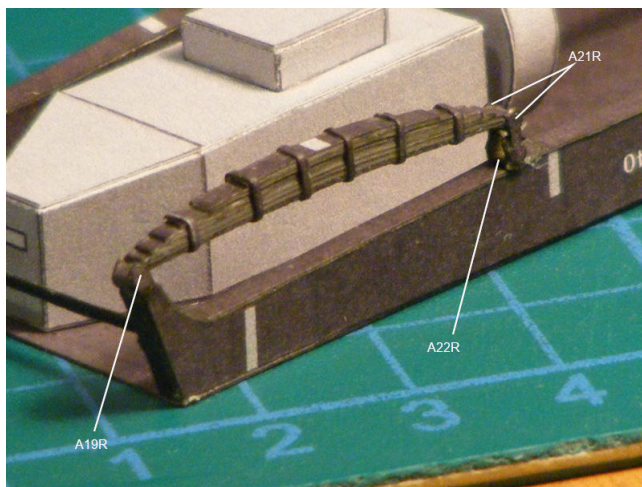
Double the top front spring leaf A23, and laminate the rest (A24-29) on paper to give each a thickness of 0.3mm. Glue the centres of the springs together, aligning carefully. Make a former from thick card then glue the remainder of the spring leaves together, letting them dry under pressure in the former. Repeat for the other front spring.



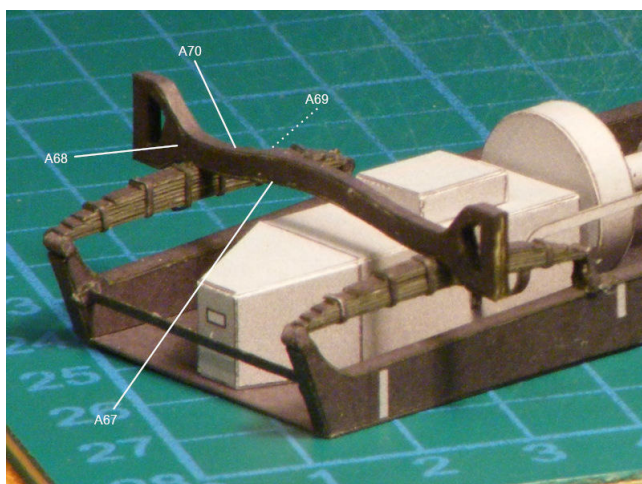
Repeat for the rear springs, except that the leaves should be made up to 0.4mm thick.



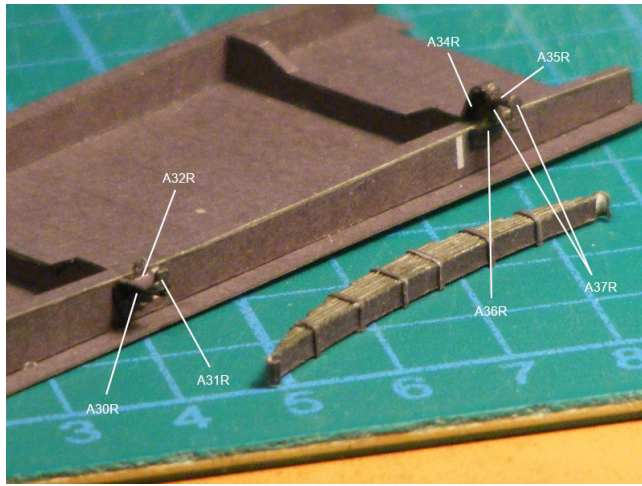
Wrap the straps A20 and A33 around the front and rear springs, positioning by eye and cutting off any excess. Curl the ends of each top leaf to form a hook.



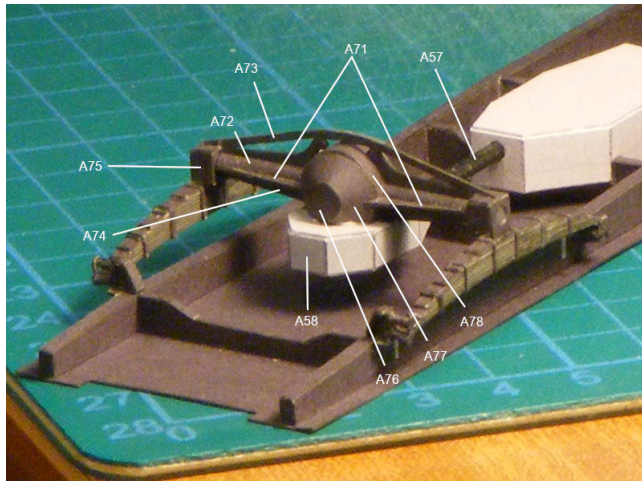
Fit the front springs to the chassis rails using front hanger A19, rear hanger A22 and shackles A21, on each side.



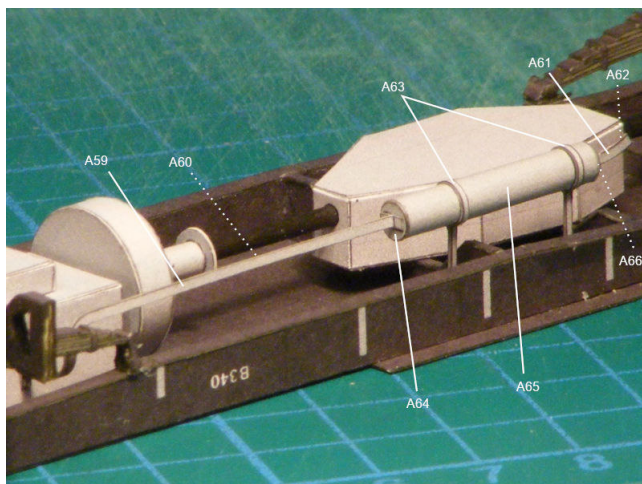
Construct the front axle from A68 and A69 backed with card, and edged with A67 and A70. Fix to the centres of the front springs.



For the rear springs, the front hangers are made from A31 and A32, with stiffening ribs A30 on the marked lines. The rear hangers consist of a cranked front plate A36, a backing stiffener A34 and two shackles A37 separated by A35 rolled into a tight cylinder.

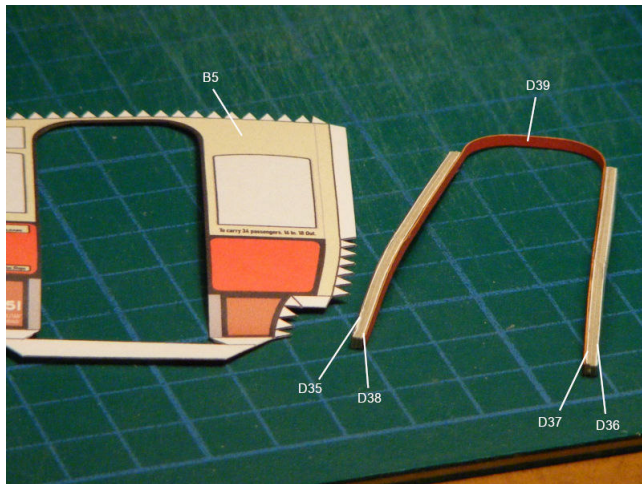


The back axle consists of a differential housing A76-80 threaded on the axle housing A72 which ends in hub blocks A75. The whole is stiffened by triangular webs A71 front and back, and A74 above (below in the photograph) and a curved support A73 underneath. The differential housing is partially embedded in the final drive cover A58. Glue the hub blocks to the centre of the rear spring and connect the final drive to the gearbox with A57.

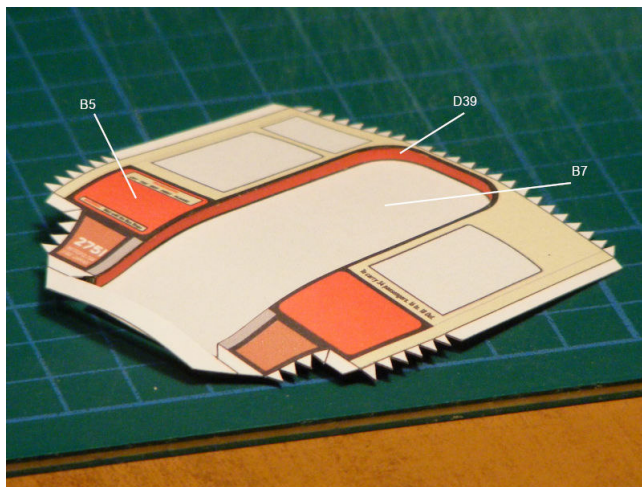


The cylindrical exhaust silencer (muffler) A64, A65 and A66 is supported from the floor plate by straps A63. The two pipes are very narrow, so are represented by flat strips A59/60 and A61/62. The front end of the main pipe is curved round to meet the side of the engine block at a suitable place.

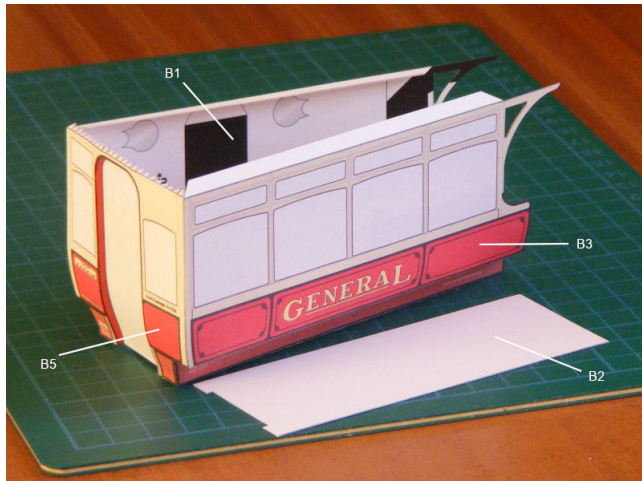
B. Simple lower saloon



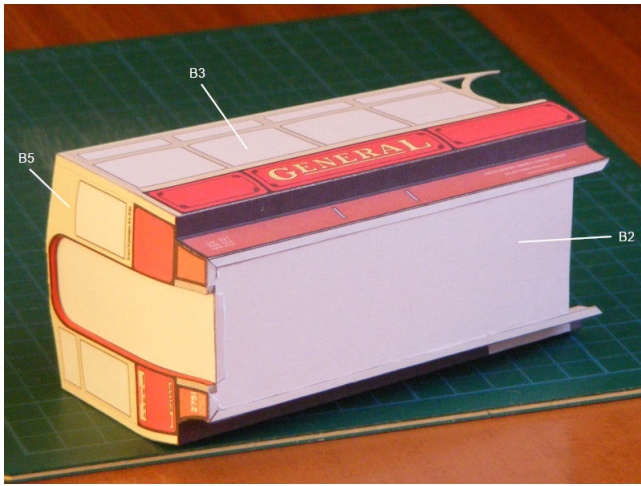
Laminate parts D35-38 with thin card and glue together in pairs, then attach to the back of D39.



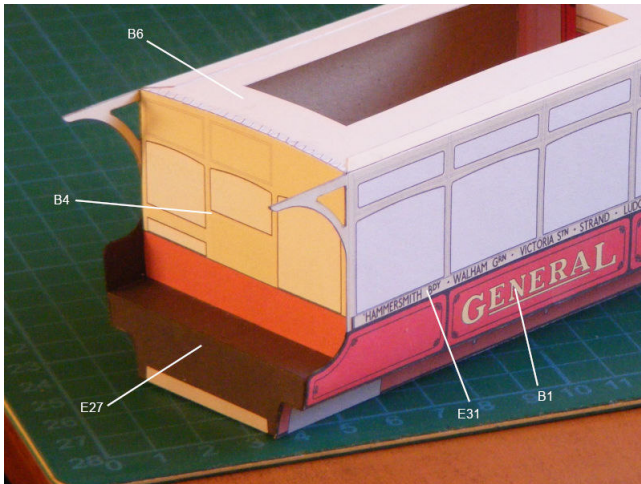
Fit D39 around the opening in B5, then attach B7 to the back to form a recessed entrance.



Add the sides B1 and B3.

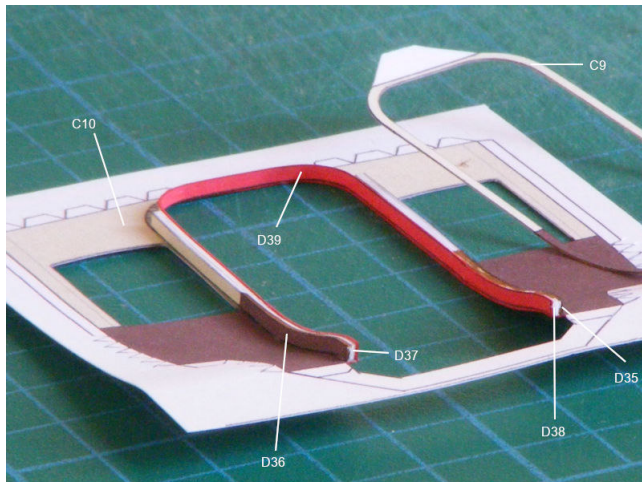


Insert floor B2.

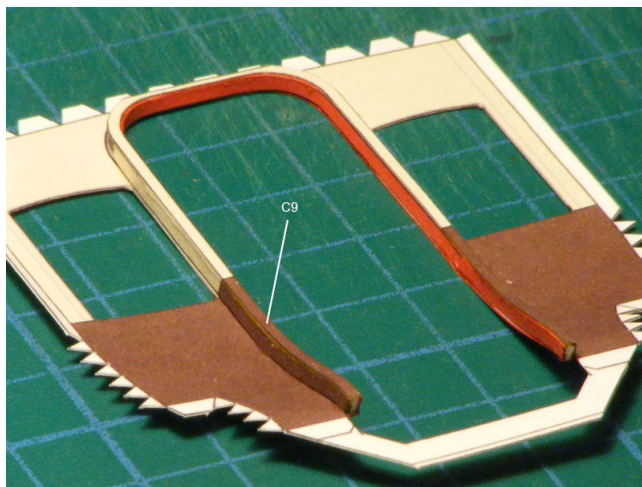


Add the front bulkhead B4, aligning the canopy brackets first. Insert the ceiling B6, ensuring the box is square and untwisted. Fit the driver's seat E27. Place the route boards E31 on the sides beneath the windows.

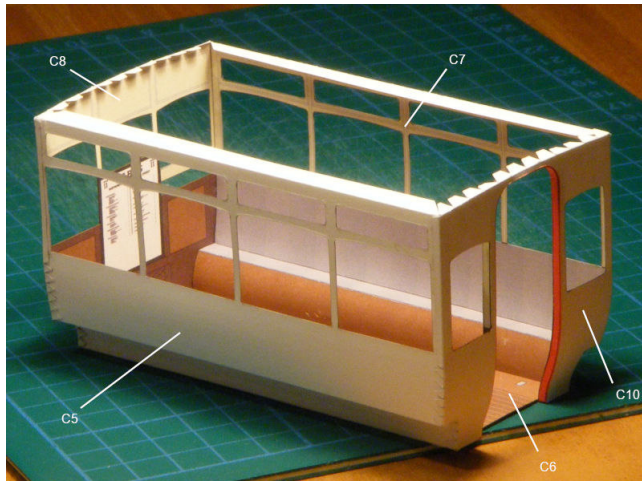
C. Full lower saloon



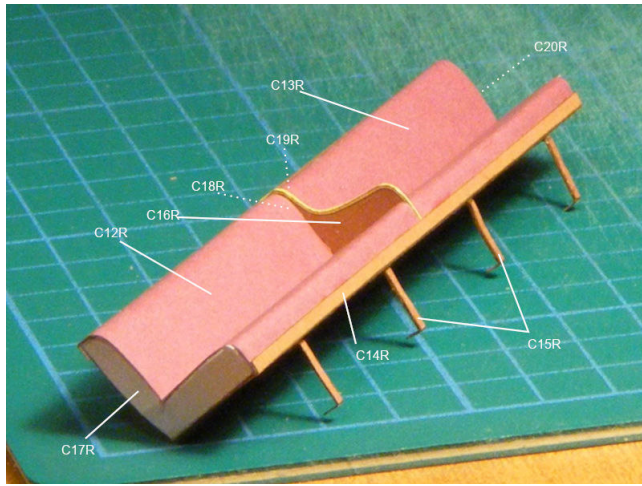
Laminate parts D35-38 with thin card and glue together in pairs, then attach to the back of D39. Fit around the opening in C10.



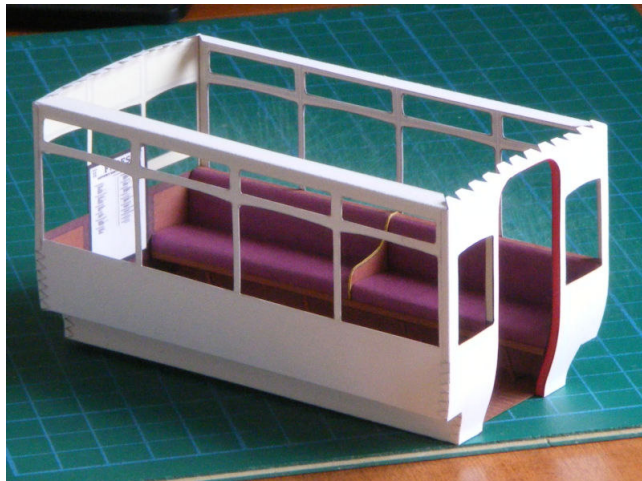
Cover the raw edge of D35-39 with C9.



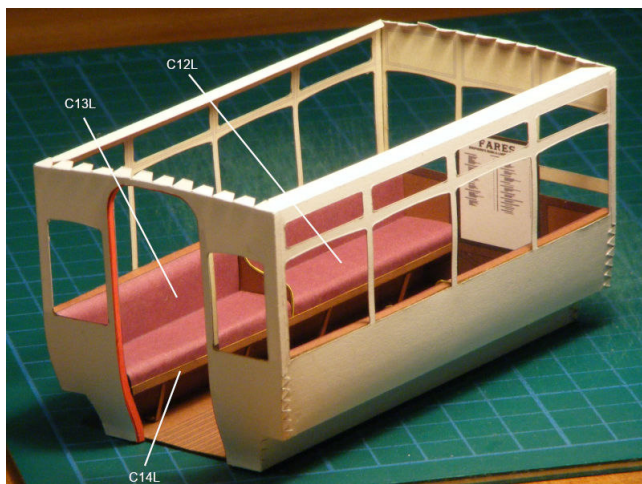
Add the sides C5 and C7, the front C8 and the floor C6.



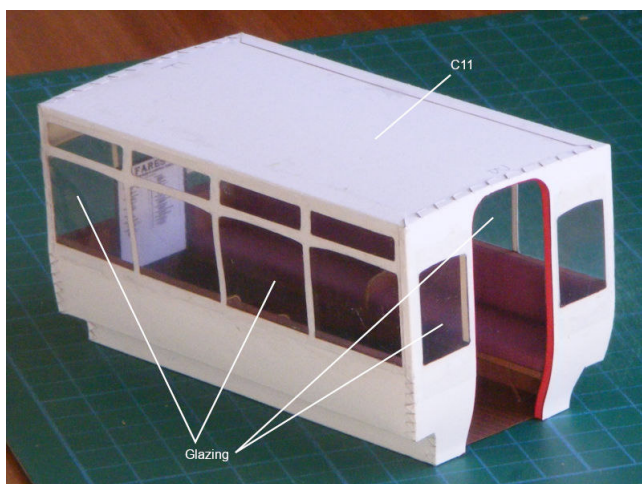
Form the seat cushions C12R and C13R around the ends C17R-C20R. Fold and glue the centre divider C16R. Attach the seats to the seat base C14R, sandwiching C16R in between. Fold and glue the supports C15R and add to the seat base.



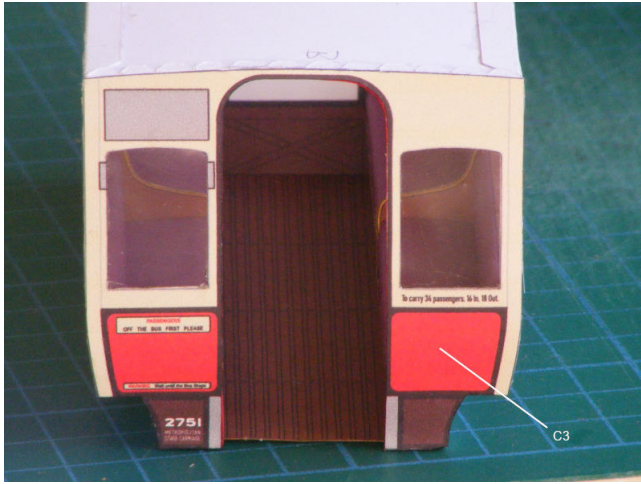
Glue the seat base to the side ledge, and the seat back to the right-hand side just below the windows.



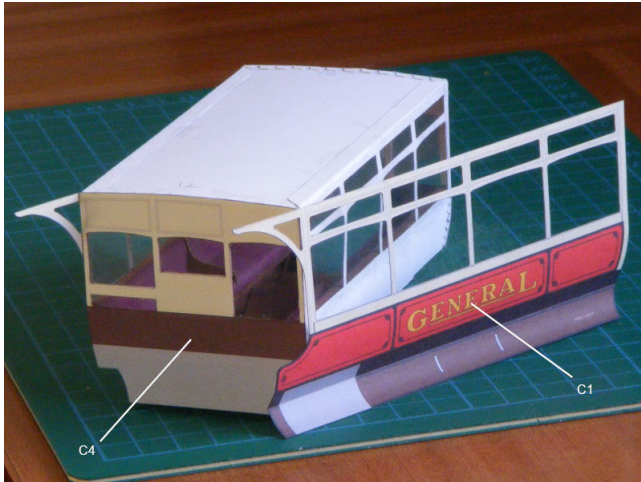
Repeat for the left-hand seat.



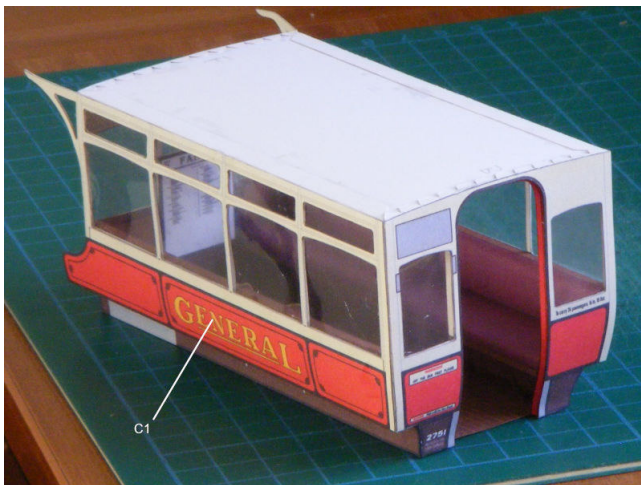
Add the ceiling C11. Cut out glazing if required, and glue to the outside of the box.



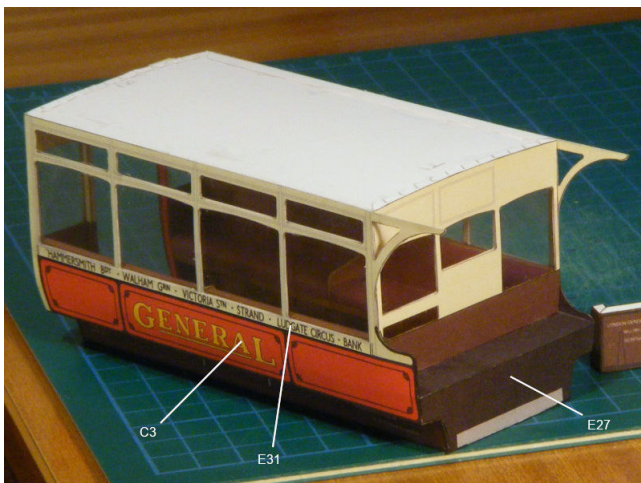
Layer on the outside rear wall C3.



Fit the outer front wall C4. Start fitting the side wall C1 with the canopy bracket, lining up carefully.

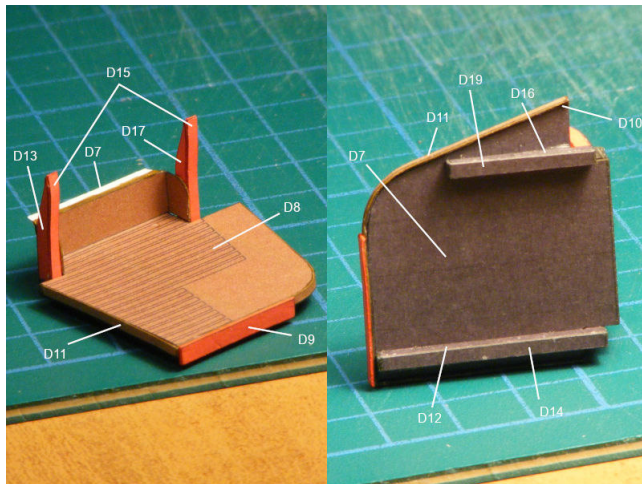


Continue with the rest of the left side.

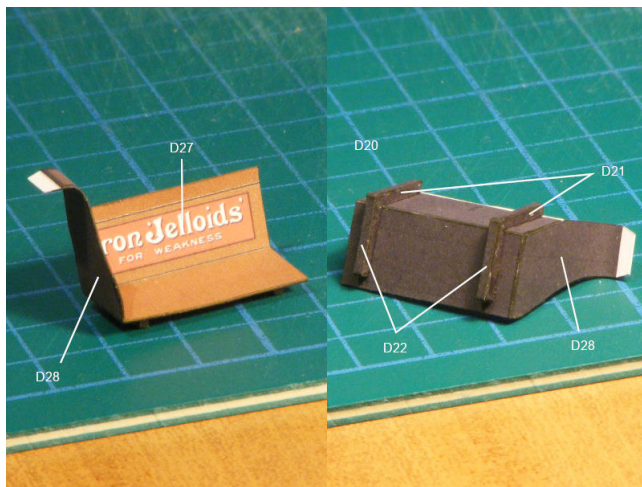


Repeat for the right-hand side C3, and then fit the driver's seat E27. Add the route boards E31 below the windows.

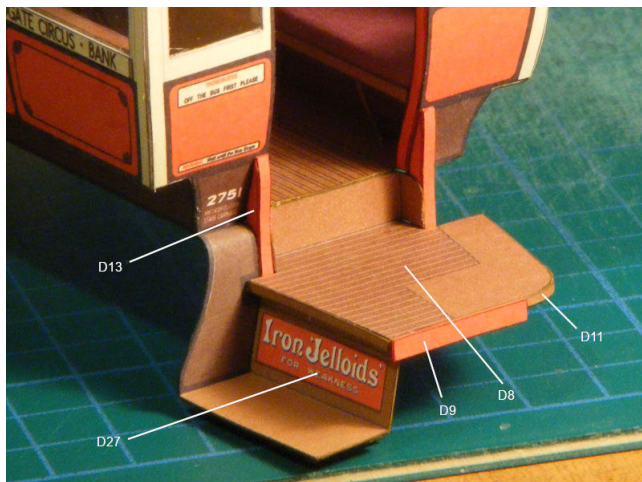
D. Platform and Stairs



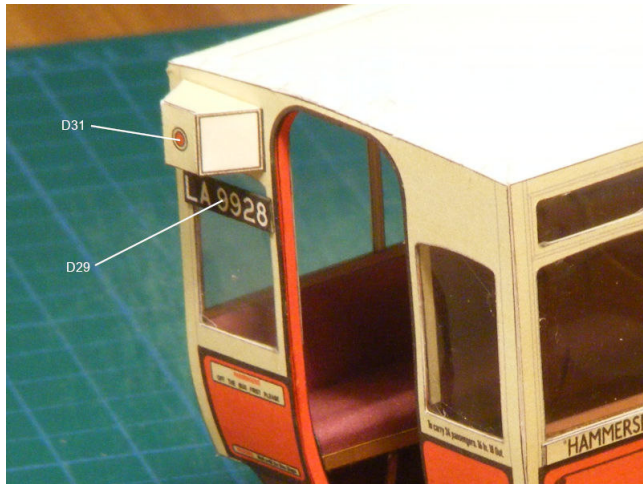
Laminate parts D10 and D11 together, then fit around the edge of D8. Cover the tabs and the back of D8 with D7. Glue parts D12 and D13 to card, then back-to-back. Cover the under edge with D14 and the front of the upright with D15. Repeat for D16, D17, D18 and D19. Fix these brackets to D7 and D8. Fold D9 in half, glue then attach to D11.



Fold up and glue D27, then back it with D28 curving the top of the upright in a quarter circle. Make up two brackets from parts D20, D21 and D22, filling with card to the required thickness. Fit to the back of the step, with the angled end at the top and the square end to the front.



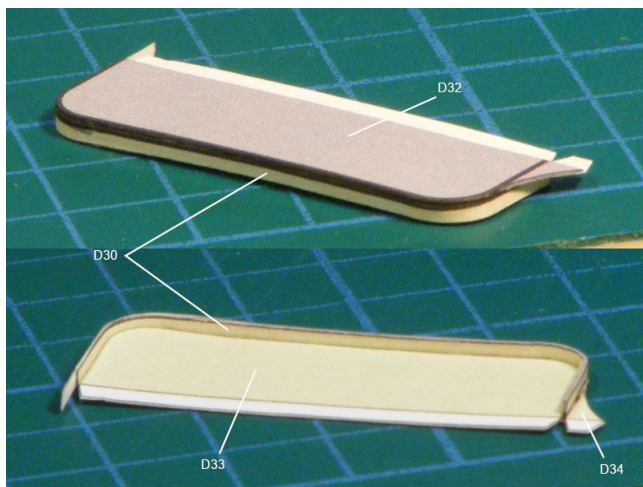
Glue the step to the front of the left-hand platform bracket D13, then the whole thing to the rear and the floor of the lower saloon.



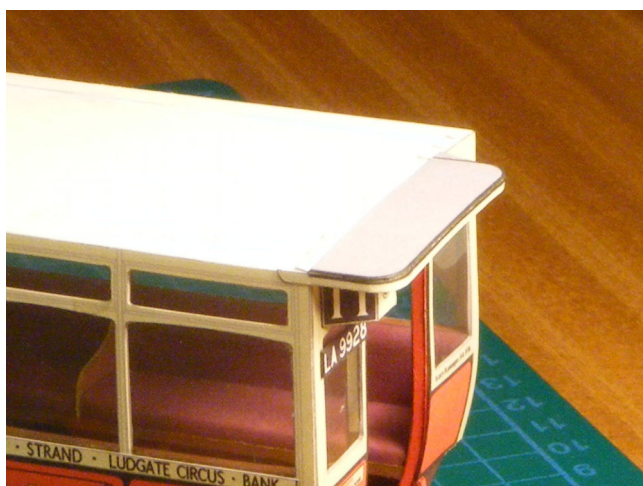
Make up the rear light D31 and number plate D29 and fit on the rear of the lower saloon.



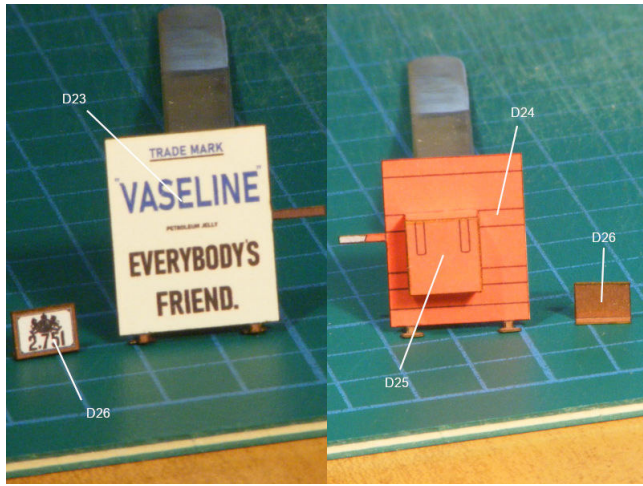
Fix the lower saloon to the wider part of the chassis floor plate.



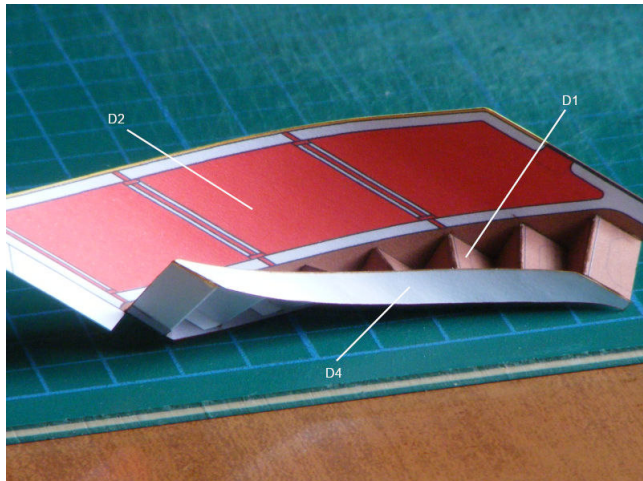
Double the rear canopy rim D30, form the curved corners and attach to the back of the canopy top D32. Cover the underside with D33 and D34.



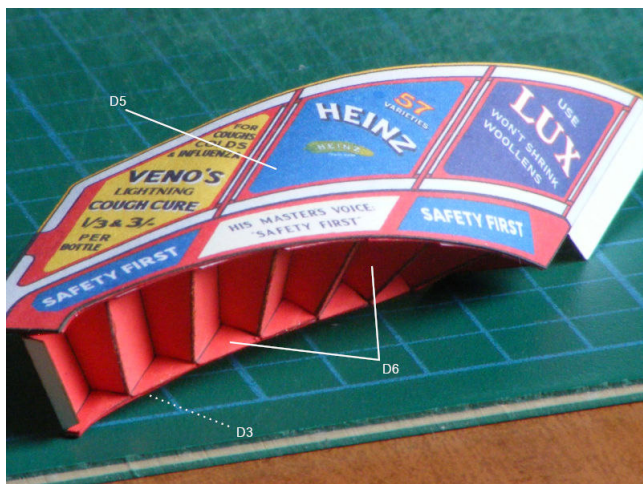
Attach the rear canopy to the lower saloon.



Make up the platform barrier D23, D24 and D25 and the Metropolitan Police Stage Plate D26. Set aside for later.

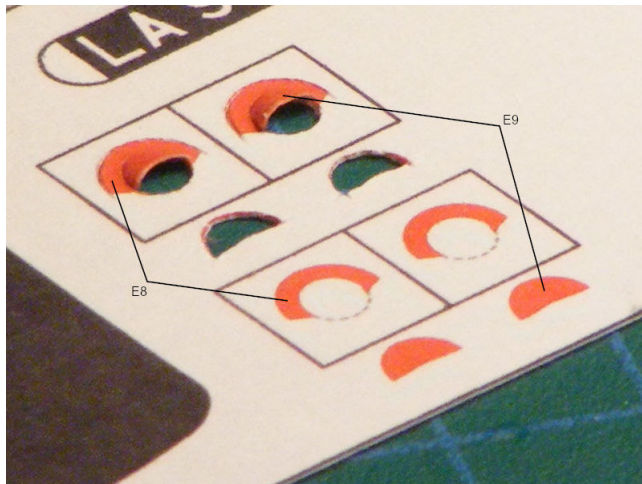


Form the inner layers of the stair side panels D2 and D4 into a quarter circle and attach to the front layer of the steps D1.

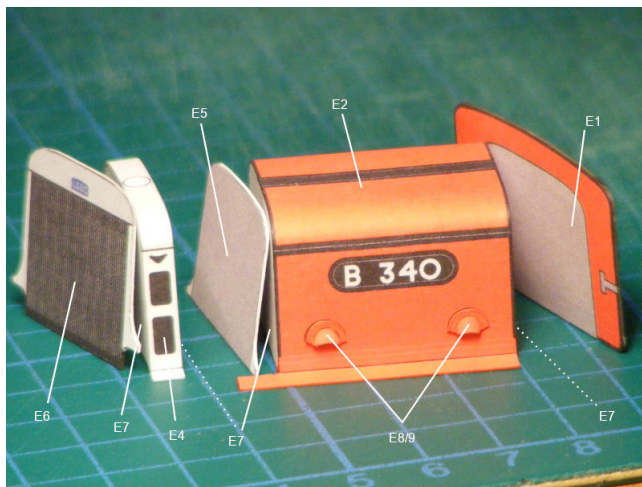


Laminate D5 to the outside panel and D3 to the inside. Add the underside of the steps D6, pushing each segment tightly into place. Do not fit the stairs to the body and platform yet.

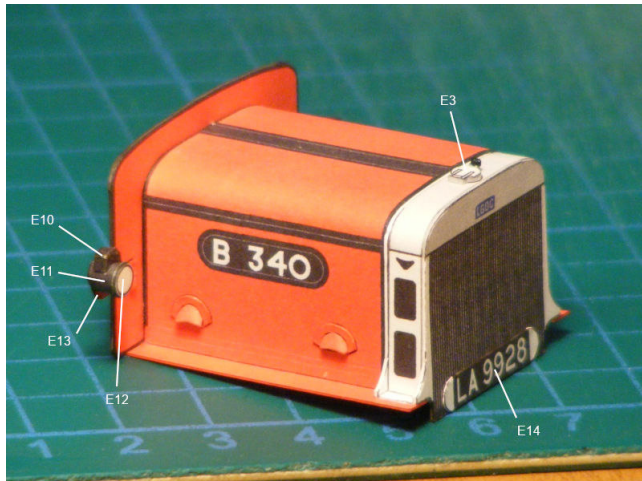
E. Front End



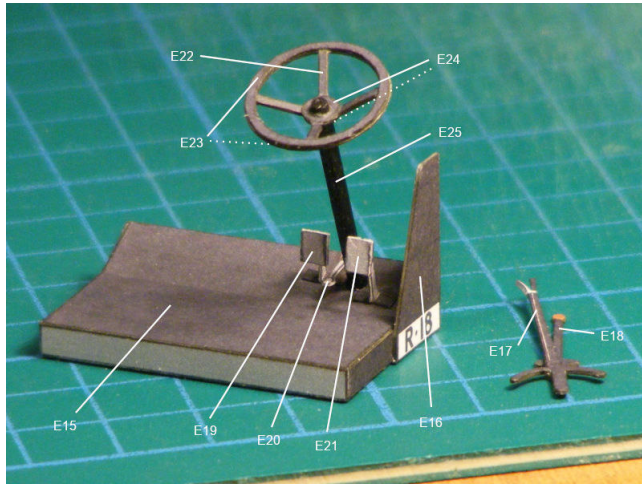
Cut out the circular hole in parts E8, then edge glue the handgrips E9 inside, shaping the grips to fit. Finish cutting out the flanges E8 and attach to the bonnet (hood) E2.



Shape E2 and E4 using the formers E7 at each end. Double E1, E5 and E6, then glue all five sections together.



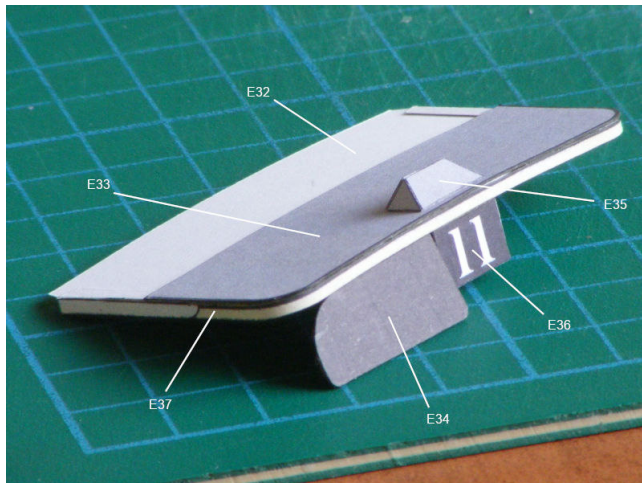
Roll the lamp body E11 and glue the front E12 to it. The rectangular locating mark for E10 should be slightly nearer the rear end. Double the bracket E13 and glue the circular part to the rear of E11. Form E10 and fit on the locating mark on E11. Fix the lamps on the front of the dashboard E1. Thicken the radiator cap with card, and attach it to the top of the radiator E4. You can add a small knob to suggest the nut holding the cap closed. Glue the number plate E14 to the bottom of the radiator front E6.



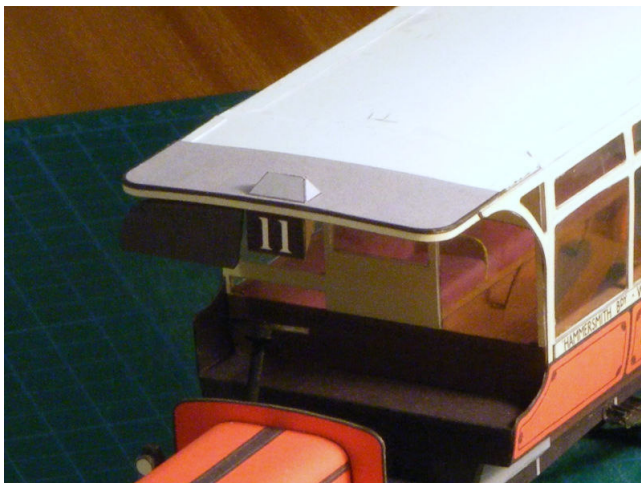
Make up the driving compartment floor E15 and attach the doubled screen E10. Double the steering wheel E22, cut out the spokes and add the rims E23 top and bottom. Angle the spokes down and add the hub parts E24 top and bottom. Fit the wheel to the steering column E25, then pass the column through the hole in the angled footrest and glue to the bottom plate at an angle of approximately 25° to the vertical. Make up the pedals E19, E20 and E21 and the brake (E17) and gear (E18) levers. Glue the pedals to the floor but do not fit the levers yet.



Fit the driver's footwell and engine cover to the chassis.

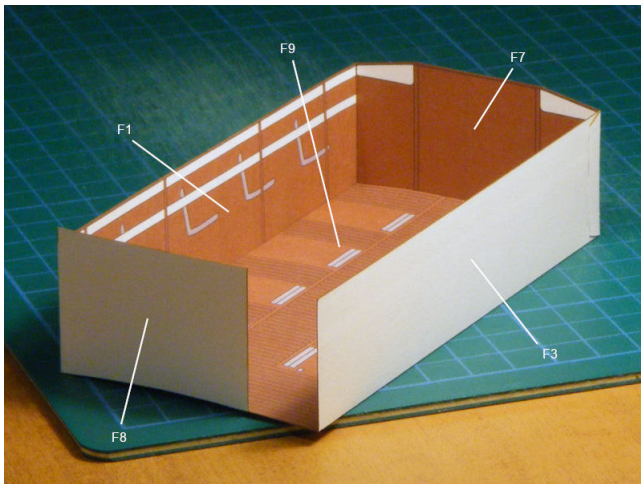


Double the front canopy rim E37, form the rounded corners and glue to the edge of the canopy top E33. Cover the tabs with the interior E32. Add the sun visor E34, route board light E35 and number stencil E36.

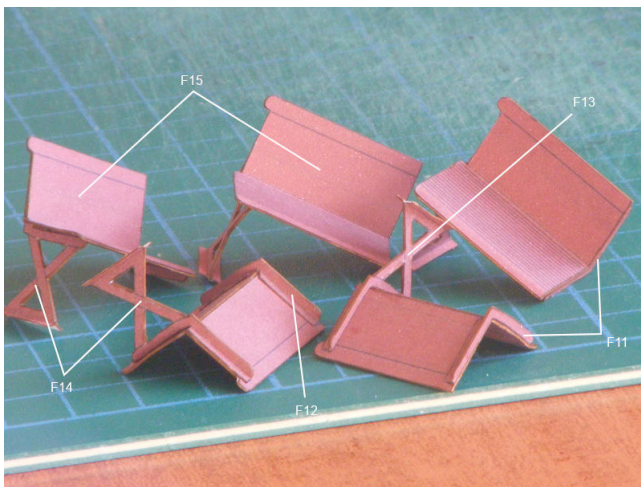


Fit the canopy between the brackets on the lower saloon.

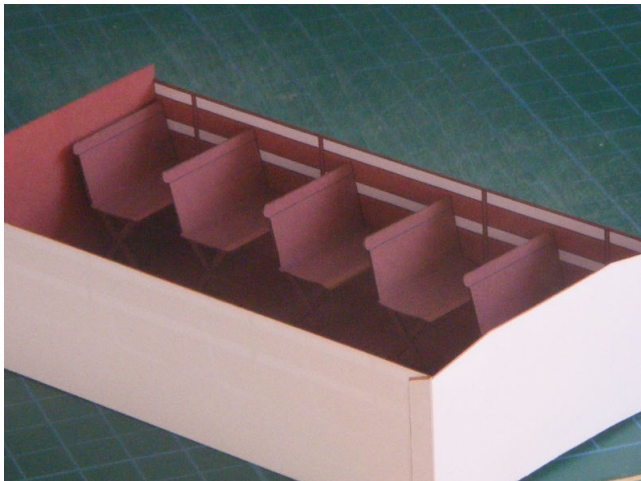
F. Upper Deck



Form the inner box from sides F1 and F3, ends F7 and F8 and floor F9.



Glue parts F13 and F14 back-to-back, and likewise F11 and F12. Double the two halves of F15, and shape the slatted seat to fit the seat supports. Assemble the five left-hand seats.



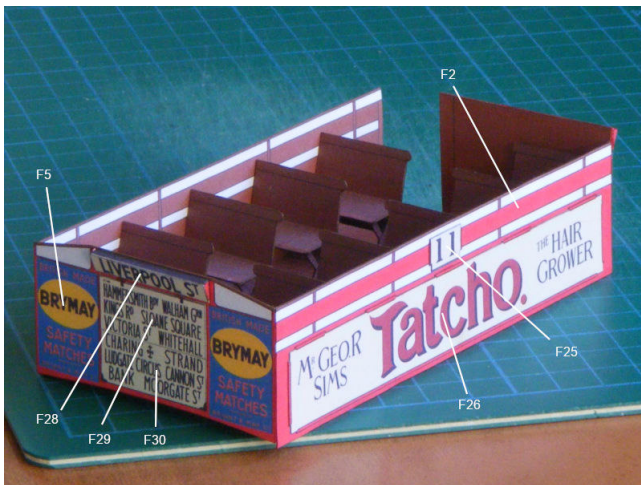
Fit the seats to the floor and left-hand side of the upper deck, on the locating marks. The seat backs should be horizontal, not parallel to the sloping floor.



Construct four right-hand seats and fit them to the right-hand side. Double the advertising board F21, and glue to the locating marks on the floor and to the rearmost seat.



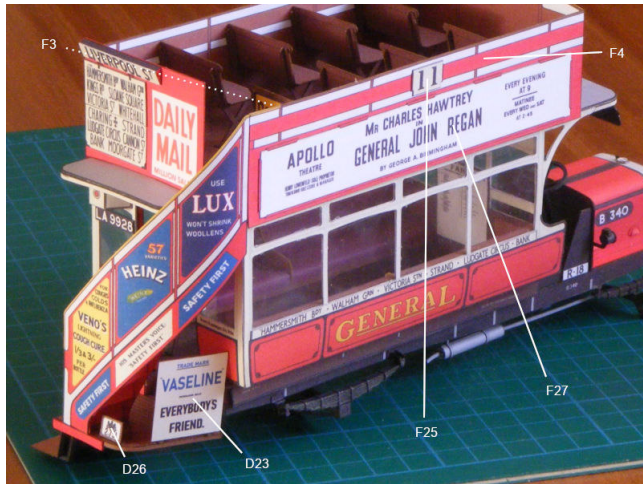
Join the two parts of the rear route board F23 and F24, and glue to the rear panel F6 with the triangular destination box F22. Glue to the outside of F8.



Make up the front panel F5, with destination box F28 and route board F29 and F30, and fit to part F7. Do likewise with the side panel F2, route stencil F25 and advertisement F26.

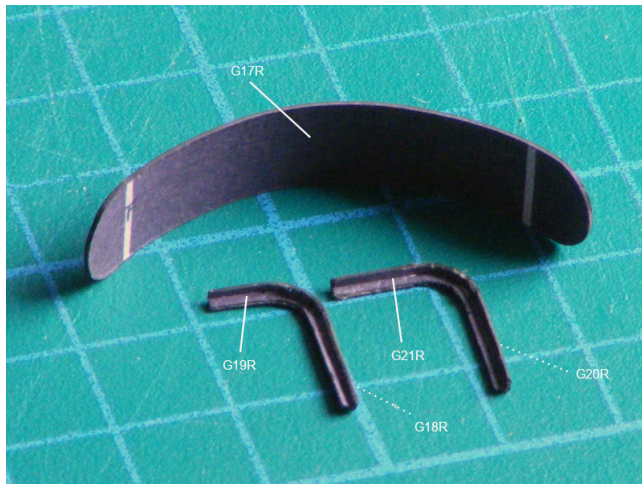


Attach the upper deck (without its right-hand side outer layer) to the lower deck and canopies. The rear edges of the two decks should be aligned, and the sides of the upper deck should extend equally on either side of the lower deck.

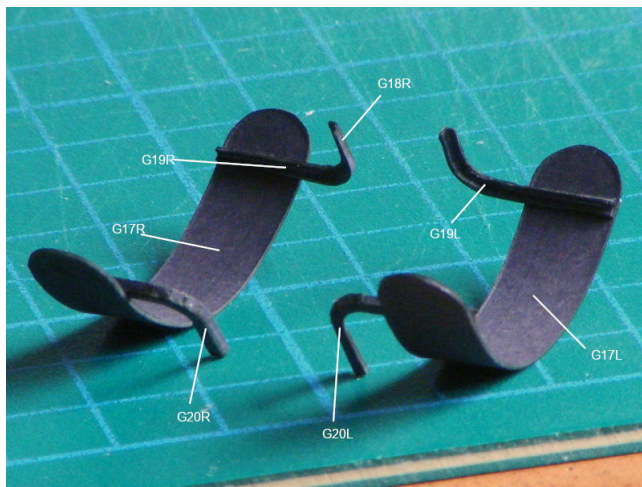


Glue the base of the stairs to the platform, lining up the rear with the rear of the platform, and the bottom step with the slightly angled ends of the printed slats. Glue the top stair riser to the back of the lower saloon, and the top tab to the outside of the upper deck side F3. Make up the outside layer of the upper deck side F4, F25 and F27 and cover the outside of F3. Fit the platform barrier D23 and stage plate D26.

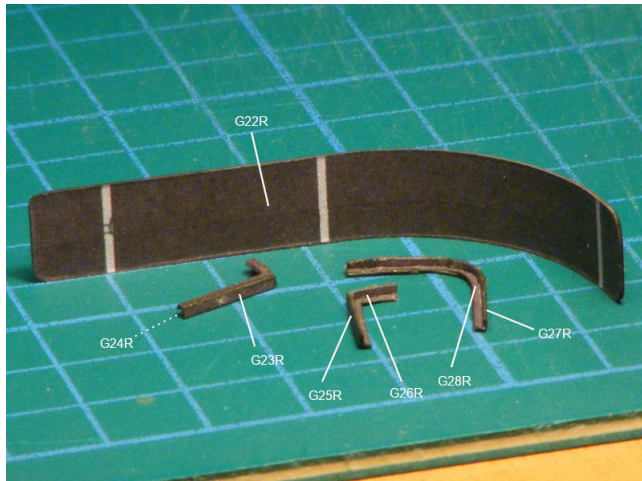
G. Guards



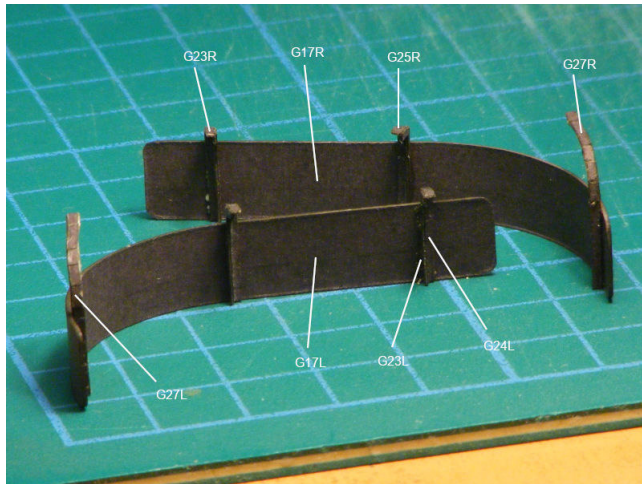
Double the front mudguard G17, cut out and form to the shape shown on the parts sheet. Fold and glue G18 and G19 to form an L-shaped cross-section, and the same with G20 and G21.



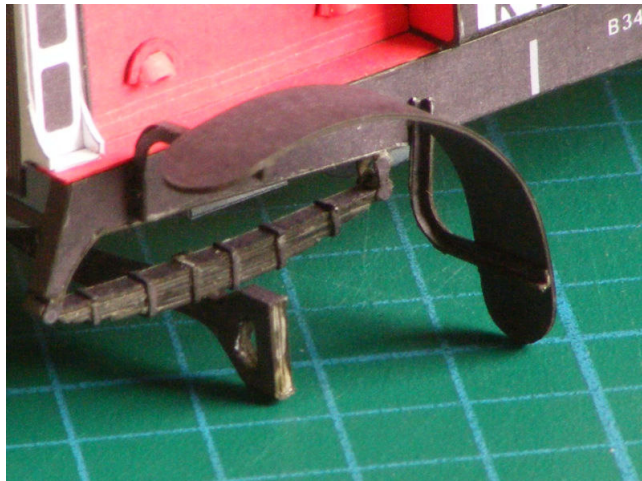
Glue G18 to the front mark on G17 and G20 to the back one. The free ends should be parallel, but with one pointing upwards and the other down.



Make the three brackets for each rear mudguard in a similar way to the front ones, from parts G23 and G24, G25 and G26, and G27 and G28 respectively. Double and shape the rear mudguard G22.



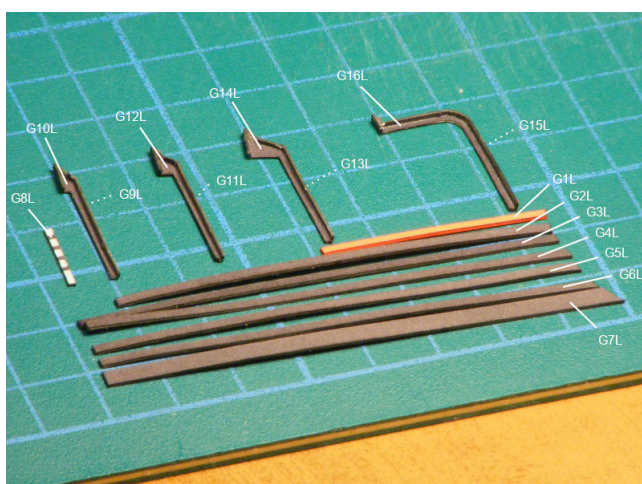
Fix the brackets to the mudguards. The back bracket G27 should curve upwards and angle slightly forward.



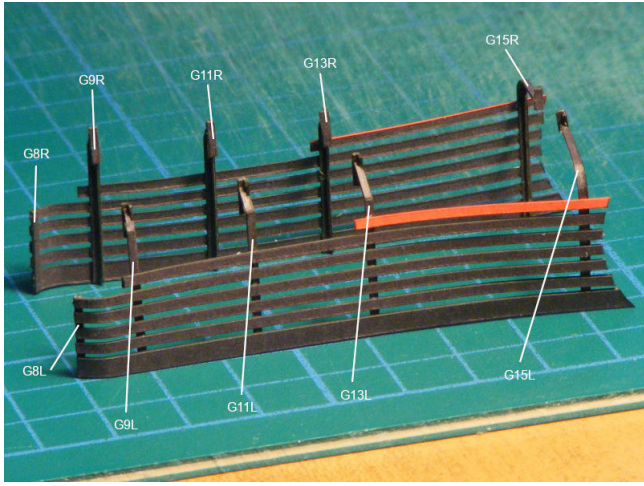
Attach the front mudguard brackets to the chassis on the front two markings.



Fit the rear mudguards. The front two brackets go on the lower body side, while the back bracket runs behind the rear spring to the back chassis marking.

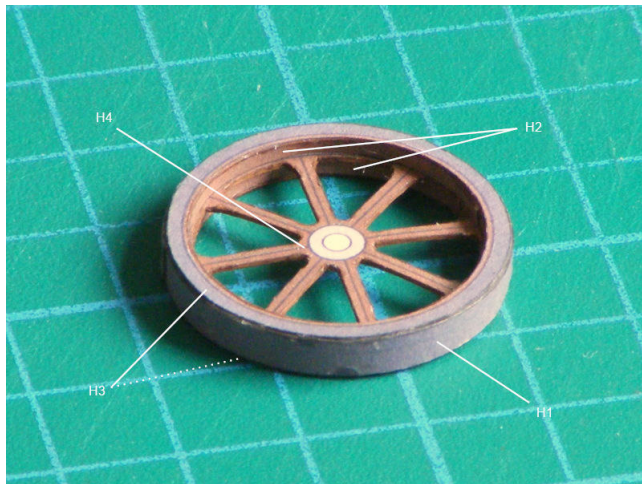


Prepare the life guard brackets G9 to G16 in a similar way to the mudguard brackets, and double the front tie strip G8.

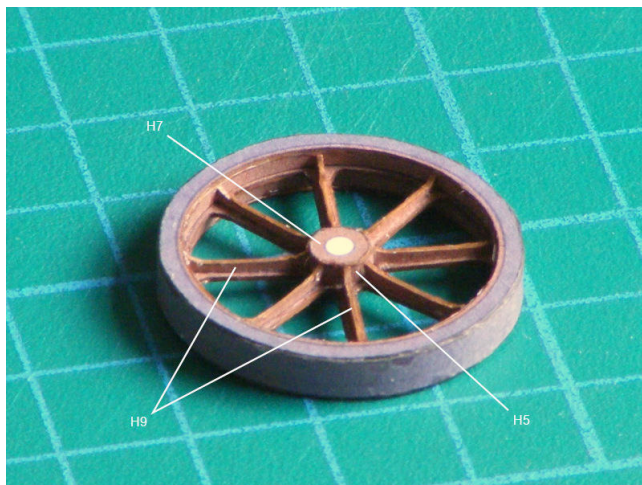


Shape the slats G1 to G7 according to the lines shown on the parts sheet, then assemble everything matching up the markings on the back of the slats with those on the front of the brackets.

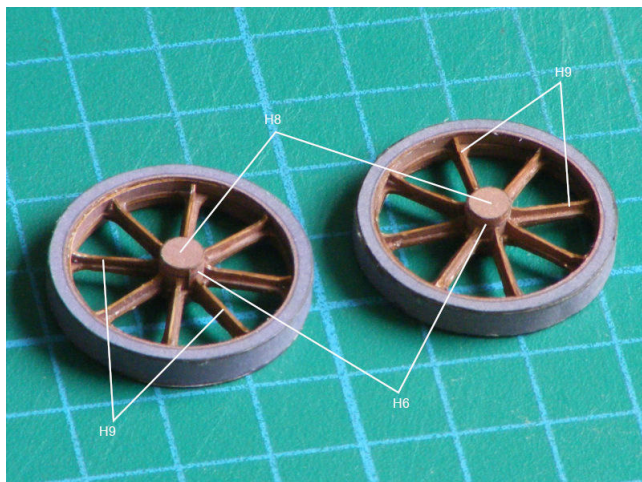
H. Wheels



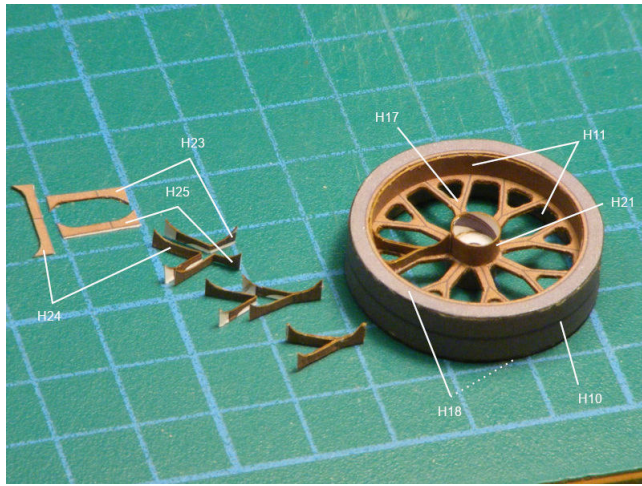
Double the front wheel spokes H4 and cut out the gaps. It is not necessary to cut the central hole, as the wheels will just be glued to the ends of the axle. Edge-glide the rims H2 on each side, then the outer sidewall H3. Add the tread H1 and then the other sidewall H3.



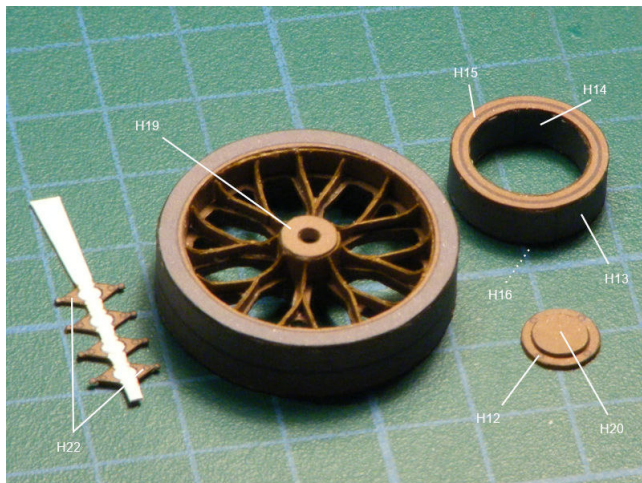
Glue the inner hub H5 and H7 to the centre of the spokes, then add eight ribs H9.



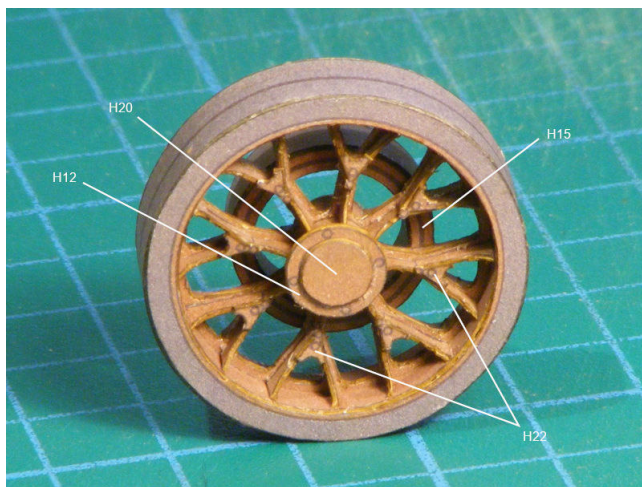
Turn the wheel over and fit the outer hub H6 and H8 and the remaining eight ribs. Repeat for the second front wheel.



Start the rear wheel in the same way with spokes H17, rims H11, sidewalls H18 and tread H10. Add the hub barrels H21 on both sides. Make each "Y"-shaped spoke stiffener with one each of H23, H24 and H25, and fit between the hub and rim over the lines on H17.



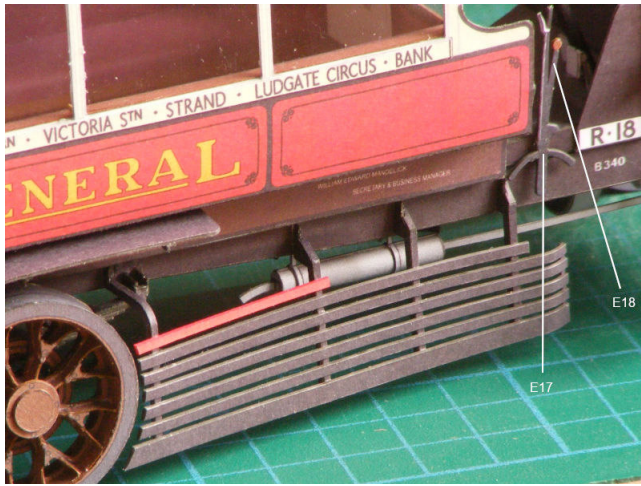
Cover the inner hub with H19 and check that the wheel runs true on the axle H26. Make up a brake drum from parts H13-16 and glue to the inside spokes, with the brown side H15 showing through to the outside.



Add the hub cap H12/H20 and the bearers for the brake drum fixing bolts H22 to the outside. Prepare the second rear wheel.



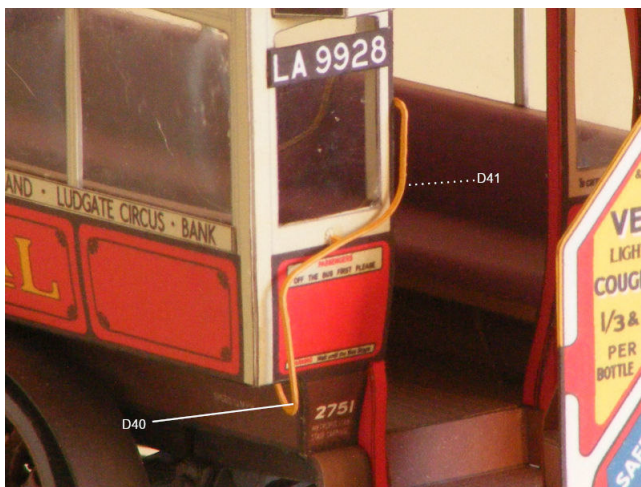
Glue one rear wheel to the axle H26, pass this through the axle housing, and add the second wheel. On a flat surface, pack up the front axle beam until the chassis top is level, then glue the front wheels to the ends of the axle beam. They should lean slightly outwards (positive camber).



Glue the tops of the lifeguard brackets to the chassis side rails, in the positions marked. Fix the brake and gear levers E17 and E18 to the side of the driver's footwell.



Make up the toolbox E26, driver's step E28, E29 and E30 and the starting handle A47 and attach to the lower body, left chassis rail and engine block respectively.



Glue D40 and D41 back-to-back, leaving the small grey tabs in the middle free, then shape and fit as shown. No location marks are printed on the body parts, so this difficult and fragile part can be omitted if desired.



You are finished!