



**Midland Railway, Midland & Great Northern Joint Railway,
Midland & South Western Junction Railway, LMS, GWR**

Clayton 43' and 45' arc roof bogie stock

Introduction

These notes apply to all four MR Clayton bogie carriages in the 51L range:

Diagram 490: 43' 7 compartment third, built 1881-84 in 4 lots

Diagram 502: 43' 5 compartment brake third, built 1881-86 in 3 lots

Diagram 513: 45' 6 compartment luggage composite, built 1884 in 1 lot

Diagram 526: 45' 5 compartment brake composite carriage, built 1884 in 1 lot

The kit covers the motor train conversions of D502 and D516 carriages.

Prototype information

Built at Derby from 1881, these Clayton bogie arc roof carriages had a strong similarity to the contemporary 6-wheeled arc roof stock. Although not as plentiful as the 6-wheelers, 240 D490, 110 D502, 80 D513 and 20 D526 were built. Note that D513 and D526 were identical in external appearance; the luggage and adjacent 3rd Class compartments of D513 were “knocked through” to produce the guard’s compartment of D526.

It is possible that these carriages were originally built with oil lamps but would have been converted to gas by 1902 in common with the 6-wheel stock. Both types of lighting are provided for in the kit. It is likely that torpedo vents were fitted in the early years of the 20th century.

In 1892 some D502s were converted to lavatory brake thirds by replacing the centre compartment with two lavatories. Two D526s were transferred to the M&GN in 1902, and withdrawn in 1919. At least seven D502s were converted in 1907 to driving brake thirds for motor train working. Again some D513/526 vehicles were altered by the addition of lavatories, and at least seven D526s became driving brake composites around 1907.

The first withdrawals took place in 1904 and by 1922 only 24 D490s and 1 D502 were in existence. The 16 D490s and 4 D502s purchased by the Midland & South Western Junction Railway before the Great War survived to receive their GWR numbers and were finally scrapped in 1924/25. Fourteen D513s and several D526s were in service in 1922. The last to go was a D502 in 1934, one of only two to get as far as the 1933 LMS renumbering. They thus did not outlive the more “primitive” 6-wheelers.

Numbering

Very little numbering detail has survived. Those known include:

D490: 33, 459, 639, 673, 1288.

D502: 228, 429, 537 (lavatories added later), 1254, 1431; DBT conversions were 0334, 0413, 0444, 0475, 0500, 746, 1131.

D513: None known.

D526: None known; DBT conversions 3401, 3417, 3521, 3543, 3567, 3572 and 3448 or 3488. M&GN vehicles were 155, 156.

All are the post-1902 numbers, which were unchanged on passing to the LMS in 1923. Two D502s received 1933 LMS numbers – 22844 and 22845.

References

Midland Carriages, An Illustrated Review, D Jenkinson & R Essery pp119-120, 137-9.

Midland Railway Carriages Volume 1, R E Lacy and G Dow, pp84, 96.

Historic Carriage Drawings, Volume 2, LMS and Constituents, David Jenkinson p6

Midland Record No. 0, pp67-79 and No. 5, pp31-35 cover the motor train conversions

Midland Record No. 35, pp23-33

Construction notes

Contents:

Body/underframe, bogie and roof frets wrapped in paper.

<p>Packet 1 Underframe parts</p> <p>Steam pipes 2 off Vacuum pipes 2 off Vacuum cylinders, 2 off Gas cylinders, 2 off Steam manifold, 1 off (D502, 526 only) Safety chains, 4 off Handbrake pillar, 1 off (D502, 526 only)</p>	<p>Packet 2 Bogie castings</p> <p>Transom ends, 4 off Bolster springs, 4 off Axlebox/spring, 8 off Spring hangers, 16 off</p> <p>Packet 5 Set of 4 16" sprung buffers</p>	<p>Packet 3 Fastenings</p> <p>8BA screws, 2 off 10BA screws & nuts, 6 off 12BA screws & nuts, 4 off Bogie inserts, 2 off</p> <p>Interior items 0.030" plasticard strip, 2 off 0.020" plasticard strip, 2 off Glazing strip, 2 off Seating moulding, 3 off</p>	<p>Packet 4 Roof castings (7 sets for thirds, 6 for composites) Oil lamp Lamp cover Gas lamp Pair of torpedo vents</p> <p>Miscellaneous 0.5mm wire, 12", 2 off 0.7mm wire, 10cm, 1 off Drawing Transfer sheet, 2 off</p>
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The kit requires Mansell pattern 14mm wheels, waisted bearings and paint to complete.

Please read these instructions before starting construction. Examine all the parts and familiarise yourself with their assembly. Remove any moulding flash or etch attachment points and ensure all parts fit correctly. We suggest wet fine emery paper (1200 grit) to clean up flash marks. Carry out a dummy run before assembly. Assembly is best carried out using ordinary solder for etched components or low melt solder for white metal. An epoxy resin such as Araldite and glues like UHU, Multibond or Thixofix can also be used. For small parts use superglue. To obtain the best results a combination of several techniques will be needed.

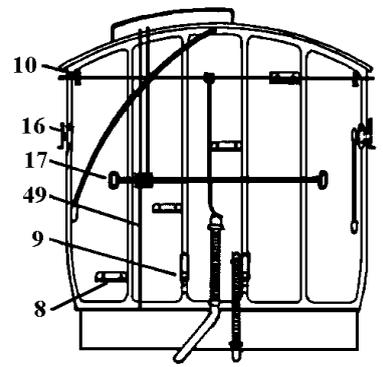
Most sharp bends are given by a half-etched line, which is always on the inside of the bend. In order to achieve a third layer of rivet detail on some components, dimples are etched into the reverse side of the sheet. Before assembly these should be raised. It is sufficient to press onto a piece of solid card with, for example a slightly blunt dart point; attention is drawn to this procedure by the phrase "raise rivets".

Numbers in *italics* (1) are the item numbers on the relevant fret. Some are duplicated on the bogie fret; these are prefixed by "B" in these notes. Numbers in normal type (1) are references to the operation number in these instructions. Parts (20), (33), (40-43), (47), (B6) and (B11) are not required. If you are building a driving carriage, then end (7) is the one on the bogie fret.

Body

- 1) Take coach ends (6) and the appropriate (7) and form the tumblehome to match the coach sides.
- 2) Take the inner sides (1) and (3) and form the tumblehome to match the coach ends, checking the fit over the whole length of the side. If building D513 or D526, remove the two blanking panels from (1).
- 3) Repeat (2) for the outer sides (2) & (4).
- 4) If building D513 or D526, take the blanking panels removed in (2) above and carefully solder them in the half-etched recesses on the *inside* of the luggage compartment end doors. Clean off any excess solder as this will affect the fit between the inner and outer sides.
- 5) Carefully fold the hinges and the end locating tabs at right angles to the inner sides and check the fit with the outer sides.
- 6) Solder the outer sides to the inner sides. It is only necessary to solder in the hinge recesses as long as the sides are adequately held together whilst they are soldered. Solder from the centre outwards to avoid distortion. Remove any excess solder, as this will affect the fitting of the glazing.
- 7) Add a vent (11, 16 off, but only 14 used) in the recess above each door, and a centre door hinge (12, 18 off, maximum of 16 used).

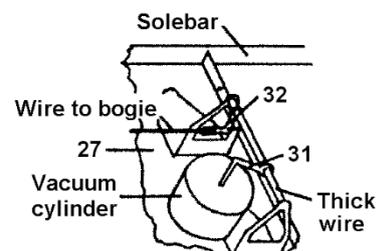
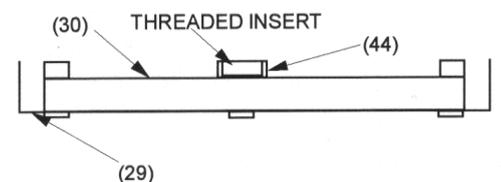
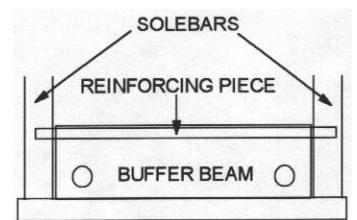
- 8) Take ends (6) and (7) and raise the rivets and fit the steps (8, 8 off), centre lamp brackets (9, 2 per end, 3 on driving ends), side lamp brackets (16, 2 per end), alarm gear brackets (10, 2 off, fitted to end 6 only from around 1901), and the end gas pipes and gas cut off arm if required (49 & 17, end 6 only).
- 9) Take end (6) and solder it to the non-brake end of an inner and outer side assembly, ensuring that they are at right angles.
- 10) Repeat (9) for other side and end (7), which this time goes at the brake end (except for D490 of course).
- 11) Tack solder the body together. When satisfied with the fit, run a fillet of solder down the side and end joints.
- 12) If building a driving carriage, add the steam heating manifold casting to the two holes at the bottom of end (7).
- 13) Bend up and the two end handrails, and the alarm gear rods and pipes if required, using the supplied 0.5mm brass wire.
- 14) You may choose to add the window bolection mouldings (5, 30 off but not all will be used) at this stage. Alternatively, prime and paint them mahogany whilst still on the fret and fix them after the sides have been painted. Note that they go only on the fixed windows, not the door droplights.



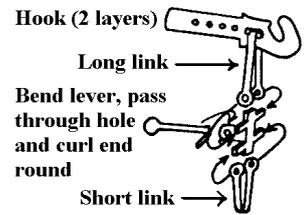
Parts 16 after bending. Note the raised rivets

Underframe

- 15) Extract solebars (23) and (24) from the fret, but do not remove the small projections on the ends. Raise the rivets and bend to shape. Note there are a number of small locating tags on the top inside edge that require bending at right angles. Do not bend the step board supports at this stage.
- 16) Take the headstock inners (25, 2 off) and form a 90° bend for the top and bottom and a double bend at each end. Reinforce with solder but ensure that the two sides are kept clear. Test fit to the solebars (note the projections on the solebar ends locate in the small slot in the headstock).
- 17) Solder a headstock inner to one solebar and check for squareness.
- 18) Repeat (17) for the other solebar.
- 19) Solder the two solebar/headstock assemblies together and check for squareness). A thin strip of scrap etch can be soldered across the underside of the headstock inner and the inside of the solebar angle to reinforce the joint.
- 20) Solder the headstock overlays (26, 2 off) to their inners. Fit the buffer bodies (fix the bushes in first), but leave the springs and heads until painting is complete.
- 21) Fold up the bogie support brackets (29, 2 off). Fold up the bogie support frames (30, 2 off) and solder them to the inside of (29) as shown:
- 22) Insert the bogie support assemblies between the small pairs of underframe locating lugs and solder in place.
- 23) Fold up the bogie locating brackets (44, 2 off), fit a threaded insert inside each and solder the brackets to the two slots in (30).
- 24) Fold up the vacuum cylinder support plates (27, 28) and solder in place between the small pairs of underframe locating lugs. Both half-etched vacuum cylinder location circles should be against the same solebar. The sketch shows (27); (28) is a mirror image.
- 25) Bend out the step board brackets on the solebars, except for the three smaller brackets in the centre.
- 26) Raise the rivet detail and bend up the brackets on the upper step board inners (21, 2 off) and sweat to the upper step board outers (22, 2 off). Solder the upper step board assemblies to the solebar brackets.
- 27) Bend up the lower step board inners (35, 2 off, one misnumbered as 36) and sweat together with lower step board outers (36, 2 off, one misnumbered as 35).
- 28) Raise the rivets on the lower step board brackets (37, 6 off) and solder one end in the half-etched slots in the lower step board assemblies and bend up at 90°.
- 29) Solder the lower step board assemblies to the underframe. The brackets align with the three small brackets on the solebar.



- 30) If modelling a gas-lit carriage, fit the gas cylinder brackets (34, 2 off) in place on the vacuum cylinder support plates, on the opposite side to the half-etched vacuum cylinder location circles. Both gas cylinders thus go on the same side of the carriage.
- 31) Fit the vacuum cylinders (2 off) to the half-etched location circles. Add the actuating levers (31, 2 off) to the cylinders, threading them together with the brake linkages (32, 2 off) onto a piece of 0.7mm brass wire which then goes through the holes in the vee hangers (see the sketch on page 3). Add the operating rods from 0.5mm brass wire. Finally add the gas cylinder castings (if required) and the safety chain J hooks (38 & 39, 2 off each hand), which are fitted with the J pointing outwards. You can also make up the couplings and safety chains, but these should be fitted after painting. Safety chains were removed in 1896.
- 32) D513 and D526 were fitted with queen posts and truss rods, due to their longer underframe. Fabricate these according to the drawing from 0.7mm brass wire and the four strips on the bogie fret between (B7) and the coupling parts. Add pieces of scrap etch to represent the turnbuckles.



Roof

Note: When soldering the roof because of the close fit it is advisable to solder on the **inside** of all joints: i.e. the side away from the body sides or ends.

- 33) Mark a centre line on the inside of the roof (45) using the etched holes as a guide.
- 34) Mark a vertical centre line on each of the roof support ribs (48, 5 off), and fold the ends to 90°
- 35) Fold the roof support frames (46, 2 off) to 90°.
- 36) Make up one side of the roof framing by taking a roof support frame and soldering a roof support rib flush with the end. Note that the L shape of the frame is not equal and the top edge of the support rib should be flush with the top edge of the support frame.
- 37) Repeat (36) for the other side frame and another support rib.
- 38) Solder the two frame/rib assemblies together, ensuring squareness.
- 39) Fit the three remaining roof support ribs avoiding the positions of the lamps etc.
- 40) Roll the roof to approximately the correct arc. A domestic rolling pin on a pile of newspapers or sponge cloths should suffice.
- 41) Take the complete roof frame and align the drawn centre line on the support ribs with the roof centre line. Tack solder the frame to the roof along the centre line ensuring that the gap at each end of the roof is equal. Try the roof assembly for fit against the body assembly; it should be a good fit. When satisfied solder the support ribs to the roof starting at the centre and working outwards to the ends.
- 42) Again check the fit of the roof against the coach body. When satisfied solder the support frames to the roof, again start at the centre and work outwards.
- 43) Add the roof detail: gas pipes if required (50, 2 off), end handrails, oil or gas lamps and lamp tops (6 or 7 of each, depending on Diagram). If required, fit the torpedo vents (12 or 14, depending on Diagram), one either side of each lamp, approximately half way between the rainstrip and the lamp.

Bogies

- 44) Take the sideframes (B1, 4 off) and bend the centre plates to form a 'U', and the brakes similarly. Lightly reinforce the joints with solder. Carefully bend out the small D-shaped spring support lugs. Solder a 12BA nut over the hole on the inside of the centre bracket. Bend out the step boards.
- 45) Solder the brake shoe overlays (B2, 16 off) and solebar overlays (B3, 4 off) in place on (B1).
- 46) Solder the solebar top angles (B4, 4 off) and step board planks (B5, 4 off) in place.
- 47) Take the bogie centres (B7, 2 off) and bend the sides to 90°.
- 48) Solder the brake linkages (B8, 4 off) into the two slots in (B7). The one closest to the bogie end points inwards; the one closest to the bogie centre points outwards. Bend their extreme tip to 90°.
- 49) Take the axlebox/spring castings (8 off), drill out holes to suit your choice of wheel bearings, carefully file the inside face flush and solder the bearings in place.
- 50) Solder the axlebox/spring castings to the solebars. Solder the spring hangers (16 off) up through the 'D' brackets on the solebar with the spindle against the end of the spring.
- 51) Lightly screw the sideframes to the bogie centre with 12BA screws and check the fit of the wheels and bearings. The screws will require cutting to length.
- 52) Solder the bogie transom end castings (4 off) in place on the bogie centre frames.

- 53) Glue in the transverse leaf springs (*4 off*) with the flat face flush against the inside face of the bogie solebar. It is desirable to ensure a space between with the inside edge and the 12BA nut.
- 54) Fit the short (*B9, 4 off*) and long (*B10, 4 off*) brake yokes between the brake shoes, connecting their ends to the brake linkages. Twist the ends of (*B10*) at 90° first. If you need to remove the wheels for painting etc., only solder the yokes on one side.
- 55) Lock the 12BA screws with Loctite or similar **after painting** and fit the bogies to the underframe with the 8BA screws. The outer end of each bogie is the one with the brake linkage closest to the end.

Assembling the body to the underframe

- 56) Solder a 10BA nut (*6 off*) centrally over each hole in the body fixing plates (*18, 2 off*) and (*19, 2 off*).
- 57) Take the underframe and body assembly and lightly screw together using the fixing plates and 10BA screws. The plates go inside the body bottom angle, with (*18*) fitting above the headstock and (*19*) above the vacuum cylinder brackets. For a brake carriage, with the underframe upright and the side with the vacuum cylinders facing you, the brake end goes to the right. When satisfied with the fit, tighten the screws and solder the fixing plates in place inside the body bottom angle only. Separate the body and underframe for painting.

Interior

The interior can be made up as a removable unit according to the drawing using the plasticard supplied. Use the 0.030" strip for the floor and the 0.020" for the compartment walls. A second 0.030" section is supplied to fill in the roof if desired. Add the seating to the compartments once the basic structure is finished. Also fit the handbrake standard if required.

Painting

Paint the body, underframe, roof, interior, bogies and wheels as separate units and screw together on completion.

Livery

Bodyside and end panels, door droplight frames: crimson lake (new – withdrawal).

Bodyside mouldings: black (new – withdrawal), lined both sides with 3/8" wide gold (new – c. WW1) or yellow (c. WW1 – withdrawal). Each gold/yellow line edged both sides in 1/16" wide vermilion (new – 1885), then only the side adjacent to black (1885 – date unknown), then both sides as before (date unknown – withdrawal). A vermilion line always painted across the bottom of the body, immediately above the solebar. A matching line sometimes painted at the top, immediately below the roof overhang.

Window bolections: mahogany (new – withdrawal).

End mouldings and "ironwork": unlined black (new – withdrawal).

Roof: lead grey overall (new – withdrawal), although some vehicles may have been painted black between the edge and the rainstrip (inclusive) from around 1900 onwards.

Solebars and headstocks (including step brackets): crimson lake, lined in yellow (new – 1902); unlined red (1902 – 14); unlined black (1914 – withdrawal).

All other underframe detail: unlined black (new – withdrawal), except that the wooden parts of the wheels were often Indian red.

Interior: timber colour with blue seating in 1st class and red in 3rd.

We suggest the following Precision Paints:

Crimson Lake	P350	Lining gold	P362
Lemon straw (yellow)	P356	Coach roof light grey	P365

The model may be lined in the conventional way, i.e. by painting the raised mouldings in yellow/gold followed by drawing in the central black area using a technical pen. However the following method of painting and lining the sides has also been suggested. Spray first with etch primer, then with brown primer, then crimson lake finish. Simple card masks can be used for the different colours of solebars etc. When thoroughly dry scrape the raised moulding (except window bolections and door joint moulding below the waist) until clean and bright. Be very careful not to touch the scraped surface with the fingers. The black centres of the moulding should be drawn in using a technical pen (Rotring, Staedtler etc) of about 0.5mm

wide filled with non-etching plastic film ink, which is fairly quick-drying. Leave a gold edging of bright brass showing on each side of the moulding, except that the black is taken right to the outer edges of the side and against the window bolections. The rounded corners are drawn in freehand. Any mistakes are readily scraped away and redrawn. The beading at the bottom edge of the side represents the packing between body and underframe; there was no head on the side itself. Before starting painting, the lower edge should therefore be made bright and clean and covered with a tape mask trimmed with a knife and rule to approx 2mm from the lower edge of the side, so that when the black edging is drawn in the gold line is within the bottom panel. A coat of clear lacquer will protect the finished side against handling, as the ink is not waterproof.

Insignia

Class markings: sans serif FIRST, THIRD or LUGGAGE in waist panel (new – c. 1906/7); large serif 1 or 3 centred in lower door panel (c. 1906/7 – withdrawal).

Company name: sans serif MR or M.R or M [door] R centred in the waist panelling (new – c. 1902); sans serif MIDLAND centred in the waist panelling or serif MIDLAND against a black background centred in the eaves panelling (c. 1902 – 1923); serif LMS centred in the waist panelling (1923 – withdrawal).

Heraldic emblem: in two lower door panels either side of the centre on composites only (new – c. 1906/7).

Running numbers: sans serif, usually in the waist panelling (new – withdrawal).

Press-to -fix type lettering transfers are provided. With a scalpel or sharp knife cut round each item through the tissue top layer but **not through the thick backing paper**. Peel the tissue away from the backing, put face down in position and press gently. If the position seems incorrect, remove and replace. When satisfied, press firmly, soak the tissue with water and peel off when it has released (about 30 seconds). Wash away surplus gum and blot dry. Varnishing of transfers is not essential, though obviously it provides additional protection against handling etc. Some oil-based varnishes can cause 'gold' transfers to tarnish rapidly. Cellulose lacquer can be applied with great care from an airbrush provided that the first coating is applied from far enough away to produce a matt finish. When this is hard dry additional light coats can be applied from progressively closer distances until the desired gloss 'is produced. This information is given in good faith, but we cannot accept any responsibility for the results as the conditions of use are outside our control. We therefore suggest trials on scrap material before working on the model itself.

Finishing

Glue in the ring door handles (*14, 16 off, maximum of 14 used*) and door grab handles (*13, 16 off, maximum of 14 used*). Also add the sprung buffer heads, couplings and safety chains (if required). Steam pipes are provided, but these vehicles were built without heating, and it is possible that only the motor train conversions were ever fitted. Cut the glazing strips to suit the door and window apertures and fix in place. Some panes will require the bottom corner trimming to clear the door handles. All the fixed window panes (apart from driving end windows) should fit in the recesses between the inner and outer sides.

Finally, assemble the vehicle, and add the vacuum pipes to the holes above the coupling hooks. Do not glue the flange to the end in case the carriage has to be dismantled at a future date.

For further help or information please email: andrew@modelsignals.com

Wizard Models

Wizard Models stocks a wide range of items for the 4mm scale modeller.

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