



**Midland Railway
Midland and South Western Junction Railway
Clayton 43' and 45' arc roof bogie stock**

Prototype information

Manufactured by the Midland Railway from 1881 these Clayton bogie arc roof carriages had a strong similarity to the contemporary 6 wheel arc roof stock. Although not as plentiful as the 6 wheel arc roof types, around 240 D490, 110 D502, 80 D513 and 20 D526 were built. It is possible that these carriages were originally built with oil lamps but would have been converted to gas presumably by 1902 in common with the 6 wheel passenger stock. Again it is likely that torpedo vents were fitted in the early years of the 20th century. The first withdrawals took place in 1904 and by 1922 only 24 D490 and 1 D502 were in existence. The 16 D490 and 4 D502 purchased by the Midland and South Western Junction Railway before the Great War survived to receive their GWR numbers and were finally scrapped in 1924/25.

In 1892 some brake thirds were converted to lavatory thirds by alteration of the two middle compartments and a number to push pull working in 1907. In 1884/85 composites to diagram D513 and D526 were produced. Externally these had the same appearance and dimensions but D526 had an extended brake compartment with one less third compartment. The D513 was a full composite with a luggage van. Again some D513/526 vehicles were altered by the addition of lavatories and/or for push pull working. Some 14 D513's and several D526's were in service in 1922. Final withdrawal would have occurred within a few years.

We produce the following variants:

- D490; 43' 7 compartment third class carriage, built 1881
- D502; 43' 6 compartment brake third carriage, built 1881
- D513; 45' 6 compartment brake composite carriage built 1884
- D526 45' 5 compartment brake composite carriage, built 1884

References

- Midland Carriages, An Illustrated Review, D Jenkinson and R Essery P118-120, P137.
- Midland Railway Carriages Volume 1, R E Lacy and G Dow, P84, 96.
- Historic Carriage Drawings, Volume 2, LMS and Constituents, David Jenkinson P6

Parts list

Packet 1	Packet 2	Packet 3	Packet 4
Underframe castings	Bogie castings	Fastenings	Roof castings
Steam pipes 2 off	Transom ends x4	8BA nuts and bolts x2	Gas lamps, 8 off
Vacuum pipes 2 off	Bolster springs x4	10BA nuts and bolts x 6	Lamp covers x8
Vacuum cylinder 2 off	Axlebox and spring x8	12BA nuts and bolts x 4	Oil lamps x8
Gas tanks x2		Spacer washer x2	Torpedo vents x8
Pipe x1	Packet 5	Miscellaneous	Interior items
	Set round buffers	0.5mm wire, x1	Polystyrene strip 0.030" x2
		0.7mm wire, x0.5	Polystyrene strip 0.020 x 1
			Glazing strip, 2 off
			Seating sections x3
			Glazing sections x2

This model requires Mansell wheels, waisted bearings and paint to complete. These are available from Wizard Models, www.wizardmodels.co.uk

Assembly

Please read these instructions carefully and familiarise yourself with the parts and method of construction before commencing assembly. **All** fold lines are on the **INSIDE** of the bend. It is assumed that the builder is soldering the kit. The angles should be lightly reinforced with solder but only after checking subsequent fits.

The prototype kits have been assembled using nothing larger than a 25W soldering iron and normal (60/40) multicore solder and acid free flux. The white metal castings were fitted to the etches by pre-tinning the brass with multicore solder and then re-tinning with low melt solder over the ordinary solder. The white metal components were tinned with low melt solder and carefully sweated to the tinned brass using a low Wattage (15-18W) Iron.

Certain parts have half etched rivet detail, these should be carefully pushed through from the back using a blunted scribe or similar, but NOT with a very sharp implement.

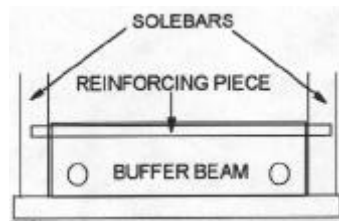
Numbers in *italics* (1) are the item numbers on the relevant etch. Numbers in normal type (1) are references to the operation number in these instructions.

Carriage body

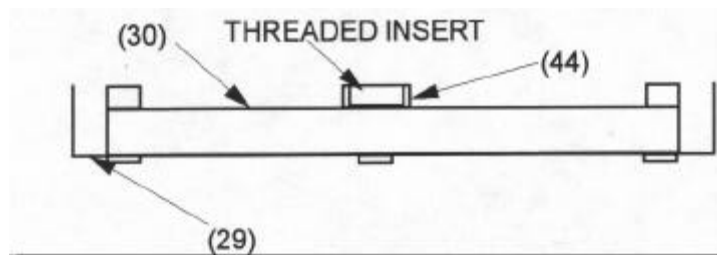
- Take coach ends (6) and (7) and form tumblehome to match the coach sides.
- 1a) Bend steps (11) and fit to end (6 or 7) as appropriate.
 - 2) Take inner sides (1&3) and form tumblehome to match coach ends (*remember to check the fit the whole length of the side*) (*Remove the blanking panel from the Composite inner sides*)
 - 3) Repeat (2) for the outer sides (2 & 4)
 - 3a) If building the Luggage Composite take the blanking panels removed from the etch (2) above and carefully solder 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 of the inner and outer sides.
 - 4) Carefully form the hinges and the end locating tabs at right angles to the inner sides and check the fit with the outer sides.
 - 5) Solder outer sides to 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 the sides distorting. Remove any excess solder as this will effect the fitting of the glazing at a later stage.
 - 6) Solder or glue the door vents (11) in place on the upper door.
 - 7) Take ends (6) or (7) and forms the rivets and fit the steps (8) lamp brackets (9) alarm gear brackets. (10) and gas cut off arm (17)
 - 8) Take ends (6) and solder to an inner and outer side assembly. Ensure that they are at right angles. Remember the alarm gear is at the non brake end!
 - 9) Repeat (8) for other side and end.
 - 9a) Note if building push-pull conversions use end (7) ensuring it is fitted at the brake end. Along with the steam heating pipe casting which is fitted in the two holes at the bottom of the end (after soldering the body together.)
 - 10) Tack solder body together. When satisfied with fit run a fillet of solder down the side and end joints.
 - 11) Make up and fit alarm gears handrails and grab handles for the coach ends from brass wire.
 - 12) Fit bolection mouldings (5) 4 per compartment.

Underframe

- 10) Take solebars (23) and (24) (do not remove the small projections on the ends) form the rivet detail, 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 step board supports at this stage.
- 11) Take buffer beam inner (25) and form right angle bend for top and bottom and a double bend at each end for the buffer beam ends. Reinforce with solder but ensure that the two sides are kept clear. Check fit with solebars (note the projections on the solebar ends locate in the small slot in the buffer beam).
- 12) Solder a buffer beam inner to one solebar note location of solebar projections into slots in buffer beam. Check for squareness.
- 13) Repeat (12) for other solebar.
- 14) Solder underframe assembly together (Check for squareness). A thin strip of scrap etch can be soldered across the underside of the buffer beam inner and the **inside** of the solebar angle to reinforce the joint.



- 15) Solder buffer beam overlays (26) to buffer beams. Fit buffer housing and bush and solder in place.
- 16) Bend up Bogie support bracket (29 and 30) and solder together. (Note bogie support frame (30) is fitted to the *inside* of the 'U' shaped frame (29) as the sketch below.)



- 17) Locate bogie support assemblies to underframe between the small pairs of locating lugs and solder in place.
- 18) Fold up the bogie locating bracket (44), fit a threaded insert inside and solder the bracket in the two slots in (30)
- 20) Take vacuum cylinder support plates (27,28) and bend to shape and fit to underframe assembly (note the plates are handed.)
- 21) Bend out step board brackets on solebars (do not bend the 3 smaller brackets at the centre of each solebar).
- 22) Form rivet detail and bend up brackets on step board inner (21) and sweat step boards together (22) Solder stepboard assembly on to the brackets on the solebar.
- 24) Bend up lower step board inner (35) and sweat together with lower step board outer (36)
- 25) Take lower step board brackets (37) form rivet detail and solder one end in the half etched slots in the lower step board assembly and bend up at right angles.
- 26) Solder lower stepboard assembly to the Underframe assembly (The brackets align with the 3 small brackets on the solebar (see 21 above)
- 27) Fit gas cylinder brackets (34) in place on vacuum cylinder support plates and fit vacuum cylinders in etched rings on the plate. Make up brake linkage from etched parts and brass wire and solder in place. Attach in place gas tanks. Note there should be a gas tanks and a vacuum cylinder on each side of the carriage.

Roof

Note: When soldering the roof because of the close fit it is advisable to solder on the *INSIDE* of all joints: ie the side away from the coach sides or ends.

- 1) Mark the centre line on the inside of the roof (45) using the etched holes as a guide.
- 2) Mark a vertical centre line on each of the roof support ribs. (48) qty 5.
- 3) Bend to L shape roof support frames (46) qty 2.
- 4) Bend Roof support rib ends at right angles.
- 5) Make up one side of the roof framing by taking a roof support frame and solder a roof support rib *flush* with the end (*n.b.*) *The L shape is NOT equal and the top edge of the support rib should be flush with the top edge of the support frame.*
- 6) Repeat (5) with the other side of the roof frame.
- 7) Solder both halves together
- 8) Fit the remaining roof support ribs avoiding the positions of the lamps etc.
- 9) Take the complete frame and align the centre line on the support ribs on 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 work from the centre outwards to the ends.
- 10) 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 to the ends.) (*Note if necessary the end ribs can be gently tweaked to improve the fit*)
- 11) Fit gas pipes (50), handrails, lamps and lamp tops. If desired fit torpedo vents. These were either side of the lamps approximately half way between the rain strip and the lamp.

Bogies

- 1) Take sideframes (1) and bend centre plate to form a 'U', The brakes to form a 'U' (all bends are on the inside. Lightly reinforce the joints with solder. Carefully bend out the small 'D' shaped spring support lugs. Solder a 8BA nut over the hole in the inside of the centre bracket. Bend out stepboard.
- 2) Solder brake shoe overlays (2) and solebar overlays (3) in place on (1)
- 3) Solder solebar top angle (4) and stepboards(5) in place
- 4) Take bogie centre (7) and bend sides up at right angles.
- 5) Solder brake linkage (8) in the two slots in (7). Bend the extreme tip at right angles.
- 6) Take the axlebox and spring castings, drill out holes to suit your choice of wheel bearings , carefully file the inside face flush. and tin.(We would recommend the small waisted bearings.)
- 7) Solder bearings in place in the axlebox and spring, and solder in place on the solebar. Solder the spring hangers up through the 'D' brackets on the solebar with the spindle against the end of the springs.
- 8) Lightly screw the bogie centre to the two sideframes with 12BA screws and check the fit of the wheels and bearings. The screw will require cutting to length.
- 9) Take the bogie transom end casting and solder in place on the bogie centre frame.
- 10) Glue the transverse leaf springs 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.
- 11) Fit brake yokes (9) and (10) (If you require to remove the wheels for painting etc.; only solder the yokes on one side)
- 12) Lock the 12BA screws with Loctite or similar. **after painting** and fit bogies to underframe with the 8BA screws.

Assembling the body to the underframe

- 1) Take body fixing plates (18) and (19) and solder a 10BA nut centrally over each hole (6 off)
- 2) 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, (18) fits above the buffer beam and (19) above the vacuum cylinder brackets. When satisfied with the fit, tighten the screws and solder the fixing plates in place inside the body bottom angle only.

Finishing

The body, underframe, roof, interior and bogies can all be painted as separate units and screwed together on completion.

The following table gives the quantity and sizes of the glazing for the 43' and 45' Midland Arc roof stock. (nb all are 12mm wide).

	Brake 3 rd	Brake Comp.	Full 3 rd	Comp. Lug.	P/P Ends
16mm x 12mm	10	4	12	4	
6.5mm x 12mm	16	18	18	16	
19mm x 12mm		4		4	
21mm x 12mm		2		2	
25mm x 12mm					2

All the glazing (other than the droplights and Push-Pull ends) fits in the recesses between the inner and outer sides

The interior can be made up as a removable unit from 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. Grab handles, door handles etc are all on the etch and can be fitted after painting if preferred.

Livery detail

Midland Railway

Carriages were painted Midland crimson lake, including droplights the shade remaining consistent from 1877 to 1923. Carriage roofs were grey between rainstrips. Very often all over grey. On 20th century clerestory and arc roof stock gloss black was applied between the rain strip and cant rail. The rainstrip itself being black. The mouldings were black; each side lined with gold gilt, which in turn was lined either side with vermilion to 1885 and adjacent to black only thereafter. Double lined reappeared at some time again becoming universal by Grouping. During the Great War period yellow was used as an economy measure in place of gold. By Grouping non-gangwayed stock was double lined yellow and gangwayed stock gold. In addition on fully lined carriages a fine horizontal vermilion line was present at the lower carriage side immediately above the slobber. In addition a second horizontal line was placed immediately along the lower part of the gutter moulding. Carriage destination boards were painted crimson lake with gold letters or china blue with white letters.

The carriage ends were painted crimson lake with end details, (raised mouldings, steps, lamp irons, etc) in black without lining. Until 1902 solebars and headstocks were crimson lake fully lined in yellow. However from 1902 to 1914 solebars and headstocks were plain red perhaps a shade darker than crimson lake thereafter plain black. Wood centred wheels were occasionally painted indian red.

The carriage interior should be timber colour with blue seating for first class and red for third class compartments.

We suggest the following Precision Paint:

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

London Midland and Scottish

Whilst many carriages were repainted by their new owners some, particularly obsolete, stock retained their previous livery to the end with the addition of LMS numbering and lettering. Suitable lettering materials are supplied by the HMRS, sheet number and paint by Precision Paint.

The London Midland and Scottish carriage livery was standardised and it is possible to be fairly sure what livery was likely for a given period. In general up to the war years, carriages were painted every six or seven years. Carriages were painted crimson lake a shade very similar to the Midland Railway shade. Until 1936 both the ends and sides were painted crimson lake but from that date the ends were painted black with the exception of driving ends of motor carriages which remained crimson lake. Detail work on the ends, steps, pipework etc was painted black. In 1946 the LMS changed the name to maroon although it is doubtful if any change in colour was discernible. However it does seem possible that the colour had become slightly darker over the years. Roofs were generally painted in the Midland style of light grey between the rain strips and black between the rain strips and cantrail. From 1933 onwards to outbreak of war the roof was specified to be a metallic aluminium type finish. The roofs quickly became dirty in service and more often were a muddy grey colour.

Lettering and lining

Before the close of 1934 early 1934 all carriages were lined in Midland style. Raised beading was painted black and edged with a 3/8th gold for gangwayed stock or 3/8th pale yellow for non-gangwayed stock. These lines were edged each side with a 1/16th vermilion line. All three colours appeared on the beading and not the body panels. In all cases the lining followed the outline of the beading. Carriage ends were not lined and beading if present painted black as per Midland practice.

From 1934 onwards a simplified lining system was adopted. This consisted of a 1/2" yellow line just below the cant rail, and a similar line above the tops of the windows. In addition just below the windows two 1/2" yellow lines separated by a 1" wide black line. The yellow lining had a darker shade than previously. During the Second World War lining was discontinued on the few carriages to be repainted. General touching up was the norm during this period. From 1946 lining was readopted and the yellow changed to straw.

Lettering such as LMS etc. was applied to the carriage sides in serif characters 4" high. The colour was gold until 1934/5 when chrome yellow was used. The lettering was shaded in pinkies white to the left blending to dark red/brown below the characters, in turn the shading was shadow shaded to the right and below in black. Some pre-group carriages with shallow depth waist panels had 3" letting. The class type was marked on the doors 8" high rendered in gold. The LMS emblem was not used on non-corridor stock and was near to the centre of the carriage when applied to corridor stock. Insignia were generally placed as near to the centre of the carriage as possible in the waist panel.

We suggest the following Precision Paints:

Crimson lake	P30
Carriage roof grey	P40
Carriage roof aluminium	P41
Lining gold (gangwayed stock)	P35
Lining yellow	P36
Vermilion	P37

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