

Ref. 16L04 - 16mm Scale W.D.L.R. 20hp "Bent Frame" Motor Rail "Simplex"



INTRODUCTION

Prototype Information

Although by no means were these the first narrow gauge internal combustion locomotives to be made, they were the first successful 'mass produced' design. Many hundreds were built for the War Department Light Railways (W.D.L.R.) for use during the 1914-18 Great War, commonly referred to as the First World War.

The manufacturer was called the Motor Rail & Tramcar Company (M.R.T.C), formed in 1911 primarily to make petrol driven railcars and tramcars, using the "Simplex" gearbox patented by John Dixon Abbott. In the run up to the Great War the company recognised the potential need for a light locomotive to be used on supply railways just behind the front line. Their efforts were rewarded when they obtained a contract in 1916 to build such a design for the War Department.

The original business was set up in Lewes in Sussex, but moved to Bedford in 1916 to be able to fulfill the W.D.L.R. orders. Part of the success of the design and manufacture, was that most parts were subcontracted, with only the frames and final assembly taking place at their own works. Engines were by Dorman of Stafford, and gearboxes by David Brown of Huddersfield.

N° 18,314



A.D. 1909

Date of Application, 9th Aug., 1909

Complete Specification Left, 16th Oct., 1909—Accepted, 4th Aug., 1910

PROVISIONAL SPECIFICATION.

Improvements in Change-speed and Reversing Gear for Motor-vehicles and other purposes.

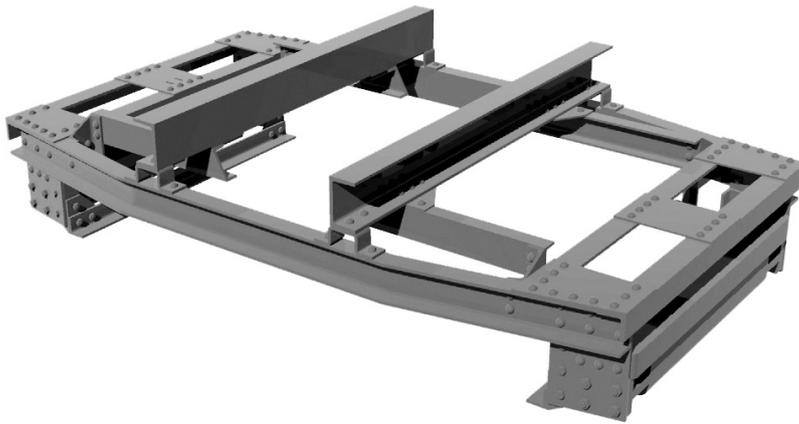
I, JOHN DIXON ABBOTT, of "Mirasel," Granville Road, Eastbourne, Engineer, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in change-speed and reversing gear especially suitable for motor-trams, and also suitable for motor-cars and other purposes.

The invention has for its objects, *inter alia*, to provide a change-speed and

These locomotives, or "tractors", and their larger, partially armoured brothers, were usually referred to by the name Simplex, and a bit like Hoover, this came to be used to describe many small petrol and later diesel tractors, whether or not built by Motor Rail, or even of the patent layout. One or two rival manufacturers even called their machines Simplex type. In the 1930s, M.R.T.C simplified their name to Motor Rail Ltd, and eventually they renamed themselves Simplex Mechanical Handling Ltd. Today, the business is owned by Alan Keef Ltd.

The "Simplex" layout involved having the engine and gearbox mounted across the loco, so that the crankshaft in the engine and the loco axles were parallel, thus avoiding the complication (and expense) of turning the drive through 90°. The down side of this arrangement was the effect on the overall width of the loco: the 20hp loco (as in this kit), with a 2 cylinder Dorman engine was 4ft-10in wide, whilst the 40hp loco (Armoured, Protected, etc.), with a 4 cylinder Dorman engine was 6ft-6in wide - both of them on track gauge of around 2 feet! Later locomotives of the Simplex pattern could be much narrower because engine size relative to power was reduced.



The ends of the side frames tapered in to give better clearances on curves, giving rise to the term "bent frame" (usually used by Motor Rail themselves), or sometimes "bow frame". The frames were made from channel, angle and plates rivetted together, in such a way as to leave clear space for the engine and gearbox in the middle. A cast iron ballast weight was hung low down at each end of the frame.

There are several of the 20hp locomotives preserved, although none are in completely original condition. The following selection is on public display:

Works No.	W.D.L.R Number	Location	Notes
246	246	Ulster Folk & Transport Museum, Cultra, Belfast	No seat or platform fitted.
264	(264)	Welsh Highland Heritage Railway, Porthmadog	Has early type (wider) brake column, and no bonnet covers.
872	(LR 2428)*	Amberley Working Museum, Sussex	Re-purchased by M.R.T.C. and fitted with a TVO converter and raised bonnet covers. Re-sold as w/n 3720. * Some sources give this as LR2593.
??	??	Imperial War Museum, Duxford, Cambridgeshire	Re-purchased by M.R.T.C. and converted to 2ft-6in gauge. Re-sold as w/n 3849. Converted back to 60cm gauge in preservation. Most visible features are original.
1111	LR 2832	Moseley Railway Trust, Apedale, Staffordshire	The only one in full working order; was main source of information for this kit. Fitted with a 1930s radiator.

(Numbers in brackets), means that the W.D.L.R. number is not currently carried on the loco.

Number plates for two of these locos, and in addition, LR2690 and LR2459 (for which there are clear contemporary photographs) are included with this kit.

Further information about M.R.T.C. /Simplex locos and their use during the Great War, can be found in the following books:

- *A Guide to Simplex Narrow Gauge Locomotives*, Hall and Rowlands, Moseley Railway Tust, 2001
- *The Early Years of the Motor Rail & Tram Car Company 1911 -1931*, Davies, Plateway Press, 2008.
- *Light Railways of the First World War*, Davies, David & Charles, 1966.
- *Narrow Gauge at War*, Taylorson, Plateway Press, 1987.

MODEL INFORMATION

We have tried, with this kit, to produce something special; a fully detailed model of Museum quality, but which also works well. The research has been conducted by a recognised expert on full-size War Department Light Railway locomotives, and the design done using the latest 3D CAD software and high quality 3D printing. There are minor compromises, to aid construction, and whilst the electric motor occupies more or less the same space as the original petrol engine, the drive shaft (and therefore, the driven sprockets) are lower than the originals. However, from normal viewpoints, the compromises are not visible. Conversely, some of the details are so small, you will need a magnifying glass to see them. Such as: the lettering on the wheels, axleboxes, gearbox and engine, and the throttle controls and spark plugs etc.

The construction principles are similar to other Slater's 16mm scale loco kits. There is a mixture of moulded polyurathane, lost wax brass castings, with etched brass for the chassis and bonnet tops. The drive mechanism uses the latest generation of high quality (and high power) coreless gearhead motor, with acetal resin ("Delrin") chains. The wheels have steel tyres with detailed moulded glass-filled nylon centres, and the axle-to-wheel fitting is square to ensure positive non-slip drive. Some of the parts are quite delicate as supplied, so will need careful handling, but when everything is assembled, the result is quite strong, with all vulnerable corners and edges in brass, not resin. However, it is a detailed model, not a general workhorse, so will still need careful handling

Tools Needed

The following tools are needed, most of which will already be in the toolkit of the average modeller.

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|--|--|
| Piercing Saw or Nippers | for removing lost wax castings from their sprues |
| "Stanley" type knife | for removing etched parts or polystyrene mouldings from the frets or mouldings. |
| Assortment of small files | for finishing removal of pips, tabs, and general cleaning up |
| Cyanoacrylate (Loctite Superglue or similar) | for quick fixing of parts where maximum strength is less important |
| 2-part Epoxy Glue (Araldite or similar) | for fixing polystyrene to brass. The 5 minute setting variety is OK for most of this work, but the 24 hour setting version is better if you have the patience to wait for each bit to set! |
| Glass Fibre Pencil OR Abrasive Rubber Block | for cleaning all materials (but particularly etched brass parts) prior to glueing and prior to painting. |
| Soldering Iron, Flux & Solder | Best for assembling the chassis and bonnet tops - but it could be done with the epoxy glue. |

Resin Body

Carefully check over the parts for moulding pips or flash, and if necessary remove these with a sharp knife or by filing. Be very careful not to breath any of the resulting dust. The parts may still have traces of the mould parting agent, so before assembly, wash in warm (not hot) soapy water. Once assembled, a more thorough wash will be needed prior to painting - see below.

Check that the main resin body has not warped slightly. The best way to do this is with a straight edge (steel ruler) along the side underneath a pair of the rivetted corner plates. If these are not parallel, the side frame will not fit properly (see diagrams in section B2). If any correction is needed, place the body in very hot water (too hot to touch, but not boiling). After a few minutes, get it out the water (perhaps using rubber gloves) and very gently bend slightly in the direction need to straighten it, whilst holding it under the cold tap. Check, and repeat if necessary.

Etched Components

Remove components from the sheets only when you need them. This is done by cutting through the small tabs with a Stanley-type knife, or a small chisel blade, whilst resting on a fairly hard surface like a piece of MDF. In many places it is possible to cut the tabs with scissors or nippers, but however you do it, do it carefully to avoid distorting the part you are removing and any adjoining parts. Usually it is best to cut the tab at the end away from the part and then remove the remains with fine nippers, finishing off with a fine file.

Most of the etched components require folding or bending. As a general rule, where components form a right angle, there is a fold line on the inside. The etched components are best soldered together, but if you do not have the necessary skills, they could be glued with the epoxy glue. In either case, cleanliness is important and this is where the glass fibre brush or abrasive rubber is needed, to clean any edges or surfaces immediately prior to assembly.

Removing plastic brake blocks from the sprues

Cut through the joining tabs with a sharp knife or nippers, away from item required, removing the remains of the tab afterwards with the knife and finishing with a file. Do not try to break or snap the tabs, as this usually results in breaking away part of the brake block!

Cleaning up Lost Wax Castings

Remove pieces from the sprue with a piercing saw or nippers and finish off with a fine file. Remove any blemishes with a file and finish with a quick polish with glass fibre brush or abrasive rubber.

Battery Operation or DCC

As designed and supplied, the kit is intended for conventional two rail electrical pickup with remote control via the track. However, there is no reason why it could not be battery powered, although the necessary extra components are not included. A PP3 9 volt battery will provide adequate power, but limited endurance. The location could be under the bonnet covers, but this would require omitting the fuel tank and the top of the engine; a suitable battery holder could be fabricated from etched brass fret waste or from Plastikard. An alternative location could be in a wagon permanently attached like a steam loco tender. In this case, a longer lasting battery pack could be included, if that is important to your operating methods. There is probably room for an electronic speed controller (or DCC chip if that is your method of working) under the body immediately behind one or other "buffer beam".

Operating Radiator Fan

On a small internal combustion engine loco like this, the radiator fan is driven from the engine, so it should be rotating when the engine is running, even when the loco is stationary. As supplied, the fan can be assembled to rotate, but the motor, battery and control gear needed to drive it, are not included. If this sort of "gimmick" appeals to you, the best location for a tiny motor is inside the top half of the engine block. Bearings, shafts, pulleys and belt are included because they are needed even if not working.

Painting and Finishing

The secret of good painting is preparation. Make sure that all parts are thoroughly clean, dry and free of any grease. Metal parts should be cleaned with the glass fibre brush or abrasive rubber as the slight scratching helps the paint to key. Everything should be washed with a mildly abrasive kitchen cream cleaner, such as Cif. Use an old toothbrush to work into the corners and crevices. You may need to repeat if the foam goes grey the first time. When it is clean, rinse in clean water. Once thoroughly clean and dry do not handle the model with bare fingers. Leave to dry, at least overnight, before applying the primer. Cover with a clean cardboard box or similar to prevent dust settling.

To prime the body, it only needs a light mist coat from a car aerosol spray, but brass should be primed more thoroughly. In fact, an etching primer is best; this is available from good model suppliers. Read the manufacturer's recommendations on the minimum drying time. If you are going to follow a car aerosol spray primer with the same maker's top coat, ten minutes may be sufficient. However, with many paints you will find that at least 24 hours should elapse before the top coat is finally applied.

Nobody is sure what colour these locos were painted, but there is evidence that the larger 40hp locos were in "Army" green, so it is reasonable to assume that the 20hp tractors were too. (This is why the resin parts are moulded in a dark green colour). A close match would be Southern Railway Dark Olive, available from Phoenix Precision, Railmatch and others. Every part would be the same colour (other than a few like the throttle control, which was unpainted brass) - none of the red buffer beams and colour coded engine parts so beloved of many heritage railways.

The final job is to give everything a coat of rust, dust, dirt and grime! This was War time, and appearance and cleanliness would not have been a high priority.

ASSEMBLY INSTRUCTIONS

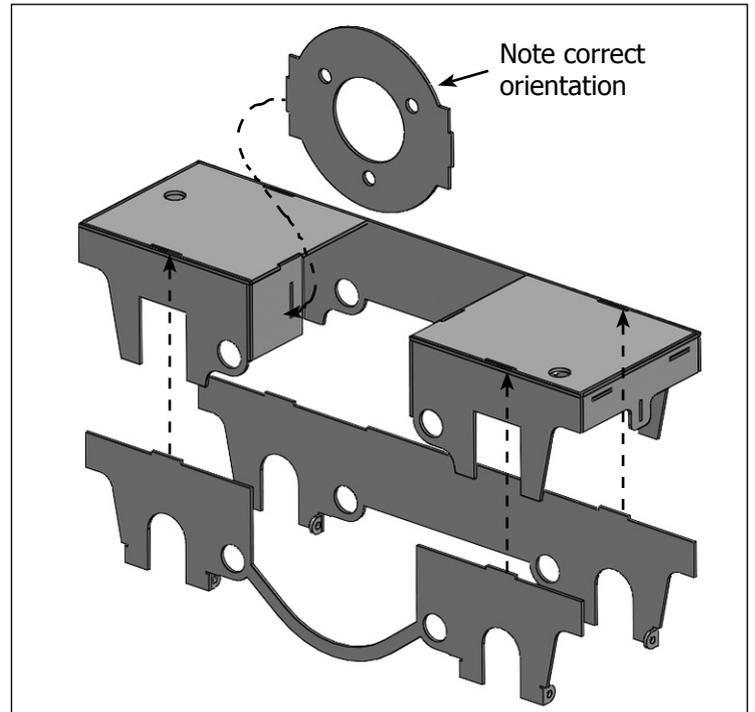
To avoid tedious repetition, it will be assumed at each stage that the parts have been removed from the etched fret, moulding or casting sprue, etc., that tabs, moulding pips, etc., have been removed, and preliminary cleaning done ready for soldering or glueing. Follow the general guidelines in the introduction; anything needing special attention will be mentioned in the appropriate section.

We recommend that you build the chassis first, because any minor adjustments found to be necessary to the body are best done before all the parts are attached

CHASSIS ASSEMBLY

Stage C1 - Fold up and assemble the etched chassis parts.

Note that the separate additional side plates go on the inside, with location aided by small tabs and slots at the top. Note also which way up the nearly circular plate goes. Fold up and fit all these parts first, and then solder them all in one go. When complete, try the square brass axle bearings (seen in subsequent drawings) to make sure that they slide up and down easily, but are not loose horizontally.

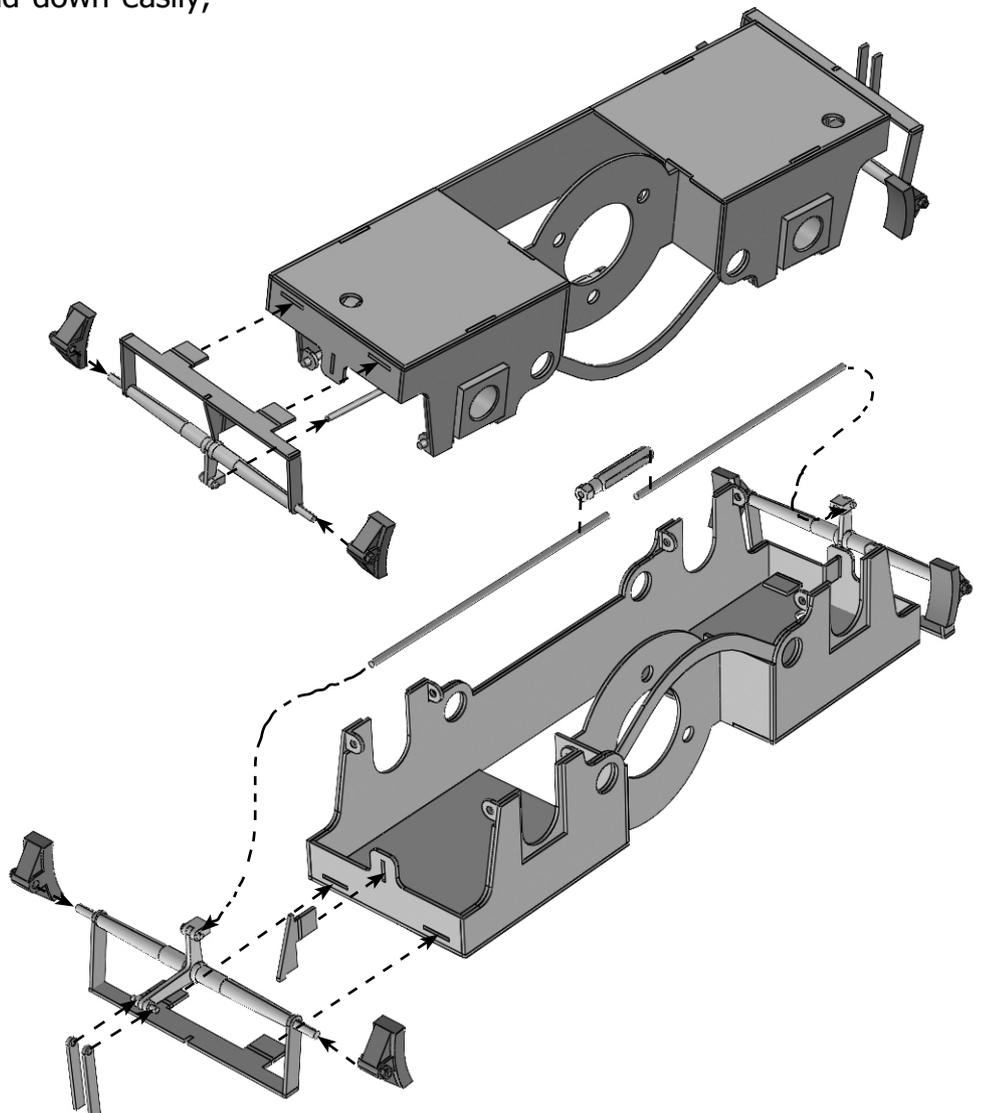


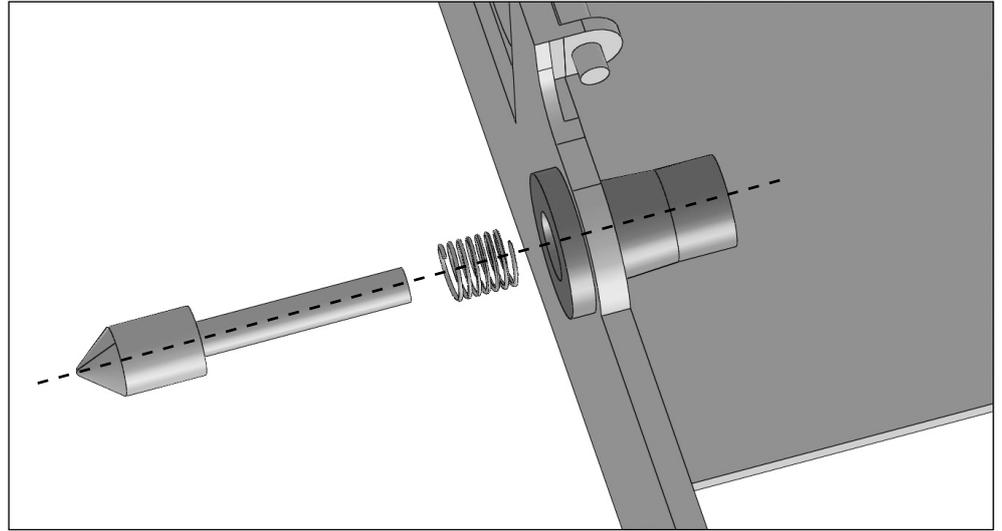
Stage C2 - Brake Gear

Fold up the etched parts and attach to the end of the main chassis frame. You will have to insert the cast brass cross beams at the same time as you fold down the brake hangers. The tabs on the various supplementary etchings are intended to fold down on the inside to hold the parts in place whilst being soldered.

The brake pull rod is fabricated from two lengths of 1mm (40thou) brass wire with the cast brass turnbuckle in the middle. **Although shown here, do not fit the pull rod until after the wheels are in place.**

Glue on the four plastic brake blocks. This is probably best done after the wheels have been put in, to make sure they are set at the correct angle.



Stage C2 - Pickups.

These are a special version of our normal 'plunger' pickups. There are four of these, but only one is shown here in detail.

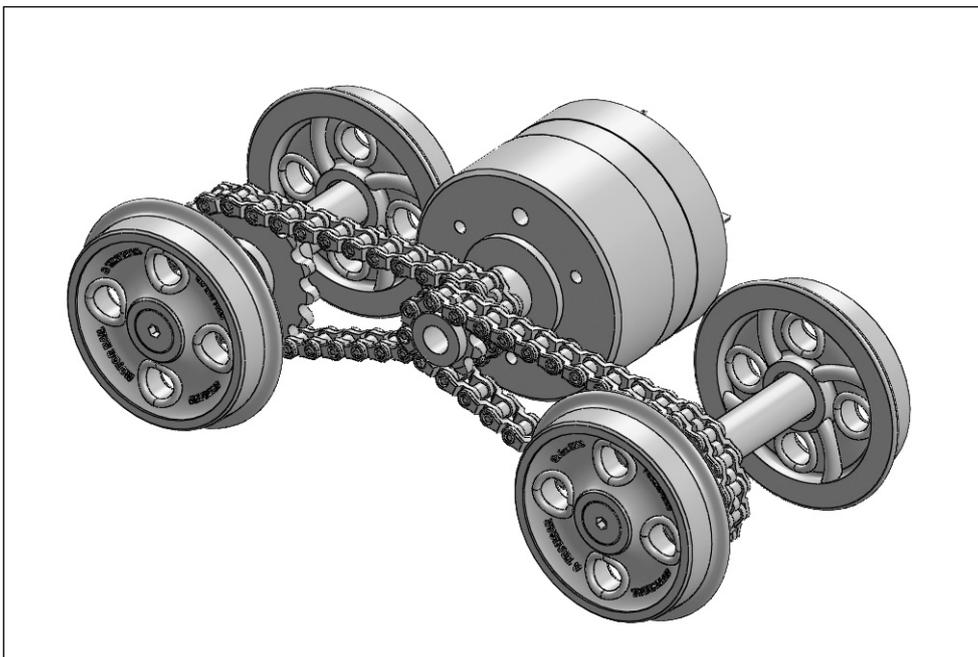
The black plastic housing is glued into the hole in the frames. The wire (not shown in illustration) is carefully soldered into the tubular section of the turned brass plunger. You may need to remove some of the solder (use an old file), in order to thread the spring over the wire and onto the plunger, and then thread the wire through the housing. You could put the spring in place before soldering the wire, but that risks heat damage to the hardened springs. Once the motor is installed, solder the other end of each wire to the motor tags - left hand (motor) side to + terminal is the convention, but you may need to check against your other locos. Note too, that on the right hand side, the wires will pass through the loop of the drive chains, once these are fitted.

Stage C3 - Assemble the remaining chassis components.

The illustration below shows the wheels, sprockets, chain and motor, without the frames etc. to show clearly how these parts fit. The top picture opposite shows the assembled chassis, but without the pickup wires.

The suggested order of assembly, in order to get all the parts in place is as follows:

- Insert both axles, with a square bearing and each chain loosely in place into the the slots in the chassis (a bit fiddly!). Note that one of the bearings is shorter than the other three, and this goes at the rear right corner - as indicated in the picture opposite (which is of course, upside down).

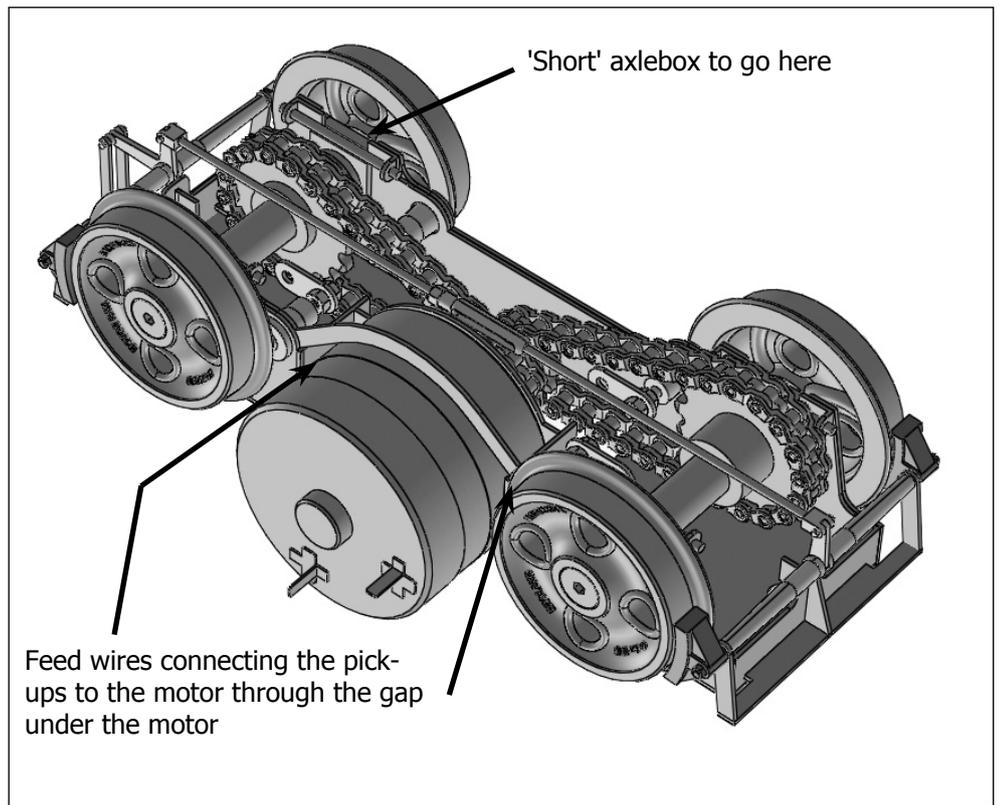


At this stage, you can retain the bearings in place with a piece of 0.5mm (20thou) wire through the little tabs, bent down at each end to stop it coming out again, but in practice, it was found to be unnecessary once the chains and motor are fitted. Note carefully which axle goes where and which way round it goes.

- At this stage, you can put the wheels onto the axles (the Allen key is for tightening the axle screws).
- Put the double sprocket in approximately the correct

place on the chains, then insert the motor with the shaft through the double sprocket. Tighten the grub screw and then screw the motor to the mounting plate.

- Finally, as already indicated in the section C2, the wires already installed in the pickup plungers can be soldered to the motor tags, with the wires passing through the gaps in the etched chassis marked with arrows. Remember too, that the wire from the right hand plungers pass through the loops of the chains.
- Also, as indicated in section C1, you can now fit the brake pull rod.



BODY ASSEMBLY

Stages B1 and B2 are described separately, but need to be done in at the same time and in parallel with each other.

Stage B1 - Check fit of main resin body to the chassis.

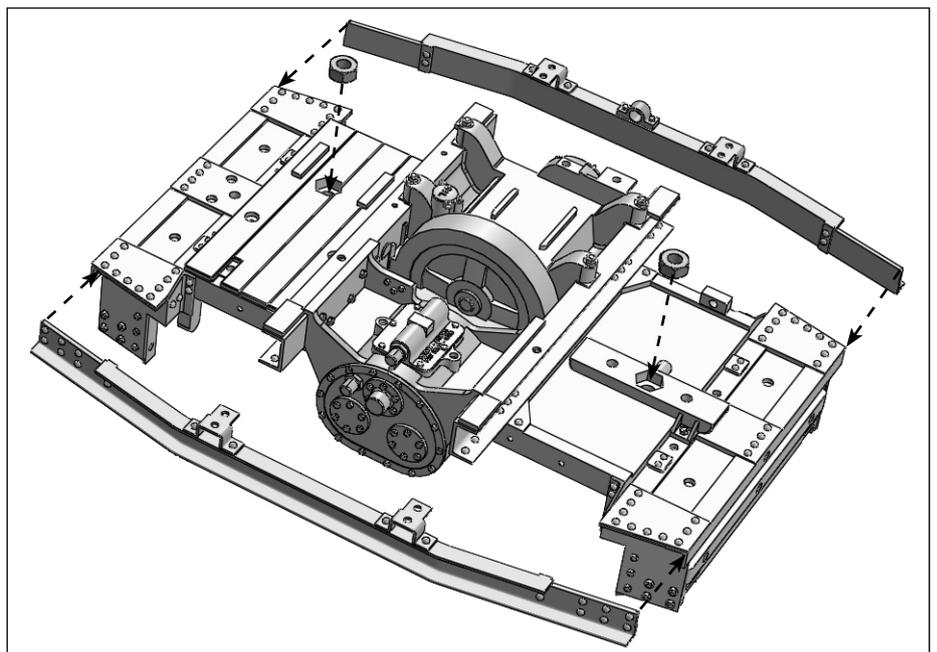
The two holes in the body for fixing the chassis have a slightly raised patch around them (on the underside of the body - a remnant of the mould making process). This should be gently scraped or filed off. Assuming that any slight body warping has already been checked for and if necessary, corrected, the chassis should fit in the recess without any rocking.

Where the electric motor fits into the bottom of the engine, it may be necessary to remove a little bit of resin to clear the wiring tags, especially if you've been a bit over-enthusiastic with soldering on the wires!

Fit the two brass 6BA nuts into the hexagonal recesses with a tiny drop of glue to ensure they stay there, but without gumming up the screw threads. Now screw the chassis in place to check for a good fit; it is easiest to remove any lumps and bumps which are preventing this now, rather than later. Remove the chassis and set aside until the body is finished.

Stage B2 - Fit the side frames to the body.

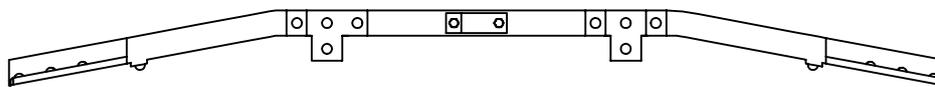
This is one of the most critical parts of the assembly. It requires a bit of fiddly 'fitting' work, but it is not difficult. The side frames must



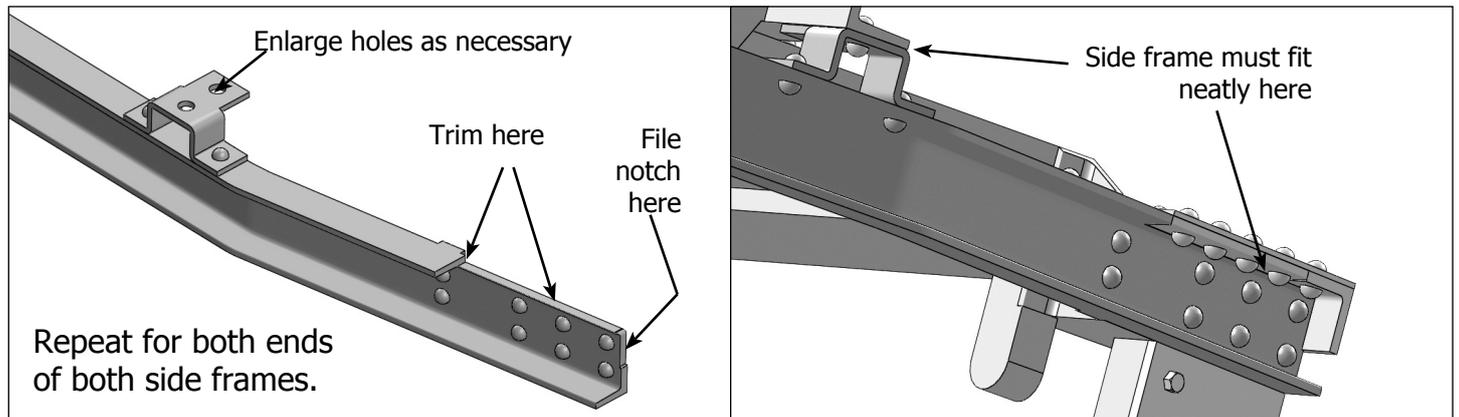
be straight in the horizontal plane, and bent to the correct angles in the vertical (but straight between the bends). The former can be done by eye by looking along the bottom edge, whilst the latter is done by comparing with the diagram below. If any correction is needed, do it gently with your fingers, or if needed, by gripping with a pair of smooth pliers (protecting the details on the castings with a piece of thin card or Plastikard). The castings will need to be trimmed slightly where shown, to ensure a good clean fit into the resin body. Do each one individually, a bit at a time and check constantly. The aim is to get them to fit snugly and cleanly without needing to force them. You may find that you need to re-do the body warping correction to ensure that this aim is attained.

Note that the side frame with the additional starting handle fitting goes on the side with the engine; the one without goes on the side with gearbox.

You can glue the right hand (gearbox) side frame in place permanently at this stage, but **do not** glue the left hand (engine) side, as it will be found impossible to fit the radiator bottom pipe with it in place. However, the ends of the channel section cross beams are very vulnerable to damage until the sideframe is on, so take great care, or perhaps hold it in place temporarily for protection, using Blue Tac or similar, until it can be fixed permanently.



Check frame sides against this drawing



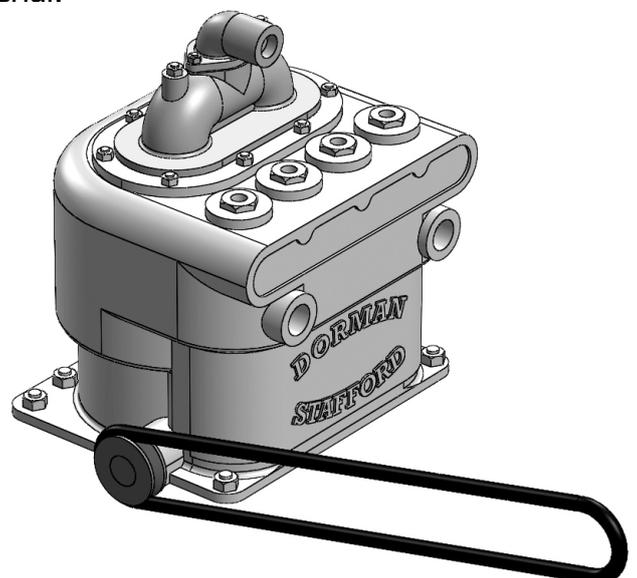
The rest of the body assembly consists mostly of attaching a large number of small parts, including forming and fitting lengths of wire. The engine area and radiator have to be done before you can assemble the exhaust system, but otherwise you can do the parts in any order. We have grouped them together for the purposes of illustration. Note that in each illustration and description, only the relevant items are shown for clarity. On the back page will be found illustrations of the complete assembly, with the parts colour coded according to material.

Stage B3 - Engine.

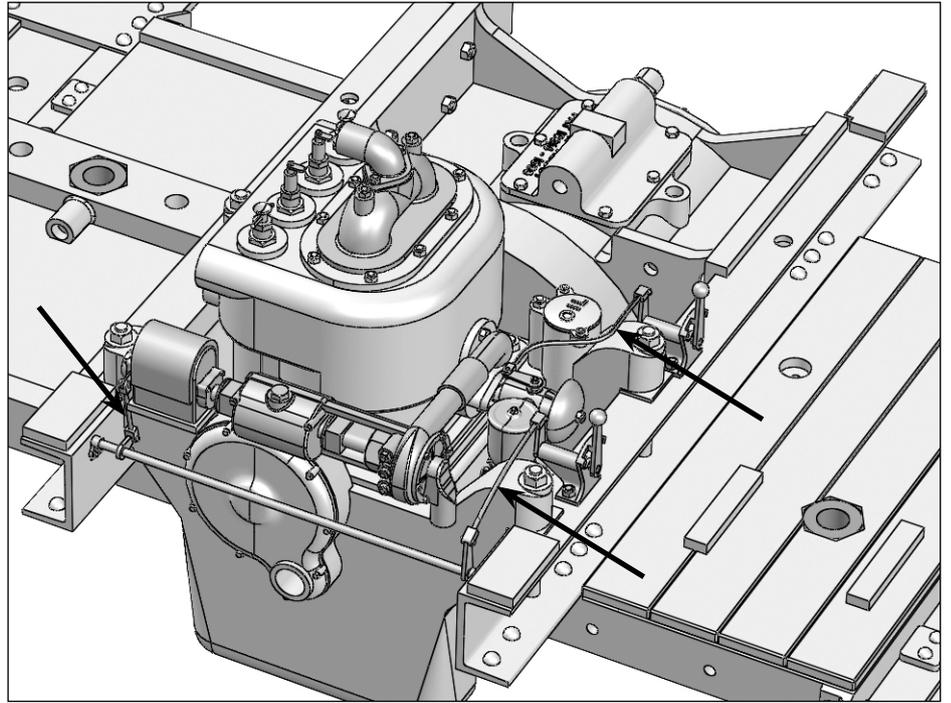
As stated in the introduction, if you want to include a small motor for the fan, now is the time to fit it. The suggested location is in the hollowed out engine top; bearings, pulleys and belt are included, but you will have to provide the motor, control gear and any route for the wiring.

The lower pulley is the one with the single journal, and fits in a brass bearing 'trapped' between the engine block and the main body below.

Assemble all the engine parts according to the illustration on the next page. On top of the engine are the cooling water manifold, spark plugs and oil



pots. At the side of the engine are the magneto, and the water pump (the latter has a pipe to be inserted, connecting with the radiator - see next section. They are best done together). At the back of the engine are the magneto lever (advance/retard), carburetter and throttle lever. Note that there are very small rods (made from finest brass wire) in three places - marked with arrows. These are incredibly fiddly to do, and will hardly be noticed if omitted; you have been warned! Ideally there should also be wires connecting the spark plugs to the magneto.

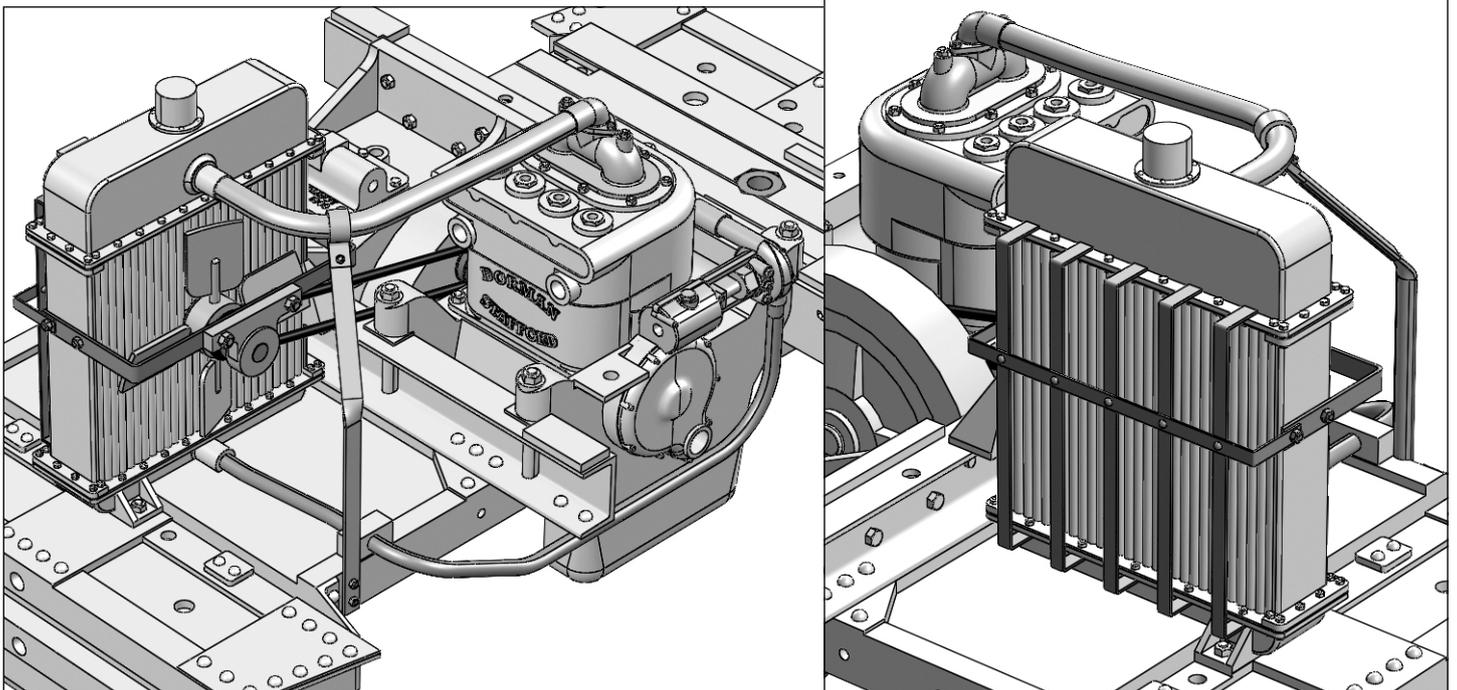


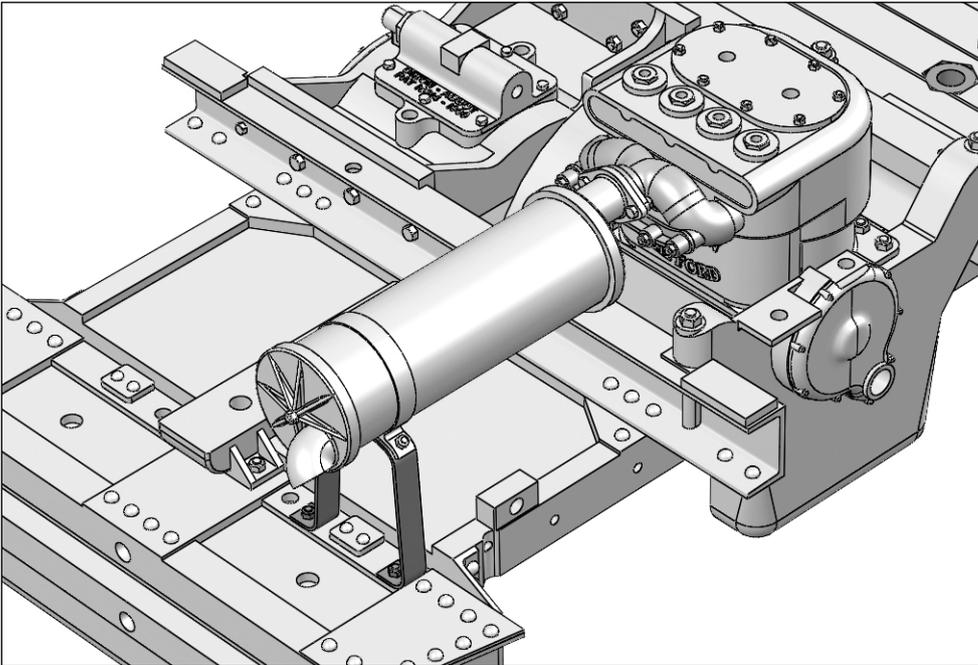
Stage B4 - Radiator.

The protecting grill is folded up from etchings and is best glued in place with the radiator lying flat on the bench before it is fitted into place. The slightly longer slats go towards the bottom. The fan bearing support strip is also an etching and is also best fixed to the radiator before it's fitted in place. The pre-assembled fan and pulley runs in a turned brass bearing inserted into the hole in radiator, and in the brass casting fitted to the strip. Don't forget to put the fan belt (a very thin O ring) in place before the engine top and radiator are fixed. The fan can be fixed, or free to rotate, or driven by the customer provided motor, depending on what you have decided to do.

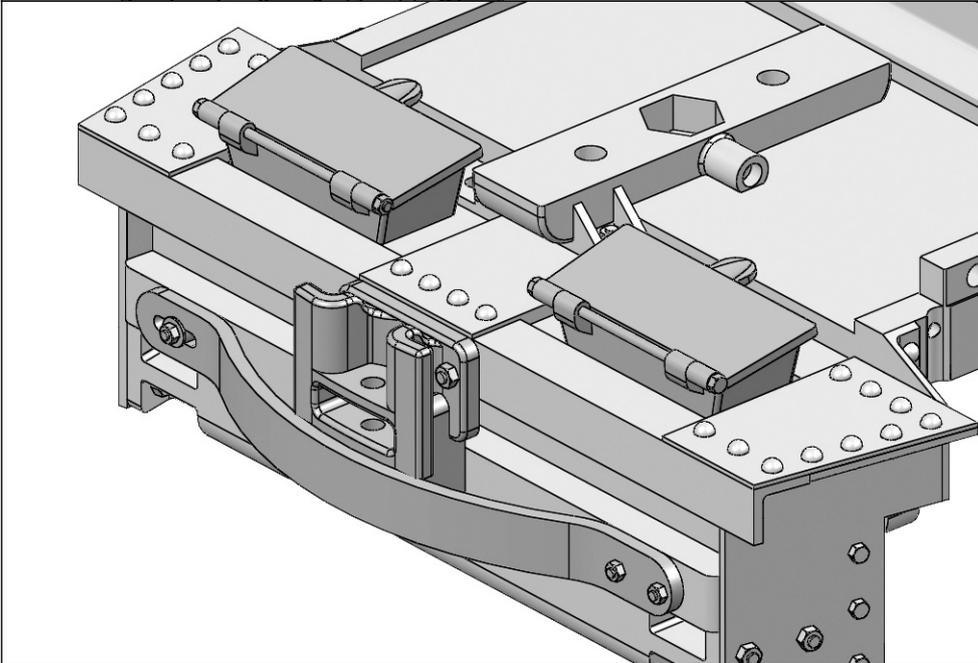
The radiator top pipe and support is a brass casting, which may need a bit of tweaking to fit properly. The bottom pipe is formed from a piece of thick brass wire, the exact shape is not critical, as long as it connects the fittings at both ends and slots through the intermediate block. If you are able to anneal the brass before bending (heat to 'red' hot in a flame or stove and the quench in water) it will be a lot easier to bend.

You can now fix the second side frame casting.

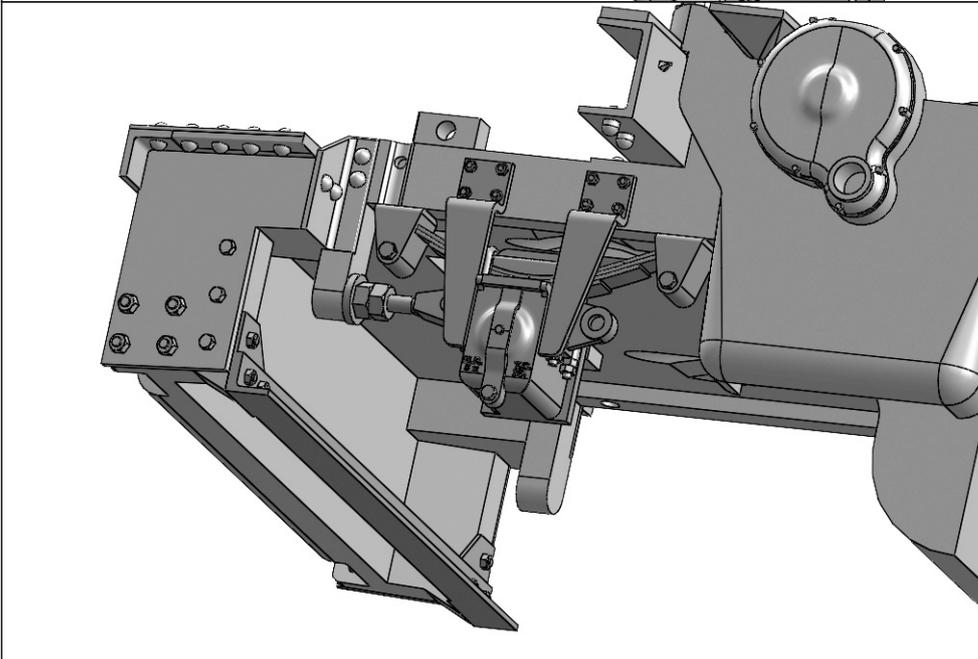


**Stage B5 - Exhaust.**

The front of the radiator is supported on a casting, and the rear by the manifold inserted into the front of the engine. Due to a late change in the design of the front support, there are no corresponding holes in the main body to take the lugs. You can either remove the lugs (the assembled and glued components should be strong enough) or you can drill your own holes in the body.

**Stage B6 - Couplings and Sandboxes.**

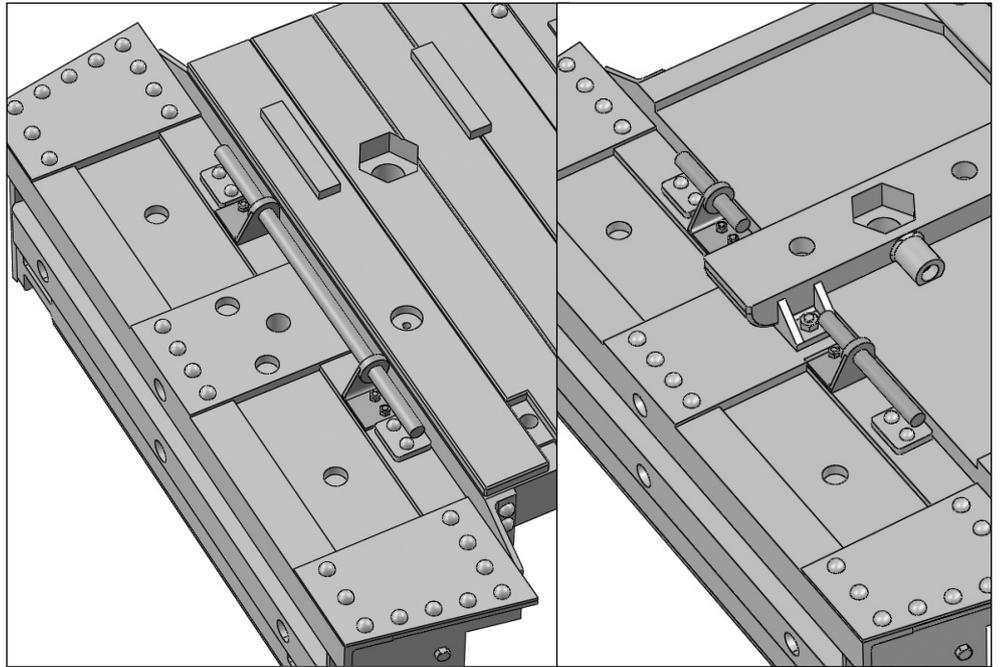
Only one end is shown; the same parts go at both ends.

**Stage B7 - Axleboxes, Axlebox Guides and Derailing Beam.**

Again, only one end is shown; the same parts go at both ends, and in their case of the axlebox parts at both sides. The axleboxes themselves are handed (2 of each), the adjusters going against the downward projection on the body.

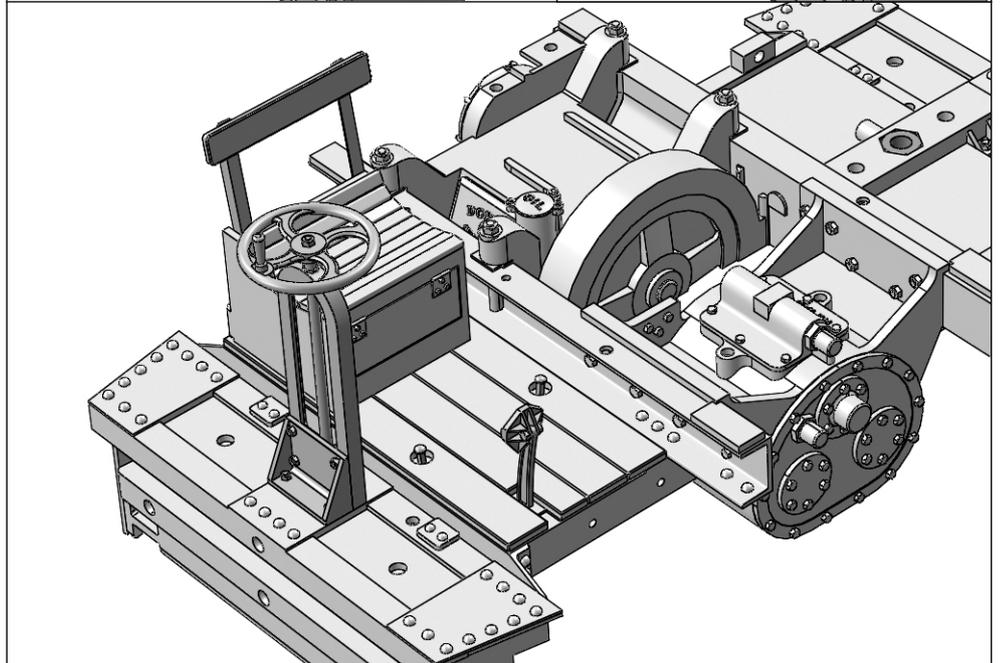
Stage B8 - Sandbox Operating Rods and Brackets.

The brackets fit as shown, with the rod formed from a section of 1mm (40thou) brass rod. At the radiator end, the rod is "broken" either side of the radiator base.



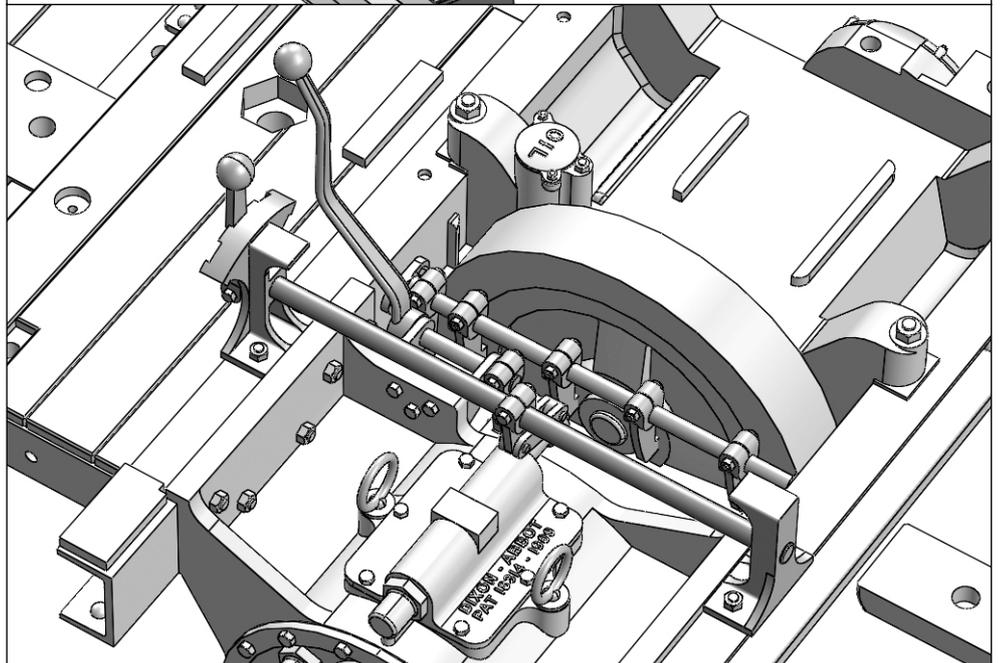
Stage B9 - Driver's Seat Area and Brake Column.

The seat is resin, whilst the seat back is brass. The brake wheel is best soldered to the top of the column for strength. The clutch pedal and the tiny little sandbox operating pedals are brass castings.



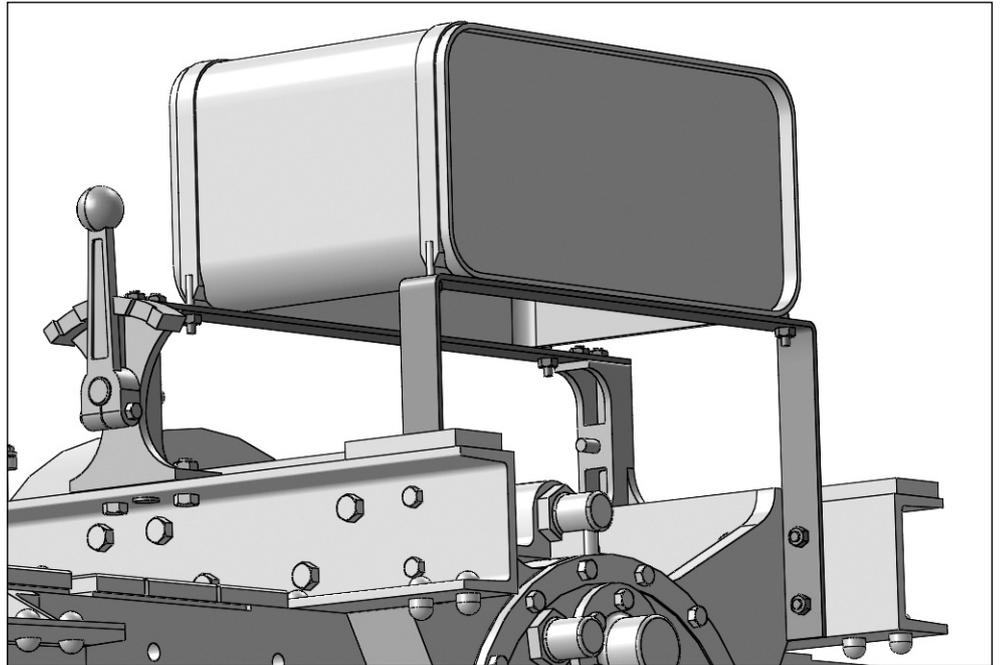
Stage B10 - Gear Levers and Rodding.

The longer speed change lever fits into the rear of the gearbox. The clutch operating mechanism should slot into small supports in the cross channels. The shorter direction lever and its opposite pillar are joined by a piece of 1.5mm OD brass tube; don't forget to thread on the crank mechanism before fixing in place! The two lifting eyes go in the top of the gearbox.

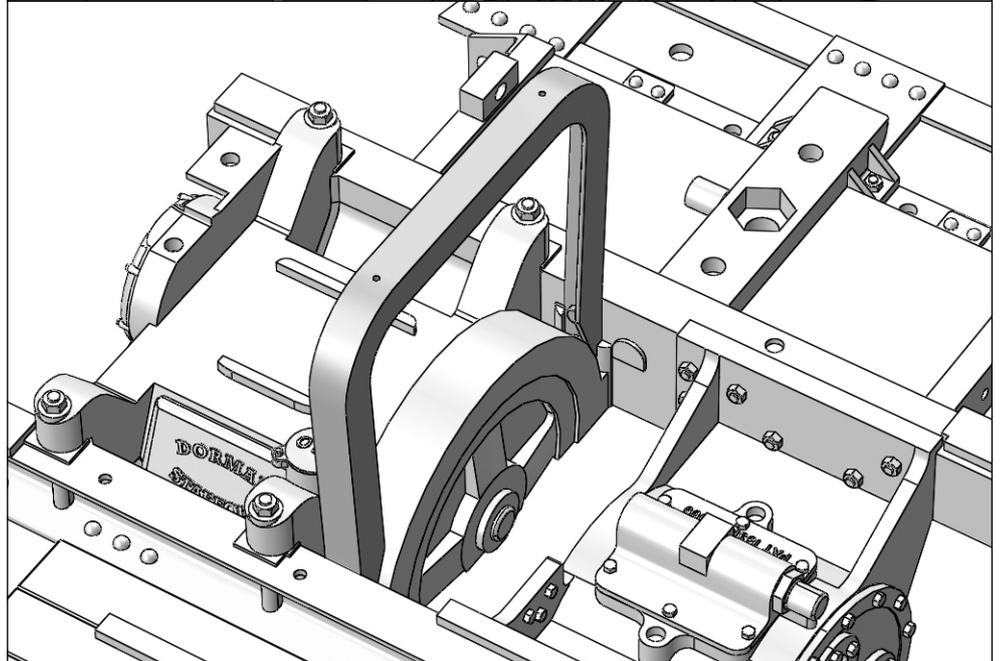


Stage B11 - Fuel Tank.

One support is a plain brass strip between the two cast pillars, the other is an etched brass strip, bent up as shown. when fixing the latter strip and the resin tank itself, make sure the it is level in both directions.

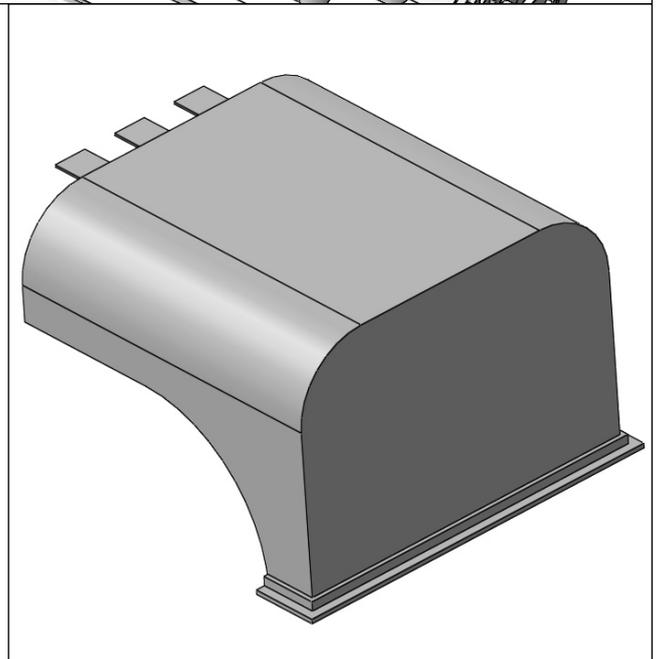
**Stage B12 - Bonnet Supprt Loop.**

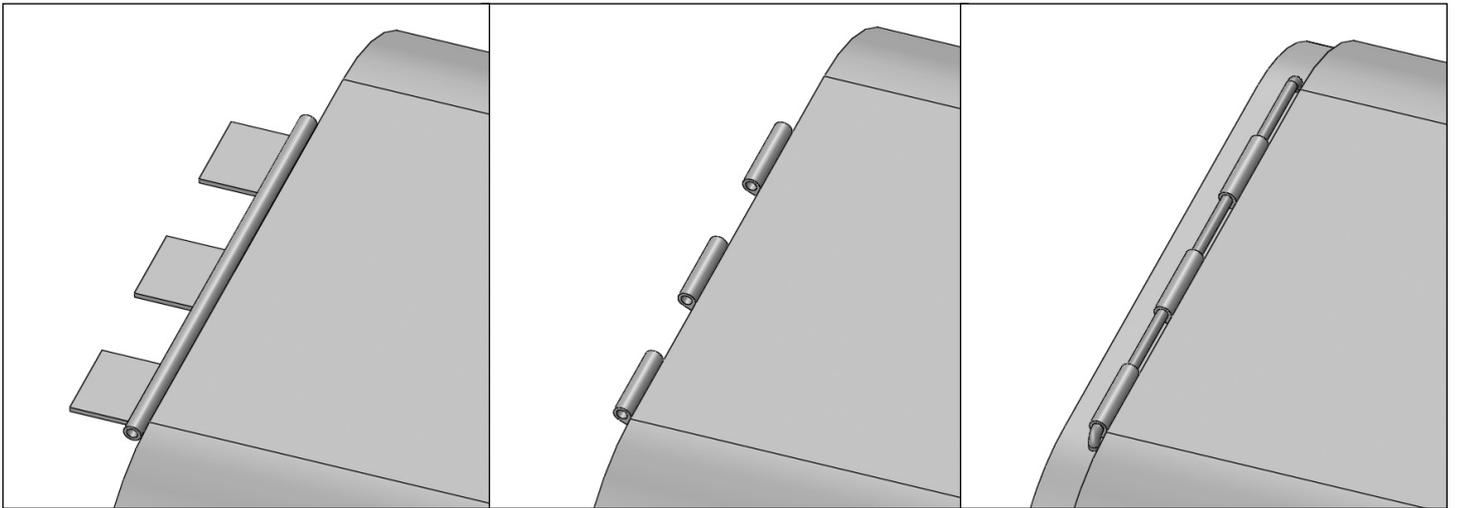
This might need gentle bending to the correct shape, which can be ascertained by comparison with the etched end of the bonnet. The casting itself fits in slots directly over the flywheel.

**Stage B13 - Bonnet Cover.**

This is bent and folded up from brass etchings. Fold down the end section, then form the curved sections which should bend themselves quite accurately because of the closely spaced etched lines on the inside. Note that the curved sections go inside the end. When the curved sections match the end, the sides and ends can be soldered together. There will be a small 'gap' left where the end and sides fold down; try to fill this with solder, or use filler afterwards. Note the reinforcing strips, also formed from brass etchings. The closely spaced lines in the etching which aid the accurate forming, will be visible on the inside of the finished bonnet covers. They can be filled with filler putty; we found that Milliput was best, but other types should also work.

Only one cover is shown; the other is slightly shorter and has a cut-out to clear the radiator top pipe.





Stage B14 - Bonnet Hinges.

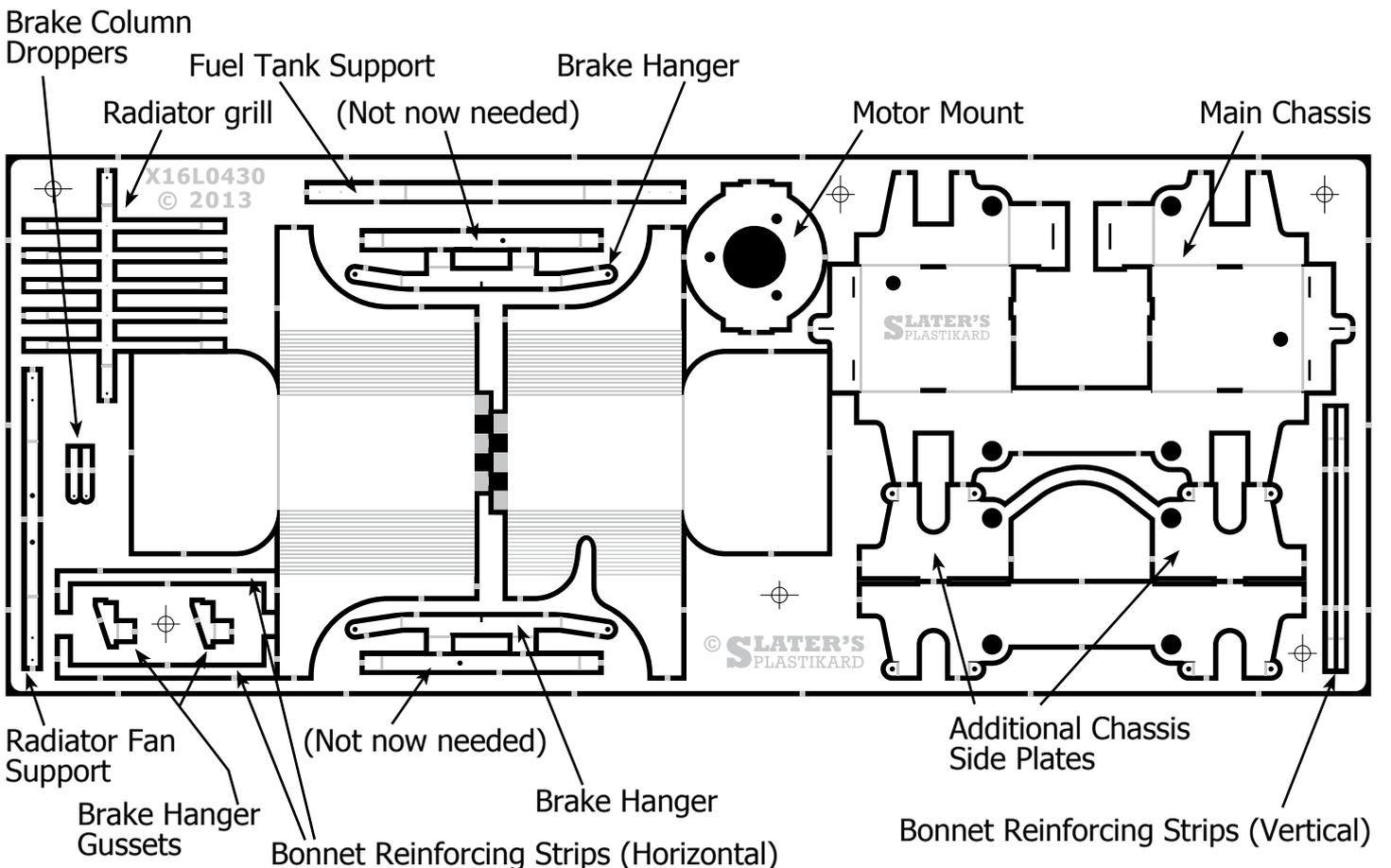
Only one half is shown in the illustrations. The hinges are formed by soldering a length of the very fine brass tube onto the etched 'tongues', then cutting out the bits of tube between the tongues using a piercing saw with a very fine blade. The tube must be positioned carefully and parallel with the end of the etching, or the other half won't match up.

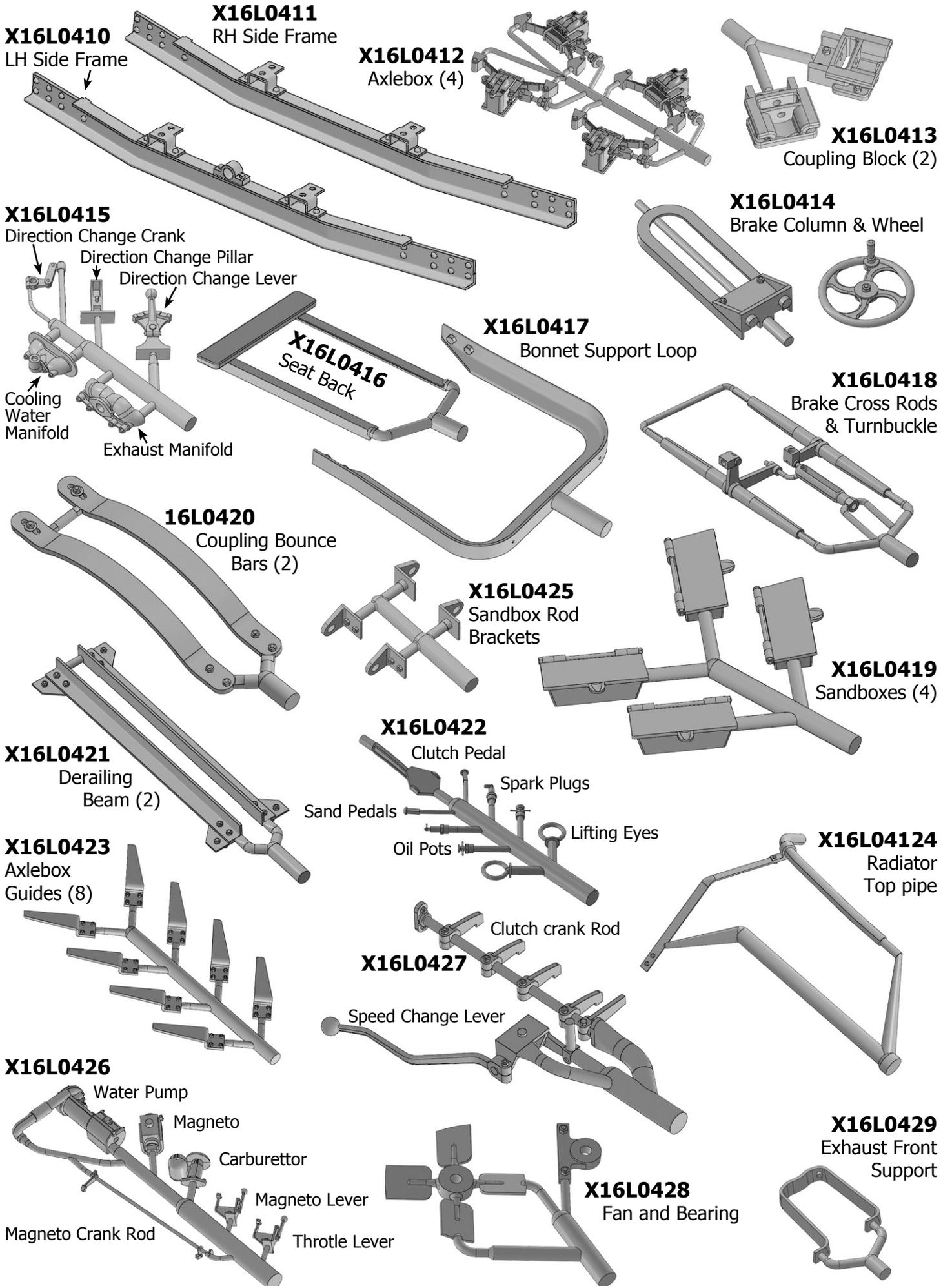
When both halves are done, a piece of 20 thou (0.5mm) wire is threaded through the tube sections, bent into a long U shape and inserted into the holes in the cast loop. The third picture shows the wire inserted in one half only; both have to be fitted before the wire is fixed to the loop.

As with the real thing, only one half bonnet can be raised at once, the raised one resting on the un-raised section.

Now all you've got to do is paint your completed model!

Etched Sheet Content

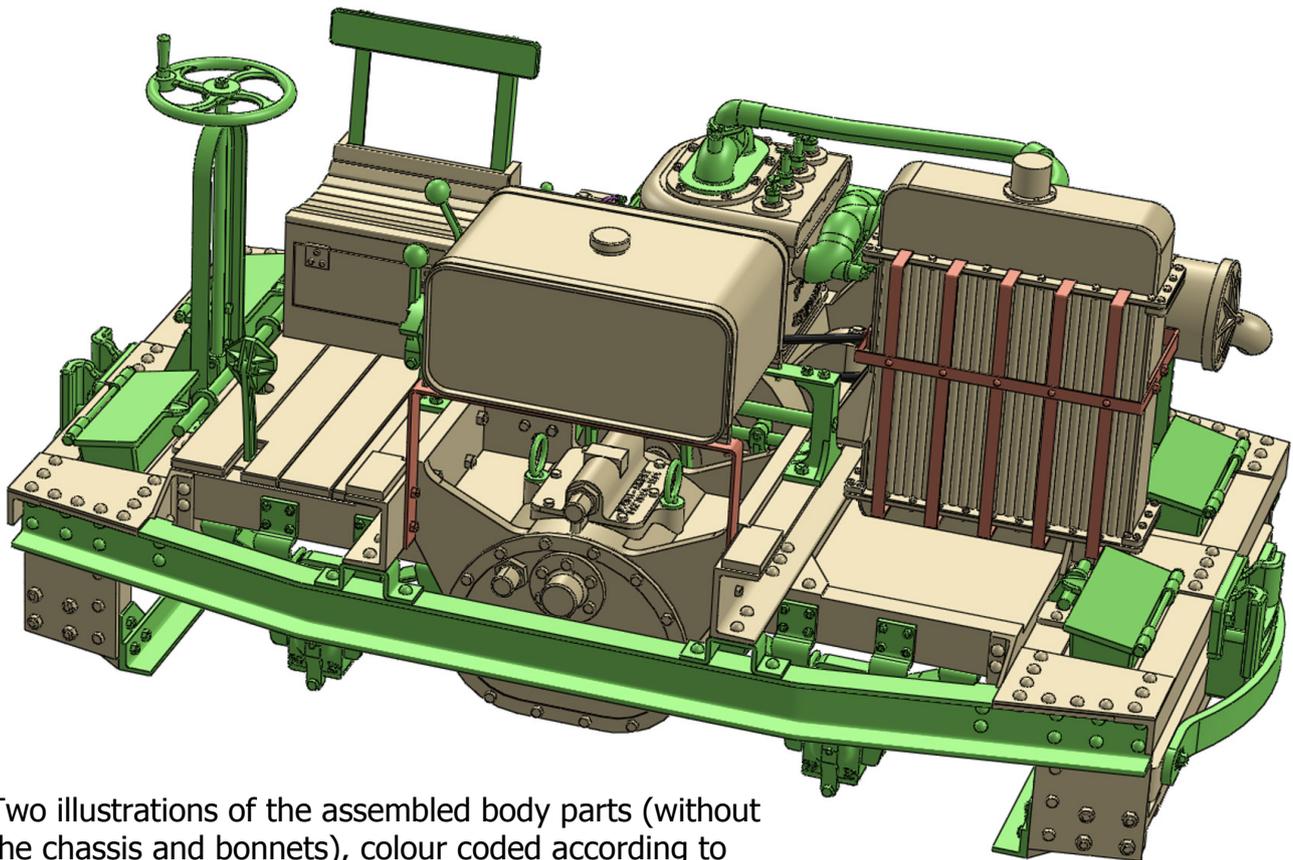




List of Parts

Part No.	Description	No. in Kit
Resin Castings		
X16L0401	Main Body	1
X16L0402	Seat	1
X16L0403	Engine Block	1
X16L0404	Fuel Tank	1
X16L0405	Exhaust Box	1
X16L0406	Radiator	1
Brass Castings		
X16L0410	LH Side Frame	1
X16L0411	RH Side Frame	1
X16L0412	Axleboxes (4 items on Sprue)	1
X16L0413	Coupling Block (2 items on Sprue)	1
X16L0414	Brake Column and Wheel (2 items on Sprue)	1
X16L0415	Exhaust Manifold, Cooling Water Manifold, Direction Change Lever, Direction Change Pillar, Direction Change Crank (5 items on Sprue)	1
X16L0416	Seat Back	1
X16L0417	Bonnet Support Loop	1
X16L0418	Brake Linkage (3 items on Sprue)	1
X16L0419	Sand Boxes (4 items on Sprue)	1
X16L0420	Coupling Bounce Bars (2 items on Sprue)	1
X16L0421	Derailing Beam (2 items on Sprue)	1
X16L0422	Lifting Eyes, Spark Plugs, Oil Pots, Sand Pedals (2 of each), Clutch Pedal (6 items on Sprue)	1
X16L0423	Axlebox Guides (8 items on Sprue)	1
X16L0424	Radiator Top Pipe	1
X16L0425	Sandbox Operating Rod Brackets (4 items on Sprue)	1
X16L0426	Throttle Lever, Magneto Lever, Carburettor, Magneto, Water Pump, Magneto Crank Rod (6 items)	1
X16L0427	Speed Change Lever, Clutch crank Rod (2 items on Sprue)	1
X16L0428*	Radiator Fan, Radiator Fan Bearing (2 items on Sprue)	1
X16L0429	Exhaust Front Support	1
Brass Etchings		
X16L0430	Chassis and Bonnet Covers (14 items on etch)	1
X16L0451	Numberplates (choice of 4 numbers)	1
Plastic Mouldings		
X16L0460	Brake Blocks (4 on sprue)	1
Drive Components		
Motor	Faulhaber 2619S012SR-22:1 (12V with 22:1 gearhead)	1
	Delrin Chain - 30 link length	2
X16L0470	Steel Double Sprocket with Grub Screw	1
7157A	Plunger Pickup Set (special design)	1
16817MR	Wheels	4
X16L0474	Axle 1, with 16 tooth Delrin Sprocket and Screws	1
X16L0475	Axle 2, with 16 tooth Delrin Sprocket and Screws	1
OtherParts		
	6BA Brass Screws	2
	6BA Brass Nuts	2
	M2 Plated Screws (for fixing motor to chassis)	3
	0.9mm Brass Tube (for bonnet hinges) (1")	2
	1.5mm/1/16" Brass Tube (for speed change gear lever rod) (2")	1
	1.5mm/1/16" Brass Wire (for radiator bottom pipe) (4")	1
X16L0471*	Steel Pulley (with two journals) (for Radiator end of Fan Belt)	1
X16L0472	Steel Pulley (with one journal) (for engine end of Fan Belt)	1
	Rubber O Ring (for Fan Belt)	1
1211	2mm ID Bushes ("4mm Coach Bearings")	2
	0.45mm Brass Wire (for various rods) (6")	1
	1mm Brass Wire (for Brake Pull Rods and Sandbox Operating Rods) (6")	2
X79601A	"Square" Brass Bearings	3
X16L0473	"Square" Brass Bearing (shorter version)	1
X78001	Allen Key for wheel screws	1
	Insulated wire, 9" length (for connecting pickups to motor)	1

* Fan and pulley are supplied already assembled



Two illustrations of the assembled body parts (without the chassis and bonnets), colour coded according to the material used:

Green	Lost Wax Brass Casting
Brown	Brass Etching
Purple	Brass Wire
Light Buff	Urathane Resin

