RT Models

4mm scale, 00/EM/P4 Austerity / J94 0-6-0ST Chassis kit instructions

This chassis has been designed to suit different bodies and can be built rigid or compensated. The chassis is produced to scale length and has half etched areas that go as far as the size of fitting under the RTR Dapol/Hornby Austerity tank or other kit bodies with greater than scale thickness buffer-beams.

Two types of coupling rods to suit in how you want them assembled.

All folds on this kit have the half etched lines on the inside.

Additional parts required

- Driving wheels, either Markits 'BRwd J94 17mm' or Alan Gibson 'G4851N Austerity/J94' wheels and appropriate crankpins
- Motor and Gearbox of your preference, I personally recommend High Level Kits range of gearboxes.
- If building your chassis with compensation or springing, your preferred brand of hornblocks.

Recommended Tools

- A selection of small needle files
- At least 0.5mm, 1mm and 1.2mm drill bits
- Tapered Reamer
- 25 Watt soldering iron
- Sprung tweezers
- Small flat nose pliers

Instructions

Main Chassis Construction

First remove the Part 1. chassis sides from the fret with a Stanley knife, carefully file the remaining tabs off.

Before you start, check the frames against the body you will want to fit the chassis under. If the chassis is too long, remove the required half etched material from the chassis ends evenly with either just a file of some tin snips and cleaning up the rest.

Now open up the large bearing holes slowly with a tapered reamer checking with the bearings to make sure they are a tight fit and not sloppy which can cause problems during construction and also poor running.

If you are planning on building the chassis with beam compensation or springing, at this stage carefully cut the hornguide outlines with a piercing saw then clean up with a small flat needle file.
With some flux, carefully tin the insides of the chassis with solder around the slots ready for the for the frame spacers.

Cut the 3 frame tabbed spacers, parts 2, 3 and 4 for your required gauge from the fret.

Fold the parts 2 and 4 'L' shaped frame spacers with the half-etched line inside the fold to 90 degrees, Once again tin the insides of the frames with solder as this will help soldering.

If you are to fit a compensation beam to the front 2 axles, we have supplied parts 8 to hopefully help in adding compensation, these have been designed to clear the inside valve gear and work off the brake support wire.

Insert the frame spacers into the slots making sure at the outer ends the slotted holes are at the top and that such as the spring detail is on the outside. Make sure the whole chassis is square, once you are happy then solder the insides. Now insert Frame spaer 3 into the middle with the ends of the inside valve gear slotted into the end slots.

An additional spacer is supplied, part 5 and this can be added to strengthen the chassis, but consideration should be given fitting the gearbox and motor at this stage.

Once you are happy with it, you can turn to fitting the bearings. Insert them into the holes, and then with a spare axle or alignment jigs, insert them into the bearings to line them up square, solder the bearings into place from the inside avoiding getting flux onto the axle if possible.

Chassis Detailing

Bufferbeam Gussets: Before you start, note that most locomotives – including all wartime production regardless of the builder – were built with only a **single** buffer beam gusset (the lower of the two) but those machines built by Hunslet after 1950 (works no. 3700 onwards) had two per corner, and any returning to Hunslet for overhaul would after that date would have received a second gusset then. Not overhauled by Hunslet but by BR workshops. See **Prototype Information** section for further details and check photos of your chosen prototype.

With a sharp pointed tool like a nail or the needle point of a compass, push out the half etched holes on the corner gussets, parts 13.

When all the rivets are formed, remove the gussets from the fret and form the 90 degree folds with the half etched lines on the inside as show. Now solder these to the ends of the chassis making sure they don't protrude over the ends of the chassis otherwise you won't be able to put the chassis under the body.

Brake Hangers: Now insert the thin 0.45mm brass wire through the small holes for the brakes, make sure you leave enough protruding out either side to attach the brakes to later.
Solder these from inside.

Motion/Valvegear Counterweight: Fold up part 14, the counter balance weight and solder the inside.

Now cut to just over the width of the chassis 2 lengths from the 1.2mm brass rod.

Slot the first one through the large top holes towards the front of the chassis, make sure you slot it also through the counter balance weight between the frames with the small D shape hole end is towards the front of the chassis.

Rear Brake Detail: Now insert the remaining thick brass rod through the rear lower holes with the pair of brake rod levers, parts 18 and 20 fitted on the correct way as shown in the diagram. Solder the ends of the rod in place but leave the levers loose for the moment till you attach the brake pull rods.

Now at this stage, clean up the chassis with warm water and a tooth brush to remove all traces of flux.

Coupling Rods and Wheels

Now assemble the coupling rods, you will need to decide how you want them made up, solid, jointed from the crankpin or the rod itself.

When assembling the coupling rods, tin the surfaces first and then soldering the 2 sides together with the aid of cocktail sticks to help align them.

- If the chassis is to be built rigid and the coupling rods are to be solid, just laminate the parts 6, full thickness and half thickness rods together.

Jointed Rods

- There are two options provided for in the kit if you wish to have jointed rods (essential with compensation or springing). The joint can either be made on the centre crankpin by cutting down parts 6 or, prototypically, by a pinned joint in front of the centre crankpin which part 7 caters for.
- If they are to be jointed on the coupling rods, solder the sides together making sure you don't get solder into the forked ends. Now clean-up the flux residue and then remove any excess solder to make sure that when you assemble them that they work freely.
- At this stage, it would be best to drill out the coupling rods holes with the required drill size, if using Romford Crankpins, open the holes out with 1mm drill or a tapered cutting broach (available from Eileen's Emporium and other suppliers). If using Gibson wheels and crankpins, open the holes to 1.5mm.

Now fold a piece of cigarette roll up paper and insert this onto the end of the pivot point, then push the other coupling rod on and insert a piece of brass wire through the hole, before soldering it, put a drop of oil onto the paper as this will help not soldering up the joint solid.

Now solder the sides around the wire. Make sure the rod moves freely on the pivot. When it does then cut the remaining brass with and clean up with a small needle file. If it doesn't then it may free itself with a bit of force but not too much, if it doesn't then you will need to de-solder it and start again.

Wheels

Be careful with Gibson wheels since they have steel tyres it is best not to handle them more than is necessary or fit them until all soldering operations are completed. They are also designed to be a press-fit on the axle and should not be removed from the axle more often than is necessary. Markits wheels have Nickel Silver tyres and will tolerate both handling and soldering more readily. These are, of course, also self-quartering.

You must, however, establish that the chassis is square and runs properly. First, fit the wheels to the chassis and check that it runs without the rods. Once correctly quartered, add the coupling rods and test whether the chassis runs smoothly by pushing it along a bit of track. If it doesn't do so now, it won't when motor and gears are added. If it does work freely then you can move onto finishing the chassis.
If it doesn't then you will need to investigate why, which it can be a number of scenarios.

1. Coupling rod holes do not line up with the ends of the axles.
2. Incorrectly quartered wheels
3. Crankpin bent.
4. Axle bearings not lined up properly.

Take your time and once you are happy with its running, its best to take the wheels off when washing the chassis of flux in warm water with a tooth brush.

Dummy Inside Valve Gear
Take parts 11, tin each side and then solder these together, repeat for parts 12 also.

Now take the 4 sets of inside valve gear and solder into the relevant slots as indicated on the diagram further down into frame spacer part 3.

Check that the ends don't foul the centre axle (or, if you have fitted compensation or springing, any of the parts associated with that), and when you are happy with the fit, solder these in place.

Solder the thick brass wire section into the 2 holes running from frame spacers 2 and 3. Once you are happy with all this, clean up the chassis of flux.

At this stage, you need to decide depending on your personal preference

- If you want to paint the chassis (at least the outside for the moment) and install the wheels and gearbox ready and install the brake gear
- Install the brake gear and then fit the wheels and gearbox after painting the whole chassis

At this stage it would be best to install the pickups before fitting the brake gear as access will be limited once the brakes are installed.

Brake Gear

Now it is time to solder the brake gear. Check the brakes, part 15 on the detailing fret as they may need the outer holes opening up with a 0.5mm drill which it is best to do whilst they are still attached.

When done, cut these off the fret and clean these up with a needle file,

Now tin the brakes part 15 and brake blocks part 16, now solder the brake blocks to the brakes making sure you have opposite pairs.
Clean these up with warm water and a toothbrush in a bowl.

Now solder these to the 0.45mm brass wire hangers sticking out the chassis sides.
Usually I solder the brakes on with the wheels in place to determine how far they need to be from the wheel face and also the flanges, take into consideration any side play of the wheels.

Once done, now remove parts 17 brake pull rods and then push a piece of 0.45mm brass wire through the

front brakes bottom hangers and through the brake pull rods between them. Then continue along with each section.

When it comes to the last brake pull rods, you will need to check these against the locating holes of the brakes and the large brass rod at the rear, determine the best hole to to attach parts 18 and 20 to(usually it's the outermost one), and then attach these to the rear 0.45mm brass rods.

Fold up part 19 and attach to the top of the leaver of part18, solder a piece of 0.45mm brass rod to the top of part 19 running up to the top of the chassis. This having been done, wash once again to remove any residual flux.

Sandboxes

Clean the castings of mould feeds and any flash. Either solder or glue these with superglue or epoxy according to skill/preference into the locating holes as shown in the pictures on the back page of these instructions.

When set, drill out the dimples at the bottom of the sandboxes with a 0.5mm drill.

Now flatten the end slightly of a piece of 0.45mm brass wire and insert into the sandbox hole. Bend this to the correct profile and cut the end off.

Make sure the end is lined up with the wheels and that it does not foul the wheels or track.
When satisfied, repeat with the other sandboxes.

Wheel Balance Weights

Cut parts 23 and 24 from the fret and clean the tabs off with a needle file.

Glue these to the wheels as indicated on the appropriate diagram, then repeat for the other side.

Painting

Recommended paint for the chassis is matt black for the whole chassis and signal red for the inside frames and dummy valve gear. The slidebars, however, should be left in a natural metal finish.

Wheels are painted differently according to the livery used with bare metal or red coupling rods. Once again, check your prototype.

Usually I would weather the chassis with a wash of matt black for the red inside frames, and dry brush Humbrol no. 62, matt leather on the brake gear and around the firebox area.

Another weathering technique is to stipple talcum powder onto wet paint on the frames as this adds texture and replicates where dirt and oil mix so common on the prototype.

References and Prototype Information

This design of locomotive was originally developed by the Hunslet Engine Company during WW2, and 377 were constructed by them and several other contractors as a standard design for the Ministry of Supply. Many of these were shipped to Europe after 1944 and some were later sold to the state railways in the Netherlands, Tunisia and to private concerns in France. Some 75 were purchased by the LNER in 1946 and were classified by them (and later BR) as J94. Among the largest of industrial locomotives, (BR rated them at 4F), more were built in the post-war period for the army, the National Coal Board, the Port of London Authority and several steel makers. More than 60 are preserved in the UK and at least 2 in the Netherlands. Do note that most have received multiple modifications (notably vacuum and sometimes air brakes) in preservation and care should be taken when using a preserved machine as a reference point. Barring vacuum pipes and fittings such as mechanical stokers, few of these modifications have much effect on the chassis however.

Austerities have often featured in the model press. The two most recent modelling articles are:

Modelling Railways Illustrated, Vol. 1 no. 2 November-December 1993, pp. 74-86
ModelRail, December 2002, pp. 18-26

Both the above articles include an excellent drawing and prototype notes by Don Townsley, formerly of the Hunslet Engine Company [Note that the drawing is reproduced in 7mm scale in *Modelling Railways Illustrated* and slightly larger than 4mm scale in *ModelRail*]. He also wrote the definitive history of the company which includes more information on the type:

Don H. Townsley, *The Hunslet Engine Works* (Plateway Press, 1998) ISBN 1 871980 38 0

The Industrial Railway Society online archive has an article detailing the history of the type, again with a drawing:
http://www.irsociety.co.uk/Archives/23/18in_Hunslets.htm

Martyn Bane's webpages include a very heavily illustrated article on developments to the basic Austerity design:
http://www.martynbane.co.uk/modernsteam/ldp/austerity/portaausterity.htm

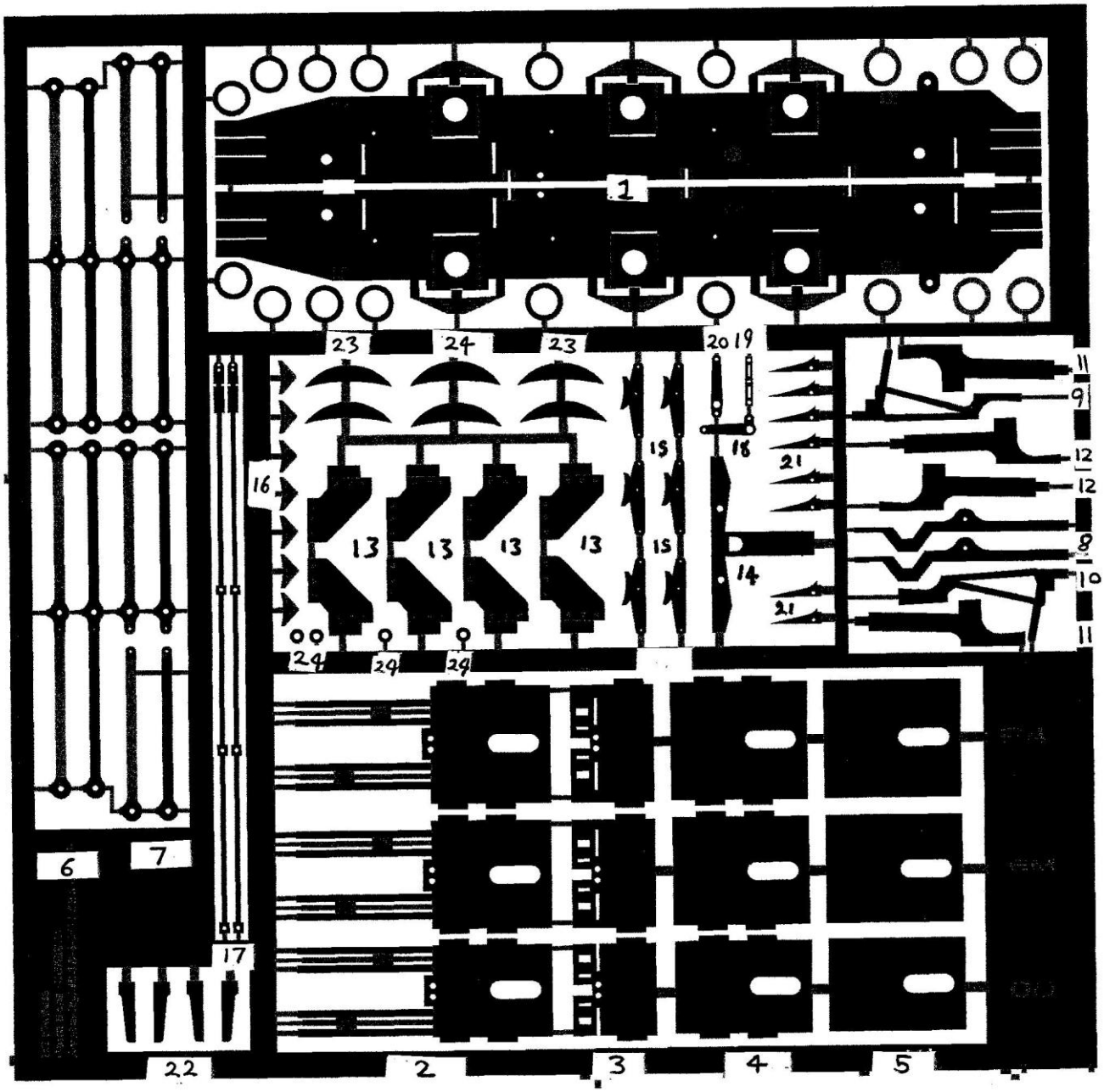
Further Detailing

RT Models can supply more detailing parts for your Austerity/J94. Currently, these include etched buffer beams (SGLP005) which can be used to improve the appearance of the Dapol/Hornby model or laminated to brass sheet to give a scale-thickness buffer beam. An alternative Giesl ejector type chimney and tank insert (SGLP002 and SGLP003) as fitted to a number of NCB machines are also available and other parts are planned. Please check the website for updates.

Special thanks go to Cambrian Heritage Railways for allowing me to measure their currently under restoration Austerity tank at Oswestry

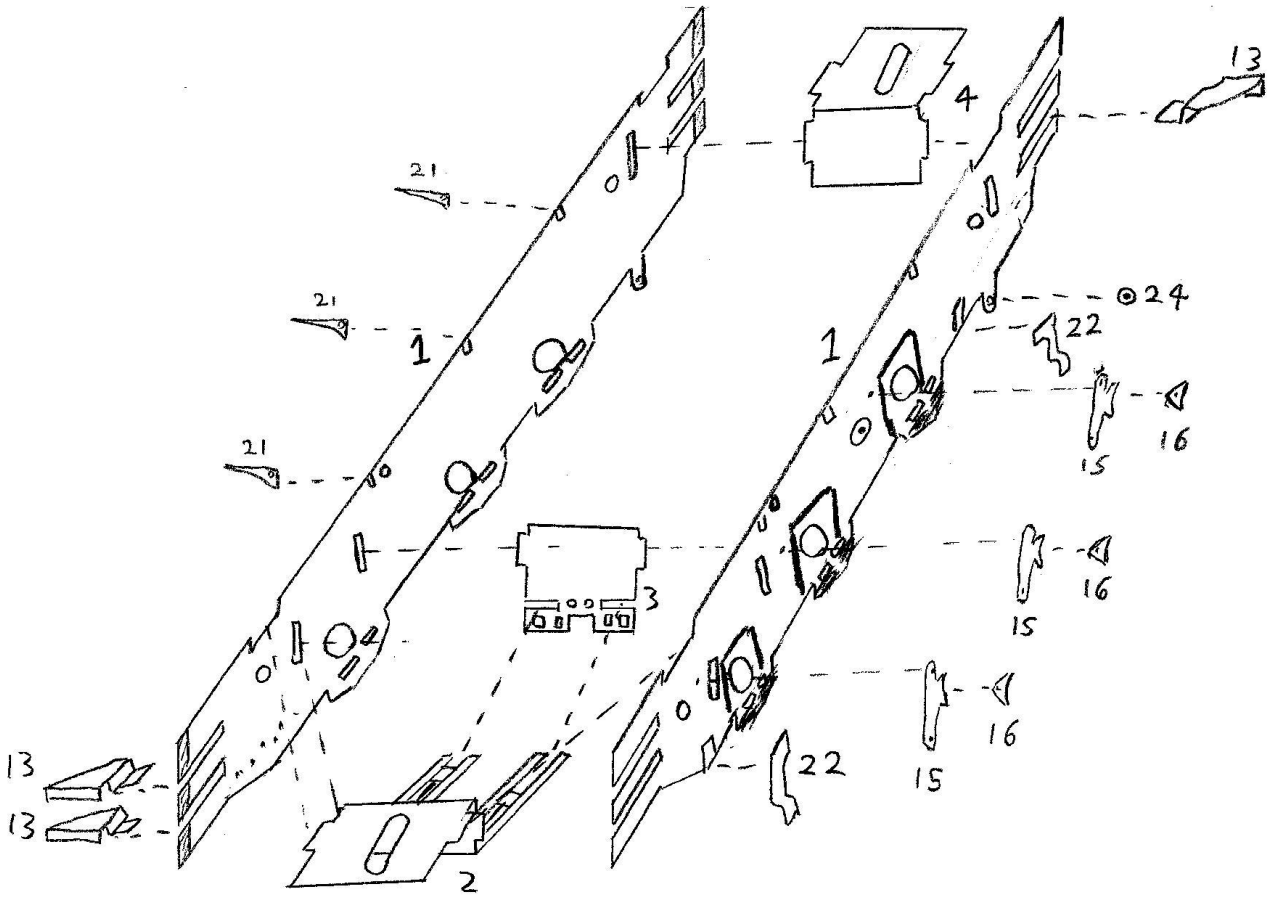
The table below (based on one supplied in the MORILL article) is intended to assist with the number of gussets to fit. It also includes notes of other details which may affect assembly of your chassis. Note that this only applies to the engines as built. As ever, check a dated photograph of your chosen prototype to be sure.

Purchaser	Original nos	Builder	Works Nos.	Year Built
Ministry of Supply	75000-49	Hunslet	2849-98	1943/4
	75050-79	RSH	7086-115	1943
	75080-99	Hudswell, Clarke	1737-41/45-62	1943/4
	75100-49	Hunslet	3150-99	1944
	75150-79	Bagnall	2738-67	1944/5
	75180-99	RSH	7130-49	1946/7
	71437-56	Hunslet	3201-20	1945/6
	71462-66	Barclay	2211-15	1945
	71467-76	Hudswell, Clarke	1785-94	1944/5
	71477-86	RSH	7286-95	1944
	71487-506	Hudswell, Clarke	1763-72/74-83	1944/5
	71507-26	RSH	7161-80	1944
	71527-36	Barclay	2181-90	1944-6
	75250-71	Bagnall	2773-94	1945/6
	75222-81	RSH	7202-11	1945
	75282-331	Vulcan Foundry	5272-321	1945
377 Locomotives, all visually identical and to a basic wartime design. **[Single buffer beam gussets]**				
United Steel Companies	-	Hunslet	3134	1944
Manchester Collieries	-	Hunslet	3302	1945
2 wartime civilian locomotives, visually identical to the 377 Ministry of Supply engines **[Single buffer beam gussets]**				
NCB	Various	Hunslet	3685-9	1948/9
As 3134/3302 above.				
Guest, Keen & Baldwin	3	Hunslet	3691	1949
As earlier locomotives except that injectors moved to firebox backplate (i.e. within cab) **[3" buffer beams and single buffer beam gussets]**				
NCB	Various	Hunslet	3692-710	1950
As 3685-9 **[except 3700-1 were fitted with double buffer beam gussets from new]**.				
Guest, Keen and Baldwin	14/24	Hunslet	3717-8	1950
As 3691 but with mechanical rather than steam sanding **[3" buffer beams and single buffer beam gussets]**				
NCB	Various	Hunslet	3767-72	1951/2
NCB	Various	Hunslet	3776-81	1952
NCB	Various	Hunslet	3784-89	1935
As 3700-1 **[Double buffer beam gussets from new]** *except 3784-5 (fitted with 12 spoke steel wheels rather than conventional Austerity 14 spoke cast iron type). These machines were delivered to NCB Durham at Philadelphia.*				
Ministry of Supply	190-203	Hunslet	3790-803	1953
Vacuum Brakes **[Double buffer beam gussets from new]**				
NCB	Various	RSH	7751-2	1953
As standard wartime units **[single buffer beam gussets]**				
NCB	Various	Hunslet	3806-11	1953/4
[Double buffer beam gussets from new]				
United Steel Companies	Various	Yorkshire Engine Co.	2566-73	1954
Visually identical to 3700-1 but with 12 spoke steel wheels as Hunslet 3874-5 **[Double buffer beam gussets from new]**				
Stock	Various	Hunslet	3816-51	1954-62
Stock batch identical to 3700-1, but for 3851 which was built with a mechanical stoker and associated modifications from new **[Double buffer beam gussets from new]**				
NCB	65-6	Hunslet	3889-90	1964
As 3851 above **[Double buffer beam gussets from new]**				

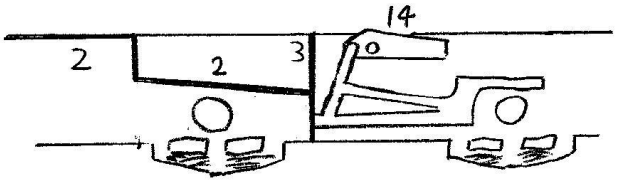


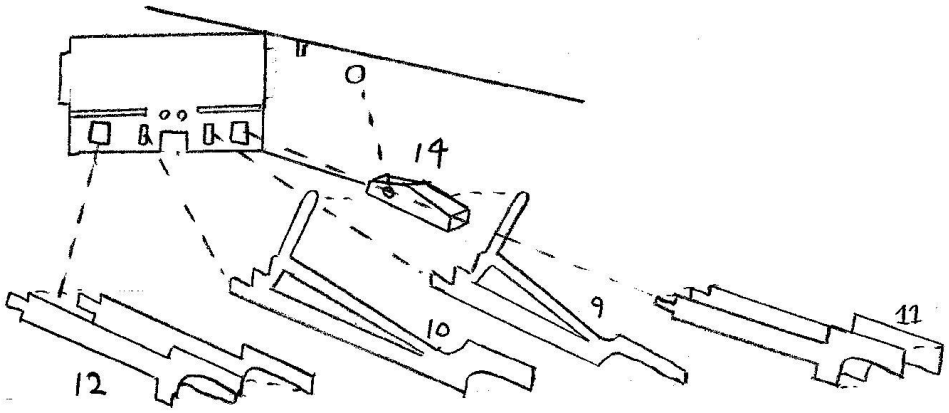
Components Supplied (not shown are 6x bearings, 4x sandboxes, PCB board, brass and Phospher bronze wire)

Main Chassis construction

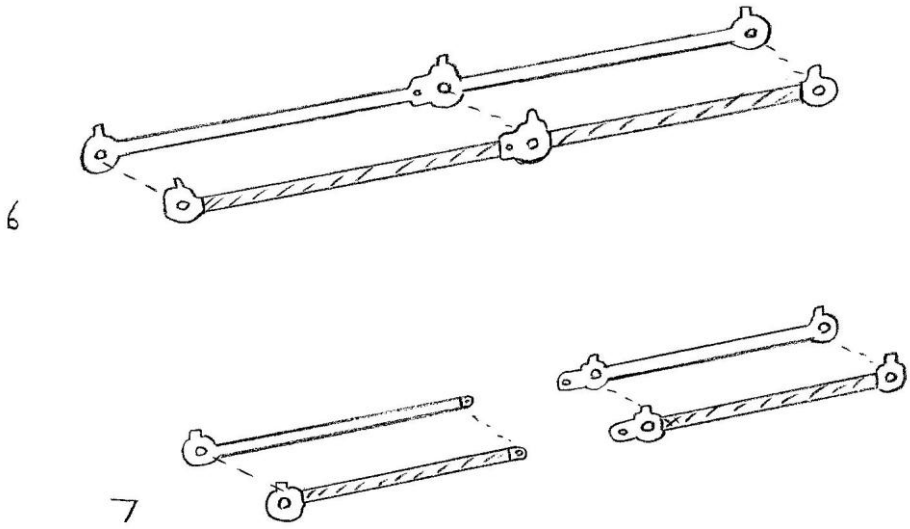


Inside valve gear assembly

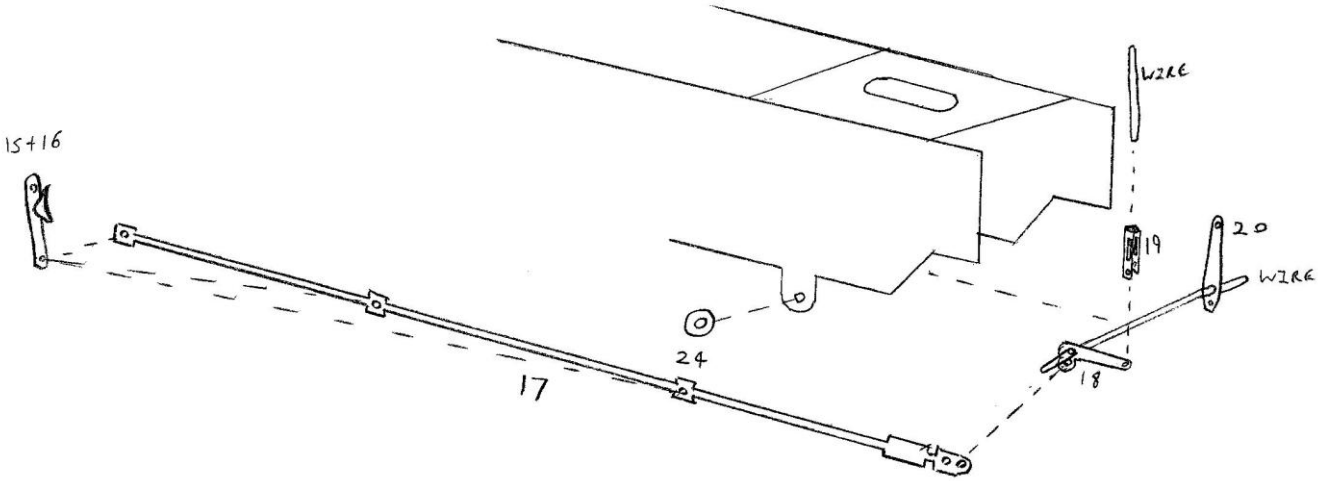




Coupling Rod construction
Parts 6 make solid or jointed at crankpin
Parts 7, make jointed at the forked ends



Brake Gear assemble and rear



Position of wheel balance weights
Note the **larger** centre weights, parts 24 go on the **centre wheels** only.