



Simplified Alex Jackson Coupling

Author John Cutler

This Technical Paper offers a simplified version of the Alex Jackson coupling building on work carried out by Vincent de Bode and Graham Allen. It aims to address some of the issues that AJ Coupling users have encountered in the past and offers solutions based on practical experience.

Simplified Alex Jackson Couplings.

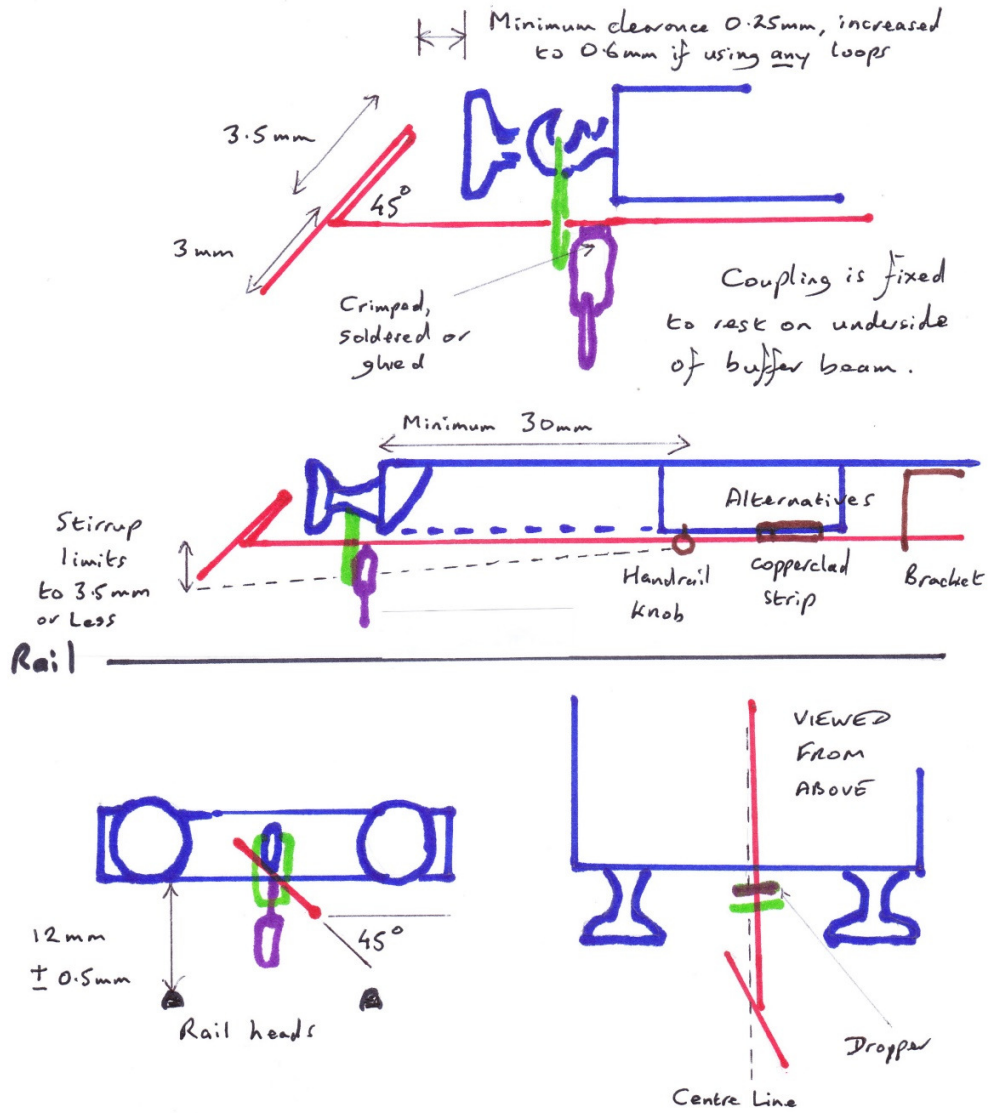
This version of the AJ builds on the practical ideas of Vincent de Bode and Graham Allen:

1. Uses 8 thou steel guitar string instead of 11 thou. This means a coupling length of only 30-35mm is needed, compared to 60-65mm, to enable sufficient flexing of the coupling. This makes it much easier to fit with less need for fancy hinge-plates.
2. The coupling height is increased from 10mm above rail height to 12mm so the coupling shank rests against the underside of the buffer-beam. This makes it easier to locate when fitting and helps to hide the hook behind the buffers when viewed from the side. A height bar is no longer required.
3. Handrail knobs can be used to fix the coupling shank end to the vehicle body. Where wagon undersides are flat plastic, this makes fitting easy.
4. The hook (=tail) of the coupling is doubled up instead of the leading nose. Vincent's tests showed that the thinner wire with a doubled-up hook is stronger than the thicker wire standard AJ hook.
5. Droppers of 3-link couplings are fitted to the AJ shank next to the buffer-beam hook. This looks much better than iron nail or paper-clip droppers. The penalty is that they are fiddly to fit. However Lanarkshire Models sell an etched nickel-silver link that is easy to fix to the shank: product code CH08 (3-link) or CH09 (Instanter).
6. The top link of the 3-link is fitted to the buffer-beam hook, not to the other links or the AJ shaft. This link, through which the AJ shaft is threaded, can then act as a stirrup or limiter on downward movement of the AJ when it meets the uncoupling magnet.
7. I decided to invert the whole AJ through 180° so that the hook is above the shank and not below it. This helps hide the hook behind the buffers. My logic (or is it gut feeling?) is that the hook should be "upright". It seems to me that such an angled hook will disengage more readily as it falls under attraction from a magnet. No doubt an engineer will be along to tell me that is a fallacy but please explain.
8. After a fair bit of experimentation, including much bodgery and damage to the victimised rolling stock, I discovered that hooks less than 3mm long were more likely to fail to couple up. So I increased the diagonal length of the hook (or tail) from 2.75mm to 3.5mm. Graham Allen seems to have discovered the same thing and uses an even larger coupling with a 4mm hook and nose.
9. He uses hook and nose angles of 45° and these seem to couple up better than the standard AJ. My limited experiments seem to confirm this. There is a visual penalty. The length of his hook is 2.8mm compared to 1.4mm of the standard AJ so the distance between vehicles in tow is increased by 2.8mm, an appreciably greater gap. Even with my reduced hook diagonal length of 3.5mm, the extra coupled distance under tension is 2.1mm greater than the standard AJ.
10. With the coupling angles set at 45°, I resisted the temptation to increase the hook diagonal dimension to 4mm. The height of a standard AJ hook is 2.4mm; the height of my (3.5mm) hook is 2.5mm, thus only marginally more. This means the required uncoupling drop is close to that of a standard AJ and so will be the dropper clearance. A 4mm hook would have a height of 2.8mm. requiring a greater drop distance for uncoupling. Note

that Graham Allen does not have this concern as he uses an onboard mini-magnet instead of a dropper to uncouple.

11. I increased the length of the nose from 2.25mm (of the standard AJ) to 3mm to allow more girth to contact errant couplings, especially as the height of buffer-beams on my models varies more than it probably should. There is no change in inclination between nose and tail when couplings meet so coupling up should be smoother.
12. I have eliminated the 60° incline of the AJ tail when viewed from the end, so the whole coupling is aligned at 45°, the same as the Graham Allen coupling. As a result, the hook does not need to be bent over itself but can lie in a flat plane. This means that it is easier to make and especially easier to judge the correct angle when fitting. My experience of seeing AJs at exhibitions is that most do not seem to adhere to the 60° & 45° end-view specification anyway.
13. Vincent de Bode's AAJ shank is fitted at a slight offset to the centre line. I tested this and it does increase the reliability of coupling (in the absence of precision engineering!).

SIMPLIFIED AJ COUPLINGS



- 8 thou (0.2mm) steel guitar wire
- Stirrup limiter disguised as top link of 3-link coupling, secured on buffer beam hook
- Soldered bottom linker or Lanarkshire Models dropper
- Alternative fixing points (cradle pivot not shown)

Hook experiments

Here are 3.5mm hooks at 45° coupled up under tension:



Note the different buffer heights (and buffer beams) of an unknown (Rapido?) RTR wagon and a Bachmann van. A shim needs to be fitted under the wagon buffer beam to equalise the coupling heights.

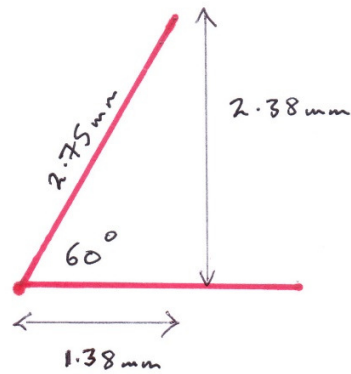
Here are 3.5mm hooks at 60°, the standard AJ angle, again coupled up under tension:



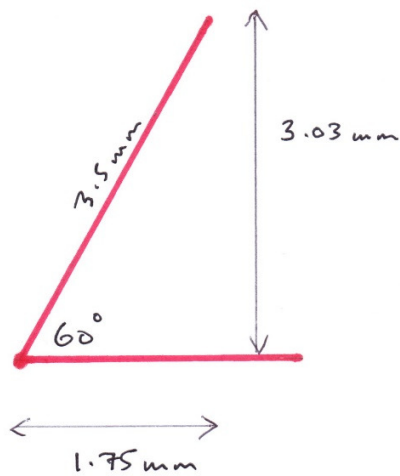
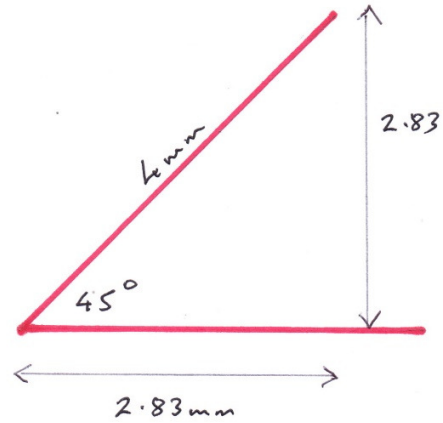
*The distance between vehicles is noticeably less.
The buffer heights of the Bachmann and Oxford Rail wagons are not so different.*

HOOK DIMENSIONS

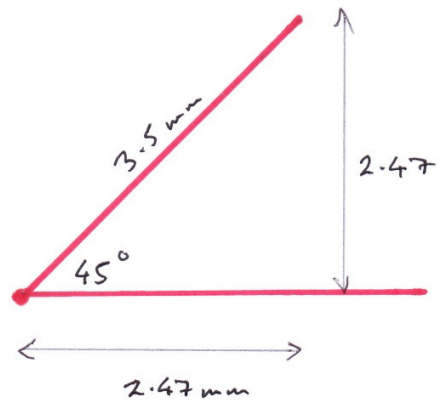
Standard AJ & AAJ



Graham Allen



Too ball



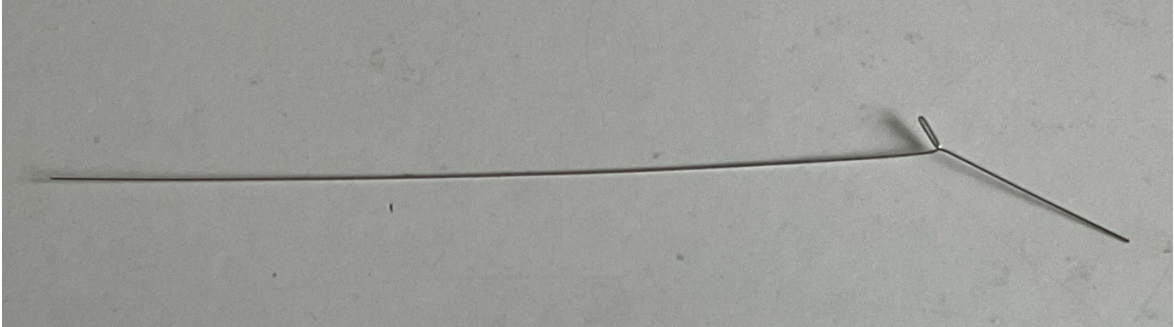
Simplified AJ

Making the hook

SAFETY WARNING

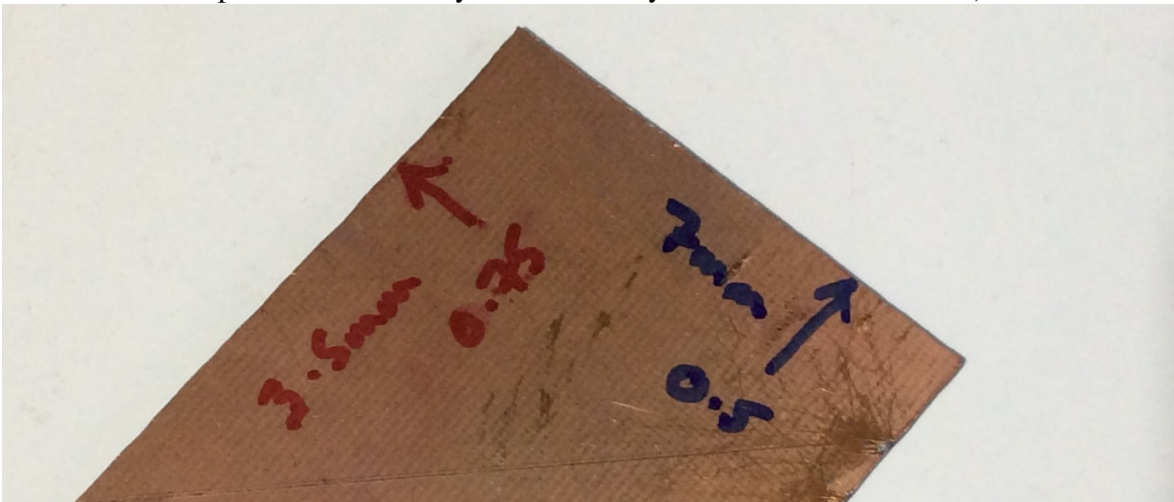
When cutting or bending hard wire, bits, or the piece being worked on, are liable to spring off surprisingly large distances in unexpected trajectories. Take care and wear safety glasses. Vacuum the floor afterwards.

At first I tried to produce these Simplified AJs using the usual AJ jigs. As with standard AJs it was difficult to produce couplings without an offset at the hook bottom. Forcing of the doubled-up wire into a narrow hole (0.6mm in the Martin Brent/EMGS jig) invariably resulted in a twisted loop in the coupling wire with a perceptible nick in the coupling profile when viewed from the side. This probably does not matter much in the case of AJs or Vincent de Bode's AAJ, and indeed may strengthen the hook, but when the hook is upright it seems to catch the opposing coupling and becomes a sticking point:



A looped twist (in an AAJ), probably resulting from forcing the double wire into a too-narrow hole. The nick where the hook joins the nose is pronounced.

So I needed a new jig. I drilled a 0.5mm hole 7mm deep in the side of a small piece of 1.5mm thick (re-used) pcb. 0.5mm diameter is excessively wide (the wire is only 0.2mm dia) but smaller expensive drills broke too many times. (Incidentally I found that ordinary HSS drills fractured or broke against the GRP. I then tried tungsten carbide drills, supposedly specifically for pcb, but they broke quite quickly; maybe they are OK for drilling from the surface not the side. I finally succeeded using titanium-coated drills). Another hole of 0.75mm diameter 3.5mm deep was drilled in the side of the pcb (the 0.75 diameter was determined by experimentation; it is the minimum width of a 360° untwisted bend I could achieve in 8 thou wire +0.05mm). It is not necessary to use a jig made from pcb; holes in hard wood will be easier (but be warned very small holes in wood can close up and the wood may be distorted by steel wire if it is too soft).

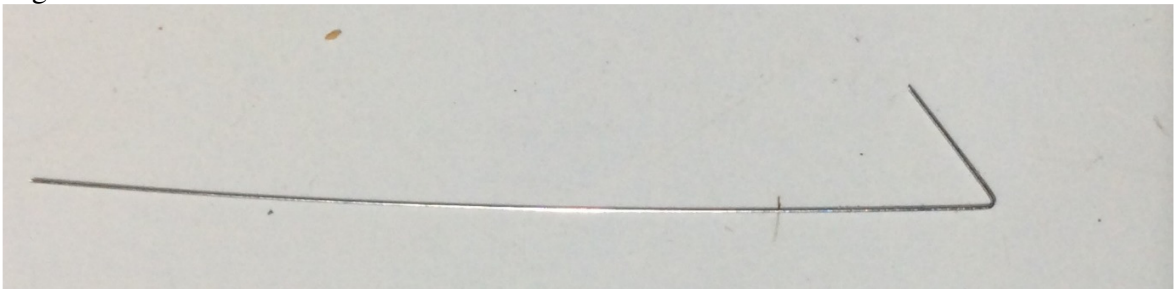


A length of 8 thou wire (50mm or so) is cut and inserted into the 7mm hole. This is then bent against the pcb. Use a metal ruler to bend so the angle is sharp. Check the bent wire

is at least 7mm long. Do not worry if it is too long. This is the nose of the coupling so a bit extra will not be of concern or you can cut any excess off later.



Using fine pliers, preferably with coarse or slightly serrated jaws, bend this back so the angle is 60° or less. Take care not to introduce a second bend.



Now you can use pliers with the coupling on a cutting mat to further bend towards 360° .



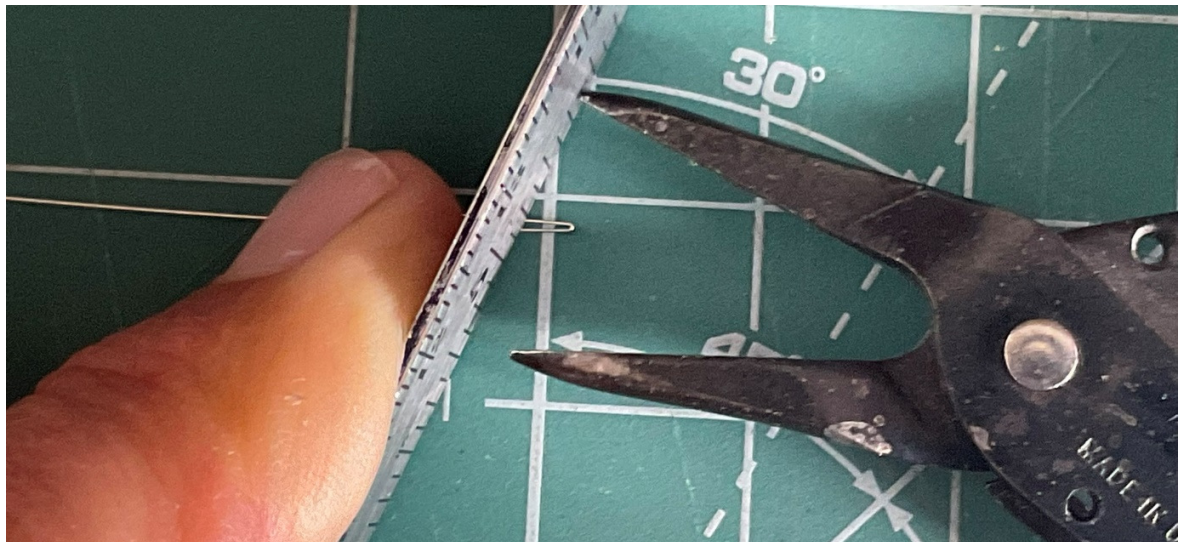
This is one way of reducing the angle from $c60^\circ$ to 45° or less; I suggest using a ruler on top of the wire; see below. Beware the wire pricking your fingers!

Once the angle is down to 45° or so, you can use a Palatine Models jig to produce the 360° bend. The jig will have to be constructed for 8 thou wire rather than 11 thou. With this jig, one only needs to compress the end 2mm or so of the angle. Do not over-compress because, even with the jig, the wire can twist and form a loop: 355°-359° is probably better than 360°.



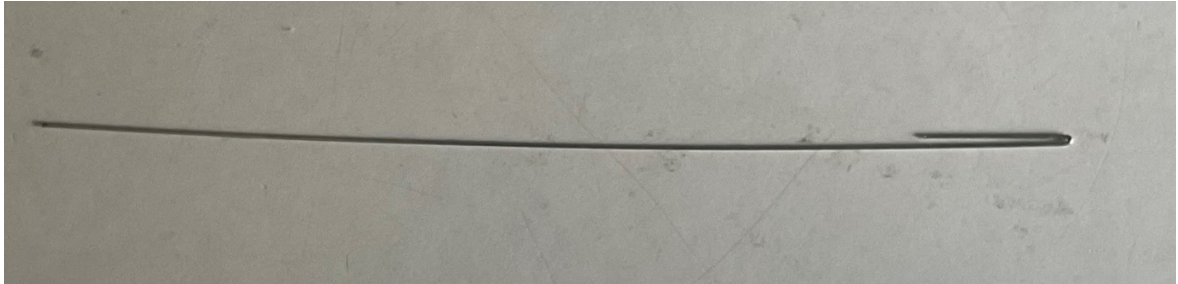
Interesting that this is called a 180 bending jig by engineers. A 180° angle is, err, straight! It should be called a 360 bending jig but even I tend to call it a 180° bend.

Alternatively continue using the cutting mat. To avoid over-compressing the bend and the wire twisting back on itself, place the wire under a steel ruler.

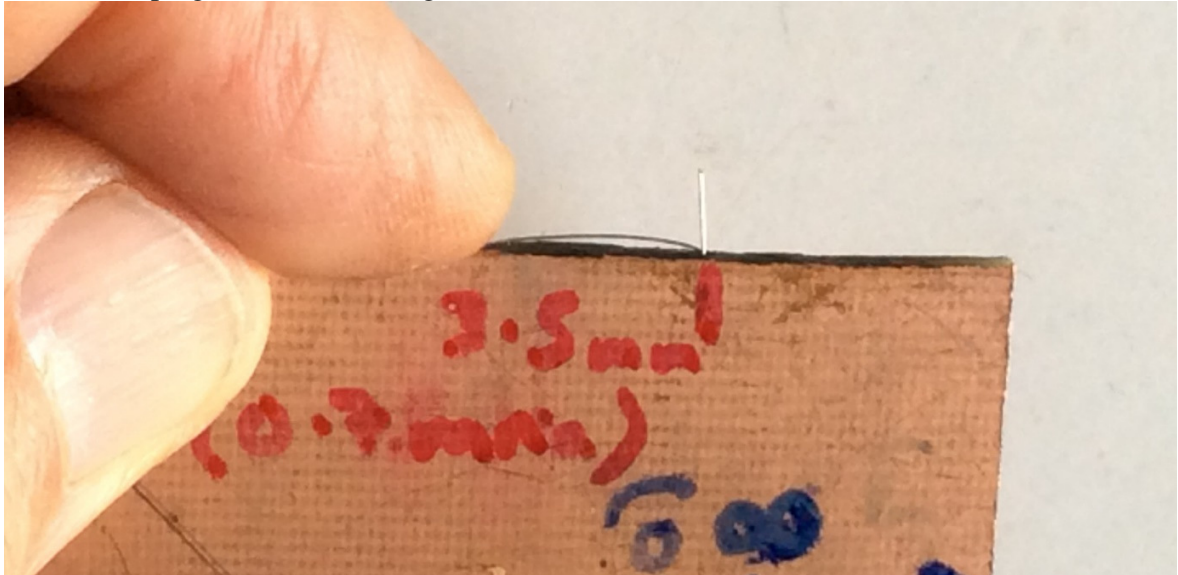


Bend gradually not all in one go. Move the ruler towards the bend. Try to keep only moderate pressure on the wire so it can move laterally but not upwards. Otherwise there is a danger of introducing a second bend between the ruler and the 360° bend. We want to end up with the wires nearly parallel and in one plane. A 5° or less angle is OK. Do not

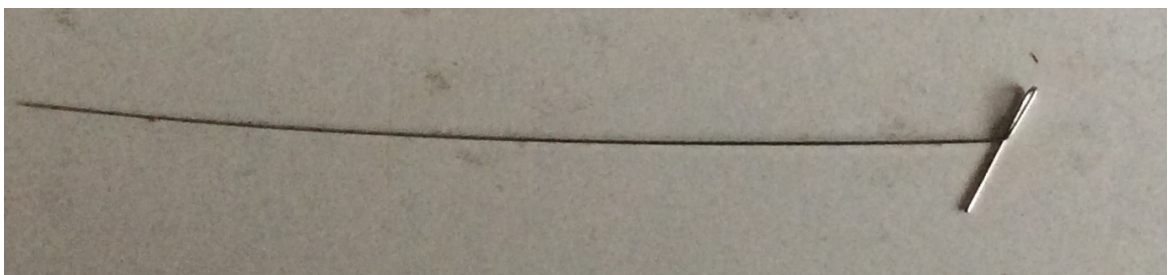
overbend or you end up twisting the wire with a loop. If the wires are parallel it is likely the next operation will twist them. I find using the Palatine jig gives more control forming this bend. Do not despair if you fail; my success rate is only 40%, so budget for more 8thou wire!



Now insert the 355° bend into the 3.5mm hole in the pcb. The slight angle (1-5°) means this will have to be forced into the hole with pliers. This tightness helps keep the bend in position and hopefully stops twisting. Keeping the short length of wire steady in the hole (I use pliers or end up with a bloody finger!), bend the longer wire away from the short section, keeping the 2 wires in alignment.



Extract the coupling from the hole.



This now looks very much like a standard AJ.

You might have introduced some twist or loop in the wire during the last bend, like that shown above. It is possible to eliminate this by bending the shank in relation to the hook, holding the hook in pliers. I did this to begin with but now realise that the shank is

weakened at this point as it has to be bent again by 90° or so in order to reverse the hook. This explains why some coupling heads broke off quite quickly! Now I fail any such couplings.

Flatten the coupling in pliers, preferably with parallel jaws. Grip the flat hook and nose so that the shank is free to be bent back. Then bend the shank back so it ends up at 45°. Because the shank is long, it is easy to get the angle approximately correct. Take care in bending the angle back so that the shank stays in the same plane as the hook; I use fingers on the shank for control. It does not matter if the radius in this bend is large.



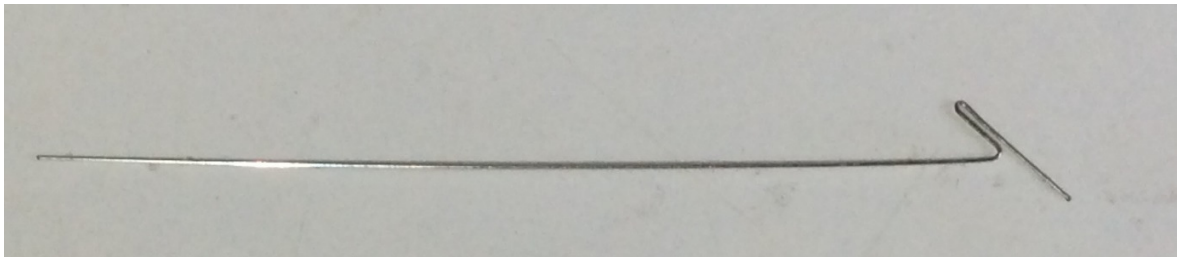
This view is after bending but shows where the pliers grip the hook and nose to enable the bend to be made. It helps to have fine pliers with a nose shaped like this.

If things have got out of alignment, carefully flatten the whole coupling with parallel-jawed pliers to keep everything in more or less the same plane.

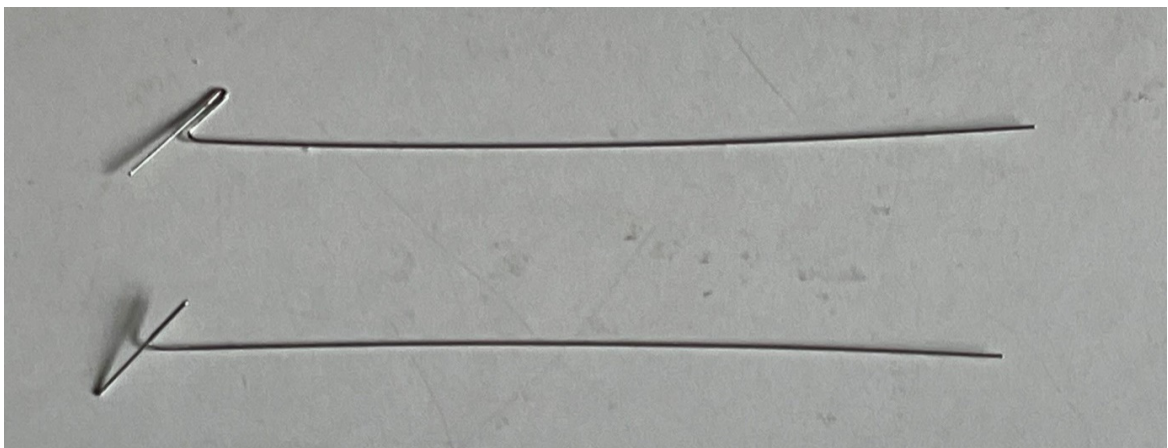


Is anything Made In England any more? Unbelievably Maun still do make these. They will set you back £40+ on eBay. Much cheaper parallel pliers can also be found there.

Voila!



The final product is similar to Graham Allen's coupling, only slightly smaller and with 10% thicker wire.



Note the bottom coupling has a twist in the hook -you can see the hook form in the shadow. Initially I treated this as usable as the slope from the end of the nose to the tip of the hook is flat and uninterrupted. Now I would discard this; after fitting it and adding a

dropper you do not want to have to dismantle the whole lot because this causes some misbehaviour as the couplings slide together. The risk of failure is not worth it.

An alternative method of construction is to use a slightly different jig. This needs a hole of 0.3-0.5mm diameter 11.5mm deep and another the same diameter 7.5mm deep. The first bend is made at 11.5mm and a second bend is made at 7.5mm so the wire becomes a Z shape (note 0.5mm is accounted for by the second bend in the wire). Then the 360° bend needs to be made at the shank end. The doubled-up hook now must be bent back to give a 45° angle, as with the first method. Keeping everything in the same plane is difficult so results were less consistent with a higher level of rejects; maybe I am just ham-fisted! I made a bending jig from brass plate but this only helped to keep everything flat for the second bend but not consistently.

If this is your first SAJ or AJ coupling, I recommend making a small batch of hooks so you repeat your technique and learn; it becomes easier.

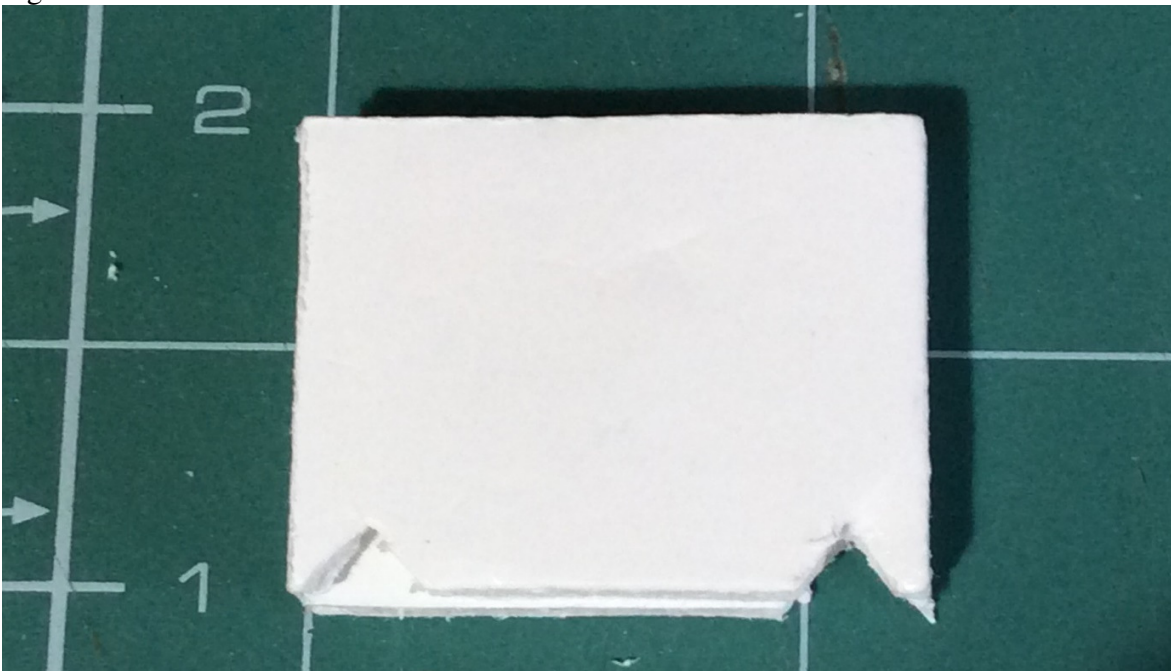
If you run heavy or lengthy main-line trains, now is the time you may want to run solder into the hook to strengthen it. The average branch line train should not need this. Graham Allen appears to use thinner steel wire of 7 thou (0.18mm) without problems but his trains seem as short as mine. (Where does he get his wire from? 7 thou is not a standard guitar wire).

A jig for fitting

Next the coupling needs to be fitted to the rolling stock. You do not need a jig for this but I find one worthwhile in order to obtain some consistency of angles. It also saves a requirement for a third hand! The Scale4 Society sell a sophisticated brass jig for standard AJs but I make one up cheaply from 3mm foamboard. Two pieces 32x24mm and 32x25mm are made with cut-outs at the bottom to locate buffers whose centres should be 23mm apart (22.8mm for GWR fanatics). The inner board cut-outs need to sit on the buffer shanks but the outer ones need to be larger to sit on the buffer top edges. Cut about 3mm up from the bottom of the 32x24 inner board for the buffer shanks.

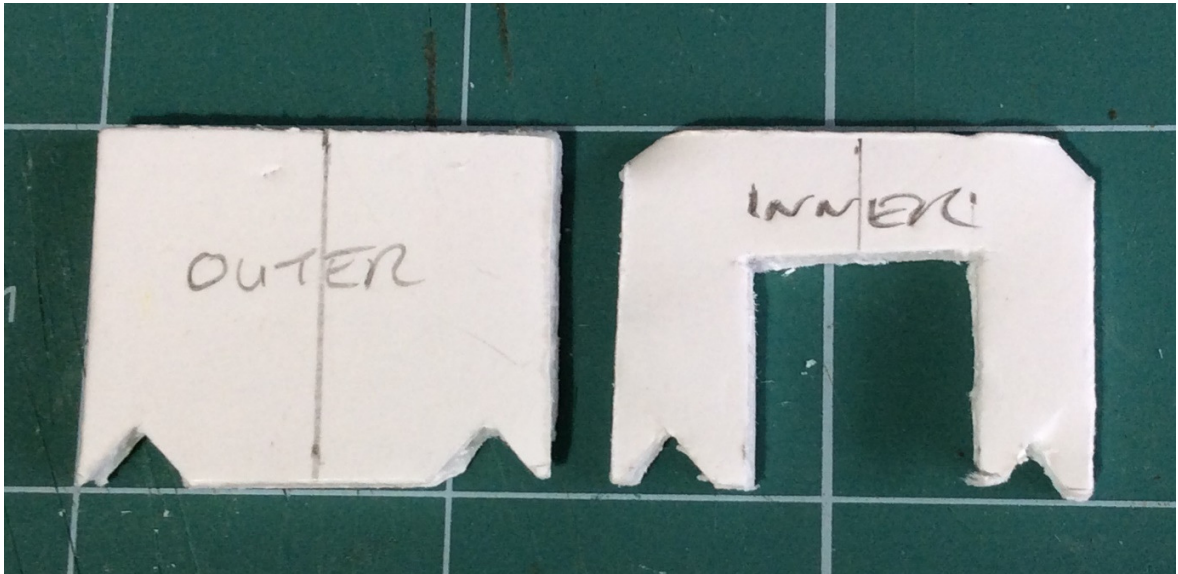


Check that this sits level on the buffer shanks of a an old hookless unfitted RTR wagon (or make a small cut-out for the hook). Using this as a template lay it on top of the 25mm high board so that the tops are flush. Then cut out the same buffer allowances, so 4mm high this time.

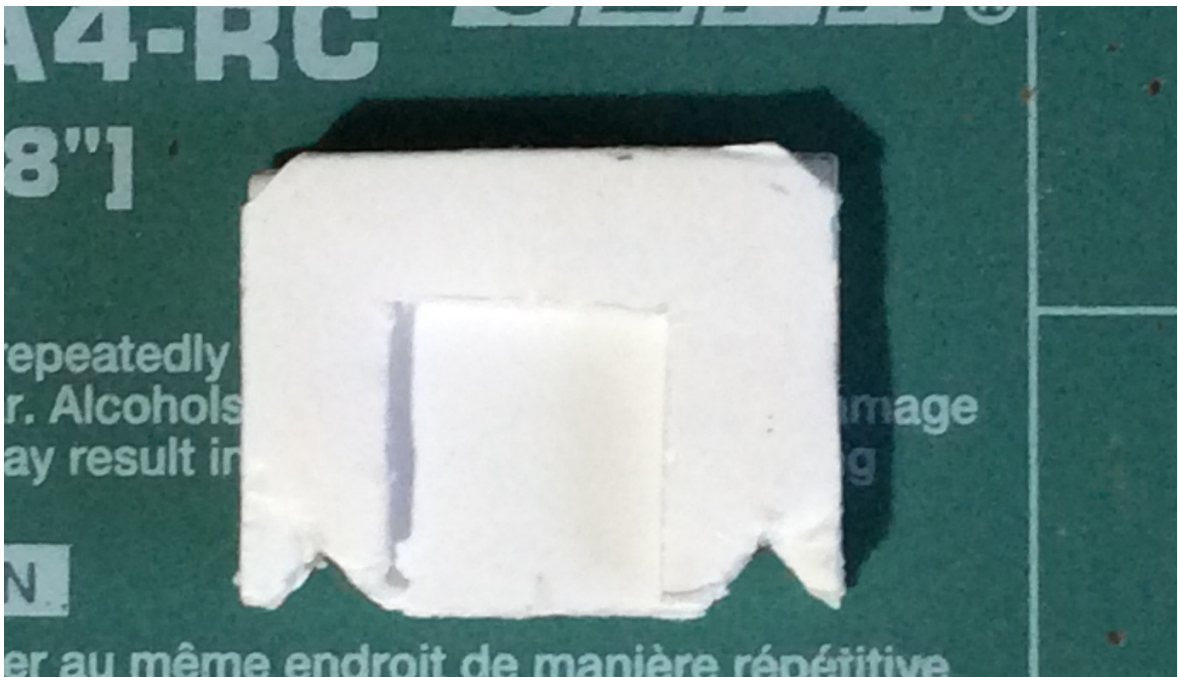


Do not worry too much about those cuts being too precise; the foam board is quite forgiving! Having made the buffer cut-outs, the excess height of 1mm of the outer board can be cut off so both boards sit flush with each other. A cut-out needs to be made in the

inner board so that it clears the coupling hook, any vacuum pipe or other protruding beam attachments; I used a cut-out of 16mm high x 15mm wide. I also cut off the top corners as from experience these otherwise foul brake van lamp irons.

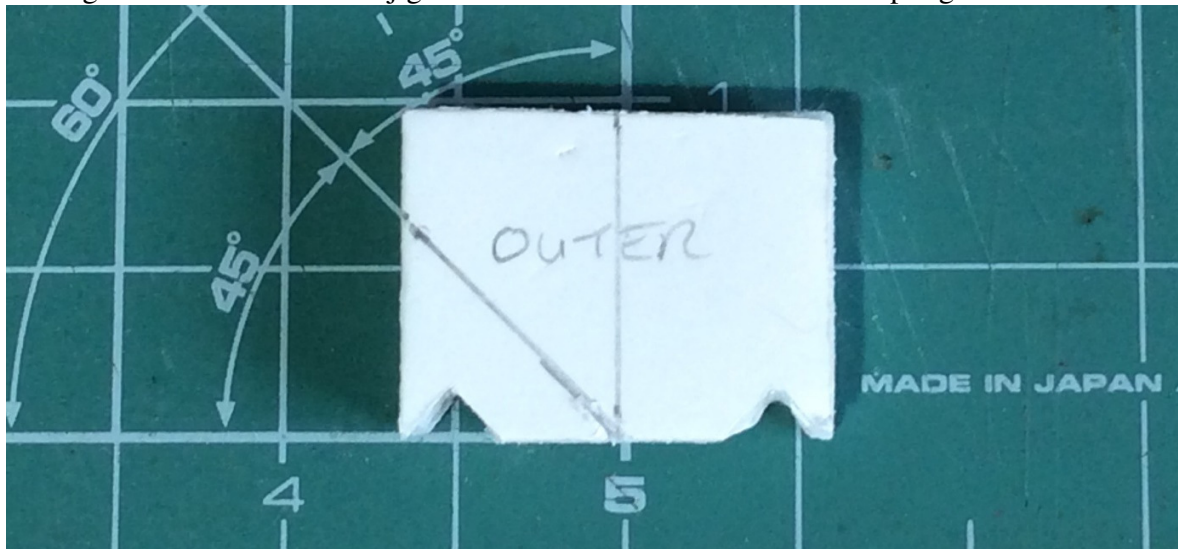


Now find a van with flat or nearly flat ends and buffers 5.5-6mm long. Place the inner board over the buffer shanks. Lay the outer one on top. The tops of the boards should be nearly flush. More importantly the bottom of the outer board must be flush with the bottom of the van buffer beam. If so, it can now be glued to the inner board in situ; instant glue is probably not a good idea.



Jig from the rear.

Note it does not matter if it does not sit exactly flat against the wagon/loco/coach body. A 45° angle is then drawn on the jig to indicate the desired line of the coupling.



This jig works fine for most buffers which are 6mm long (a lot of RTR are a bit short) but you may need a thinner jig for shorter buffers. If you make a mess of the jig, you have only lost a couple of small pieces of foamboard and your temper.

For longer buffers you might want to add another layer of foamboard, perhaps with a 45° slot sawn across the front for the SAJ hook.

Fitting to wagons

First of all, consider whether you need to fit auto-couplings to every wagon. Would it not make sense to fit 3-links between those 3 coal wagons that always seem to appear together in your yard? For exhibition layouts it makes sense to minimise the number of things that can go wrong and that includes couplings. Ray Earl used to shunt cuts of 4 wagons fixed together in the yard on his EM exhibition layout Brookfield with very few onlookers realising it (he used 3mm scale Sprat & Winkle couplings for reliability). Iain Rice did the same with Trerice. Even if you want a shunting puzzle, shunting a cut of 3 wagons fixed together can present challenges out of the ordinary.

Vincent de Bode suggests that the minimum length of an AJ-type coupling using 8 thou guitar wire should be 30mm from the fixing point to the buffer beam. Graham Allen suggests a minimum length of 40mm, inclusive of hook, despite seeming to use thinner 7thou wire (0.18mm; not available as guitar wire). 30 mm works OK for me. My recommendation is to make this slightly longer than 30mm if you can but try and avoid making the fixing point more than halfway along the vehicle. Otherwise one of the advantages of 8 thou wire over the standard thickness is lost; long standard AJs (without hinge plates) can pull the opposite end of a vehicle off the rails on a sharp curve. If you are fitting to a long vehicle using handrail knobs, you might want to consider a maximum

length of 40mm or so to try and avoid the problem of the coupling drooping under gravity and the shank is no longer lying against the buffer beam.

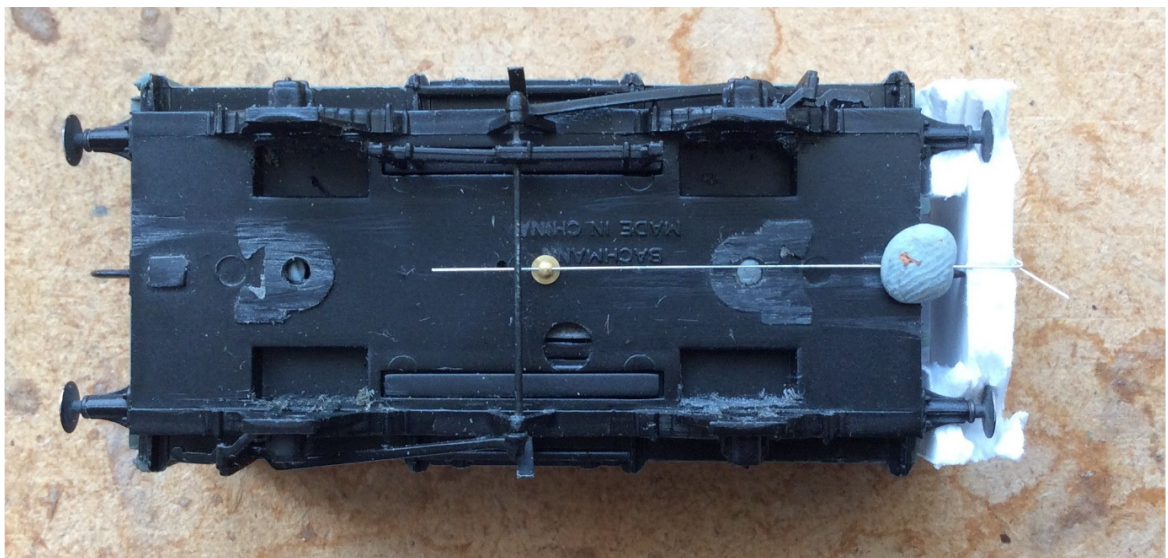
It is essential that the default position of the coupling is fixed so it rests against the buffer beam. After fixing it may sag a little due to gravity; by using a longer nose than the standard AJ such errant couplings are more likely to engage. Thus it is desirable that the fixing point is level with or just slightly below the buffer beam bottom, not above it. If above, the shank should be bent so it rests level against the beam; avoid this if you can.

On vehicles with a flat plastic surface flush with the bottom of the buffer beam, typically Bachmann wagons, I use Markits wide-base handrail knobs as the fixing. These give a larger surface than standard knobs for glue to adhere. If the vehicle surface is not level with the bottom of the buffer beam one can use a bracket with a hole drilled in it or add a block of wood or plastic so a knob can be used. Another alternative is to glue a piece of pcb or copperclad to the bottom and solder to that. If the vehicle has a brass or nickel bottom flush with the buffer beam then the tail of the coupling can simply be spot-soldered in place; even I can manage that.

Note you need to ensure that knobs are fixed so the hole is parallel to the vehicle sides. I drill a hole for the knob in plastic floors and ensure it is a tight fit. Then the coupling is placed through the knob and is positioned using the jig. It does not matter if the jig does not sit exactly flat against the wagon/loco/coach body but ensure the bottoms of the jig and the buffer beam are flush. A blob of Blutak holds the shank tightly against the bottom of the buffer beam. Check there is clearance between the hook and the buffer heads (easier said than done! Practice with the jig will help judge this). The minimum buffer to coupling hook clearance needs to be 0.25mm. Increase this to a minimum of 0.6mm (as per I Rice's Imprecise), preferably 1mm, if you plan to use any loops for bogie vehicles or locomotives. I judge this by eye; if there is a clearly visible gap then I find the gap to be at least 0.5mm. Position the shank so it is very slightly offset to the right of the centreline when viewing from below the wagon. With coupling satisfactorily positioned and the knob in place, I apply solder paste to the shank either side of the knob. An iron is applied to the side of the knob so solder runs inside it. Once soldered the knob can be extracted, some superglue applied to the hole and the knob replaced. If the knob is glued in place first, the application of heat to the knob will often destroy a superglue bond.



Jig held in place by rubber band and buffers. Coupling held in place by jig, by Blutak on buffer beam and handrail knob. Hook and nose are aligned with the 45° line on the jig.



Another example, a Bachmann 16T mineral. Note the RTR coupling bases have been levelled off. There is an offset to the centreline at the bufferbeam but it is imperceptible.



A close-up of the end of the same 16T mineral wagon.

If your coupling has a shank length of 35+mm, I would be tempted to replace the knobs with short strips of pcb glued to the wagon floor. The 1.6mm thick copperclad strips sold by the EMGS for trackwork are ideal (also sold by C&L but only in bulk packs). A large blob of solder (the only sort of soldering I excel at) securing the shank to the strip should reduce its inclination to droop. See pictures further down.

If your wagon has a floor above the buffer beam/soleplate, I suggest using a pivot cradle provided there is space for it, rather than a handrail knob affair. This avoids any future tendency for the coupling to droop but involves a bit more work. Refer below.

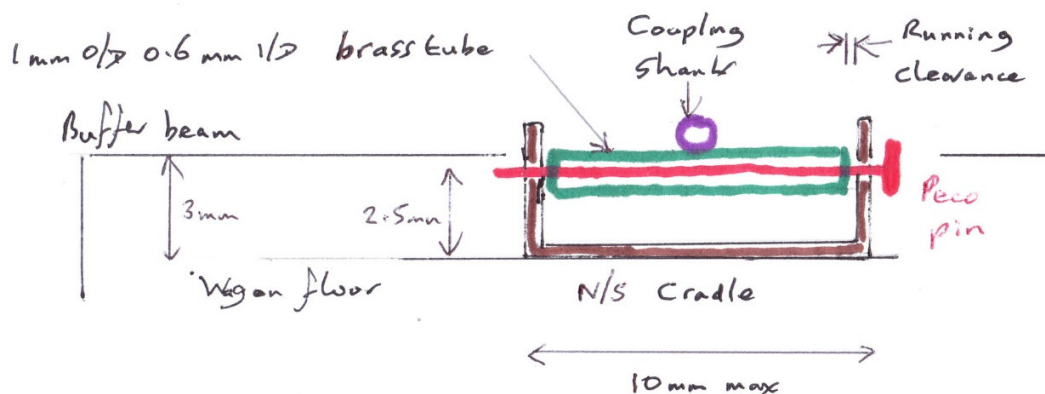
Fitting to bogie vehicles

The consensus seems to be that for bogie vehicles the coupling should be fixed to the bogie rather than the coach body. Most modellers will have reverse curves on our layouts for coaching stock to navigate. The accepted wisdom seems to be that couplings on bodies are likely to fail on crossovers or worse lead to derailment. However the real thing has couplings on the buffer beam and modellers seem to get beam-mounted Flippems (if not Dinghams) to operate satisfactorily. I think the real problem here is that we tend to use sharper crossovers for coaching stock than would be acceptable on the prototype.

The major problem fitting working AJs on coaching stock is that the bogie pivot gets in the way of the coupling shank which needs to be 30mm+ long. One work-around this is to employ a heavily cranked shank to the coupling, not a good idea unless supported

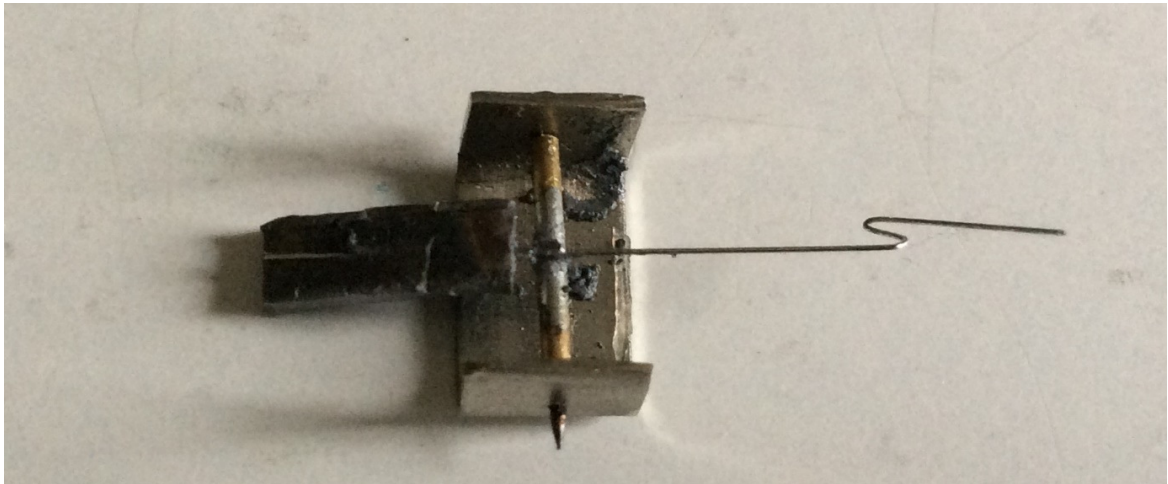
somehow to take the load to prevent distortion. I played around with a design comprising pulling posts (you need these or the crank angles will be pulled wider), guide posts and a hinge plate but could not end up with anything simple and easy to mount on the confined space of a bogie (P4ers are able to do this but it is beyond my skills).

I have an ancient Airfix bogie bolster wagon (one of a pair) that I wish to be able to shunt in my yard. This has a very small bogie less than 30mm long so there is not much hope of fitting an unmodified SAJ to it. Instead I installed a pivoted coupling to the body. This comprises a short U bent up from 6mm nickel-silver strip to make a cradle 10mm long to hold a pivot. The pivot is a Peco track pin, 0.55mm diameter, on which sits a brass tube 1mm o/d 0.6mm i/d to which the coupling shank is soldered.



The cradle is shown with 90° angular bends. That is not necessary, mine have large radius bends; so long as the pivot holes end up at c90° to the floor all is OK. The dimensions shown may not apply to other vehicles.

I drilled the holes for the pin 2.5mm above the cradle floor; this is easier to do after bending the strip. We need to ensure the brass tube is level with the bottom of the buffer beam so the coupling shank can lie horizontally. The holes should be drilled 0.55mm so the Peco track pin is a tight fit and does not need soldering in place. Make sure the brass tube rotates easily on the Peco pin; if not, ease out the tube with a 0.6mm drill bit. The tricky balancing act is that one wants the brass tube to have no lateral movement but not so tight against the cradle wall that there is no running clearance; the tube must be free to rotate. Before fitting, test the tube to ensure it is a sliding fit within the cradle.



Assembly with counterweight fitted; the coupling was soldered with the cradle temporarily in place in the chassis. You might prefer to fix the coupling after the cradle is glued in position.

Before soldering the SAJ coupling to the brass tube pivot, a counterweight needs to be fitted. I sliced a 2mm strip of 1.5mm lead roofing sheet 8mm long for this and drilled it lengthwise with a 0.3mm drill. This takes the coupling shank and can be secured with glue or a tiny dot of BluTak. Do not fit a huge heavy weight as the uncoupling magnet may not cope with it. I deliberately used a flat lump of lead so I could easily add a bit more on if needed; it was not.

Before gluing the cradle in place, check the pivot moves freely; it is easier to dismantle now than after fixing to the wagon (how do I know?). The assembled cradle is glued to the wagon floor hard up against the buffer beam which helps take the coupling load but this is not essential; the cradle can be set further back if there is room.



One assembly in place with t'other awaiting coupling fitment. The bogie pivot mounting helps stop the counterweight from dropping off. As you can see, the small lump of lead is sufficient to move the coupling hook. If space behind the buffer beam is minimal, the coupling shank may be bent to avoid the obstruction; the weight will however be more visible. The buffers at one end have been replaced with sprung ones but the other originals are being left alone. This is an experiment to see if sprung buffers make any difference to coupling or uncoupling.

Before refitting the bogies, the protruding parts of the cradles should be painted black.



Yes, it works! I discovered that the pivot is mounted a fraction below the buffer beam resulting in the coupling height being a bit high; a black card shim glued to the bottom of the buffer beam rectifies. In measuring the pivot height, I failed to allow for the depth of glue under the cradle.

Regrettably fitting SAJs to bogies is not a short simple job. I use semi-fixed couplings within coach rakes, so at least the fitting of such SAJs to coaches will be minimised. Hornby coaches are a nightmare. If you are lucky, the bogies will lever off with a screwdriver (take care you do not damage anything in the process). Otherwise you have to remove the body from the chassis, another nightmare, and push the bogies out of their pivots from above. Evidently Hornby have given no consideration as to how modellers can populate their coaches with passengers. With Hornby coaches, I recommend adding passengers and fitting SAJs at the same time as widening the brakes on the bogies for EM wheels (refer Manual 4.2.3.(2) for this). Do not change your mind about the passengers! Ugh!

Fitting to locomotives

Couplings on locomotives can be fixed in position so they can have short tails and do not need droppers. This is useful on locos like the Hornby Adams Radial tank which are otherwise impossible to furnish; even a fixed coupling is extremely awkward to fit successfully. Note this means double-heading becomes impossible if the leading loco is required to be detached from the train and both locos are fitted with fixed couplings.

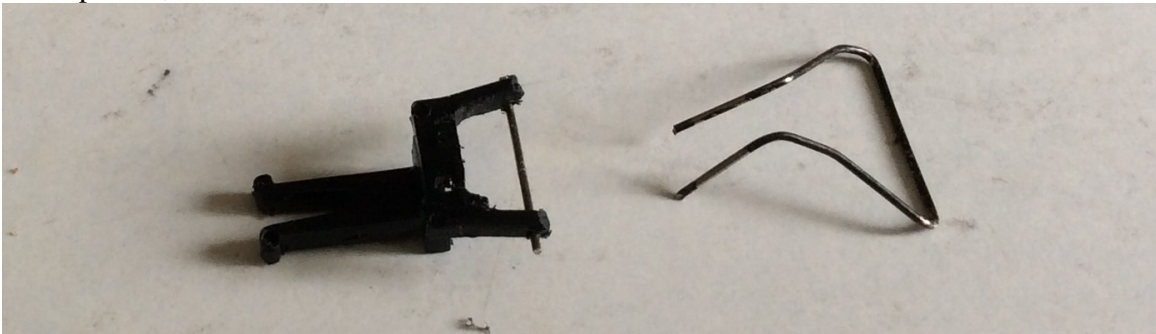
An alternative for locos is to instead fit a loop level with the loco buffer faces in the manner of Iain Rice's Imprecise coupling. This may be easier to fit but the penalty is that it is more obtrusive and there is no delayed uncoupling feature. If you fit loops you need to ensure the minimum clearance between the buffers and the SAJ coupling hook is increased to at least 0.6mm, preferably 1mm. This applies to all your couplings otherwise the loop may fail to engage. Note this means your vehicles will be further apart when under tension (load).

Here is the Hornby Adams Radial chassis fitted with SAJs:

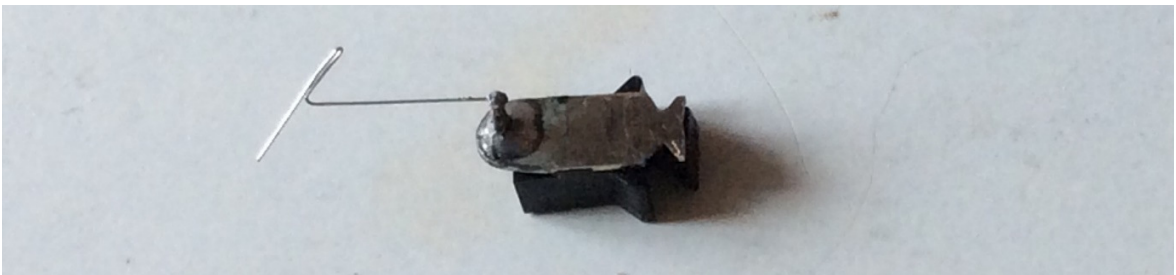


Fitting a handrail knob fixing to the front bogie is relatively straightforward. Or should be; the coupling kept getting distorted. I discovered the shank was fouled by the body aft of the wheels. Once shortened, all is OK. I recommend against any working coupling being fixed to the Hornby Adams front buffer beam. The beam seems to be supported only by thinnish plastic and might easily be distorted by any heavy loads (though I guess one could reinforce the footplate with metal plate glued below it).

The rear radial truck, a heavy solid casting, is a bit of a nightmare when it comes to fitting a coupling. I tried fitting loops, one a modified cranked Bachmann coupling in the NEM pocket, but these failed.



So I tried this:



A piece of nickel silver strip was cut to the shape of the NEM pocket plus a bit extra on the end. This is so the tall handrail knob misses the radial axle block. The NEM pocket and the strip are attached with tiny bits of Black Tack (much stickier than BluTak) and the whole lot attached with more Black Tack to the NEM pocket anchorage slot on the

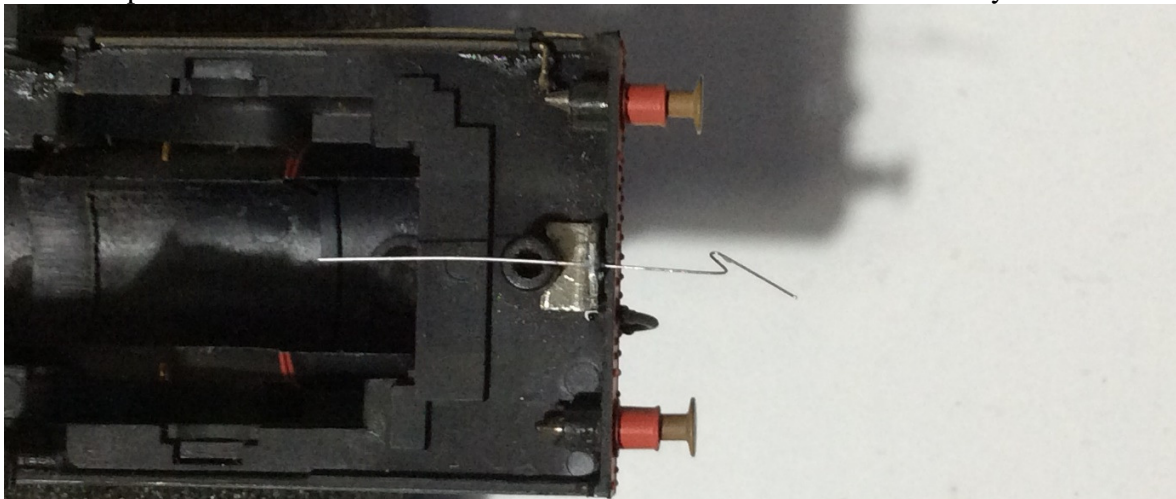
chassis. The NEM pocket acts as a key to hold the strip in place. This allows easy dismantling and repair but no doubt it will probably drop off occasionally!



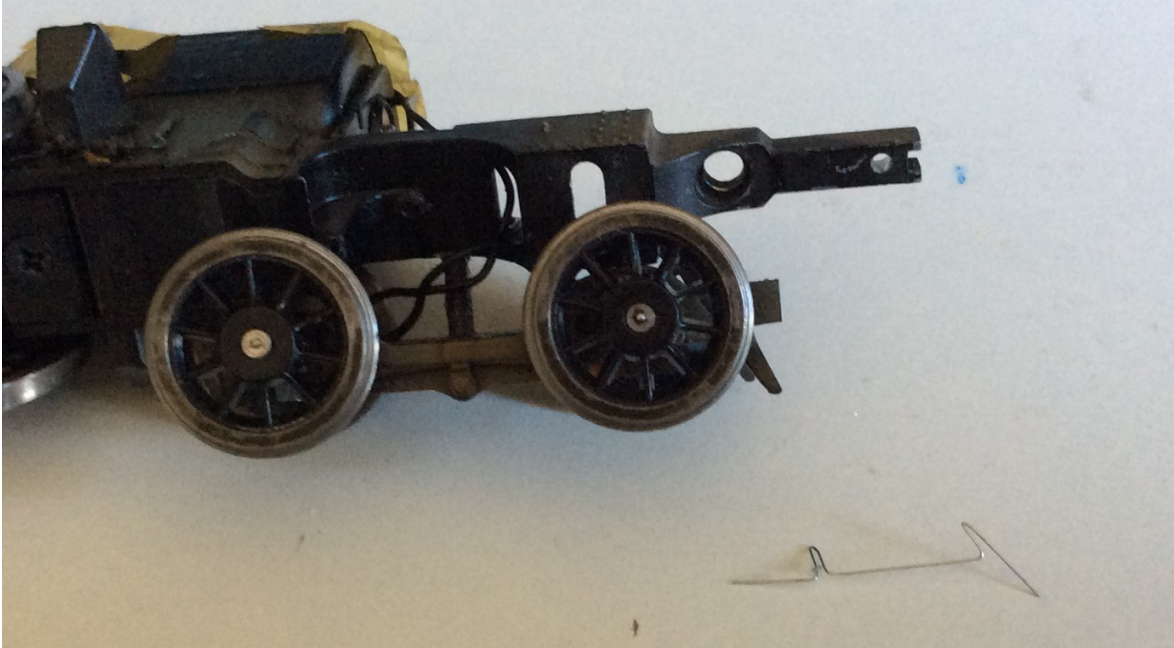
The down side is that the knob is very visible; some black paint and a dangling screw coupling might help to hide it.

I tried to fit a bracket instead of the knob arrangement but this fouled the movement of the radial truck; clearance between the buffer beam and the radial truck is almost zero.

Unfortunately it can be difficult to fit any alternative couplings to many RTR locos unless the NEM pockets are used. Here are the contorted affairs attached to the Hornby M7:



The front end has a simple nickel silver bracket held in place with Black Tack so as to be easily removable and adjustable; the bracket is also held in place by the chassis. The coupling shank needs to be cut off to allow this; there is just enough space behind the buffer beam for there to be no need to cut anything off the chassis.



This is the M7 rear end with the oddly bent SAJ shank with challenging angles and measurements! The doubled-up element fits in the otherwise redundant small 1.3mm hole in the end of the chassis casting (not sure what it is/was intended for). The hole is filled with Araldite epoxy, the doubled-up bit of shank inserted, and more epoxy covers the centralised tail. The rear chassis casting is level with the bottom of the buffer beam and this seemed a simple and safer option than trying to fix the coupling to the bogie. I did consider adding a knob or bracket to the bogie but the cast chassis has a channel cross-section which shows where it meets the buffer beam. So a coupling shank sliding across it is going to get a bumpy ride and will probably distort quickly or worse it will stick against the chassis and derail the bogie and any coupled stock.

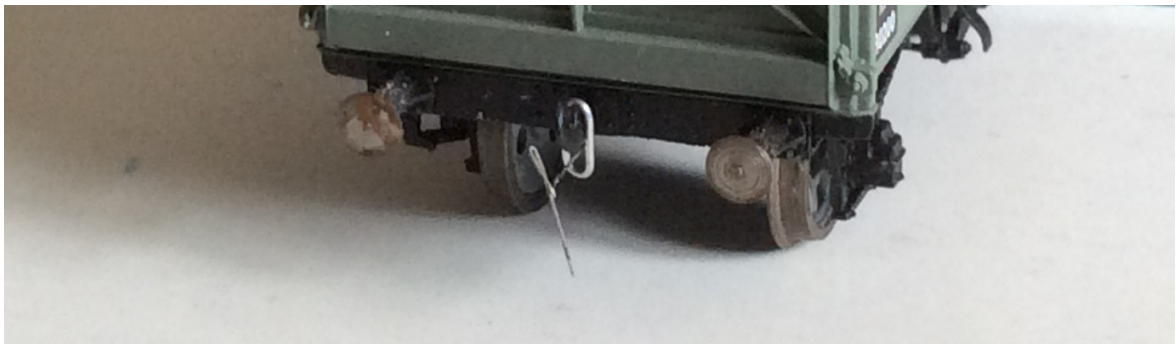
You can be forgiven from the above for being a bit concerned about fitting SAJs to RTR locos. But one has the same difficulties in fitting standard AJs and almost all other auto-couplings (Kadees will fit in the NEM pockets). Even Dinghams and Flippems which fit in the buffer beam have problems with required protrusions to the rear; I suspect both ends of the M7 chassis and the radial truck of the Adams will cause clearance difficulties for those. Of course you have designed your kit/scratch built chassis with the couplings in mind so no problems there!?! I cannot help feeling a simple cranked bracket that fits in the standard NEM pocket and that can be drilled for AJ holes at varying heights would be a good idea but is probably not viable commercially and will probably look ugly.

Top link

On the SAJ drawing above, I have shown the maximum drop allowed by the stirrup to be 3.5mm. This is the AJ standard for bogie vehicles; for short wheelbase wagons it is 3mm. With a 2.5mm rail depth and a 0.5mm clearance for the dropper above the rails, this seems a recipe for AJs to hit the ballast. If you follow the method below, the resulting stirrup/top link will restrict vertical movement to about 3mm, quite a bit safer. A drop of over 2.5mm is required for the coupling to disengage; refer to the Hook Dimensions diagram above.

Following the prototype, the stirrup or top link should be put in place in the upper rearward slot of the beam hook before the dropper is fitted. However, this tends to force the fitting of the dropper forward of the beam hook which ends up looking odd, especially in the case of Instanters. Rather than using the upper slot in the buffer beam hook, I often use the main hook so the top link is set forward in front of the dropper; the dropper is fitted before the top link. This means the dropper can be wholly under the beam hook which looks a lot better for Instanters. It also means the top link is easier to replace when it inevitably drops off! The downside is that the coupling may drop too far on uncoupling due to the lower setting; simply replace the top link with a shorter version.

I use 0.5mm florists iron wire for this, bent around a piece of brass strip 4mm x 1mm. Unfortunately small metric metal strip seems to be unobtainable these days (a result of Brexit?). Plastruct sell a plastic strip of a similar dimension (0.04"x0.187") at a much cheaper unit price (but the iron wire may cut into it after a while). Florists wire is very soft but keeps its shape well. This yields a link with parallel sides and a length of about 5mm. The florists wire is very easy to shape and to cut but is easily magnetised. The completed closed-up link is manoeuvred down the nose and over the hook of the coupling with tweezers.



Here is the top link fitted to the upper slot of the 16T mineral hook. You might wish to remove this before fitting the dropper and afterwards replace it in the main buffer beam hook.

Droppers

The Lanarkshire Models dropper etch is 5mm long. Their bottom link is also about 5mm long. This gives a total length when attached of 9.5mm so 0.5mm above rail height when attached to a standard AJ. The standard AJ is set at 10mm above the rails whereas the SAJ is at 12mm. One answer is to replace the bottom link with one that is 6.5-7mm long. Another is to increase the height of the uncoupling magnet when activated (my option). Another is to increase the magnet power. Yet another is to follow Graham Allen's idea and add a small magnet to the bottom link.

Next step is to fit the dropper to the coupling shank. Preferably it should sit under the main hook. The etch should be folded to 90° or so with pliers. Then placed on the shank and closed up. Lanarkshire suggest you might want to use solder (no way for me!) or glue to secure it. I found that just crimping the etch with pliers was sufficient to hold it in place. Now the bottom link needs to be opened up, threaded through the etch and closed

up with pliers; ensure they are not magnetised! I used the Lanarkshire iron links supplied with their etches. These are a bit chunky perhaps and not so easy to shape as the florists wire, but are pre-blackened and with a bigger mass that helps with magnetic attraction.

Before opening up the Lanarkshire link, make sure it is the correct shape i.e. with parallel sides if possible. Then open it up vertically so it is still in the same plane, but not twisting it sideways as well.

Alternatively twist it sideways but not vertically. This means you can attach it to the bottom link and use fine-nosed pliers to close it up again. If it is twisted and the opening pulled upwards as well, it will be a nightmare to close up again in situ without the link losing its desired shape.



Bottom links. Left-hand is a desirable shape. Middle is opened up vertically; try not to open up too much or the opposite side to the opening gets irretrievably kinked. Right is opened up sideways only; this is my preferred option as it is easier to close up again by flattening with single pliers.

Attaching these is fiddly and if you are clumsy like me, the etch or the top link can easily be displaced. I discovered that everything becomes magnetically charged, especially after testing for uncoupling, and is difficult to adjust using normal tweezers and pliers which themselves get magnetised. Bits go everywhere you do not want them to go! I resorted to using nylon-jawed tweezers to position things:



Sorry I do not recall where I obtained these; maybe from an electronics supplier. The finish on the jaws is a bit too smooth for my liking. They are good for positioning but near useless for closing up the links.

For closing up links I use these fine nose pliers:



The green handled USA-made ones are ancient and unfortunately magnetised! So a handicap for closing up links but they have rounded noses useful for forming bends. Similar ones are sold on eBay. The Engineer Miniature Needle Nose pliers (PS-03) made in Japan are superb and cost £15 but have squarer noses. Even finer Xuron Tweezer Nose pliers made in the USA cost around £18.



I await the inevitable advice that the 16t mineral really needs an Instanter coupling (also supplied by Lanarkshire) rather than a 3-link. No screwlink version is available...yet. The top link is in the prototypically correct slot; with 3-links the dropper position does not look too bad. An advantage of the Lanarkshire bottom link is that it is pre-blackened. I wish they blackened the etch as well. I will paint the etch (not the SAJ hook; a permanent marker pen will be used for that) but will not bother with the iron top link; I hope it will dull down naturally given time; look at the corrosion of the nearest (Alan Gibson) buffer face. Hopefully it might divert any close attention away from the etch. The camera cruelly exposes poor alignment of the bottom link at its opening; it looks perfect from all other angles!

Once you are happy with the coupling and its uncoupling, a tiny spot of Black Tack or glue on the top link/hook contact helps it stop dislocating.

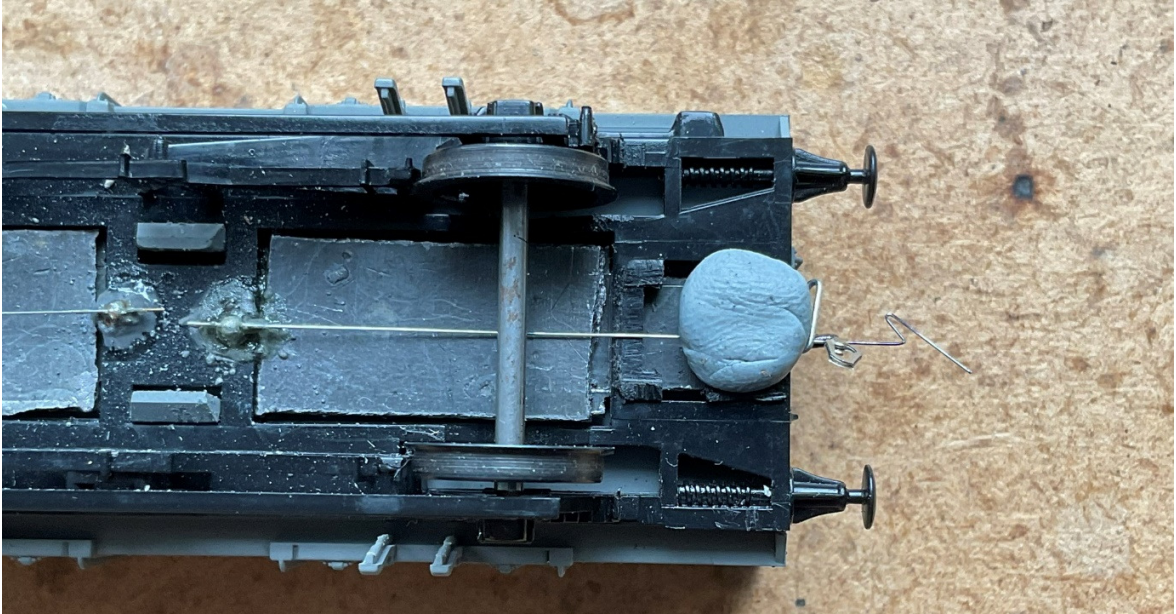
Drooping

Hold your horses! After that struggle to get the links and dropper in place, some wagons will have developed a droop so they are no longer in contact with the base of the buffer beam (this should not apply to vehicles with pivot cradles). This seems particularly to apply to couplings with longer shanks.

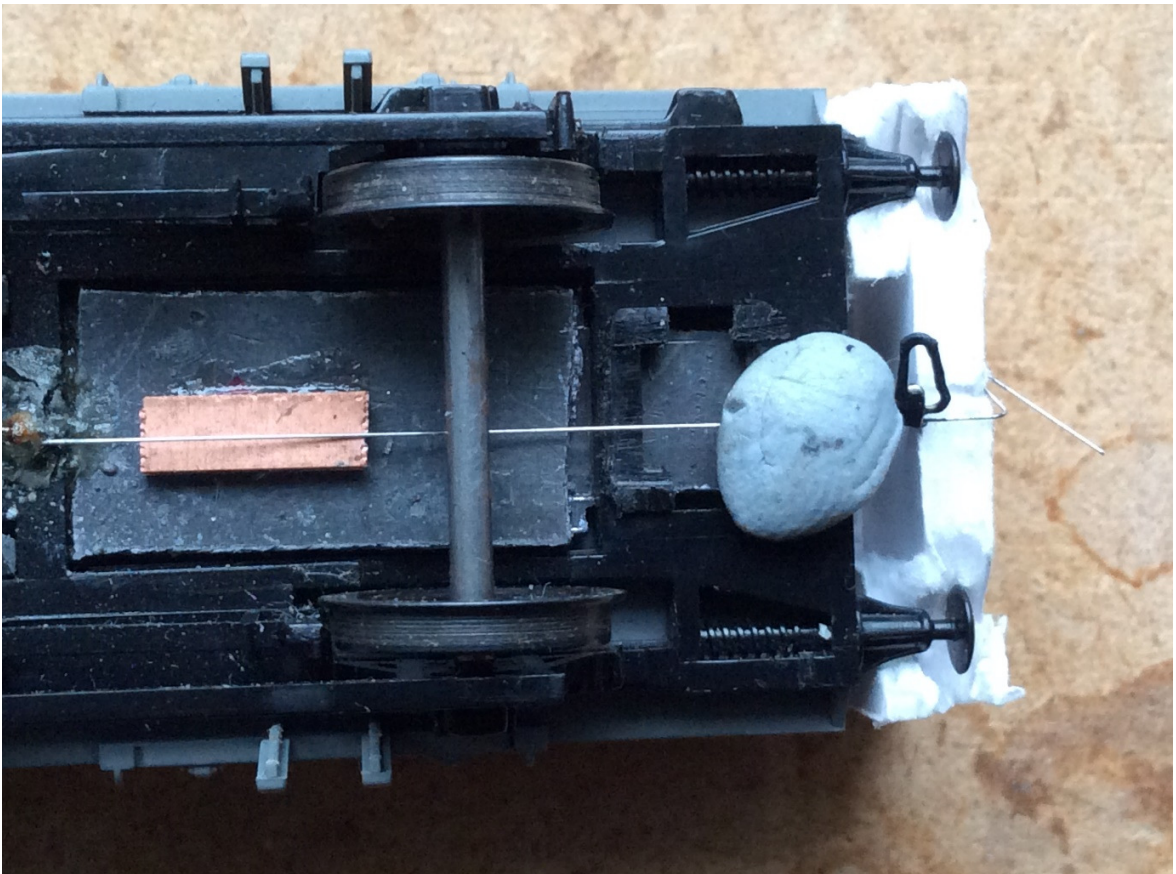


Ugh!

Up-end the offending wagon, press BluTak firmly onto the coupling and the buffer beam, then touch the soldering iron briefly to the handrail knob. Hopefully that fixes it but check the hook has not rotated in the process and that the offset has not been lost. When you turn the vehicle back over, expect the dropper to have moved and the upper link to have fallen out of the hook!



The Airfix 21T mineral seems to be a repeat drooping offender because of the long shank; maybe this is a disadvantage of using thinner wire compared to the standard AJ?



The shanks were cut off at the knobs and a bit of copperclad awaits soldered fixing instead (using a shorter shank). If that does not work, I may dig out those extra lumps of lead and install pivot cradles.

Height Gauge

The P4ers imply that a height gauge is essential to ensure the AJ coupling is set at the correct height and operates efficiently. Those sold by the EMGS and ScaleFour Society are set too low at 10mm above the rail head for these SAJs. One could build a similar one set at 11.9 or 12mm but I am not sure there is much point and I certainly lack the skill to obtain accuracy. The datum point for SAJs is the bottom of the buffer beam. If one wants a benchmark, I suggest that it should be the locomotive that is to be used most frequently in the goods yard, preferably one that has a fixed coupling. Check the buffer beam height of that, especially if you have used under/oversize wheels in converting it. If it is over 12mm high, glue a shim under the beam so the coupling shank height ends up at 12mm or close to it. If it is less than 12mm high, it may be possible to incline or crank a fixed coupling upwards so the shank ends up at 12mm or so. If the coupling is incurably low, at say 11mm, then I am afraid the loco should not be on shunting duty; it must look a bit odd height-wise anyway. That loco is going to give trouble with any height-sensitive coupling, not just AJs, and maybe with buffers as well.

Having selected a satisfactory benchmark loco, match the height and test all your vehicles with that for coupling and uncoupling. This way not only is some consistency assured but you also know the shunter should shunt reliably! Remember, though, to regularly check that shunter for possible coupling distortion, especially if it has been handling heavy loads.

Magnets

I use 4mm dia 2mm deep neomydium magnets on my home layout. They sit below the sleepers and are pushed up just above the sleepers to activate uncoupling. The droppers wobble a bit when passing over them in the lower position. When raised, the droppers fall. I did think that adding micro magnets (cut from a sheet of A4) to the dropper might help uncoupling, as used by Graham Allen, but it turns out to be unnecessary; I can always add them later to errant troublesome trucks.

Trouble-shooting

If 2 vehicles fail to couple or uncouple, make a note of them and mark the undersides of the offending ends of them with a permanent marker. Also record where on the layout the problem occurred. Try each in turn with the datum locomotive to see if one fails to couple/uncouple with that. If that fails to identify the offender, choose a half-dozen other wagons and test each against them. If that fails, keep a record. That way if the problem repeats you may be able to identify the issue. Of course, the cause could just be external influences like a wagon being on a curve or on dodgy track (I have plenty of that!).

Trouble-shooting, coupling up:

1. Is the coupling the correct shape with no twists and all in the same plane?
2. Is the coupling plane at 45° or so? It is easy for it to become 60° or worse after adjusting for other issues. Use a jig for consistency.

3. Is the shank drooping at its default setting and failing to meet the bottom of the buffer beam? Reset by touching the fixing with a soldering iron with BluTak holding the shank against the buffer beam (remember to offset against the centre-line).
4. If drooping is still a problem, consider replacing a knob fixing with a piece of thin pcb or copperclad glued to the wagon floor and soldering to that; this seems to give a better result for long shanks over 35mm long. Alternatively replace with a pivot cradle if there is space for it and the counterweight.
5. Is the buffer beam more than 12mm high above the rail head? Or does the coupling incline upwards too much after emerging from the vehicle? If so, insert a shim of black card, plastic or even thin metal strip under the beam so the shank is lowered.
6. Looking from above, is the shank slightly offset to the left of the buffer beam hook centre-line? It should be a fraction to the left and not so much that the buffer beam hook fails to obscure some of it. If not offset properly refer to the next para, or try bending the shank a fraction near its body fixing. Alternatively glue a small plastic block (it needs to be as high as the shank movement) next to the shank to force an offset. Or refix the coupling.
7. Check the top link is not unduly restricting the offset of the coupling shank. My experience is that the lower and larger buffer beam hook allows more flexibility of the top link so try using that instead of the prototypically correct rear upper slot of the hook. A possible cause is that the top link has been narrowed in closing it up.
8. If a pivot coupling sticks in the lower uncoupling position, try lightly lubricating the pivot. If that fails, add some more weight to the counterweight.
9. Check the fixing is not loose. Knobs especially seem able to wobble and dance but not fall out!
10. If all else fails and you are tearing your hair out, consider semi-permanently coupling a troublesome truck to another with 3-links or similar.

Trouble-shooting, uncoupling:

1. Check the top link (=stirrup) has not gone walkies. They have a tendency to come adrift and work their way underneath the vehicle. Sometimes they work their way off the SAJ coupling hook altogether. God knows how as they are a nightmare to refit over the hook and bottom links if they are to be positioned behind the dropper. Opening them up and refitting and closing over the shank is still difficult. They can be glued in place but be careful that does not restrict the offset of the shank. Life is a lot easier if the top link is placed in the main hook with the dropper behind.
2. Check the buffer beam hook is not broken (yes, a hook snapped off one of my RTR wagons).
3. If the hook hits the ballast, check the top link is in place. Otherwise shorten it.
4. If the hook fails to lower sufficiently, check the top link is sitting in the main buffer beam hook properly. If the link is too narrow, it can get stuck in a raised position. Otherwise lengthen the top link.
5. If a lot of vehicles are failing to uncouple at the same spot, check that the magnet is powerful enough to attract the droppers. If all the magnets are giving problems, consider adding micro magnets to the bottom links. Be wary of increasing the lengths of droppers that thereby end up less than 0.5mm above the railhead.

6. Hey! Unless you are exhibiting, does it matter if you have to intervene with the Hand of God occasionally? Get hold of the offender, make it bow politely to its neighbour, and just lift it away and up off the rails. Put it in the corner of the fiddle yard with a Dunce cap on.

More considerations

1. These couplings, like standard AJs, are susceptible to damage in transit. Ensure stock boxes are suitably designed to protect the couplings. Foam, paper and bubble-wrap are favourite attachments for couplings to hang onto; you are warned!
2. Do not forget to modify buffer stops to allow the buffers to hit them before any part of the SAJ coupling.

Pros and cons compared to standard AJs:

For:

1. Slightly easier to make.
2. Much easier to judge the correct angle when fitting.
3. Shorter distance of coupling to anchorage. Possible to avoid sideways pull of opposite end of vehicle without resorting to hinge plates.
4. No need for a height bar.
5. More of the coupling is hidden behind the buffers from side viewing.
6. Slightly less intrusive because of the use of thinner wire.
7. Can be made so as to be compatible with Iain Rice's Imprecise couplings (by increasing the minimum gap from the hook to the buffers to 0.6mm, preferably a bit more).

Against:

1. Slightly more difficult to fit to bogie vehicles because of the higher setting above the rails?
2. Incompatible with AJs and AAJs.
3. Greater distance between vehicles when under tow.
4. More delicate due to thinner wire so perhaps more prone to damage in transit for portable layouts.
5. More allowance has to be made for gaps in buffer stops because the coupling is set higher and is longer.
6. May need reinforcing for long or heavy trains.
7. Longer so more visually intrusive when vehicle is viewed end-on.

I believe the SAJ is more tolerant of production errors than an AJ. My efforts in trying to get standard AJs to work resulted in frustration and abandonment after a lot of effort; they just require too much precision and maintenance. I think Iain Rice went through a similar experience so I was not alone.

Risk

The SAJ, AAJ, standard AJ and Imprecise are all cheap to make from wire. If you commit to proprietary couplings there is always a risk the supplier will disappear. The

Yeovil and Fleetwood Shawe couplings in the EMGS Manual are no longer available. Dinghams nearly disappeared recently but were rescued by societies and a new supplier of a similar type (the Flippem).

Conclusions

If you are not a precision engineer, then this Simplified AJ coupling may appeal. It is double-ended (stock can be turned), features delayed uncoupling, is fairly unobtrusive and is cheap. If a mere bodge-merchant like me can make them work reliably, so can you. OK I have not achieved 100% reliability but am well over 50% and improving quickly. That compares with about 15% for standard AJs and no improvement in prospect.

Special offer: TWO for the price of ONE. If after trying these out, you decide they are not for you, do not dismantle the couplings. So long as you allowed 0.6mm+ between the hooks and the buffer faces, you can fit loops and you have Imprecise couplings!

Hopefully this article will inspire others to adopt and to simplify or improve further.

Bouanne Chànce!

References:

1. "Altered Alex Jacksons" by Vincent de Bode, MRJ123.
2. "A Modification of the Alex Jackson Coupling" on YouTube by Graham Allen. His video of yard operation is impressive.
3. "Auto Angst", pages 93-97 of "Cameo Layouts" by the late Iain Rice (published by Wild Swan). Concludes with his Imprecise coupling design.
4. "Brookfield" by Ray Earl, MRJ142. Essential reading for anyone wishing to build an exhibition layout aimed at entertaining the general public.