Pick-ups – a vexed question.

Bob Alderman © 2006

There are probably as many ways of current collection for model locomotives as there are wheel arrangements. After many years of modelling a suitable choice for a particular model still poses a challenge to me at times.

Of all the methods available each has its benefits and protagonists. I will endeavour to describe and illustrate each type.
There are a variety of "wiper" types where a wire or strip bears on the wheel. There are several sources of plunger pick-ups where a spring loaded contact bears on the back of the flange and there are shorted wheels, with and without split axles.

Wiper pick-ups.

Wiper pick-ups are probably the simplest and most adaptable type. They can be fitted in many places and can be discrete.
I found the best method of mounting them is to use a piece of copperclad. This can be sleeper strip or cut from a sheet. If you do not wish to glue the strip to the chassis then double sided copperclad can be used and soldered on. Take care of course not to create a conducting path between the two copper conductors.

The wiping contact is a matter of choice. I favour 0.45m diameter brass wire, but nickel silver or phosphor bronze can equally be employed.
The geometry of the wire will depend on the installation. In the picture above you can see that several bends are needed to clear the bottom of the chassis then reach over to the back of the wheel. The end in contact with the wheel can be either the end of the wire pressing into the flange or shaped as in picture to sweep the back of the wheel. It is a matter of personal choice. I have found no advantage with either.
The contact pressure on the wheel should not be too heavy. Treat the wire as a cantilever spring.

A simple rule of thumb is if the length of the wire from its fixed point is taken as “X” units, ignoring any bends, then the deflection required to bear on the wheel is about 0.2X units.

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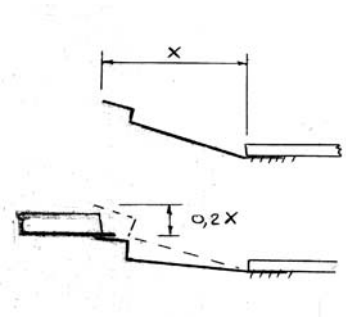


E.g. If X= 10mm,
Then offset is 0.2 x 10 = 2mm

Sometimes it may prove difficult to thread the pick-up wire through brake gear without it touching. A simple solution to this is to insulate it. Simply strip off some insulation from some fine flexible wire and thread it over the pick-up wire.

An alternative to the wiper rubbing on the back of the wheel is to have it rub on the tread. The theory being that it is self cleaning. This is not always easy from inside the chassis and can lead to a convoluted pick-up wire. If possible try to mount it on the outside of the chassis. The illustration below shows a pick-up fixed to the head of an 8BA bolt threaded through an insulated bush in the chassis. The bush in this case was made from the body of a plunger pick-up but styrene tube serves too. In this case it is slightly free to move in the bush allowing one set of wheels to move on the compensation. The motor wire is soldered to the inside end of the bolt.

The pick-up shown is largely hidden by the loco body in this case.

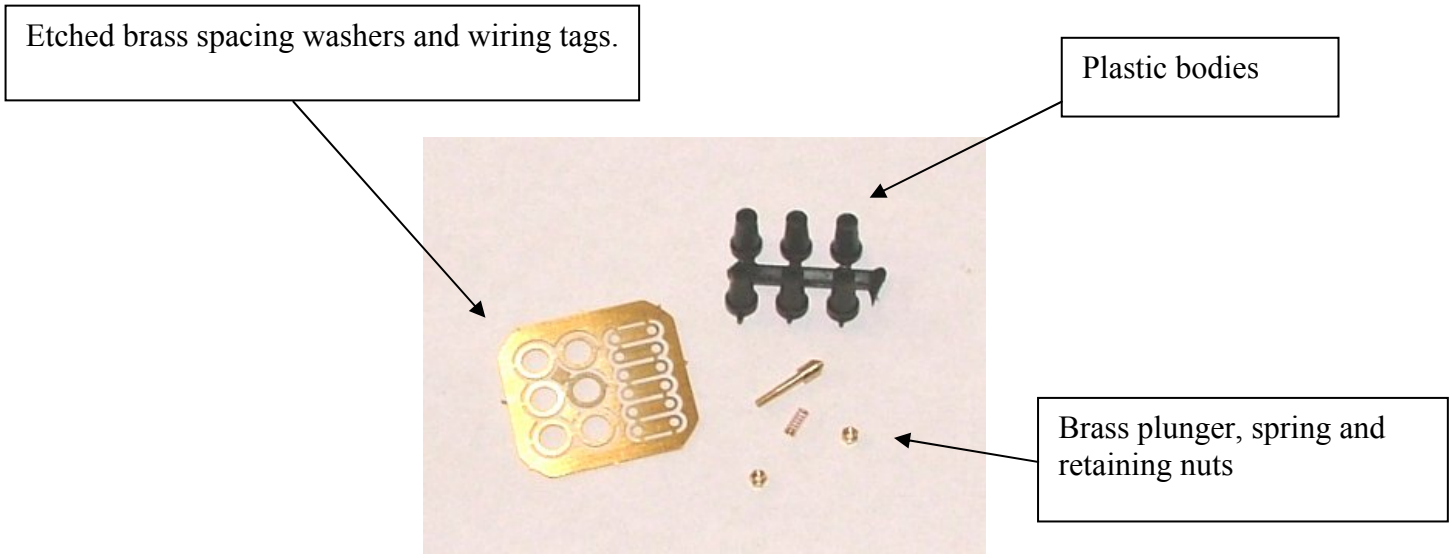
Plunger pick –ups

There are several sources of plunger pick-up. In 7mm Slater's, Gladiator and Ron Chaplin, also some kits come with the manufacturers own. In 4mm only Alan Gibson's come to mind.

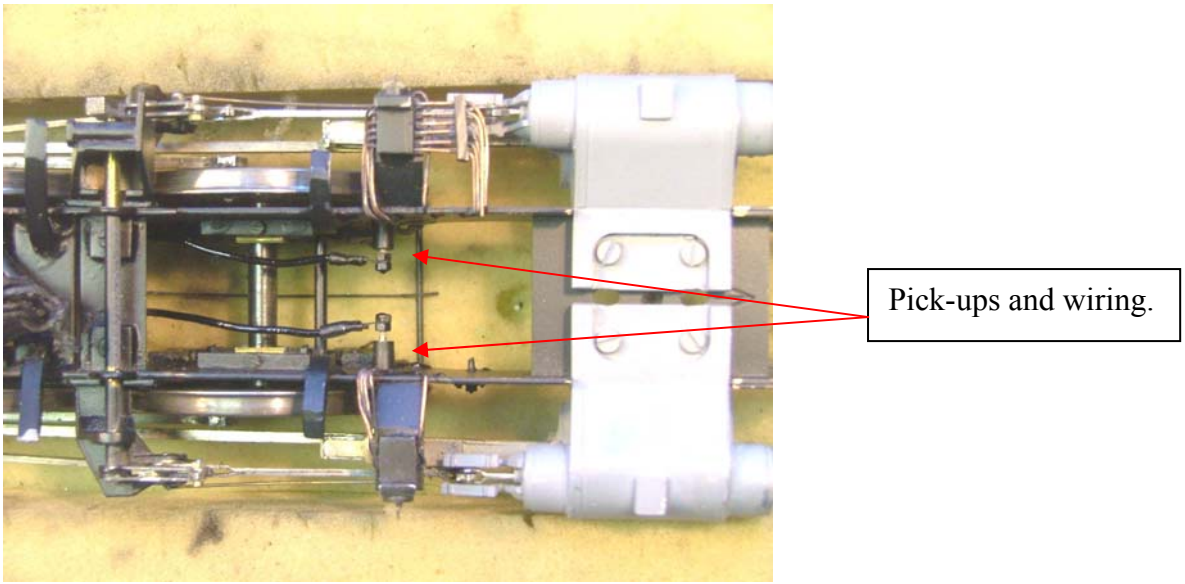
As the name suggests a plunger is pressed against the back of the wheel. A spring is used to apply the pressure.

The installation requires a hole in the chassis to fit the body of the pick-up or in the case of the Gladiator one to clear the plunger. The position of the hole can be important. If there is any form of suspension then the hole should be on the horizontal centreline of the axles, or nearly so.

Illustrated below are the parts of the Slater's 7mm plunger pick-up.



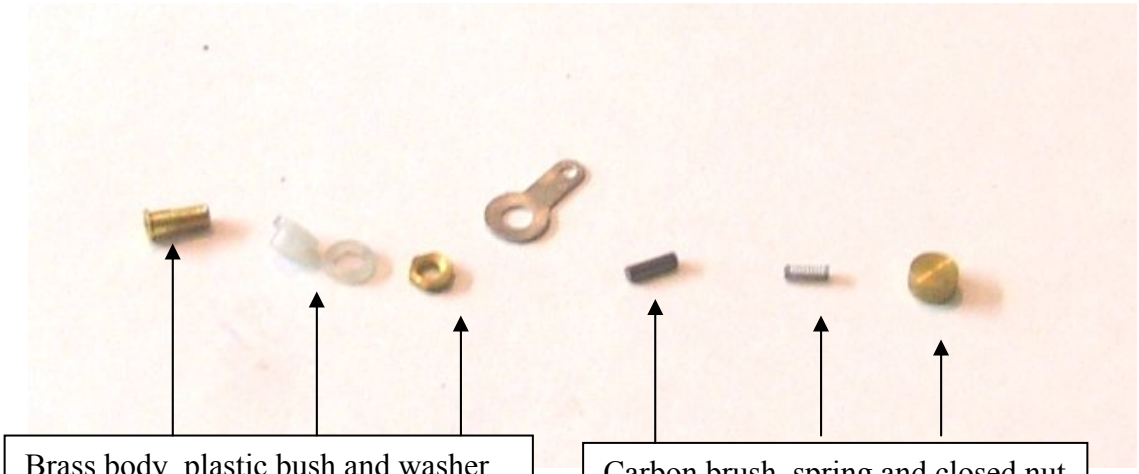
The picture below shows a typical installation.



When fitting the plastic body open out the hole in chassis with care. The body should be a light push fit with retaining superglue under the flanged head. Check too, that that when the plunger bottoms out, the pair are not wider than the back to back distance across the wheels. If they are it is an automatic brake and can distort the wheel on the axle. File off the excess off each plunger, the same on both. It doesn't matter if you loose the point a flat picks up equally well.

In 4mm the Alan Gibson ones are very similar.

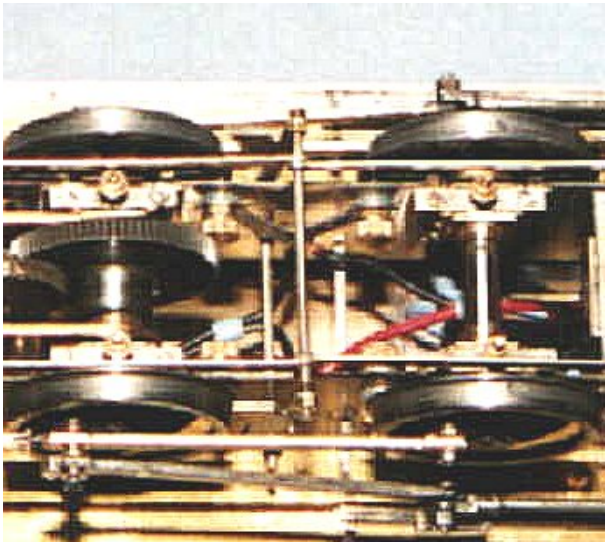
The 7mm Ron Chaplin ones are slightly more complex.. In this case a metal body is retained in plastic bush in the chassis. Once the body is fitted in the chassis the carbon brush pick-up and spring can be fitted at a later stage. This does mean you can check for free running without ant pick-up friction. The carbon brush and spring are retained by a closed nut fitted from the inside. The parts are shown below.

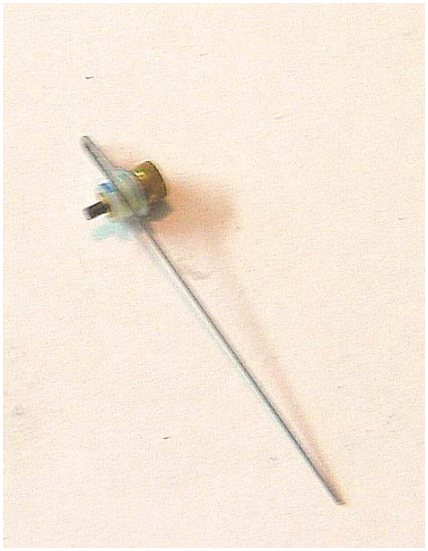


Brass body, plastic bush and washer, retaining nut and wiring tag.

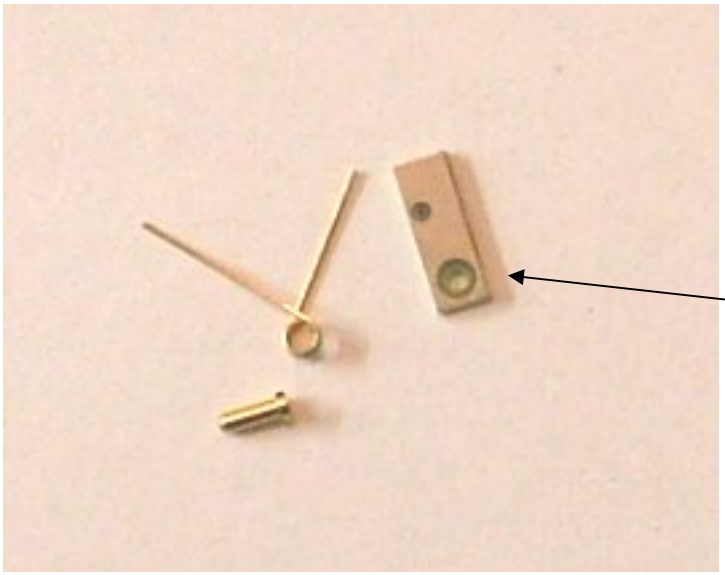
Carbon brush, spring and closed nut

An installed pick-up is shown below and detail assembly alongside. The thin wire represents the chassis plate.





The 7mm Gladiator is shown below. This differs from the earlier types as it requires its body to be soldered to the inside of the chassis. The body is a glass based copperclad pad. The spring is soldered to this and the plunger passes through a hole and through a hole in the chassis. The chassis hole must not touch the plunger or it will short circuit. Care must be taken not enlarge the hole the plunger fits in or it will cockle and jam. Like the Chaplin one the plunger can be fitted after free running has been achieved.



The baseplate, spring and plunger.

Part of the assembly instructions are reproduced, with permission below.

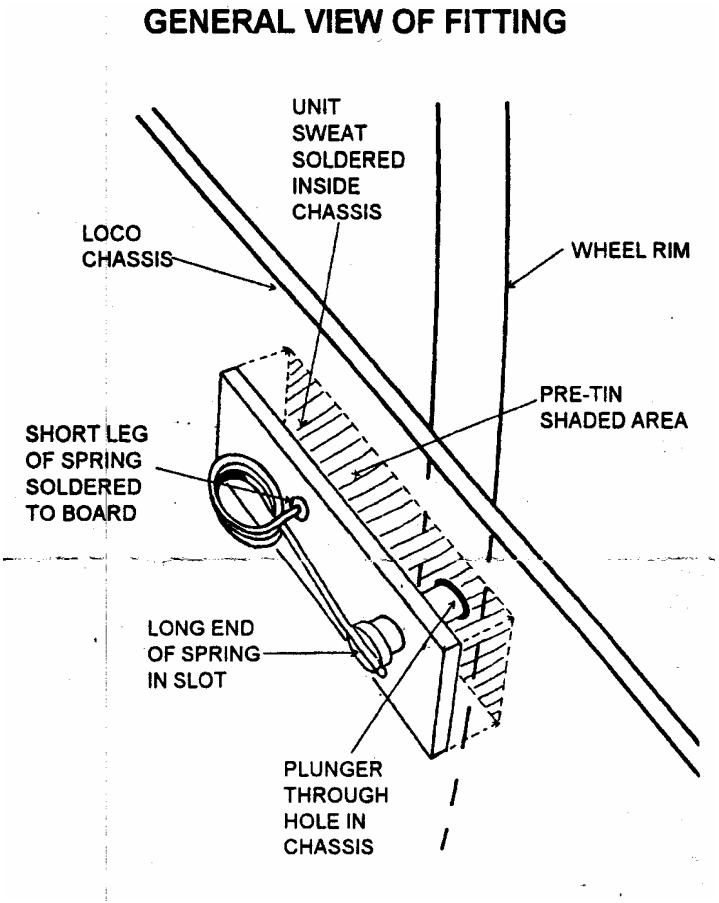


Illustration courtesy Gladiator Kits.

American Pick-up System and Split Axles.

Shorted wheels.

For either of these systems a shorted wheel will be necessary, except of course if you use an un-insulated Romford in 4mm.

The illustration below shows a Slater's 7mm wheel shorted from tyre to centre bush.The metal parts are drilled to accept a copper wire or, as shown, a phosphor bronze strip. Either will do. The wire can be readily soldered if it is tinned before fitting and a large hot soldering iron is used. The soldering should only take moments. The spokes in this instance have been relieved for the strip. This again is an option.

For a 4mm wheel that has a fully insulated centre solder the wire to a 5BA brass washer (for ⅛" axles). I believe there is an etched product that does the same.

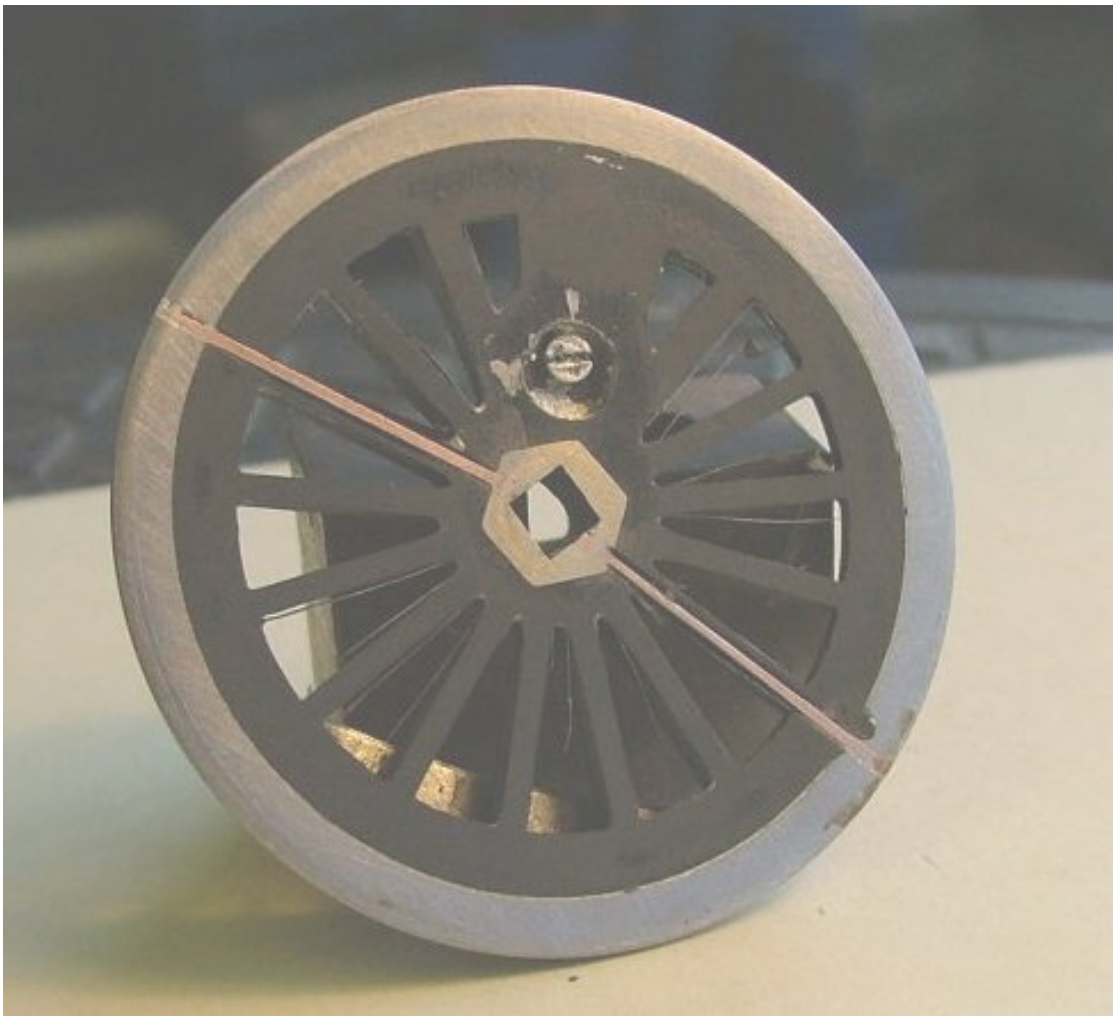


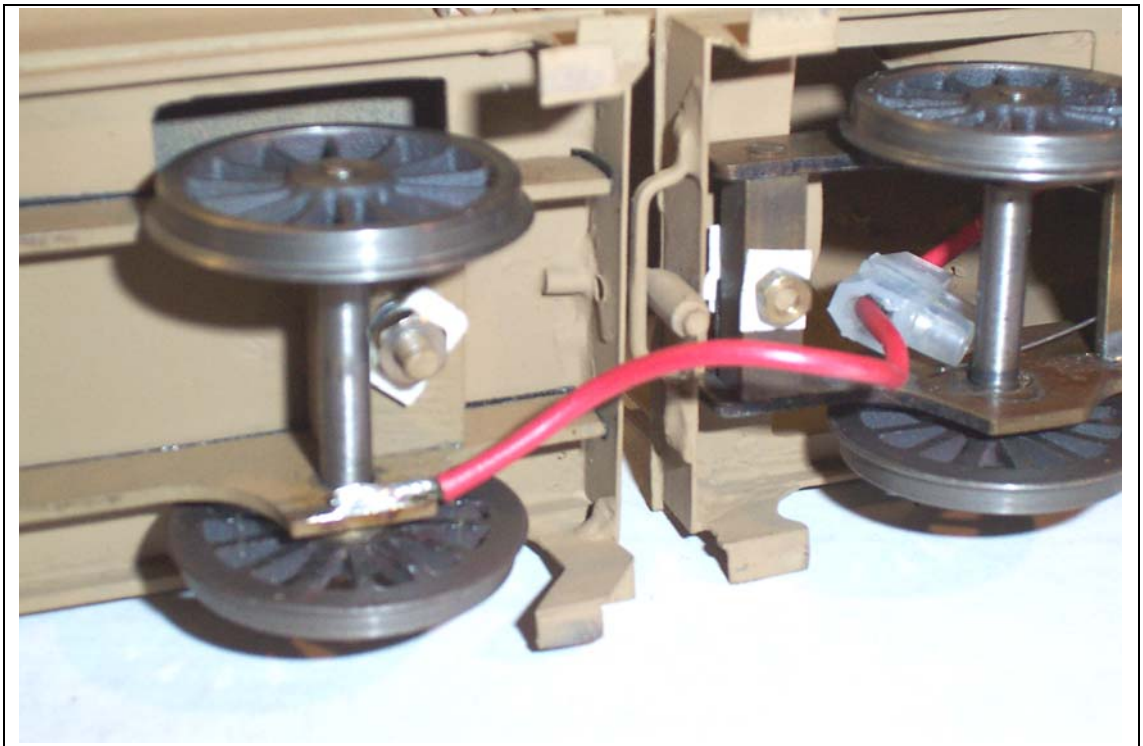
Photo courtesy Fred Lewis.

The 'American' wiring system for locomotives.

Ken Sheale – G0G

The system is designed to eliminate the use of pick-ups rubbing against the wheels of a locomotive but is only applicable to tender engines and some tank engines. Basically, the locomotive wheels are insulated on one side only and power is picked up from the rail on the uninsulated side. The tender wheels are insulated on the opposite side and the uninsulated side acts as the return to the other rail. One terminal on the motor is connected to the locomotive chassis and the other is taken to the tender chassis via a connection between the engine and tender.

Although the system is simple it has certain drawbacks. For example, unless the locomotive and tender chassis are insulated from the bodies the minimum radius can be a problem. On sharp model curves, some locomotives with long overhanging cab roofs can come in contact with high-sided tenders creating a short circuit. Similarly, unless the locomotive couplings are insulated, double-heading can also cause a short circuit if both locomotives are wired the same way round.

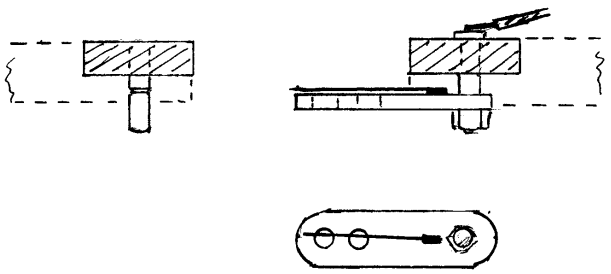


The connection system fitted to an old model converted from three rail. The tops of the chassis members have a thin insulating layer attached to ensure that the locomotive and tender bodies are electrically dead. The mounting screw holes in the frame stretchers have been enlarged to allow an insulating sleeve to be installed. Insulating washers are fitted under the nuts. The locomotive and tender are semi-permanently connected by the wiring, which just uses a simple 'chocolate-block' connector to link the two. Now-a-days miniature line plugs and sockets are available from a number of suppliers like Squires, Maplin, etc. The wheelsets are cast iron.

The system can be adapted for tank engines having a bogie. The chassis is from a Southern M7 0-4-4T. An insulated block has been fitted into the frame at the rear and it carries the bogie pivot post. This makes contact with the bogie frame. The bogie wheelsets are insulated on the opposite hand to the drivers and provide the return path. The bogie sideplay is slightly restricted to prevent the leading bogie wheels from coming into contact with the steps below the cab and creating a short circuit when traversing curves down to 4ft radius. The wheelsets are cast iron.

A secondary problem can arise depending on the type of wheelsets used. Cast iron wheelsets where one side is insulated are easier to install. They can be obtained from a number of sources and do not require further work. Wheelsets, where the body of the wheel is an insulating material, like Slater's, require a shorting strip to be installed on one side to provide a current path. Slater's can provide wheels with a shorting link built in but they have to be specially moulded and the cost is quite high (about £4.00 per wheel at the moment). The alternative is to fit a connection using a thin wire (15A fuse wire). This needs to be soldered to the hub and to the rim, but requires care to avoid damaging the plastic moulding.

The Insulated Drawbar Connector



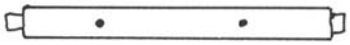
The simple arrangement shown above and used by Far Eastern brass locomotive builders for the American market is the built-in connector making use of an insulated drawbar. The tender carries a pivot pin fixed firmly to the body. The locomotive has a similar pin located in an insulated block carrying the drawbar. Usually two holes are provided, one for the normal connection and a longer one to allow for use on tight radius curves. The light wire spring is to prevent the drawbar sliding off the pin. The act of coupling automatically makes the electrical connection. If combined with insulated chassis, the system provides a simple pick-up system that does not require checking and adjustment.

Split Axles

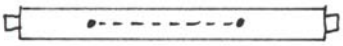
Frank Sharp

Split axles using Slaters axles, thus maintaining the square ends.

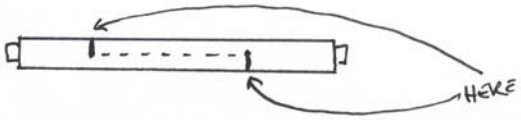
A drill two holes 15mm apart, using a 1mm drill or less, as shown



B using a fine blade in your piercing saw, join up the two holes



C fill the slot created with araldite and leave for 12 – 24 hrs to harden



D cut a slot from above and below the holes as shown, and fill again with araldite, leaving to harden.

Clean up with fine emery and you have ideal split axles, particularly for tenders etc.

For the driven axle I make the slot small and move it over to one side – this is the time to measure carefully. It helps if you are using Slaters plastic hornblocks and also if you can get an insulated bush to use in your gearbox. (JPL models do them)

So far I have made some40 axles like this with no failures.

Hope this helps

FGJ

For Frank's system it is better to use 24 hour cure Araldite rather than rapid set. If the Araldite can be cured with a little heat, such as on a radiator, then a better cure can be achieved.

It is also possible to use this method on 4mm ⅛" axles, though Frank says the axle is a little weaker.

Finally I have friend who has occasionally used 4mm sprung buffers as pick-ups in both 4 and 7mm models. The brass buffer body is soldered to a piece of copperclad stuck in the appropriate position.