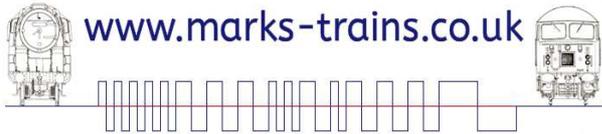


'MarWick' Brush Insulating Sleeve

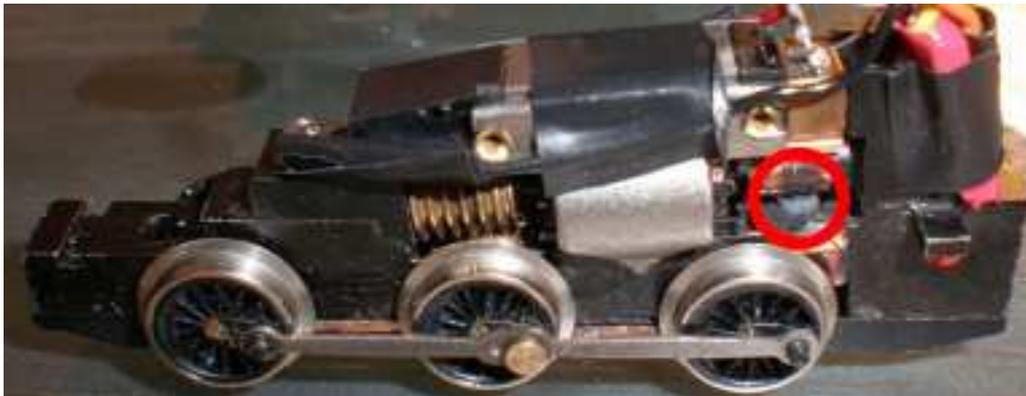
A joint venture by Mark's Trains and Wickness Models



*A sleeve designed and manufactured to aid the conversion of early Graham Farish 'Poole' built locomotives to DCC.
With no chassis drilling required, no mess, and a quick and easy installation.*

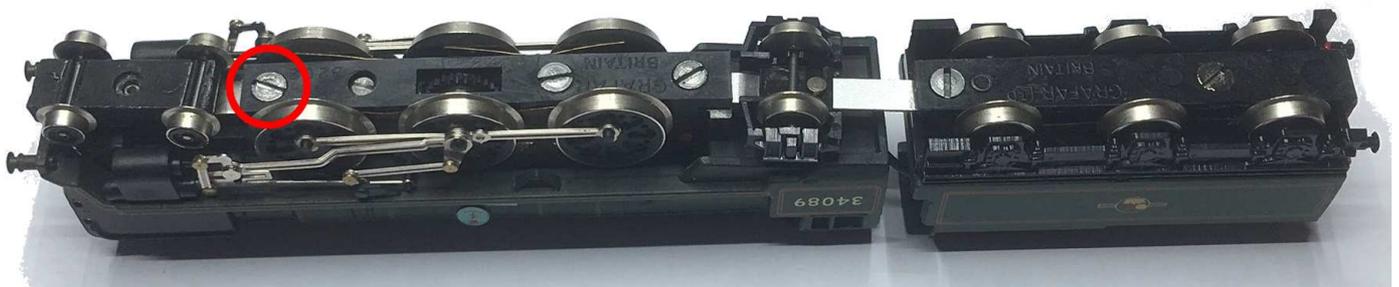
The 'MarWick' Brush Insulating Sleeve has been designed and manufactured to the exact measurements of the original Graham Farish brass brush sleeve, used to aid the conduction of electricity between the chassis and brush. The 'MarWick' Brush Insulating Sleeve is manufactured from a Polyoxymethylene copolymer (POM-C) also known as Acetal. It is an engineering thermoplastic used in precision parts requiring high stiffness, low friction, and excellent dimensional stability. POM is characterized by its high strength, hardness and rigidity. It has a melting point of 175°C.

The 'MarWick' Brush Insulating Sleeve is designed as a direct replacement to insulate the brush and spring from the chassis to allow easy and simple conversion to DCC, and by insulating the retaining clip with the Kynar heat shrink provided, this provides the complete isolation from the chassis and track pick-up required for a successful DCC conversion to take place.



Steam locomotive body removal

Step 1: On the underside of the chassis remove the screw at the front end. If there is a pony truck this can be slid out from the groove and placed somewhere safe with the screw.



Step 2: Once removed the chassis should lift up from the front end of the body, slide the chassis forward to detach from the body. Care should be taken for locomotives with a tender and pick-up wire running through, it is sometimes easier to remove the tender body first to allow extra working space.

Step 3: With the chassis underside facing upwards remove the screws holding the black base plate in place. With tender locomotives remove the screw at the rear first to slide the tender & coupling bar away. You should now have access to the axles and pick-up strip. Remove the final screw holding the pick-up strip in place, then carefully lift the wheel-set out making sure you do not damage the rods and motions.

Diesel locomotive body removal

Step 1: Remove the body by simply lifting off vertically from the chassis. The sides of the body may require gentle prying outwards at the centre to aid body removal. The bodies on diesel locomotives are simply a press fit, so removal should be quite easy.

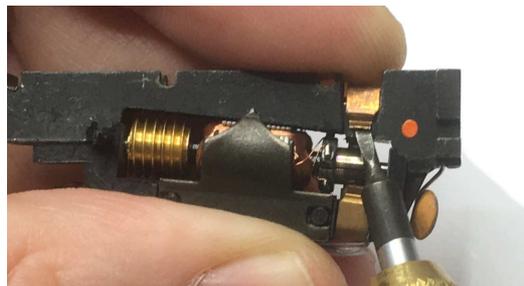
Step 2: Remove the battery box from the underside of the chassis to gain access to the bottom of the motor.



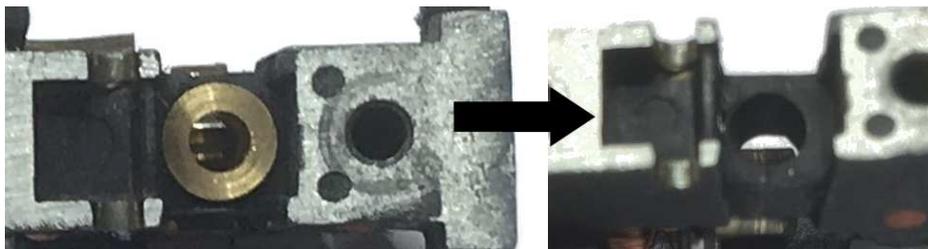
Note: Class 08's and 20's have a different body removal procedure. For class 08's refer to the steam locomotive body removal section above. Class 20 bodies are removed by carefully easing and unclipping the front cover, then removing the screw located beneath.

Installing the 'MarWick' Brush Insulating Sleeve

Step 1: Remove the brush retaining clip now visible on the underside of the chassis, bearing in mind that there is a spring and brush beneath this, use a small flat head screwdriver under the clip whilst supporting the clip with a finger to prevent the clip and spring from flying out.

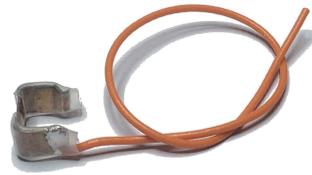


Step 2: Turn the chassis upright and gently tap to remove the spring and brush. The brass sleeve can now be removed, it should normally fall out but some may require a bit of gentle persuasion with a small flat bladed screwdriver or needle nose pliers. Keep the brush and spring to one side as they will be needed again.



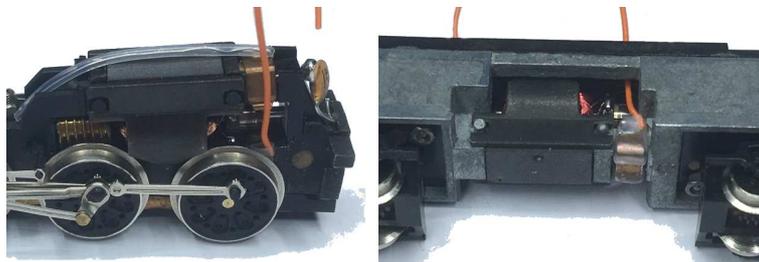
Step 3: Now insert the 'MarWick' Brush Insulating Sleeve in to position, it should not require too much force to insert as very minimal resistance is present. Too much force may indicate the sleeve being inserted at an angle, which may damage the sleeve and cause the brush to bind. Make sure the sleeve flange is located flush with the chassis.

Step 4: The brush retaining clip now needs to be modified so that complete isolation from the chassis and track pick-up takes place, and also to provide a means of supplying current to the brush from the decoder. Simply solder a piece of wire to one side of the retaining clip where a groove is present on each side, the groove may need cleaning with a fibre glass pen or file first before soldering. Insulate the sides of the retaining clip by cutting the Kynar heat shrink provided to the correct length, and slide over the sides of the clip. It may be easier to slide the heat shrink over the sides first before soldering the wire on, as feeding the heat shrink over the wire and clip may be a little fiddly. The modified retaining clip should look like the one in the photo below.



Pro tip 1: Cut the pieces of Kynar to length so that they reach past the sides, over the corner and towards the middle of the clip – this prevents the possibility of shorting against the chassis at the corner of the clip.

Pro tip 2: Solder the orange decoder wire straight on to the retaining clip for a tidy conversion, observing the required routing of the wire before soldering in to place. It is important on diesel locomotives to route the wire from the top of the chassis going through the inside before soldering on to the clip. The photos below show the correct routing of the wire, with a steam chassis on the left and a diesel chassis on the right.



Step 5: Inspect the brush for wear and contamination. If the brush shows too much wear (less than 2mm below the spring shoulder remaining) or signs of contamination (oil and/or powder present) it is recommended to replace the brushes as a pair. If the brush is OK, refit the brush into the new sleeve aligning the groove on the face of the brush with the motor commutator. The brush should slide in easily without binding against the sleeve; during operation the brush is required to move axially to provide good electrical contact as it wears during use. If the brush does not slide through easily it may require replacement.

Step 6: Finally fit the spring inside the 'MarWick' Brush Insulating Sleeve making sure the brush is still inside, and install the retaining clip taking care not to damage or tear the Kynar heat shrink. On steam locomotives you will need to make sure the retaining clip does not foul the wheels, if they do then slightly filing the side of the chassis should cure this problem.

Final checks

Check connections between the wire from the retaining clip and the chassis to ensure no shorts are present, do this using a digital multimeter set to resistance measurement. There should be infinite resistance present (i.e. no change of resistance reading displayed, indicating infinitely high resistance). A short will have a resistance value of approximately 0 Ohms.

If new brushes are being installed it is worth mentioning that the motor will need to be run in as if it was a new locomotive, the locomotive may run irregular until the new brushes have bedded in. It is best to run in a locomotive on DC, to do this temporarily connect the wires from the retaining clips to each side of the chassis (where the decoder pick-ups will be located). Whilst the locomotive is being run in check for smooth running and excessive arcing between the brushes and commutator. Excessive arcing displays flaring over the commutator surface and is normally yellow/orange in colour. A slight amount of blueish sparks are perfectly normal at high speeds, and isn't a matter of concern.

If all of these final checks are complete and you are satisfied with your work, install a DCC decoder of your choice; wiring the black wire to the left hand track pick-up (nut in front of the motor), red wire to the right hand track pick-up (capacitor lead behind the motor), the orange wire to the bottom brush and the grey wire to the top brush. Check wiring and retaining clips for any signs of shorts and stray blobs of solder before testing on a DCC track supply. Once happy with the conversion the body may be refitted.

Mark's Trains and Wickness Models recommend the following DCC decoders: Zimo MX621 (wires only), TCS Z2 (wires only), Lenz Silver Mini (wires only), ESU LokPilot Nano, and Digitrax DZ126 (diesel only).

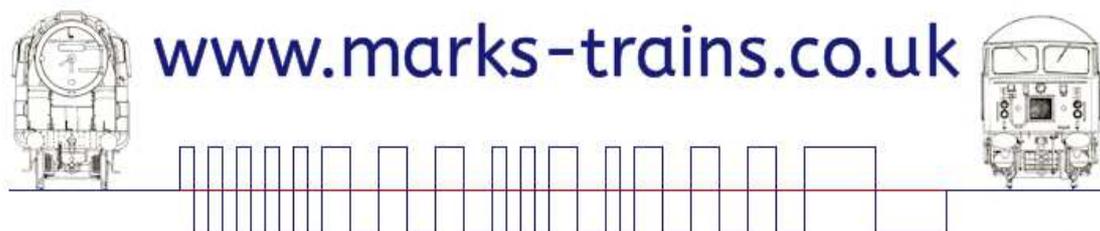
Pro tips

Carefully trim the capacitor from the chassis leaving a section of the lead still attached to the chassis, this can be used as a pick-up for the decoder (red wire).

Some diesel chassis' have a lever tab over the brush and spring instead of a retaining clip, simply swing the tab to replace the brass sleeve with a 'MarWick' Brush Insulating Sleeve and then solder the decoder motor control wire to the top of the spring. Slide a section of Kynar cut to length over the tab before swinging the tab back over the brush and spring.

On the top of a diesel chassis there is a brass strip with a brush in the middle. Simply pop in a second 'MarWick' Brush Insulating Sleeve to isolate it, and solder the black decoder pick-up wire to the brass strip. Loosen the screw near the capacitor to remove it and slide the tinned end of the red decoder pick-up wire through the hole so that it touches the chassis, remembering to tighten the screw again to clamp the wire in place!

Diesel split chassis: 'MarWick' Brush Insulating Sleeves can be used to isolate the split chassis sides from the brushes to allow easy DCC conversion. Insulate the centre of the retaining clips with a small piece of Kynar (leaving the sides unprotected) and solder a decoder pick-up wire on the side. Fit the insulated sleeves and solder the decoder motor control wires to the springs before refitting with the brushes.



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