SERVICE PLEASE

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If you own a Trix AC loco it's a great benefit to know how it works and how to do repairs and servicing. There are helpful service sheets on www.TTRCA.co.uk, and also on www.TRIX.co.uk, but for those that cannot access the Internet this article should be of help.

A common 1950's BR tank loco has been chosen to show the AC mechanism parts. Trix made AC mechanisms for almost 20 years, and there are design variations, but the early 1950's version is probably the most common.

Dismantling

Have a small container handy to store small parts after they have been removed. Tools required are a small pair of long-nosed pliers, screwdrivers, alcohol based cleaner (eg Maplin Contact Cleaner), cotton buds, pipe cleaners and a rag.

Remove both crank bolts with pliers, taking care not to damage the hexagonal nut. Remove the piston rods/crank arms.

Undo the 4 buffers. Wrap them in cloth or rubber bands to avoid scratching and loosen with long nose pliers. Tender locos have two buffers and screws at the rear of the cab.

Lift off the loco body, weight and spring. Tank locos sometimes have a piece of packing at the rear of the chassis. Lift the front end of a tender loco to avoid the reverser hinge pin catching on the rear beam of the cab.

Your loco chassis should look similar to the photo below.

Next, undo the brush caps and remove the brushes and springs. Then carefully loosen the two motor side frame screws - undo each one a few turns at a time.

Carefully wiggle the side frame until it comes away. This part is fragile and often suffers from metal fatigue, causing it to break apart. If the side frame is stuck after loosening the side frame screws, gently tap the screw heads alternately to free it. Later versions of the chassis have a suppressor capacitor soldered across the contacts.

Next remove the contact shaft and the two retaining pieces. Note that the stiff brass part is mounted in front of the springy piece.

Take hold of the armature shaft and turn slightly to bring one of its coils between the wheels and remove it from the chassis.

Undo the bolt that holds the reduction gear, turn the driving wheels slightly and remove the gear.

Cleaning

Dip a cotton bud in cleaning fluid and wipe the black deposits from the copper commutator. Use a wooden cocktail stick to clean between each sector.

Wipe clean the contacts on the reverser shaft, retainer spring, motor side frame, and field coil.

If the brushes do not need replacing wipe them with some paper. Clean out the side frame brush holes with a pipe cleaner.

Remove dust, hair and old oil from the chassis and reduction gear. Inspect the reduction gear for worn teeth, and ensure its inner cog is firmly fixed to outer cog.
Spray cleaner (not oil!) on the reversing pawl assembly.

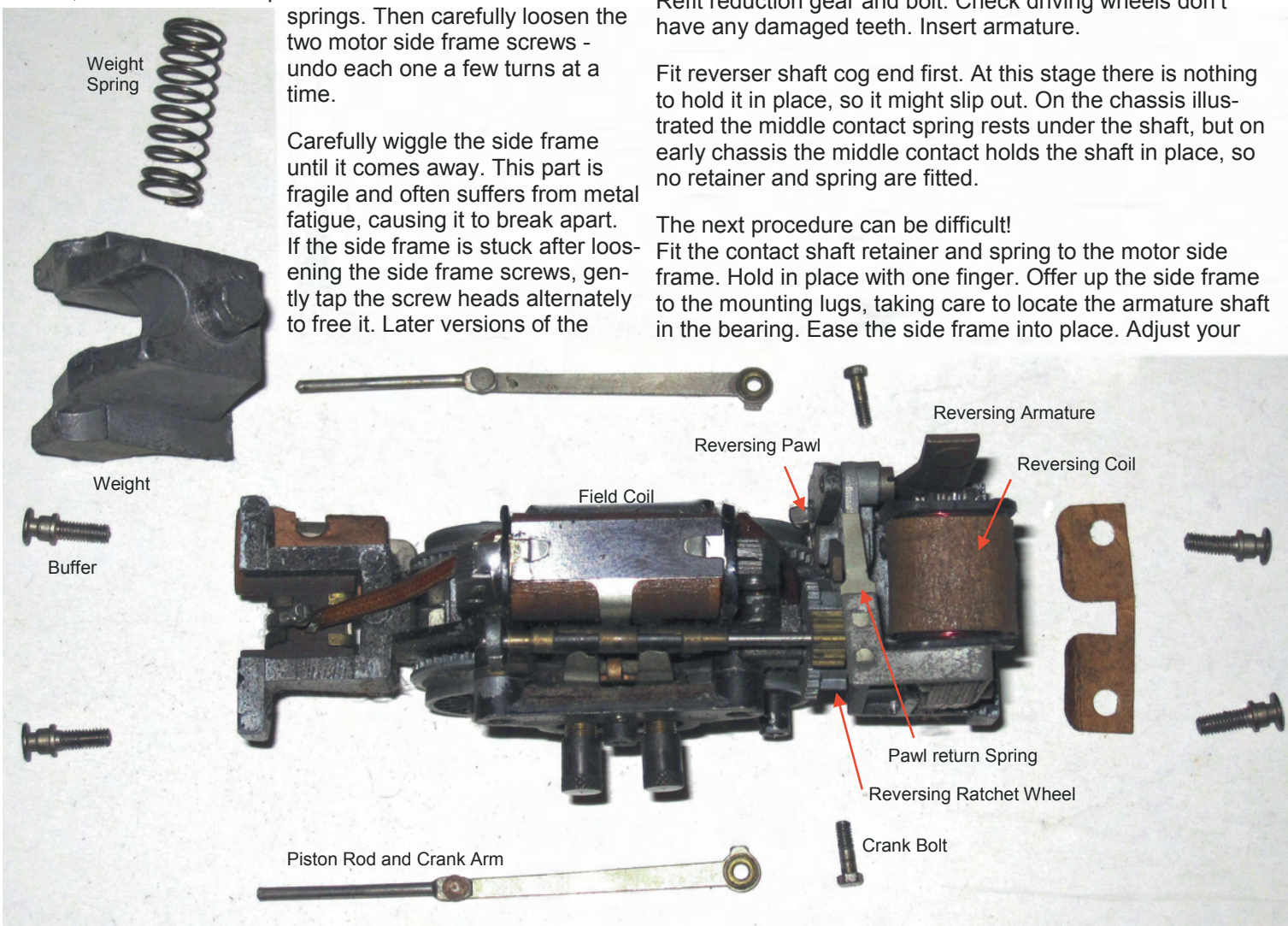
Clean the wheels inside and out with a stiff brush, removing any hardened oily deposits at the roots of the gear teeth with a pin. Ensure that the axles turn freely.

Reassembly

Refit reduction gear and bolt. Check driving wheels don't have any damaged teeth. Insert armature.

Fit reverser shaft cog end first. At this stage there is nothing to hold it in place, so it might slip out. On the chassis illustrated the middle contact spring rests under the shaft, but on early chassis the middle contact holds the shaft in place, so no retainer and spring are fitted.

The next procedure can be difficult!
Fit the contact shaft retainer and spring to the motor side frame. Hold in place with one finger. Offer up the side frame to the mounting lugs, taking care to locate the armature shaft in the bearing. Ease the side frame into place. Adjust your



fingers to hold the side frame firmly in place while tightening the two retaining bolts - a few turns on one side, then the other, so that the frame is not distorted.

Operate the reversing armature smartly with the forefinger of the right hand. Each time this is done the contact shaft should revolve ¼ turn, alternately bringing a pair of contacts or bakelite insulating sections to a horizontal position. The armature should always fall back freely.

Unfortunately it is possible to refit the contact shaft a few degrees out of alignment. If the contacts / insulating segments are not horizontal, i.e. facing directly away from the left hand side of the motor at each operation, the shaft should be removed and re-engaged with the pawl wheel on the next tooth round. Once you've done this a few times you'll be an expert in the art of motor side frame fitting!

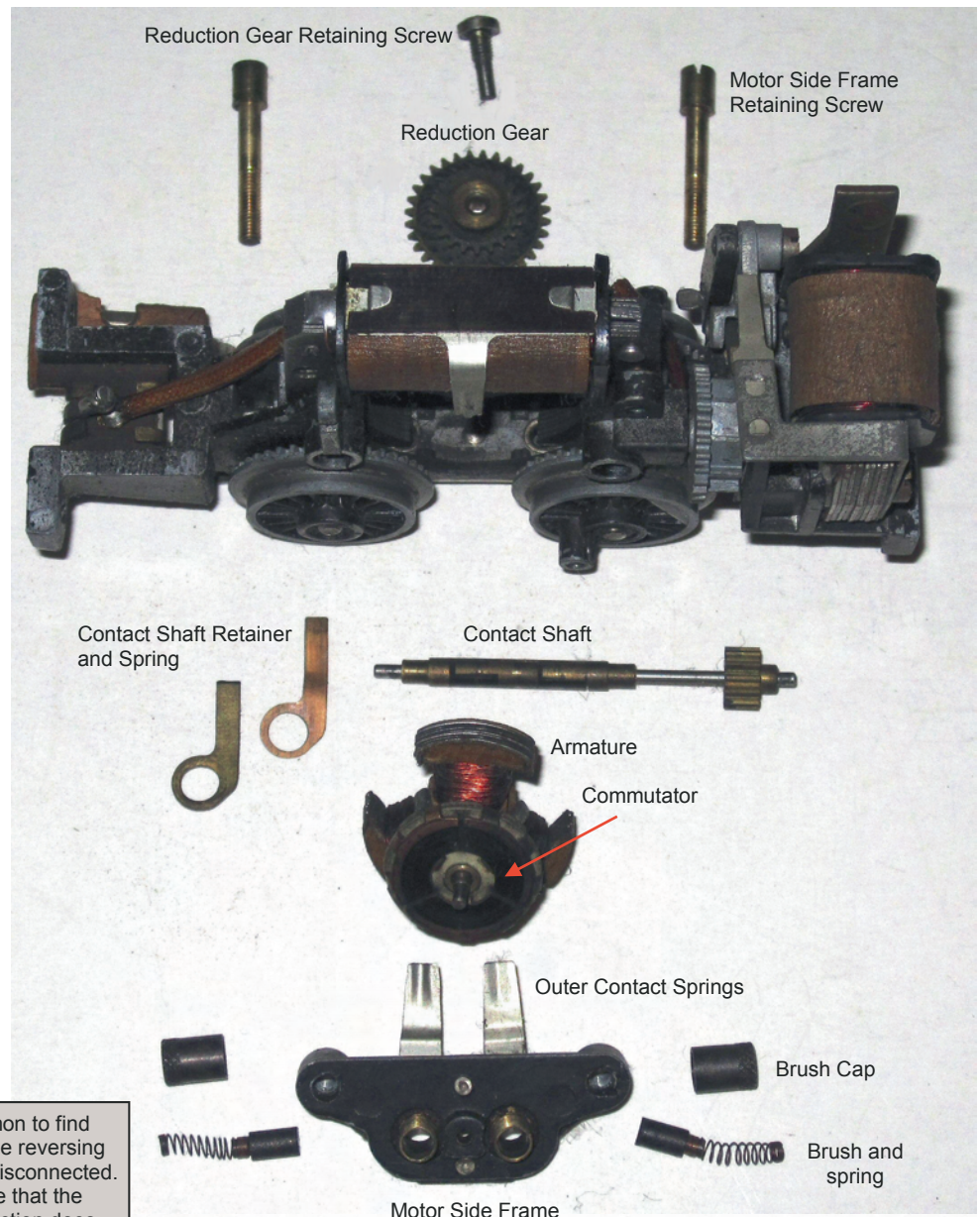
The contact shaft should press lightly against the middle contact spring. If this has become distorted it must be carefully bent back into shape.

The retainer consists of a thick brass piece which usually bends slightly away from the reversing shaft, and supports an identically shaped flat contact spring. When assembled the latter exerts slight pressure on the groove at the front of the shaft and serves to ensure a good electrical return to the chassis. Both this and the side frame contacts must make contact without excessive pressure since the shaft must be able to turn with the available force of the reversing magnet.

Now see that the wheels, reduction gear, and armature turn freely.
Refit brushes and springs and brush caps. The wheels will now be stiffer to turn. Do not fit the body until the chassis has been power tested.

Adjustments
Adjust the tension of the pawl return spring so that the reversing armature flops away from the reversing coil after it has been operated.

Check that the leaf spring under the centre shoes is flat except for the stamped out "finger" at each end. If the rest of the spring has become bent up, excessive pressure will contribute to wheel spin. It sometimes happens that the centre shoe cover is banana shaped because its retaining screw has been over-tightened or the cover has not been properly seated between the lugs on the chassis. If this is so it should be straightened with pliers. Check that the shoes move freely. If they are sticking, find the cause rather than bending the spring to increase pressure.



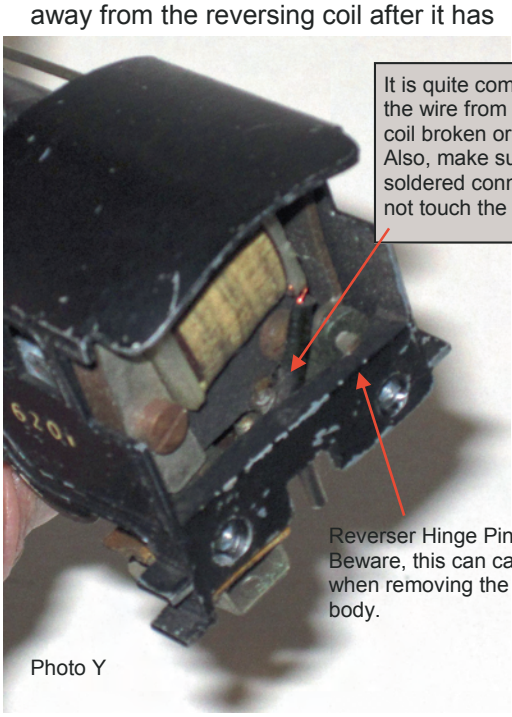
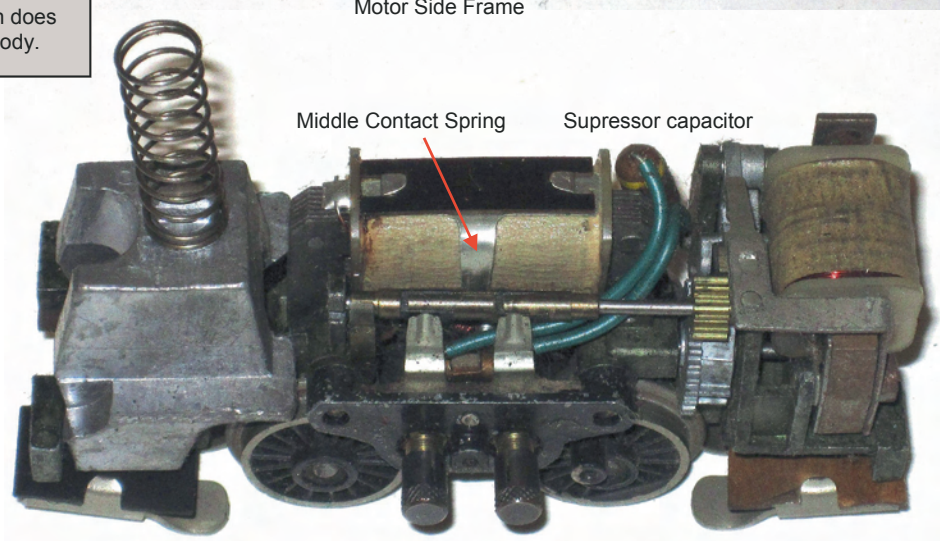
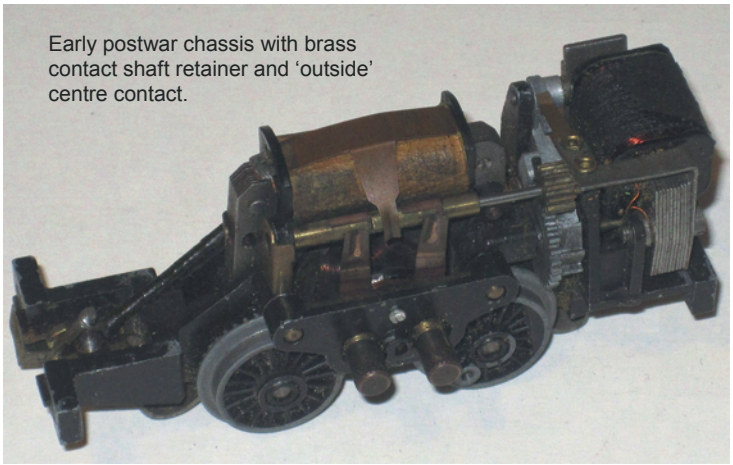
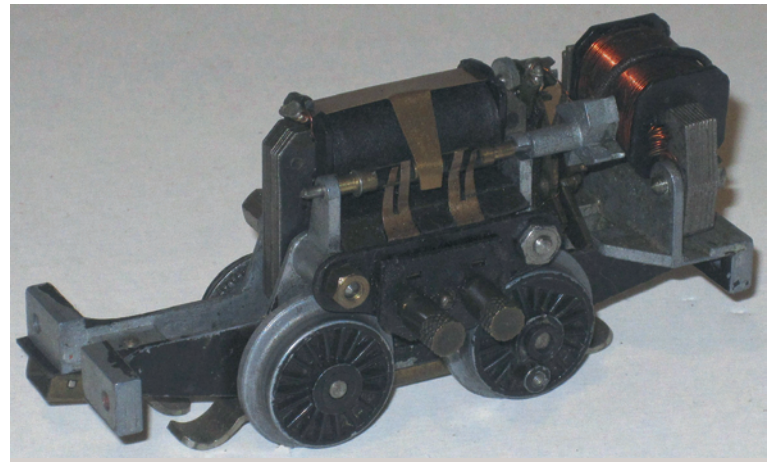


Photo Y





Early postwar chassis with brass contact shaft retainer and 'outside' centre contact.



An early prewar chassis with different contact shaft and retainer, 'outside' centre contact, no reversing ratchet wheel, nut and bolt fibre side frame, thin chassis, and several other differences. The chassis is prone to fracture.

Testing
Lubricate the following points only with light oil, using a wire dropper:

1 drop to the chassis bearings at each end of the axles.
1 drop to the reduction gear pinion screw.
1 drop either side of the small gear on the reduction gear. (This will spread to the wheels).
1 drop on the pinion gear at the end of the armature shaft.
1 drop to the bearing at each end of the armature shaft.

Do not oil any part of the reversing mechanism

Inspect collector shoes for wear and cleanliness. Replace or clean.

Place the chassis on clean track, ensuring the collector shoes are on the rail that you will be powering. Switch on and operate the controller. If it's your lucky day the loco will perform correctly, but often problems arise.

See the TTRCA Spares list for oil, replacement shoes, brushes, etc.

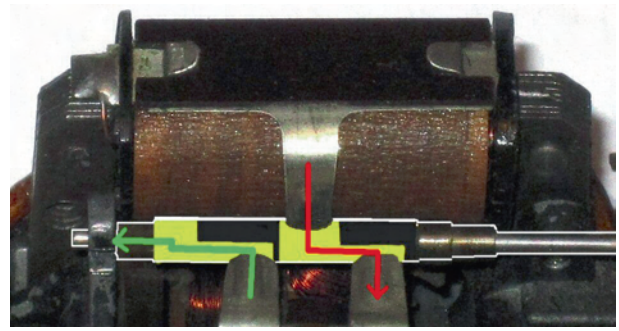
Loco runs but won't reverse.
The ratchet wheel has wear.
The pawl assembly and/or ratchet wheel have 'grown' due to age and are stiff.
The reversing coil is faulty or disconnected.
The contact shaft is not making electrical connection.

Loco buzzes but won't run.
Contact shaft is stuck in 'neutral' position
Motor Armature winding is faulty
Field Coil or its connections are faulty

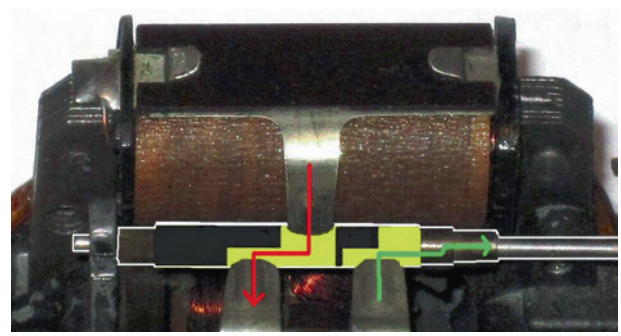
If you have any corrections, tips or improvements to offer regarding AC loco servicing please send them to the Editor.

REVERSING SHAFT OPERATION

To explain how the reversing shaft operates, I've coloured the brass electrical contacts yellow on the photos below:



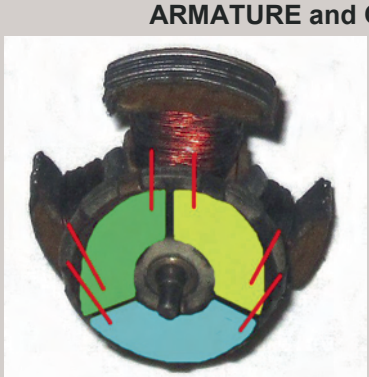
This photo shows the current flowing (in red) from the middle contact on the field coil through the brass section on the reversing shaft and on to the right hand brush contact spring.
The brush passes the current to the armature, after which it returns via the left hand brush and contact spring to the chassis (shown in green, above).



When the contact shaft is rotated (by two clicks on the controller), the current now flows to the left hand contact spring (shown in red), and returns via the right hand brush to the chassis (shown in green).

This change of direction of current flow through the armature causes it to turn in the opposite direction, thus driving the wheels in the opposite direction.

ARMATURE and COMMUTATOR



The copper segments in front of the Armature are the Commutator. I've coloured each segment for clarity on the photo.
The three coils are connected to the segments as shown in red.
Using a continuity tester, there should be low resistance (approx 3 ohms) measured between any two segments. If a higher resistance (approx 10 ohms) is detected it means that one coil is not working, probably because the fine connecting wire is broken. This is quite a common fault, and requires a replacement or rewound Armature.

Note that Armatures are not all the same! The diameter of the shaft varies, as does the thickness of the copper segments, so they are not all interchangeable.