How To Get The Best Out Of Your BEC mechanisms - Running Them In.

The following checklist should help you to get the best from your trams.

(1) Good running depends on a good chassis. To check the chassis means looking at two critical aspects. Firstly the mesh of the gears. The worm-wheel (or pinion as it is sometimes known) must mesh with the worm in such a way that there is a little play between the teeth. Too much play and there will just be a nasty noise and no movement of the tram, but this is rare. Far more common is the problem of binding gears. This produces the odd effect of a chassis that will run nicely by itself but stops under the weight of the body. The easiest test is to hold the chassis in one hand and press hard on the bottom of the worm-wheel. Then with the finger of the other hand try to rock the worm lightly.
It should rotate slightly in each direction. If so all is well, if not it means that the weight is being carried on the teeth of the gears rather than the axle of the wheels where it should be. Hence plenty of friction and probably a burnt out motor. The cure is to raise the motor. Try very gently pushing the worm upwards, using the handle of an old toothbrush. If this does not work then remove the retaining straps and reposition them slightly higher or putting packing pieces under the motor.
Whichever way is best the aim is to raise the worm about one millimetre. Then retest the mesh as before.

(2) The second critical aspect is the electrical pick-up. Make sure all pick-up wires press against the wheels when they are at their furthest point of sideways movement. Next check the electrical contact to the motor. Sometimes the circuit is made through the chassis and the appropriate brush holder is soldered to it. This soldered joint can crack and cause erratic responses of the motor. To play safe solder a short piece of wire from the brush holder to the chassis. GREAT CARE MUST BE TAKEN. Use a hot iron and only allow contact for a maximum of 1 second, otherwise damage will be done to the brush assembly.

(3) Now that the chassis has been checked and adjusted, it must be lubricated. The rule is to use very little oil. Use a light oil such as electrolube (but take heed of the warnings below) and apply a tiny drop, a pin dipped in the oil holds enough, to each bearing of the armature. Do keep the oil well away from the brushes. I know electrolube says it can be used on the commutators and brushes, but I find it does soften the brushes and reduces their life while increasing the tendency to clog the armature. These days it is difficult, if not impossible, to get proper brushes for the small motors (if you are in real need try short lengths from the lead of an HB pencil). The lubrication is completed by putting a few drops of oil on the worm, worm wheel, axles and the axle bearings. I have also heard from several modellers that they have had experience of electrolube softening plastic, so for safety keep it away from plastic or nylon gears and bearings.

(4) The chassis now ready to run, but like a car it must be run in. It is always useful to have a small oval of track and I have assumed you either have one or have access to one. Run the chassis on the track for about half an hour, changing direction every few minutes. The running speed should be comfortable with the controller giving a lot less than full power. As the motor warms up the chassis will probably speed up. Compensate by reducing the controller setting. After this running it will probably be fairly hot so rest it for a while. Oil lightly and run for another 20 minutes or so. Any sign of sticking or overheating, or worse smoke, switch off power and investigate.

(5) By now you will know whether the chassis has a preferred direction, if your layout is the type where trams need not reverse, you should put the chassis into the body so that the preferred direction is the one used. If the chassis is a single axle drive try to keep the driven axle to the rear, this keeps wheel slip to a minimum.

(6) The chassis can be placed in the body. For metal body trams check that there is clearance between the body and the wheels at the limit of their side play. If the wheels do touch the sides it could cause shorting. Such shorting can result in very erratic running and hours of searching for the cause. Side play can be reduced by putting fibre washers between the wheel and the side of the chassis. Cut a slot in the washer to

allow it to be slipped over the axle. If the side play is still so much that washers or adjusting the body does not cure it, then a piece of plastic card can be glued to the inside of the trucksides to solve the problem.

(7) The tram should be placed on the test track. After all this work the model should run faultlessly. If you do get problem running then check:—

a) the collecting wires
b) the cleanliness of the wheels and track
c) whether the wheels are shorting on the body

If the tram only runs reliably in one direction then check the chassis connection to the motor. If the model labours on curves check the gear clearance, the track gauge on the curves and the back to back measurement of the wheels. On tight radii the track gauge should be “opened up” by half to one millimetre, to prevent the flanges binding (unfortunately commercial model railway flexible track tends to close the gauge on tight curves).

(8) Even after all this, the job is not finished, to keep perfect running there are three rules:

a) Clean track
b) Clean wheels
c) Regular maintenance

Solid nickel silver or brass track can be cleaned with an abrasive rubber such as Peco track cleaner or a very fine wet and dry paper as sold in Halfords for rubbing down car paintwork. Never use an abrasive on plated track as it removes the plating and exposes the steel underneath. This then rusts at the slightest hint of dampness and the trams will stop running. So use a rag dipped in lighter fluid, or meths, or thinners. If you are not sure what track you have play safe and keep away from abrasives.

(9) Wheel cleaning, as with track, depends on the type. Plated wheels should have the rag and cleaning fluid treatment. Solid brass wheels (as used by BEC) can be cleaned with wet and dry. The driven wheels are easy as the controller is connected to the brushes of the motor and the wheels cleaned as they spin. After you have done the first wheel compare it to the others. You will be shocked at the filthy state they are in. Non-driven wheels have to be cleaned the hard way by gentle rubbing while slowly revolving them.

(10) Regular maintenance means doing all these things on a fairly planned basis. I take my layouts to exhibitions on average once every two months and I clean the track and wheels and service the trams before each one. The service, over and above the wheel cleaning, consists of a check on the pick-up wires and light oiling as described before. A quick test run (on a clean track) followed by a clean of the body and trolley head. The tram then goes into the travelling box ready for the exhibition.

(11) As part of the care of your trams it is very useful to keep each one in its own box whenever it is not running. This keeps it free from accidental damage and from dust. Similarly it is useful to keep your layout covered when you are not operating, it is unbelievable the amount of dust that settles from the air. Another point to remember when exhibiting or demonstrating the layout to friends is that something usually goes wrong, So have a few spare trams ready to replace any rogue. If you get trouble from a tram please do not mess about with it, but get it off the track and away and replaced by a good one. There is plenty of time after the exhibition or demonstration to repair it. After all, what the audience want to see are trams running not someone messing about with a faulty tram.

(12) Finally a word about electronic track cleaners. They can help to keep the trams running, but you still need to keep the track and wheels clean and regularly maintain the trams. It may seem formidable but the pleasure of trouble free running amply repays the relatively small amount of work involved.

Thanks David Voice for permission to reproduce these tips which first appeared as an article in the magazine of the Tramway and Light Railway Society.