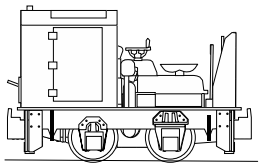
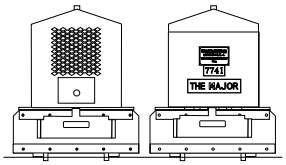
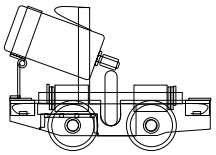
Nigel Lawton 009 O&K RL1c 'Montania' Diesel Mechanical Loco Kit

Assembly Instructions - 12 V dc operation for kits supplied after 1st June 2005







WARNING! ETCHED PARTS CONTAINED IN THIS KIT HAVE SHARP POINTS, EDGES AND CORNER. HANDLE ALL ETCHED PARTS WITH CARE AND REMOVE SHARP EDGES FROM THE COMPLETED MODEL.

- **PLEASE READ ALL THESE INSTRUCTIONS THROUGH BEFORE STARTING TO BUILD THE KIT.**
- **IT IS IMPLICIT THAT ALL JOINING PIECES, FLASH ETC SHOULD BE REMOVED FROM BOTH ETCHED AND CAST COMPONENTS BEFORE ASSEMBLY.**

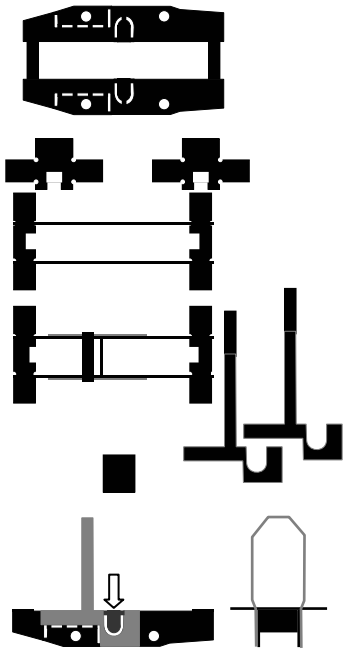
Tools

Small hobby knife or scalpel with new blade.
Soldering iron (preferably temperature controlled)
Flat thin nosed pliers long and short
Side cutters or snips
Piercing saw with 80tpi blade.
Small needle files. Also Toolmakers' 'stones' if you have them
0.5mm drill
0.6mm drill
0.8mm drill
1.5mm drill
Hand chuck or pin vice.
1.5mm tapered Jeweller's broach

Consumables

Standard 240 degree solder
Flux (I recommend a paste type like 'Powerflux')
Non-permanent thread lock (e.g. Blue Loctite 242)
Model grease or oil
Superglue or quick setting epoxy

A note about cutting parts from the frets.
Use a sharp knife or scissors. Apply knife side to side, not downwards. Cut small and half-etched parts like the rivet overlays with scissors not a knife. Where possible cut the trace at the opposite end to where it joins the part and trim with scissors afterwards. Use fine mousetail files or toolmakers stones to clean up small projections.



Chassis (non compensated version)

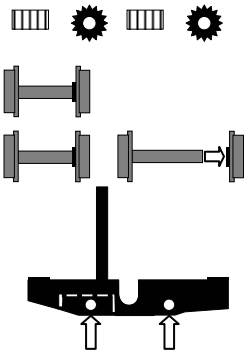
Before you start you need to decide whether you are going to build the chassis as a rigid (non-compensated) unit or with compensation. The compensated version is built with the front wheelset mounted in a bogie which is allowed to rock from side to side. This ensures that all four wheels remain in contact with the rails over uneven track work and points and generally results in better slow running and less stalling. See page 3 for compensated version assembly instructions. If you are not experienced in building small mechanisms I recommend you build the non-compensated chassis for your first attempt. A well built compensated chassis runs better than a well built non-compensated chassis, however a badly built compensated chassis may run worse than a well built non-compensated unit.

Frames

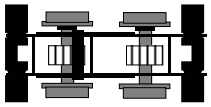
Remove the two joined chassis frames K1 from the fret being careful not to bend the thin sections. Using flat jaw pliers with jaws at least as long as the chassis bend the two frames each at 90 degrees to the joining pieces with the half etched fold lines on the inside of the bends. Remove the two cross piece spacers K2 from the fret. Fold the one large and two small tabs to 90 degrees with the rest of the cross piece with the half-etch on the inside of the bends. Repeat with the other cross piece. Assemble the cross pieces to the folded chassis sides and solder in place. The joining pieces of the chassis fit inside the folded tabs of the cross pieces. The large folded tabs fit flush inside the ends of the frames. Remove the two chassis strengtheners and spring brackets K3 from the fret. Super-impose one on the outside of one side of the chassis with the half etched folds on the inside and solder in place. Repeat with the other side. Bend the two vertical motor guide spring supports outwards from the centre of the chassis so they are about 6.5mm apart. Fold the top sections over to the horizontal and solder together. Remove the chassis stiffener K4 (plain rectangle) from the fret and fit between the frames immediately in front of the U shaped cutouts. Use a piece of fret inserted through the front slot of the cutout to locate this item at 90 degrees to the frame. The stiffener should be flush with the bottom of the frames and slightly below flush with the top of the frames. Remove the locating piece and solder the stiffener in place. Carefully cut through one tab of each of the U shaped cutouts using a piercing saw or sharp edged file. Do not use snips or cutters or a knife as this will distort the chassis. Once one tab is cut gently bend the U shaped section from side to side until it breaks off the other tab. Clean up the cutout with needle files.

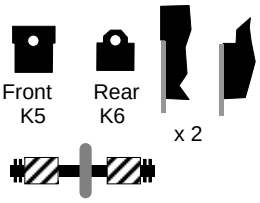
Wheels

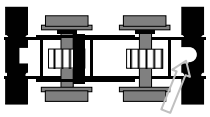
Identify the two 5mm lengths of Ø2mm brass tube (F). Trim until they fit loosely between the two sides of your chassis – this should be around 4mm-4.5mm - using a file or piercing saw. Clean up the ends and chamfer the outside of the ends of each one. Drill a 0.8mm hole in the wall of each tube as close to one end as possible. This allows thread lock to be applied if necessary. Locate the two black plastic worm gears and fit one centrally on each of the two lengths of Ø2mm brass tube. Take care not to grip the gear teeth with any tool. Locate the wheelsets (C). Remove the points from the axles with a toolmaker's stone or file. Identify and remove the insulated wheel from each axle. It should be possible to do this without using a tool but if not grip the shaft about 1mm behind the insulated wheel with pliers and lever it off with tweezers or another set of small pliers using two prongs one either side of the axle so the wheel comes off straight. Take care that the plastic insulating part is not lost and carefully fix each one permanently to its wheel with superglue.

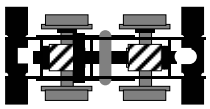


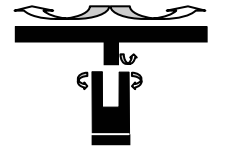
Try the axles in the appropriate holes in the chassis frames. If necessary open out the four axle holes in the chassis, using a tapered jeweller's broach in the Ø1.5mm range (i.e. starting smaller than 1.5mm and ending larger.), so that the wheelset axles can **just** fit and rotate freely without any appreciable side-to-side movement. Fit each wheelset axle through the left hand frame (looking from above) fitting one of the brass tube and worm gear assemblies then through the right hand frame. Fit the insulated wheel to each axle being careful to put it on straight, this is best done by pushing on the insulating washer rather than the wheel itself. Position the brass tubes centrally on each axle. If the brass tubes are not tight on the axles fix in place with a small amount of non-permanent thread lock fluid.

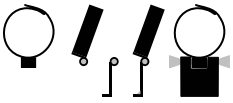


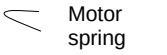


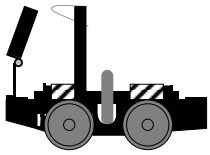


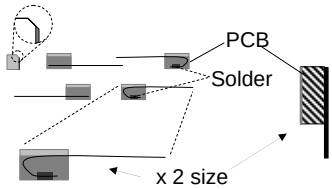


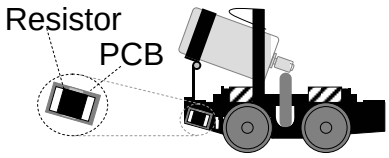


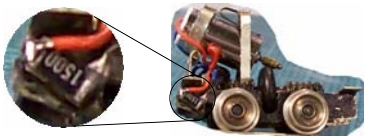


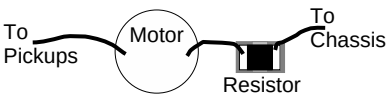


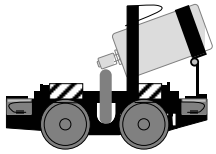












Lay shaft

Remove the two lay shaft supports K5 & K6 from the fret. Using a 1.5mm tapered jeweller's broach open out the holes until the lay shaft can just be fitted and rotated freely but is not loose. Fit the front bracket K5 loosely between the frames at the front of the cutout section around the front axle. Fit the rear bracket K6 about 1mm behind the worm gear on the rear axle. Remove four washers from the fret and clean up, noting that any projections on these may lead to a jamming or jerky mechanism. Locate the lay shaft, the two brass worms and the friction wheel centre and O ring. Fit the O ring to the friction wheel centre. Fit the worms and friction wheel to the shaft with the friction wheel in the middle with a worm on each side. You should be able to do this without using tools, ease the worm holes with a broach if not. Fit two washers to each end of the lay shaft. Offer the lay shaft with its friction wheel, gears and washers up to the supports locating the worms over the worm gears. Fit the rear end of the axle first, note that the rear support will need to move out of position to allow the axle to be fitted. Check that with the supports in the proposed positions and the worms and washers hard up to each support the worms are positioned within 1mm of centrally over the worm gears. Also check that the wheels may be moved slightly (worm gears not pushed hard against worms) and the worm gears are engaging with the worms. Adjust the support positions if necessary. Note & mark the supports' positions and remove the lay shaft. Carefully return the two supports to their positions and tack solder in place. File a slot in the middle of the front edge of the rear frame cross-piece using a small round needle file to form a slot about 2mm wide and 2mm long with a rounded inner end. This allows the lay shaft to be inserted further at the rear so you can get the other end into the front support and doubles up as the securing screw location for the body. Re-fit the lay shaft putting the rear end first into the rear support then sliding forward into the front support. Make sure you still have two washers on each end. Position the worms and washers up against the support at each end and fix the worms in place with non-permanent thread lock. There should be a minimum of end play without the shaft being jammed solid, aim for zero and you'll probably have enough! When the worms are fixed solid position the friction wheel so it is central in the U shaped cutaway in the frames. If there is any discernable play in the lay shaft make sure its central with the lay shaft in the middle of its play and that its still clear of the frame at each end of the play. The less play you have the better the loco will run, this is because of the angled friction drive – the worms thrust the lay shaft against one end of its bearings depending on direction and if there is significant end movement in the shaft this will cause more friction in one direction than the other, if there is even more movement the friction wheel will foul on the frames. You can make small adjustments to the end play by bending the upper part of the front bracket slightly.

Motor

Remove the two motor bracket components K7 & K8 from the fret. Cut an 8mm length of 0.6mm wire. Using fine nosed pliers roll up the ends of the brackets then work on the outside with the wire inside as a former. The two brackets joined by the wire form a hinge. Roll the two tangs of the small bracket K7 away from the side with the half etched fold. Remove the wire and roll the short tang of the large bracket K8. Fold the lower section of the small bracket at 90 degrees to the rest with the half etched fold line on the inside. Run a fillet of solder along the inside of the fold. Solder the small bracket to the front chassis cross member with the folded section flush with the front of the cross member. Form the two long tangs of the large bracket around the motor and then remove the motor and make them a bit smaller so the motor is gripped. Assemble the two parts together as shown using the 0.6mm wire. Flatten one end of the wire to keep it from dropping through the hinge but don't flatten the other end until you have test run the chassis with the body and made any necessary adjustments. Locate the 1mm x 0.13mm phosphor bronze strip and cut a 12mm length. Bend to the approximate shape shown to form the motor spring and solder the shorter arm to the top of the spring brackets, do this with minimum use of heat as the phosphor-bronze loses it springiness if you heat it too much (it anneals). Locate the 3mm length of Ø1.5mm tube, clean up and fit to the motor shaft securing it with non-permanent thread lock. The tube should be flush with the end of the shaft and about 1mm of shaft should show between the tube and motor body. Fit the motor through the loop of the motor bracket and under the motor spring so that the 1.5mm tube rests on the O ring. The motor shaft with 1.5mm tube should be lightly sprung onto the O ring with a millimetre or so of easy up and down movement. You can test run at this stage by connecting a controller between the motor wires on strictly 0-6V (do not trust controller dial markings, 50% is probably more than 6V). If it does not run smoothly or at all check that the lay shaft can rotate freely without the motor fitted and that there is not too much or too little pressure between the motor shaft and O ring.

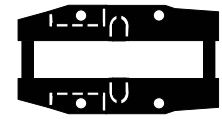
Pickups

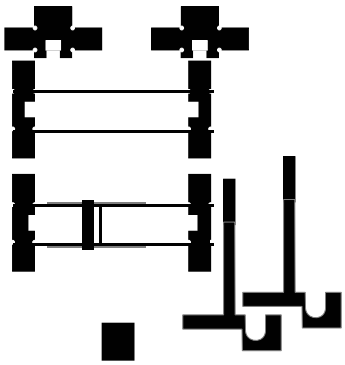
Locate the 2mm x 3.2mm pieces of 1.6mm thick PCB material. File a 0.5mm bevel on the copper side of one of the long edges of each piece. This provides an insulating band ensuring the PCB copper does not short to the chassis cross member. Cut two 12mm lengths of 1mm x 0.13mm phosphor-bronze strip and solder to each piece pf PCB as shown (one right and one left handed). Fold the ends of the phosphor bronze strip into the shape shown. Glue the pickup assemblies to the right hand side chassis frame underneath the front and rear cross-members with superglue or quick setting epoxy. If using epoxy you'll need to clamp them in place whilst the glue sets. Make sure the end of the phosphor-bronze strips spring lightly onto the adjacent wheel. Each pickup can be adjusted once fitted by bending the phosphor-bronze strip in the area of the PCB. Solder a length of interconnection wire from the rear pickup PCB to the front pickup PCB, routing it along the outside upper edge of the right hand frame with a deviation to clear the O ring. Fix in place with superglue or fast setting epoxy. Cut to length and connect one of the motor wires to the front pickup PCB. Gap the dropper resistor mounting pad using a round section mouse tail file and fix on the front section of the frame on the opposite side to the pickups using superglue or fast setting epoxy. Fit the surface mount resistor and bridge with solder so that the top end of the resistor is connected to the chassis. Shorten and solder the other motor wire to the bottom end of the dropper resistor (see circuit to left).

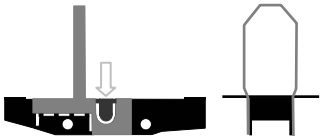
Testing & trouble-shooting

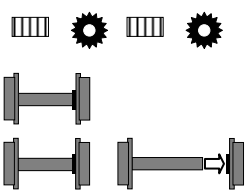
The chassis is now complete. Carefully apply some model grease or oil to the washers and bearings on the lay shaft and the frames where the wheelset bear through them. Take care NOT to get any on the O ring particularly if using oil (which can spray around) – this is a friction drive and will not work with lubricant on it! It is not necessary to oil the motor shaft. Try running it with wires connected to the chassis and one pickup before you try it on a track. Make sure everything runs smoothly without the uncertainties of power collection. Make any necessary adjustments bearing in mind that everything needs to run freely without excessive play for the best results. Check that the chassis is 'flat' by standing on a piece of glass. If all four wheels do not make contact together tweak the chassis (twist it) so they do. Finally try it out on a very clean length of track with a knob of blue tack or plasticine as a ballast weight (needs to be about 20g). If you have problems getting it running email me with a description and if possible close-up photos and I will try to help.

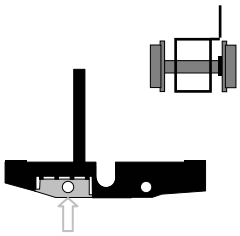
Skip to page 5 for body assembly instructions

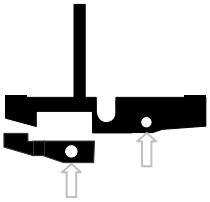


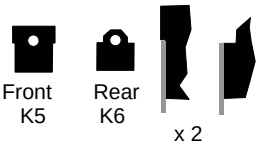


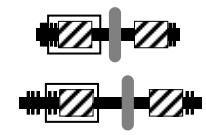


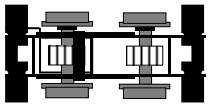












O&K RL1c Chassis - Compensated version assembly instructions

WARNING: Building very small chassis like this one with compensation can seriously damage your mental health! For non-compensated instructions please see page 1. If this is your first attempt at building a small mechanism I recommend you build the non-compensated version.

Frames

Remove the two joined chassis frames K1 from the fret being careful not to bend the thin sections. Using flat jaw pliers with jaws at least as long as the chassis bend the two frames each at 90 degrees to the joining pieces with the half etched fold lines on the inside of the bends. Remove the two cross piece spacers K2 from the fret. Fold the one large and two small tabs to 90 degrees with the rest of the cross piece with the half-etch on the inside of the bends. Repeat with the other cross piece. Assemble the cross pieces to the folded chassis sides and solder in place. The joining pieces of the chassis fit inside the folded tabs of the cross pieces. The large folded tab fits flush inside the end of the frames. Remove the two chassis strengtheners and spring brackets K3 from the fret. Super-impose one on the outside of one side of the chassis with the half etched folds on the inside and solder in place. Repeat with the other side. Bend the two vertical motor guide and spring supports outwards from the centre of the chassis so they are about 6.5mm apart. Fold the top sections over to the horizontal and solder together. Remove the chassis stiffener K4 (plain rectangle) from the fret and fit between the frame immediately in front of the U shaped cutout. Use a piece of fret inserted through the front slot of the cutout to locate this item at 90 degrees to the frame. The stiffener should be flush with the bottom of the frames and slightly below flush with the top of the frames. Remove the locating piece and solder the stiffener in place. Carefully cut through one tab of each of the U shaped cutouts using a piercing saw or sharp edged file. Do not use snips, cutters or a knife as this will distort the chassis. Once one tab is cut gently bend the U shaped section from side to side until it breaks off the other tab. Clean up the cutout with needle files.

Wheels

Identify the two 5mm lengths of Ø2mm brass tube (F). Trim until they fit loosely between the two sides of your chassis – this should be around 4mm-4.5mm - using a file or piercing saw. Clean up the ends and chamfer the outside of the ends of each one. Drill a 0.8mm hole in the wall of each tube as close to one end as possible. This allows thread lock to be applied if necessary. Locate the two black plastic worm gears and fit one centrally on each of the two lengths of Ø2mm brass tube. Take care not to grip the gear teeth with any tool. Locate the wheelsets (C). Remove the points from the axles with a toolmaker's stone or file. Identify and remove the insulated wheel from each axle. It should be possible to do this without using a tool but if not grip the shaft about 1mm behind the insulated wheel with pliers and lever it off with tweezers or another set of small pliers using two prongs one either side of the axle so the wheel comes off straight. Take care that the plastic insulating part is not lost and carefully fix each one permanently to its wheel with superglue.

Remove the compensated bogie K10 from the fret. Fold up with all the etched fold lines on the inside of the bends. Before you solder it together open up the side to side axle holes with a 1.5mm broach to fit the shaft on one of the wheelsets, and the front to back axle holes to match the lay shaft. Both should fit without significant slop. Ensure that the axle is aligned with the bogie before soldering the bogie together.

Remove the 'postage stamp' dotted area which includes the fixed front axle holes on both frames. This is best done by filing away the two sections which join this section to the frame on the lower edge and then repeatedly bending the section until it breaks out. Do not use a knife or snips as this will distort the chassis. Clean up all the joining pieces. Try the bogie in the hole, it should fit with the axle in line with the rear axle.

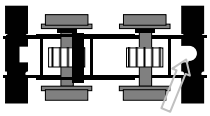
Try the axles in the appropriate holes in the chassis frames and bogie. If necessary open out the four axle holes in the chassis and bogie, using a tapered jeweller's broach in the Ø1.5mm range (i.e. starting smaller than 1.5mm and ending larger.), so that the wheelset axles can **just** fit and rotate freely without any appreciable side-to-side movement. Fit one wheelset axle through the left hand frame rear axle hole (looking from above) fitting one of the brass tube and worm gear assemblies then through the right hand frame. Fit the insulated wheel to the free end of the axle being careful to put it on straight, this is best done by pushing on the insulating washer rather than the wheel itself. Repeat with the bogie taking care to end up with the insulated wheel on the same side as the projecting bracket for the pickup. Position the brass tubes centrally on each axle. If the brass tubes are not tight on the axles fix in place with a small amount of non-permanent thread lock fluid.

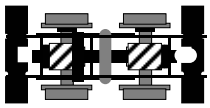
Lay shaft

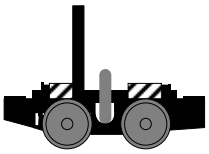
Remove the two lay shaft supports K5 & K6 from the fret. Using a 1.5mm tapered jeweller's broach open out the holes until the lay shaft can just be fitted and rotated freely but is not loose. Fit the front bracket K5 loosely between the frames in front of the cutout section around for the compensation bogie. Fit the rear bracket K6 about 1mm behind the worm gear on the rear axle. Check that the distance between the two supports is 18mm +/- 0.2mm and adjust if necessary.

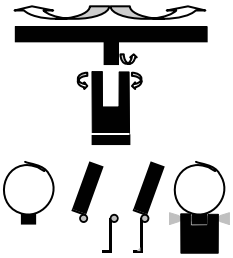
Remove seven washers from the fret and clean up, noting that any projections on these may lead to a jamming or jerky mechanism

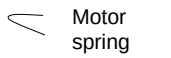
Locate the lay shaft, the two brass worms and the friction wheel centre and O ring. Fit the O ring to the friction wheel centre. Fit the worms and friction wheel to the shaft with the friction wheel in the middle with a worm on each side (omit the compensation bogie, this is a 'trial' fit). You should be able to do this without using tools, ease the worm holes with a broach if not. Offer the lay shaft with its friction wheel and gears up to the supports locating the rear worm over the worm gear. Fit the front end of the axle first, note that the rear support only jus allows the axle to be fitted. Check that with the supports in the proposed positions and the rear worm positioned within 1mm of centrally over the worm gear that there is space for two washers between this and the rear support. Also check that the rear wheels may be moved slightly (worm gear not pushed hard against worm) and the worm gear is engaging with the worm. Adjust the support positions if necessary. Mark the supports' positions and remove the lay shaft. Carefully return the two supports to their positions and solder in place. File a slot in the middle of the front edge of the rear frame cross-piece using a small round needle file to form a slot about 2mm wide and 2mm long with a rounded inner end. This is the securing screw location for the body. Offer up the compensated bogie and fit the lay shaft through the appropriate holes threading on washers and the worm as

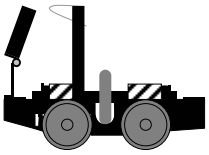


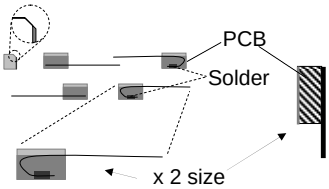


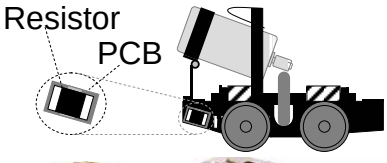


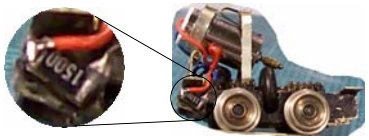


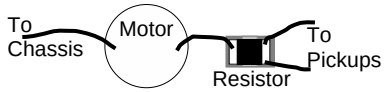


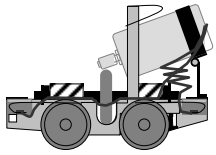












indicated. Fit the lay shaft into its rear support and slide backwards to allow the washers between the bogie and front support to be inserted. Take care to make sure all the washers are in place. Setting up the compensated version is more difficult as one might expect. The key difference is that in addition to ensuring that minimal front to rear play is available the front worm also has the job of locating the bogie centrally (front to back) within the cutout in the frames. This is achieved by the use of the right number of washers and careful adjustment of position. The expected numbers of washers are two between the front worm and front of the bogie and two between the rear worm and rear lay shaft support. Three washers are expected between the front of the bogie and the front lay shaft support. However the aim is to locate the bogie centrally in the cutot section of the frames so that it can move from side to side without touching front and back. If necessary adjust the number(s) of washers to achieve this. When everything is set up fix the worms in place with non-permanent thread lock. You will probably find it easier to fix the rear worm first. Applying thread lock to the front worm is tricky and I suggest using a thin wire or capilliary (these are available to fit syringes) and apply from the rear to avoid locking up the washers. The lay shaft should turn freely and the bogie rock freely. There should be minimal front to back movement in both and the bogie and friction wheel should not foul on the chassis at either end of any movement. The less play you have the better the loco will run, this is because of the angled friction drive – the worms thrust the lay shaft against one end of its bearings depending on direction and if there is significant end movement in the shaft this will cause more friction in one direction than the other, if there is even more movement the friction wheel will foul on the frames. You can make small adjustments to the end play by bending the upper part of the front bracket slightly.

Motor

Remove the two motor bracket components K7 & K8 from the fret. Cut an 8mm length of 0.6mm wire. Using fine nosed pliers roll up the ends of the brackets then work on the outside with the wire inside as a former. The two brackets joined by the wire form a hinge. Roll the two tangs of the small bracket K7 away from the side with the half etched fold. Remove the wire and roll the short tang of the large bracket K8. Fold the lower section of the small bracket at 90 degrees to the rest with the half etched fold line on the inside. Run a fillet of solder along the inside of the fold. Solder the small bracket to the front chassis cross member with the folded section flush with the front of the cross member. Form the two long tangs of the large bracket around the motor and then remove the motor and make them a bit smaller so the motor is gripped. Assemble the two parts together as shown using the 0.6mm wire. Flatten one end of the wire to keep it from dropping through the hinge but don't flatten the other end until you have test run the chassis with the body and made any necessary adjustments. Locate the 1mm x 0.13mm phosphor bronze strip and cut a 12mm length. Bend to the approximate shape shown to form the motor spring and solder the shorter arm to the top of the spring brackets, do this with minimum use of heat as the phosphor-bronze loses it springiness if you heat it too much (it anneals). Locate the 3mm length of Ø1.5mm tube, clean up and fit to the motor shaft securing it with non-permanent thread lock. The tube should be flush with the end of the shaft and about 1mm of shaft should show between the tube and motor body. Fit the motor through the loop of the motor bracket and under the motor spring so that the 1.5mm tube rests on the O ring. The motor shaft with 1.5mm tube should be lightly sprung onto the O ring with a millimetre or so of easy up and down movement. You can test run at this stage by connecting a controller between the motor rear connection and chassis metalwork. If it does not run smoothly or at all check that the lay shaft can rotate freely without the motor fitted and that there is not too much or too little pressure between the motor shaft and O ring.

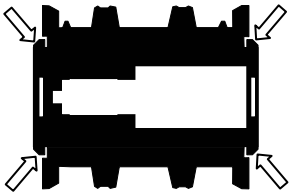
Pickups

Locate one of the 2mm x 3.2mm piece of 1.6mm thick and the 2mm x 3.2mm piece of 0.8mm thick PCB material. File a 0.5mm bevel on the copper side of one of the long edges of each piece. This provides an insulating band ensuring the PCB copper does not short to the chassis cross member. Cut two 12mm lengths of 1mm x 0.13mm phosphor-bronze strip and solder to each piece pf PCB as shown (one right and one left handed). Fold the ends of the phosphor bronze strip into the shape shown. Glue the 1.6mm PCB pickup assembly to the right hand side chassis frame underneath the rear cross-member with superglue or quick setting epoxy. If using epoxy you'll need to clamp them in place whilst the glue sets. Glue the 0.8mm PCB pickup assembly to the pickup bracket on the compensation bogie flush with the upper edge. Make sure the end of the phosphor-bronze strips spring lightly onto the adjacent wheel. Each pickup can be adjusted once fitted by bending the phosphor-bronze strip in the area of the PCB. Gap the dropper resistor mounting pad using a round section mouse tail file and fix on the front section of the frame on the opposite side to the pickups using superglue or fast setting epoxy. Remove the surface mount resistor from its plastic pocket and fit to the pad and so that it is insulated from the chassis at both ends. Shorten and solder one motor wire to the top end of the dropper resistor (see circuit to left). Solder a length of interconnection wire from the rear pickup PCB to the bottom of the resistor, routing it along the outside upper edge of the right hand frame with a deviation to clear the O ring then across the chassis under the motor. Fix in place with superglue or fast setting epoxy. Connect a second length of interconnection wire from the from the front pickup to the bottom end of the resistor creating a 'zig-zag' of wire underneath the motor to allow the compensation bogie to move freely.

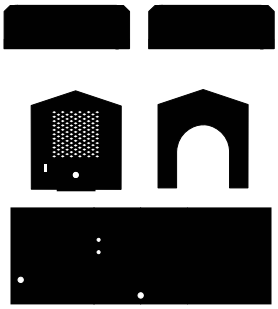
Testing & trouble-shooting

The chassis is now complete. Carefully apply some model grease or oil to the washers and bearings on the lay shaft and the frames where the wheelset bear through them. Take care NOT to get any on the O ring particularly if using oil (which can spray around) – this is a friction drive and will not work with lubricant on it! It is not necessary to oil the motor shaft. Try running it with wires connected to the chassis and one pickup before you try it on a track. Make sure everything runs smoothly without the uncertainties of power collection. Make any necessary adjustments bearing in mind that everything needs to run freely without excessive play for the best results. Check that the rocking of the bogie takes it each side of the point where the front wheels are aligned with the rear. Finally try it out on a very clean length of track with a knob of blue tack or plasticine as a ballast weight (needs to be about 20g). If you have problems getting it running email me with a description and if possible close-up photos and I will try to help.

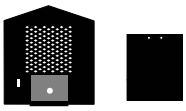
Body



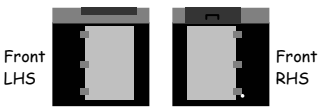
Running plate and cosmetic frames.
Remove the cosmetic frames and running plate J1 from the fret. Carefully remove the parts from inside the cutout and save for future use. Using long nosed flat pliers carefully fold the two cosmetic frames to 90 degrees with the running plate with the half etch on the inside of the bend. Do not bend the four small extensions at each end of the running place (indicated). Remove the two buffer beams J2 from the fret. Note that the half etches on these parts are ***NOT*** bend lines! The half etched lines in the buffer beams match with the folded cosmetic frames. Adjust the frames to fit into the half etched rebate in each buffer beam with the bevelled corners against the running plate. Solder the buffer beams to the cosmetic frames and running plate.



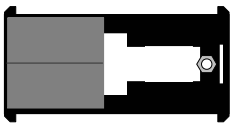
Engine housing
Remove the engine housing front J3, rear J4 & top & sides J5 from the fret. Bevel the side and top edges of the front and rear and the complete length of the long edges of the sides & top. The bevel must be inside the housing (outlines to left show 'front' side). Bevel the edges on the 'back' of the part with the grille; the 'front' of this part has the slot to the left of the grille . Bevel the edges on the same side as the fold lines on the engine housing sides & top and one side of the engine housing rear. This is to give a nice invisible join at the corners. Fold up the sides and top to the shape of the front and rear so that the three may be fitted together without having to spring the sides & top inwards. Lay the rear on a heatproof surface and position the sides & top above it. The hole for the radiator filler should be at the top of the sides & top (away from the rear). Tack the two together with solder in the two lower corners. Check the fit and when you are happy the two parts are correctly positioned tack at the apex also. Again check the fit and if happy run solder all around the inside of the join. If you do this in short sections and allow cooling between sections you can do this without the whole thing just falling apart again! Repeat this process with the front noting that the cutout in the rear gives access to the front joints hence the order of assembly. Take care not to get any solder into the diamond shaped ventilation holes – its hard to get out again! Position the engine housing on the running plate and glue in place. You can persist with solder for this and some other joints but its difficult to prevent other joints unsoldering….



Remove the engine housing top lid J6 from the fret. Fold to fit the top of the engine housing with the half etched fold line on the inside of the bend. Cut a 6mm length of 0.4mm wire for the engine cover top lid handle. Make a U shaped handle to fit the holes in the cover and engine housing from 0.4mm wire and long enough to go through both. Fit the cover using the handle as a guide for its position. Glue cover and handle in place.

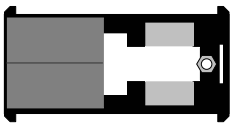


Remove the engine housing doors J7 from the fret. Take care as these bend easily. Fit to either side of the engine housing with their front edge in line with the front edge of the lid as shown. The hinge details are to the front on both sides.



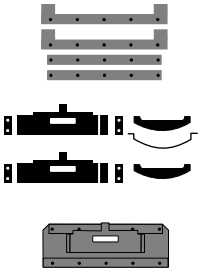
Fixing nut
The fixing nut is positioned over the small slot at the rear of the aperture in the running plate. Solder in place taking care to make sure its central side to side and avoiding getting solder in the threads. You may find it easier to hold the nut using the fixing screw (full length), putting a small amount of model grease between nut and bolt to prevent the solder running into the threads. Use very small amounts of solder and flux to avoid getting solder into the threads. Check that the fixing screw can be fitted through the filed-out section of the chassis cross member and cut the screw to be flush with the top of the nut when tightened.

Gear and brake levers
Remove the two levers J11 from the fret. Mount the smaller one to the front of the hole on top of the fixing nut and the larger one behind the hole on top of the fixing nut. Solder in place using small amounts of solder and a quick soldering iron, or glue them with small amounts of epoxy. Soldering these is best and is easier than it sounds.

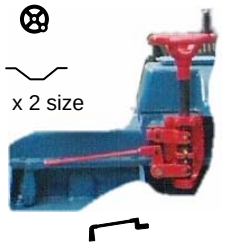


Gearbox
Remove the gearbox mounting brackets J10 from the fret. Fold the end sections to 90 degrees with the centre section with the half etched fold line on the inside of the bend. The left hand bracket is the one with two holes. Fit a length of 0.4mm wire between these holes. Fit the brackets flush with either side of the cutout in the widest part of the rear section of the running plate as shown. The gearbox casting should fit between the brackets and its flange should rest on the top inner edges of the four folded sections. Gently run a file across the vertical parts of the brackets to ensure they are all at the same level and check the gearbox extends to the level of the running plate. Before permanently fixing the gearbox fit the chassis and test run to check for fouling. Ease with a round needle file if necessary until everything runs free.

Cosmetic axle boxes
Note that the larger heavier style fits at the rear. Remove flash and glue in place in line with the shape of the cosmetic frames..



Couplers & buffer beam detail
Before fitting the couplers the buffer beam detail must be added. Remove the four pieces J17 & J18. Bend the thin section of the J17s at 90 degrees to the thick sections. Glue the lower details J17 to the bottom of each buffer beam with the thin section glued to the front section of the beam and the cut away section underneath the body. Glue the upper details J18 flush with the top of the buffer beam up against the bottom of the running plate. Remove the coupler components J19, J20 & J24 from the fret. Roll the main coupler components J19, using a cylindrical object about 7-10mm in diameter, on a resilient surface (e.g. a large rubber band) to match the curvature of the coupler tops J20. Glue these pairs of parts together using superglue or fast setting epoxy with the tops on the same side as the coupler tang. Glue the cosmetic half-etched bolt overlay details J24 to each end of the folded coupler and then glue the coupler sub-assemblies centrally to each buffer beam up against the top rivet detail using superglue or fast setting epoxy.

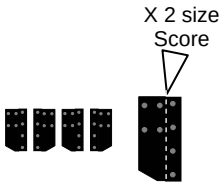


Handwheel

Remove the handwheel J14 from the fret. Use a 1.3mm drill mounted the wrong way around in a pin vice to push the centre of the handwheel down into a resilient surface to form the shape of the handwheel. Glue or solder the formed wheel to the head of the 16BA screw provided (the smaller screw with no matching nut). Soldering is best and is easier than it looks,. Glue a short length of 0.4mm wire into the hole on the rim of the handwheel then cut off to about 1.5-2mm above the wheel. Cut the screw thread about 3.2mm from behind the head. Clear out the hole on the top right of the gearbox with a 0.8mm drill and fit the cut end of the screw into the hole securing with glue. Clear the hole in the lower right side of the gearbox with a 0.6mm drill and fit a 2mm length of 0.6mm wire with the outside end filed flat. The gear change linkage J15 fits between this and the handwheel column detail on the lower front right of the gearbox.

Rear bulkhead

Remove the rear bulkhead J9 from the fret. Bend the two wings at 90 degrees to the main section with the half etched fold lines on the inside of the bends. Fit to the rear of the running plate as shown.

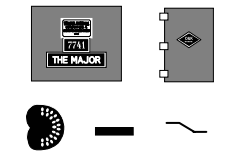


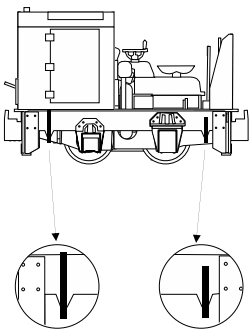
Ballast

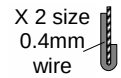
Flatten and trim if necessary and fit one piece of 10.5mm x 11.5mm x 1.5mm sheet lead each side of the engine housing. Fill the coupler cavities with the liquid lead provided and secure with a flood of glue. If you think you can add more weight good luck to you! The model weighs 17-18g, add a fat seated driver and you might get to 20g.

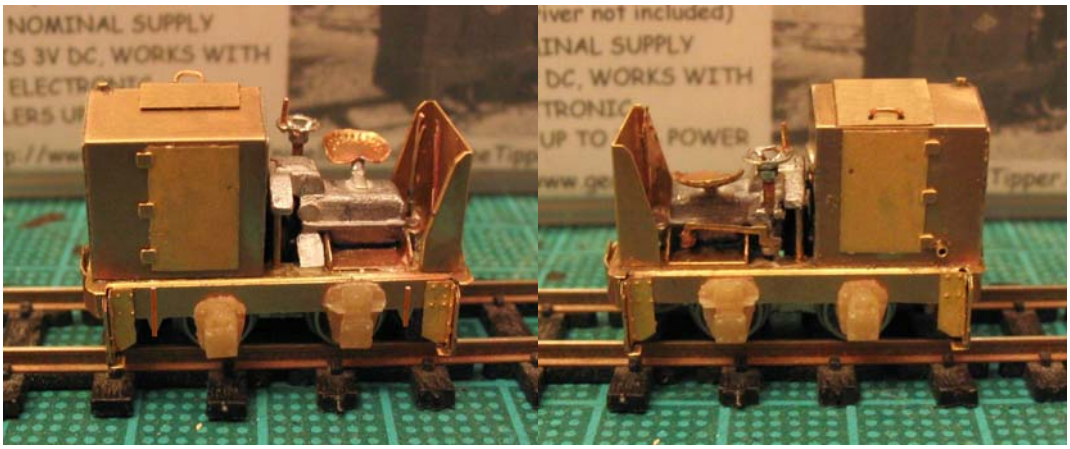
Detail parts

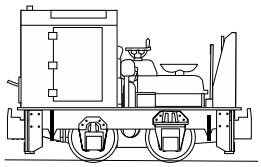
Locate the cosmetic frame rivet overlays J16. Score each overlay between the row of four 'rivets' and first row of two 'rivets' and fold to 90 degrees, Glue these to the four 'corners formed by the cosmetic frames and buffer beams. Make a square end on the 0.8mm wire and cut a 1mm length. This is the radiator cap and should be glued into the hole at the front top of the engine housing, using superglue or quick setting epoxy, to protrude about 0.6mm on the outside. Make sure it does not protrude on the inside as it will foul on the motor. Make a square end on the length of 0.8mm pipe and clear open the central hole with a 0.6mm drill. This is the exhaust pipe and should be glued into the hole on the lower right hand side of the engine housing just to the right of the lowest door hinge detail, using superglue or fast setting epoxy, to protrude about 0.8mm. Cut two 5mm lengths of 0.6mm wire for the sand pipes. Clear out the holes on the undersides of the 'wings' of the gearbox (actually the sand box) and test fit the 0.6mm wire from below and inside the body. Shorten the 0.6mm wire slightly, if necessary, to allow the wire to fit between the sand box and running plate then glue in place. Select works plate, number plate and if desired nameplate and fit to the outside of the rear bulkhead, Remove the driver's seat J12 and fold up the side and rear edges to form a shallow bucket seat. Remove the seat bracket J13 from the fret and bend one end at an angle. Solder to the bottom of the seat. Joggle the end (see photos) and glue or low-melt solder to the top of the gearbox in the centre of the large flat section. Low melt solder is best for this joint, tin the brass part with standard solder first. Take care not to melt the gearbox which will only stand 120C. Locate the decompression handle J25 and bend 5mm at one end at 90 degrees. Glue on the inside of the front of the engine housing with the long end protruding through the slot. Bend at 90 degrees to the right 2.5mm outside the housing and cut off at around 2mm from this bend. In the real loco this handle is used to stop the engine and also to allow the engine to be turned over by hand to start by releasing compression on the engine. Cut two 10mm lengths of 0.4mm wire and bend one into a tight U with a 4.5mm leg and the second with a 3.5mm leg. Fit these to the two brackets on the right hand side of the cosmetic frames. These are oil 'dip legs' and are used to check the engine and gear box oil levels on the real thing.

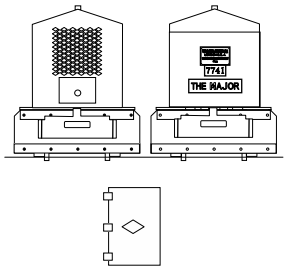












Painting

This kit is primarily based on 'The Major', No 7741 which is painted light blue in preservation at Amberley Chalk Pits Museum. Humbrol No109 is approximately right. Buffer beams, handwheel and linkages and stems of levers 'pillar box' red. Couplers, axle boxes and handles of levers matt black. Wm Jones UK importer's plate original brass. Nameplate and number plates pillar box red background with silver surround and lettering. The other loco for which a number plate is provided is No 7600, ex Oxted lime works, is now owned by Pete Wilson and he tells me she (now named Madge) was originally painted in a burgundy shade. Locos in the UK would have been fitted with the Wm Jones plate only, locos in other parts of the world would most likely have the O&K badges positioned centrally on the engine housing side doors.

Note that there is a 'trouble shooting' or 'diagnostics' checklist posted on my website which you may want to refer to if you have problems with making your loco run. Please contact me by mail if you do not have internet access sending one standard P&P or S&H charge to cover postage.