



Alco 2-6-2T chassis instructions

You will need to assemble the chassis at least to the point where it has wheels before starting the body. It is best not to completely finish it as the rods and valve gear are bound to suffer some damage with all the extra handling involved. You will need a soldering iron of at least 40W, preferably 50 – 60W as the layered frames are quite chunky and soak up the heat.

Folding parts

All normal folds are to 90 degrees with the etched line on the INSIDE of the fold. Folding double means to fold 180 degrees with the etched line on the OUTSIDE of the fold. Be sure to double check before folding as re-folding the other way usually means that the parts break apart.

Valve gear pins

The pins supplied are needlework pins which will need their heads reduced. Put a pin in the chuck of a mini drill and, with it running and the head of the pin resting on a piece of wood, apply a file to the side and top of the pin head. You are after a head around twice the diameter of the pin and around half the depth of the head as supplied. Do 14 now, which will be enough to do the job plus a couple of spares.

Basic chassis

The chassis comes with compensation and hornblocks on all driving axles, although the rear set rest against stops on the frames and will not move when running. If you want to build the chassis rigid, modify the other four horn guide cut outs by adding scrap etch to replicate the rear ones then carry on as per the instructions but omitting the compensation beam and pivot. Its best to get the loco sitting level on just the front and rear axles first then adjust the height of the center axle slightly higher so it will not rock on high spots in the track.

As a rigid loco, performance will be seriously compromised as never more than three or four wheels will be on the track at any particular time. Power pick up will be reduced and derauling is much more likely. Since everything is included for compensation, why not give it a go.

Chassis frames and spacers

READ THIS BEFORE REMOVING THE FRAMES FROM THE ETCH

The frames are made up of three layers, they are joined by tabs and extension pieces to fold up in a zig zag and will line up perfectly. Remove them from the etch in one piece or you will have to line up the layers by eye. Do not file any of the tabs until the frames are assembled as they will be weaker as a single layer. Frame spacers are supplied for 16.5mm and 14mm, 12mm users will use the 14mm spacers and set the wheels closer together. All parts that vary because of gauge will be marked 16.5 or 14/12, except the pony trucks and brake beams, there are 3

different widths of these marked 16.5, 14 and 12.

Remove the frames 1 & 2 from the etch, keep the 3 layers of each side joined but remove the waste pieces in between the parts. Note that the slots for the spacers are in the inner two layers only, before folding the frames test the fit of the spacers in the slots and ease the fit with a piece of scrap etch forced into the slots. Push out the rivets at the front and rear of the outer layers and gently fold them double with the etched lines on the outside of the fold, the layers at the top and bottom will fold opposite ways and will line up with the mid layer when flat.

Squeeze all the folds with pliers to ensure that the layers are flat. Tack solder them together along the top and bottom edges but avoid getting solder near the spacer slots as it will be hard to clean out. Leave all the tabs for now, and the fold aid strips.

Locate the front footplate 3, under plate 4, smokebox top plate 5, rivet strips 6 and the frame spacers 7 (16.5) or 8 (14/12). The spacers are marked A to F either on the spacer or the etch next to them, A is the front one back to F at the rear. Clean up all the tabs and push out the rivets in the front footplate. Test the spacers for fit, the front one A can go either way round, do not use B as it has been replaced with spacer 9, the middle two C and D must have the notches facing the rear and the rear two E and F need folding and will only fit the correct way round. Locate the frame jigs 37 for your gauge and assemble the frames around them, they should fit just behind the rear axlebox cut out and just in front of the front ones. Position one on one frame and secure with a spot of solder or super glue, then attach the other to the other frame.

Put the two frames together and see how square it looks, standing the assembly on end is usually a good indicator that things are right or not. Adjust the jigs until the frames are square from all angles then spot solder or glue the other ends.

After each spacer is fitted, double check that the frames are still square, if not stop and find the problem before proceeding. The front spacer is temporary and will be removed later so just tack it in place. Fit the rear one positioning the folded parts nearest the front but solder one end only. The Z shaped spacer fits right next to it so fit that and solder it at both ends and the other end of the previous spacer. Fit the two narrowest spacers into the slots between the axle box cut outs from underneath, the notches face to the rear. Spacer 9 is used full length for 16.5 but break off the ends at the etched lines for 14/12, fold to shape and fit between the frames with the holes in line with the center of the square holes in the frames, the plain folded part points downwards. The underside of the spacer must be in line with the top of the square frame cut outs as the cylinder pegs will fit in here later. Solder two 10BA nuts on top of the holes in this spacer, if they stand higher than the frame top edges, file them down until they are level.

Clean the top of the frames flat but only the long part from the front to the rear axle boxes.

Turn the front footplate upside down and position the under plate on it so that the front edge just touches the etched line and the cut out surrounds the etched recess in the footplate. Solder these two parts together and clean up any solder around the edges. Solder a 10BA nut into the hole in the under plate, you may need to round the corners off to make it fit. This fits on the top of the frames with the under plate between them and the frame ends should line up with the front edge of the etched line, remove the front spacer first as its no longer needed, solder in place when happy. The smokebox top plate fits onto the rear part of the footplate and the holes, the rear edges and sides should line up, solder in place. The 2 rivet strips go on top of the top plate flush with the edges, solder in place. You can assemble these parts off the frames and fit them as a unit, I usually do it that way. The front spacer A and the front frame jig will need removing before fitting these parts, clean off any solder that may be in the way before starting.

Buffer beams

Locate the buffer beam layers 10 - 13, push out the rivets in 10 and 12 and solder the pairs together and clean off the tabs. There are square holes in the rear buffer beam that fit over the frame ends and slots at the top of the front buffer beam that do the same job, the front one should butt up under the footplate. The slots in the rear buffer beam are wide enough for both

gauges, 14mm builder should have the frame ends touching the inner sides of the slots, 16.5mm builders the outer sides. Ensure that they are square to the frames and solder in place. The rear footplate support 9 is dual gauge, use as it is for 16.5mm or cut the ends off at the etched lines for 14/12mm. Fold it to shape and solder to the rear buffer beam with the top flush with the top of the buffer beam. Add the bracing plates 18 to the front and 19 to the rear, the lines of rivets are horizontal.

Now add any more solder you feel necessary to the frame layers and clean up all round. Cut off the extension pieces used as a folding guide and file all tabs and fold pieces flat.

Hornblocks

If you HAVE used High Level hornblocks before, stop and read this bit.

Fold up the hornblock etches according to High Level's instructions and fit brass bearings into each one. Don't try to do a proper "fitting" job on them yet as this is best done after soldering in place. On this loco the horn guides are fitted inside the frames as normal but back to front, the outer face of the guide faces inwards, the side guides fit between the cut out sides. The fit of the guides is designed to be exact and will not require hornblock setting jigs, just clean the inner faces of the cut out until the guide pushes in with the side guides pushed up as far as they will go. Before soldering, file the bottom ends of the cut outs until the tiny holes in the guides are visible when fitted, then solder at the top. Repeat with the other five horn guides and file flush any guide that shows above the frame tops.

Remove the hornblock bearings and "fit" them one by one, marking each with an indelible pen as you do. I use blue for one side and red for the other, marking them with dots, one, two or three with matching dots on the frames next to the guides. Once "fitted" to a particular guide, the blocks must not be moved around or fitted a different way up as they won't necessarily fit well elsewhere. Fitting means to rub two opposing faces of the bearing on very fine abrasive paper until you achieve an easy fit with no slop, they should drop under their own weight. The rear hornblocks will not move in use and will rest against the stop at the top of the guide, it is easier if these 2 are a tight fit, then they will not keep dropping out during assembly. Check also for solder showing around the joins from when you fitted the guides; scrape out any visible with a knife tip. Once "fitted", check the axles are free to move and ease the bearings if required.

Check that each axle can twist (lift one end only up) and still turn freely.

Springs and Compensation beam

Locate the compensation beams which are numbered 13 on the etch but should have been 46, oops, solder together then open the hole to 2mm to fit the tube supplied, cut a length to fit loosely between the frames and solder the beam centrally. Cut a length of 1mm rod slightly longer than the width of the frames and fit the beam, noting that it is not symmetrical, the front end is slightly longer and marked with an F. Fit it the correct way round and the right way up, add a spot of oil to each end of the tube and solder the rod on the outside at both ends. File the ends of the wire flush with the frames.

The springs 38 come in an etched outer box and must be left in the box during soldering, this keeps them in the correct position for attaching to the frames and cuts out the guesswork. Remove the box from the etch and fold in a zig-zag using the fold lines indicated. While holding the layers together, solder along the top edges of the springs only. From the plain rear of the springs chop through the attachment tags at the bottom of the legs and centre pieces. Turn it over so the front of the springs face upwards and chop through the bottom of the tags this side, also the bottom of the T piece and between the two vertical gaps. Cut the outer box near the top corners and the frame work will fall off leaving the springs still joined by the top section, see sketches for clarification.

The bottom tags need to be cleaned up before fitting but be gentle as the support frame is delicate. You can fit them now or leave them until nearer the end if you prefer but if the brakes are not fitted yet, open out the mounting holes to the relevant sizes before fitting the springs. The recessed rear faces sit on the frame top edge with the springs lining up centrally with each axle. Solder the legs and spring centres, seven points in all. Once fitted, cut away the support frame and the etched T piece and add more solder to the legs as the layers there are still separate. Clean up gently with files and knives.

Wheels, gearbox and cranks

Note - the axle shims 42 referred to later are not numbered on the etch but will be found in the blank areas in the chassis parts 1 and 2.

Study the wheel sets shown in the sketches to see how they fit together. The blackening on the wheels does not need removing as it does conduct electricity. The axles supplied are 30.4mm for 16.5mm gauge and will need shortening to 28.4mm for 14/12mm gauges. Bevel the end slightly before fitting the wheels as sharp edges will damage the plastic bushes. Trim any bush protruding from the face of the wheels with a sharp knife.

Locate the outside cranks 25 which are laid out in sets of three. Fold each set in a zig zag and thread onto an oiled broach, line up the layers and solder. Counter sink the rear of the small hole with a drill bit, fit a crankpin screw and solder. Open the larger hole until it almost fits on the axle. File the back of the crank flat then thoroughly wash them and put aside.

Locate the gearbox 45 with its two spacers and three shims, solder 2mm bushes into the large holes pointing outwards, fold to shape and add the spacers. Reinforce the folds with solder from inside after checking that its square. Cut 2mm steel rod to 10mm lengths for the gear shafts, ease the holes to a tight fit and test assemble, use a drill or rod of less than 2mm for the final drive gear. Add two shims next to the first gear and check clearance for the final gear. This will be tight but it should fit and shaving a little off one end will help, a sharp knife is the best way. No spacer shims are required other than the ones supplied as the gears will hold themselves in position. Builders using 12mm gauge will have to file back the ends of the bushes to a total width of less than 10mm, 14mm builders to less than 12mm, 16.5mm builders get away with no filing at all. The lower shaft will need to be short enough not to touch the backs of the wheels, in 12mm it will have to be flush with the sides. In 12mm it is a good idea to put a slight kink in the sides of the gearbox to gain an extra 1mm of clearance, this allows the bush heads to be left in place as well, see sketch for details.

Fit the axle through the gearbox and final drive gear, it will be a tight fit in the gear. Placing the gearbox over slightly open vice jaws is the best way to do this, the axle needs to protrude equal amounts on both sides of the gearbox. The motor screw holes will need opening slightly, pick the two that match the motor supplied, they may vary over the years. The mesh of the worm can be adjusted by filing the screw holes slightly oval if required. The motor is prefitted with a tube to resize the shaft, position the worm so that it fits in the side cut out when the motor is in position, fit it and test the gearbox. When it runs smoothly, lock the shafts in position with super glue and remove the motor.

Push the wheels onto the axles and set to gauge, make sure that equal amounts of axle protrude on both sides. For 16.5mm gauge only fit a plastic washer on each end followed by the correct horn block and fit in the frames. The rear axle is positioned with the gearbox leaning backwards and the motor pointing forwards. Push a crank onto the end of each axle and check the side play you have available. It will be limited by either the outside cranks or the plastic washers hitting the horn blocks depending on the accuracy of your assembly so far. You must decide how much free play to allow. On the front two axles you need around 0.5 – 0.75mm but you can have as much as you like on the rear axle but maybe no more than 1.5mm is necessary. In 16.5 and 14mm gauges it will probably be fine as it is but 12mm builders will need to add

one or two axle shims 42 behind the cranks to reduce play.

Do not file the protruding centres of the hornblocks at all or the cranks will hit the spring detail, if you need more free play, move the cranks outwards slightly.

Pony trucks

The pony trucks 14 are identical front and rear, select the 2 for your gauge, open the holes to take 2mm bushes and fit them with the head on the non etched side. Fold the tabs with bushes around 70 or 80 degrees then fold the long end 90 degrees twice. The two arms need to align which is achieved by bending the long arm as shown, when it does align, grip both with pliers and solder the end. Fold the bush tabs in a full 90 degrees and solder the two edges that are not attached and any of the arm that is unsoldered. There will need to be a dogleg in the arm but that is best left until fitting. When fitting the wheels, an axle shim 42 will be needed at each side.

Locate the pony truck anchors 16 for your gauge, solder a 10BA nut where shown and file the nut until the thickness of nut and metal is 1.6mm or less. These are not interchangeable and are marked F and R, the rear one has side pieces 2mm shorter than the front. Fold the box part to shape and solder the side tags, fold the legs and test fit in the chassis, the closed side faces the centre of the loco. Its likely that the half etched cut outs at the front have solder in preventing the legs from fitting properly. An easy fix is to clean out what you can and bend the ends of the legs in slightly so they touch the underside of the plate, not the solder trapped in the corner. Solder in place and repeat at the rear, the legs of the rear one should be flush with the frame tops, solder in place. Locate the side spring retainers 17, push out the rivets and solder in place as shown.

Compensation

The compensation method used here is of the three point principle on the driving axles only, the pony trucks are sprung. The front beam bears on the middle of the front two axles, giving a fixed point at the centre of the beam. The rear axle horn blocks will hit the stops at the top of the cut outs, this gives two more mounting points, one on each side. This gives the required three mounting points and the front two axles will move around to follow the track. On the real thing there is a complicated set of links and levers connecting the springs of all five axles, this might be possible to replicate on a 16mm scale model but not on one of this size.

Fit all three axles and stand the chassis on a flat surface, measure the height of the frames at both ends, they should be the same height. If not, check that the all horn blocks are going fully to the top of their guides, particularly the rear. Also check that the front two axles are free to move up and down in their guides. If they all seem OK then a slight bend put into the beam will solve the problem. Do this in very small stages as not much bending will be needed. Also check that each side is the same height, if not this will definitely be a problem in the rear horn blocks. You should be able to lift each wheel slightly off the track while all five others adjust and stay where they are, if this test fails it is more than likely sticky horn blocks, a check for gunge, solder or filings in the horn guides should fix it.

Now is a good time to build some of the body, at least basic cab assembly and boiler fitting as some handling of the chassis will be required which might cause damage. Once these basic body parts are done, the rest is all cosmetic and can be done with the cab and boiler off the chassis.

Cranks

Before fitting the cranks, check that there is no solder on the threads of the crankpin screws. If there is, it can be removed easiest with a rotary wire brush in a mini drill. Make sure that the bushes will screw on right up to the crank. Fold up the quartering jig as shown in the sketch and

fit the axle guides in the slots relevant to your gauge. Remove all three axles but keep note of where they go and which way round.

The purpose of the jig is to ensure that the cranks are set the same on all three axles, not that they are exactly at 90 degrees, but they won't be far off. In a perfect world, the cranks would be a dead square push fit and could be secured with Loctite or similar. In our not so perfect real world, they will need soldering as they will not fit accurately enough, fortunately the silver steel axles solder easily.

Use a broach to open out the holes from the rear of the cranks until they start to push on the axles. Fit a crank to one end of each axle and force it on using a vice. Apply flux, check that they are square and solder them quickly with a hot iron, if you linger too long with the iron the crankpin screw may come loose and need re-soldering. Fit a second crank to each axle positioning it roughly at 90 degrees. Lay an axle in the jig with the soldered crank in the vertical position, the other crank should be in the horizontal position with its screw in the cut out. If not in the correct position, gently turn it until it is, remove from the jig, force this crank on in the vice then solder as before. If the cranks are a good fit when pushed on they can be removed from the jig and soldered whilst held in the hand, if the fit is looser it would be best to leave them in the jig. Repeat for the other two axles.

If all goes well, the cranks should all be firmly soldered in place and not to the jig, and be at the same quarter to each other. Clean up the cranks, double check for solder on the crankpin threads and refit in the chassis. One tip here is to use an iron bit with a large flat surface, lay this across the end of the axle as you solder, heat transfer will be quicker with less risk of problems. It also helps to move the wheels inwards 2mm or so which gives more room to work and reduces the chance of soldering the hornblock to the axle.

Brakes

Brake shoes 20 and pull beams 21 are included but whether you fit them is up to you. They can be seen through the frames but would not be missed much if you left them off. The real downside is that the axles, motor and gearbox become unremovable once they are fitted. If you go ahead, fit the rear two 20A on 0.6mm wire to line up with the centre of the wheel treads, the other four 20B fit into the notches in the lower spacers, the 14mm spacers have two notches for 14 and 12mm gauge. The pull beams slot into the notches in the brake shoes and a representation of the pull gear can be made from wire, see sketch for the layout. I found it easier to remove the frame spacers, just heat the ends and lift, fit the shoes and pull beams then replace the spacers. Once fitted, the part of the 0.6mm wire between the rear brake shoes must be removed as it will foul the gearbox.

The brake pull lever layers 22A are soldered together as a pair with a joggle at the top to take the pull bar. They fit on a 1mm wire through the holes in the frames near the front, the lever should sit in the slot in the plate above leaning forward a little. The levers 22B fit on the same wire centrally pointing down and are where the pull wires attach. Both levers can be detached from the etch as pairs and folded double before soldering. The pull bar should run back to the brake mechanism in the cab but this would prevent chassis removal. A short bar 44 is supplied to run from the lever to the under the side tank, its best fitted after the body is tried for fit as it must line up with the other half from the cab to the tank rear.

Coupling rods

The coupling rods 23 are laid out on the fret in the way they must be used, remove them as sets of three and they will fold in a zig-zag and stay aligned. They can be used either side, but the front and rear ends must not be switched. Solder each set of three together, you can use drill bits or broaches in the holes to line them up if they seem misaligned. Open the holes out until they fit easily onto a crankpin bush, a little over 1.5mm, the small holes to take a needlework

pin are 0.7mm. The male halves of the joints on the rear section are supposed to fit in the slot in the end of the front section. The fit might be tight and there may be stray solder in there. The female end can be eased by folding abrasive paper double and using it in the slot, the male end can be filed a little. Ensure that the rod joints fit together easily and fit a pin through each joint. The trick here is to apply a tiny drop of oil to the joint, paste flux to the pin at the back of the rod and solder quickly. It usually works first time but you can always do one again if it seizes up. Cut off the excess pin and file almost flush.

Put a 1mm washer 40 on each crankpin followed by the assembled rods. Screw the bushes into place and see if you can push the chassis along. The holes will probably need opening out further, try doing one side at a time then reassembling both to try again. To speed things up, try using a drill pin chuck, set to just grip the bush flange. This can be pushed onto a bush and the bush screwed on or off in seconds. If you have problems picking up the bushes and getting them started on their threads, try pushing a broach into the bush from the plain end, use this to position the bush in a pin chuck, remove the broach and screw the bush on using the pin chuck.

When the chassis pushes along easily, remove one rod, lay it flat with a bush in place in the rear holes and file the bush almost flush with the rod. The other four bushes need to be recessed. File a slot in the outer face of the rod to about 1/4 depth, fit the bush in this slot, lay flat and file the bush almost flush at the back. Refit the rods but before fitting each bush, gently countersink the threaded hole before fitting each one. Double check that all is still OK, then trim the front four crankpins flush each side.

Now is a good time to start the body, before the chassis gets too delicate to stand all the handling it will get.

Cylinders and motion brackets

The cylinders are 3D printed, they may be slightly sticky when you get them but it is of no consequence and can be painted over when the time comes. They fit with the square peg fitting through the square holes in the frames, screws secure them from underneath into the nuts on the second spacer. Check that they fit in the frame holes and file the pegs as required until they do, also drill through the holes to take the screws.

Locate the slidebars 39 and fold each side double to form a triple thickness and solder. Its near impossible to 3D print a small square hole so drill the hole in the cylinders 1mm and file 4 to 5mm of one end of each bar round to be a good fit in the holes you drilled. Before fitting them test fit them in the cast crossheads. The hole there will almost certainly have debris inside which can be cleared with a fine round file, it also helps to round the edges of the slidebars slightly. When they are a good sliding fit, drill the centre holes in the cylinders 2mm to 13mm deep, do not go right through. Cut two 15mm lengths of 2 x 1mm tube and fit in the centre holes, they should protrude by 2mm. Fit the slidebars and test the crossheads again, ensuring they still move smoothly over their full travel. If everything seems good, glue the slidebars in place and add a touch of superglue around the outside of the tubes.

Pick ups

The easiest solution is a pair of pcb strips between the brake shoes, secured to the centre spacers with super glue. this will not work so well in 12mm as space is limited. Another method is to use two gapped pieces of pcb and join them with wires, see sketch for details. Whichever method you use the pcbs must not touch the wheels, brake shoes or each other. The pick ups are made from 0.3mm PB wire, they must rub on the backs of the wheels not the flanges as PB wire is harder than the wheels and will wear the flanges. The blackening on the wheels does not need removing as it does conduct electricity. Connect the pick up pcbs to the motor with the enamelled copper wire supplied, it is self stripping, just apply flux and solder but the iron must be over 400 degrees C to do this.

Painting

Now would be a good time to paint the chassis as the wheels can still be removed easily and this chassis needs a lot of painting.

Valve gear - preparation

Locate the valve gear parts expansion links 43, fly cranks 26, radius rods 27, valve rods 28, drop links 29 and union links 30. Study the sketches to see how they all fit together but once removed from the etch, keep a note of which bits they are as some are very similar. All these parts except the expansion links are in pairs which can be folded double and soldered, except the drop links 29 which need to have a kink bent into them prior to soldering. The kink needs to be wide enough for the valve rod to pass through, see the sketch for details. Open out all the holes to 0.7mm for a needlework pin, except the larger hole in the fly crank which is 1.5mm.

Fold the expansion links to shape and solder 0.6mm wire through the second lowest holes, holding the assembly wide enough to take the valve rod. Also clear the two holes in the crossheads, the bottom ones to 0.7mm, the centre ones to 1mm.

Locate the motion bracket detail 34, fold the U shaped part 90 degrees and curve the two legs to follow the U shape, solder the seams. Clean up the motion bracket casting, it has a hole to the rear for the expansion link pin and one at the top for the lifting link, both to be drilled 0.7mm, if you can drill through both holes as it makes assembly easier. The etched part fits over the front top corner of the casting, make sure there is enough room to get the valve rod between the two parts, see sketch. Test fit them on the chassis, they sit over the top edge of the frames, the sidebar should fit against the flat area underneath where it will be soldered later. For positioning, the expansion link hole should be 4mm in front of the centre of the middle axle, make sure that both sides are in line, if you have drilled the holes right through, use the wire to keep them lined up.

Valve gear - assembly

Rather than treat the valve gear as one long complicated job, look at it as several small and fairly easy jobs, study the drawing, sketches and pictures to see how the valve gear fits onto the loco. It can be built in sections that come together at the end and if each section works, the whole thing will work. If you have completely assembled the motor and gearbox, it will make life easier during assembly and testing if the motor is removed so that the wheels can be turned by hand.

Start with the fly cranks, radius rods and expansion links, do both sides at the same time so its easier to make sure you get a left and right handed version. Push the pins through from the outside, add paste flux to the back and a tiny drop of oil to the inner pivot **in that order**, then solder quickly with a hot iron, 145° detailing solder is useful here. If the joint doesn't "take" first time, reflux, re-oil and try again. Do not rely on the oil to last two attempts as it usually doesn't.

Assemble these three parts and trim the pins almost flush at the back. If all goes horribly wrong, heat the joint and remove the pin, clean the solder off the parts and try again with a new pin. You should end up with two sets that are a mirror image of each other, lay them side by side as they would be on the loco. You can also use solder mask for this type of job but I find mine has set solid every time I need it, so I use oil. The old piece of paper trick is not reliable and results in much sloppier joints so is not recommended.

Repeat the above procedure with the valve rod, combination lever and union link. In this case the valve spindle is added to the top holes of the drop link. Again you should end up with mirror

images, lay them in front of the previously assembled parts. The combination levers may need a kink in them to clear the crossheads, this will be near the top and is best done before fitting to the chassis.

Countersink the rear hole of the crossheads with a drill turned by hand and fit the connecting rods to the crossheads with the 14BA screws supplied, the nuts go on the outside. Test fit these on the chassis and try pushing the chassis along to check clearances. There should be visible clearance between the back of the crosshead and the crankpin, if there is not enough, the crankpin bush can be recessed more by thinning the rod further and the head of the 14BA screw can be filed flush, see sketch for details. Once clearance is good, remove the connecting rods and crosshead, trim the 14BA screw flush with the nut and attach the union link to the bottom hole in the crosshead.

Fit this assembly back onto the chassis with a 1mm washer on the crankpins before the connecting rods and a temporary piece of wire through the motion bracket. This is a good time for a track test so refit the motor/worm and give it a try. Run it with no oil at first as this will show up problems easier and quickly wear off any burrs in the holes. If all is well, fit the rear sections of valve gear, see sketch for setting the crank positions and solder with a hot iron. Test again, checking on curved track as well as straight.

Once all mechanical problems are eliminated, the temporary pin can be secured with glue at the back or, if its long enough, bent over. Oil all moving parts and keep it running for a while. If you have a rolling road or a circuit to run it on, run it for five minutes or so in each direction.

Small details

Drill out the holes in the lifting arms to 0.7mm and thread a 50mm length of 0.7mm wire through the castings to represent the cross shaft and position the arm over the rear edge of the right hand motion bracket. Position the trunnions just inside the inner lifting links then solder them both to the motion brackets. Solder a lifting arm to one end and attach a lifting link to it and the valve rod. Repeat with the same parts on the other side. Make sure that all parts are sitting square and are equally spaced on both sides then solder the arms to the wire, and the wire to the trunnions. Cut away the excess cross shaft wire outside of the trunnions and dress all the ends almost flush.

If you want to make the valve gear easier to dismantle, the centre part of the cross shaft can be cut away leaving 10mm each side. The centre can be bridged with fine tube (0.7 x 1.0mm is available on Ebay). This will allow both sides of the cylinder/valve gear assembly to be removed if required, but it is fiddly and not actually necessary, your choice.

Finally

Finally, you should have run out of parts by now so it must be finished. Those of you who like to paint the chassis during assembly will have done so by now but it can be painted after assembly, just use an old brush when getting in the awkward corners. Colour choices will be Army grey or black, unless you are modelling a preserved one that happens to be in a body colour. Give it a good long test with weights on top, or the body, to eliminate any last minute issues. Mine ran quite happily at the first attempt which is always nice, particularly when it is a test build.

Alco 2-6-2T body instructions

You will need to assemble the chassis at least to the point where it has wheels before starting the body. It is best not to completely finish it as the rods and valve gear are bound to suffer some damage with all the extra handling involved. The cab and bunker are etched parts that need soldering but the boiler and tanks are 3D printed. The kit is supplied as the WD version, a separate etch is available for Mountaineer early and later types but beware as some parts overlap the two types, refer to pictures of Mountaineer at the period you want yours to represent. Some of the parts are different but basic assembly is much the same for all types.

Folding parts

All normal folds are to 90 degrees with the etched line on the **INSIDE** of the fold. Folding double means to fold 180 degrees with the etched line on the **OUTSIDE** of the fold. Be sure to double check before folding as re-folding the other way usually means that the parts break apart.

Clean up means to remove any joining tabs but do not over file the edges as it will be detrimental to the fit of the parts. Only do this if the edge will show on the finished model. When asked to trim something, it is best to rub the edge on abrasive paper flat on a bench as files always leave a curved edge. This is also the best way to clean off the joining tabs without distorting the part.

Boiler and tanks

Examine the boiler assembly for blemishes, which can be cleaned up with fine abrasive paper. Place it on the chassis and see if it sits correctly, the base of the smokebox insists on printing at an angle so I made it too deep so it can be filed square. The tanks will be fitted before shipping as they are not easy to get straight and I have a jig to do it on. The boiler should be central along the chassis and be parallel to the frames when viewed from the side or above, the smokebox base sits on the front plate and the rib around the firebox rests on the edge of frame spacer E. If it doesn't sit well, check the firebox and the smokebox base for trueness and file if necessary. If you manage to file off too much it can easily be resurrected by gluing on a layer of plastic card and the process started over. Hold the boiler in its exact location and drill through the spacer into the smokebox 1.5mm for a self tapping screw. The rear of the firebox rests on a spacer and will need gluing there when detailing and painting is finished, I would suggest an epoxy adhesive generously applied to firebox and spacer, it will not be seen as it will be under the floor.

Cab assembly

Some of this section has been split into two parts for WD and Mountaineer and some parts have specific notes, please read carefully before doing anything. The loco kit is supplied with a WD cab, Mountaineer's cab is covered by an extra etch and the parts are mixed up on the two sheets to fit them in. Do not try to use WD parts on Mountaineer or vice versa as although some may be similar, they will not fit.

All types - Locate the floor 1, both layers and cab front frame 2, the Y shaped piece in the lower floor layer will be removed later but leave it in place for now. Clean up the edges and test that a piece of waste etch will fit in the four slots, locate the floor layers with drills or broaches through the holes and solder in a few spots around the edge but not near the slots for the cab frame. on Mountaineer, fold down the two side strips at the cab doorways. Use a knife to cut through the half etched parts that retain the Y piece and remove it. Fold the cab front frame to shape and fit in its slots, make sure it is fully engaged and solder from the inside, clean off any solder visible on the outside.

All types unless noted - locate the cab front 4 and sides 5 & 6, clean off the tags and check that they sit in place and there is no solder in the corners holding them out of place. WD only - push out the rivets in the front, locate the window shields 27 and curve to fit under the strip above the windows. Solder in place from underneath and clean up. Position the front against the frame with the overhang equal at both sides and the top curve aligned with the frame, solder

from the rear but avoid the edges.

WD only - push out the rivets in the sides, position them against the front and resting on the footplate, solder in the same way. Examine this assembly critically for crooked parts or bits that don't line up and solder all the parts fully when you are happy that they are all square. Solder 12BA nuts over the four holes in the floor.

Mountaineer early- assembly is much the same except that the sides fit against the front with the top edges aligned with the angle in the cab front, see sketch for details, they will overhang the floor by around 2mm. Solder in place when all seems square.

Mountaineer later - the later version has cab side tops that need to be curved to match the curve of the front edges, this does remove the requirement to set the height as they will position themselves and will end up with the bottom edges slightly lower than the fold down floor pieces.

Great care must be taken to make the curved top even and get the sides on straight, see sketches for pointers. I would suggest a couple of solder tacks when you think it's all OK then have another look when the bunker is fitted. My first attempt came out rather crooked and I soldered them fully, they were a real pain to remove. It is worth test fitting the roof on the later Mountaineer as it plugs into the slots in the rolled over side top edges, this can be used as a guide to get the sides in the right place. The rear section of the roof fits behind the sides and should fit into the slots in the cab rear, the slots in the cab front were left there by mistake and can be filled with solder at some point.

Bunker

WD - Locate and clean up the bunker overlay 7, bunker covers 22, bunker front 11 and bunker door 12. Push out the rivets in the door side strips. It fits over the door opening on the non etched side just short of flush with the bottom. It can be fitted either way up depending on whether you want the door open or closed. Fold the bunker front to match the half etched line in the floor. Solder the covers over the holes in the middle of the bunker overlay, they can be open or closed as you wish. Curve the overlay to match the etched line in the floor and test fit it with the front. They were both drawn a fraction over length and the front in particular may need a slight trim to fit between the sides. When happy, solder both in place from inside.

Mountaineer early - Locate the bunker frame 3 and fit in a similar way to the front frame. Locate the bunker sides and rear 8, 9 & 10 which fit in a similar way to the cab but they overhang the floor like the cab sides do. The rear must be folded to the shape of the bunker sides using a straight edge, dimensions are given in the sketches. It rests on the tiny ledge of floor which will set its height, solder in place. The sides should line up at the top and can also be fitted. Fit the bunker door 11 to the bunker front 12 and fold the top over to point rearwards, this fits between the sides against the edges of the frame, solder at both sides. Locate the cab rear 13 and door 14, solder the door over the central opening from the inside and test fit the rear in place, it fits between the sides flush with the rear and the ledge on the bunker below should touch it. It should be exactly the same height as the front which can be checked with a straight edge across the two parts. solder in place

Mountaineer later - Assemble much as above, the difference is that the bunker sides have tops that must be curved to match the edges of the bunker rear. Mark and fold the bunker rear 10 according to the sketch and fit it centrally with 1mm overhanging the floor. Form the bunker sides 8 & 9 so that the curve fits the top corners of the bunker. Try for a fit and gently tweak the bunker rear until it matches the sides, use the doorway and top edges of the cab and bunker sides to judge if things are square. Secure with a spot of solder at the top and bottom of the rear edge from the outside then double check that everything is still square. Fit the bunker front 11 and door 12 as above and the rear door 14 to the cab rear 13. This needs to be slotted into place then held up against the top curves of the sides. Check with a straight edge and by measuring that it is the same height as the front, if not the curved tops will need tweaking a little. When it looks good, solder it to the ledge of the bunker front.

Handrails and roof.

WD - There are several handrail types on this version, all seem to have the same rear type which fits in a hole in the floor, goes through a bracket 18 and up to behind the cab side under the roof. Use 0.6mm wire and wrap the bracket around the wire, soldering it to the bunker side such that the handrail is vertical, the top end is soldered behind the cab side. The front handrails are either of a similar type or use angled brackets 19 to tuck inside the cab side, bend these to shape, they are handed, thread onto the wire and solder inside the cab side. The roof is curved to shape and soldered squarely onto the cab sides and front, the four rivets in a square go on the right side nearer the front.

Mountaineer - These do not reach the floor and have different brackets top and bottom, the top ones are handed. Solder the top brackets in place positioning the hole about 1mm away from the cab edge. Wrap the lower brackets around the wire, thread the wire through the top bracket and position the lower bracket so that the handrail is vertical, solder in place. The roof is a wrap over type including the upper sides. Create the fold at the roof eaves first by measuring against the sides that are already fitted. When these seem OK, form the curve in the main roof. Keep test fitting as you go to get the fit accurate, it may take some time but its worth it as errors will be easily visible. Late Mountaineer has tabs and slots to locate the roof into the cab sides and the tabs can be bent under a little to hold the roof on, the rear section fits behind the sides and slots into the slots in the cab rear. Early Mountaineer has a butt joint and the real thing is on a light framework inside the cab. To get round this there are two strips 30 which can be used as a bridging piece if fixing the roof permanently or eight small squares 32, three of which can be soldered in a row along the join. The trick here is to solder the outer two to the upper part and the center one to the lower part, they will then overlap each other and hold the roof in place.

The roof can be soldered or glued in place but will make access to the cab difficult, if you are going to fix it permanently, do it after all work and painting in the cab is finished. It can be made removable by using strips 30 or squares 32 on the inside at the lower edges. This will allow it to be removed easily but it will be prone to being pulled off by others who have not been told that its removable. This would be my choice as cabs always seem to need access at a later date, just warn anyone that may be about to pick it up.

A few other bits on the etch are the front lamp base 28 which was on the original WD design but did appear on the early Mountaineer for a period, fold to shape and glue to the smoke box front. If you drill holes in the tabs and drill through these into the smokebox, wire can be soldered into the brackets and the assembly glued in place, a much more secure solution. The front lamp sit on its base and the rear fits inside the bunker top, both can be glued in place. There are lifting brackets that were fitted to Mountaineer at some point and are shown on the chassis sketches, fold to shape and solder according to pictures, they do not look out of place on the WD loco either. There are also 3 lamp irons 29 which can be bent to suitable shapes and attached where required, not all locos had them, refer to pictures for shapes and positions.

Body castings

A little cleaning up of the castings may be needed as there will be a little flash in some corners, fine files are best for this. Round parts like whistles can be polished with fine abrasive paper and fitted after painting, if you want them to stay shiny, give them a coat of gloss varnish to stop them tarnishing. Have a good look at the instructions on positioning the various parts, most of the options are shown but there may be others as things can get moved around during rebuilds. The WD layout is fairly standard but Mountaineer varies a lot from time to time. Choose the layout you want and fit the parts according to the drawings.

It is best to drill the parts and fit hand wheels and pipes with solder before fitting, but make sure you clean the parts before gluing as it will not stick if there is flux present. A lubricator is supplied for Mountaineer which needs a mass of pipe work attached, the best approach here is

to decide how to attach it to the tank front, paint it and then fit the pipes. All the feed pipes disappear between the tank and boiler so do not need to be very long, as long as the ones on the lubricator are present it will look fine. If you have a few days to spare, it should be possible to track the run of all the pipes from pictures and replicate them in fine copper on the model, from my point of view this comes under the heading of "life's too short" but you might feel otherwise.

I recently noticed that Mountaineer had a chime whistle at one point, as did one of the restored WD versions but this is not included in the kit as I didn't spot it in time. Also there is no reverser, mainly because of lack of any decent pictures and an inability to visit Wales since the Covid lockdown was on and off at the time. If anyone can send me decent pictures of the reverser, I will have a casting made to add to the kit, those that have already bought a kit will get it for free.

Finally

Give the cab a good clean before priming and painting, it should fit over the boiler and is fixed by screws from underneath. As you may have noticed by now, I got the position of the screw holes in a bad place but if you drill into the spacer underneath to clear a screwdriver, it is possible to fit the screws, sorry about that. Luckily it can be removed at any time as it can be tilted during removal and will clear any fittings on the boiler.

Any problems or queries email me at borsig1958@gmail.com.
I can supply parts for this kit but etched parts can only be supplied as a complete etch.