

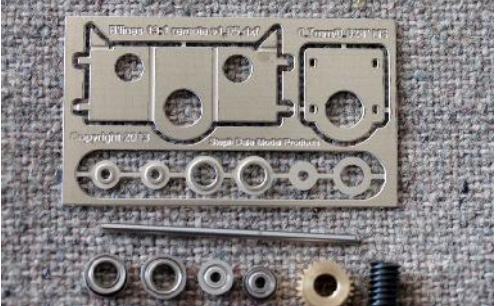
Instructions for Blines 13:1 'Remote' Gearbox

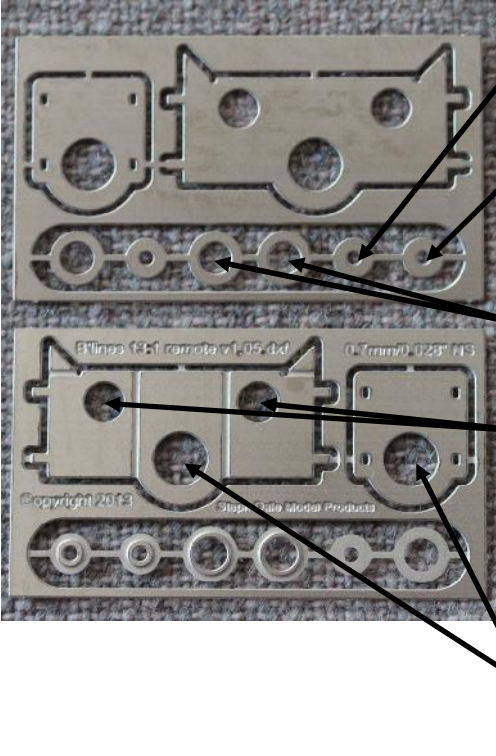
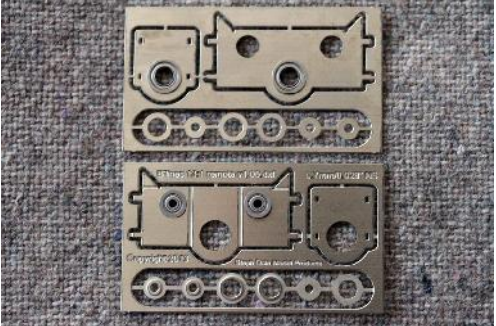





Introduction

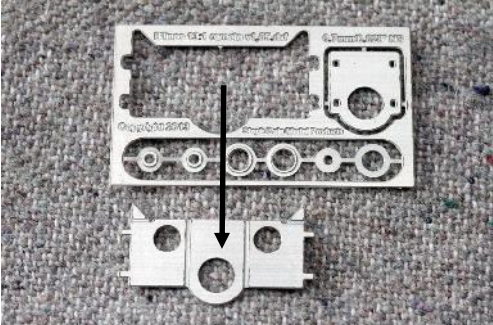



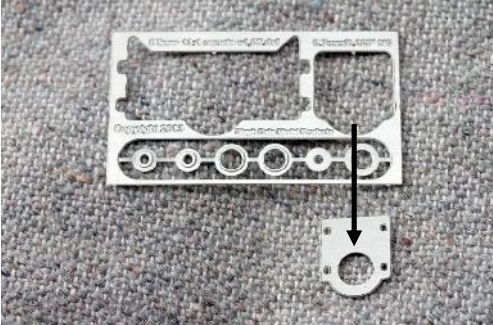



1. These gearboxes are much more closely toleranced than typical 'fold-up' types and care is required in their assembly. Taking a little care and time will result in an exceptionally quiet, smooth and long-lasting gearbox.
2. Failure to follow this procedure is likely to result in a gearbox that will not run (or not run well) – this is not a warranty issue although I will happily provide replacement frets or other components (at cost) should you run into difficulties.
3. These gearboxes use the cusps on the fret as a means to control tolerances – **DO NOT REMOVE CUSPS FROM ANY OF THE COMPONENTS UNLESS DIRECTED.**
4. The reamers mentioned in the instructions can be obtained inexpensively from discount tool sellers and even from well-known on-line auction 'sites'. They are recommended for the assembly of the gearboxes as they result in the necessary accuracy in the opening of the critical holes as well as being speedy to use.
5. Twisty-tabs. These components use twisty-tabs to position and secure the components before soldering. Twisting the tabs approximately 90degrees will hold the parts firmly relative to each other in preparation for soldering.






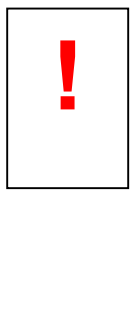


Additional items








1. Axle/wheelset of your choice, on a 3/16" diameter axle. These instructions show a Slater's axle in use.
2. A universal joint/drive coupling. For coupling this gearbox to a motor or adjacent gearbox. Suitable items are available from me (in the form of a low-cost silicon tube 'ball drive') as well as Branchlines, Exactoscale, etc.









No.	Illustration	Symbols	Text
1			<p>First job is to check you have everything:</p> <p>Fret x1 FR156zz 3/16" id bearings x2 MF62zz 2mm id bearings x2 Gearset x1 2mm diameter silver steel x1</p>

2		<p>2mm Dia.</p> <p>3/16" Dia.</p> <p>6mm Dia.</p> <p>5/16" Dia.</p>	<p>Ream the holes to the sizes shown:</p> <ol style="list-style-type: none"> 1. Small washer holes 2mm diameter. 2. Large washer holes 3/16" diameter. 3. End bearing holes 6mm diameter. 4. Axle bearing holes 5/16" diameter. <p>All holes must be carefully de-burred from each side to allow the bearings to seat properly against the frame.</p>
3			<p>Test fit the bearings in the holes as shown.</p> <p>Do not fix at this stage.</p>
4			<p>Test fit the bearings on the 2mm diameter silver steel shaft.</p> <p>If it's too tight then you can polish the motor shaft with emery paper until it just fits.</p> <p>Do not fix at this stage.</p>
5			<p>Test fit the bearings on to the axle you'll be using.</p> <p>If it's too tight then you can polish the axle with emery paper until they just fit.</p> <p>Do not fix at this stage.</p>

6			<p>Cut the main part of the gearbox from the fret.</p>
7			<p>Bend down the two top ears to 90 degrees.</p>
8			<p>Bend up the front and back to 90 degrees.</p>
9			<p>Cut the sideplate for the gearbox from the fret.</p>
10			<p>Check that the sideplate and the main part of the gearbox fit together easily.</p> <p>Test the tabs and slots carefully, one set at a time.</p> <p>If you find that any of the tabs are too tight they can be eased now.</p> <p>Do not solder at this stage.</p>

11			Carefully remove the burrs from the end of the worm.
12			Remove the four shaped washers from the fret.
13			Carefully de-burr the back of the washers.
14			<p>Note: The smaller washers always fit with the worm in this position. The shaped side should always be away from the worm.</p>
15			<p>Assemble the washers, bearings and worm in to the gearbox, on to the silver steel shaft.</p> <p>Do not fix at this stage.</p> <p>Note: These bearings fit with the flanges on the inside of the gearbox.</p>

16			<p>The sideplate can now be placed back in to position.</p> <p>Do not solder at this stage.</p>
17			<p>Note: The larger washers always fit with the gear in this position. The shaped sides of the washers should always be away from the gear.</p>
18		 	<p>Test fit the axle, gears, washers and bearings into the gearbox.</p> <p>Note: These bearings fit with the flanges on the outside of the gearbox.</p> <p>At this stage test that the shaft turns over smoothly and that the gears mesh smoothly.</p> <p>There is some movement in the slots in the sideplate of the gearbox. With a little experimentation you should find that moving them one way tightens the mesh, the other slackens it off. You are aiming for the gears to mesh closely and smoothly.</p> <p>It may take several goes to get this absolutely perfect.</p> <p>Do not fix at this stage.</p>

19			<p>Once you are comfortable with the running of the gearbox twist the tabs on the gearbox to hold everything in position.</p> <p>Carefully remove all the components from the gearbox without disturbing the location of the twisty tabs.</p>
20			<p>The joints and all other bend lines can now have solder run in.</p> <p>Take care to ensure that solder does not get on to the surfaces that seat the bearings.</p>
21			<p>Fix all bearings with retaining compound. I use Loctite 603.</p> <p>Take care not to get any of the retainer on the faces or races of the bearings – they will seize solid in no time. If you think this has happened remove them from the frame and if found to be seized I can supply replacements for a nominal fee.</p>
22			<p>This is probably a good opportunity to think about whether the shaft needs cropping.</p>
23			<p>After the retainer has fully cured re-assemble the gearbox in the same order as before. (See steps 15,16,17, 18).</p> <p>You should now have a fully functioning gearbox.</p>

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At this stage I lubricate the gears with a little gear lubricant which must be plastic compatible.

The aim is to get a thin, even coating on both the gear teeth and worm. I use Woodland Scenics Hob-E-Lube 'Gear Lube' (Item WHL655).

The bearings are lifetime lubricated and will need no further lubrication.