

GB5/20 TWO STAGE 38:1 REDUCTION GEARBOX with precision cut helical gears and steel worm with grubscrew

For 2.0mm shaft diameter motors

This gearbox has been designed for use with motors having fixing hole centres from 8 to 10mm. The gearbox can be used on its own as a solution for many drive configurations and is especially useful for small prototypes requiring a compact drive layout. It can also be used together with a drive extender which allows even greater flexibility. This is often necessary when a large wheeled prototype is being built to 00 gauge so that the motor barrel will not enter the frames or sit between the wheel rims. In addition, the use of a drive extender allows the choice of 38, 46 or 50:1 overall reduction.

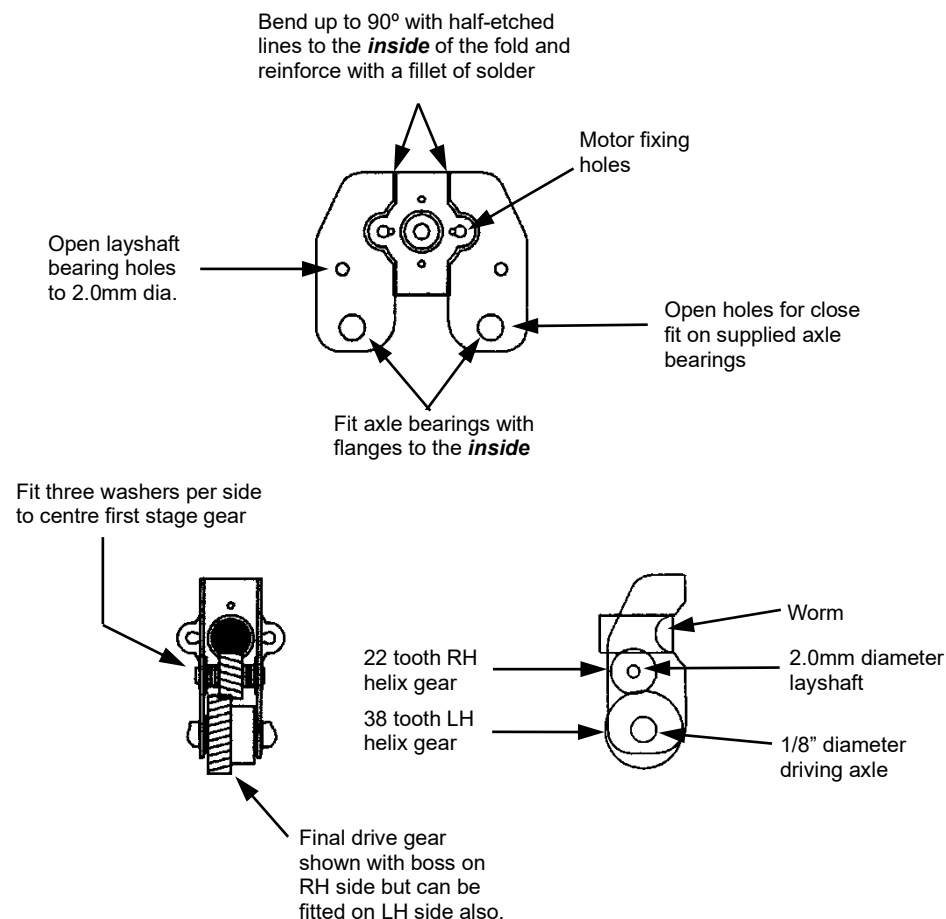
ASSEMBLY INSTRUCTIONS

- Carefully open out the layshaft hole in the gearbox etch until the 2.0mm diameter layshaft is a close fit. Next open out the axle holes until the bearings are a close fit, taking care to avoid making the holes too big. Take your time with this and check for fit frequently, removing the minimum of material. This is best done using a five sided broach which will ensure that the holes stay on centre. Please note that if the holes drift off centre this will affect the performance of the gearbox.
- Open out the motor fixing holes to suit the motor you are using. Overlapping holes are provided at 8.0mm centres assuming the use of M1.4 fixing screws and at 10mm centres for M2 fixing screws. Holes in vertical orientation are at 8.5mm centres. File back any swarf from the motor mounting surface.
- Solder the axle bearings in place with flanges to the **inside**. The bearings have a short reach so that the outer surface of the gearbox sides is flush.
- Bend up the gearbox sides using flat pliers with the half-etched line to the **inside** of the fold. Tweak the sides with the fingers and check with a metal try square to ensure that they are both at 90° to the gearbox back plate and also parallel. Take your time to get this right since if the etch is assembled out of square this will affect the performance of the gearbox. When satisfied reinforce the joints with solder.
- The gearbox can now be washed in hot soapy water and dried on a radiator or with a hair drier. To remove any remaining soldering flux.
- Fit the worm on the end of the motor shaft leaving a small space between the end of the worm and the front bearing to allow some end float. Screw the motor in place.
- Assemble the etched spacing washers into two sets of 3 washers and solder together, ensuring they remain concentric and an easy fit onto the 2mm diameter layshaft. Feed the layshaft through the upper hole in the gearbox, threading on first one set of 3 washers, then the 22 tooth gear, then the second set of washers. Although the gear has a grubscrew it is best to ignore this and not tighten it up, which can pull the gear off centre and lead to inferior performance. We prefer instead to fix the layshaft to one gearbox side only using a small drop of superglue or Loctite so that it will not rotate or work itself out sideways. This leaves the gear free to rotate on the layshaft and find its own centre between the worm and the final drive gear. Should it be necessary to dismantle the gearbox for any reason the layshaft can be gently drifted through the gearbox side to free off the adhesive joint.
- The 38 tooth gear can now be mounted on an axle and the assembled gearbox lubricated and test run before final assembly into the frames. We recommend that you run in the gearbox on the bench at intermediate speeds in both directions, then at increasing speed, checking that the motor is not overheating and that the drive is smooth and quiet.

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The gearbox can now be fitted into the chassis and the axle and 38T final drive gear fitted. Remember to file a flat on the axle for the grub screw to bed on. This is especially important where the gearbox is to be used in a large prototype intended to pull a significant trailing load.

Drawings shown actual size



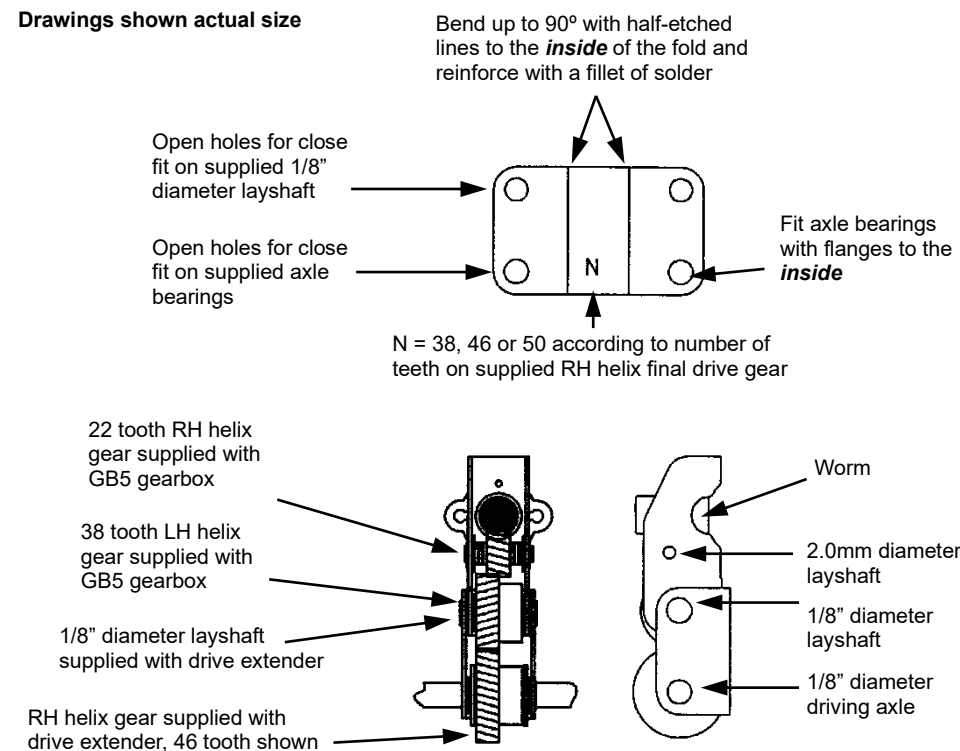
GEARBOX DRIVE EXTENDER with precision cut helical gear and layshaft.

The GB5 gearbox can be used with a drive extender which allows even greater flexibility. This is often necessary when a large wheeled prototype is being built to 00 gauge so that the motor barrel will not enter the frames or sit between the wheel rims. In addition, the use of a drive extender allows the choice of 38, 46 or 50:1 overall reduction.

ASSEMBLY INSTRUCTIONS

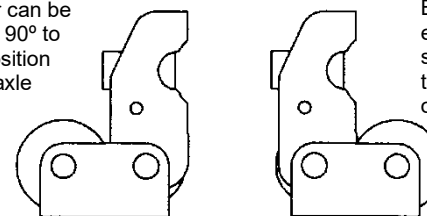
1. The drive extender has a pair of holes adjacent to the etched legend 38, 46 or 50 according to the ratio of the extender chosen. Carefully open out these holes until the supplied bearings are a close fit, taking care to avoid making the holes too big. Take your time with this and check for fit frequently, removing the minimum of material. This is best done using a five sided broach which will ensure that the holes stay on centre. Please note that if the holes drift off centre this will affect the accuracy of the mesh with the gearbox and the performance of the assembly.
2. Solder the axle bearings in place with flanges to the **inside**. The ends of the bearings can be filed back flush with the outside face of the drive extender.
3. Carefully open out the pair of holes at the other end of the drive extender until the supplied 1/8" diameter layshaft is a close fit. Once again, it is important not to make this a loose fit in order to ensure correct meshing with the gearbox.
4. Bend up the sides of the drive extender using flat pliers with the half-etched line to the **inside** of the fold. Tweak the sides with the fingers and check with a metal try square to ensure that they are both at 90° to the back plate and also parallel. Take your time to get this right since if the etch is assembled out of square this will affect the performance of the drive train. The inside faces of the drive extender should be a close fit over the outside faces of the gearbox. When satisfied reinforce the joints with solder.
5. The drive extender can now be washed in hot soapy water and dried on a radiator or with a hair drier to remove any remaining soldering flux.
6. Align the holes at the top (gearbox) end of the extender with the holes at the bottom end of the gearbox itself. Note that the extender can be coupled to the gearbox in either of two ways according to the desired application. See sketch. Feed the 1/8" layshaft through the holes in the extender and those in the gearbox, at the same time capturing the 38T LH helix gear supplied with the gearbox. Make sure you have fitted the gear the correct way round, see sketch.
7. Although the gear has a grub screw it is best to ignore this and not tighten it up, which can pull the gear off centre and lead to inferior performance. We prefer instead to fix the layshaft to one side only of the drive extender using a small drop of superglue or Loctite so that it will not rotate or work itself out sideways. This leaves the gear free to rotate on the layshaft. Should it be necessary to dismantle the drive extender for any reason the layshaft can be gently drifted through the side of the extender to free off the adhesive joint.
8. Fit the drive axle through the holes in the bottom end of the drive extender, at the same time capturing the final LH helix gear (38, 46 or 50 tooth). Make sure you have fitted the gear the right way round. The assembled gearbox and drive extender can now be lubricated and test run before final assembly into the frames. We recommend that you run in the assembly on the bench at intermediate speeds in both directions, then at increasing speed, checking that the motor is not overheating and that the drive is smooth and quiet.
9. The gearbox and drive extender can now be fitted into the chassis and the axle and final drive gear fitted. Remember to file a flat on the axle for the grub screw to bed on. This is especially important where the gearbox is to be used in a large prototype intended to pull a significant trailing load.
10. The gearbox and drive extender can be left free to rotate so that the optimum angle for the desired application can be determined by experiment. Once satisfied the drive extender can be fixed at the desired angle with a spot of solder or superglue at each side, ensuring that this does not enter the layshaft holes.

Drawings shown actual size



GB5 gearbox and drive extender shown in vertical configuration to give maximum clearance between motor centre line and driven axle centre line

The drive extender can be swung round up to 90° to offset the motor position behind the driven axle centre



By fitting the drive extender etch the other way round as shown here it is also possible to position the motor forward of the driven axle centre