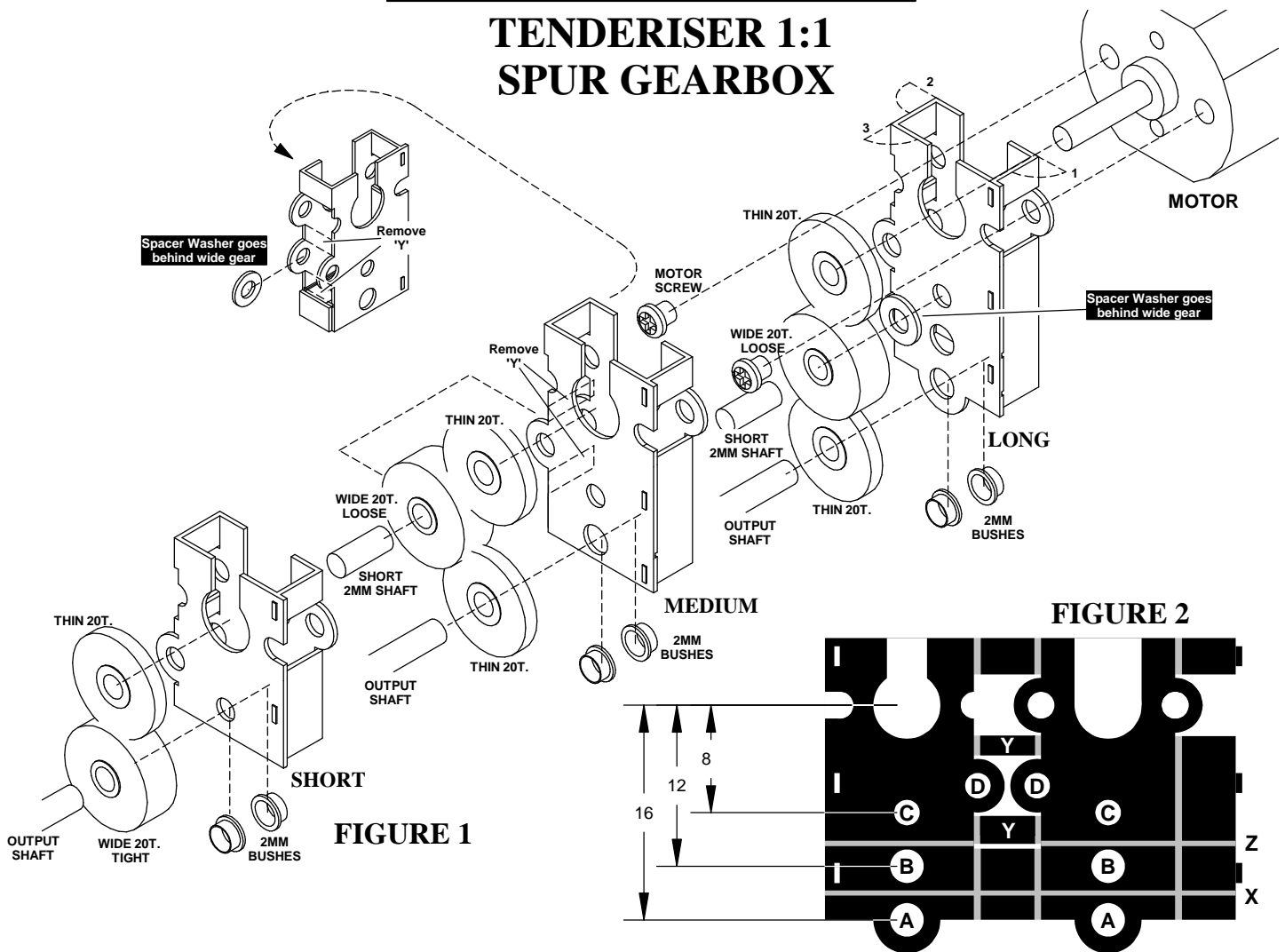


TENDERISER 1:1 SPUR GEARBOX



Remove the gearbox etch from the fret, then study Figures 1 and 2 and decide which configuration you're going to build.

Long: For this configuration, the three-gear drive train is arranged vertically. Leave the etches as they are and open out holes 'A' to suit 2mm brass bushes and 'C' so a length of 2mm gearshaft is a good fit.

Medium: Here the middle gear is offset to reduce the height. Use flat-nosed pliers to repeatedly bend the etch along line 'X' until it snaps. Clean up the edge and then open out holes 'B' to suit 2mm axle bushes and 'D' so a length of 2mm gearshaft is a good fit. Carefully remove areas 'Y' and tidy up the edges.

Short: This uses only two gears. Bend and snap along line 'Z' as above and open out hole 'C' to accept 2mm bushes

Holes should be progressively **reamed out** and the components offered up until they a tight push-fit. Once the unit is assembled, the idler shaft will be fixed with the gear free to revolve on the shaft. Remove burrs by inserting the tip of a drill bit (of much larger diameter than the hole) and gently rotating it between your fingers. Solder the 2mm **axle bushes** into their holes, noting that the shoulders on the bushes are on the same side of the etch as the bend line.

For **Long versions**, the etched **Spacer Washer** (see below) can be tricky to fit once the etches are bent to shape. If you wish, you can solder it in place now, but before proceeding, make sure the shaft will still pass through the hole.

Fold up the etch, making the bends in the order shown in Fig. 1. Use flat-nosed pliers and grip the etches near the bend lines to avoid distortion. All bends are 90 degrees, with the bend lines on the inside of the gearbox. As you make the final bend, the tabs should locate in the slots to form a four-sided box – before soldering along the join, check the box is square and adjust as necessary, before running a good fillet of solder along the line.

We've included two **etched brackets** which you may find useful for fixing the TendeRiser into you chassis. When they're folded to shape, they can be soldered to the gearbox and used as location holes for wires to hold the unit in place.

De-flux the gearbox, scrubbing with household cleaner, then rinse it and allow to dry. If it's likely to be visible then **paint it black**.

For long and medium versions, use a carborundum disc in a mini-drill to cut a short **idler shaft**, so its length equals the overall depth of the gearbox. Wear effective eye protection – cutting discs can and do disintegrate if they snag. Remove any burrs with a fine file. If the shaft is a tight fit, it will only pass through both sides of the etch if they are truly square. If it won't go through, check to see if the etches have been folded accurately. Position the **thick 20t gear** at its location in the gearbox, manoeuvre the full-thickness etched **Spacer Washer** into place, then slot the short length of 2mm shaft through the gearbox, gear and washer. Check the gear rotates freely and then secure the shaft using a tiny amount of cyano glue at one end only - the rear of the shaft should be flush with the outer face of the etch or it may catch the motor.

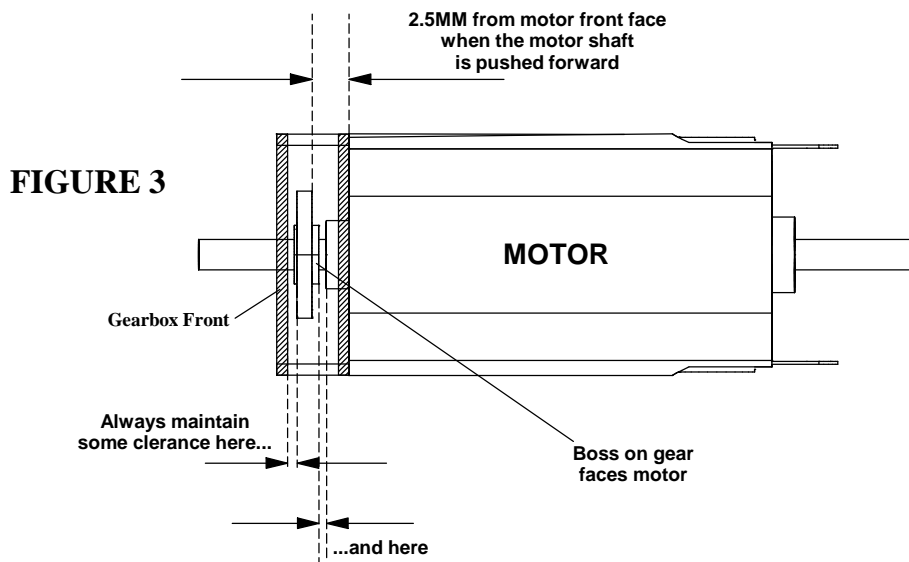


FIGURE 3

Our illustrations show a Mashima 14 series motor, which has a small boss on the front face; any make and size of motor can be fitted to the gearbox, as long as the **screw fixing centres** are 10mm apart. Larger motor bosses may require paring down to achieve the clearances shown in Figure 3.

Push a push the thin, **Tight-fitting 20T** gear onto the **motor shaft** so the larger boss on the gear is nearest the motor. Check the clearance between the gear and motor, when the motor shaft is pushed fully forward. Now try the motor in the gearbox and secure it using the motor screws. Use a small screwdriver and be carefully and not to damage the gear as you tighten the screws.

View the gearbox from above as you push the motor shaft forward – there should be some clearance between the front face of the gear on the inside of the gearbox to prevent rubbing. Check the gears are fully meshed and then **test the unit under power**.

Now you can fit the **output shaft** into the gearbox. The gear on this shaft is a push-fit on the shaft.

For **Long and Medium** set-ups, up to 1.5mm **end float** is available, which can be used to your advantage. The narrower, output shaft gear will slide along the full-width idler gear. This acts like a **spline**, but with much reduced levels of friction and can be an invaluable feature, if a fixed-length driveshaft will cause problems (e.g. twin-pivot tender coupling arrangement).

If you do wish to eliminate some, or all, of the end float on the shaft, then you can use the etched washers, packed either side of the output gear, or make your own arrangements with collars on the drive shaft.

Short versions of the box have no end float on the output shaft due to the width of the output gear.

To **fit the output shaft**, cut a length of 2mm shaft to length and push it through the gearbox and tight 20T output gear, including washers if applicable. Ideally, you should try and site some sort of universal coupling arrangement on the shaft, as near to the TendeRiser as possible; a long length of unsupported shaft running from the box will cause wear to the bearings. Alternatively, you can remove the front, output shaft bearing and run the shaft straight to a second bearing further along the shaft and fixed to your tender frame (See Fig 4). For this set-up, ensure that the output shaft is running parallel to the other shafts and the TendeRiser is firmly secured in the tender.

The gears are effectively self-lubricating but a little plastics-compatible grease will do no harm. Do not use general-purpose modelling oil, which attracts dust and grit. Metal-on-metal contact areas (motor bearings, axle bushes) should be lubricated with a tiny amount of light machine oil.

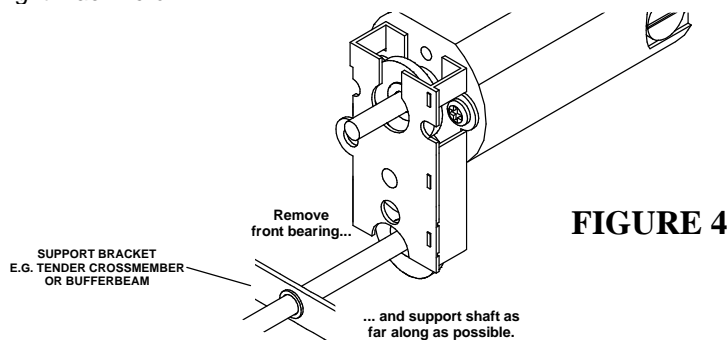


FIGURE 4

FOR MORE INFORMATION ON HIGH LEVEL *PRECISION* GEARBOXES CONTACT
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