All aboard for the NUMBERS GAME

Bright, cheerful, and above all educational, this delightful toy designed by Janet Carmichael is certain to provide hours of fun for the kids while teaching them the all important skill of numeracy

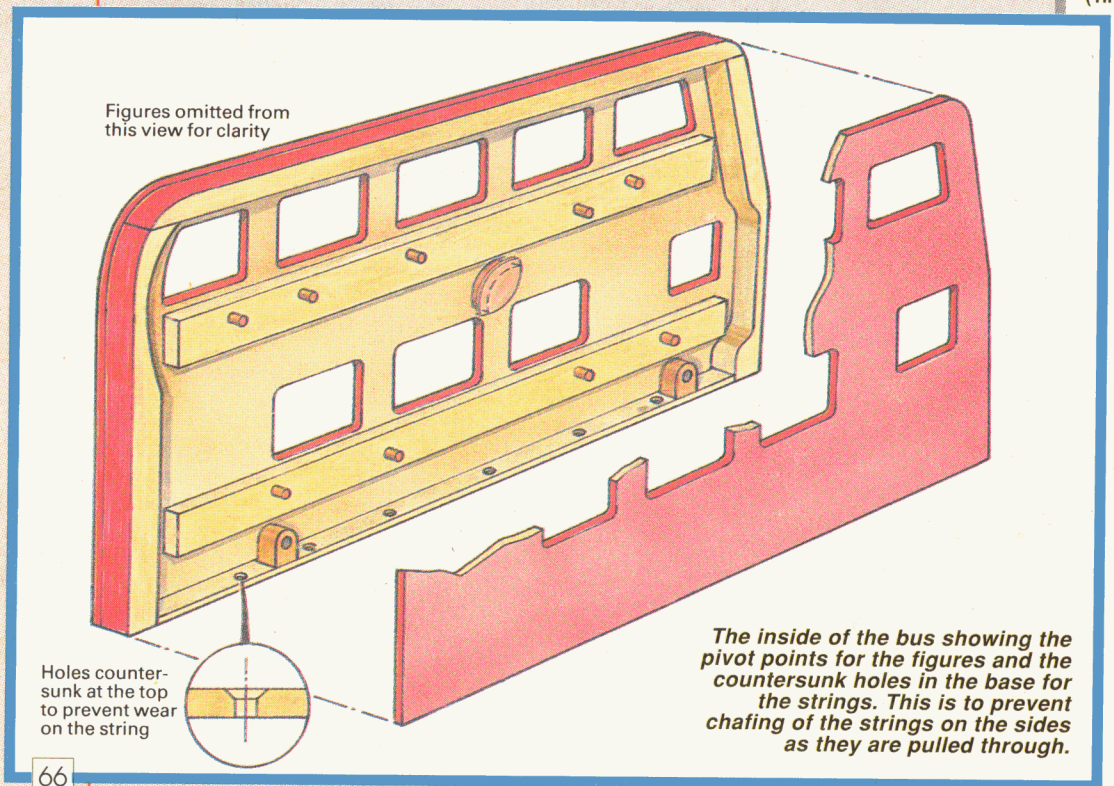
THIS toy is designed to be hung on the wall probably in a playgroup setting and for that reason is sufficiently large to allow children to see what is going on. It is based on the old Routemaster bus design but I have opted for fewer windows to allow for the spacer bars between them to be thicker and the windows slightly larger so that up to six figures can be seen in the window when they pop up. The finished item is made in plywood but it is a good idea to make a cardboard mock-up first in order to be able to assess the problems and ascertain the string positions and the pivot points of the figures. It is important to ensure that the figures do not foul each other, and that they have free access to drop down, also that the upper figures do not appear in the lower windows. All of this can be evaluated at the cardboard mock-up stage. I initially had the string numbers running from 6 to 1, left to right, but eventually decided to reverse this to bring it into line with the idea of ascending numbers and of course the direction of reading.

Construction

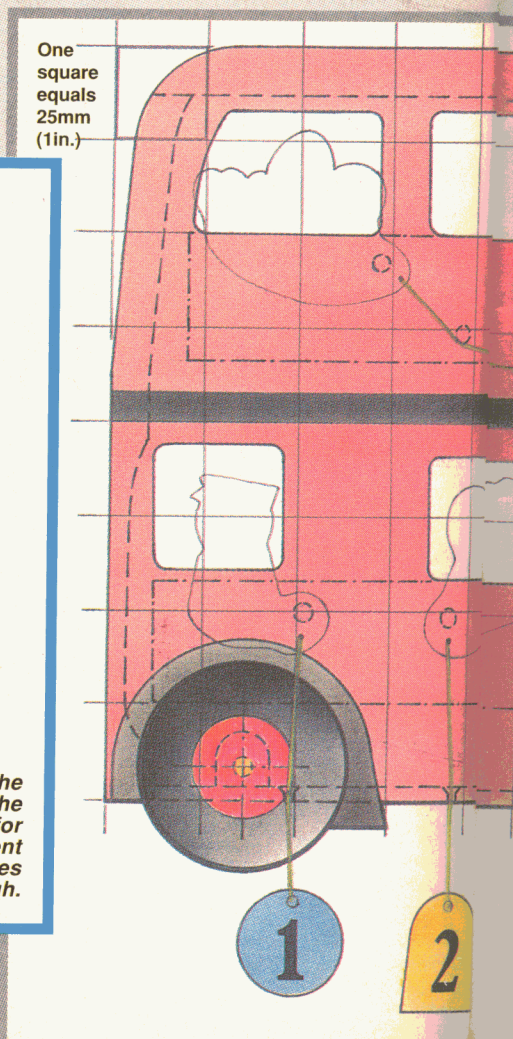
The design is traced onto a piece of 4mm plywood with the outer grain running vertically to obtain sufficient strength for the window bars. Two layers of plywood are cut together to allow for a perfect match front to back. These are held with double-sided tape and cut out with a fretsaw. Drill a hole at each corner of the windows to enable the fretsaw blade to be inserted and turned when cutting them out. I used a sanding block to remove all the sharp edges and the slight breakout which occurs with plywood. The spacers were cut separately from the back and front since 20mm (12 plus 4 plus 4) is rather deep for a fretsaw.

Figures and number discs

These again were cut with a fretsaw and are in 4mm plywood. It is important not to make the number discs too heavy or they will activate the figures by their own weight. The pivot holes are drilled in the positions



The inside of the bus showing the pivot points for the figures and the countersunk holes in the base for the strings. This is to prevent chafing of the strings on the sides as they are pulled through.



marked; these are 6mm holes in order that the figures turn easily on the dowel pegs. The figures and discs were sealed with 50/50 polyurethane and white spirit after sanding to prevent the stains streaking. After decorating all were sealed with matt polyurethane.

Pivot pins

Two strips of 6mm plywood 320 by 30mm were cut and the pivot pins marked with reference to the drawing. Holes slightly smaller than the 5mm dowel were drilled to ensure a tight fit.

Assembly of the bus

Having checked that the edging strip will not obstruct the figures and having drilled six evenly spaced 4mm holes in the base for the strings, the edge pieces were glued to the back of the bus. The holes for the strings were slightly countersunk to avoid wear and tear as they are pulled up and down. The 6mm strips were glued into position just below the windows and the 5mm dowel was cut into lengths a fraction under 9mm (so as not to obstruct the placing of the front of the bus). The end was slightly tapered, given a touch of glue and hammered into position. The locator for string number three ensures that the string cannot be seen at a bottom window and thus spoil the illusion.

Painting the bus

This is very much a matter of personal choice but I used wood stains sealed with polyurethane. Plaka paints were used for the details and the advertisement stuck on with pva glue.

Stringing the figures and numbers

The locations of the string holes were again checked and then the holes drilled accordingly. The strings were tied in a double knot and then end-stitched for strength. Nylon cord with the ends fused is particularly strong and suitable for repetitive playgroup use. The strings are then passed through the appropriate holes in the base and attached to the number discs.

Final assembly

After finally checking that all is well, the front of the bus can be fitted by gluing it to the spacers. Making the axle holes is a simple matter, and the wheels I turned up on a drill lathe attachment. After sealing all with three coats of polyurethane the wheels were eventually attached with a dab of pva glue. The cost of the whole project was minimal although it was rather time-consuming; but as all toymakers will know, this is a labour of love. Be sure however at all times that the materials you use are non-toxic and that individual pieces are large enough not to cause a possible choking problem if they get broken off and accidentally swallowed.