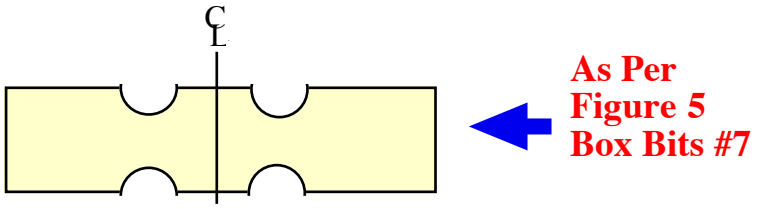
Box Bits #8

Advanced Lifts & Pulls

Introduction
In Box Bits #7, at **Figure 5** we had produced a routed piece of stock as shown below.



A Plan view of this stock is shown below in **Figure 1.**

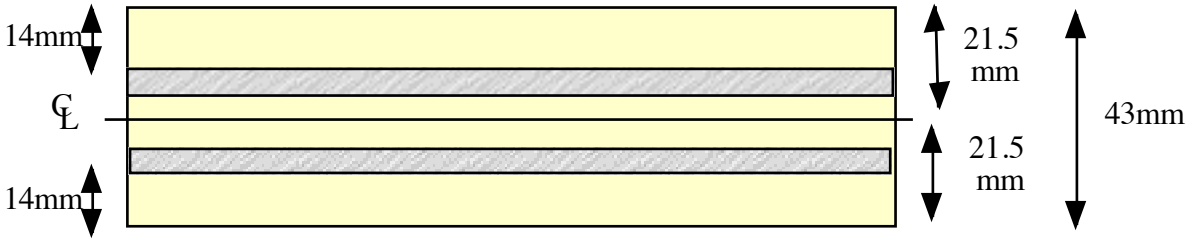


Figure 1

To introduce a circular element into the shaping of these items we will use a hole drilling jig, which will again use the marked centre line (CL) to ensure that both sides of the stock are evenly matched. These holes should be drilled on a drill press, and may be attempted using stop blocks and lots of luck, but the jig described within this article is easy to make and easy to use.
Before describing the jig in any detail, the following steps will give a broad outlook of what we are attempting to achieve.

Step 1.
Firstly we need to drill equally spaced holes in the routed stock as shown in **Figure 2.**

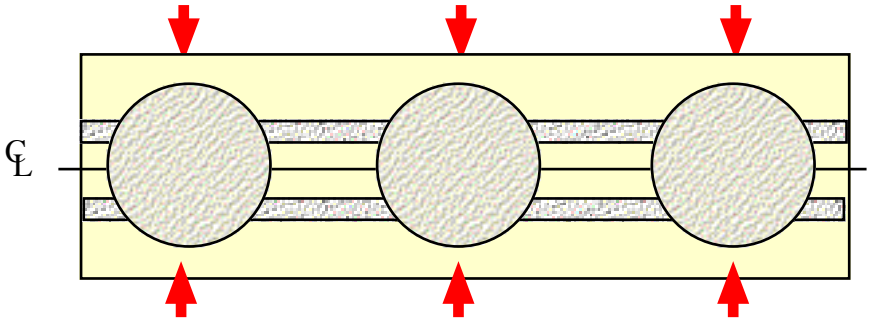


Figure 2

The diameter of the holes will be chosen as more detail is revealed, but consideration must be given to the amount of stock remaining in the arrowed areas after drilling.

At this stage, the same separation procedures detailed in Box Bits # 7 are used, and the routed and drilled stock is separated along the centre line into two equal halves as shown below in **Figure 3.**

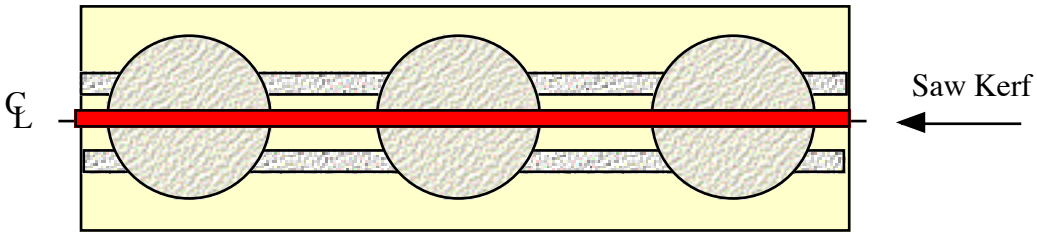


Figure 3

In Box Bits #7 the separated lengths of stock were then routed with a round-over or a bevel bit along the sawn edges and the same procedure applies here, although lighter cuts should be taken due to the shape of the stock. **Figure 4** refers.

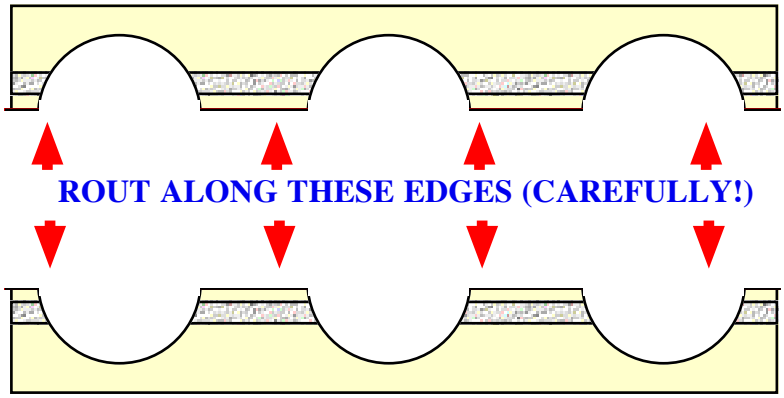


Figure 4

Again the individual pieces are separated as per Box Bits # 7 and the finished item is shown in **Figure 5** below

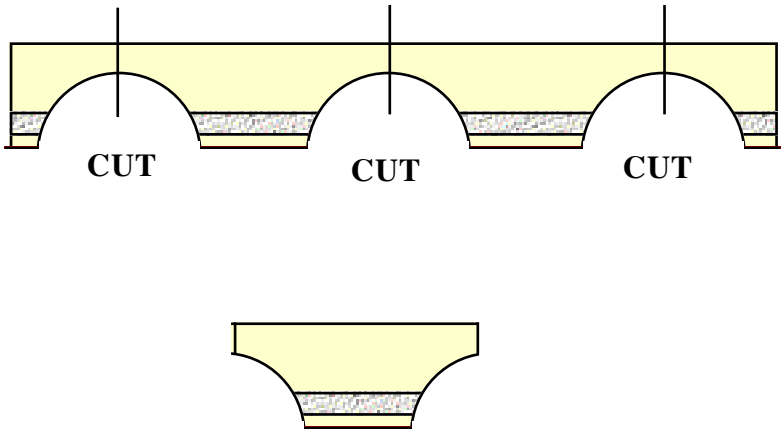


Figure 5

So, in theory, we have achieved a circular element into our home-made Lid lifts and Drawer Pulls. In practice, a longer length of stock will yield more finished items than shown here to make the exercise worthwhile. Also, to ensure that all of the finished items are exact duplicates, very accurate alignment of the drill along the centre line of the stock is mandatory.

Now.....let's go and build a jig.

The Jig Plans

The Hole Drilling Jig
The jig consists of 5 basic components and is constructed from standard sized pine boards, MDF and Masonite.

The approximate measurements are shown below:

The Drilling Table	- 70mm x 19mm Pine 300mm long
The Spacer	- 40mm x 19mm Pine 300mm long
The Fence	- 30mm x 6mm Masonite 300mm long
The Key Slide	- 40mm x 19mm Pine 116mm long
The Base	- 43mm x 19mm MDF approx 340mm long

The Drilling Table is simply a flat surface upon which the stock is positioned whilst drilling.
The Spacer is used to move the drilling area out past the Drill Fence Stop Blocks to ensure that the stock to be drilled can move along the jig fence without obstruction.
The Fence is glued between the **Drilling Table** and the **Spacer** to provide a solid and straight reference edge for the stock.
The Key Slide is the hole locating device that ensures that the holes are centred on the centre line, and equally spaced along the length of the stock. **The Key Slide** contains a pin which acts as a key for the hole registration, and which can be adapted for different hole sizes.
The Base provides a threaded insert to which the Key Slide is locked, and provides an area for the key slide to move during set-up.

Constructing the Jig
Using normal gluing precautions, sandwich the Fence between the Drilling Table and the Spacer. The end view is shown below in **Figure 6.**

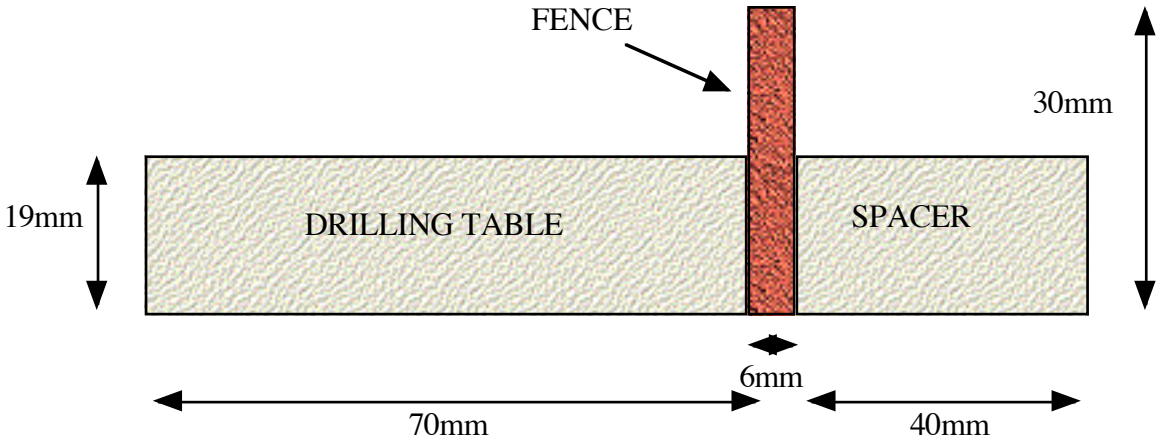


Figure 6

Once dry, cut the assembly in half across its width as shown below in plan view in **Figure 7**.

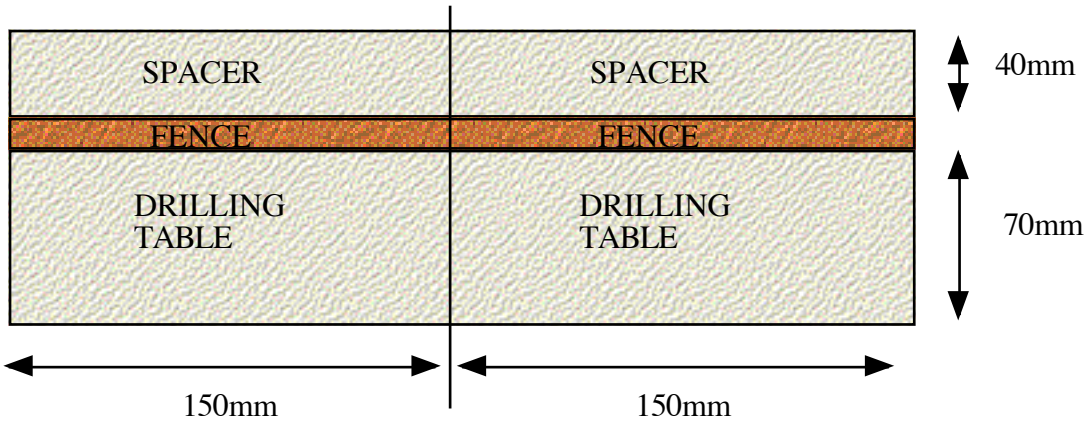
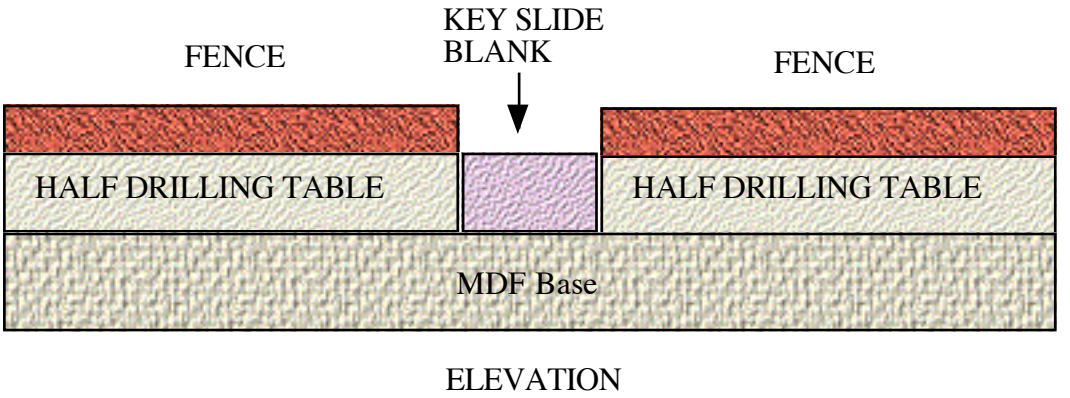
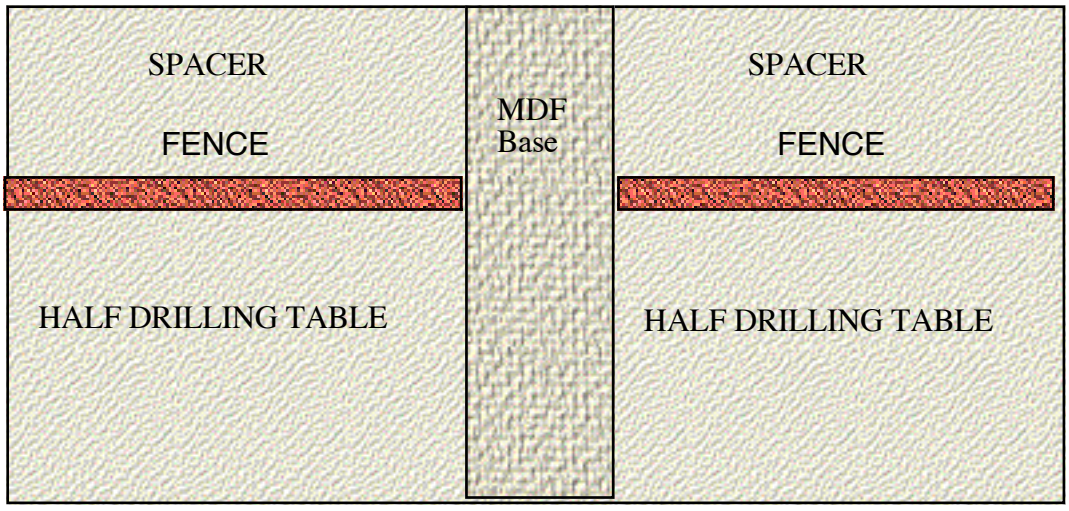


Figure 7

Separate the two halves by the width of a Key Slide Blank (sliding fit), and attach them to a 19mm thick MDF base ensuring that the fence is straight and true. The rear of the base and the rear end of the Spacer should also be straight and true. Glue or screws may be used. **Figure 8** shows the elevation and plan view of this set up.



ELEVATION



PLAN

Figure 8.

To complete the basic jig, drill an 8.5mm hole at the position indicated and screw into this hole a 6mm threaded insert as shown in **Figure 9**.

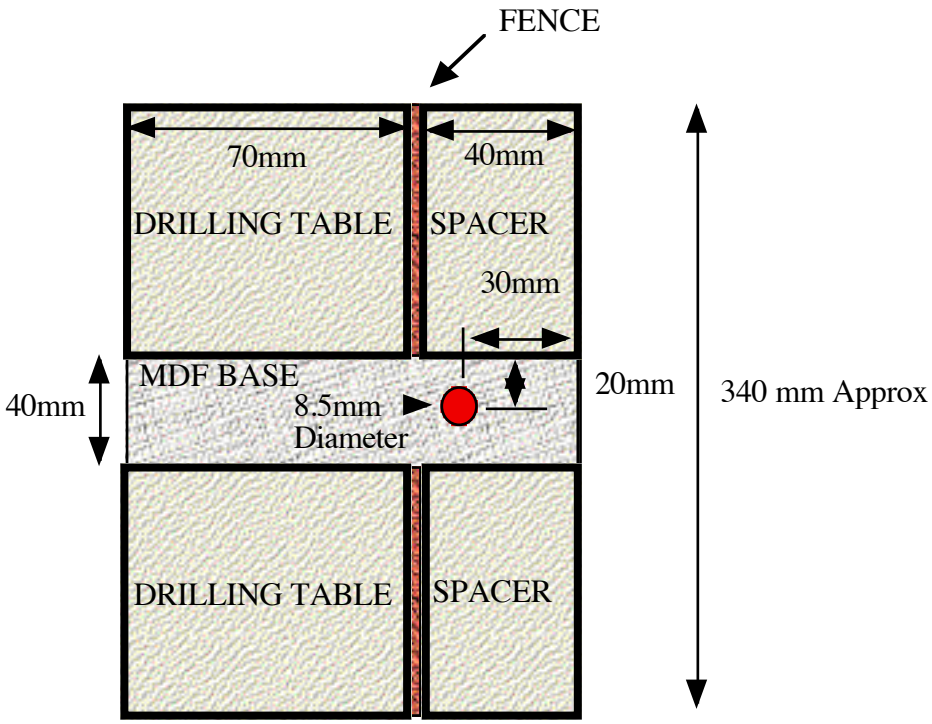


Figure 9.

The next step is to manufacture the Key Slide. This is basically a lockable slide, with a hole to mount the Key Pins. The most important point with the Key Slide is that it should never protrude beyond the rear of the Spacer and the MDF Base when it is set. This ensures that the jig will sit flush against the Drill Press Fence. A plan is shown at **Figure 10.** The Key Slide is locked in the selected position by a 6mm set screw.

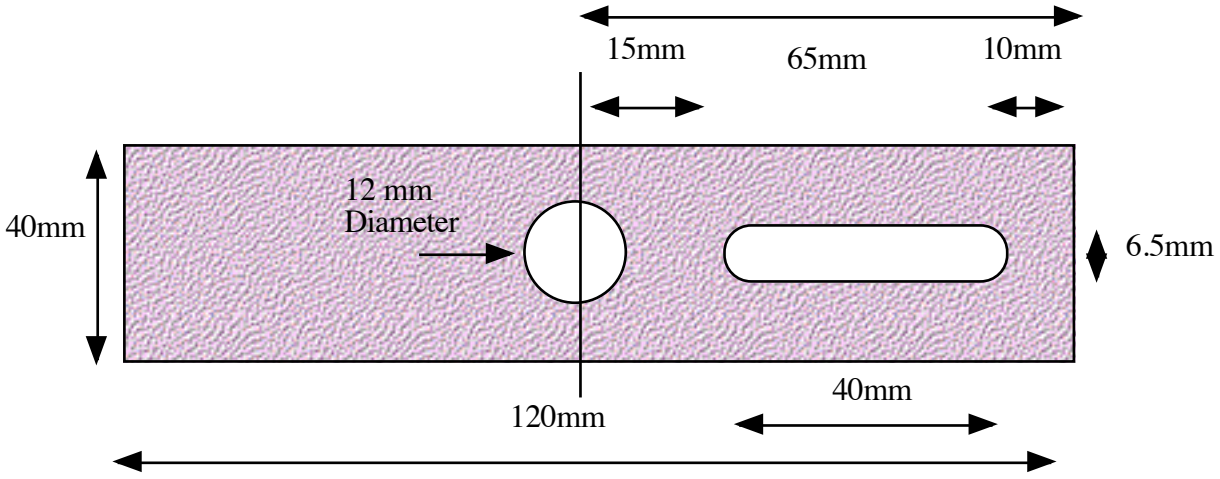


Figure 10

The **Key Pin** is simply a short length of 12mm dowell inserted into the 12mm hole in the **Key Slide** so that it protrudes from the top of the **Key Slide** by approximately 3-5mm. A bevel on the protruding end is recommended so as to ease the fitting of the holes in the routed stock over the pin.

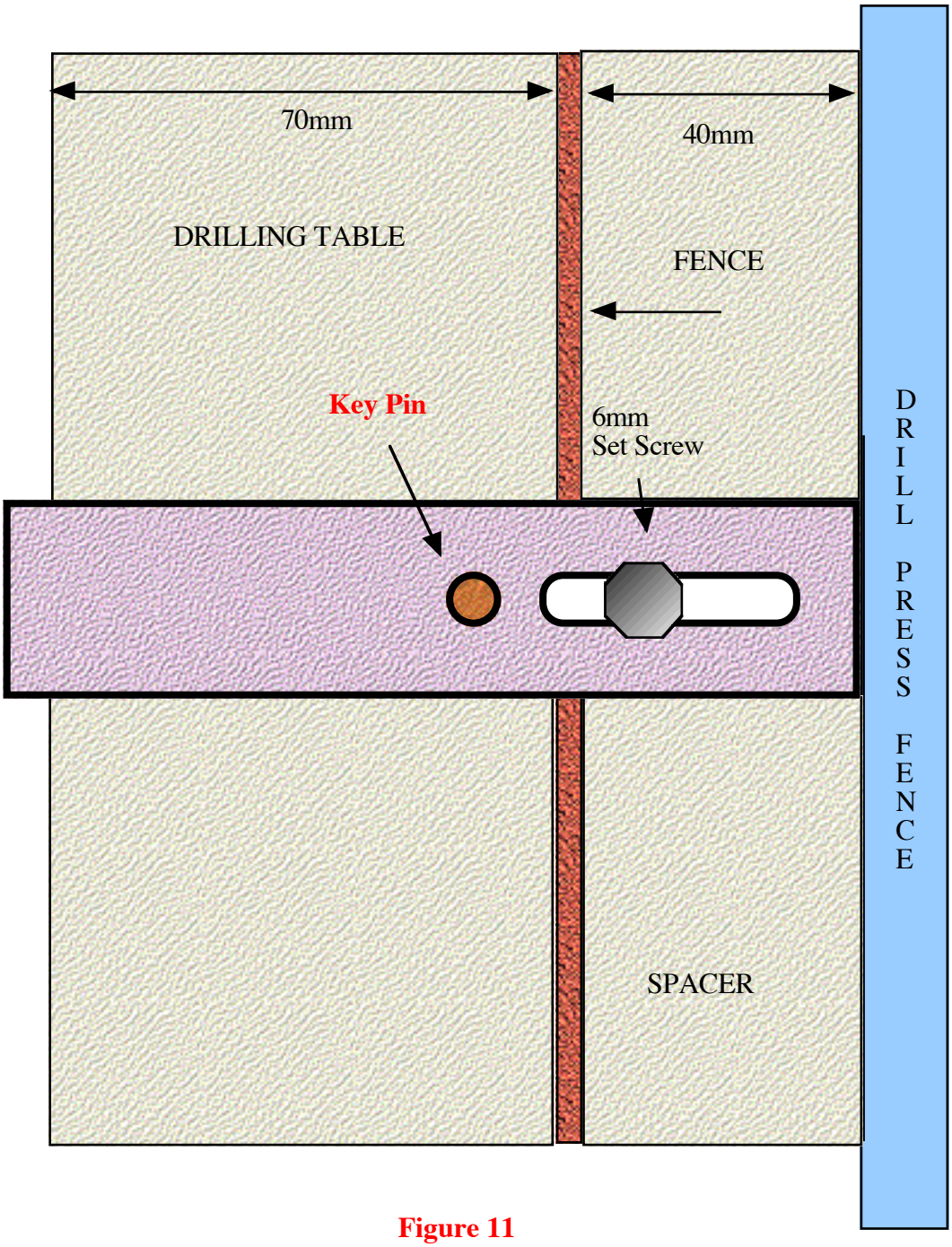


Figure 11

Well that's the Jig Plan completed.....so lets have a play with it.

Using the Jig
With the basic Key Pin set at 12mm, we use a 12mm Forstner Style bit to drill the holes in the routed stock along the centre line. Knowing how difficult it can be to accurately set a Forstner bit along a centre line, we have used a Pin Vice chucked with a fine point in place of the Forstner Bit and adjusted the Drill Press Fence until the fine point is exactly on the centre line. This is done with the routed stock on the jig which is held against the Drill Press Fence during the adjustment. The Pin vice is then replaced with the Forstner bit, which should now drill holes accurately on the centre line.

The next step is to drill the first hole completly through the routed stock at one end.

This first hole is placed over the Key Pin on the Jig, and the Key Slide is locked in position so that the routed stock is flush against the Jig Fence. The Jig is then adjusted along the Drill Press Fence until the Key Pin (Centre) is the required distance from the Forstner Bit and then held in position with stop blocks. This sets the Length of the finished items, and is totally up to your taste. **Figure 12** shows this set-up.

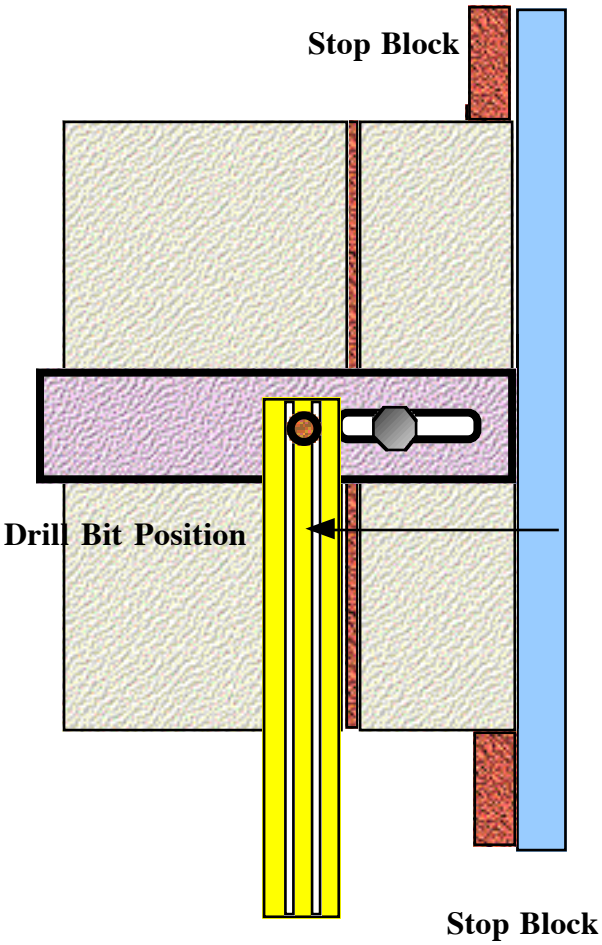


Figure 12

You could continue drilling holes and fitting them over the Key Pin....drill....shift...drill...**BUT,** If you have a look underneath where the first hole was drilled you will probably see that the Forstner bit has chewed up the underside of the stock. Maybe...Maybe not.
So, to prevent this happening, the second hole is only drilled a little over half way through the routed stock, the stock is then inverted over the Key Pin and the hole drilled right through.
Next shift the routed stock so that the second hole is over the Key Pin and drill half way though again. Invert .....drill through.....shift.....drill half way.....invert.....drill through...and so on.
When all the holes are drilled, separate the lengths/rout the edges/separate the items as per the procedures already detailed.
By the time you get to the end of the process you will have a bag full of identical items to use on your box projects.

NOTES:
For larger diameter holes you could make up a new Key Slide and use larger dowell, but we've found that by drilling a 12mm hole in a slice of the larger dowell it will fit over the12mm Key Pin already employed. Currently, we have used dowell up to 32mm in diameter with a 12mm hole drilled in its centre, and the same Key Pin.
This lets the jig work to make larger items for full sized Furniture projects as well.

So, by using this one simple jig we can manufacture identical Lid Lifts and Pulls for both boxes and furniture projects. The profiles and router bits shown are by no means the limit to the shape of the items produced....so let your mind roll free.....and have fun!