BARROWMORE
MODEL RAILWAY GROUP

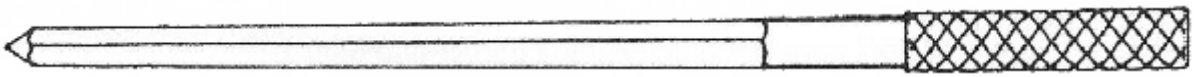
"Modelling to a high standard amongst friends"

Workshop Notes: Broaches

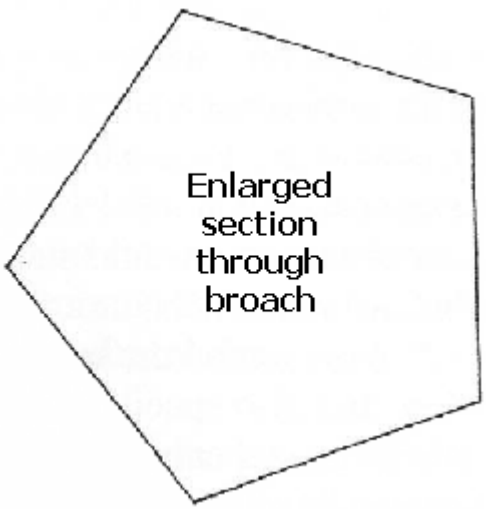
One of the most expensive items in many modellers' toolkits is that set of 'number' drills - usually from numbers 61 to 80 (middling small to horribly tiny), which will now cost somewhere between £10 and £40 depending upon quality. Replacements for the inevitable breakages are similarly costly, with the smaller - and hence more breakable sizes up to £1 each, and not easy to come by. And of course you break that no.63 drill (you don't have a spare) just when you need it! These imperial drill sizes are now basically obsolete, which is one reason for the high cost, and metric drills of similar diameter are often around half the price. Given that we modellers are usually drilling sheet material to suit a wire or fitting, then a modest selection of metric drills and a set of taper broaches will allow us to make any size hole we like, a policy long advocated in Iain Rice's writings. Here we consider the broach, a useful tool that deserves to be better known in modelling circles.

A straw poll of my local model club members several years back revealed that sixty percent of them did not own a broach. In fact, nearly half had never even seen one. The broach in question (a simple watch-maker's hand-tool) is an essential part of the modeller's armoury - and one that could do with a public relations job.

We ignore here the other sort of 'broach' used in engineering trades - a press tool which makes an irregular-shaped hole in sheet metal. In the traditional clock- and watch-making trade, two types of broach are commonly used. There is the **cutting broach**, used primarily for enlarging holes, and the **smoothing broach** which polishes them. Here, we'll deal with the cutting variety, which is the one of most use to modellers. Although you will often find that they are manufactured in Switzerland they are readily available here, and I give some sources below.



What a broach is: Imagine a piece of tapered steel rod between three and six inches in length, with five equal flats ground on the sides. Where each flat intersects its neighbour there is a sharp edge, and it is this which does the actual cutting (see diagram). Diameters range from 0.3mm (about 0.010in) up to about 6mm (about 0.25in). The nominal sizing of individual broaches is usually by metric measurement of diameter or by twist drill number gauge, using the even numbers only. In each case, the measurement is taken from a point 10mm from the thick end, and represents the largest diameter of cut available from that broach. And that's all there is to the broach, apart from a knurled finger grip at the top - the diagrams should make all plain.



Using the broach: If you have ever used the tang of a file to open out a hole in sheet metal then you have already used a very crude broach. In effect, the broach is a sort of tapered reamer, and its purpose is to enlarge an existing hole in sheet metal or plastic. You simply drill a hole smaller than you require and use a broach (or series of broaches) to open it up until it is just right. However, it cannot be used in a blind hole. (A 'blind' hole is one that does not go right through the material, and in which the tool will bottom before completing its cut.)

To use, insert a suitably sized broach into the hole which is to be enlarged up to the point where it is about to jam. Then simply rotate it with the fingers while at the same time pushing it further through the hole, thereby removing small amounts of plastic or metal by the shaving action of its corners. Remember to keep testing the enlarged hole for size in order to avoid making it too big - it's difficult to put material back! That's all there is to it.

Care and precautions: As with all small tools, be careful not to overload a broach; if it should jam or stick, ease it out gently, and try again. A little oil or soap for lubrication is a good idea, especially in 'sticky' materials like white-metal. Try to avoid using your broaches in hard metals such as stainless steel as these will quickly blunt the cutting edges. You can, of course, sharpen a blunted broach using a slip-stone or grinding wheel, rubbing each flat along the stone to restore the angle where it meets the next flat. Lightly oil the broach before putting it away, both to prevent rust and to provide an element of lubrication next time it is used.

Conclusion: From the foregoing you will realise the potential value of these tools to the modeller: apart from anything else, they can save a lot of money in broken small drills, as well as enabling you to get away with far fewer drills in the first place. It is probably sensible to buy your broaches as a set from watch-makers' or modellers' suppliers. As a start, I would suggest a set of six, from about 0.75mm (0.030in) to 3mm (0.12in). These should cost you about £11. Now this may seem like a lot of beer money but when you consider that commonly available number and metric twist drills covering the same size range could cost you at least £40, you begin to see what a bargain broaches are. Individual broaches are priced from less than £1 for a number 80 (0.3mm) to nearly a fiver for a number 10 (4.9mm), so you can see that in the smaller sizes they can be cheaper than twist drills.

Now we come to the vital bit - **where do you get them?** They are a specialist tool, so you won't find them stocked by your local DIY Superstore. In the larger sizes (when they are sometimes listed as 'Lancashire broaches') they can often be obtained from engineering firms advertising in Model Engineer and similar magazines. The most useful smaller sizes of broach are sold singly or in sets by suppliers to the clock and watch trade, the better tool dealers, or a few model-makers suppliers. Try the following, some of whom attend the larger model railway shows such as IMREX, Manchester, Warley, and also specialist events such as ExpoEM, Guildex and Scaleforum. If all else fails, you can try mail order – possibly via the internet – but it must be admitted that seeing exactly what you are buying is hard to beat! All these firms listed below can supply a telephoned order.

Shesto, Unit 2, Sapcote Trading Estate, 374 High Road, Willesden, London NW10 2DH
Tel. 020 8451 6188. www.shesto.co.uk

Squires Model & Craft Tools, 100 London Road, Bognor Regis, West Sussex PO21 1DD
Tel. 01243 842424. www.squirestools.com

Eileen's Emporium, PO Box 14753, London SE19 2ZH. Tel. 020 8771 3366.

Mainly Trains, Unit C South Road Workshops, South Road, Watchet TA23 0HF
Tel. 01984 634543. www.mainlytrains.com