

# ALL ABOUT PERFORATING

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PERFORATIONS are not generally considered an interesting branch of philately. Their study *per se* is particularly dull. A collector of modern Great Britain, who industriously verifies that his commemoratives are really perforated  $15 \times 14$ , as stated in the catalogue, is only wasting his time. On this basis, as far as most of the modern issues are concerned, the catalogue references are quite superfluous, since the individual stamps need no checking of a perforation constant for the whole issue.

It is only when the collector asks himself the questions, (a) *how* was it done?, (b) *why*?, and possibly also (c) *since when* and *for how long*?, that he can gain a better understanding, frequently very rewarding, of the complex and ever-changing production processes that go into the making of the stamp. And only then does he graduate from plain collector-squirrel to serious philatelist.

## (1) The Three Basic Types of Perforation.

By way of *aide-mémoire*, there are three basic types which allow a satisfactory classification of all the numerous perforations encountered in philately:—

### (a) Line perforation

The least sophisticated of all; it consists of a single line, or a group of parallel lines, which perforates the sheets first in one direction only. A second perforator then repeats the action at right angles. The stamps thus "framed" by separate horizontal and vertical perforating lines, which are not synchronised, usually show the corner teeth irregularly formed.

This method is used nowadays mainly for Canadian and United States stamps, and does not apply to the issues of Great Britain.

### (b) Comb perforation

The perforating pins are arranged in the shape of a comb—one long base line approximating the width of the sheet has a number of shorter vertical lines, spaced to fit the row of stamps. Applied to the lowest row (20) of a G.B. sheet, this comb will perforate with its first strike the bottom and three sides of the stamps in row 20. The second strike will perforate the top of row 20, which is the same as the bottom of row 19, and the sides of the stamps in row 19. This continues up to row 1, which is reached with the twentieth strike. The twentieth-first strike provides the top perforation of row 1 and also cuts through the top margin.

This work can be halved by the use of double combs which perforate two rows of stamps at a time, the bottom row completely and the top row on three sides. There are also treble combs and larger combinations for special purposes.

These "combs" are used for all stamps of Great Britain and also on most of the modern issues the world over.

### (c) Sheet perforation

Here, the perforation pins are arranged in a pattern corresponding with the layout of the whole sheet, and one single strike achieves a complete perforation, leaving the margins, usually, unperforated.

Used extensively on miniature sheets, but will soon also appear on conventional large sheets. The perforation of the future, this method does not apply, yet, to the production of British stamps.

NOTE.—Each of the three basic perforations can be worked either on cut sheets by means of hand-controlled presses or synchronised directly or indirectly with the printing presses on the continuous reel of uncut sheets, coils or booklet panes.

## (2) Perforation Gauge and Characteristics

The **gauge** of the perforation is measured and expressed by the number of pins (or pinholes) per 2 cm., a convenient arrangement now recognised even by postal administrations and stamp printers. This seemingly arbitrary basis of 2 cm. was chosen because it had a gauge average of  $13\frac{1}{2}$  to 15, within the full scale ranging from  $5\frac{1}{2}$  to 18 (a 1 cm. unit would have yielded less convenient quarter fractions). It also makes it easy to determine the exact gauge of an individual stamp, given only the 2 cm. length from an ordinary ruler, by merely counting the number of holes over that distance. "Perf.  $15 \times 14$ " signifies gauge 15 horizontally, 14 vertically; "perf.  $14\frac{1}{2}$ " means this number of perforation holes in either direction, horizontal or vertical.

A more accurate decimal reading for purposes of research is obtained by counting over a length of 20 cm. on larger units of stamps and dividing by 10, which may then give as a result anything between, say 14.3 and 14.7 for a stamp which is listed as "perf.  $14\frac{1}{2}$ ". There is no measuring unit for the size of the perforation holes (Harrisons are using pins with a 0.9 mm. diameter), though different-sized pins can alter the appearance of a perforation quite considerably without having any bearing on the gauge.

In philately, the stress is on the *shape of the perforation teeth* (not the pins). Slender pins produce **blunt teeth**; thick pins, **pointed teeth**, according to the small expanse of paper bridging the holes. The practical application of this distinction allows, for instance, the identification of Portuguese Colonies' originals from reprints, and to distinguish different Bavarian issues.

The **quality** is expressed as either **clean-cut**, **intermediate** or **rough perforation**. **Irregular spacing** of the pins can cause a fluctuating gauge, which may then be expressed as "perf.  $14-14\frac{1}{2}$ " to show the small variation within one and the same sheet. New machinery would most likely produce **straight perforation**; badly worn pins, **perforation out of alignment**. A "dropped pin", i.e. the incident of a missing perforation hole, is a misnomer; a **missing perforation** is caused in fact by a **broken pin**. If the perforating arrangement produces over-wide stamps incorporating part of the sheet gutter, the term is **wing margin** (G.B. and Hong Kong Victorian issues). And lastly, there are the **errors of double perforation** and of **perforation omitted**. Normally well-centred, a stamp may also show, on the other end of the scale, a **misplaced perforation**. Illogically, the intermediate stages of **badly centred** stamps, particularly when the perforation cuts lightly into the design, are shunned by collectors.

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## All About Perforating (continued from page 1293)

So much for the terminology of perforations. To complete the picture, here are also two *trade terms*; a **clipped perforation** refers to booklet panes and coils which were cut too closely, and **split perforations** apply to sheets or large units of stamps which have been folded and re-folded so many times that they have separated, in part, on their own.

NOTE. These details and terms apply equally to all three basic perforations.

### Why "perf. 15 × 14" for Great Britain?

Since literally hundreds of different kinds of paper are used for stamps the world over, the perforation should ideally have a gauge consistent with the paper quality, thick or thin, hard or soft, smooth, rough, flexible, brittle or tough. Another thought is that the nimble-fingered Japanese would want their stamps perforated differently from those handled by a Canadian backwoods settler.

But neither printers nor postal administrations appear to worry unduly what kind of perforation is best, and dealers who break down whole sheets for new issue distributions will readily testify that certain stamps are invariably "very difficult", others "very easy" to separate.

I know of only one scientific investigation in this respect, almost 60 years ago. In Great Britain, counter clerks found it troublesome to tear, from the quarter sheets, horizontal strips of six and double strips of 12. As likely as not, the sheet would separate vertically instead. It was then discovered what the papermakers had known all along, that *the paper is tougher across the web*, due to the particular alignment of the fibres during the process of manufacture.

In consequence, from June 1911 onwards, gauge 14 all round was changed to gauge 15 × 14 by adding an extra pin horizontally, to make for easier separation in this direction, and it has remained so ever since. The change is well-known to collectors of British King Edward VII issues (though they may not appreciate its underlying cause) since it presents a most welcome means by which to distinguish the issues printed posthumously by Harrison from the earlier ones by De La Rue. The same gauge is encountered on most Commonwealth, and also on many foreign issues, from Austria to Peru, all pedigree stock from Harrison's stables at Hayes, Middlesex, and High Wycombe, Bucks.

### (3) Comb Perforation on Sheets

Taking a close look at the Comb Perforation—the only type occurring on British stamps, and also the most universally used—a distinction must be made between *perforation of cut sheets, irrespective of whether sheet-printed or reel-printed*, and of uncut sheets (or booklet pages and coils) perforated on the reel.

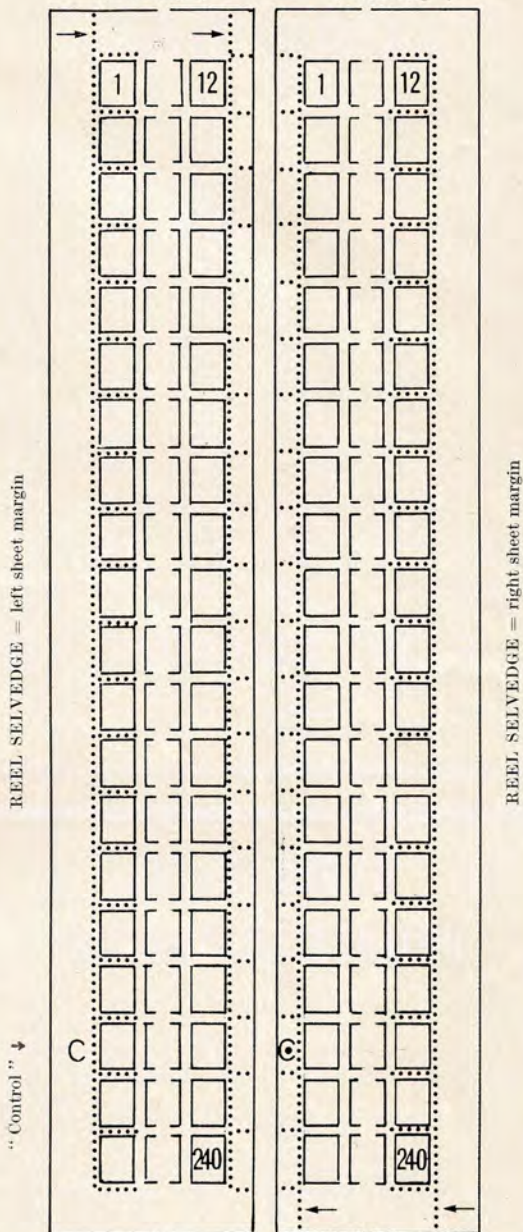
First the sheets. The subject may appear slightly involved at times, but your efforts to follow the next few paragraphs step by step will be amply rewarded by getting now, for the first time, answers to several puzzling problems. In the diagram I have omitted the repetitive vertical stamp rows 2 to 11 in order to keep it to a manageable size; it mirrors faithfully the original treatment of standard double panes in photogravure during their first two years of printing, 1934 and 1935. Basically, most of it still holds good today. I picked on that particular "historical" sheet as it incorporates the maximum number of points worth knowing.

**Point One.** The first strike of a comb invariably begins with one unperforated margin, the last strike ends by cutting through the opposite margin.

**Point Two.** The "starting" margin and the "ending" margin are each clues indicating in which direction the perforation took place.

LEFT PANE  
("no stop")

RIGHT PANE  
("with stop")



Perforation by single comb horizontally, showing first and last strike (arrowed) on each of the separated panes (see text)

The sheet might well have been perforated in a different way, starting with an appropriate comb at the bottom and moving *vertically* upwards, until the top margin is perforated with the 21st strike. Obviously this would have meant much more effort for the same result (21 strikes vertically as against 13 strikes horizontally), which explains generally why some G.B. sheets, in particular commemoratives, are perforated horizontally, others vertically.

**Point Three.** The type of perforation, vertical or horizontal, is normally dependent on the layout of the sheets, aiming to achieve results with a minimum of effort.

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The diagram shows the two sheet panes (= one press sheet) separated (into two counter sheets) before perforation. At that time (1934) this was necessary because the equipment, dating from 1910, had been produced to accommodate single (counter) sheets only. To ensure their correct positioning within the perforation "box", they are guided by three "lays", adjustable metal brackets in front and at the sides, which confine them in the right place. Since the reel selvedge allows side margins considerably wider than the halved inter-pane gutter (see diagram), the positioning would have had to be adjusted separately each time for "no stop" and for "with stop" sheets; to avoid this, the reel selvedge was used as a "starting" margin throughout, that is, for the second half of the pane also, by simply turning it upside-down. Because of this working method, not only does the horizontal perforation on the "with stop" sheets run in the opposite direction, but all four margins appear different on each of the halves. The "no stop" Control Block (shown as "C") has two unperforated margins; the "with stop" Control Block (shown as "C'"), two perforated margins.

**Point Four.** One and the same comb may produce two or more entirely different variants of the perforation.

Later, when new perforating equipment for double panes became available, the cutting of press sheets into two counter sheets took place *after* the perforation was completed. The new Machin "Profile" definitives, as well as some late printings showing the old Dorothy Wilding portrait, are at present perforated horizontally from selvedge to selvedge, right across the inter-pane gutter. Separated, each of the halves again shows a difference. The "no stop" counter sheet has the normal characteristics of "starting" and —apparently—"ending" margin, but on the "with stop" sheet, which shows both long margins perforated, no proper "starting" margin exists.

**Point Five.** The long margins can only be both perforated on counter sheets cut after horizontal perforation. In this case the "ending" margin must be identified as such in conjunction with the component sheet.

More usually, combs of double width perforate both counter sheets simultaneously, in 21 strikes vertically, which is slightly more economical than perforating horizontally across both counter sheets in 26 strikes.

### Double Combs

Double combs (in double width) nowadays replace the single combs, which reduces the number of strikes vertically from 21 to 11, or horizontally from 26 to 13.

The points where two consecutive strikes meet are usually two corners of the stamp; the first strike provides the perforation on three sides, the second finishes it off (and provides three more sides for the stamp in the next row). In high-grade, modern perforation these joining points are done with such precision that it is virtually impossible to recognise them. Strike after strike blends so perfectly that one cannot say whether a single or a double comb has been used. One minute irregularity within the comb, maybe one single pin-hole very slightly out of alignment, can sometimes give the game away, since it repeats itself over the whole sheet. There are also cases, such as recent De La Rue printings (1967 New Zealand 7½c. Trout; Western Samoa, the four values of the South Pacific Health) where the consecutive strikes have wide gaps that make it child's play to trace the shape of the individual comb used.

**Point Six.** Single and double combs can be distinguished only if slight imperfections cause repeating irregularities in the perforation.

Modern combs need not be U-shaped to perforate three sides of the stamp, but can also have the pattern of H, in which case the joins of consecutive strikes are halfway down the individual stamp. These side joins may show imperfections, such as on the 1960 Chambon perforation of New Zealand, but the corners will inevitably be perfect.

### The Extension Spur

Arrowed within the diagram, and shown clearly in the close-up photo of the corner stamp, is a length of perforation cutting through the top margin, a seemingly superfluous continuation to the left of the comb which, if omitted, would not make any difference to the perforation of the stamps in the sheet. Known as the *Extension Spur*, and today no longer used, its length may vary on different combs between three and 15 pin-holes. Its use was not, as one might suspect, to facilitate the separation of the stamps by "opening up" the top margin (on the right-hand sheet it is the bottom margin), but to provide vertical strips of 20 stamps with perforated margin, either top or bottom, so that they could be joined up into composite coils for use in slot-machines and stamp-affixing apparatus, then popular with private users. The strips joined with unperforated margins would have shown up immediately and might also have interfered with the machine mechanism. This legacy from King Edward VII times disappeared only after the new K.G.V photogravure stamps could be produced in vertical continuous coils, that is, from the end of 1934 onwards. This, however, leads to the question why later, up to this day, small printings of the definitives have appeared, exceptionally, with horizontal instead of vertical perforation. Could it be that this was not an emergency measure at all but a means to produce composite horizontal coils?

**Point Seven.** Two perforated sheet margins at right-angles indicate the use of a comb with Extension Spur, making it often difficult to verify the direction of the perforation. (The information summarised in Points Three and Six may at times be of help.)

### The Freak Perforations

Unwanted, unscheduled, irregular and ranging from the barely noticeable to the most conspicuous, I can find no better expression for it than *Phantom Perforation*. It concerns a usually small number of perfectly formed pin-holes running from the cutting edge of the margin towards the bottom line of the first comb strike (but touching it, or even partly overlapping it, only in very rare cases, and then producing a fake marginal or double perforation). The illustration of the corner stamp shows a phantom perforation extending over five pin-holes; there should have been a second appearance level with the top of the stamp, but it was lost through the turned-over (and, in the illustration, put back) sheet corner.

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FREAK PERFORATION  
(corner turned over)

PUNCHED GUIDE-HOLE →

Close-up of the left  
top corner stamp in the  
diagram, but with  
"phantom" perforation  
in margin.



## All About Perforating (continued from page 1297)

This particular perforation, which may also occur double or treble, had experts puzzled for over half a century. Of the many explanatory theories advanced, the most convincing one regarded it as a "trial strike". I will let you into a secret: by a rare stroke of luck I was able to witness the perforating of British stamps when such a phantom perforation actually occurred. Briefly, when one batch of sheets—they are conveniently handled in layers of seven at a time—is in the process of being perforated, the comb will not accept the next one moved towards it within the "box" until the first job is completed. If work should proceed too hastily, the outer edge of the "starting" margin may get struck by the tips of the comb when it is just giving the first batch its final strike, in which case the second batch is guiltily withdrawn by the girl operator to await its proper turn a few seconds later, but by then the damage is already done.

Unusual *climatic conditions* may be a contributory cause. If the supply of sheets from a cold storage cupboard arrives in the warm perforating room, some batches of sheets ready for their proper turn may suddenly curl up in proximity of the comb, in which case the operator again withdraws the lot quickly, but perhaps not quickly enough to prevent a glancing strike on the "starting" margin by the ready comb. The sheets, straightened out by hand, are then presented a second, or even a third, time. This is the condition also for *turned-over corners* resulting in freak perforations (caused by the first strike), as shown in a mild example on the stamp illustrated on page 1297.

**Point Eight.** The Phantom Perforation, occurring only on the "starting" margin, is a useful short cut to determine in which direction the perforation was effected—one single marginal copy of a stamp is sufficient to tell.

A practical way to minimise the trouble caused by the curling of the sheets is to perforate *back to front, on reversed sheets*. This know-how trick, practised for many years now, is known also abroad, in India for instance. It is thus often possible to trace the printing of back-to-front perforated issues to periods of extreme summer heat. On mint stamps, the pin-holes clearly "dip in" when viewed from the back, forming slightly raised "craters" in front.

**Point Nine.** Back-to-front perforation, if it means reversing top and bottom, or the sides of the sheet, may cause additional perforation variants.

### Irregular Perforations

Remnants of the 1850 imperforate issue of **Brazil** were perforated 16 years later by counter clerks at Rio de Janeiro post office, with an old machine normally used on official forms. The rest of the country had to do without this amenity.

**Germany**, in 1872, made the startling discovery that perforating pins will wear out four times quicker when used on coloured stamp margins. Experimental perforating on the reversed sheets, from back to front, showed the same results. The issue of stamps with coloured margins has been avoided ever since.

**Albania** had to resort to perforation by sewing machine for an issue of 1913, using guide lines traced in pencil. This emergency measure involved no real hardship, since the total printing amounted to only 800 stamps.

In order to put a stop to inflated prices asked by dealers for errors "perforation omitted" **Bavaria** decided, in 1920, to re-issue all the previous six years' stamps, a total of 65 different, in imperforate sheets and booklet panes. Whilst some had been acquired legitimately over the counter, a considerable quantity came from half-finished supplies looted from the printers during the 1919 revolution.

STAMP COLLECTING, February 15th, 1968

In **Great Britain**, the Union of Postal Workers, on behalf of the counter clerks, has just lodged an official complaint with the G.P.O. regarding "the poor perforation of the sheets of 4d. Christmas stamps, which almost fall to pieces in handling".

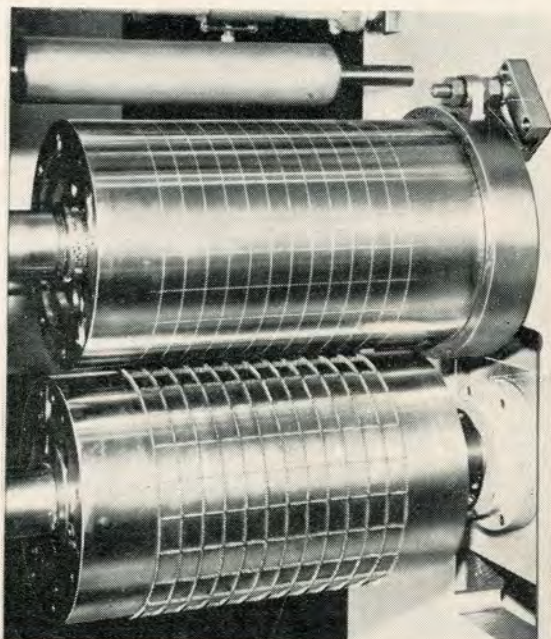
### (4) Comb Perforation on the Reel

"On the reel" here has two interpretations: (a) it may mean that the perforation takes place simultaneously with the printing, through a component of the press, in which case printing and perforating are synchronised mechanically or electronically, or (b) it can mean a completely printed reel of stamps may be fed into an entirely independent perforator. That is so with British stamps. The perforator applies a treble comb, usually in double width, which repeats continuously from the beginning of the printed reel to its end. Seven applications of the treble comb, that is 21 rows, correspond to one complete turn of the printing cylinder (which produces 20 rows plus the inter-sheet gutter margin in row width).

**Point Ten.** Comb perforation on the reel is identified by the perforation cutting through both lower and upper margins of the sheet.

Since the paper in the reel is prone to slight expansion or contraction through the moisture of the printing ink and the subsequent drying, it is necessary to synchronise it with the perforation apparatus to ensure correct centring of the stamps throughout the whole length of the reel. For this purpose, the printing cylinder provides with each revolution *marginal guide-holes* in the selvedge, sometimes also in the inter-sheet gutter. Bosses on a conveyor chain engage in these holes when transporting the printed reel length towards the perforator, and as they are exactly synchronised with the three-comb strikes, correct centring is ensured even if the job should take place many days after the printing.

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"Instant" rotary sheet-perforation "on the reel". The pins on the lower drum, patterned in an exact copy of the sheet layout, punch the perforation holes by engaging in the counter-drum above. (Photo: De La Rue Giori S.A., Lausanne).

## All About Perforating (continued from page 1299)

If, for certain technical reasons, the printed reel is cut into press sheets before perforating, these guide-holes replace the three "lays" used for sheet perforation which have been mentioned in the previous section. Bradbury Wilkinson's current high-value definitives do not use the confining brackets for the sheet perforation at all, but have similar guide-holes in the margins, produced by sharp punches affixed to the curved cylinder-plates.

**Point Eleven.** A marginal guide-hole need not have been put to practical use and does not, therefore, allow any conclusions regarding horizontal or vertical perforation, by the sheet or in the reel.

The punched guide-hole shown in the illustration is suitable for vertical perforation, either on the reel or by the sheet: but the evidence (of the Phantom Perforation) shows that the perforation was done horizontally by a single comb.

### (5) The Future: Rotary SHEET Perforation

All signs point to widespread use of *Sheet Perforation* in the near future, the type known so far only from miniature sheets perforated completely in one single strike. It eliminates the use of combs, with all their many variations and complications, and it does not require marginal guide-holes.

STAMP COLLECTING, February 15th, 1968