

## **A reconstruction of stencilling based on the description by Gilles Filleau des Billettes**

Eric Kindel

*with two appendices by Fred Smeijers*

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### *Corrections*

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|---|--|
| p. 28, figure 1: image replaced with version of greater clarity.  | p. 49, n. 6, 1st sentence: minor rewording for clarity.                        |
| p. 29, 2nd text ¶, 2nd sentence: minor rewording for clarity.   | pp. 52–4, figures A3.1–A3.5: images replaced with versions of greater clarity. |
| p. 30, n. 4: minor rewording for clarity.   | p. 52, figure A3.1 caption, (1), ‘probably’ deleted.                           |
| p. 32, 2nd text ¶: ‘character’ in quotation replaced with ‘stencil’ (twice).  | p. 53, 3rd text ¶, figure A3.4 reference repositioned.                         |
| p. 44, 3rd and 4th ¶s: ‘sergent’ and ‘patte’ replaced with English equivalents (‘sash-clamp’ and ‘holdfast’, respectively). | p. 53, 3rd text ¶, 3rd sentence: ‘very probably’ deleted.                      |
| p. 46, top text line: ‘repère’ replaced with English equivalent (‘guiding-mark’).   | p. 53, figure A3.4 caption, ‘probably’ deleted.                                |

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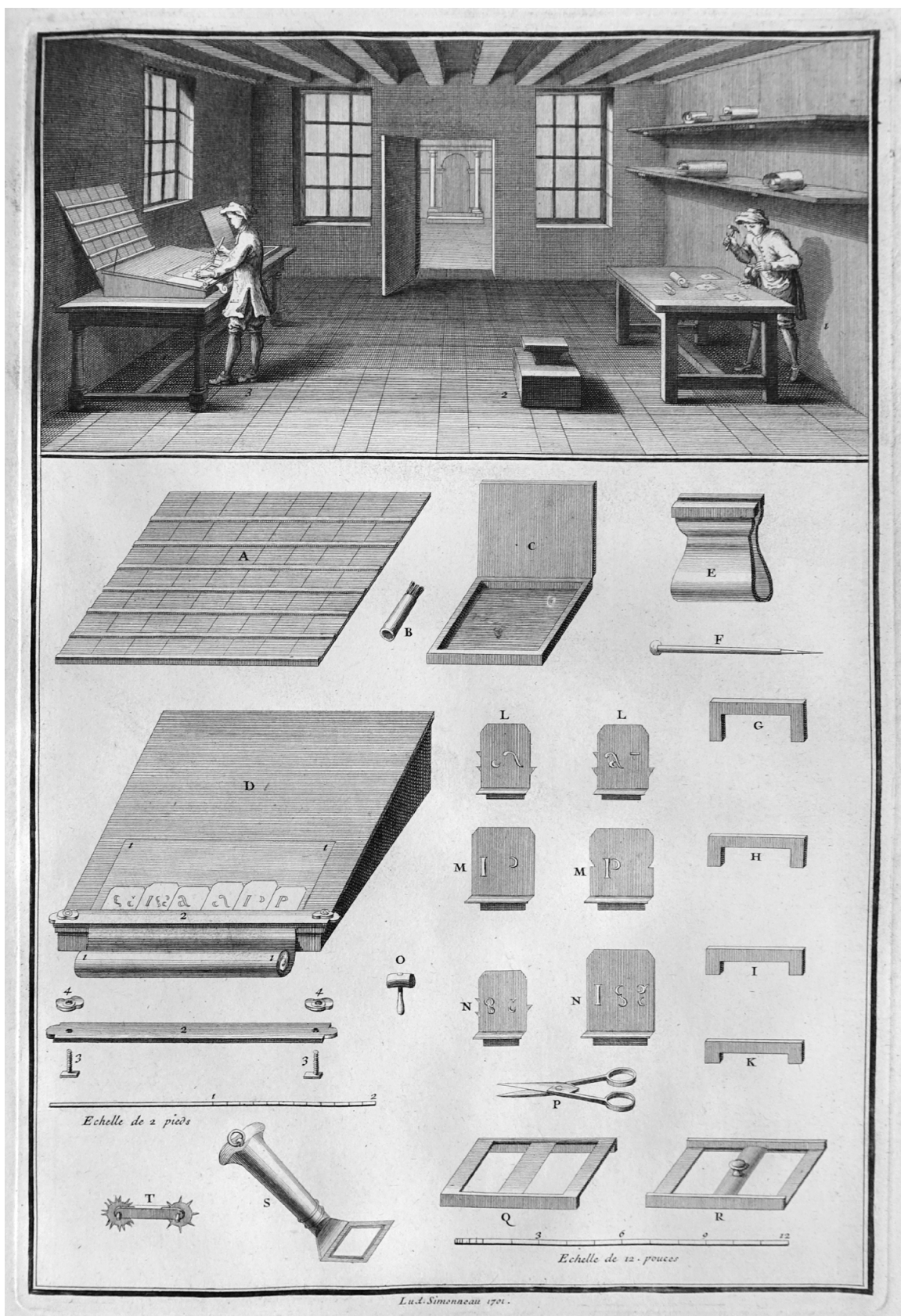


Figure 1. Engraving for Des Billettes's description of stencilling, signed 'Lud. Simonneau 1701.', 268×176 mm, from the album 'Les Arts et Métiers de l'Académie des Sciences',

St Bride Library and Archives, SB5825 ('Plates relating to printing and kindred arts, principally engraved by L. Simonneau'). See also appendix 3, pp. 52–4 (below).

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## A reconstruction of stencilling based on the description by Gilles Filleau des Billettes

This essay recounts and illustrates a reconstruction and testing of tools, furniture, and working methods for stencilling texts. The description of stencilling on which the reconstruction is based was written by Gilles Filleau des Billettes as part of work on a 'description of trades' (*Description des arts et métiers*) begun in 1693 and carried out under the direction of the Académie royale des Sciences, Paris. From the reconstruction, observations and conclusions are drawn about the effectiveness of the tools, furniture, and working methods Des Billettes describes, and their likely relationship to stencilling practices of the time. Four appendices address Des Billettes's instructions for designing and spacing letters, the cutting of stencils with chisels, the engraving by Louis Simonneau that accompanies the description, and later stencil materials that incorporate features similar to those described by Des Billettes.

1. Gilles Filleau des Billettes, 'Imprimerie de Livres d'Eglise, Ecriteaux ou Sentences &c.', Wing MS oversize Z4029.225, pp. 166–89, The Newberry Library, Chicago. For a transcription and translation of this text, see this volume, pp. 66–86; for details about the context of its compilation, and for biographical notes on Des Billettes, see this volume, pp. 87–90. References to the text in the present essay are given in parentheses, e.g. (166), and correspond to pagination given in the transcription and translation. For examples of stencilled liturgical books, see below (p. 47), Kindel (2003), and François (2010).

2. The issue of whether Des Billettes's description is a record of existing practices, or an improvement on them and therefore not wholly representative of contemporary work, is discussed below.

According to Gilles Filleau des Billettes, the use of stencils for marking out texts began around the middle of the seventeenth century. The practice, he says, was employed in the production of 'livres d'église', ornamental liturgical books typically made in only a single copy and customised to a particular secular or monastic church to reflect its preferred liturgical content. Des Billettes also says that stencils were used for setting out scriptural texts or maxims for interior display – on a wall, for example, or above a door.<sup>1</sup> Throughout the eighteenth century and into the nineteenth, in France and elsewhere in Catholic western Europe, texts in liturgical books continued to be stencilled, along with their chant notation and (variously) titles, initials, and decoration. Stencilling in secular contexts is also found during this period: for text and decoration on accounting ledgers, billheads, visiting and trade cards, and for *ex libris* and other marks of ownership in books. While surviving artefacts allow some conclusions to be drawn about how such stencilling was done, at times it is difficult to work out the details of the procedures followed and equipment used. For this reason, Des Billettes's description of stencilling, illustrated with an engraving by Louis Simonneau (figure 1), is of considerable interest.

That the stencilling of texts was well established by the time Des Billettes was writing is suggested by his lengthy treatment of the subject, though he also says so directly, remarking that it 'is currently used quite frequently as having much grace and usefulness'. (166) What is less clear is just how much of the method Des Billettes sets out is a reflection of contemporary stencilling practices, and how much is an elaboration or extension of them, or indeed newly invented, with the intention of improving on equipment and procedures already used in workshops where stencilling was done. For this reason, it is important to approach his text bearing in mind that it may be a record or a proposal, or both.<sup>2</sup>

This issue is referred to in the account of work on the 'Description des Arts et Métiers' (to which Des Billettes's text was a contribution) given in the *Histoire de l'Académie royale des sciences* ... (1699): 'This survey will investigate the smallest detail of each art, difficult though it may often be both to learn from the craftsmen and to explain. It will indicate either by words or figures all the materials and tools used and all the operations of the workman. In this way innumerable techniques, full of wit and invention, but for the most part unknown, will be rescued

from their obscurity. Skills will be handed down to posterity, those at least which are practised at this moment, preserved for ever in this compilation, in spite of revolution. [...] The ingenious man who cannot take the trouble or has not the leisure to study a trade in the workshop can here take it in almost at a glance and will be encouraged by this to devise improvements. Nor will the Academy omit to indicate the cases where advances might be made, or at least what it considers to be desirable.' Quoted in Jammes (1965), p. 73 (translation by Gillian Riley).



In the pages that follow, Des Billettes's method is scrutinized through a reconstruction of the equipment and procedures he describes. The reconstruction is summarised and illustrated with reference to relevant parts of his text. The aim of the reconstruction is to test how the conceptual dimensions of the method translate into actual work, and from this determine what characteristics are specific to it: its visual attributes, speed and order, sources of error and irregularity, physical stresses on equipment and stenciller, and more. The results should in turn offer insights into the usefulness of Des Billettes's method in its own right, and by comparison with surviving artefacts, its relationship to stencilling practices of the time.<sup>3</sup>

### Preliminaries

Des Billettes's description, some 10,000 words in length, can be divided into four sections of varying size, according to the content of each. These are proposed only as a convenience, as they are not signalled as such by him. The first section (166) identifies the work of stencilling texts, its possible origins, and its particular nature. A lengthy second section (167–84) describes the items of equipment in detail, the principles of their design, and how they are made; a third section (184 insert) outlines the procedure of work using the ensemble of equipment. The fourth section (184–9) reviews, point by point, the advantages of this method of stencilling over other methods that might be used.

The reconstruction is described and illustrated in an order that best conveys the principles of Des Billettes's method. The order adopted departs from the order of the text in a number of places. Similarly, the narrative of the reconstruction is only a summary, and while Des Billettes's assiduous arguments are quoted in places, the reader is encouraged to turn to his text to take them in more fully. Concerning Des Billettes's technical terms and their English equivalents, these are introduced in the specific contexts where they occur and so their meanings should be generally self-evident. Two instances, though, require advance notice: *caractère*, a term Des Billettes uses to refer to the stencil plate; and *lettre*, which he uses to refer not only to letters but also (often by implication) to numerals and other signs and symbols in the set of characters. To avoid confusion, the (English) word 'character' is avoided as far as possible. Des Billettes's 'caractère' is variously translated as 'plate', 'stencil plate', or 'stencil', depending on the descriptive emphasis required, while 'letter' is used in the same encompassing sense as his 'lettre'.<sup>4</sup> Two other terms, *conduite* and *lumière*, which refer to quite specialized features of the equipment, are generally left untranslated.

3. The reconstruction was carried out between May 2001 and March 2002 as part of a research project funded by the Arts and Humanities Research Board (as was); the project team consisted of Andrew Gillmore (furniture and tools reconstruction), James Mosley (text and linguistic consultant), Fred Smeijers (stencil reconstruction, stencilling). Aspects of the work were presented by Kindel and Smeijers at the annual congress of the Association Typographique Internationale in Rome (2002), and in subsequent papers; and in Kindel (2003). Elements of the reconstruction were exhibited in 'Fred Smeijers: work so far' (Koninklijke Academie van Beeldende Kunsten, The Hague, 2003; St Bride Printing Library, London, 2004), and 'Fred Smeijers and a new generation of type designers' (Catapult Gallery, Antwerp, 2006). A second phase of reconstruction took place in 2011–13 when a new set of stencils was made. It is important to note that many of the conclusions drawn from the reconstruction, and insights gained, have resulted from the close collaboration of project team members during and after the research project. Particular attention, however, should be drawn to the work of Smeijers, whose extended study of the design and making of the stencil letters proposed by Des Billettes has led to significant advances in their interpretation. These advances are incorporated into the description

of the reconstruction at various points, and are discussed in appendices 1 and 2, pp. 48–51, below.

4. It is notable that Des Billettes adopts the term *caractère* rather than *patron*, though the latter was known to him. Indeed he uses 'patron' to denote the stencil employed for adding colour to playing cards in his description of that subject, which among his texts follows the description of stencilling. The use

of 'caractère' establishes a connection with printing (*imprimerie*), as will be seen below, while at the same time suggests a separation of text stencilling from other kinds of stencil work as found, for example, in wall and furniture decoration, and in the production of playing cards, wallpaper, and *papiers peints*. In these spheres 'patron' is invariably employed; the stencils referred to were made of card (*carton*), or possibly canvas or parchment.

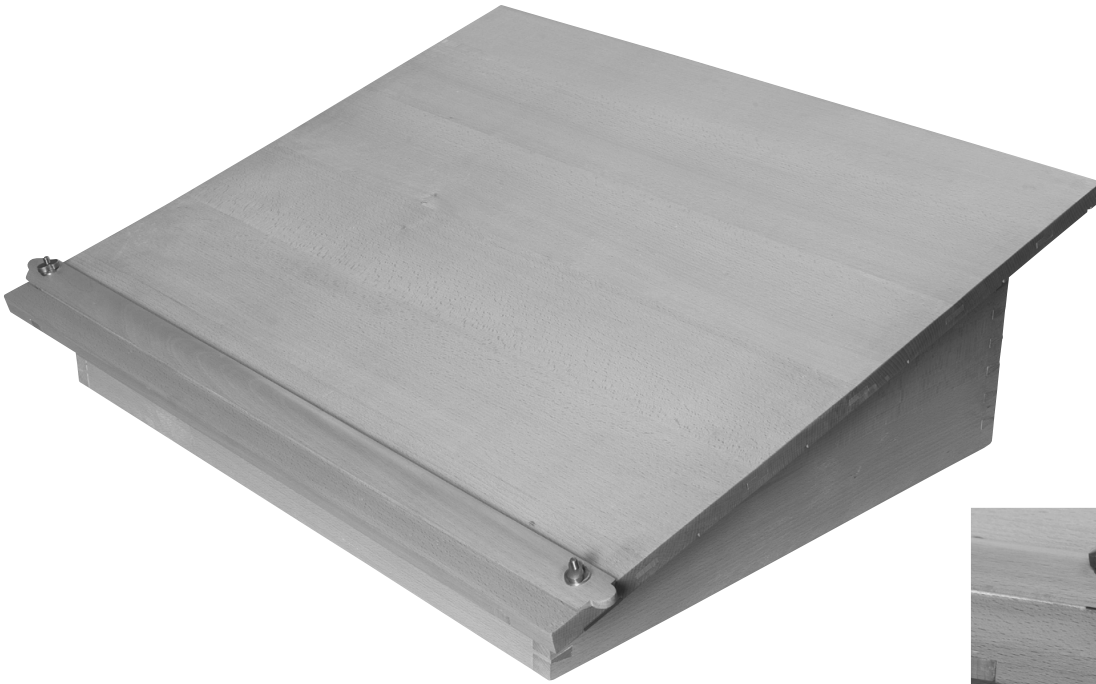
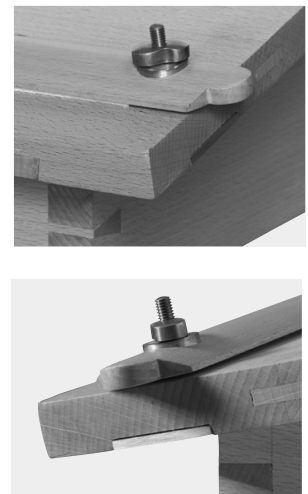


Figure 2. Desk, beech, 15° slope, grooved planks & tongues bonded with animal glue (work surface), dove-tailed planks (supporting box), 850 mm wide × 670 deep × 90 high at front edge of work surface. The desk, as reconstructed, differs from the engraving in its overhanging work surface, introduced to accommodate the nut-and-bolt attachments that fix the *conduite*. Des Billettes also recommends that the desk be covered with leather, cloth, or vellum (not shown here).

Figure 3. *Conduite* (details).  
(a) Nut-and-bolt attachment.  
(b) Raised fore-edge and underside.



#### Nature of the work (166)

In this first section of his description, Des Billettes identifies text stencilling as a species of work and proposes a general scenario for how it came about. He then touches on its particular nature. In reference to ‘true’ printing (*imprimerie*, i.e. with movable type), he states that there are other arts that might also be called printing even though they do not really qualify as such and in fact are only related. One of these is the stencilling of texts. Des Billettes arrives at this conclusion by comparing stencilling with writing and printing, since it appears to share certain features with both. He decides that the relationship with printing is stronger ‘owing to the specific affinity which exists between it [text stencilling] and printing, inasmuch as both employ metal characters instead of a pen.’<sup>5</sup> This, however, is immediately qualified ‘with this difference among others, that for printing types the letter is in relief and reversed, whereas in this process [stencilling] the letters are the right way round and cut out.’

5. While Des Billettes does not elaborate on the affinity of the metal ‘caractères’ in each sphere of work, it surely extends to their respective configurations that fix and make repeatable the forms of the letters, their spacing, and their consistent baseline location. He notes several further parallels between text stencilling and printing elsewhere in his text.

#### Desk & *conduite* (170–1) | Engraving: D, D2–4

To gain a clear understanding of the method of stencilling Des Billettes sets out, it is best to begin with his description of the desk (figure 2). The desk is comprised of a work surface covered with leather, cloth, or vellum, and sloped at 12–15 degrees. The dimensions of the work surface are left to the maker’s discretion; as reconstructed, it can accommodate a maximum page width of 700 mm. (The pages of very large books are stencilled as single leaves, front and back, then bound by stab-stitching along their long edge). The timber is also left unspecified, but in any case should be ‘sound, smooth, dry wood that does not twist, bow or warp’; the reconstruction uses beech, a minimally grained utility timber found in much of Europe.

At the base of the desk’s work surface is the *conduite* (roughly, a ‘ruler’; figure 3). It is 40 mm wide and is fastened to the desk at both ends with bolts and shaped nuts. The nuts can be loosened to allow a sheet of paper or vellum to be slid beneath the *conduite*, which is then tightened down. A narrower width of ‘wool or fabric ribbon’ is glued to the lower underside of the *conduite* (here cotton webbing was used); it makes direct contact with the sheet and holds it in place. Importantly, the ribbon also serves to lift the *conduite* so the specially configured stencils can be slotted under its fore-edge.

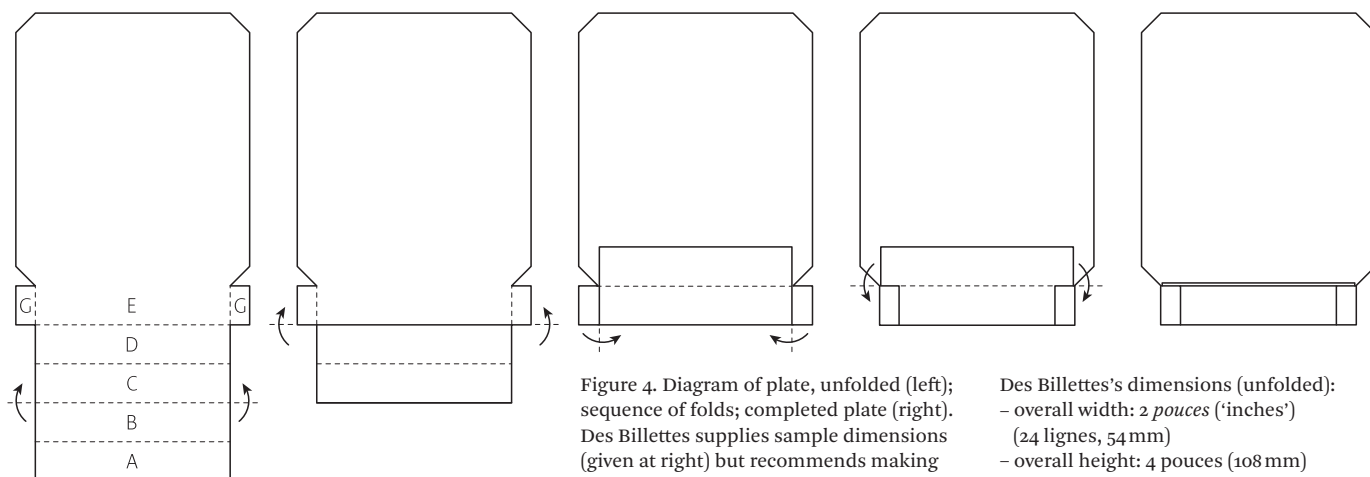


Figure 4. Diagram of plate, unfolded (left); sequence of folds; completed plate (right). Des Billettes supplies sample dimensions (given at right) but recommends making plates of various widths to suit the different letters. Three widths were reconstructed: 20, 28, and 36 *lignes* (45, 63, and 81 mm).

Des Billettes's dimensions (unfolded):  
 – overall width: 2 *pouces* ('inches') (24 *lignes*, 54 mm)  
 – overall height: 4 *pouces* (108 mm)  
 – height of bands A–E: 4 *lignes* (9 mm) each  
 – width of bands A–E: 20 *lignes* (45 mm)  
 – width of lugs G: 2 *lignes* (4.5 mm) each (1 *ligne* = c. 2.256 mm; metric values, above, are approximate. Reconstructed plates follow these dimensions, apart from the dimensions for overall width and the width of bands A–E.)



Figure 5. Vice extension, brass (jaws) and steel (spring body), 66 mm high × 69 wide × 31 deep. The vice extension is held in a rougher vice; the cut brass sheets for the plates are hammered over its edges to produce sharp, precise folds.

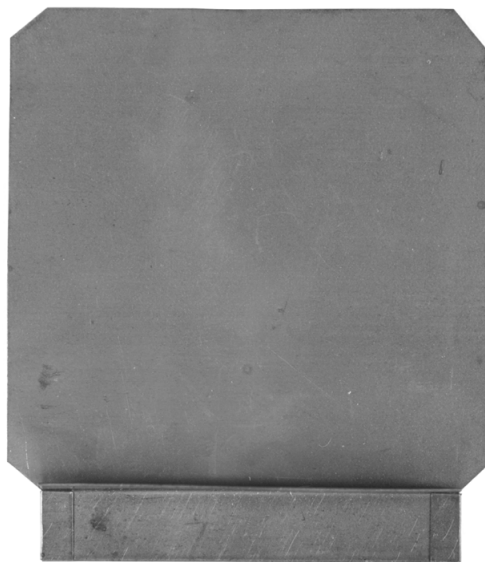


Figure 6. Plate folded, brass, actual size (63 mm width).

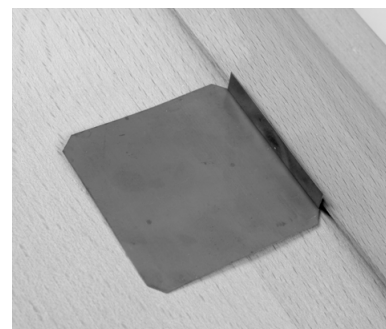


Figure 7. Plate under conduite.

#### Stencil plate configuration | character set (167–9, 185) | Engraving: E, L, M, N, O, P

The construction of Des Billettes's stencil plate (*caractère*) is relatively complicated, involving more than simply folding a brass plate upward at its base to form a handle. (Stencils of this kind were apparently common or even conventional when Des Billettes was writing and he criticises them towards the end of his text; see (185), also figure A4.3, p. 56, below). The material specified is brass: 'one takes pieces of very thin brass of the kind called "latten" ... as thin as they can be while keeping the strength that will make them last and stand up to the work that must be done with them'.<sup>6</sup> (167) Des Billettes recommends the thickness precisely: a twelfth part of a *ligne*, i.e. a *ligne*

6. See Kindel (2003), p. 70, n. 15, where French terminology associated with brass is discussed in greater detail.

*seconde*, or just under 0.2 mm. The brass is cut to the rectangular dimensions required, further trimmed to a specific shape (figure 4), then folded (by hammering) in a vice extension (figure 5) using a wood mallet. The result is a plate that is stiff and robust, easy to pick up, and that slots securely and consistently under the conduite (figures 6, 7).

Des Billettes recommends making plates of several widths suited to the various letters. The number of plates needed is determined by the extent of the character set. Des Billettes states that 'around eighty or more stencils will be needed' including for 'small and big letters, which are to be precise what we call in printing lowercase and capital letters. Then one must have some double letters, punctuation marks, figures etc., and if one wishes to add to that some reference signs, musical notes, and a few others, this can add up to at least a hundred or so stencils depending on the purposes of the person who wishes to use them'. (169)

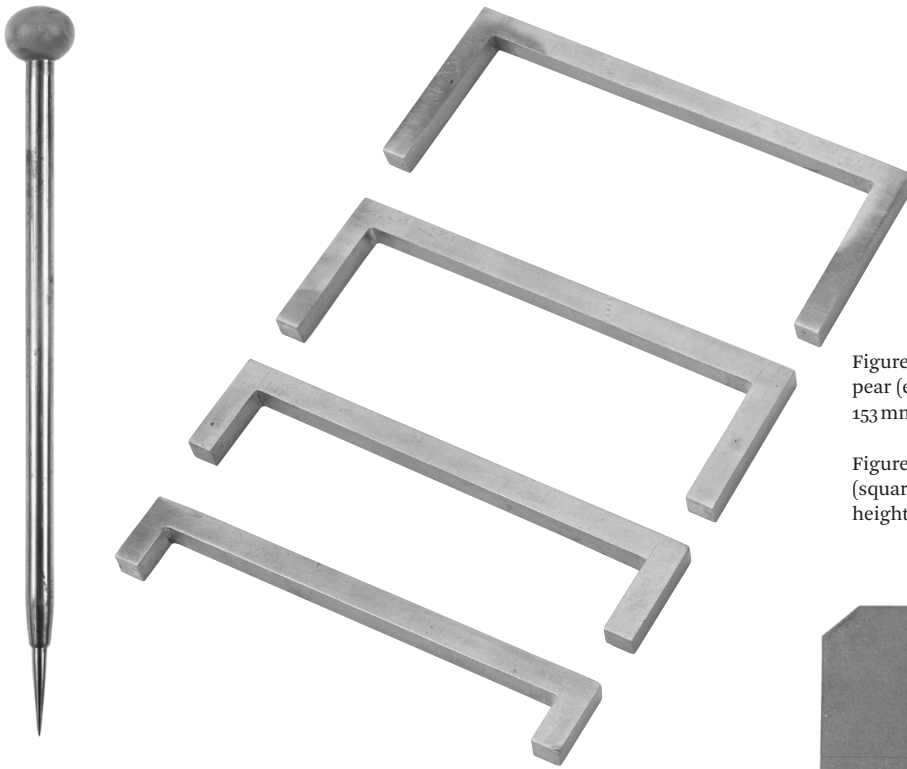


Figure 8. Scribing point (far left), pear (end), brass (shaft), steel (point), 153 mm long.

Figure 9. Proportion rulers (left), brass (square section), 110 mm wide × 6 mm deep; heights are 18, 24, 37, and 43 mm.

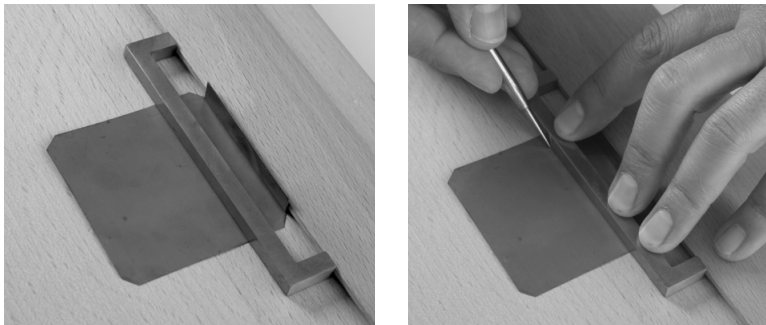


Figure 10. (a) Plate with proportion ruler in position (left); (b) scribing one of the four proportion lines (right).

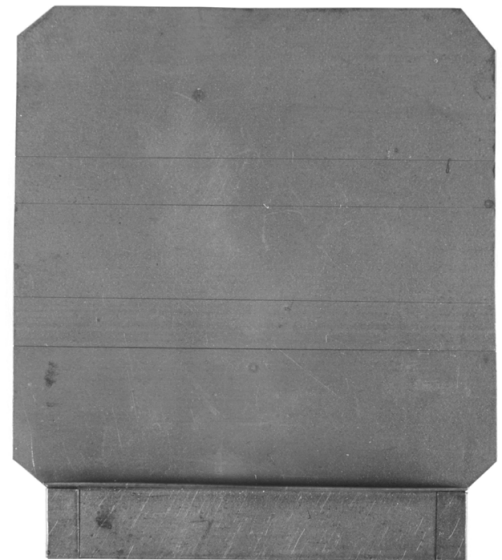


Figure 11. Plate, with inscribed proportions.

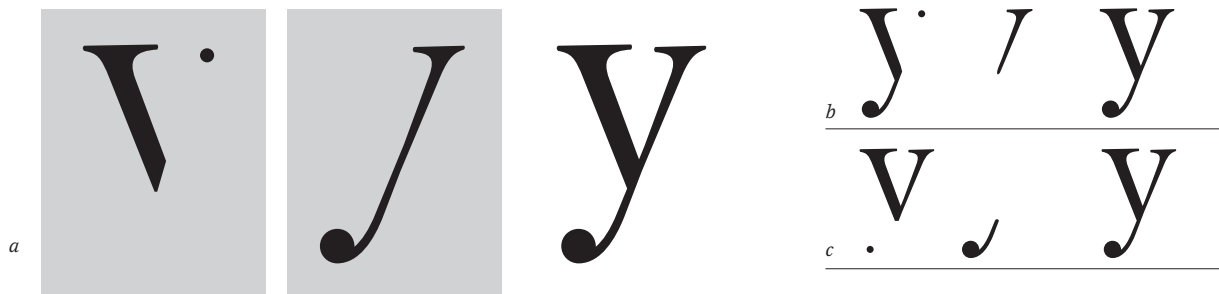
### Inscribing the plate: letter proportions

(170–3) | Engraving: F, G, H, I, K

After the plates have been made in the number and to the several widths required, each is readied to receive the letter that will be cut from it. Des Billettes observes that in printing ‘one of the greatest defects (inherent) in it is that the alignment of the letters is not good, but wavers up and down, or is otherwise uneven’. (170) The first steps towards countering similar defects in stencilling have already been described: the conduite, as it holds the substrate and the plates in place, fixes the position of each relative to the other; what remains is to fix the relative position of the letters. This is done with the four specially designed proportion rulers whose height dimensions correspond to the

capital height, x-height, baseline, and descender depth of the letters (figure 9). After a blank plate is slotted securely under the conduite, each ruler is placed successively over the plate and horizontal guidelines inscribed across it with the scribing tool (figures 8, 10). Because the ends of the rulers rest only on the fore-edge of the conduite, the four guidelines on the plate are always in precisely the same position relative to the conduite despite any irregularities in the plate’s folded construction (figure 11). The rulers thus establish both consistent proportions among all the letters to be scribed onto the plates, and consistently positioned baselines. When the stencils come to be used, it will not be necessary to align them manually since their configuration, in coordination with the conduite, will ensure this by default.





#### Principles of composite letters and letter spacing (173–8, 185–6) | Engraving: L, M, N

Having fixed the relative positions of the conduite, the paper, and the stencil plates (and their letters), Des Billettes then introduces the principle to be followed for configuring the letters themselves. It arises from his view that the 'breaks' typical of stencilled letters, formed by 'attachments' (*tenons*, i.e. ties or bridges) in the stencil plate, mean that when marked out 'the letter has something missing and is imperfect because its shape is interrupted by blank space(s)' (174). These blank spaces (breaks) require the stenciller to 'take the pains to finish off these shapes with a pen or a brush' (174), something Des Billettes worried might be done poorly, or not at all (185–6).

To avoid the defect, one which 'greatly disfigures the beauty of this [kind of] printing', Des Billettes proposes splitting into two 'halves' those letters that, when cut as stencils, would normally require attachments. When the halves are marked out consecutively, they recombine to form a composite letter that appears complete and unbroken. Des Billettes also recommends a composite design for letters that do not strictly require it, such as v or y, in order to avoid weaknesses in the stencil plate where their counters would otherwise be attached by only a narrow strip of brass (174).

To arrive at a composite configuration, two identical letters are scribed onto the plate side-by-side. Cut from each of these are the halves that will together form the whole. Des Billettes does not specify exactly how each

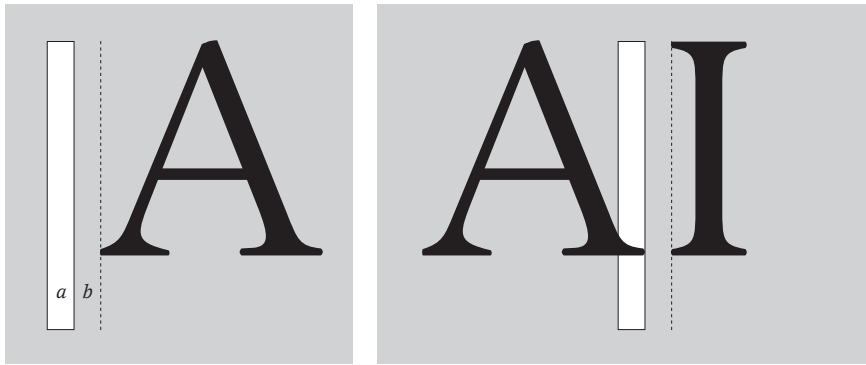


Figure 15. *Lumière* and inter-letter space.

- (a) *Lumière*, is a 'window' through which the previously-stencilled letter is seen. The *lumière* may extend from the capital height to the baseline, or to the descender depth (as here).
- (b) Inter-letter space, is specified as the stem width of capital 'I'. For simplicity, the width for the *lumière* is made the same as the inter-letter space.



Figure 16. Inter-letter spaces. Des Billettes states that the inter-letter space should be measured between the extremities of adjacent letters, whatever those extremities are (serif, bowl, curve, etc.).



Figure 17. Letter sequence showing the position of (successive) *lumières*, and the inter-letter spacing that results.

letter is split apart other than advising that whatever the division, the strength of the plate must be preserved and, importantly, where the halves come together, they overlap slightly ('a soldering together') to avoid new, accidental breaks (175, 177). To help the stenciller join the halves of the letter accurately, Des Billettes specifies a guiding-mark or dot (*repère*), which is (usually) positioned to the right of the first half of the letter. The dot is stencilled along with the first half; then, after guiding the placement of the second half of the letter, it is covered over when the second half is stencilled (175–7).

The final element to be added is the means of spacing the letters. Des Billettes states that the distance between letters should be the stem width of capital 'I' (177–8). To gauge this distance while stencilling, he specifies a *lumière*

(roughly, a 'window') to be cut from the plate, to the left of the letter. The *lumière* takes the shape of a tall, narrow rectangle extending from the capital height to the baseline or descender depth (which of the two is not specified). Its right vertical edge is positioned at the recommended distance (stem width of I) from the leftmost extremity of the letter. If, when stencilling, the rightmost extremity of a just-stencilled letter, as seen through the *lumière*, touches the *lumière*'s right vertical edge, then the plate is correctly positioned, and the spacing between the two letters, as stencilled, will also be correct (178).

See also appendix 1: Designing and spacing the letters, pp. 48–9, below.

Figure 18. Stencil plate with a pair of identical letters ('A'), lumière, and guiding-mark drawn in position. Actual size.

The letter is assigned to a plate width best able to accommodate it. Once the four proportion guidelines are inscribed on the plate, the letters are set out accordingly. Des Billettes states that for a letter requiring a composite construction, the pair of letters should be drawn, side-by-side, in their entirety. The lumière is also incised in its

correct position. Des Billettes offers no guidance on the lateral position of the elements on the plate. In practice, the two element groups (1: lumière + left half of letter + guiding-mark; 2: right half of letter) are best placed equidistant from each other and from the sides of the plate, exploiting a maximum of the plate to shield the stencil brush. Letters that are not composite in design are simply centred on the plate, along with their lumière.

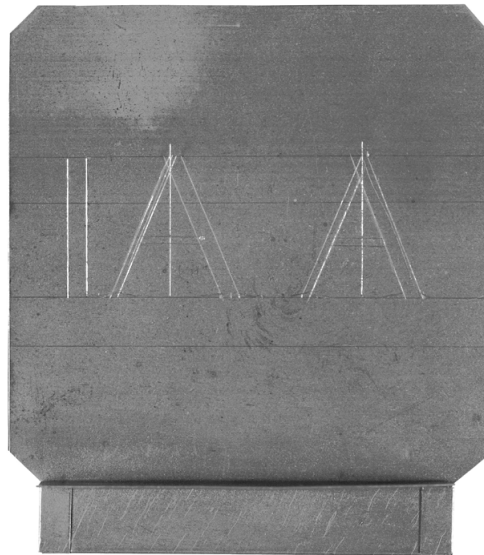
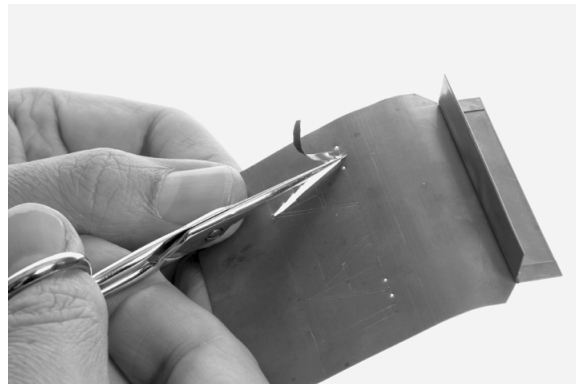
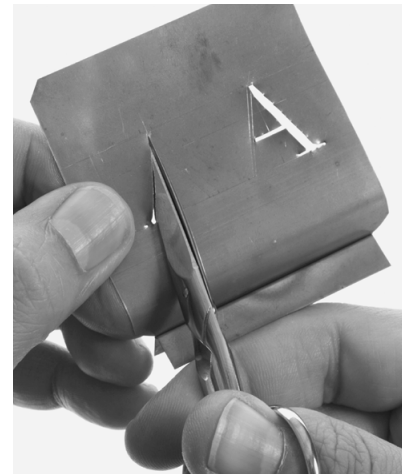


Figure 19. Rough cutting. A hole is first drilled through the thickest part (stroke) of the letter with the scissors. The letter is then cut by snipping outward from the hole and along the inscribed



outline. Provided the scissors are very sharp, and there is minimal 'play' between the two arms, they work relatively well, though they are still only able to reach into the larger, wider parts of the letter. Their



cutting action is at times obstructed by the perpendicular 'foot' projecting outward from the folded plate. Bending the plate backward allows the foot to be manoeuvred out of the way.

#### Letters: inscribing on the plate, and cutting (169, 173, 178, 186) | Engraving: P

In addition to expatiating on the principles of the composite letter, the guiding-mark, and the lumière, Des Billettes describes how they are delineated on the plate and makes several other points about their design. He is surprisingly brief about these matters and the few comments he does offer are scattered throughout his text.

The task begins by drawing the letter (or pair of letters) 'with all the possible accuracy and in the most beautiful proportions' (173). Although Des Billettes does not specify exactly how this is done, his description implies that letters are freely outlined (*designer*) but according to the proportional guidelines set by the rulers. This is confirmed

in his summary in section four of the text when he asserts that making the letters twice 'is not difficult for someone with a steady hand' and takes little additional time 'if one has the model in front of one' (186). Concerning the style of the letters he is again unspecific, stating only that they should be 'the letters one wants to cut' (169). He offers more guidance on size, advising that it would be 'very difficult or at least quite useless to make any as small as *Gros Parangon* [c. 22-point Anglo-American], because even if they could be well executed, there would be even more difficulty in marking / printing them out properly' (169). Instead he recommends *Gros Canon* (c. 44-point) or larger.

After the letters are drawn on the plate, along with the lumière and, if needed, the guiding-mark, the next task is to cut them out. Des Billettes suggests that it is the cutting



Figure 20. Rough cut, and stencilled proof.

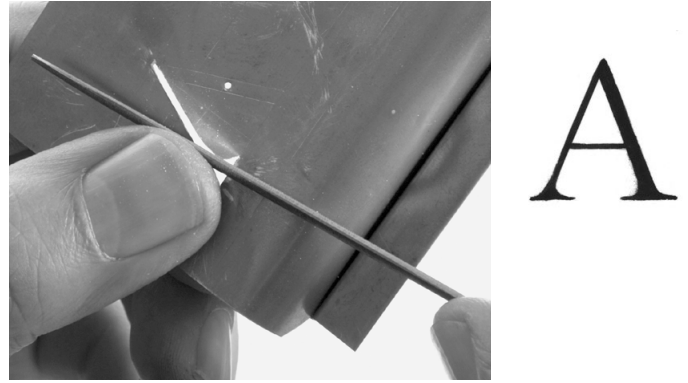


Figure 21. Preliminary filing, and stencilled proof. Much filing is needed to refine the rough cut. Parts of the plate

can be bent outward to give access to the files when shaping serifs, stroke edges, and other parts of the letter.

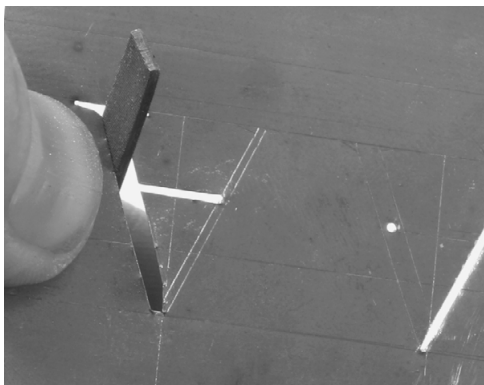


Figure 22. Additional filing. Once the shapes and details of the rough cut are sufficiently well refined, further

filing may be needed to add weight to the letter, making it consistent with the weight of others.



Figure 23. Completed letter, and stencilled proof.

wherein 'lies all the skill of this little art' (169), and that its success mostly 'depends on the particular skill of the person who undertakes the task'. (178)

The tools and procedure of work are given: 'the best way to open or to cut them out [i.e. the letters] is to make a hole at one end of the thickest points of the shape with very sharp scissors [*ciseaux*], then continue cutting with the point of the same scissors as close to the outline as possible. And then for the remaining uneven parts or what(ever) remains to be done to finish off the contours, where scissors are not sufficient, one can easily complete the task with small files of a very small gauge, [that are] flat, round, semi-rounded, like a knife, in the form of a sage leaf, and all sorts of other shapes according to the different varieties of letters, such as the small files commonly

used by clockmakers'. (178) This description is confirmed by Simonneau's engraving, which shows scissors (P) immediately below several stencil plates (L, M, and N), though no files are illustrated.

Despite the apparent clarity of this description, there remains some ambiguity about the word for scissors, '*ciseaux*', as it is also the plural form of '*chisel*'. The ambiguity increases in light of a more precise phrasing, '*une paire de ciseaux*', that Des Billettes might have used to describe the scissors but does not. While the use of scissors is reasonable on the evidence of the text and the engraving, the production of stencils with chisels was also tested. See appendix 2: Cutting the letters with chisels, pp. 50–1, below.



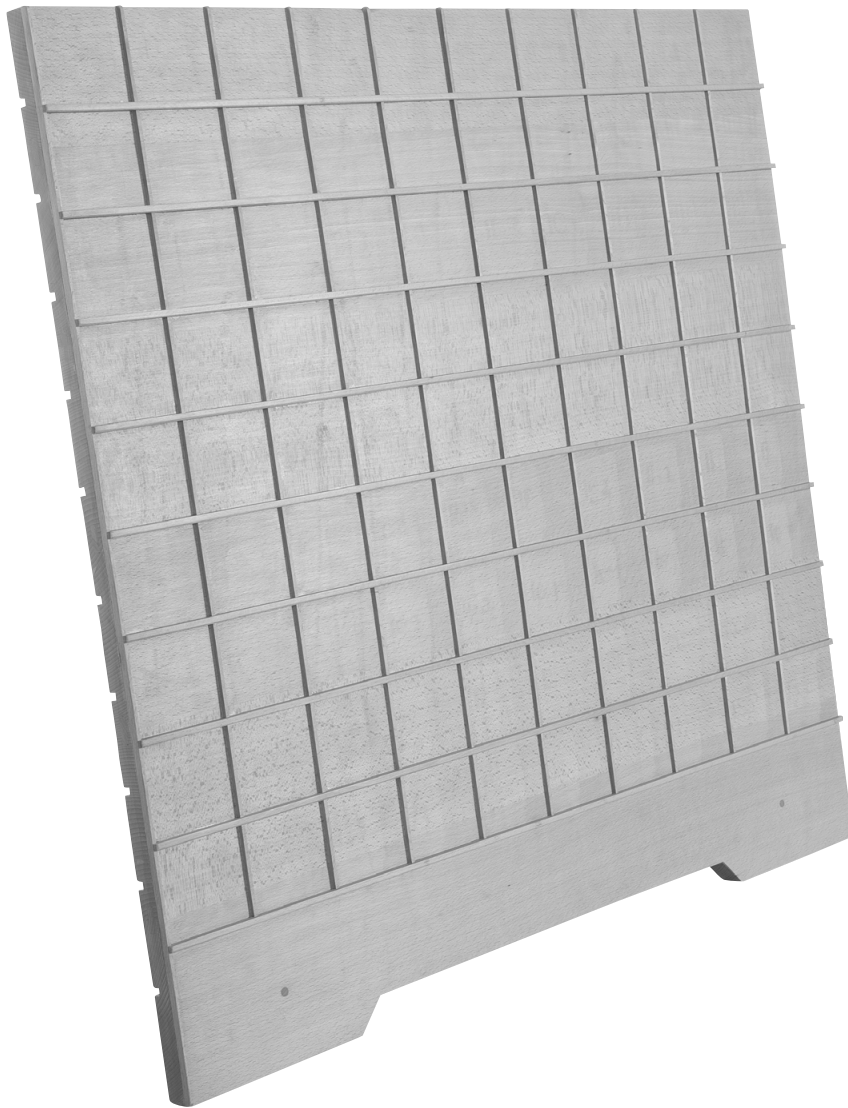


Figure 24. Lettercase, beech, grooved planks & tongues bonded with animal glue, 895 mm high × 955 wide. The lettercase, which Des Billettes describes as ‘little’, must in fact be relatively large to accommodate a set of 80–100 stencils; as reconstructed it has 90 compartments. It is best positioned to the left or right of the stenciller, rather than behind the desk, and low enough for all its compartments to be easily reached.

#### Auxillary furniture and tools | ink materials (178–84, 187) | Engraving: A, B, C, Q/R, S, T

To organise and hold the stencils, Des Billettes proposes ‘to have behind the desk a little case somewhat similar to that used in printing; that is to say [like] a printer’s type case divided into as many little compartments or cells as there are stencils, but with the following difference among others, that each compartment must be very shallow, because only enough space is needed for a single stencil, which must be easy to pick up by its foot. This case must be almost vertical or sloping very slightly backward, but in a word placed in such a way that (every) one can have it within sight and within reach to pick up the stencils easily.’ (178) (figures 24–26)



Figure 25. Lettercase (detail), compartments with stencils. The lower ledge of the compartment protrudes sufficiently to provide a secure rest for the stencil, but not so far that it interferes with picking up the stencil by its foot (handle).



Figure 26. Lettercase (back), with supports. Such supports, which enable the lettercase to stand on its own, are not described by Des Billettes; the engraving shows the lettercase leaning against a wall.

To stencil the parts of a composite letter and at the same time prevent the stencil brush from straying into the lumière, two different masking tools are specified. The more complicated is the *sergent*, roughly a ‘sash-clamp’ (figure 27). It consists of a frame whose inside vertical dimension is slightly less than that of the stencil plate’s upper section. A *curseur* or *coulisse* (‘cursor’ or ‘slide’) is set into grooves inside the frame. As the names suggest, the cursor can be slid left or right to make the frame opening(s) wider and narrower. By placing the sash-clamp over a stencil positioned on the conduite and adjusting the size of the frame opening accordingly, those parts of the stencil that should not receive ink can be covered (178–81).

The other masking tool, the *patte*, roughly a ‘holdfast’, is far simpler: it is a fixed frame (i.e. not adjustable) set



Figure 27. Sash-clamp (*sergent*), from above (a) and below (b), brass, 110 mm long × 61 wide × 10 high (excluding cursor button).



Figure 28. Holdfast (*patte*), brass (frame) and oak (handle), 62 mm (width of frame) × 150 (length of handle).

into a wood handle (181–2) (figure 28). Its smaller dimensions allow it to be used in confined spaces, for instance near the inner margin of an already bound book (182). In addition to their masking functions, both tools are used to press the stencil plate flat to the substrate.

Several further items are associated with the stencilling ink. A shallow, lead-lined box is specified to contain the ink workings (figures 29–30). To prepare the workings, gum tragacanth or gum arabic (binders) is mixed with soot, or ivory or peach kernel ash, together with a small amount of existing (wet) ink, to form a paste. The paste is then spread onto the lining to form a base, which dries. Drops of wet ink are subsequently added to the base prior to stencilling, into which the brush is rubbed to take up the ink; any surplus is wiped onto the lead lining. Des Billettes gives



Figure 29. Ink box, beech, brass (hinges), lead (lining), 300 mm × 300 × 45 (closed). Simonneau illustrates the box with a lid, though Des Billettes makes no mention of it.



Figure 30. Ink box (detail), showing lead sheet folded into box interior.

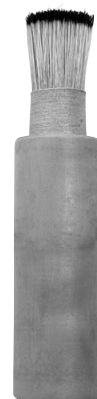


Figure 31. Brush, pear (handle), and boar bristle, 85 mm.

recipes for black and red inks (183; neither ink was reconstructed). The size of the ink box is, by implication, large enough to accommodate bases of both colours. To apply the ink, a common brush or paintbrush is recommended, which could be procured ‘ready-made from the workers who make whisks and consists simply of a tuft of very stiff pig or boar bristles with cords wrapped tightly around the thick end of the bristle’ (184). The latter should be trimmed straight across, a profile that is typical of stencil brushes.

The final tool in the ensemble is a toothed wheel for pricking interlinear increments down the left and right margins, a tool known to scribes (see Johnston, 1908, pp. 99–100). Des Billettes proposes that its teeth be adjustable, to prick out whatever increments are needed by the stenciller (187; this tool was not reconstructed).

Figure 32. Stencilling under-way. Prior to stencilling, the sheet of paper or vellum is slipped under the loosened conduite. Prickings already made along the margins, which establish inter-linear spaces, are aligned to the fore-edge of the conduite, which is then tightened down. Simonneau's engraving shows the lower part of the sheet rolled around a dowel; it is not mentioned by Des Billettes (nor shown here).



Figure 33, a–c. Masking.  
(a) Stencil + sash-clamp.  
(b) Stencil + holdfast.  
(c) Stencil + hand (i.e. no masking); this method relies entirely on careful brush-work.



a



b



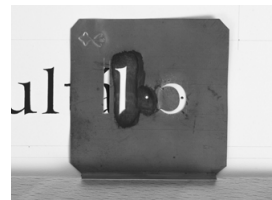
c



a



b



c



d

Figure 34, a–d (above).  
Marking out a letter.

- (a) Stencil in position:  
first half of letter.
- (b) First half + guiding-mark  
stencilled.
- (c) Stencil in position:  
second half of letter.
- (d) Letter completed.

Figure 35, a–b (right).  
Letter spacing.

- (a) Previous 'b' aligned to  
right edge of lumière.
- (b) Next letter marked out.



a



b

### Procedure of stencilling (183–4, 184 insert, 188)

Stencilling with the ensemble of equipment begins with a paper or vellum substrate. Des Billettes briefly describes their preparation at the close of the text's second section (184), stating simply that the paper should be the whitest, most well-sized, and smoothest that can be obtained, and that it or the vellum should be of the finest quality. The procedure of stencilling is then described in the third section. Des Billettes states at the outset that how the ensemble of equipment is to be used 'is easy to judge ... from what has been said'; and indeed this third section is evidently an afterthought, as it is written on a separate loose leaf and inserted into the cahier, using a symbol to mark its position between the end of the second section and the beginning of the fourth. Although Des Billettes rehearses the procedure in full, it will be sufficient to

highlight several points not already mentioned in the second section.

Before the sheet of paper or vellum is slipped under the loosened conduite, it is pricked along both margins to establish interlinear increments, using the toothed wheel. As Des Billettes describes them, the prickings function as horizontal alignments for the conduite's fore-edge, rather than as line-ends for the text; the configuration of the stencil means that the baseline of the text would therefore sit slightly higher. After a reminder to secure the sheet in position by tightening down the conduite, the use of the stencils in combination with the sash-clamp is reviewed. Letter spacing using the lumière is included in the explanation, though no advice is given on spacing between words.

Des Billettes advises twice more that excess ink should be removed from the brush. (Earlier, in the second section, he recommends the use of a paper cone filled with ink,



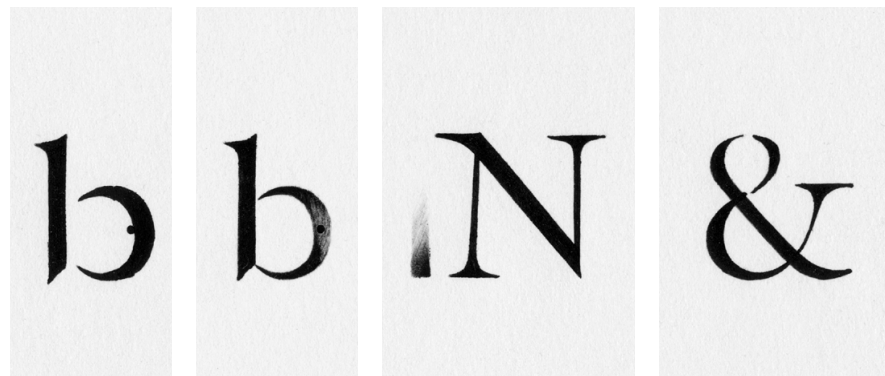
Figure 36. Stencilled text, actual size. Expected features of text stencilled according to Des Billettes's method.

- (1) Letters without breaks (i.e. composite, where required).
- (2) No baseline guide.
- (3) Prickings for interlinear spaces positioned below the baseline (not visible here).
- (4) Consistent spaces between letters but not words.



Figure 37. Stencilled letters, actual size. Possible faults generated by Des Billettes's method (left to right).

- (1) Mis-aligned halves; guiding-mark visible.
- (2) Incomplete inking of second half; guiding-mark visible.
- (3) Inked brush strays into lumière, leaving a ghost.
- (4) Mis-aligned halves, with (apparent) breaks into the upper interior space only.



over which is placed a sponge to moderate the uptake of ink by the brush; if the brush were to become saturated, the excess ink could be wiped onto the lead sheet in the ink box; 183–4.) He also gives an indication of the brush action: '[move] it around several times to the right and to the left until one sees that the letter is clearly marked out' (184 insert), having earlier noted that 'if the letter does not appear deep black at first it will become so subsequently' (183; this change in appearance is characteristic of iron gall ink on exposure to air). To work cleanly, and in particular to prevent ink from seeping under the plate, Des Billettes reiterates the need to press down firmly on the masking tools to flatten out surface deformations in both the stencil plate and the substrate.

The description of the stencilling procedure concludes at this point. It is worth noting that Des Billettes only discusses the stencilling of consecutive lines of text; he offers no comments on procedures for planning and executing

the many other page features typical of stencilled books (see discussion below, p. 46). At (188), in the final lines of section four, brief reference is made to ornamenting the work with 'all sorts of stencils bearing fleurons, vignettes, cartouches, etc., which are used in printing'. These might be left as stencilled, or form the basis for painted colour-work if stencilled first in outline. Des Billettes cuts short this description of ornamenting in anticipation of it being dealt with elsewhere, as 'an art which belongs to illumination or to miniatures and which will be explained in its proper place as the work of painters'. (No such text by him on this subject is known.) Des Billettes also suggests that colour work might be conducted as it is by playing card makers. As noted above, a description of the printing of playing cards follows the description of stencilling in Des Billettes's cahier; there, colour work is described.



### The fourth section (184–9)

The fourth section of Des Billettes's text is different from the previous three in that it is essentially rhetorical, a summary of what has gone before, supplemented by concluding remarks and references. Because it reviews features of Des Billettes's method already discussed, the fourth section is of less immediate interest in this respect. Instead, its importance is in the arguments that accompany and support the summary, in which Des Billettes advances the logic and advantages of his own method while asserting as inferior other methods a stenciller might use. In describing the latter, he incidentally provides valuable clues about the conduct of contemporary stencilling, features of which he clearly did not approve. And by forcefully reiterating the claimed improvements of his own method, Des Billettes also demonstrates the value he ascribed to displacing many of stencilling's irregular features with more regularised alternatives.

Des Billettes begins the fourth section with a list of the equipment used by stencillers unwilling to subject themselves to rules such as those that govern his method. Their equipment includes an ordinary table, a simple ruler, plates folded up once at the base, and letters cut with attachments and without a *lumière*. Used together, they require the stenciller to have a 'perfectly sure eye and a perfectly steady hand' in order to position each stencil with precision, aided only by triangles (or another shape) cut into the plate at the baseline of the letter, and by baselines ruled on to the substrate for every line of text (184, 1<sup>o</sup>).

Having summarised the defects of working thus, Des Billettes then reviews the comparative advantages of his method, feature by feature. At (185, 2<sup>o</sup>): if a stencil plate is simply folded up at the base to make it easy to handle and its configuration has no other purpose, then the effort of positioning it accurately must be 'constantly renewed'; with a more purposefully configured plate and the *conduite* 'one can work with a vengeance'. At (185, 3<sup>o</sup>): if the

*lumière* is dispensed with, then inter-character spacing depends entirely on trial and error guided by eye, or on a spacing dot placed after the letter, to be covered over in most cases, but not all, by the next stencilled letter (see below, figure A4.32); neither can guarantee the even and accurate spacing offered by the *lumière*. At (185–6, 4<sup>o</sup>): if composite letters are not used, then attachments are needed; the unpleasant breaks these cause in the stencilled letter need to be filled in with ink using a pen or brush, something the stenciller may be unwilling to do for fear of spoiling the letter, or because the defect is thought imperceptible, or simply out of laziness. Des Billettes continues by arguing for the composite letter: it takes little extra time or effort to draw on the plate, cut out, or stencil; and the letters that result do not have breaks that need filling in. At (186–7, 5<sup>o</sup>): by dispensing with the *conduite*, the stenciller must rule in every line, and these may become unevenly spaced or drift out of parallel; with the *conduite*, only the two line-ends are needed. (It is here that Des Billettes proposes the toothed wheel for pricking line-ends). And at (187, 6<sup>o</sup>): again, that stencils with triangles cut at baselines and spacing dots to the right of letters are not only more difficult to make, they are 'a very imperfect substitute' for the *conduite-lumière* combination.

The position Des Billettes arrives at near the end of the fourth section (188) is that while a stenciller may, through practice and concentration, succeed in making good work using only the simplest of means, a similar standard can be reached more easily using his method and equipment (and, he implies, by stencillers of varying skill and experience). Indeed Des Billettes goes on to describe those who use simple tools and procedures as mere economizers, or the associates of people who have 'little refinement' or have bad taste. His lesson (if this is not overstating the matter) is that 'in this [stencilling], as in many other arts, the pains that are taken at first in (making) the equipment or tools of the trade are abundantly rewarded by the sureness, the perfection, and the ease that one subsequently finds in working'.

## Discussion

Des Billettes's neat summation just quoted encapsulates a strategy of work that underlies the whole of his text. It is the redirection of effort away from the ad hoc features of the stencilling itself, and toward the earlier stages of its design and planning. Energy otherwise spent (and wasted) marshalling and executing every task uniquely – ruling text lines, aligning stencils, gauging spaces, completing breaks – is instead invested in devising equipment and procedures that more effectively anticipate the stencilling to come. Their integrated design ensures greater regularity, precision, and efficiency in the work. This, he argues, does not simply improve the work, it makes the worker's circumstances less taxing and, by implication, more rewarding.

### *Theory and practice*

The particular way Des Billettes enhanced the regularity of text stencilling represents his principal innovation. His method, as he claimed, is efficient and capable of generating well-composed words

and text; the reconstruction confirms as much. But while this is true in general, the reconstruction also reveals features of Des Billettes's method that appear ineffective or superfluous, suggesting that in places Des Billettes was proposing a work concept that does not always hold up in practice. Disjunctures of this kind do not undermine the method's overall effectiveness, though they do raise questions about its relationship to practice.

The question of whether elements of Des Billettes's method were theoretical in origin and remained so, were shaped by testing them, or were borne out of observed practices, can be weighed up by first noting Des Billettes's own remarks on the matter. Near the end of his text (188) he says 'it is always more sure both for the ease of the process and the perfection of the work to follow the methods that we have just described. And we can assure (the readers) that all circumstances being supposed equal we have never seen other simple methods succeed so well'. Referring to existing stencilled books (discussed below), he notes that while they are excellent 'it is nevertheless certain that their texts never have the accuracy that they would have if produced by our method'. (188) While Des Billettes fails to state categorically that his equipment was made and used, both statements suggest that this was the case.

Support for the suggestion can be sought through an appraisal of the reconstruction. The equipment is mostly realistic in design and relatively easy to construct with the materials, tools, and skills available to metal- and woodworkers of the period. The exception is the stencil plate, which presents some difficulties. While measuring, cutting and folding the plates is straightforward, cutting out the letters with scissors is challenging and time-consuming; as the size of the letter decreases, the cutting becomes increasingly difficult, and below a certain size effectively impossible.<sup>7</sup> And yet Des Billettes does warn that it is difficult to make letters as small as Gros Parangon, and recommends Gros Canon or larger instead. The latter, notably, is roughly the minimum size for which scissors of the kind illustrated in the engraving are not excessively difficult to use. Des Billettes seems to anticipate the challenges involved when he remarks that it is the cutting wherein lies 'all the skill of this little art' (169), and that its success mostly 'depends on the particular skill of the person who undertakes the task'. (178)

Similarly challenging, and also associated with making the stencil plates, is the implementation of Des Billettes's method for consistent letter spacing. His 'normal rule', that all letters should be separated by the stem width of capital I, brings with it implications for the design of letters that are not immediately obvious (see appendix 1). But they can be dealt with, demonstrating that the spacing method is neither impractical nor merely theoretical; indeed its description as a normal rule suggests well-established practice. Nevertheless, Des Billettes's explanation of it is relatively uncomplicated, which may indicate one of two things: that his understanding of such a system was limited, since he takes no notice of its implications; or that he saw no need to provide many details, since it was a skill whose successful execution resided in the know-how of the specialist who would do the work.<sup>8</sup>

7. It is possible that Des Billettes never observed such work directly, or based his description on stencil-making practices employed elsewhere, for example in the production of playing cards where scissors (and knives) were employed, though the material being cut was either card or canvas, and the cut-out shapes comparatively simple.

8. This is also the case with Des Billette's descriptions of the furniture and tool making, where the details of the wood and metal working are left largely unspecified, presumably under the assumption that they would be resolved by the specialists doing the work.

Once made, the use of the equipment gives additional indications of the method's putative relationship to practice. There is much about it, for example, that enables fluent and effective work, and which is again realistic. This is demonstrated by the stencil plate, whose folded configuration is intelligently partnered to the desk and conduite; in use, it is appropriately stiff, robust, and able to resist deformation. The four proportion rulers are equally effective in providing a consistent vertical position for each letter on all the plates, while avoiding each plate's particular irregularities. Consistent positions, together with properly executed letter-lumière combinations, demonstrate that good composition can be readily achieved. Apart from the method itself, there are also some indications that Des Billettes gathered information about the work of stencilling by observing it in action. These are evident in remarks he makes about the ink and brush: he issues several warnings not to overload the brush with ink; he remarks that the uptake of ink can be moderated with a sponge; he notes that the most important feature of the ink, in addition to its blackness, is that it dry quickly; and he calculates that between fifteen and twenty letters can be stencilled with one brush-load of ink. Each of these has a specificity that seems to derive from direct observation; each is confirmed by reconstructed practice.<sup>9</sup>

But if much about Des Billettes's method allows for fluent and realistically effective work, there are also features of it that undermine what he claims for it. One example, which relates to the ink and brush workings, and to the size of the letters, is that small-size letters are difficult to mark out and should therefore be avoided. The claim is doubtful since in practice marking them out is relatively easy if an appropriately sized brush is used whose bristles are the right length and stiffness.<sup>10</sup>

A more significant disjuncture, however, concerns the masking tools, the sash-clamp and the holdfast. Initially, they seem to be logical adjuncts to the composite letter and the lumière, since without them the ink-loaded brush would surely stray into various openings in the stencil plate where it would mar the work. But in practice both tools are problematic because their use requires more hands than are available to the stenciller. When stencilling, one hand is needed to pick up, position, and hold the stencil in place against the conduite while the other is occupied with the brush and the sensitive handling it requires to deliver ink fully but not excessively through the stencil. The use of either masking tool in effect requires a third hand: after the stencil is positioned, the masking tool must be picked up with the same hand (the other is holding the brush), adjusted (if using the sergent), and placed on top of the stencil, which almost invariably shifts the stencil out of position. Once the letter is eventually marked out, it must be left to dry completely since removing the masking tool too quickly may again shift the stencil and smear the ink.

Apart from threatening the quality of the work, these various operations are awkward and time consuming. Without a masking tool the stenciller can, with several deft movements, first position the stencil and mark out the letter, then flip the stencil up by its foot and slide it to its next position; or return the stencil to the letter case, pick up another, and set it in position. In either instance, the ink

9. Des Billettes's specifications may suggest that these practices associated with the ink – crucial to good stencilling – were common knowledge.

10. Des Billettes's claim may have been rhetorical, to partner and support his guidance on cutting out the letters with scissors. Certainly as the eighteenth century progresses, letters far smaller than his stated minimum are in evidence, both as stencils and in stencilled books and other applications. They may indicate an increasing frequency in the use of etching for making stencils, which facilitated very small letters, as scissors did not.

(if it is of the correct viscosity) is sufficiently dry before the stencil is repositioned or replaced by another. The increase in speed and ease of working is considerable, far more so than when the sash-clamp or holdfast is involved. Nor is the masking function of these tools essential: clean and accurate work can still be achieved without their use, so long as the brush retains its shape and is not too broad to begin with, and has no inky fly-away bristles likely to stray into the lumière or those parts of the letter not being marked out.<sup>11</sup>

### *Contemporary practice*

Observations on the reconstruction of Des Billettes's equipment and its use allow one to make statements about its viability as a freestanding proposal. Despite a number of disjunctures between the method as described and as implemented, it remains realistic, efficient, and capable of good quality text composition. But the method's relation to contemporary stencilling practices is less clear. What firm evidence is there that Des Billettes based his method on equipment and procedures already in use, or that he extrapolated the method from less developed practices he observed or was aware of? If neither, and Des Billettes's equipment and procedures were entirely new, is there evidence that his method influenced subsequent text stencilling?

The record of known artefacts suggests that there is some relationship between Des Billettes's method and contemporary practices, though this does not amount to proof of direct influence. The relationship arises through shared features, namely (1) composite letters that are (2) stencilled without visible baseline guides and (3) evenly spaced without evidence of inter-character spacing dots (see appendix 4, figure A4.9, p. 57, below, for examples). Each of these features appear to signal a relationship, though it is not possible to assert a direct connection to Des Billettes's method in the absence of corroborating equipment.<sup>12</sup>

Although little stencilling equipment contemporary to Des Billettes appears to survive, several stencil plates recently recorded and possibly near in date to his text do employ folds in a configuration nearly identical to that which he describes (see appendix 4, figure A4.2, p. 55, below). The stencils also include alignment triangles that extend from the sides of the plate like those illustrated by Simonneau (see appendix 3, figure A3.2, p. 53, below). Despite their inconsistent relationship to Des Billettes's text (as noted, Des Billettes rejected alignment triangles), the stencils are at present the only unambiguous evidence that at least one item of associated equipment was made and used, possibly at or near the time.

One further kind of evidence may be brought to bear on the relationship between Des Billettes's text and contemporary or subsequent practice, though here through its absence. One example already mentioned is very small letters, which have so far not been recorded in early stencilled books. Their absence might suggest that stencil cutting with scissors, as described by Des Billettes, was used at the time since it is not possible to produce small-size letters in this way.<sup>13</sup> Another example is the absence of residual errors of the kind Des Billettes's method generates, such as the ghost of a lumière

11. It is important to note that Des Billettes additionally recommends the use of masking tools to press the stencil plate flat to the substrate and, in turn, the substrate flat to the desk, thereby stopping ink from seeping under the plate. (Here one can discern an echo of the scribe's knife, put to similar use during writing.) But this does not work as planned since the stencil plate's inevitable warps and deformations cannot be completely flattened with either masking tool. The fingers of the hand are in fact more flexibly suited to this purpose, and in any case the likelihood of seeping ink is greatly diminished if the viscosity of the ink, and the length and stiffness of the brush bristles, are correctly gauged at the outset.

12. While one or two of these features occur in some stencilled books of the period, only a few are presently known to exhibit all three features together.

13. The absence of very small letters may, by corollary, indicate that methods other than scissor-cutting, such as etching, were not yet well established. Nevertheless, this absence might be equally well explained by the possibility that small-size letters were simply not needed for large stencilled liturgical books at the time.



left by a wayward brush, or the trace of a guiding-mark discernable within or protruding from a letter whose parts it helped to coordinate (see p. 41, above). Such errors have so far not been found in any stencilled text; their absence therefore points away from the use of equipment (and stencil plates, in particular) configured as Des Billettes describes.

### *Final observations*

A summary characterization of Des Billettes's description is that it probably represents several innovations in the stencilling of texts, while in other respects reflects existing practices. Those features of the method he describes at length (the integrated configuration of the stencil plates, the composite letters, and the associated equipment) may be that which is new, since the detail of their description suggests that they were unfamiliar. By contrast, those features he includes, but with little explanation (basic letter design, the rule for spacing letters, scissor cutting), or that he rejects out of hand (conventional stencil letters, alignment triangles, inter-character spacing dots, drawn-in baselines) may be features of stencilling that were already well known.

Given Des Billettes's concentration on the concept, equipment, and procedures for marking out lines of texts, it is worth reiterating the observation that the 'imprimerie' in the title of his description refers only to the work of text stencilling and not to the production of a whole book. Designing, painting, and illuminating decorative matter, or titles and initials, for example, clearly fell into other, related spheres and would presumably be described separately.<sup>14</sup> Equally, the construction of the pages of a book (measuring, pricking, ruling, scoring), or the raking out of staves, or the coordinated composition of text, chant notation, and initials, or the creation of title pages, could also be dealt with elsewhere, though surely some or all of this work falls within (or well within) the stenciller's sphere of operations. Des Billettes's omission of such descriptions indicates that his aims were limited to addressing only that feature of the *livre d'église* he thought most amenable to improvement: the composition of its text.

A final item, already referred to above, also tantalises: Des Billettes's note near the end of his text where he states '[t]here are two excellent examples of this kind at the Invalides. But it is nevertheless certain that their texts never have the accuracy that they would have if produced by our method'. (188) The remark confirms the observation just made that Des Billettes's principal concern was not the production of an entire book but the improvement of its text element, while also suggesting that 'our method' was both different and had been tested. It additionally indicates the works Des Billettes had in mind, against which his own method could be compared. One of the 'excellent examples' is likely to have been a monumental liturgical book made in 1682 at the Hôtel royal des Invalides, and still to be found there (figure 38, opposite).<sup>15</sup> Des Billettes was clearly confident about his method since this example is among the finest stencilled liturgical books known, complete with well composed

14. See (188). It is important to note that many late seventeenth- and early eighteenth-century liturgical books, for which stencilling was employed for texts and chant notation, otherwise incorporate drawn, painted, and illuminated decorations, initials, and/or titling, the latter usually in the form of large roman capitals. Such work showcased the talents of painters, illuminators, and writing masters, though over the course of the eighteenth century these elements were stencilled with increasing frequency.

15. 'Graduale et antiphonale ad usum S. Ludovici Domus Regiæ Invalidorum pro solemnioribus totius anni festivitibus', 1682, Paris, Musée de l'Armée, manuscrits et imprimés, 5389 bis, 3251 B1B. Another, similar book made at the Invalides for the royal chapel, Versailles, is now in the Bibliothèque nationale de France (Richelieu): 'Graduale et antiphonale ad usum S. Ludovici Domus Regiæ Versaliensis pro solemnioribus totius anni festivitibus', 1686, Ms. Lat. 8828. It is not clear whether this is the second of the two examples to which Des Billettes refers. See also following note.

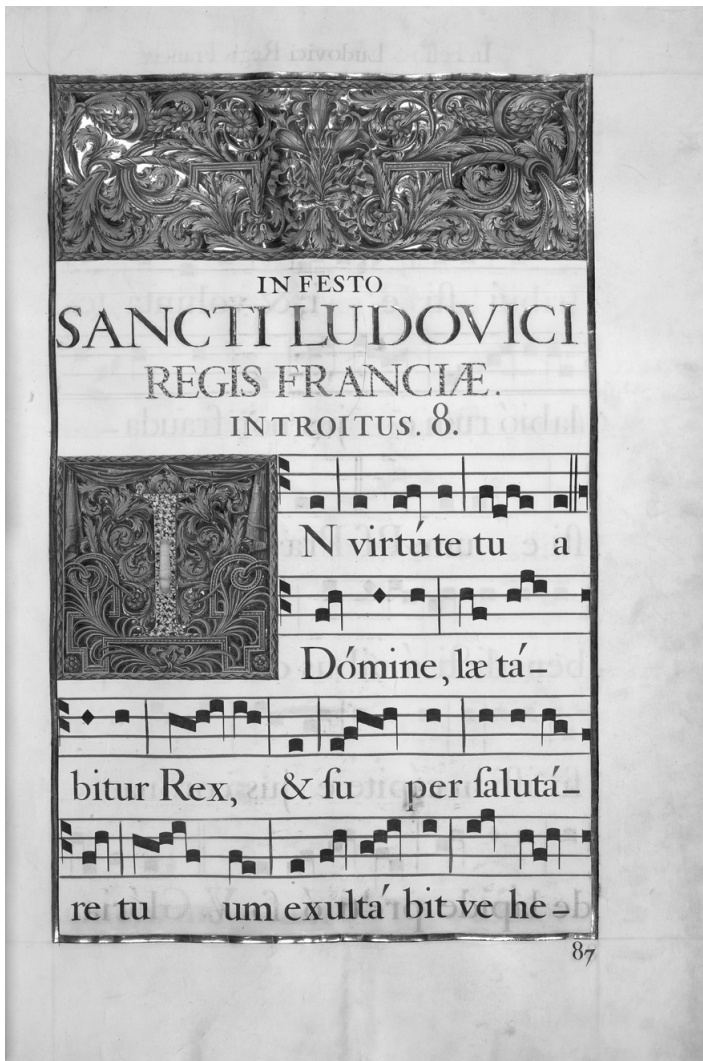


Figure 38. 'Graduale et antiphonale ad usum S. Ludovici Domus Regiæ Invalidorum ...', parchment, 1682. Musée de l'Armée, Paris.

(left) p. 87, 800 × 570 mm. Stencilled elements include chant text and notation.

(above) Detail of p. 87, showing consistent letter spacing, but variable syllable and word spacing; cf. appendix 1, note 6, p. 49, below.

texts. The reference may also suggest a context in which Des Billettes envisioned his method being used. The Invalides was a rest home recently founded by Louis XIV for French ex-soldiers, many of whom were occupied in artisan workshops on-site.<sup>16</sup> Those employed in making liturgical books could hardly be expected to have acquired the expertise of the professional scribe or writing master. In these circumstances, stencilling would have offered precisely the right means by which 'les manchots'<sup>17</sup> could contribute to the work by producing texts capable of outshining even the best of those made with a pen.

16. The Hôtel royal des Invalides was founded in 1674. Thomas Povey, emissary of Charles II, made a detailed record of the Invalides in 1682 to inform the planning of the Royal Hospital Chelsea; see Povey, 'The hostel of the Invalides', transcribed in Ritchie (1966). Povey's list of workshops does not include one devoted to liturgical book production. The first official account of the Invalides

was written by Le Jeune de Boullencourt the following year (*La description générale de l'Hôtel royal des Invalides* ..., Paris, 1683). Boullencourt does indicate that by 1683 such books were being made at the Invalides, and that on a recent visit Louis XIV had expressed his wish to have one for the royal chapel at Versailles: '[L]a dernière fois qu'elle [Sa Majesté] y est venue, on luy fit voir des livres

d'Église travaillés par des Invalides manchots. Elle les trouva si beaux qu'elle voulut qu'ils en fissent de semblables pour sa chapelle de Versailles'. Quoted in Maral (2001), p. 26, where additional accounts relating to liturgical book production are given. See also the original research of Vanuxem (1974).

17. 'The one-armed'; in zoology, 'penguins'.

## Fred Smeijers

## Appendix 1: Designing and spacing the letters

When designing and making letters by whatever means, two basic problems present themselves: how the letters should look, and how they should be spaced. The first problem is connected to the second: how letters look influences how they are spaced, though it is also possible to state the inverse: how letters are spaced influences how they look.

## Shapes and spaces

Des Billettes gives no clear instruction in his text about how letters used for stencilling should look. He only remarks that they should be ‘the letters one wants to cut’ (169), and further on, that they should be drawn ‘with all the possible accuracy and in the most beautiful proportions’. (173) (To get an idea of the letters he may have had in mind, see figure 38, above; also p. 86, below.) But if Des Billettes is vague about how letters should look, he does provide a relatively clear rule for how they should be spaced: in short, that the distance between the rightmost extremity of one letter and the leftmost extremity of the next should be the stem width of capital I.<sup>1</sup>

The rule thus stated, however, seems too simple and on its own an insufficient guide to the work of making the stencil letters. Some additional understanding is needed about how letters are devised, though Des Billettes only alludes to this in his assumption that the letters will be made with accuracy and beautiful proportions. In the absence of any further remarks, one can do little more than speculate on exactly how the work was carried out, or on what basis letter shape and letter space were coordinated.<sup>2</sup>

If one asserts (as above) that the space between letters partly determines how the letters themselves look, then one might test Des Billettes’s spacing method by devising the accompanying letter shapes on the same basis, that is to say, from units of stem width. Some treatises dealing with inscriptional capitals establish the proportions of the letters in this way, and among writing masters the stem (or stroke) width would have been one of several factors influencing decisions about letter height, width, and counter size. To adopt units of stem width to determine both shape *and* spacing does not, therefore, seem wholly anachronistic, though admittedly no source (known to the author) before or contemporary to Des Billettes proposes this explicitly.<sup>3</sup>

## quodim

The sequence of illustrations (figure A1.1, opposite) incorporates this approach to test the effectiveness of Des Billettes’s rule for letter spacing. The purpose of the test is to demonstrate the relationship between letter shape and letter spacing, and show how the spacing rule works in practice.

1. While this is a fair summary of the rule, Des Billettes’s explanation is considerably longer; cf. (177–8), p. 77, below.

2. As discussed above (p. 43), Des Billettes’s omission of detailed guidance on letter shape might be understood as an assumption by him that the person devising the stencil letters already possessed such knowledge, and that an exposition on the matter was not therefore needed.

3. Des Billettes is an early source supplying a rule for spacing letters on the basis of stem width, though by describing it as ‘the normal rule’ (177), he implies that it was generally known. Crucially, the Commission Bignon, which undertook the making of the *romain du roi*, and of which Des Billettes was a member, based its roman (and italic) designs on modules that equated to stem width; the work apparently did not, however, extend to the specification of spaces between letters. See Mosley (1997), pp. 12–13. Later, the Dutch writing master Jan Pas, in *Mathematische of wiskundige Behandeling der Schryfkonst* (1737), illustrates alphabets proportioned in units of stem width and promises that in a subsequent work he will demonstrate how to space letters; no such work by him is known.

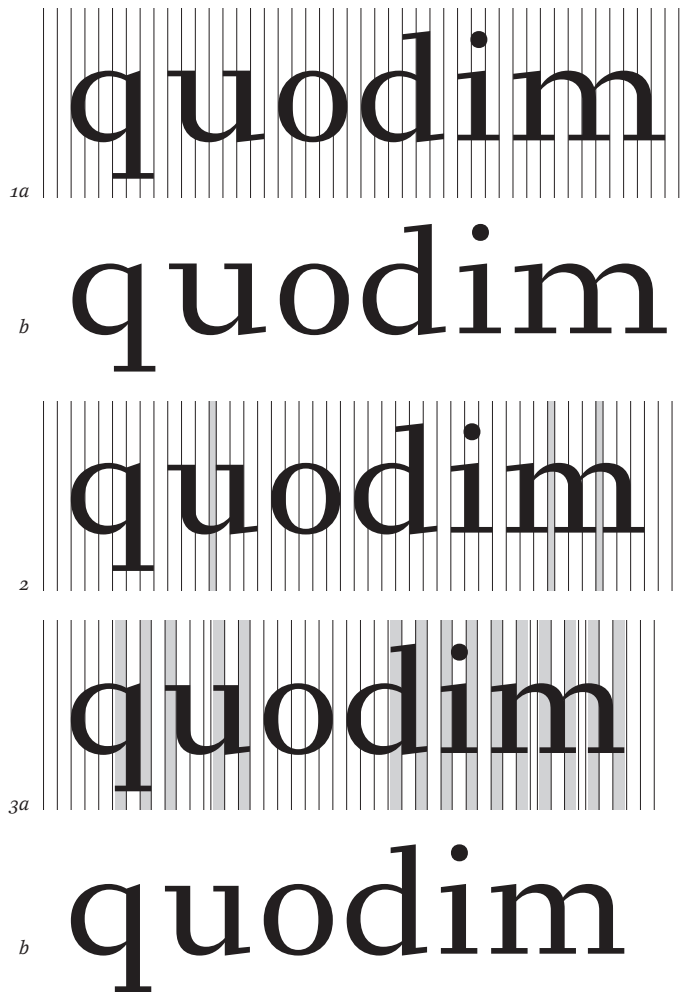


Figure A1.1. Letter shape and spacing based on stem width.

**quodim** (1). The letters of the made-up word 'quodim' are initially proportioned on units of stem width: the x-height is 5; the counters are 3; the serif lengths are 1.<sup>4</sup> The word includes the principal letter and stem/stroke combinations a spacing system needs to resolve: a straight followed by a straight (qu, dim); a straight followed by a round (uo) or vice-versa; and a round followed by a round (od). Applying Des Billettes's spacing rule to the sequence of letters results in (1a, b). The spacing produces a relatively cohesive word shape. Problems of both letter shape and spacing, however, do occur: u and m appear too wide, while the space between q and u is excessive, and between o and d is insufficient; overall the word appears too loosely spaced.

**quodim** (2). The problems of quodim (1) can be addressed by reducing the counter widths of u and m by half a stem width (indicated by the grey tints). But problems remain: the word still appears too loosely spaced (except between o and d), while the internal serifs of m are now nearly touching.

**quodim** (3). The problems in quodim (2) can be mostly resolved by shortening the serifs (again, indicated by grey tints). This improves the m and reduces the space between the straight strokes throughout (the stem width unit is retained between the shortened serifs of adjacent letters). The result is quite acceptable (3a, b). One or two problems remain, in particular the space between q and u, which is still too large. While these problems would need to be resolved with further refinements, Des Billettes's rule, combined with basic alterations to counters and serifs, proves generally effective and able to be extended to the complete set of small letters.<sup>5</sup> The result would be relatively evenly spaced letters and coherent word shapes.<sup>6</sup>

4. For this demonstration, the stem width of capital I is taken as equivalent to the (vertical) stem width of the small letters (it is normally wider). The letters roughly emulate those found in contemporary (French) stencilled books, where round shapes (b, d, o, p, q) are based on a circle. To achieve this, and to (again, roughly) emulate letter weight, the 'o' is assigned horizontal and vertical dimensions of 5 stem widths. This produces a counter of 3 stem widths (horizontal dimension), which is then initially adopted for the counters of the other letters, as shown in the 'quodim' sequence.

5. While Des Billettes's rule works well for most small letter combinations, some letters present difficulties, including those that do not have straight or curved strokes on one or both sides (e.g. f, r, t, v/y). In general, his rule works best for the letters he probably had in mind, i.e. romans with relatively conventional proportions. Using the rule with letters based

### Capital letters

In his text, Des Billettes only draws on sample combinations of small letters when explaining his spacing rule. The spacing of capital letters is not mentioned, either in all-capital situations (titles) or in combination with small letters. In (reconstructed) practice, the spacing rule continues to work for capitals as long as adjustments are similarly allowed to their serif lengths and counters, and the stem widths of the capitals and small letters are taken as roughly equivalent. Des Billettes's instruction to use the same four proportion rulers for devising both capital and small letters implies that their designs should be coordinated in other respects, too.<sup>7</sup>

on more extreme or unconventional proportions, especially counter size and serif length, would be unlikely to produce good results, though such letters were not used for stencilled texts at the time.

6. In stencilled liturgical books, consistent spacing in chant text is relatively unusual. This arises from the dynamic relationship that exists between the text and the chant notation, where the phrasing and duration of notes, syllables, and complete words require variable spacing to ensure their correct correlation. The generally preferred result, it appears, was

text composition that produced consistent letter spacing to preserve syllable and word identity, but which was otherwise regulated by varying spaces between syllables and words. This might explain why Des Billettes offers no guidance on word spaces, since they would be context dependant (see figure 38, above).

7. A review of stencilled books contemporary to Des Billettes, however, shows that this coordination did not always occur in practice. Instead, stencil capitals are often taller than the ascenders of small letters, and bolder.



Fred Smeijers

## Appendix 2: Cutting the letters with chisels

As described above (p. 37), Des Billettes uses the term ‘cizeaux’ to describe the tool employed for cutting the letters from the plate. Although it seems relatively certain that Des Billettes is referring to scissors (a supposition supported by Simonneau’s engraving), there remains sufficient ambiguity for the meaning of the term to be taken as ‘chisels’ instead. For this reason, chisel cutting was also tested as part of the reconstruction. A ‘chisels’ reading is worth considering for two reasons: first, while reconstructed practice shows that cutting letters with scissors can be done, the work is nevertheless difficult and relatively time-consuming; second, the design of the scissors (shown by Simonneau) makes it impossible to cut out letters below a certain size.

The use of chisels, by contrast, is easier and quicker, though they, too, can only cut letters of a certain minimum size (albeit somewhat smaller than scissors). The work requires several chisels whose cutting edges vary in length.<sup>1</sup> Once the letter and the other elements (guiding-mark, lumière) have been drawn onto the plate, a chisel with a longer cutting edge is used both for straight parts (stems and other strokes) and interior curves (roughly shaped using overlapping long cuts). A chisel with a short cutting edge is used to shape exterior curves, again roughly at first. Thereafter, files are used to refine all shapes and edges. Unlike cutting with scissors, it is not necessary to bend the foot of the plate out of the way when using chisels; this is because chisel strikes are (for the most part) perpendicular to the plate. The plate only requires a solid (wood) support. Smaller parts of the plate must still, however, be bent outwards to facilitate filing.

In general, chisels are sharper than scissors and therefore cut more readily. More cutting can be done with them initially because they can reach into smaller parts of the letter. Overall, cutting a letter with chisels takes about half the time needed to cut the same letter with scissors.

1. The lengths will vary depending on the size of the letter being cut; for the present reconstruction, five chisels were used; the shortest cutting edge was approximately 1 mm in length, the longest approximately 7 mm.

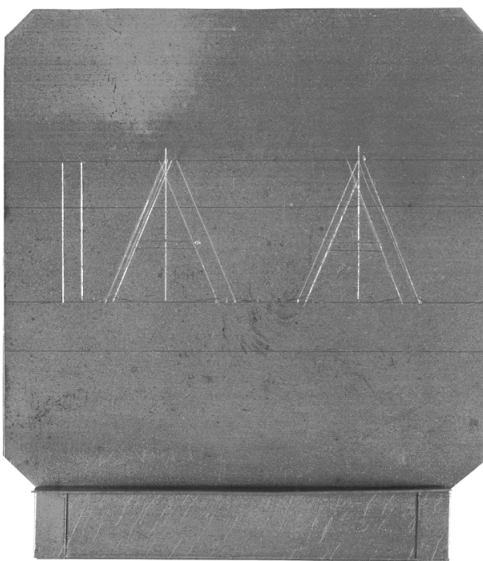


Figure A2.1 (left). Plate with letters (A), lumière, and guiding-mark drawn in position. Actual size. See also figure 18 (above).

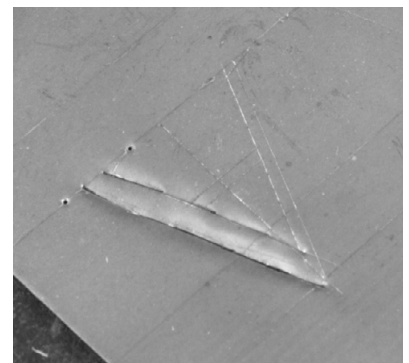


Figure A2.2, a–b (above left, and above). Initial chisel cuts, made with the longest chisel edge (7 mm).

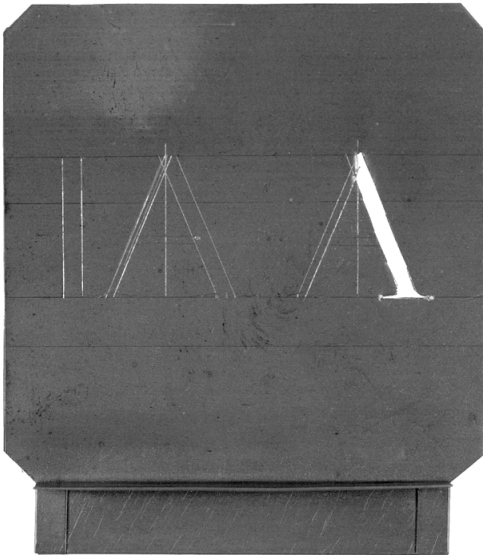


Figure A2.3 (left). Partially complete rough cut.

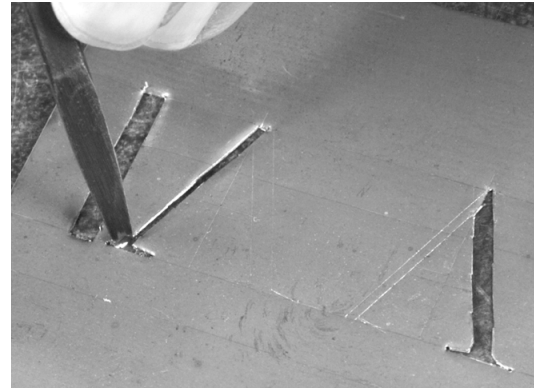


Figure A2.4, a-b. Cuts with long chisel edge (above, left); a short chisel is used for the serif bracket (above, right).



Figure A2.5.  
(a) Rough cut complete (left).  
(b) Proof of rough cut (above).

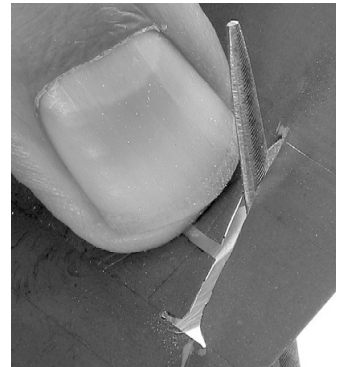
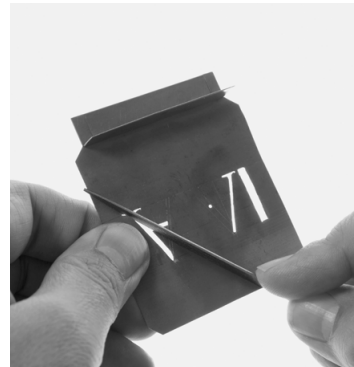


Figure A2.6, a-b (above).  
Initial refinements to rough cut.



Figure A2.7 (above, left).  
Proof of initial refinements.

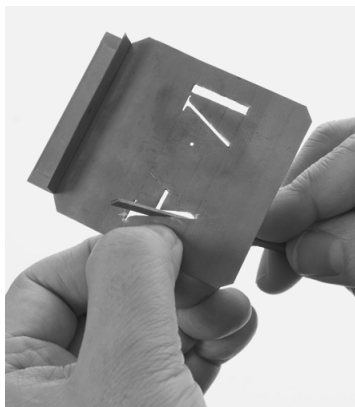


Figure A2.8 (above, right).  
Further refinements.



Figure A2.9.  
(a) Finished stencil (right).  
(b) Final proof (far right).

## Appendix 3: The engraving by Louis Simonneau

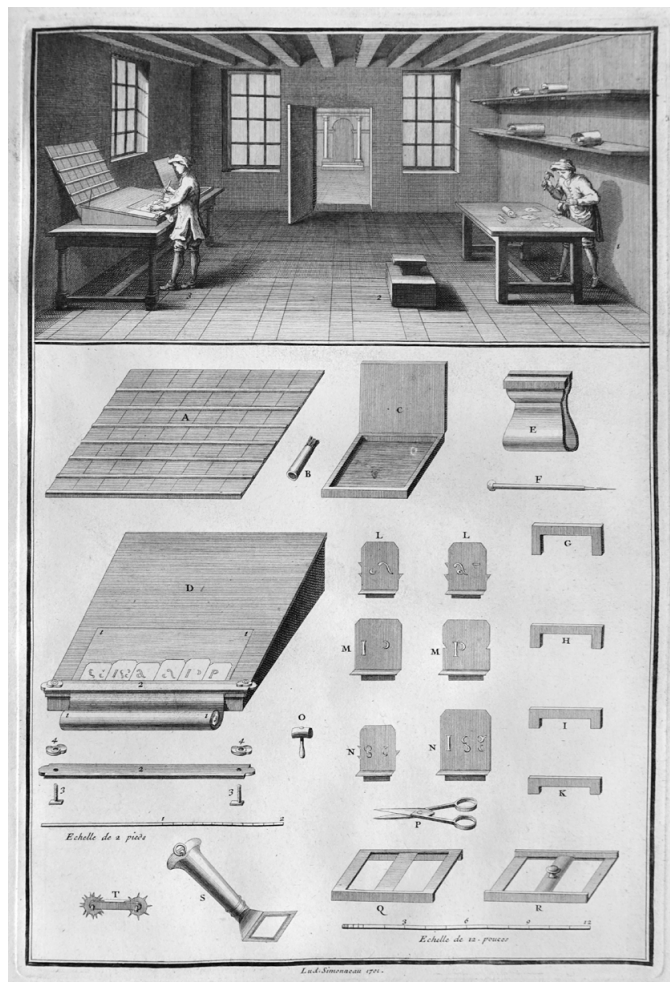
Figure A3.1. Engraving to accompany Des Billettes's description of stencilling, signed 'Lud. Simonneau 1701.', 268 × 176 mm, from the album 'Les Arts et Métiers de l'Académie des Sciences', St Bride Library and Archives, SB5825 ('Plates relating to printing and kindred arts, principally engraved by L. Simonneau').

Upper section:

- (1) worker folding brass sheets into stencil plates (right)
- (2) anvil (middle)
- (3) worker stencilling (left)

Lower section:

- (A) lettercase
- (B) brush
- (C) ink box
- (D) desk, with (D1) substrate, rolled around dowel, (D2) ruler (*conduite*), (D3) bolts, (D4) nuts
- (E) vice extension
- (F) scribing tool
- (G, H, I, K) letter proportion rulers
- (L, M, N) stencil plates (*caractères*)
- (O) wood mallet
- (P) scissors
- (Q, R) sash-clamp (*sergent*)
- (S) holdfast (*patte*)
- (T) toothed wheels



Des Billettes's description of stencilling is paired with an engraving signed by Louis Simonneau, dated 1701 (figure A3.1). The engraving is divided into an upper section that presents a scene of workers engaged in stencil-making and stencilling, and a lower section that illustrates their equipment.<sup>1</sup>

The items of equipment in the lower section are assigned reference letters (A–T); elements that are attached to the desk (D) are assigned secondary reference numbers (1–4).<sup>2</sup> The lower section is divided notionally in half vertically, with items in the left half shown at half the relative size of items in the right half, according to the accompanying scales. The ink box (C) appears to be out of position; its size seems better determined by the left scale. The hammer (O) is equivocally positioned, and may be incorrectly sized relative to either scale. The holdfast (S) and toothed wheels are better referred to the right scale. The sash-clamp is shown twice, once from above (R), and again from below (Q) to make clear its flush underside. The engraving also includes one item of equipment Des Billettes does not mention: a dowel of some kind around which the paper/vellum

1. Other engravings associated with the Description des Arts et Métiers are compiled in the album 'Les Arts et Métiers de l'Académie des Sciences', St Bride Library and Archives, SB5825. See also sources given in James Mosley, 'A note on Gilles Filteau des Billettes', this volume, pp. 87–90.

2. These reference letters and numbers were no doubt introduced to the engraving in anticipation of its publication alongside the text, into which such references would have also been inserted. They are not present in Des Billettes's text.



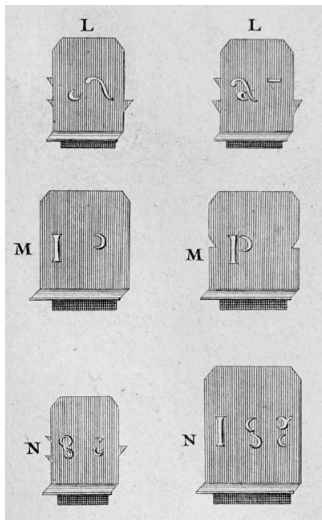


Figure A3.2. Stencil plates, variant configurations, detail of engraving by Simonneau.

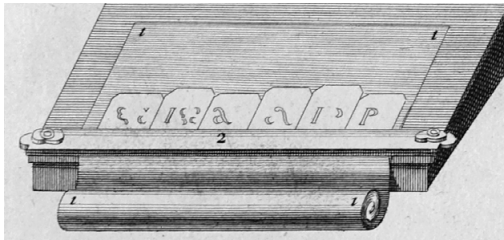


Figure A3.3. Stencil plates positioned on conduite, detail of engraving by Simonneau.

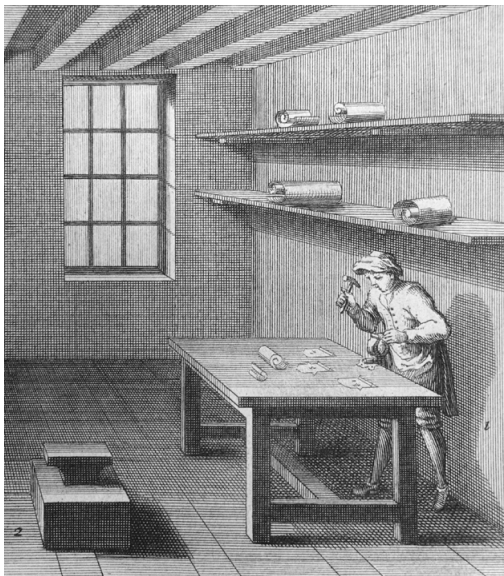


Figure A3.4. Worker folding brass sheets into stencil plates, detail of engraving by Simonneau.

on the desk is rolled to protect it from denting or creasing during stencilling, given its vulnerable position between the desk and the stenciller's hips.

Reviewing the illustrations of the equipment (and leaving aside issues of scale), they are mostly accurate in relation to Des Billettes's text, except the six stencil plates, about which there appears to have been some confusion (figure A3.2; cf. marginal figures 7–10, p. 75, below). The basic folded shapes of all the plates are correct, more or less, though they are inaccurate where the flat 'face' of the plate meets the 'foot' (cf. figure 6, p. 32, which is correct to the text). The various configurations of letter and lumière on each plate are again inaccurate, in different ways. The right plate of the 'N' pair is nearly correct, and is defective only in the distance shown between the lumière and the left part of the letter (it should be the stem width of capital I); each of the other plates omits the lumière. The plates 'L' (left) and 'M' (left) both show an accurate composite letter, while their paired plates (right) show a conventional letter with attachments of the kind that Des Billettes explicitly rejects. The letter of N (left), shown both complete and incomplete, is probably an error; L (right) includes a superfluous horizontal bar.<sup>3</sup> Only two of the plates, M (left) and N (right), correctly omit the conventional side alignment triangles that Des Billettes also rejects. The latter do occur in plate M (right) where they are cut into the plate, and in the L pair and N (left) where they are protruding.<sup>4</sup> The six plates are also shown on the desk in the left half of the engraving, set in a row above the conduite (figure A3.3). The letter configurations are largely the same, though the letter of N (left) is now shown correctly as simply a composite letter (g), while the letter-lumière combination on the plate second from left matches Des Billettes's description in every respect. Alignment triangles are correctly omitted from the all plates; the perpendicular 'feet' of the plates, which should protrude above the fore-edge of the conduite, are not shown.

Turning to the scene of work in the upper section of the engraving, the first observation to be made is simply that the scene itself provides some understanding of the scale of the equipment relative to the workers. The activities of the workers, to the right and left, are each given a reference number (1 and 3, respectively), while located between them is an anvil, also numbered (2). On the right, the worker is folding brass sheets into the plate configuration specified by Des Billettes, with the aid of the vice extension (E) and the wood mallet (O) (figure A3.4). The brass is shown as small flat pieces on the table, and in larger curled sheets on the shelves above. It is otherwise difficult to draw secure inferences from the activity illustrated. Notably, the sheet brass is shown curled up, suggesting that it was supplied this way, or curled naturally, but in any case needed to be beaten flat. The anvil (2) may have been for this purpose, though Des Billettes

3. The horizontal bar is in fact the cross bar of 'A', and should be part of a plate carrying a composite A, not 'a'; cf. (174) (pp. 74–5, below), where the composite A is described and illustrated.

4. Both kinds of alignment triangles are found among historical artefacts. Those

cut into the plate are far more common and have become conventional; those protruding from the plate are rare and may only have been used at around the time Des Billettes was writing. See appendix 4, figures A4.2, A4.3, and A4.32, pp. 55, 56, and 63, below.



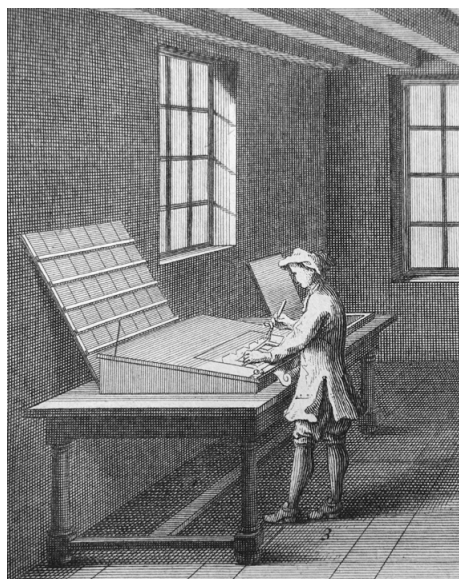


Figure A3.5. Worker stencilling, detail of engraving by Simonneau.

does not mention it in his text. Instead he recommends that the brass be worked with the wood mallet on a smooth wood surface, after it has been annealed to make it more pliable (169). This working with the mallet may have involved both flattening the sheet brass (and pounding it to the desired thinness) as well as folding the brass into plates (with the help of the vice extension). Any or all of these activities might be part of what is illustrated on the right.

On the left of the scene, it is notable that the stenciller is working in a standing position, with the desk surface at about waist height or slightly higher (figure A3.5). This would appear to be somewhat too low for stencilling comfortably for an extended period. The location of the lettercase behind the desk seems similarly inconvenient, requiring the stenciller to reach repeatedly across the desk to pick up and replace the stencils – as shown in the engraving, it would be very difficult to do this. There is also a discrepancy between the number of compartments in the lettercase: in the scene of work only 35 are visible, while in the lower section of the engraving the lettercase has 56. In each instance, the number falls short of what is needed if the compartments are intended to match the number of stencils Des Billettes's specifies for a complete set (80–100; see 169). A final observation of the scene of work concerns the workers' attire: it is secular and not ecclesiastical. This is notable, given that stencil work was also conducted in monastic workshops. That is clearly not the context shown here.

Reviewing the engraving of Simonneau more generally in the context of Des Billettes's text, it is possible to state that while the procedures of work described by Des Billettes are shown in only a very general and limited way, the equipment is illustrated with a considerable degree of fidelity, though in places discrepancies occur, some significant. It may be telling that these discrepancies are mainly found in relation to the stencil plates and their composite letters and lumière, elements that in Des Billettes's text are ironically described at great length. How and why these discrepancies arose is difficult to ascertain. They are perhaps surprising if one accepts that Des Billettes's equipment was constructed at the time or was based on existing equipment. In either case, this would have provided Simonneau with actual objects to refer to. It is similarly unclear whether the sketches Des Billettes added to his handwritten text played any role in the design of the engraving. One can at least say that the letters 'a' and 'g' sketched by Des Billettes to explain the composite letter principle do reappear in the engraving, incorporated into the stencils. Two other sketches in the cahier are also translated to the engraving: one of the rulers that delineate the proportions of the letters, and the toothed wheels for pricking line increments.<sup>5</sup>

Assuming that Simonneau's engraving post-dates Des Billettes's text, the engraving's date of 1701 appears to provide a *terminus ante quem* for the text's compilation.<sup>6</sup>

5. See also Pinault (1987), pp. 79–80, where two preparatory drawings by Simonneau for other engravings associated with the *Description des Arts et Métiers* are shown; and pp. 83–5, where an account of surviving drawings is given. No preparatory drawing for the engraving of stencilling is listed.

6. It may be worth noting that Des Billettes's description of the printing of playing cards, which occurs after the description of stencilling in his cahier, is also paired with an engraving by Simonneau, dated 1697.

## Appendix 4: Examples of practice

This appendix groups together examples of stencils and stencilling that in one or several respects can be related to Des Billettes through their principle of design, method of work, or other conceptual features. The examples mostly occur after Des Billettes compiled his text and are found in a variety of circumstances, artefacts, and texts. Unless stated, there is no intention to assert any direct connection between Des Billettes and the examples tallied here. Instead the appendix mainly enumerates principles, methods, and features whose recurrence is evidence of their durability over time, whether continuously so, or as a result of periodic rediscovery or reinvention.

### Plate configuration

Stencil plates have been recorded in a variety of configurations. For some time, the folded configuration described by Des Billettes was thought to be specific to his equipment. Recently, however, several similar plates have been recorded, though the configuration may, in general, be relatively uncommon. Far more common and indeed conventional is the simpler unfolded plate, with or without an upturned ‘foot’ (forming a handle) – which was criticised by Des Billettes as less effective than his own. A number of

other configurations are included below, for comparison. Of these, plates with groups of characters (from 2 up to 14 or more) arranged vertically or in a matrix, were apparently made principally in the eighteenth and nineteenth centuries, while plates with groups of characters arranged horizontally occur mainly in the nineteenth and twentieth centuries. ‘Settable unit’ plates, configured for ‘adjustable’ or ‘interlocking’ composition, enable an unlimited number of characters to be assembled laterally.



Figure A4.1. Stencil plate, folded brass, scissor-cut and filed, 72 × 63 mm. Reconstructed according to the description of Des Billettes.



Figure A4.2. Stencil plates, maker not known, French, c. late 17th or early 18th century, brass, 45 × 43 mm (left), 77 × 73 mm (right, shown unfolded). Abbey of Bellafontaine (near Nantes).



Figure A4.3. Stencil plate, maker not known, French, late 18th or early 19th century, brass, etched, and filed, 71×54 mm. Stencil plates with four angled corners, an upturned base forming a handle, and alignment triangles cut into the sides, were apparently common when Des Billettes was writing and possibly conventional. He criticises them towards the end of his text (185). Notable in this example is the '12' punched into the upper left corner of the plate; it gives the size of the letter (capital height) in *lignes* (1 ligne = c. 2.256 mm). In France, size designations of this kind later became generic set numbers (i.e. 'No. 12') accompanied by a metric size (i.e. '27 m/m').



Figure A4.4. Stencil plate, maker not known, British, 20th century, zinc, routed, 114×95 mm. Plates with four angled corners and no upturned handle at the base are typical of (but not exclusive to) British manufacture.



Figure A4.5. Stencil plates, makers not known, French, c. first half of the 19th century, brass, etched; 108×47 mm (left), 88×97 mm (right). Example at right: Abbey of Bellfontaine.



Figure A4.6. Stencil plate with complete character set, maker not known, probably French, c. first half of the 19th century, brass, etched, 50×195 mm. Stencil alphabets and numerals used by architects, engineers, and surveyors were also typically arranged horizontally on several plates. See Kindel (2010).



Figure A4.7. Stencil plate, configured for 'settable units' (i.e. adjustable or interlocking) composition, Reese's Adjustable Stencil Plates, made by S. W. Reese & Co., United States, based on US Letters Patent no. 148,087 (1874) and no. 173,058 (1876), die-stamped and folded, spring brass, 57×30 mm. See also figure A4.36, below.



### Composite letters

Des Billettes's method is based on composite letters, which are closely allied to the configuration of the stencil plate, and thereafter to the desk, conduite, and masking tools. Relatively few examples of composite small letters have been found in liturgical books (composite capitals are more common); where they are found, it is unclear if the stencils used were part of specially configured apparatus.

Composite letters in stencilled texts seem to disappear after about 1730 (very roughly), though they were regularly and continuously employed for titles and initials. They are found in several US patents of the 19th century, and in ticket- and signwriting 'outfits' of the 1920s. Composite letters also occur in lettering based on a 'kit-of-parts' assembly, and in stencils used to assist typeface design.

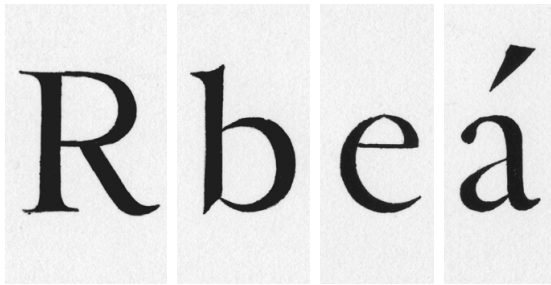
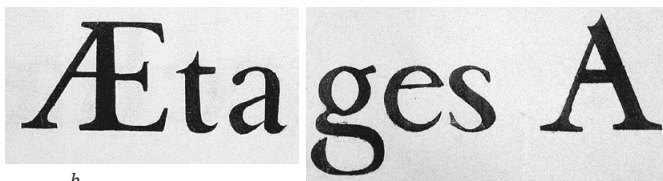


Figure A4.8. Composite letters, as marked out with stencil plates reconstructed according to the description of Des Billettes.



a



b



c

Figure A4.9. Composite letters, from stencilled liturgical books roughly contemporary to Des Billettes's text. Each of these examples exhibit the three features (composite letters, no visible baseline guides, even spacing without evidence of inter-character spacing dots) whose combination suggests a relationship with Des Billettes's method, at least through similar results. See discussion above (p.45).

- (a) from 'In coena domini [suivi de:] Canon missae', no date (17th century); x-height: 14 mm. Bibliothèque municipale de Besançon, Arch.G.II.152.
- (b) from 'Graduale et Antiphonale, ad usum regalis monasterii Sancti Nicasii Remensis, pro festis primi ordinis', 1685. Bibliothèque de Reims, Ms 267.
- (c) from 'Graduale pro missis solemnibus, seu canonicalibus celebrandis in ecclesia cathedrali Sanctæ Mariæ, Ruthenensis', 1693; x-height: 14 mm. Archives départementales de l'Aveyron, Rodez. The design and spacing of letters in the texts of this book resemble the specifications given by Des Billettes.

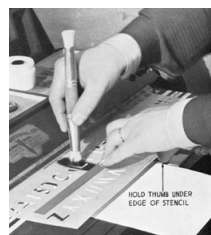
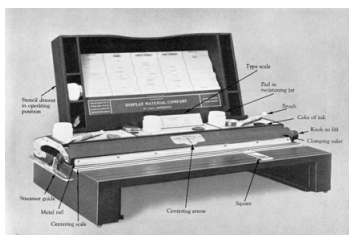


Figure A4.10. 'Stencillor Signwriter', made by Display Material Co, St. Paul, Minnesota, introduced February 1926. A stencil-based signwriting outfit employing composite characters. Alphabets were cut from shellac-reinforced card to form long stencils (177×467 mm). The stencils were used in combination with a desk-like apparatus that incorporated a fixed straight-edge across its width, against which the stencil was positioned (and slid laterally) to facilitate the alignment of baselines and the sequential stencilling of composite letter parts. The straight-edge could be raised to admit the paper or card being stencilled, then lowered to secure it in place. Thus despite some differences in configuration, the Stencillor is conceptually similar to Des Billettes's desk-conduite-stencil configuration. Among other signwriting outfits based on composite stencil letters were the 'Showcarder' (Showcarder, Inc, introduced March 1926, also of St. Paul, Minnesota), the 'Signmaster' (National Display Specialties, c.1950s), and the 'Econosign' (1922/27; see figure A4.11, overleaf).



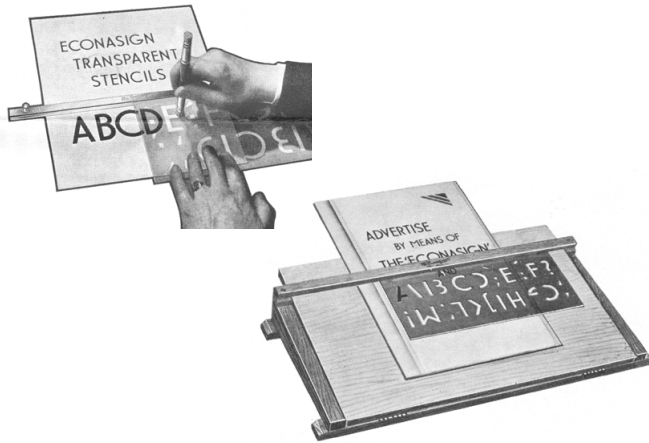


Figure A4.11. The 'Econosign', made by The 'Econosign' Co. Ltd, London, based on British patents 176,525 (1922) and 282,895 (1927). The Econosign outfit is similar to the 'Stencillor' (figure A4.10), but simpler and more compact. It was packaged in a box or small case that contained a portfolio of alphabets, each cut from one or several celluloid sheets. Outfits additionally included a grooved straight-edge, drawing pins, and brushes and inks. Characters were either composite in design, or 'natural' (e.g. a Gill Shadow equivalent; see also figure A4.23, below). Celluloid sheets were slid along and below the grooved straight-edge, which at its ends was fixed over the substrate with the pins. Composite parts were stencilled consecutively to form a complete character; the alignment of parts, and letter- and word-spacing, was aided by the celluloid's transparency. Econosign also sold a ready-made desk with evident similarities to the one described by Des Billettes.

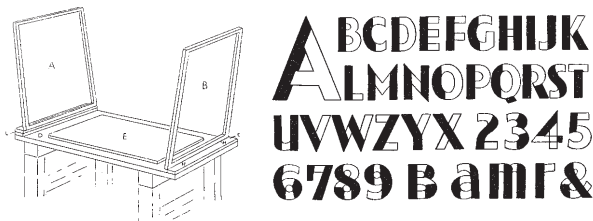


Figure A4.12. Alfred Hunter, *Professional ticket-writing*, 2nd edn, London: Blanford Press, 1946. Characters are divided into two parts; these are stencilled consecutively with an apparatus comprised of two hinged frames, to create complete characters without breaks.



Figure A4.13. Specification drawing, Ezekiel B. Foster, US Letters Patent no. 4045 (1845). 'The nature of my invention consists in forming all the letters of the alphabet in stencil painting and printing by means of nine characters by changing, reversing and combining the said characters. Thus making nine characters to answer the place of twenty seven letters, in the operation of which the letters are made more perfect – leaving no spaces or interstices to be filled up after the brush has passed over the stencil as in the present mode, or mode now in use.' Foster included instructions for how each letter should be made, for example: 'X is formed by no. 5 as represented and a reversed impression annexed.'

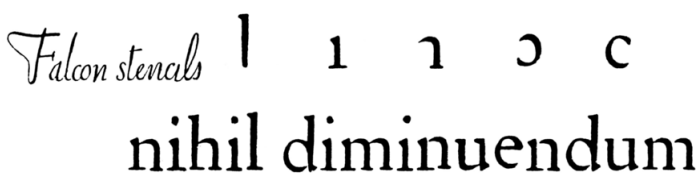


Figure A4.14. 'Falcon' stencils, W.A. Dwiggins, from *WAD to RR: a letter about designing type*, Cambridge, Mass: Harvard College Library, 1940. 'In making the Falcon I tried another scheme for arriving at the characteristics of the first-run experimental letters. I cut stencils in celluloid – a long and a short stem, the n arch, and a loop – twice the size of 12 point – pretty small! – and constructed letters from these elements by stencilling.' (p. [6])

#### Breaks completed

The practice of filling in the breaks of stencil characters with ink and a pen or brush appears to be longstanding. The earliest known individual stencilled letters, made by Johann Neudörffer, *d. Ä.*, around 1550, were completed in this way. Des Billettes refers to the practice to emphasize its likely faults and thereby encourage the take-up of his method, which avoided them. Stencilled texts in liturgical books show considerable variability: in some, breaks are filled in exactly, while in others the work is done indifferently, poorly, or not at all. Generally, but with notable

exceptions, the filling-in of breaks appears to diminish over the course of the eighteenth century and into the nineteenth, while characters with breaks become increasingly prevalent and possibly even valued for their graphic effect. Some nineteenth- and twentieth-century texts dealing with stencil lettering in architecture, engineering, and surveying, including Wilme (1845), Stanley (1866), and Lineham (1915), recommend filling in breaks, though the evidence of surviving technical drawings indicates that this was often not done.



Figure A4.15. Johann Neudörffer, *d. Ä.*, 'Gründlicher Bericht der alten lateinischen Buchstaben', c. 1550. Museum für angewandte Kunst (MAK), Vienna, S 10 (Inv. Nr. B. I. 5697), f. 16<sup>r</sup> (digitally altered to emphasize breaks). Neudörffer's manuscript contains a geometrically constructed alphabet of large roman capitals, outlined with ink and filled with wash. Consecutive letters of the alphabet are drawn on every other leaf of the manuscript; on the leaf that follows each drawn letter, the same identically-sized letter has been reproduced using a stencil, probably made of card or parchment. Each stencil letter has been marked out with thick black ink. The breaks, created by bridges apparently glued across the stencil's voids, were initially left intact. A thinner ink wash was then used to fill in the breaks and complete the letter. See also Doede (1957), pp. 54, 60; and Linke & Sauer (2007), pp. 108–11.



Figure A4.16. Letters with breaks filled in with pen and ink, from stencilled liturgical books.

- (a) 'Gradualis de tempore ecclesiae Parisiensis', 1669, with later additions. Musée de Notre-Dame de Paris.
- (b) 'Antiphonarium pro solemnitatibus majoribus iuxta ritum sanctae Autissiodorensis ecclesiae', 1730.

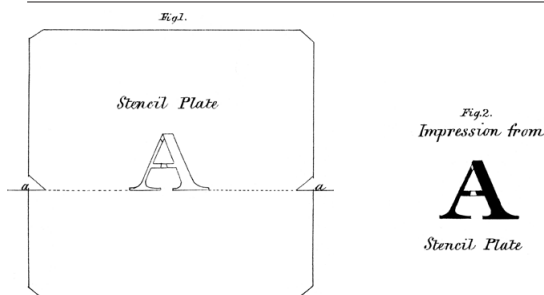


Figure A4.17. B[enjamin]. P[ickever]. Wilme, *A manual of writing and printing characters, both ancient and modern: for the use of architects, engineers and surveyors, engravers, printers, decorators, and draughtsmen; also, for use in schools and private families . . .*, London: printed for the author by John Weale, 1845. 'The white spaces which are seen in the impression from the stencil-plate are caused by the small pieces of brass in these places stopping out the ink. These pieces of brass are necessarily left to keep together those parts bordering on the perforated spaces. The white spaces must be made good with a pen and ink.' (p. 10)

**SPECIMEN**

Figure A4.18. Block letters, from W. F. Stanley, company catalogue, 1912, p. 85. '[T]he block letter . . . having all the strokes of equal thickness, is one of the most imperfect stencil letters, there being so many breaks which have to be left in the metal to give support to interior portions, as the centre part of O's, etc., thus to make block letters look slightly, it is necessary to fill up the breaks with the colour employed in stencilling.' William Ford Stanley, *A descriptive treatise on mathematical drawing instruments . . .*, London: n.p., 1900 (1866). (p. 227)



Figure A4.19. Wilfred J. Lineham, *A treatise on hand lettering for engineers, architects, surveyors and students of mechanical drawing*, London: Chapman and Hall, 1915. 'Now supposing the lettering is completely stencilled, do not let the result be marred by leaving the bars, now white, unfilled with ink, for the lettering is immensely improved by filling-in with black, and the labour is but small.' (p. 239)

### Breaks avoided

To avoid the obvious imposition of breaks on otherwise conventional characters, strategies have been devised to disguise the breaks. These include ‘composite’ characters (discussed above); ‘natural’ characters, whose design

integrates breaks seamlessly; and ‘bridge’ characters, marked out from stencils whose bridges do not leave breaks in the characters as stencilled.

*Natural form.* Breaks can be disguised by making them integral to the design of characters from conception, rather than imposing breaks on to already designed characters at a later stage. Des Billettes makes no mention of letters designed in this way, probably because at the time he was writing decorated letters (which are very amenable to such treatment) were painted and illuminated rather than stencilled. Stencilled examples begin appearing in liturgical books in the middle decades of the eighteenth century, sometimes partnered with other kinds of decoration (borders, head- and tail pieces) conceived on the same basis; they are in evidence throughout the remainder of

the century. They appear to have been used less frequently in liturgical books made in the early decades of the nineteenth century, then re-appear with greater frequency in a wide variety of styles. They are also illustrated by Stanley (1866), and in catalogues offering stencils for architects, engineers, surveyors, and the legal profession. For Scott-Mitchell (1906), natural stencil letters were an extension of stencilling in general, in which ‘natural’ breaks were fundamental to the idiom. Throughout the twentieth century, and up to the present day, natural stencil letters have appeared with regularity and often with considerable invention.

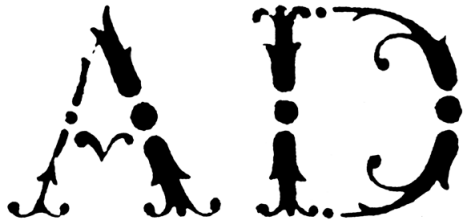


Figure A4.20. Titling letters from ‘Graduale Romanum de Tempore & Sanctus’ Abbey of Loo (Flanders), 1755. Gilmore Music Library, Yale University.

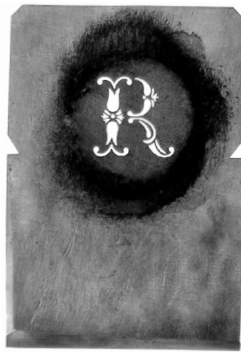


Figure A4.21. Stencil plate, Jean Gabriel Bery, Paris, 1781, brass, etched and filed, 78 x 54 mm. American Philosophical Society Museum, Philadelphia.



Figure A4.22. Sample stencil letters, from William Ford Stanley, *A descriptive treatise on mathematical drawing instruments ...*, London: n. p., 1900 (1866), p. 348. ‘The [stencil] letters which appear most perfect are shaded outline, old English, and ornamental. Although there are breaks in these, by the style or ornamentation they can scarcely be noticed.’ (p. 349)

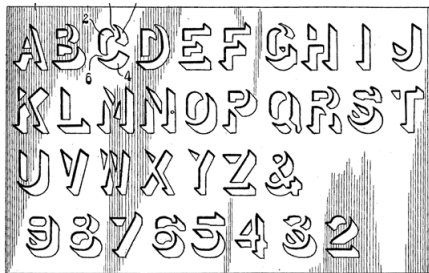


Figure A4.23. Specification drawing, Albert J. McCauley, US Letters Patent no. 1,098,745 (1914). ‘My improved stencil is formed by slotting a sheet of material to represent shadows of complete alphabetical or numerical characters, and leaving portions of the material between some slots to represent faces of the characters. The material between the slots is an integral part of the stencil sheet so that the stencil has ample strength, and the characters formed by painting through the stencil do not have the mutilated appearance of the ordinary stencil characters.’



Figure A4.24. 'Stencilled letters', Frederick Scott-Mitchell, *Practical stencil work*, London: The Trade Papers Publishing Co, 1906, p. 166. 'Some fancy types make better stencils than the styles now in vogue, and the ties then may become part of the lettering as necessary to the letter as to the stencil plate. Curves, scrolls, and other embellishments become then the beauty and the strength of the letter'. (p. 165) Scott-Mitchell devoted an entire section of his text to ties (i.e. bridges, or attachments), which he described as the 'keynote' of the stencil. Ties integrated seamlessly into a design are termed 'natural' and compared favourably to those imposed irrespective of the design. 'There are good and bad kinds of these ties. The old fashioned stencil cutter would appear to have drawn his design independently of ties and then put them in promiscuously before cutting. Afterwards he would go over his work again "filling in" these blanks with a sable or camel hair pencil [i.e. a fine brush], freehand, or would in some cases cut a separate stencil plate to cover those ties and thereby obliterate all trace of ties if he could do so, apparently to hide the fact that he had used stencils at all. All that is now reversed. The kind of ties that require "filling in" are the wrong kind. The majority of stencilled work now remains untouched after the stencil plate is removed from the work.' (p. 26)

*Bridges.* Breaks have also been avoided by the use of stencils whose bridges are constructed in a way that allows the brush (with ink) to pass underneath the bridge, resulting

in characters without breaks. In some instances, these bridges actually rise up from the stencil plate as they span the plate's voids.

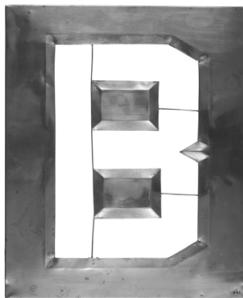


Figure A4.25. Stencil plate, maker not known, copper and wire, United States, late 19th or first half 20th century, 316 × 260 mm. The wires holding in place the counters of the B are sufficiently thin to allow an ink-filled brush to sweep beneath them, producing a letter without breaks.

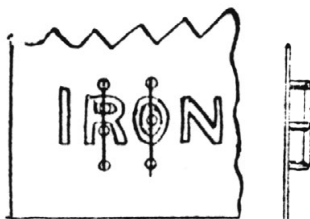


Figure A4.26. Specification drawing, J. A. Jordan, UK patent 11,491 (1892). 'In order to avoid the necessity of using two stencils for letters &c., the loose centres ... of the letters are hung from beams ... which are supported on pillars ... on the plate.'

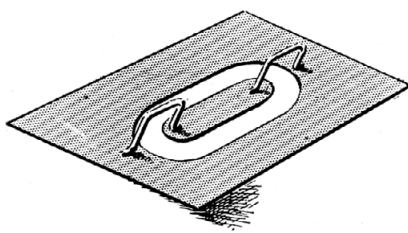


Figure A4.27. Illustration from G. Charrière, *Le pochoir, un outil merveilleux ... mal connu* (The stencil, a wonderful tool ... not well known), Paris: G. Charrière, 1935, p. 20. This manual addresses many aspects of stencilling, including the use of *ponts* (bridges) fastened to a stencil plate to secure its separate parts in position.



### Inter-character spacing

A number of methods have been devised over the centuries to regulate the spaces between stencil characters. Des Billettes's *lumière* is an early example, though there is no direct evidence of its use in stencilled liturgical books. Instead, and despite his warnings, another early method, the inter-character spacing dot, was commonly employed and may have been conventional. It remained in continuous use and was still a feature of French-made stencils well into the twentieth century. Variations are also found, mainly incremental markings set out above or below letters to regulate their spacing. Several uses of a similar

kind of opening, or 'window', are found in the nineteenth century, both in the patent record and in manufactured stencilling devices. Devices that achieve inter-character spacing through the composition of individual plates ('set-table units') were also introduced in the nineteenth century, most enduringly as the 'Adjustable Stencil'. Accurate spacing of letters and words was also achieved through the use of transparent celluloid stencils. Celluloid easily improved on the various mechanical solutions that were necessitated by brass and other opaque materials.



Figure A4.28. *Lumière*, reconstructed according to the description of Des Billettes. Complete stencil shown in figure A4.1.



Figure A4.29. Stencil disk, made by New York Stencil Works, based on US Letters Patent no. 81,032 (1868) and reissue no. 4402 (1871), 250 mm dia. 'The orifices through the plate ... adjoining the figures serve as windows to see how to place the figures in marking. ... The space between the orifices and the figures is used for spacing the figures ..., the same as the marginal space of the plate [i.e. at the edge of the plate] is used for spacing the latter [*sic*; letters]'; (from reissue). See also US Letters Patent nos. 257,423 (1882) and 1,345,653 (1920).

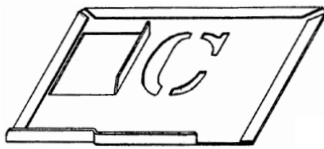


Figure A4.30. Specification drawing, Leo Wallenstein, US Letters Patent no. 1,413,246 (1922). This invention assured the aligned fitting of successive plates by means of their shape, and by abutting the plate to the vertical flanges to the left and below the character. The window to the left of the character alternatively assisted alignment, especially when marking out on other than a straight line.

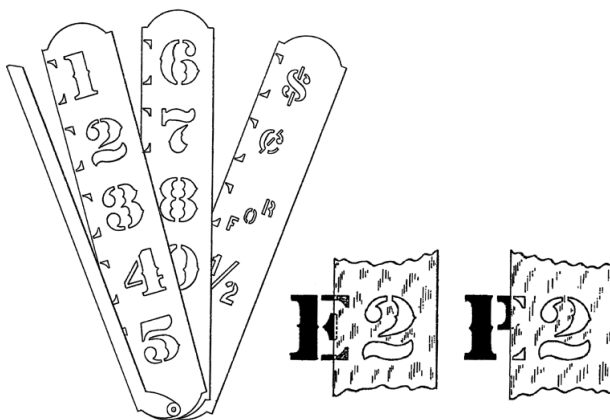


Figure A4.31. Specification drawings, Thomas C. Hough, US Letters Patent no. 931,309 (1909). An unusual vertical stacking of characters. To their left are 'gauge perforations' through which the right-most parts of the previously stencilled character could be seen and thus accurately spaced. Hough devised a separate, adjustable strip that could be positioned over these perforations to mask them from the inked brush. Examples of this invention survive. Other alphabet or numeral stencils configured as vertical strips simply position the characters a consistent distance in from the left edge of the plate; this distance then determines the space between consecutively stencilled characters, similar to the stencil disk, above (figure A4.29).

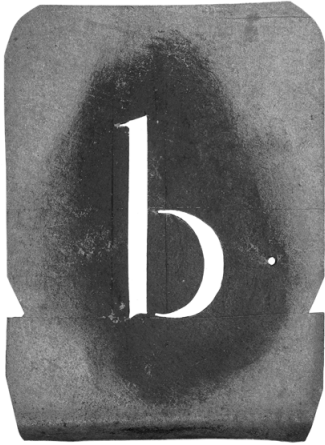


Figure A4.32. Stencil with inter-character spacing dot, maker not known, France, probably 18th century, brass. The inter-character spacing dot is the small hole cut through the plate to the right of the letter. When stencilled, the resulting dot indicates the position of the next letter. In theory, the dot is covered over by the left part of the next letter stencilled, but in practice this is not always possible while maintaining even spacing (e.g. with f, t, or z; or with x, v, or y). The vertical position of the dot may be as low as  $\frac{1}{2}$  the x-height (as here), or as high as  $\frac{4}{5}$ , but is usually around  $\frac{2}{3}$  to  $\frac{3}{4}$ , to maximise the likelihood of it being covered by the following letter. The spacing that results from inter-character spacing dots is fairly consistent, and most stencil makers observe the need to place dots closer to round strokes (of b, c, e, o, p, æ) to lessen the distance to the next letter and maintain even spacing. There is some indication that average letter spacing decreases in more recent (19th-century) sets of stencils.



Figure A4.33. Stencil plate, made by Johann Merkenthaler, Nuremberg, late 19th or first half of the 20th century, etched zinc, 53×42 mm. Two spacing lines are cut from the plate, above the letter ('a'); the letter and its righthand spacing line are then marked out together. The next stencil is positioned such that its lefthand spacing line aligns with the already marked out righthand spacing line from the 'a' plate.

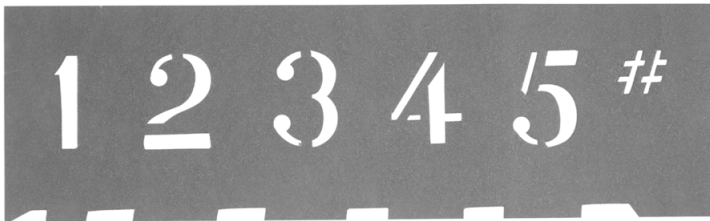


Figure A4.34. Stencil plate, made by Huntington Stencil Co., United States, mid 20th century, 'oiled cured' card, 114×380 mm. After a numeral is marked out, a line is made (with a pencil) down the left vertical edge of the cut-out rectangle positioned below and to the right of the numeral. The pencil line is then aligned with the right vertical edge of the rectangle positioned below and to the left of the next numeral to be marked out. Other vertical edges may be used to increase letter spacing.



Figure A4.35. Stencil plate, made by Cia. de Canetas Compactor, Brazil, early 21st century, plastic, 59×38 mm. After the letter is marked out, additional (pencil) marks are made through either pair of vertically aligned holes to the right of the letter, depending on the amount of letter spacing desired. The pencil marks are then aligned with either pair of vertically aligned holes to the left of the next letter to be marked out.



Figure A4.36. Reese's Adjustable Stencil Plates, made by S. W. Reese & Co., United States, based on US Letters Patent no. 148,087 (1874) and no. 173,058 (1876), die-stamped and folded, spring brass, 57×30 mm (R plate). The earliest patent for a 'settable-units' stencil was issued in 1840, in the US. A succession of related patents followed, culminating in the Reese patents of 1874 and 1876 (definitive). This invention, unchanged but now known as 'interlocking stencils', is still in production by the original manufacturer (Hanson). See Kindel (2006).

## Masking

Des Billettes describes two masking tools, the sash-clamp (*sergent*) and the holdfast (*patte*). Neither are attached to the stencil plate but are instead placed separately, on top of it, after the plate has been set in position. Des Billettes's are the only such masking tools presently known.

In the nineteenth century, in the United States, at least two stencilling devices incorporated a mask or shield, as did at least one French device, which is later in date. In these instances, the mask/shield is physically attached to the stencil plate.

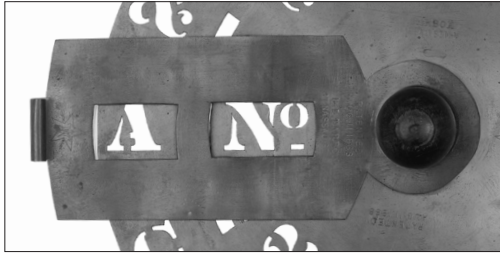


Figure A4.37. Stencil disk, made by New York Stencil Works, based on US Letters Patent no. 81,032 (1868) and reissue no. 4402 (1871), 250 mm dia. 'The shield has orifices through it which correspond in position with the circles of letters and figures on the plate. This shield is broad enough to cover a portion of the plate and protect the latter from the stencil-brush while the letter or figure which it is desired to use is exposed through the orifices .... The shield allows the letter ... and the figure ... to be used without interfering with any other letters or figures'.

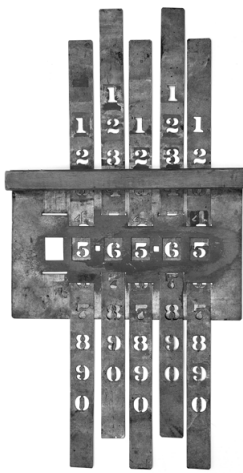


Figure A4.38. Number/date stencil, maker not known, United States, probably 2nd half 19th century, brass (number strips), copper (plate), wood (handle), 192 mm (width). The plate through which the number strips are threaded doubles as a shield against the ink-filled brush. This specific device, while apparently not patented, is similar to devices specified in US Letters Patent no. 37,648 (1863), no. 56,674 (1866), and no. 80,711 (1868). See Kindel (2006), p. 71.



Figure A4.39. Alphabet plates (1 of 3 in the set) with sliding shield, maker not known, France, 20th century, etched brass (plate), zinc (shield), 35 × 167 mm.

## Ink

In his description of the stencilling ink, Des Billettes recommends the use of a (paper) cone filled with ink, over which is placed a sponge to moderate the uptake of ink by the brush. While this specific advice has not (yet) been found elsewhere, use of a sponge together with stencil ink

is found in alphabet sets made in the US in the nineteenth and twentieth centuries. Here, however, the sponge serves either to draw ink out of the brush if at first an excessive amount has been taken up, or it moderates the uptake of water by the brush before it is rubbed on a dry ink cake.



Figure A4.40. Ink cake and sponge in tin holder, from Reese's Adjustable Stencil Plates, boxed set, c. 1880s, 92 mm (length).

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## Reconstructions

Andrew Gillmore: figures 2, 3, 5, 8, 9, 24–31

Eric Kindel: figures 4, 6, 32–37, A4.8

Fred Smeijers: figures 7, 10, 11, 12–17 (glyphs), 18–23, A1.1, A2.1–2.9, A4.1, A4.28

The reconstructed equipment is presently located in the Department of Typography & Graphic Communication, University of Reading, and may be consulted there. Unless noted, other artefacts are in the author's collection.

## Photography &amp; imaging

Figures 2, 3, 5, 8, 9, 24–31, 32–35; A4.3–4.7, 4.25, 4.29, 4.32–4.40: Laura Bennetto (D&P, University of Reading)

Figures A4.2, 4.9, 4.16: Claude-Laurent François

Figures 4, 6, 7, 10, 11, 18–23; A2.1–2.9; A4.1, 4.21: Eric Kindel

Figure 38: (C) Paris – Musée de l'Armée, dist. RMN –

© Photo Musée de l'Armée

Figures 1, A3.1: St Bride Library, London

Figure A4.15: Museum für angewandte Kunst, Vienna

Figure A4.21: American Philosophical Society, Philadelphia