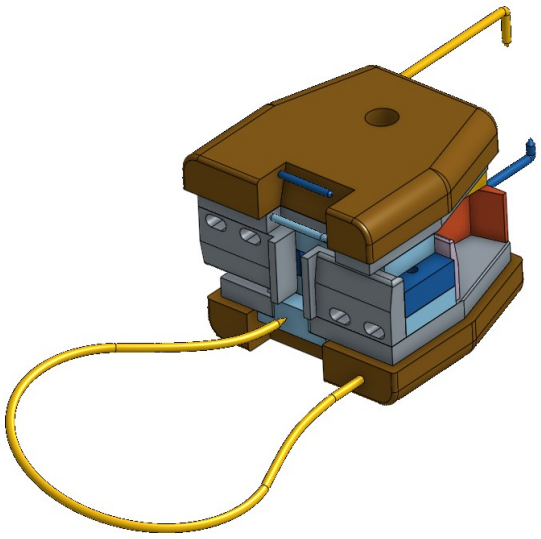
Series HM **Typefounder's Hand Molds**
Device HMB Hand Mold B

A Plain Typefounder's Hand Mold

Description & Construction Notes



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Copyright & Licensing Statement

See the section entitled "**Distribution**" later in this document for a discussion of the issues of open source hardware and links to the original online distribution of this document and its associated CAD models and engineering drawings.

What This Is

This is a newly modeled and drawn version of a typefounder's hand mold. It is of traditional design, but it is not based on any single example; it employs features from several sources. While authentic in terms of function and major features, it is intended for (relative) ease of construction rather than fully authentic appearance.

It is a *plain* hand mold, by which I mean it is not a lever[1] hand mold. It is in what I would term a *composite* constructional style.[2] That is, it is built around *base plates* after French and many English style molds. However, where the two halves of French/English molds typically are keyed together using a *potence* (in French) or *male gauge* (in English), in this mold the two halves are keyed together by a combination of the ordinary mold *registers* (which are found on all hand molds) and *wings* (which do not appear on French molds). This practice is characteristic of German molds (which do not use base plates).[3]

This mold is modeled and drawn for a 24 point body (using American printer's points[4]), 0.918 inch height-to-paper and 0.050 inch depth-of-drive. It could certainly be altered for other bodies, type heights and drives.[5] It is intended for traditional-style hand mold matrices with a head bearing of 0.250 inches (but, again within limits, this may be altered).

This mold's type-body, height-to-paper, and depth-of-drive dimensions are calculated using a shrinkage value of zero for typemetal and an expansion value of zero for the mold. This is not correct. Notwithstanding myths still in common circulation, typemetal does shrink slightly upon solidification. Molds also change dimensions during casting depending upon their temperature. American Type Founders, for example, constructed its molds slightly oversize to compensate for these factors.[6] Once I have gained sufficient experience with this mold, I may alter its dimensions to accomodate these factors.[7]

The nick placement is in the Anglo-American style, with the nick on the side of the body which is at the bottom of the face.

It is dimensioned in inches.

The discussion here presumes that you have a basic knowledge of the working principles of the typefounder's hand mold.

1 Also known as a "trigger" hand mold.

2 This is my own term. I do not know of any term at all in the literature for this style.

3 I have seen an example of this use of French-style base plate construction with Flemish-style wings in a lever hand mold which is probably of 19th century American construction. See the discussion of "Hand Mold A" at http://www.CircuitousRoot.com/artifice/letters/press/hand-casting/drawings/hma/index.html

4 The exact definition of the American printer's point requires a book-length study and if you take it to too many decimal places everyone has their own "true" value (or values!) For the purposes of this design I'll take one point to be 0.013,84 inches.

5 Within reason, alterations for other body heights may be accomplished relatively simply by changing the body pieces. (For smaller bodies, this may require modifications of the registers and wings.) Alterations for different heights to paper or drives may require more extensive changes (especially of the mouthpiece components).

6 The ATF specifications for its B-2 style molds in automatic (Barth) casters at 24 point allowed an estimated shrinkage of 0.0032 inches. For pivotal caster molds at the same size they allowed 0.0017 inches shrinkage. See for example this specification as reprinted in Rehak's *Practical Typecasting* (p. 183).

7 Note also that the expansion of the mold will be different for different construction materials (brass, steel, or aluminum).

Warnings and Disclaimers

This document may be read simply to better understand the history and technology of the typefounder's hand mold. Today this is a relatively safe thing to do. (It was not always so. The technology of printing enabled by the hand mold was powerful and dangerous politically. It helped to bring down governments and spark religious wars. Unsurprisingly, typefounding was tightly regulated in many areas, such as England, from its beginnings. In many parts of the world its successor technologies are still regulated.)

However, this document and the model and drawings it describes may also serve as the basis for constructing and using a typefounder's hand mold. I do not suggest that you do so, but if you wish to, you may. **If you choose to do so, be aware that you do so by your own choice and at your own risk. You must accept all responsibility for your actions. In no case will the author be liable for any injuries you may sustain or cause.**

In particular, be aware that there are dangers involved with the use of hand and power tools such as those which might be used to make this mold. Some of these dangers and potential injuries are very serious. It is your responsibility to learn, understand, and practice safe tool use and workshop practices.

Be aware also that if you choose to cast type with a hand mold you will be working with molten metal at temperatures which can cause instant and disfiguring injuries (including permanent eye injuries). It is your responsibility to learn, understand, and practice safe procedures for working with molten metal.

Be aware also that if you choose to cast type using traditional typemetal alloys, there are potentially significant health risks associated with its improper use. It can be used safely and has been used safely by typefounders for centuries. But it is, again, your respondibility to educate yourself in the safe practices of the handling of typemetal in both molten and solid states.

These are more than just idle disclaimers. Really, you can hurt yourself instantly and very badly. All of the procedures used to make this mold and cast type with it using traditional typemetal can be performed safely, but only if you educate yourself about them, understand them thoroughly, and practice them responsibly.

Words are powerful and dangerous. So are the tools used to make them. Use them safely.

Views of the Mold

Here are some views of the CAD model of the mold. No screws are shown.

The coloring is arbitrary (it is the coloring automatically generated by the CAD program to distinguish one part from another).[8]

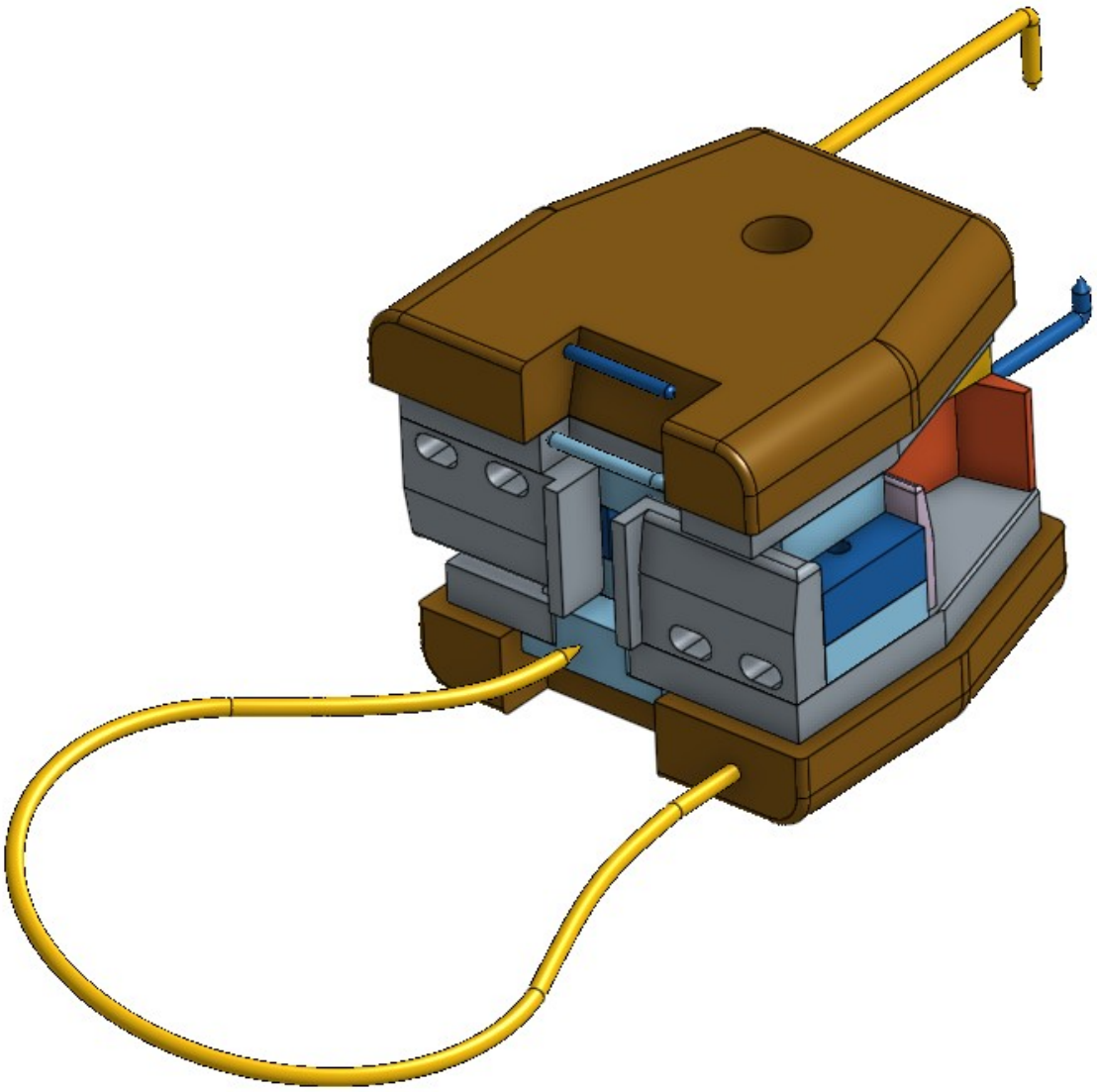

Figure 1: Assembled View from the Matrix Side (without a matrix present)

8 Exception: I made the woods brown explicitly.

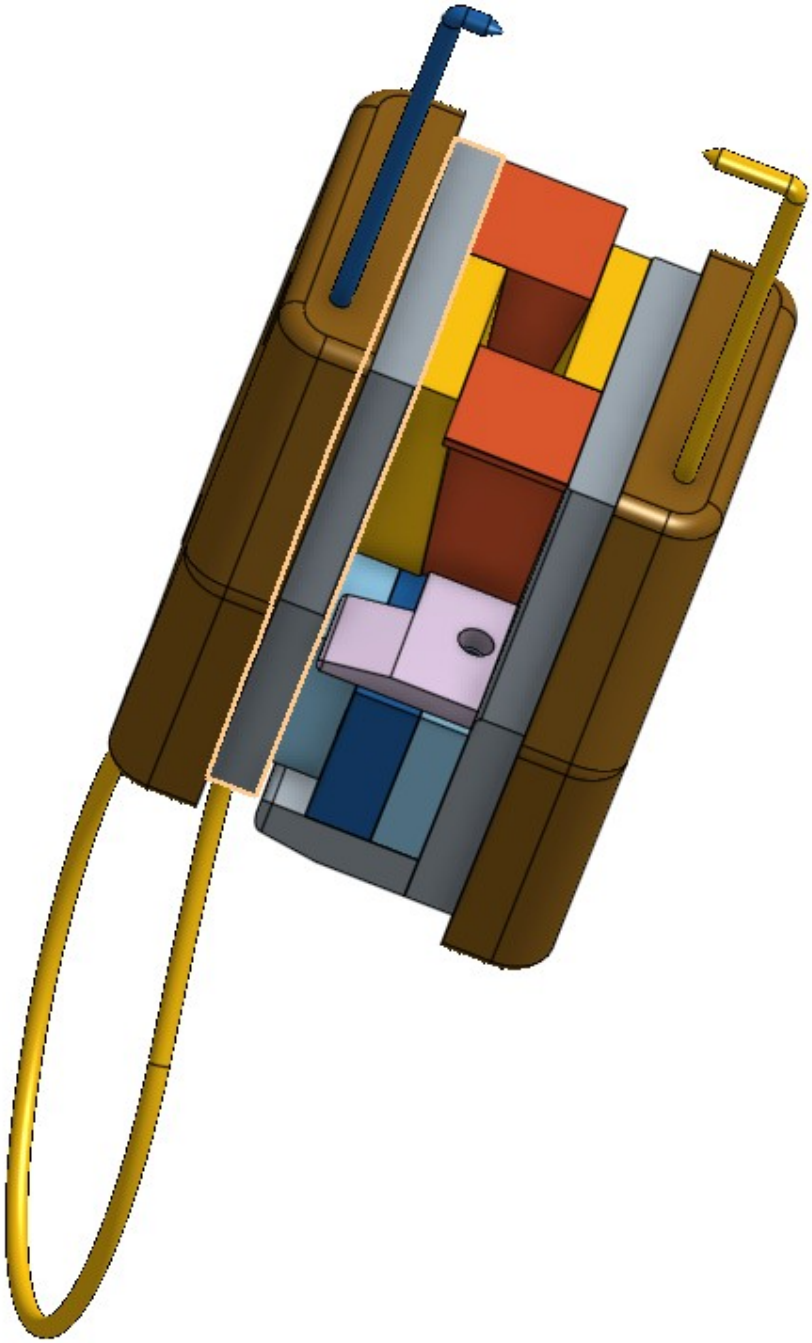

Figure 2: Assembled View with the Mouthpiece (where the liquid typemetal is poured in) at the top.

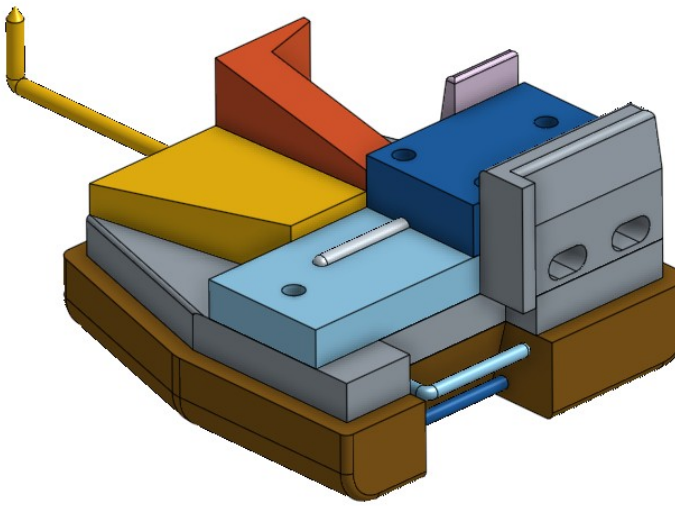

Figure 3: Top Half (shown "upside-down")

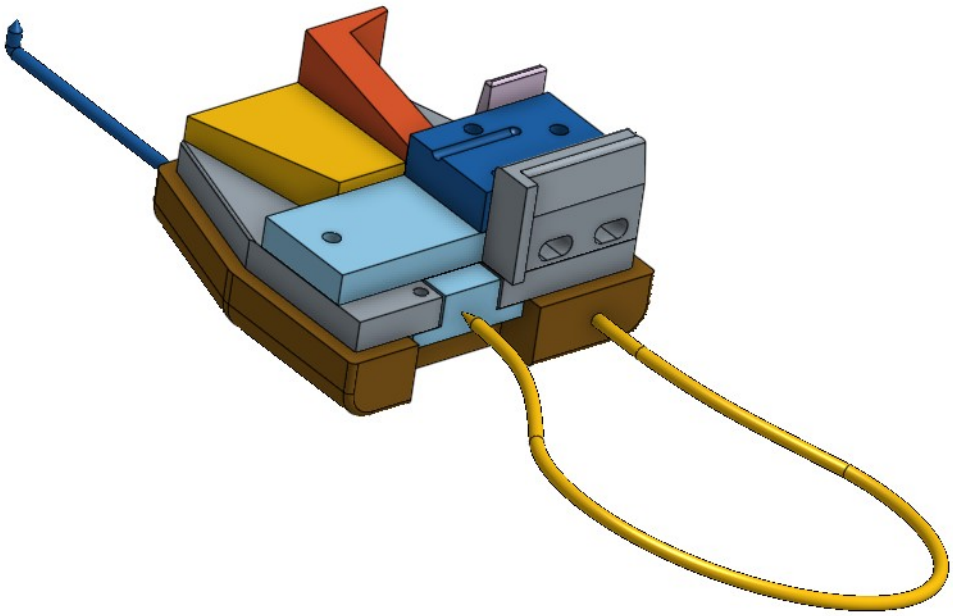

Figure 4: Bottom Half

Sources

I am indebted to Stan Nelson, not only for his invaluable 1985 article on this subject but also for his generosity in demonstrating and sharing his knowledge of the hand mold at numerous meetings of the American Typecasting Fellowship and at other times.

To some extent, the design of this present hand mold draws upon the entire literature of the hand mold. For a summary of that, see:

http://www.CircuitousRoot/artifice/letters/press/hand-casting/literature/index.html

Within that literature, Fournier's *Manuel Typographique* (the first volume, of 1764) takes pride of place. The plates of Diderot and d'Alambert's *Encyclopedie* are often easier to interpret. Moxon, while earlier and of great interest, is a more difficult source.

The most direct source for many of the features of this mold is a lever hand mold which is presumed to be of 19th century American construction. It is now in the collection of Patrick Goossens' Letterkunde Press in Antwerp. Through the kindness of Paul Aken (of The Platen Press Musuem in Zion, Illinois) I was able to examine this mold in some detail while he owned it. This mold, the authenticity of which is beyond question, is my primary source for the combination of base plates (French tradition) with Wings (Flemish tradition). For more on this mold, see:

http://www.CircuitousRoot.com/artifice/letters/press/hand-casting/drawings/hma/index.html

About The Model and Drawings

To the best of my present knowledge, these are the first engineering drawings of a typefounder's hand mold ever published.[9] Because the hand mold changed the course of civilization, because was invented 550 years ago, and because it continued in regular industrial use for the first 400 of these years, this may seem surprising. After all, we have plenty of engineering drawings of steam engines and telegraphs and airplanes.

These drawings are also of a style which is "neither fish nor fowl" and so require some explanation.[10]

The period of the industrial use of hand molds spans the 400 years from Gutenberg to the middle of the 19th century (when the pivotal type caster replaced them at nearly all type foundries). For most of this period, the hand mold functioned in the same way. Constructional styles varied, but the operation was unchanged. From the introduction of the lever hand mold after (probably) 1811,[11] that style probably became common. After the introduction of the pivotal type caster, hand molds continued in limited use by matrix justifiers. They used plain, not lever, molds because the lever mold's increased rate of production was not important to them.

During this period of industrial hand mold use, engineering drawing was not well developed. The micrometer had not yet been introduced into most workshops. It is likely that most hand mold makers would have worked from at most a sketch (if even that). We now know from research by Patrick Goossens and Karel van der Waarde that is was common to build hand molds to quite "loose" dimensions and to rely upon shims to bring the molds to size.[12]

So one historically appropriate way to draw this hand mold would be to sketch it on the back of an envelope. I have not done this.

By the second decade of the 20th century, engineering drawing and dimensioning were beginning to assume modern forms (this happened much later than the myths of the origins of "mass production" would suggest). The justifier's hand mold was in common use in foundries during this period. It is almost certain that engineering drawings were made for at least some of them. However, I am not presently aware of any such drawings and do not know of any that were published.

9 I would like to be wrong here. If you know of examples, please let me know. I am aware that there have been several reasonably detailed *technical* drawings of hand molds in the literature, but technical drawings aren't quite the same as true engineering drawings. There has also been at least one instance of a 3-D CAD model of something resembling a hand mold, but a 3-D model without dimensions and tolerances is, again, not quite the same as a set of proper engineering drawings.

10 I am being a little defensive here, because I'm very much aware of the issues with and deficiencies in both the CAD model and the drawings.

11 This is the date of Binny's second patent, which (while lost) is presumed to be for the lever hand mold. Peek's patent for a different mechanism for the lever mold is earlier (1809), but it seems likely that Binny's was the more common style.

12 See {Goossens & van der Waarde 2019}, which is their chapter on "The 'Vanderborght collection of hand mould in the Plantin Moretus Museum" in a forthcoming book.

In the absence of a tradition, the other appropriate way to model and draw this hand mold would be to employ the best modern practices. This would involve, in particular, employing ANSI Y14.5 "Geometric Dimensioning and Tolerancing." This would, moreover, be an instructive exercise because a hand mold illustrates the kind of thing that GD&T is good at: distinguishing situations of necessary high accuracy (and expense/difficulty) from those where tolerances may be much looser.

Yet I have not done this. GD&T remains unfamiliar to the average reader. So the drawings are done in a kind of an *ad hoc* version of traditional 20th century engineering drawings - simplified for amateur / home-shop construction. It is my hope that this way they might appear to be more intuitive.[13]

I should also note that the CAD model was, for me, a learning exercise in the CAD system I used (Onshape). Under-the-surface, in the logic and organization of the 3-D model, if I were to do it again I'd do it differently.

See also the section below on "Drawing Tolerances".

13 But I really hold out little hope for this, primarily because I do not believe that intuition exists.

Simplifications and Anachronisms

It is possible to construct this hand mold in ways which are entirely authentic. It is also possible to build it in ways which are not (and the basic drawings show or imply details which are not "authentic.") The choice of methods and details depends upon your purpose.

If your purpose is to build a mold in an authentic tradition - a mold as it might have been made in at least the 19th century - then of course you should use details in the traditional styles. But if your purpose it to build a mold in the simplest way so that you can use it, then anachronistic details are perfectly reasonable.

The most important detail is that of the style of screw head used. The style of screw head which would have been used in every hand mold through at least the early 20th century is the *cheese head* screw. If you immerse yourself sufficiently in old and fine instruments and machinery, you develop a sense of and taste for this. Cheese head screws look right. Socket head cap screws, which were not developed until the 20th century, look wrong and ugly.

Yet from a modern instrument builder's perspective, socket head cap screws would be the most appropriate screws to use. Moreover, you don't have to make them - you can just buy them. This greatly simplifies construction. The style of the heads of the screws holding the mold together has precisely zero effect upon the face of the type cast.

So this mold has been modeled and dimensioned to accommodate modern hardened steel socket head cap screws. If you desire a more traditional appearance, replace these with cheese head screws (you might have to modify some dimensions to allow for the slightly larger heads typical of cheese head screws).

The method of attachment of the *woods* to the base plate has also been simplified. In this model, a socket head cap screw is used (which screws into a tapped hole in the base). In traditional practice, a stud would have been riveted to the base. Its end would have been threaded and a round nut with holes for a spanner wrench would have been used to affix the wood.

Finally, it is perhaps worth noting that making hand molds in the 21st century is itself an inherently anachronistic activity. Pick you style of anachronism: if socket head cap screws had existed in the 18th century, Fournier would have used them!

Drawing Tolerances

Throughout the drawings, I have specified dimensional tolerances. Please do not take these too seriously. Mostly, I've just made them up based on a guess as to what might be about right.

It is better, instead, to think through what a hand mold does and where it must be precise and/or accurate (and where it need not be).

Precision is how close the thing we make is to our ideal mental conception of it, without regard for externally defined dimensions. So for example if I shape two pieces of metal so that no light shows between them, they are very precise. But I have no idea how big they are or how flat in millimeters or inches or printers points. They may be precise, but they are not necessarily accurate.

Many parts of a hand mold need to be precise but need not be accurate. For example, the pieces of the mouthpiece on each side must slide smoothly together (otherwise molten typemetal will spill out), but they just have to be approximately the right size.

Accuracy is how close the thing we make is to some dimensions which may be measured by an externally defined standard. So for example a piece of type in America must be 0.918 inches high. If it is when you measure it (within some tolerance, depending upon how persnickety you feel), then it is accurate. If your tolerance is +/- 0.001 inches and your type measures 0.914 (say), then it is not accurate.

Something may be precise but not accurate. I'm not sure that it is possible for a single thing in isolation to be accurate but not precise.[14]

The following parts of a hand mold must be both precise and accurate:

- The thickness of the body pieces (which give you type body size)
- The width of the carriages and the body pieces (that is, the mold depth - this combined with the matrix depth-of-drive gives you height-to-paper)
- The squareness of the casting cavity (one side of each body piece and one part of each carriage) to the surfaces of the body pieces and carriage upon which the matrix bears. (If they are not sufficiently square, your type will lean.) This is a matter of accuracy because we are measuring against a known numeric angle (90 degrees).

Moreover, a reasonably high level of accuracy is required. Variations of a thousandth of an inch in body size will be detectable in the printing form. Twentieth century American industrial practice here tended to work to the "tenth" (a ten-thousandth of an inch: 0.000,1).[15] That's going to cost you extra in a commercial machine shop, or more time and care in your home shop.

The following parts of a hand mold must be precise but need not be accurate:

- The flatness of the casting cavity.
- The fit of the mold halves as they slide over each other (which involves several components: bodies, carriages, registers, wings, and mouthpiece parts).

14 You may be able to have accuracy without precision if you're considering averages over a batch of parts. I haven't thought this through sufficiently.

15 A sheet of ordinary typing paper (not that anyone types anymore) is about 3 thousandths of an inch thick. So a "tenth" is 1/30 of the thickness of a sheet of paper.

The degree of precision required for these fits is really very high. Molten typemetal will flow into spaces much smaller than 0.001 inches.

Many parts of a hand mold do not need to be particularly precise. They just have to fit. Some examples of this include:

- Overall width, height, and thickness.
- The length of the mouthpiece; also its angles.
- The exact location of screws
- [many others]

Tolerances for these may be quite large: sometimes a tenth of an inch, or even a quarter of an inch.

Some parts of a hand mold are entirely matters of taste. Some examples include:

- The external shape of the woods.
- Chamfering some components (some base plate edges, some register and wing faces).
- Relief angles on the registers and wings (which need not be angled at all).

So think through the mold functionally and take the tolerances on the drawings only as general guidelines. (But if you find one where I've made an outright mistake - something that just won't work - please let me know!)

Constructing this Hand Mold

[TO DO]

How to Use a Hand Mold

IMPORTANT: If you read nothing else here, read this: ***USE A GLOVE*** to protect your hand which is holding the mold and ***WEAR SAFETY GLASSES***. I know that they didn't do this in the 15th through 19th centuries, but re-enacting traditional crafts should not extend to re-creating traditional injuries.

[TO DO]

Parts List

The part symboling system used here is described in CircuitousRoot document 0ZZ6, *The CircuitousRoot Part Symboling System*. This is online at:

http://www.CircuitousRoot.com/oshw/documentation/index.html

It is based on the Bancroft/Monotype system used for the various Monotype (and Monotype-Thompson) type casters. In simple terms, "HMB" is the machine code which distinguishes these parts from parts of other machines or devices. Prefixed before it is a number which indicates a logical group within the machine. Suffixed after it is another number which indicates the part within the group. A symbol without a numeric suffix (e.g., "1HMB") indicates the logical group of parts. It does not designate any specific physical item.

0ZZ	**General Documentation for Open-Source Hardware at CircuitousRoot**
0ZZ1	Binder
0ZZ2	Binder Slipcase
0ZZ3	Licensing Terms
0HM	**Series HM General Documentation**
0HM3	Series HM Cover Page and Binder Labels
0HM4	Series HM Device List
0HM4	Series HM Introduction
HMB	**Hand Mold B**
0HMB0	*Description & Construction Notes* (what you're reading now)
1HMB	Base Plates group
1HMB1	Base Plate (bottom)
1HMB2	Base Plate (top)
1HMB3	Base Plate Screws for Woods [if used] (2): 1/4-32 UNF x LENGTH steel socket head cap screws
2HMB4	Base Plate Studs for Woods [if used] (2): TO DO
2HMB5	Base Plate Nuts for Woods [if Studs used] (2): 1/4-32 UNF round spanner-wrench nuts (see drawing)
2HMB	Carriages group
2HMB1	Carriage (bottom)
2HMB2	Carriage (top)
2HMB3	Screws for Carriages (4): 8-32 UNF x LENGTH steel socket head cap screws
3HMB	Bodies group
3HMB1	Body (bottom)

3HMB2 Body (top)
3HMB3 Screws for Bodies (6): 8-32 UNF x LENGTH steel socket head cap screws

4HMB Nick Wire group
4HMB1 Nick Wire

5HMx Potences group (Male and Female Gauges)
Note used in this mold.
(I'm reserving the '5' group for them so that I can try to keep part symbols consistent between different hand molds.)

6HMB Registers group
6HMB1 Register (bottom)
6HMB2 Register (top) NOTE: In this mold, the bottom and top registers are identical.
6HMB3 Screws for Registers (4): 8-32 UNF x LENGTH steel socket head cap screws

7HMB Wings group
7HMB1 Wings (2)
7HMB2 Screws for Wings (2): 8-32 UNF x LENGTH steel socket head cap screws

8HMB Stool group
8HMB1 Stool
8HMB2 Screws for Stool (2): 6-40 UNF x LENGTH steel socket head cap screws

9HMB Mouthpieces group
9HMB1 Mouthpiece Plate (bottom)
9HMB2 Mouthpiece Plate (bottom) Screw (outboard):
8-32 UNF x LENGTH steel socket head cap screw
9HMB3 Mouthpiece Plate (bottom) Screw (inboard):
8-32 UNF x LENGTH steel socket head cap screw
9HMB4 Mouthpiece Sidewall (bottom)
9HMB5 Mouthpiece Sidewall (bottom) Screws (2)
8-32 UNF x LENGTH steel socket head cap screws
9HMB6 Mouthpiece Plate (top)
9HMB7 Mouthpiece Plate (top) Screw (outboard):
8-32 UNF x LENGTH steel socket head cap screw
9HMB8 Mouthpiece Plate (top) Screw (inboard):
8-32 UNF x LENGTH steel socket head cap screw
9HMB9 Mouthpiece Sidewall (top)
9HMB10 Mouthpiece SIdewall (top) Screws (2)
8-32 UNF x LENGTH steel socket head cap screws

10HMB Woods group
10HMB1 Wood, bottom
10HMB2 Wood, top

11HMB Matrix Wires group

11HMB1 Gimlet

Fournier called this *le gimblet*. Carter thought that in English it was the "bridge" ({Fournier 1930}: 196). Nelson called it the "gimlet," but noted that it was also called the "gallows" ({Nelson 1985}: 112-113).

11HMB2 Jobbet

Fournier called this *le jobet*. Carter was unable to find an English term for it ({Fournier 1930}: 196). Nelson (1985): 112-113 called it the "jobbet."

12HMB Bow group

12HMB1 Bow

Also commonly called the "spring" (see, e.g., {Rees 1810}).

13HMB Hook group

13HMB1 Hooks (2)

Rees called these the "hags" ({Rees 1810}).

14HMB Tools group

14HMB1 Wrench for No. 6 Screws for Stool: 7/64 hex key, commercial item

Used in assembly/maintenance only.

14HMB2 Wrench for No. 8 Screws: 9/64 hex key, commercial item

Used in assembly/maintenance and to adjust the registers while casting.

14HMB3 Wrench for 1/4" Screws for Woods: 3/16 hex key, commercial item

Used in assembly/maintenance only.

Total number of pieces:

Machined pieces:	17	
Screws:	28	
Wires:	6	
Tools:	1	(include only tools used while casting to adjust registers)

Grand Total:	52	

Plus 2 tools used in service.
Plus this manual.

Distribution

CAD/Modeling/Drawing

I modeled this in 3D using the proprietary Onshape® "cloud-based"[16] CAD system, and generated a 2D engineering drawing from that model.

At the time of writing, Onshape has a free version which will allow you to view these models/drawings. It will also allow you to copy them to your own space and modify them.

Online Locations

The main page for this device is on the author's CircuitousRoot website at:

http://www.CircuitousRoot.com/artifice/letters/press/hand-casting/drawings/hmb/index.html

The distribution there includes digital (PDF format) copies of the engineering drawing, exported versions of the CAD models, this present manual, and other documentation.

The original CAD models for the parts of this device are online in Onshape. If you have a free or fee-based Onshape account, you may view and copy the Onshape "Document" (their word for "Project") at:

https://cad.onshape.com/documents/5bf4a74af99f405392406e40/w/4dc259b88dc54a6d91c73c59/e/52339e1d81939a32bf5ae661

Design and Licensing Considerations

The typefounder's hand mold is a traditional device which predates all modern concepts of intellectual property; its design is in the public domain.

This particular implementation of a hand mold is Open Source Hardware. Its CAD model, engineering drawing(s), and other documentation are kept open and protected from from proprietization by "copyleft" licensing terms.

Please see the "Notebook on Open-Source Hardware on CircuitousRoot" for further information:

http://www.CircuitousRoot.com/oshw.html

Within this, please see in particular the CircuitousRoot Open Source Hardware document 1ZZ0, "Licensing Terms."

If you received this device as manufactured by The Singing Lemur LLC, please see Singing Lemur product manual Section 1ZZ0, "Licensing Terms" for more information. A printed version of this section may have accompanied this product; if not, see:

http://www.lemur.com/oshw.html

16 Datacenters by another name.

References

For a survey of the literature of the hand mold, see:

http://www.CircuitousRoot/artifice/letters/press/hand-casting/literature/index.html

The following references bear directly on the hand mold described here.

{Fournier 1930} Fournier, Pierre Simon,[17] trans. Harry Carter. *Fournier on Typefounding: The Text of the* Manuel Typographique *(1764-1766) Translated into English and edited with Notes.* London: Soncino Press, 1930.

Carter's translation remains the only English translation of Fournier. It has been reprinted twice (NY: Burt Franklin, 1973. Darmstadt, Germany: Technische Hochschule Darmstadt, 1995) but remains in copyright and is not available digitally. Digital versions of the original French edition are now freely available online. For a bibliographic study of editions, see:

http://www.CircuitousRoot.com/artifice/letters/press/typemaking/literature/general/index.html#fournier

{Goossens & van der Waarde 2019} Goossens, Patrick and Karel van der Waarde. "The 'Vanderborght collection' of hand moulds in the Plantin Moretus Museum." In *Printing Things* (forthcoming).

{Moxon 1683} Moxon, Joseph. *Mechanick Exercises: Or, the Doctrine of Handy-Works. Applied to the Art of Printing. The Second Volumne.* London: Printed for Joseph Moxon, 1683.

The bibliographic history of Moxon is complicated. The first volume of his *Mechanick Exercises* was printed serially over several years (1678 New Style to 1680) and is devoted to various mechanical arts (blacksmithing, turning, etc.) It does not cover printing or type. Publication of the second volume extended from 1683 to 1684. For a study of editions of Moxon, including current digital and print-on-demand editions, see:

http://www.CircuitousRoot.com/artifice/machine-shop/ornamental-turning/literature/moxon/index.html

In 1958, Herbert Davis and Harry Carter published a scholarly edition of Moxon's second volume on printing under a title of their own devising, *Mechanick Exercises on the Whole Art of Printing* (Oxford: Oxford Univ. Press, 1958). A revised edition appeared in 1962.

17 Carter (p. xxiii) notes that Fournier "subscribed himself" Simon Pierre Fournier but that he is usually known as Pierre Simon. The portrait in the *Manuel Typographique* has "P. S. Fournier." He was called *le jeune* (the younger) to distinguish him from his elder brother, Jean Pierre Fournier (who was called *l'âiné*, the eldest).

This revised edition was reprinted in 1978 by Dover Publications. It is out of print, but still easy to find secondhand. *You need to have this book.*

{Nelson 1985} Nelson, Stan. "Mould Making, Matrix Fitting, and Hand Casting." *Visible Language*, Vol. 19, No. 1 (Winter, 1985): 106-120.

The subtitle for this issue of *Visible Language* was: "The Computer and the Hand in Type Design; Proceedings of the Fifth ATypI Working Seminar, Part 1." The article describes the construction of a hand mold in the 18th century French style, with male and female gauges. Stan and the editors of *Visible Language* have both graciously consented to its digital reprinting. See

http://www.CircuitousRoot.com/artifice/letters/press/hand-casting/literature/index.html#stan-nelson-late-20th-century-section

{Rehak 1993} Rehak, Theo. *Practical Typecasting.* New Castle, DE: Oak Knoll Books, 1993.

{Rees 1810} Rees, Abraham, ed. *The Cyclopædia; or, Universal Dictionary of Arts, Sciences, and Literature.* Vol. 15 [issued 1810]. London: Longman, Hurst, Rees, Orme, & Brown, 1819.

The article of interest is "Foundery, Letter, or the Method of Casting Printing Letters," together with a portion of Plate XV. For digital versions of these, see:

http://www.CircuitousRoot.com/artifice/letters/press/hand-casting/literature/index.html#rees-cyclopaedia

Contact

I may be reached at:


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Dr. David M. MacMillan
2526 Wearne Road
Mineral Point, Wisconsin  53565
USA
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or via e-mail at: dmm@Lemur.com

I prefer not to receive telephone calls. Thank you.

Revision

2 2019-08-04. Numerous small changes.
1 2019-08-04. Initial version.

Appendix 1: Bill of Materials

Metal

Wire

Screws

Wood

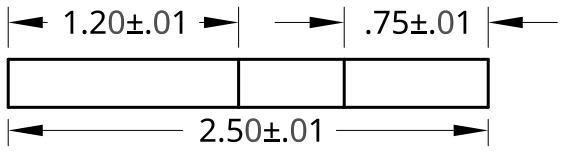
Appendix 2: Drawings

The following pages contain copies of the drawings for this mold. Please note that these may not be as current as the versions of these drawings which are distributed online. If you are going to build this mold, you are advised to check online to make sure that you are using the most current versions of the drawings. (The digital CAD models are also available online only.)

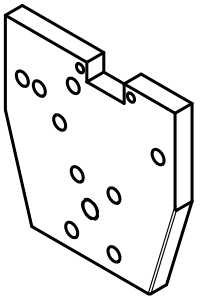
These drawings are ANSI A size, which is the same as US Letter (8.5 x 11 inches). As presented here, they have been rotated 90 degrees counterclockwise so as to fit fully on the pages of this document in portrait orientation. This makes them much harder to read. The original PDF (and Onshape) versions are oriented in landscape mode.

BOTTOM

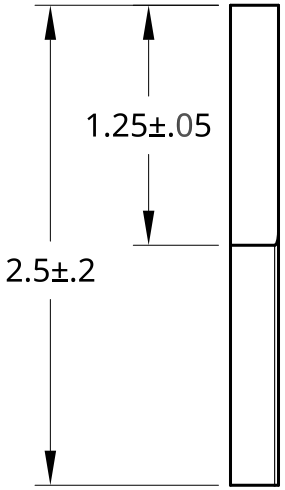
0.25 THICK IN ALUM. OR BRASS
0.125 THICK IN STEEL

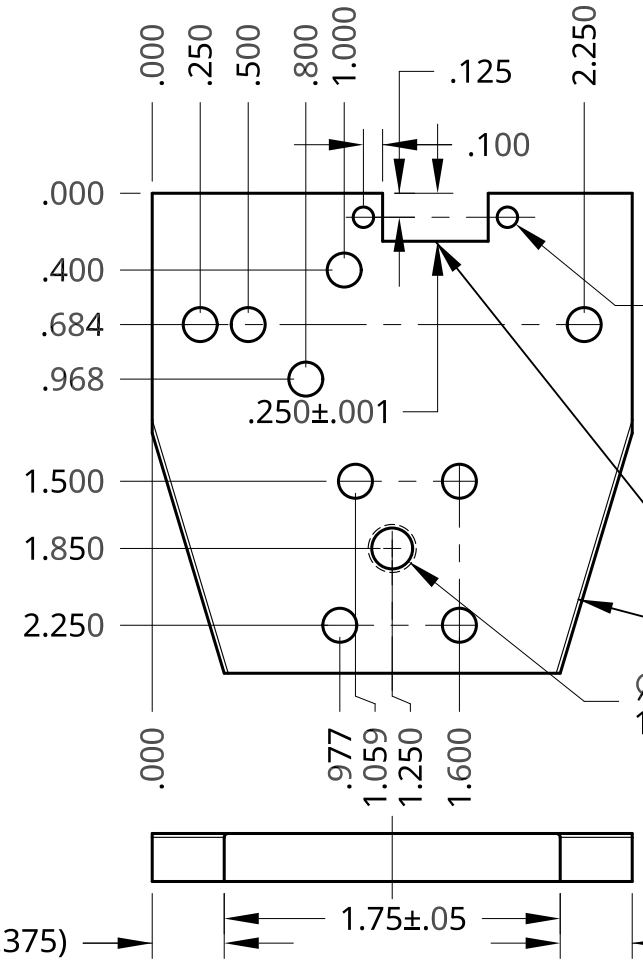


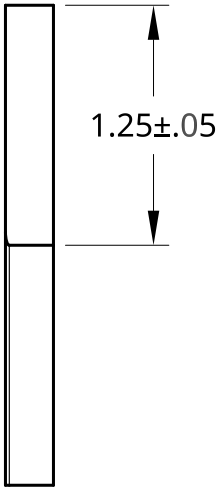
FRONT VIEW IS FROM CARRIAGE SIDE



SCALE 1:2







CHAMFER AS DESIRED

ALL UNSPECIFIED HOLES
ARE 0.177 CLEARANCE
THRU HOLES FOR #8 SCREWS

HOLE LOCATION
TOLERANCE: +/- 0.002

VERY LIGHTLY BREAK EDGES
EXCEPT AS NOTED

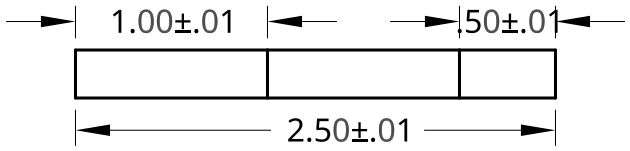
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL	STEEL, ALUM. OR BRASS	FINISH

CircuitousRoot

TITLE: HMB - HAND MOLD B
1HMB1 BASE PLATE (BOTTOM)

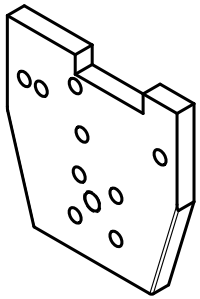
SIZE	DWG NO.	REV.
A		0
SCALE 1:1	WEIGHT	SHEET 1 of 1

0.25 THICK IN ALUM. OR BRASS
0.125 THICK IN STEEL

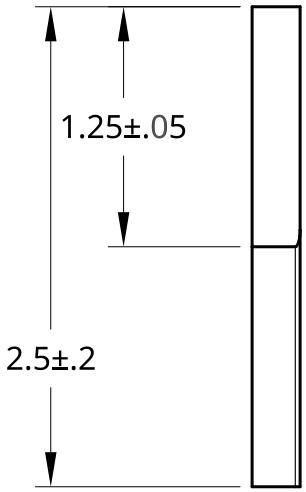


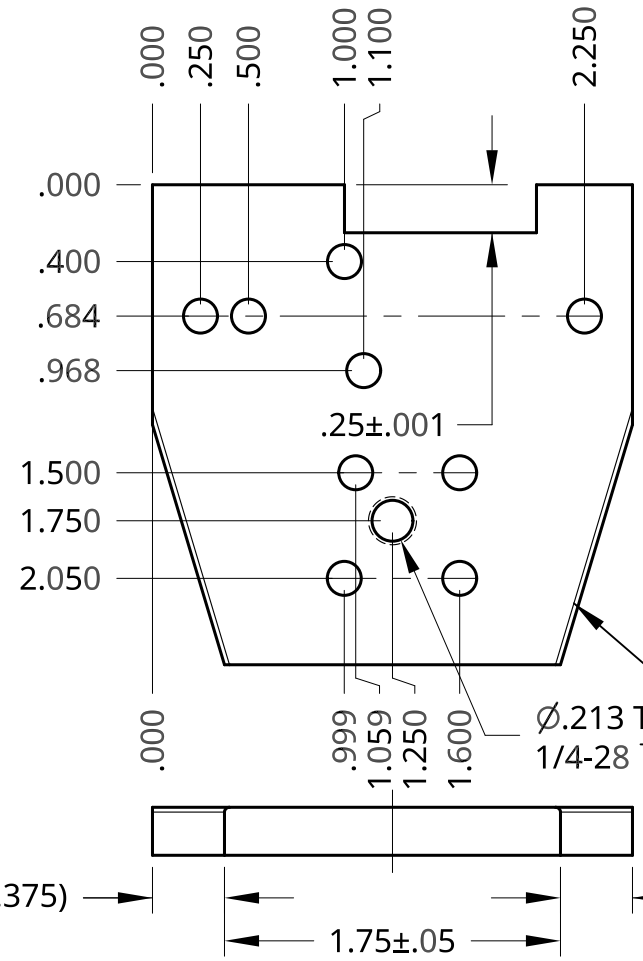
TOP

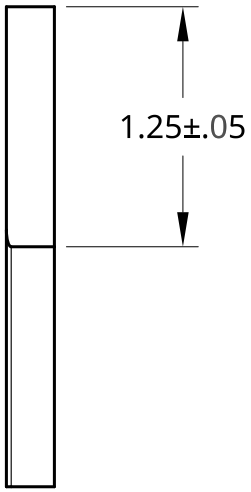
FRONT VIEW IS FROM
CARRIAGE SIDE



SCALE 1:2







ALL UNSPECIFIED HOLES
ARE 0.177 CLEARANCE
THRU HOLES FOR #8 SCREWS

HOLE LOCATION
TOLERANCE: +/- 0.002

VERY LIGHTLY BREAK EDGES
EXCEPT AS NOTED

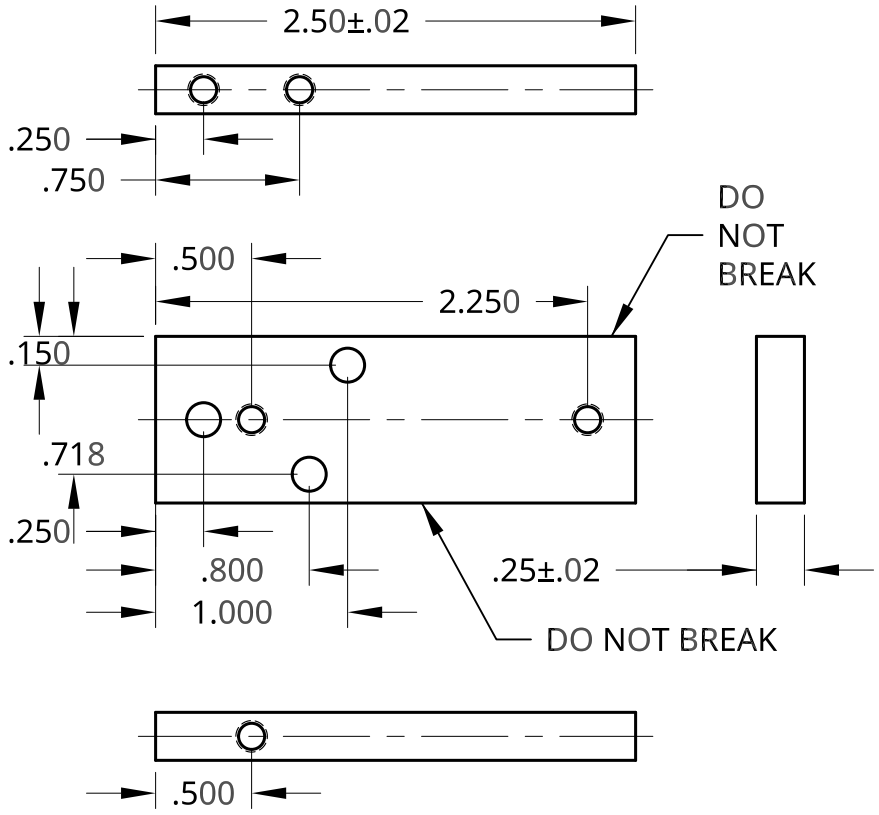
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL	STEEL, ALUM. OR BRASS	FINISH

CircuitousRoot

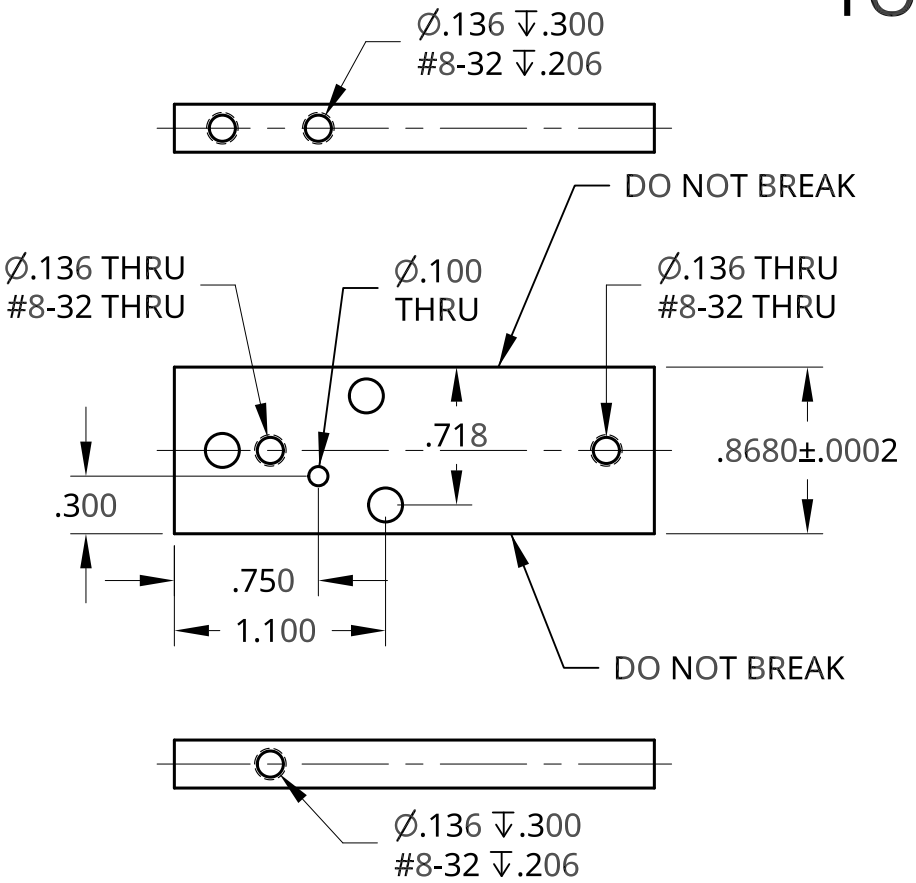
TITLE: HMB - HAND MOLD B
1HMB2 BASE PLATE (TOP)

SIZE	DWG NO.	REV.
A		
SCALE 1:1	WEIGHT	SHEET 1 of 1

BOTTOM



TOP



OMITTED DIMENSIONS ON ONE
PART MAY BE INFERRED FROM THE OTHER

ALL UNSPECIFIED HOLES
ARE 0.177 CLEARANCE
THRU HOLES FOR #8 SCREWS

HOLE LOCATION
TOLERANCE: +/- 0.002

VERY LIGHTLY BREAK EDGES
EXCEPT AS NOTED

MOLD HEIGHT 0.868 = 0.918 - 0.050 DEPTH OF DRIVE.
NO COMPENSATION FOR TYPEMETAL SHRINKAGE.
(TYPEMETAL DOES SHRINK. ATF DID COMPENSATE FOR THIS.)

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL	STEEL, ALUM. OR BRASS	FINISH

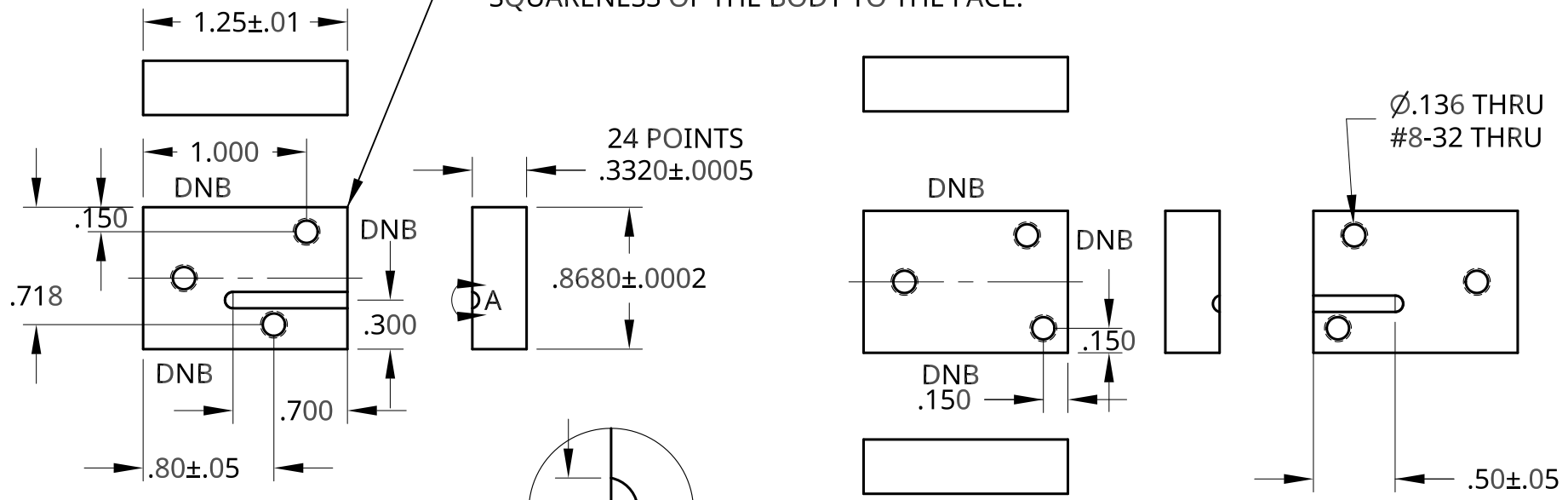
CircuitousRoot

TITLE: HMB - HAND MOLD B
2HMB1 AND 2HMB2
CARRIAGES

SIZE	DWG NO.	REV.
A		0
SCALE 1:1	WEIGHT	SHEET 1 of 1

BOTTOM

TOP



TYPEMETAL WILL FLOW INTO SPACES UNDER 0.001". THE PRECISION OF THE FIT OF THE NICK WIRE INTO ITS RECESSES IN THE BODY PIECES MUST BE AS CLOSE AS POSSIBLE.

MOLD HEIGHT 0.868 = 0.918 - 0.050 DEPTH OF DRIVE.
NO COMPENSATION FOR TYPEMETAL SHRINKAGE.
(TYPEMETAL DOES SHRINK. ATF DID COMPENSATE FOR THIS.)

OMITTED DIMENSIONS ON ONE PART MAY BE INFERRED FROM THE OTHER

HOLE LOCATION TOLERANCE: +/- 0.002

VERY LIGHTLY BREAK EDGES UNLESS NOTED "DNB"

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL: STEEL, ALUM. OR BRASS	FINISH	

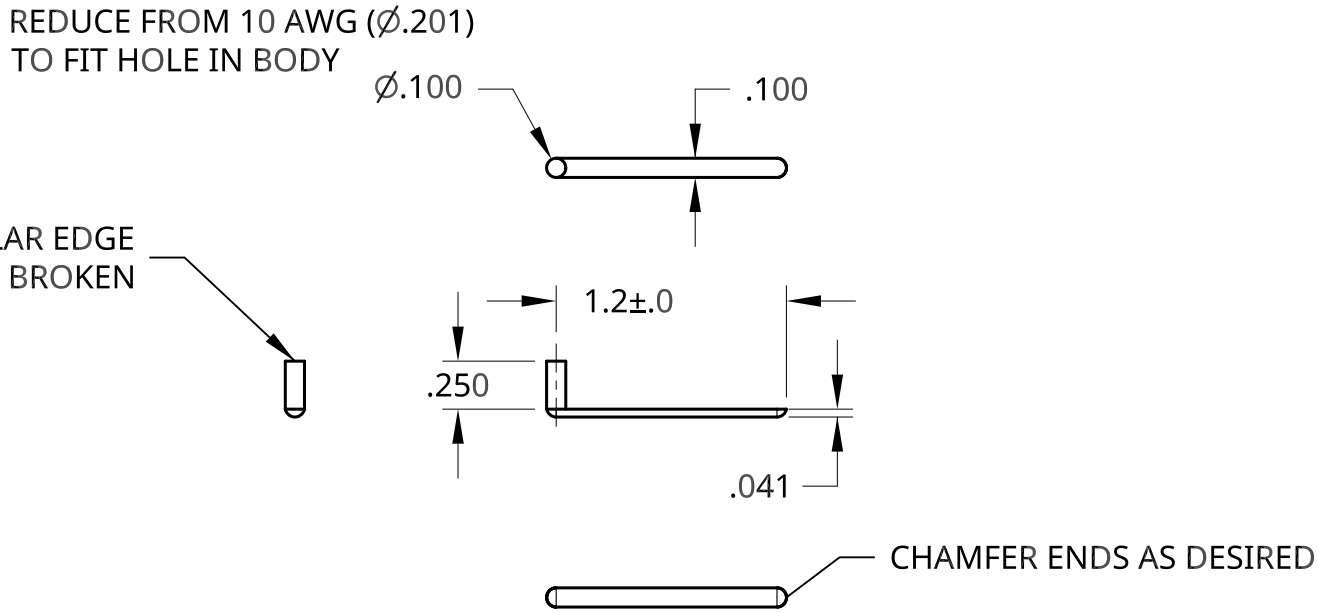
CircuitousRoot

TITLE: HMB - HAND MOLD B
3HMB1 AND 3HMB2
BODIES

SIZE	DWG NO.	REV.
A		0

SCALE	WEIGHT	SHEET
1:1		1 of 1

TOP



THIS MAY BE MADE AS A SINGLE PIECE BY COLD FORGING A SQUARE BEND IN A 10 AWG WIRE. ALTERNATIVELY, IT MAY BE MADE IN TWO PIECES WHICH ARE SILVER-BRAZED TOGETHER.

DO NOT BREAK ANY EDGES UNLESS NOTED

THE NICK WIRE IS A 10 AWG (Ø.102) WIRE CUT TO JUST UNDER HALF THICKNESS.

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL: STEEL	FINISH	

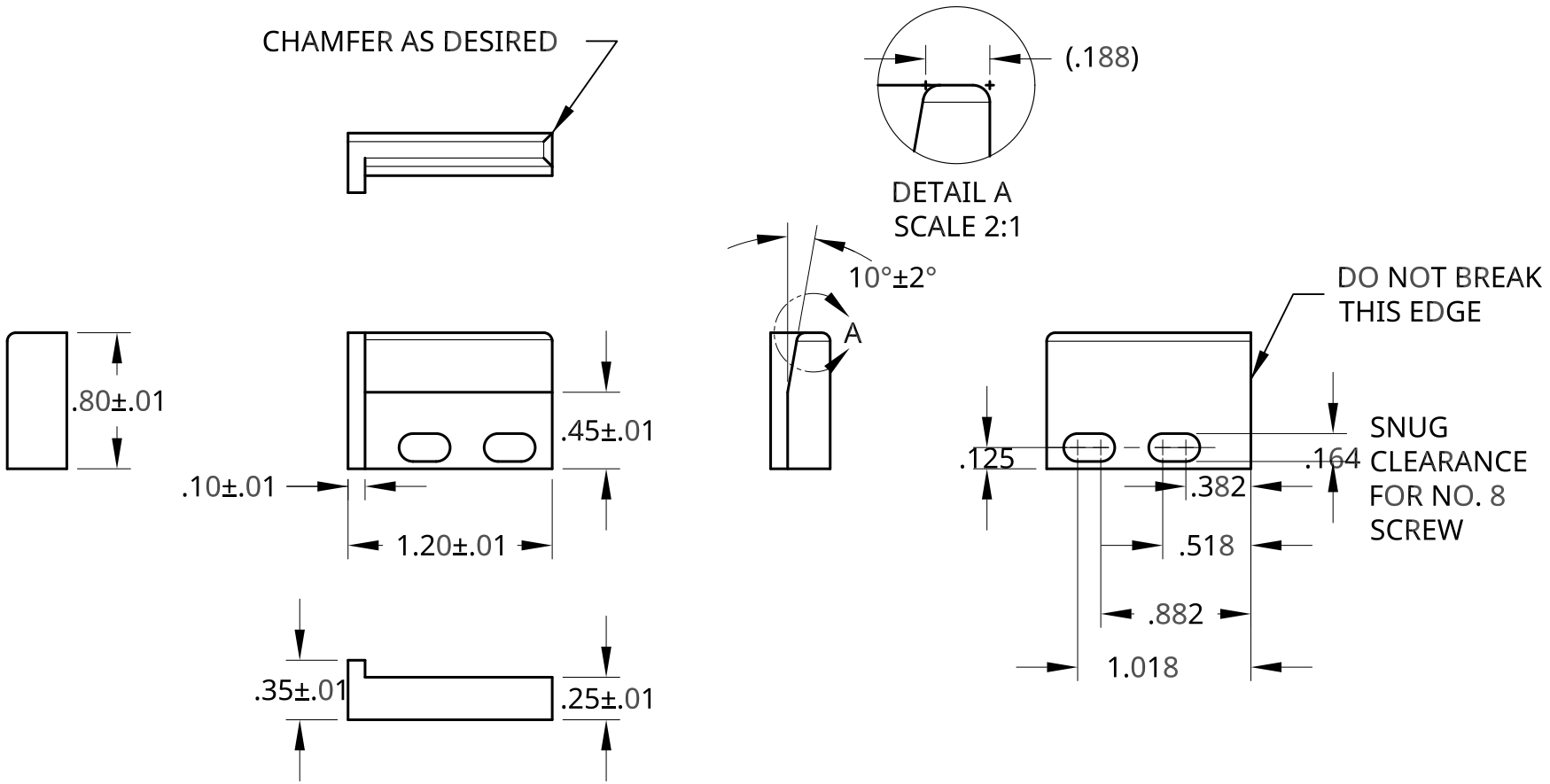
CircuitousRoot

TITLE: HMB - HAND MOLD B
4HMB1 NICK WIRE

SIZE	DWG NO.	REV.
A		0

SCALE	WEIGHT	SHEET
1:1		1 of 1

BOTTOM & TOP (SAME)



SLOT LOCATION
TOLERANCE: +/- 0.002

VERY LIGHTLY BREAK EDGES
UNLESS NOTED

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-02
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL: STEEL, ALUM. OR BRASS	FINISH	

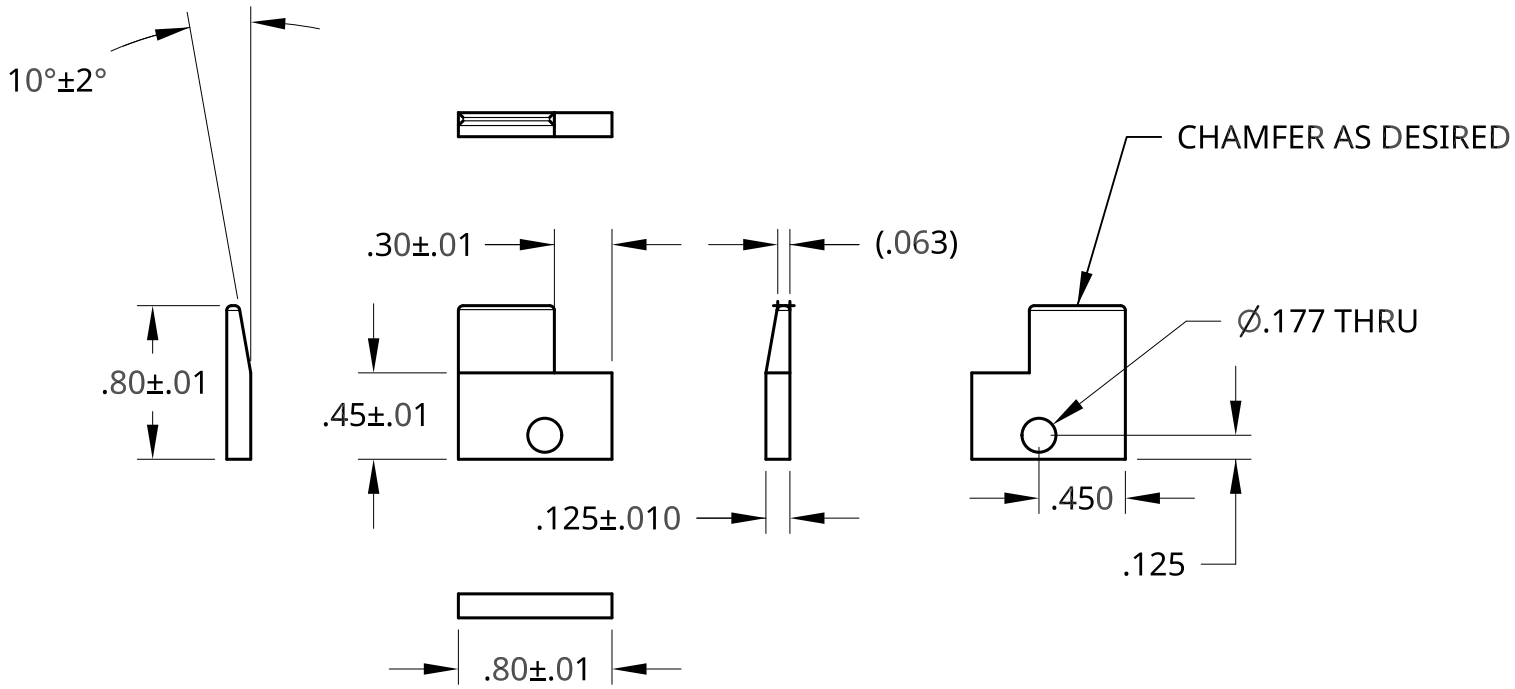
CircuitousRoot

TITLE: HMB - HAND MOLD B
6HMB1 AND 6HMB2
REGISTERS

SIZE	DWG NO.	REV.
A		0

SCALE	WEIGHT	SHEET
1:1		1 of 1

BOTTOM & TOP (SAME)



HOLE LOCATION
TOLERANCE: +/- 0.002

VERY LIGHTLY BREAK ALL EDGES

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL	STEEL, ALUM. OR BRASS	FINISH

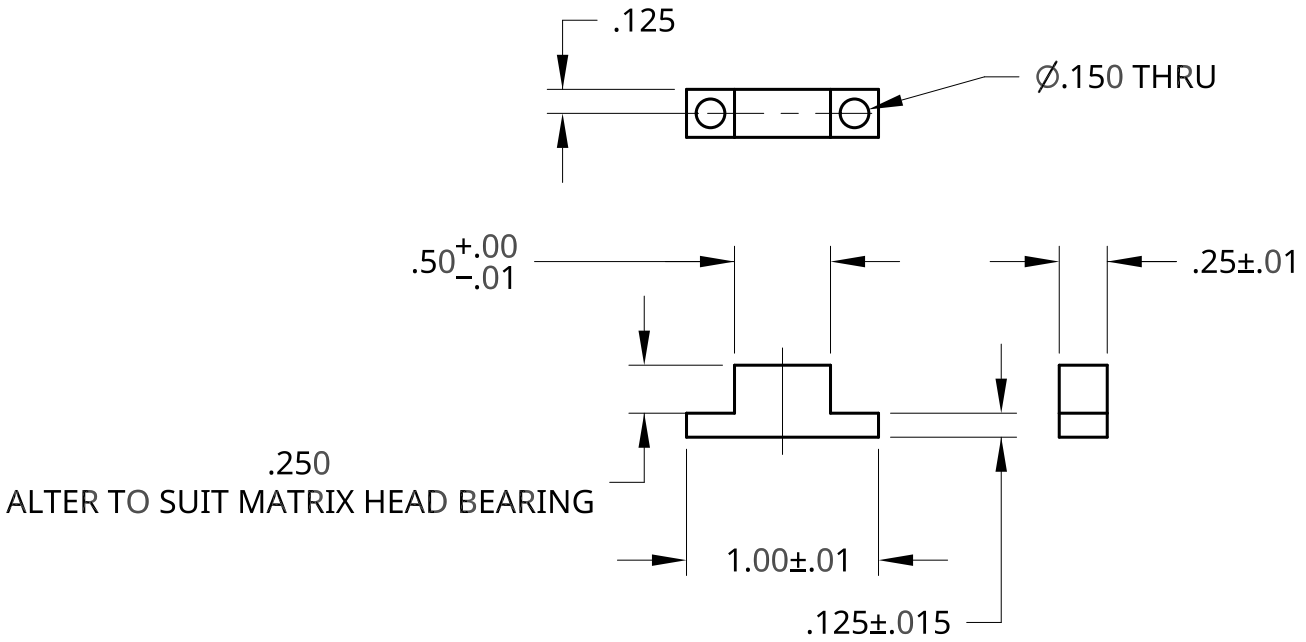
CircuitousRoot

TITLE: HMB - HAND MOLD B
7HMB1 WINGS

SIZE	DWG NO.	REV.
A		0

SCALE	WEIGHT	SHEET
1:1		1 of 1

BOTTOM



HOLE LOCATION
TOLERANCE: +/- 0.002

VERY LIGHTLY BREAK ALL EDGES

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL	STEEL, ALUM. OR BRASS	FINISH

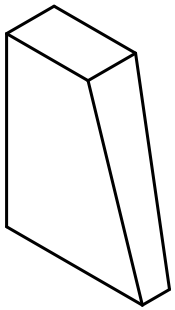
CircuitousRoot

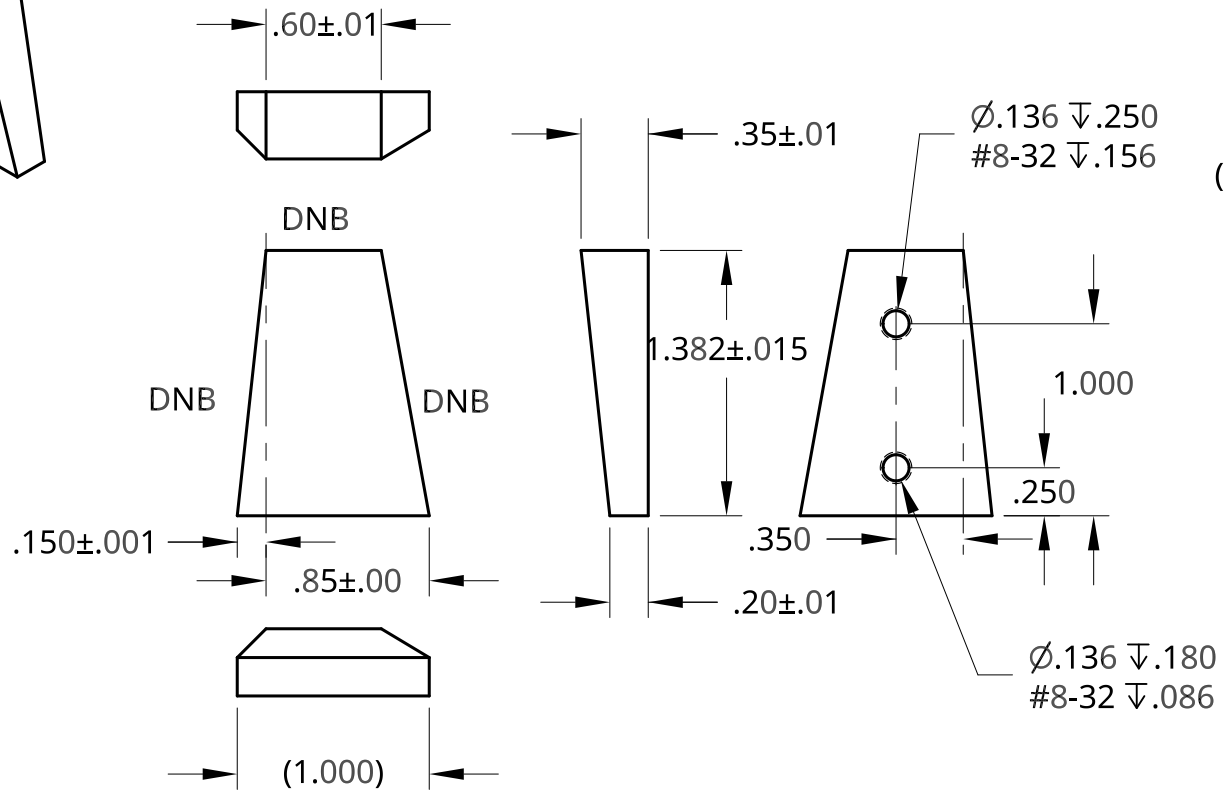
TITLE: HMB - HAND MOLD B
8HMB1 STOOL

SIZE A	DWG NO.	REV. 0
SCALE 1:1	WEIGHT	SHEET 1 of 1

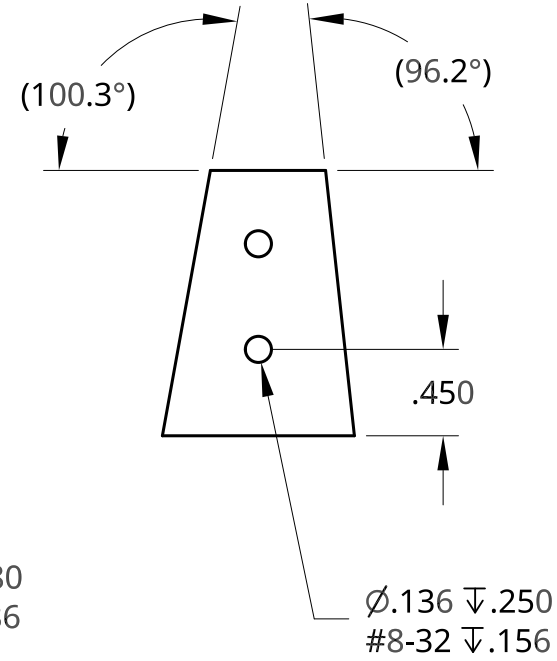
BOTTOM

TOP





(IT IS PROBABLY EASIER TO WORK TO LINEAR DIMENSIONS RATHER THAN ANGLES)



3HMB1 (BOTTOM)

3HMB7 (TOP)
IDENTICAL EXCEPT FOR OUTER HOLE

OMITTED DIMENSIONS ON ONE PART MAY BE INFERRED FROM THE OTHER

HOLE LOCATION TOLERANCE: +/- 0.002

VERY LIGHTLY BREAK EDGES UNLESS NOTED "DNB"

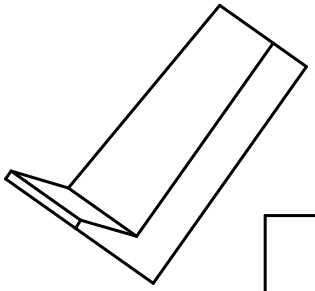
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL: STEEL, ALUM. OR BRASS	FINISH	

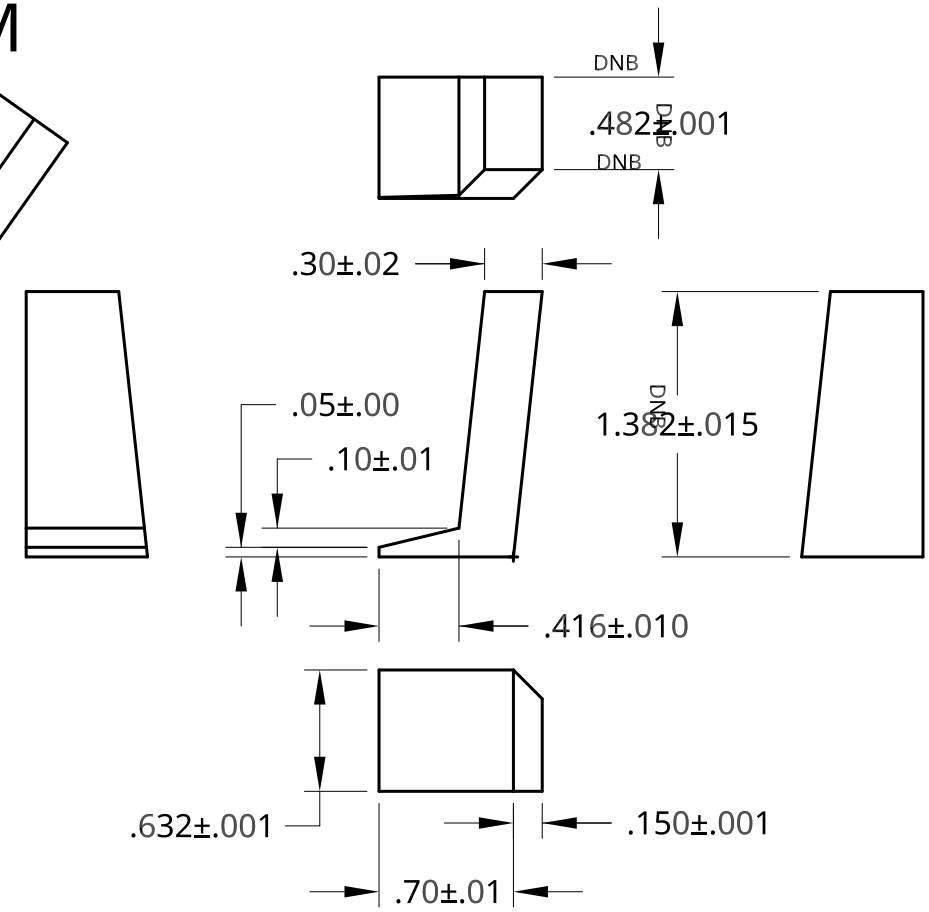
CircuitousRoot

TITLE: HMB - HAND MOLD B
9HMB1 AND 9HMB6
MOUTHPIECE PLATES

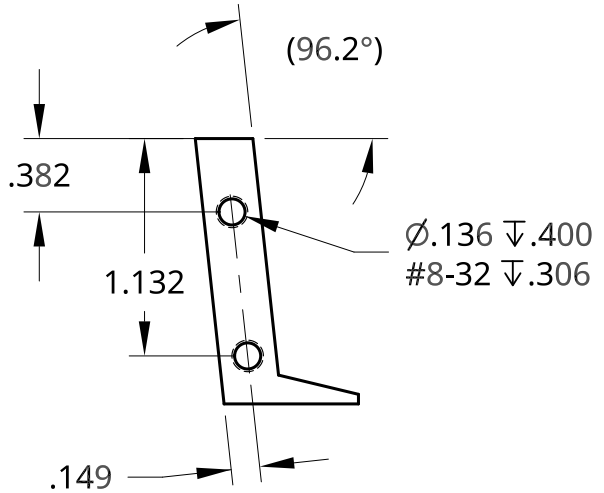
SIZE	DWG NO.	REV.
A		0
SCALE 1:1	WEIGHT	SHEET 1 of 1

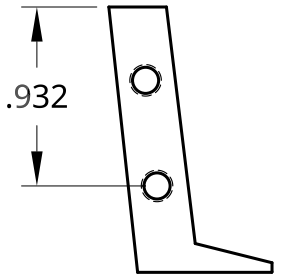
BOTTOM





(IT IS PROBABLY EASIER TO WORK TO LINEAR DIMENSIONS RATHER THAN ANGLES)





TOP

3HMB4 (BOTTOM)

3HMB10 (TOP) IDENTICAL EXCEPT FOR THIS DIMENSION

OMITTED DIMENSIONS ON ONE PART MAY BE INFERRED FROM THE OTHER

HOLE LOCATION TOLERANCE: +/- 0.002

VERY LIGHTLY BREAK EDGES UNLESS NOTED "DNB"

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL	STEEL, ALUM. OR BRASS	FINISH

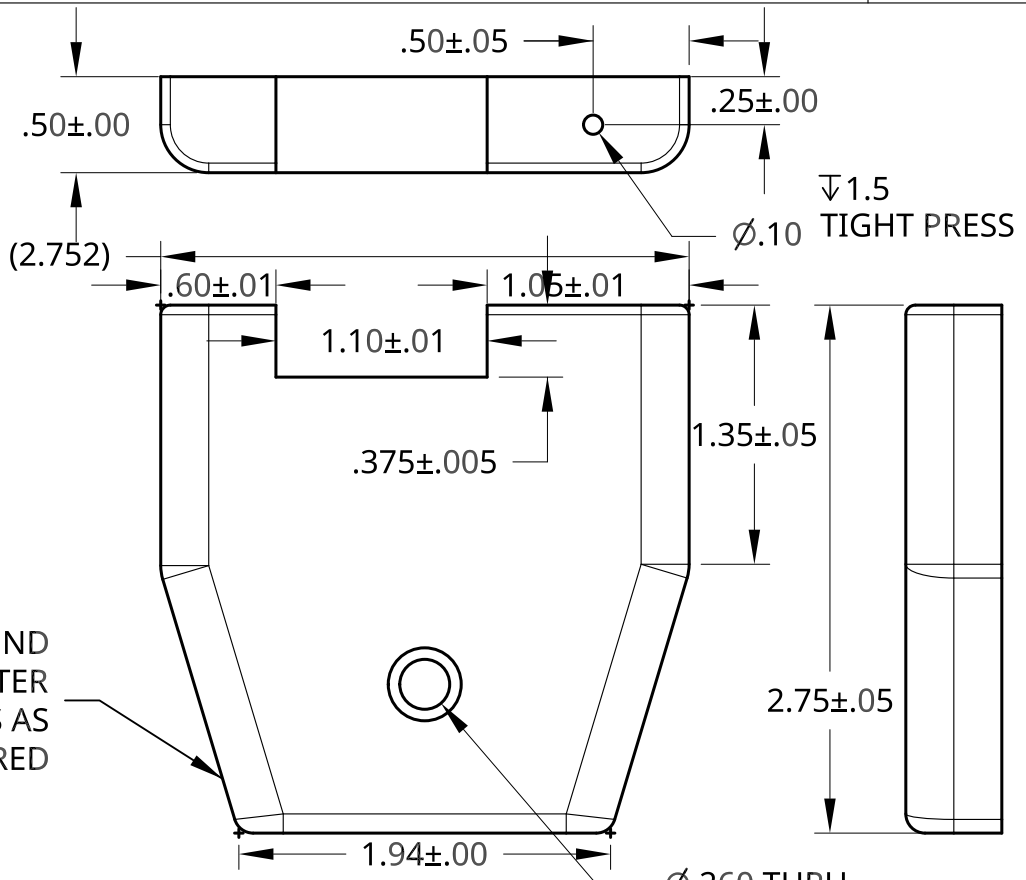
CircuitousRoot

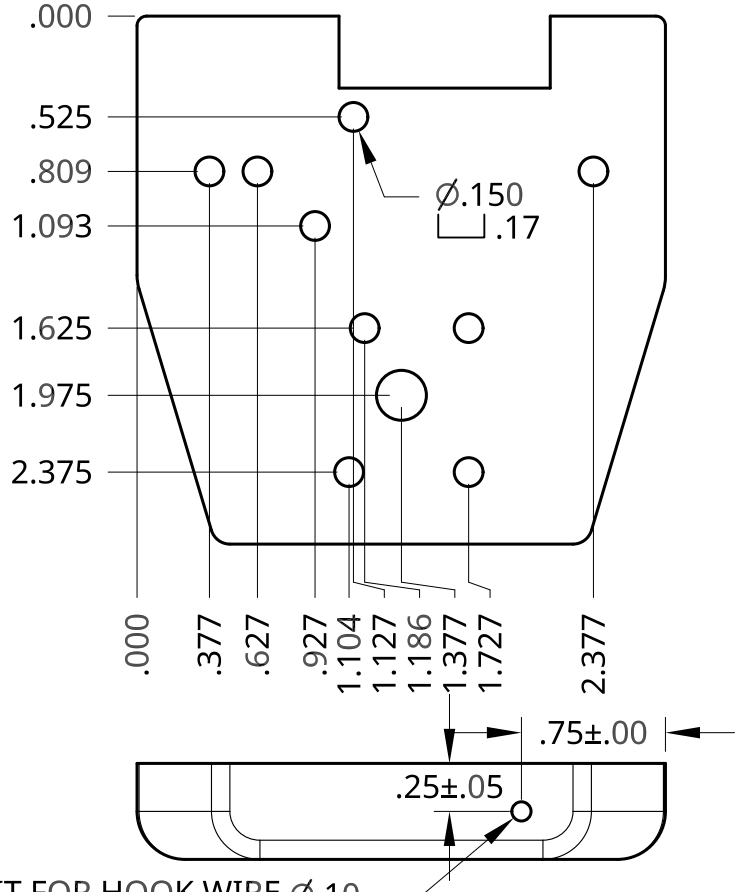
TITLE: HMB - HAND MOLD B
9HMB5 AND 9HMB9
MOUTHPIECE SIDEWALLS

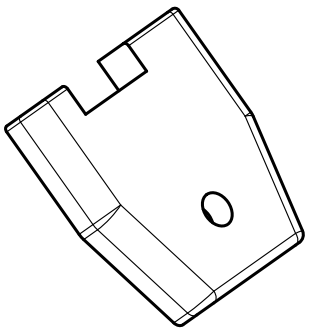
SIZE	DWG NO.	REV.
A		0

SCALE	WEIGHT	SHEET
1:1		1 of 1

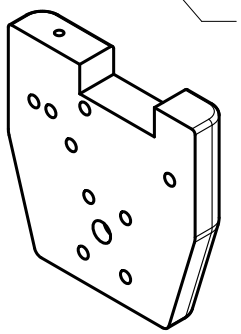
BOTTOM







SCALE 1:2



SCALE 1:2

HOLE LOCATION TOLERANCE: +/- 0.002

VERY LIGHTLY BREAK EDGES EXCEPT AS NOTED

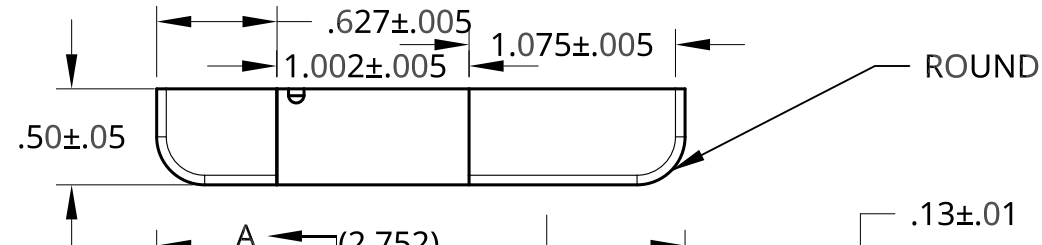
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL	FINISH	
	WOOD		

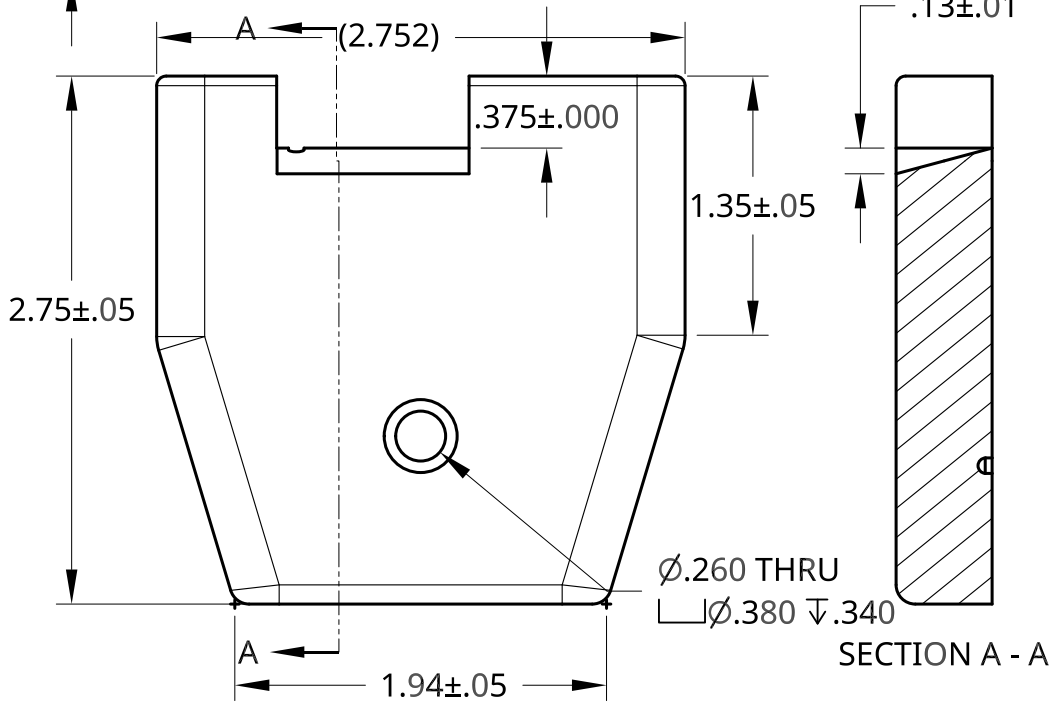
CircuitousRoot

TITLE: HMB - HAND MOLD B
10HMB1 WOOD (BOTTOM)

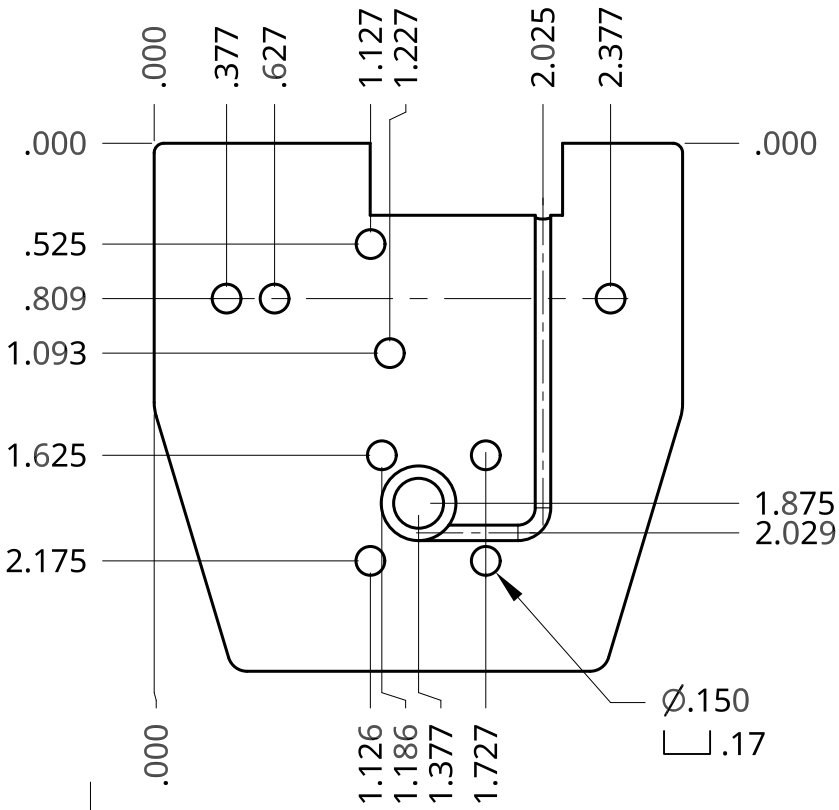
SIZE	DWG NO.	REV.
A		0
SCALE 1:1	WEIGHT	SHEET 1 of 1

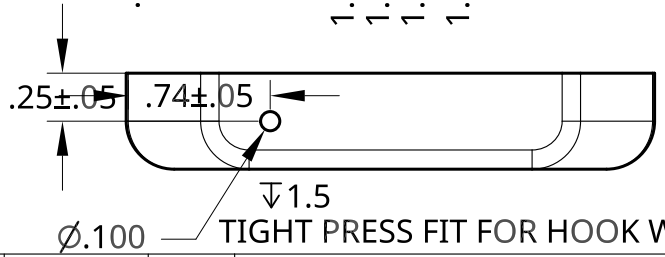
TOP

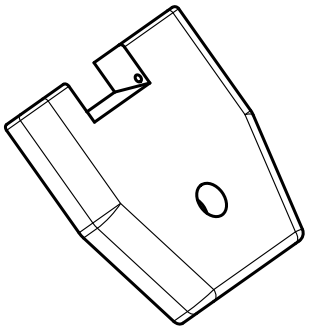




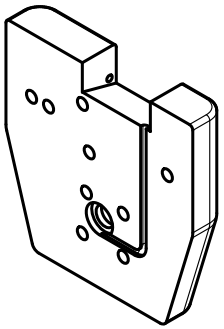
SECTION A - A







SCALE 1:2



SCALE 1:2

HOLE LOCATION
TOLERANCE: +/- 0.002

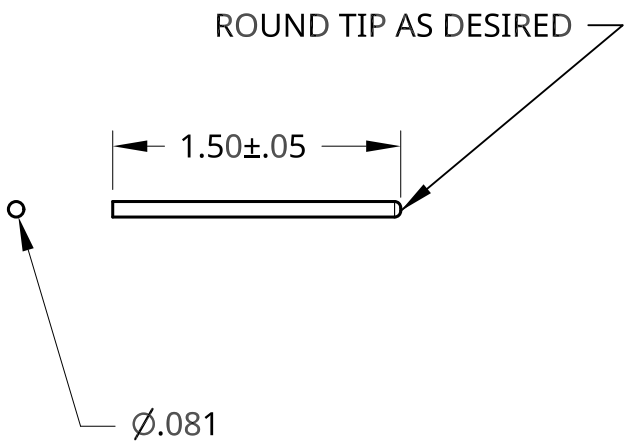
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL	WOOD	FINISH

CircuitousRoot

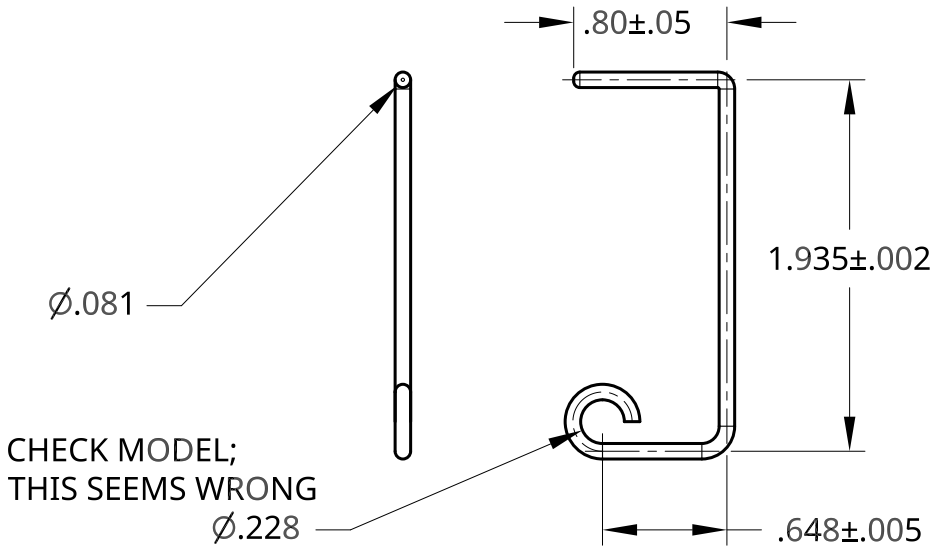
TITLE: HMB - HAND MOLD B
10HMB2 WOOD (TOP)

SIZE	DWG NO.	REV.
A		0
SCALE 1:1	WEIGHT	SHEET 1 of 1

TOP



11HMB1 GIMLET



11HMB2 JOBBET

BOTH ARE 12 AWG STEEL WIRE

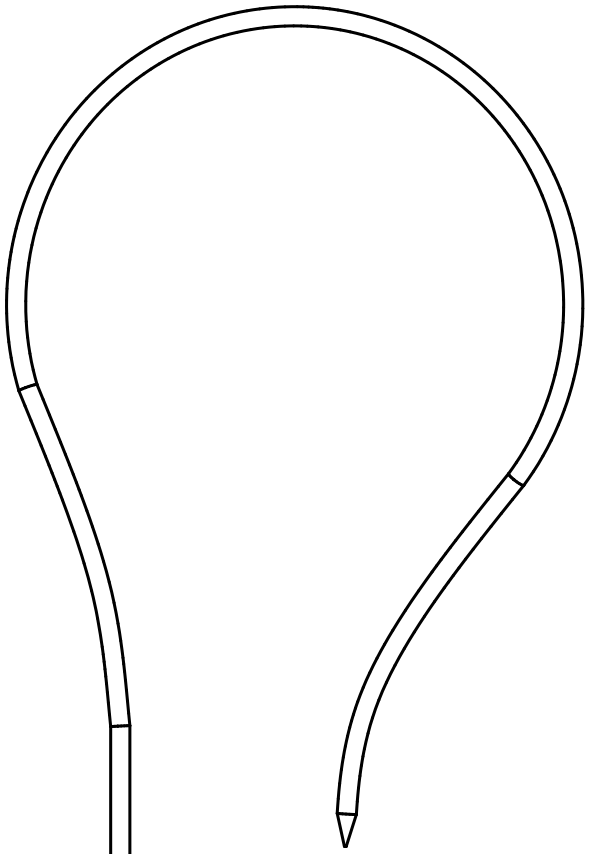
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL	FINISH	
	STEEL		

CircuitousRoot

TITLE: HMB - HAND MOLD B
11HMB1 GIMLET
11HMB2 JOBBET

SIZE	DWG NO.	REV.
A		0
SCALE 1:1	WEIGHT	SHEET 1 of 1

BOTTOM



SHARPEN TIP AS DESIRED

REDIMENSION MODEL
TO AN AWG SIZE
.100

MAKE TO SUIT OUT OF STEEL SPRING WIRE

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL	STEEL	FINISH

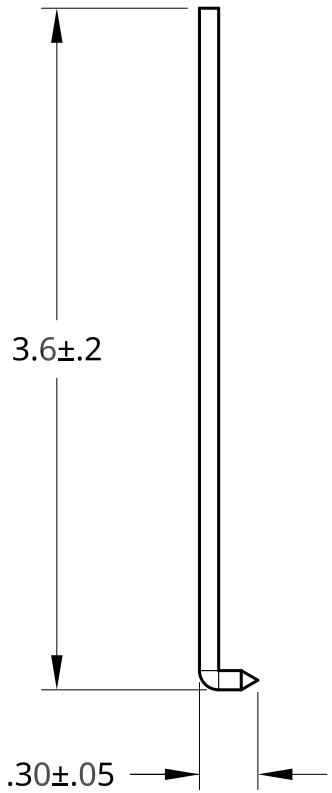
CircuitousRoot

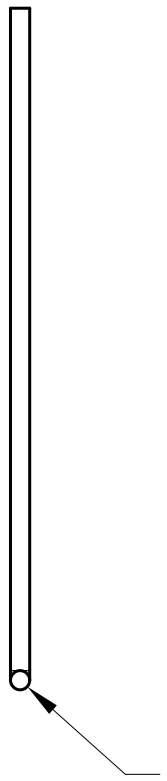
TITLE: HMB - HAND MOLD B
12HMB1 BOW

SIZE	DWG NO.	REV.
A		0

SCALE	WEIGHT	SHEET
1:1		1 of 1

BOTTOM & TOP (SAME)





REDIMENSION MODEL TO AN AWG SIZE

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		NAME	DATE
	DRAWN	DMM	2019-08-01
	CHECKED		
	APPROVED		
DO NOT SCALE DRAWING			
THIRD ANGLE PROJECTION	MATERIAL	FINISH	
	STEEL		

CircuitousRoot

TITLE: HMB - HAND MOLD B
13HMB1 HOOKS

SIZE	DWG NO.	REV.
A		0

SCALE	WEIGHT	SHEET
1:1		1 of 1