The Fowler Calculators – a Catalogue Raisonné[1]

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Introduction

The purpose of this article is twofold: First, it provides a catalog of known models with descriptions of their cases and their scales. Second, pictures are provided of many of the models that Fowler produced.

Several articles have been written about William H. Fowler, the history of his company and his calculators, but no comprehensive *catalogue raisonné* of the different Fowler Calculator models and scale varieties has ever been developed. To date, we have identified and described 50 different models and scale varieties. However, we certainly do not believe that this catalog is now absolutely complete and we fully expect that its publication will inspire collectors to compare their Fowler's calculators to the list and report additional candidates for inclusion in the catalog.

Two serious problems were encountered in the development of this catalog: (1) Fowler's calculators, their instructions, and their advertisements have virtually no useful dating information to aid in the development of a chronology of model groups, and (2) the illustrations of Fowler's calculators in their instructions and advertisements show only the basic models, not any of the many scale varieties. Hence, our chronology had to be developed by inference from the progression of manufacturing approaches, and the actual list of models and scale varieties had to be developed from Fowler's calculators that we have actually handled and/or from scanned images of Fowler's calculators in private collections.

The catalog is divided into three parts:

1. Six groups of "early" and "transition" models, listed in inferred chronological order (2A, 2B, 2C, 3D, 2E, and 2F - 2 for 2-1/2 in. diameter and 3 for 3-1/4 in. diameter),

2. Three groups of "modern models", listed by size (2M, 3M, and 4M - 2 for 2 1/2 in. diameter, 3 for 3 3/8 in. diameter, and 4 for 4 5/8 in. diameter), and

3. The 4-1/2 in. Fowler Junior Calculator (4MJR).

Within each group, the models are further broken down into general-purpose Calculators (G) or special-purpose Calculators: (T) for textile, (A) for artillery, (N) for nautical, (MT) for machine time and (MP) for Mackay Paper & Board.

First Group

• **2A)** The first early 2-1/2 in. diameter double-sided Calculator models, with a one-piece die cast case and a back button to rotate the front scale:

2AG1) Fowler's Calculator (w/back button)
(marked "Scientific Publishing Co., Manchester Eng.")
5 circles (front): Logarithms, "Short Scale", Long Scale (2 circles), Degrees ($0° - 90°$ logarithmic)
4 circles (back): "Short Scale", Cubes and Cube Roots (3 circles)

2AT1) Fowler's Textile Calculator (w/back button)
(marked "Scientific Publishing Co., Manchester Eng.")
3 circles (front): "Short Scale", Fractions, Weft
2 tables (back): Looms, Reeds

• **2B)** Transition early 2-1/2 in. diameter double-sided Calculator models, with the same one-piece die cast case as the 2A models,

2BG1) Fowler's Calculator - Type O
(marked "Scientific Publishing Co., Manchester Eng.")
5 circles (front):
Logarithms, "Short Scale", Long Scale (2 circles), Degrees ($0° - 90°$ logarithmic)
4 circles (back):
"Short Scale", Cubes and Cube Roots (3 circles)

2BT1) Fowler's Textile Calculator - Type T
Guaranteed (marked "Scientific Publishing Co., Manchester Eng.")
3 circles (front): "Short Scale", Fractions, Weft
2 tables (back): Looms, Reeds

• **2C)** The last early 2-1/2 in. diameter double-sided Calculator models, with the same one-piece die cast case as the 2A and 2B models:

The five general purpose models are made up from the following four faces:

#1 Front Dial (Type H) - supplied with Back Dial like #3 or #4
- 6 circles: "Short Scale", Reciprocals, Logarithms, Square Roots (2 circles), Sines ($5°45' - 90°$)

#2 Front Dial (Type R) - supplied with Back Dial like #1, #3, or #4
- 6 circles: "Short Scale", Long Scale (5 circles)

#3 Back Dial Cube Roots
- 4 circles: "Short Scale", Cubes and Cube Roots (3 circles)

[1] We normally use the spelling *catalog,* but this phrase is french in origin, hence the spelling.

#4 Back Dial Conversion Scale
- 5 circles: Inches, Millimetres, Whit Pipe Threads (3 half-circle tables), Whit Bolts (3 half-circle tables)

2CG1)) Fowler's Calculator - Type H
Front Dial: (Type H)
Back Dial: Cube Roots

2CG2a) Fowler's Calculator - Type R
Front Dial: (Type R)
Back Dial: Cube Roots

2CG2b) Fowler's Calculator - Type O
(identical to the Type R)
Front Dial: (Type R)
Back Dial: Cube Roots

2CG3) Fowler's Calculator - Type A
Front Dial: (Type H)
Back Dial: Conversion Scale

2CG4) Fowler's Calculator - Type A1
Front Dial: (Type R)
Back Dial: Conversion Scale

2CG5) Fowler's Calculator - Type RX
Front Dial: (Type R)
Front Dial: (Type H)

2CA1) Fowler's "Artillery" Calculator
8 circles (front):
"Short Scale", Reciprocals, Square Roots (2 circles), Log Sines ($5°45' - 90°$), Log Tangents ($5°45' - 45°$), Log Sines ($35' - 5°45'$), Logarithms
8 circles (back):
Conversion Scales - Yards/Miles, Kilometres/Inches, Millimetres/Inches, Degrees F Degrees C

2CT1) Fowler's Textile Calculator - Type M
1 circle (front): "Short Scale"
(also divided by 8ths)
3 circles (back): Weft, Looms, Reeds

2CT2a) Fowler's Textile Calculator - Type E
1 circle (front): "Short Scale"
3 circles (back): Weft, Looms, Reeds

2CT2b) Fowler's Textile Calculator - Type E1
(identical to the Type E except more finely divided)
1 circle (front): "Short Scale"
3 circles (back): Weft, Looms, Reeds

- **3D)** Early 3-1/4 in. diameter single-sided Calculator models with same type one-piece die cast case as the 2A, 2B, and 2C models:

3DT1) Fowler's Textile Calculator - Type B
1 circle: "Short Scale"

- **2E)** Transition 2-1/2 in. diameter double-sided Calculator model with a two-piece sheet metal case and a fixed outer scale:

2EG1) Fowler's Circular Slide Rule (w/fixed outer scale)
7 circles (front): "Short Scale" (fixed), "Short Scale"(movable), Logarithms, Square Roots (2 circles), Log Sines ($5°45' - 90°$), Log Tangents ($5°45' - 45°$)
6 circles (back): Reciprocals, "Short Scale", Cubes and Cube Roots (3 circles), Log Sines ($35' - 5°45'$)

- **2F)** Transition 2-1/2 in. diameter double-sided Calculator models with a two-piece sheet metal case and three stems (two stems are active control knobs and the center stem is simply decorative with a metal bow):

2FG1) Fowler's Calculator (w/three stems)
7 circles (front):
"Short Scale", Reciprocals, Logarithms, Square Roots (2 circles), Log Sines ($5°45' - 90°$), Log Tangents ($5°45' - 45°$)
7 circles (back): same as front

2FT1a) Fowler's Textile Calculator - Short Scale Type (w/three stems)
1 circle (front): "Short Scale"
3 circles (back): Weft, Looms, Reeds

2FT1b) Fowler's Textile Calculator - Short Scale Type (w/three stems)
1 circle (front): "Short Scale"
3 circles (back): Weft, Cloths, Reeds

- **2M)** Modern 2-1/2 in. diameter double-sided Calculator models with a two-piece sheet metal case:

2MG1) Fowler's Calculator
7 circles (front): "Short Scale", Reciprocals, Logarithms, Square Roots (2 circles), Log Sines ($5°45' - 90°$), Log Tangents ($5°45' - 45°$)
7 circles (back): same as front

2MG2) Fowler's Long Scale Calculator
7 circles (front): "Short Scale", Long Scale (6 circles)
8 circles (back): "Short Scale", Reciprocals, Logarithms, Square Roots (2 circles), Log Sines ($5°45' - 90°$), Log Tangents ($5°45' - 45°$), Log Sines ($35' - 5°45'$)

2MA1) Fowler's Artillery Calculator
6 circles (front):
"Short Scale", Reciprocals, Log Sines ($5°45' - 90°$), Log Tangents ($5°45' - 45°$), Log Sines ($35' - 5°45'$), Logarithms
8 circles (back): Conversion Scales - Yards/Miles, Kilometres/Inches, Millimetres/Inches, Degrees F/Degrees C

2MMT1) Fowler's Patent "Machine Time Computer"[2]
X circles (front):
Y circles (back):

2MT1a) Fowler's Textile Calculator - Short Scale Type
1 circle (front): "Short Scale"
3 circles (back): Weft, Looms, Reeds
Instructions: 16- or 26-page booklet

2MT1b) Fowler's Textile Calculator - Short Scale Type
1 circle (front): "Short Scale"
3 circles (back): Weft, Cloths,
(Two in a Dent) Reeds
Instructions: 16- or 26-page booklet

2MT1c) Fowler's Textile Calculator - Short Scale Type
1 circle (front): "Short Scale"
3 circles (back): Weft, Cloths, Reeds
Instructions: 16- or 26-page booklet

2MT1d) Fowler's Textile Calculator - Short Scale Type
1 circle (front): "Short Scale"
3 circles (back): Weft, Cloths,
(Two in a Dent) Reeds (Plains)
Instructions: 16- or 26-page booklet

2MT1e) Fowler's Textile Calculator - Short Scale Type
1 circle (front): "Short Scale"
Single-sided Calculator with solid metal back
Instructions: 16- or 26-page booklet

2MT1f)) Fowler's Textile Calculator - Short Scale Type
1 circle (front): "Short Scale"
Pick Finding (back): Reeds, Cloth Width (3 half-circle tables),
Basis, Low Picks, Pickfinding, High Picks (4 quarter-circle tables)
Instructions: 16- or 26-page booklet

2MT2a) Fowler's Textile Calculator - Long Scale Type
2 circles (front): "Long Scale" (2 circles)
3 circles (back): Weft, Looms, Reeds
Instructions: 16- or 26-page booklet

2MT2b) Fowler's Textile Calculator - Long Scale Type
2 circles (front): "Long Scale" (2 circles)
3 circles (back): Weft, Cloths,
(Two in a Dent) Reeds
Instructions: 16- or 26-page booklet

2MT2c) Fowler's Textile Calculator - Long Scale Type
2 circles (front): "Long Scale" (2 circles)
3 circles (back): Weft, Cloths, Reeds
Instructions: 16- or 26-page booklet

2MT2d) Fowler's Textile Calculator - Long Scale Type
2 circles (front): "Long Scale" (2 circles)
3 circles (back): Weft, Cloths,
(Two in a Dent) Reeds (Plains)
Instructions: 16- or 26-page booklet

2MT2e) Fowler's Textile Calculator - Long Scale Type
2 circles (front): "Long Scale" (2 circles)
Single-sided Calculator with solid metal back
Instructions: 16- or 26-page booklet

- **3M)** Modern 3-3/8 in. diameter single-sided Calculator models with a two-piece sheet metal case, or with a one-piece sheet metal front and a flat black plastic back or a molded brown bakelite back.

3MG1) Fowler's "Universal" Calculator
9 circles: "Short Scale", Reciprocals, Logarithms, Cubes and Cube-Roots (3 circles), Sines ($5°45' - 90°$), Sines ($35' - 5°45'$), Tangents ($5°45' - 45°$)
Instructions: 48-page booklet

3MG2) Fowler's "Twelve-Ten" Calculator
7 circles: "Tenths", Reciprocals, "Twelfths" (10-100), "Twelfths" (1-10), Sines ($6° - 90°$), Sines ($35' - 6°$), Tangents ($6° - 45°$)
Instructions: 99-page booklet

3MT1a) Fowler's Textile Calculator - Type B
1 circle: "Short Scale" (also divided by 16ths)
Instructions: 42-page booklet

3MT1b) Fowler's Textile Calculator - Type B
4 circles: "Short Scale" (also divided by 16ths), Weft, Looms, Reeds
Instructions: 42-page booklet

3MT1c) Fowler's Textile Calculator - Type B
2 circles: "Short Scale" (also divided by 16ths),
$\pm$ Scale (-40 to +60)
Instructions: 42-page booklet

- **4M)** Modern 4-5/8 in. diameter single-sided Calculator models with a two-piece sheet metal case, with or without a glued-on textured vinyl covering on the back.

4MG1) Fowler's "Magnum" Long Scale Calculator
14 circles:
"Short Scale", Reciprocals, Square Roots (2 circles), "Long Scale" (6 circles), Logarithms, Sines ($5°45' - 90°$),
Sines ($35' - 5°45'$), Tangents ($5°45' - 45°$)
Instructions: 27- or 30-page booklet

4MG2) Fowler's "Jubilee Magnum" Extra Long Scale Calculator

[2]This model is known to be in a private collection; a description of the scales was not available in time for this catalog list.

13 circles: "Short Scale", Reciprocals, Logarithms, "Long Scale" (10 circles)
Instructions: Interim Instruction Leaflet or 26-page booklet

4MN1) Fowler's Nautical Calculator
6 circle pairs: Sine/Long (6 circle pairs)

4MMP1) The Mackay Paper & Board Calculator
3 circles: Outer Scale (fixed), Middle Scale (movable), Inner Scale (movable)
Instructions: 14-page booklet by the F. Mackay & Co.

4MT1a) Fowler's Textile Calculator
1 circle: "Short Scale"
Instructions: 42-page booklet

4MT1b) Fowler's Textile Calculator
2 circles: "Short Scale", ± Scale (-40 to +60)
Instructions: 42-page booklet

4MT1c) Fowler's Textile Calculator
4 circles: "Short Scale", Weft, Cloths, (Two in a Dent) Reeds
Instructions: 42-page booklet

4MT2a) Fowler's "Magnum" Textile Calculator
1 circle: "Short Scale"
Instructions: 42-page booklet

4MT2b) Fowler's "Magnum" Textile Calculator
2 circles: "Short Scale" (also divided by 16ths), ± Scale (-40 to +60)
Instructions: 42-page booklet

4MT2c) Fowler's "Magnum" Textile Calculator
4 circles: "Short Scale", Weft, Looms, Reeds
Instructions: 42-page booklet

- **4MJR)** Modern 4-1/2 in. diameter double-sided Fowler's "Junior Calculator" with aluminum frame, movable white celluloid center (with scales on both sides), and movable clear celluloid on both sides (with the cursors).

  4MJRG1) Fowler's "Junior Calculator"
  9 circles (front): "Short Scale", Reciprocals, Logarithms, Cubes and Cube-Roots (3 circles), Sines ($5°45' - 90°$), Sines ($35' - 5°45'$), Tangents ($5°45' - 45°$)
  7 circles (back): "Short Scale" (fixed), "Short Scale" (movable), Logarithms, Square Roots (2 circles), Sines ($5°45' - 90°$), Tangents ($5°45' - 45°$)

Discussion and Observations Regarding Fowler Calculator Varieties

The 2-1/2-inch Calculators

Figures 1 and 2 represent an early example of the Fowler Textile Calculator (2AT1) that the authors believe to be the first offering of this prolific line of devices to carry the Fowler name. Note the distinctive reverse center knob for directly controlling the obverse pointer and also the reference to the Scientific Publishing Company directly printed on the face. The exact body type with center knob is also found on the early Fowler's Cube and Cube Roots Calculator (2AG1) seen in Figures 3 and 4. Again, note the Scientific Publishing Company reference. (An early Fowler's reference [1] featuring an advertisement and picture for The Mechanical Engineer Pocket Calculator clearly ties this to the Fowler calculator, but due to the focus of this article, the authors consider The Mechanical Engineer to precede the Fowler Calculator.)

The diameter of the body is approximately 2-1/2 in., and is typical of the numerous small-sized Fowler calculator types that followed and included the Types O, T, A, A1, H, R, RX, Long Scale, Short Scale Textile, Long Scale Textile, and Textile Types E, E1, and M.

The Type O Calculator (2BG1) (Figures 5 and 6) is representative of the Fowler second body type. Here, the metal body still consists of one continuous piece with no seams or separations evident anywhere. From the figures, one can see that the Type O scales are identical to those of the Fowler Cube and Cube Roots Calculator (2AG1) with all face and cursor controls moved to the edges of the device. Analogous to this change, the Type T Textile (2BT1) is the direct successor to the Fowler Textile Calculator (2AT1).

The Fowler Artillery Calculator (2MA1), pictured in Figures 7 and 8, is representative of the third type of 2-1/2 in. diameter body type. Here the metal body is made of two distinct parts with a corrugated metal edge on both halves to provide a snug friction fit. Both Artillery Calculator varieties appear to be quite uncommon and very difficult to find.

Unusual circular equivalency conversion tables are featured on the Short Scale Textile Calculator with Pickfinding (2MT1f) (Figure 9) reverse. More research is necessary to understand the purpose and utility of these tables and to identify whether the different Textile Calculator reverse varieties can be correlated to a manufacturing time line.

At least eight special-purpose calculators or special variations of this size have been identified and include: Fowler Artillery (two types), Fowler Machine Time Computer, Fowler Short Scale Textile with Pickfinding Variety reverse, Fowler Calculator (two varieties), Fowler Circular Slide Rule, and Fowler Circular Slide Rule with one outer scale fixed to the body. Also it should be noted that within the Short and Long Scale Textile Calculator family, several reverse table variations exist: [WEFT, LOOMS, REEDS], [WEFT, CLOTHS, REEDS], [WEFT, CLOTHS, Two in a Dent REEDS], [WEFT, CLOTHS,

Two in a Dent REEDS Plains], and, finally, a variety with a metal back, the latter being the only single-sided variety of this group.

One particularly unusual special-purpose example that belongs to one of the authors features a removable front glass and a series of cardboard scales that can be attached to the center to change the obverse scale. Since this could be the result of an after-factory modification, this was not included as one of the types in the catalog. The base model is that of an RX calculator with one-piece body, with additional Artillery Scale and other general engineering scales that can be attached, all covered in one of the other types of Fowler calculator within the catalog.

Many of these types can also be found with two edge-stems, each controlling a face or a cursor, or with three edge-stems, where two stems are active control knobs and the center stem is simply decorative with a metal bow.

Although not every single type of each of these obverse/reverse/stem number variety combinations has been actually observed on both the Short Scale and Long Scale Textile calculators (e.g., no Long Scale Textile with three stems with [WEFT, CLOTHS, Two in a Dent REEDS Plains] reverse has actually been observed), a logical extension of the major known variations was made in developing the comprehensive listing in this article.

The 3-3/8-inch Calculators

Fowler also produced 3-3/8 in. models, all of them single-sided only. These include the Universal, the "12-10", and four varieties of the Textile Type B. All models typically featured either a friction-fit metal, a friction-fit bakelite, or screw-attached plastic reverse, with the notable exception being the one-piece Fowler Textile Type B, Variety I (3MT1). It is generally believed that the metal back and the bakelite back were manufactured in parallel, with the bakelite backing representing a considerably lighter version of the calculator. The screw-attached plastic reverse appears to be of later manufacture, since all of these models also carry the notation "Established 1898" on the face, which was first used in 1948 during the 50th anniversary year of Fowler Calculators, Ltd. This notation was first featured on the Fowler Jubilee Magnum Extra Long Scale (4MG2), a 4-5/8 in. diameter model, issued to honor the 50th anniversary year. At this time, only four distinct varieties of the Type B are known and all are pictured in Figures 10 through 13.

Of the examples of the 3-3/8-inch calculators known, we believe that the Textile Type B, Variety I (3DT1) (Figure 10) is the earliest of the group. Note that the Variety I is unique among the Fowlers in that it is the only 3-inch model that utilizes the early needle pointer and one-piece die cast case type as found on the early 2-3/8-inch calculators. Textile Type B Varieties II and III (Figures 11 and 12) exhibit identical logarithmic scales, but Variety III contains additional non-logarithmic tables similar to those found on the Long and Short Scale Textile calculators. Variety IV (Figure 13) has added to it a -40% to +60% calculation scale and also contains the notation "Established 1898", and is therefore considered to be the final form of this type.

The 4-5/8-inch Calculators

Both of the examples shown in Figures 14 and 15, the Textile Calculator with [WEFT, LOOMS, REEDS] table and the Nautical Calculator, are single-sided, 4-5/8-inch diameter calculators, and are among the more unusual of Fowler's largest-sized calculators.

Models within this group include the Fowler Textile (two varieties), the Fowler Magnum Textile (two varieties), the Magnum Long Scale, the Jubilee Magnum Extra Long Scale, the Mackay Paper and Board Calculator, and the Nautical Calculator.

A large-sized "Fowler Long Scale Textile Calculator" has also been rumored but not seen nor verified by the authors. It is not clear at this time whether this is a new and distinct variety or an example of one of the four known large-sized textile models and hence, this model is not included in the listing.

Conclusion

We have endeavored to establish a system by which a collector can precisely identify his or her Fowler calculator as one of the known types or as a new type not specifically included in the catalog. It is fully expected that the publication of this catalog will encourage collectors to compare their examples to those in the table and report any new models or variations of models directly to the authors for inclusion in a subsequent and more comprehensive summary of the Fowler calculator. In fact, as this article was being written, several new types surfaced, and these were identified and added to the catalog right up to the final week before publication.

Previous articles on this subject [2, 3, 4] provide additional information as to history and case details, knob variants, inner gear workings, and model types. In particular, Peter Hopp's work identifies at least 30 different types of Fowler calculators. Although most are included in the catalog, the authors would like to bring special attention to those not included here with the hope that these models could be uniquely detailed as to exact scale layout and added to the catalog. These include the Type E1 (non-textile), Type MD, Type CSR, a second scale variation of both the Universal and Magnum Long Scale, and the Textile Long Scale. Anyone having specific information on these or any other unidentified types is encouraged to contact Rick Blankenhorn at rcb@gemmary.com or Bob De Cesaris at robert.g.de.cesaris@intel.com.

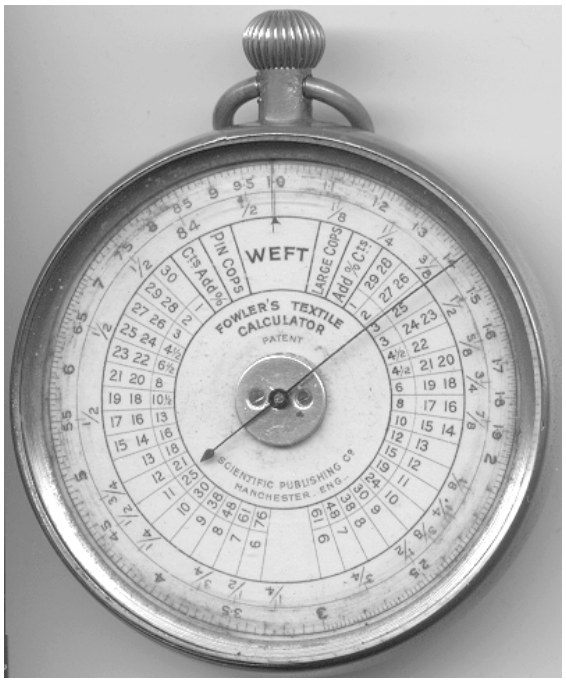

Figure 1. 2AT1, front of an early Textile Calculator.

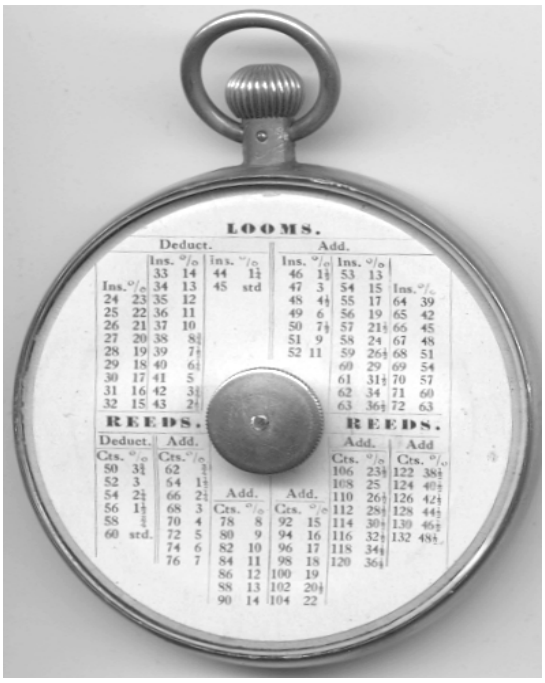

Figure 2. 2AT1, back of the early Textile Calculator.

Figure 3. 2GA1, face of the Type 1 Cube and Cube Root Calculator.

Figure 4. 2AG1, back of the Type 1 Cube and Cube Root Calculator.

Figure 5. 2BG1, face of the Type O Calculator.

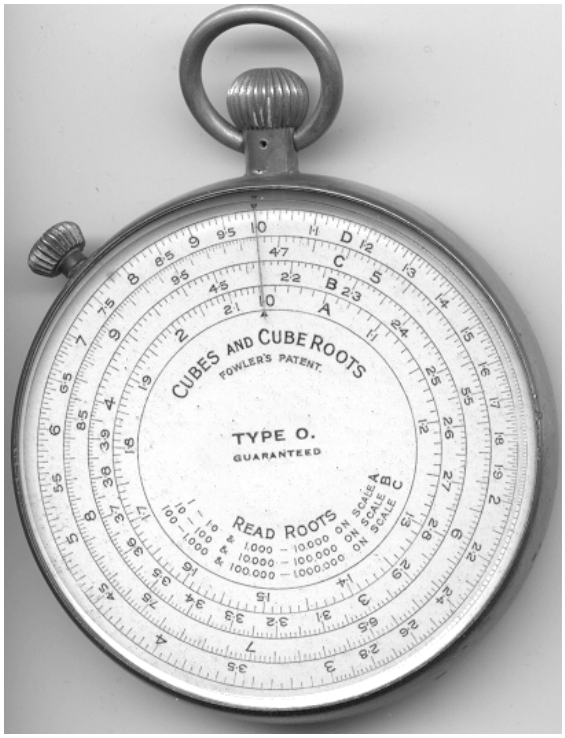

Figure 6. 2BG1, back of the Type O Calculator.

Figure 7. 2MA1, face of the Artillery Calculator, second variety.

Figure 8. 2MA1, back of the Artillery Calculator, second variety.

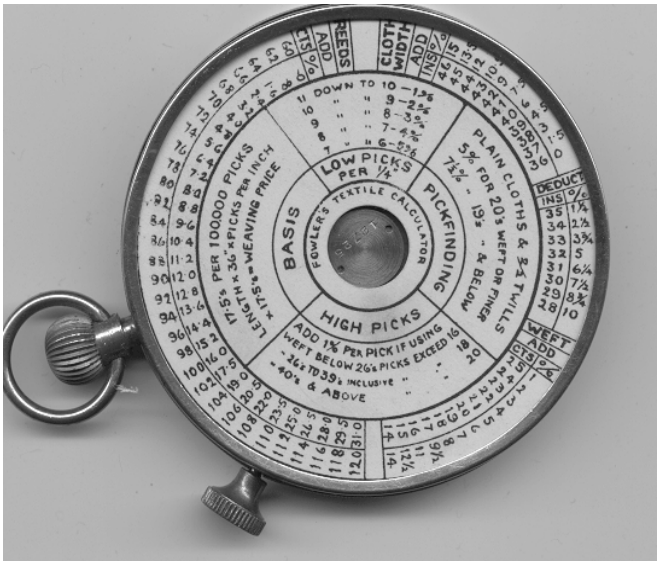

Figure 9. 2MT1f, back of the Short Scale Textile with pick finding variety reverse.

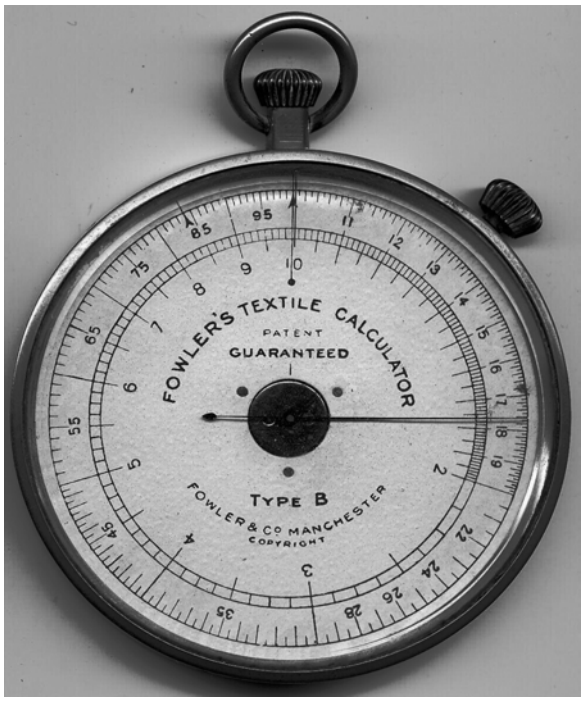

Figure 10. 3DT1 Textile Calculator, Type B, Variety I.

Figure 11. 3MT1a Textile Calculator, Type B, Variety II.

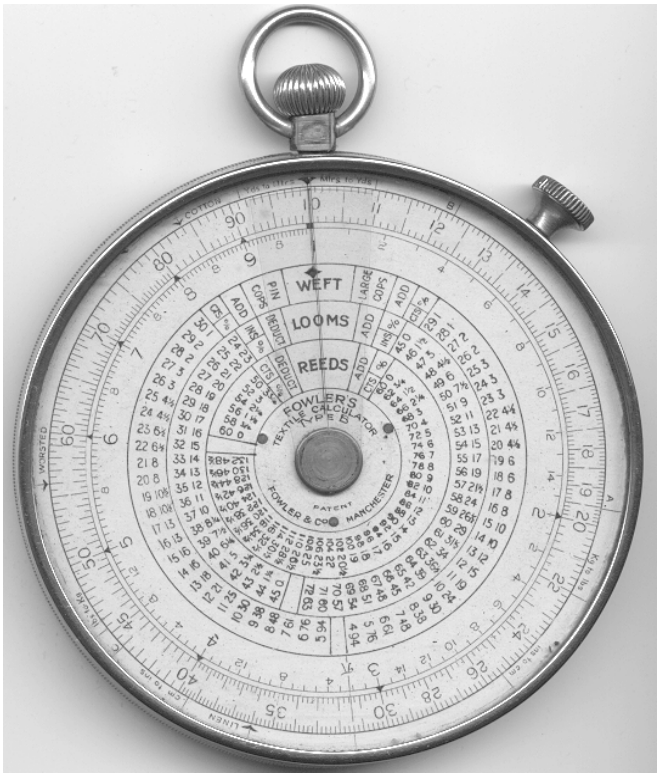

Figure 12, 3MT1b, Textile Calculator, Type B, Variety III.

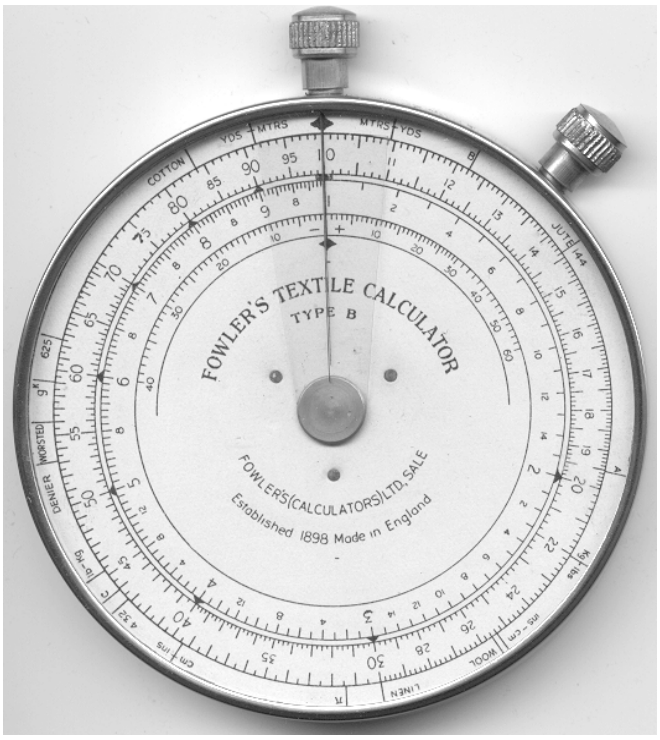

Figure 13. 3MT1c, Textile Calculator, Type B, Variety IV.

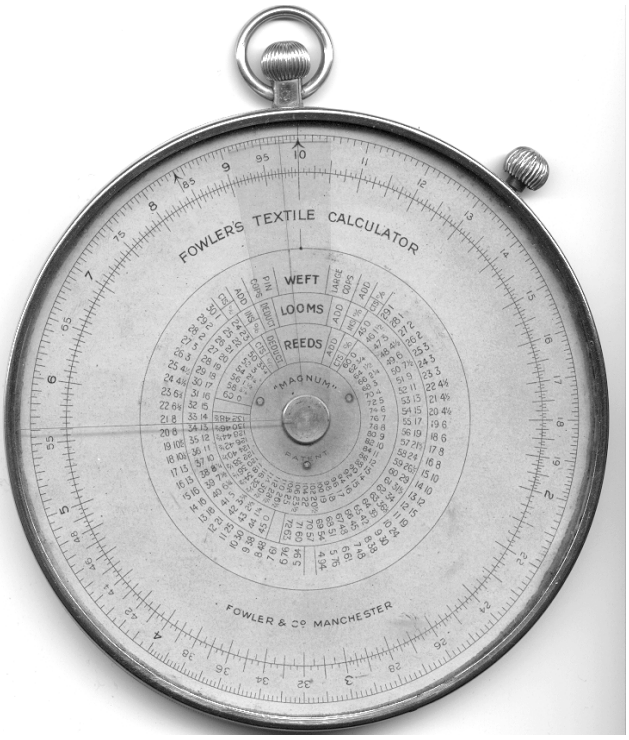

Figure 14. 4MT2c, 4-5/8 in. Textile Calculator, Variety II.

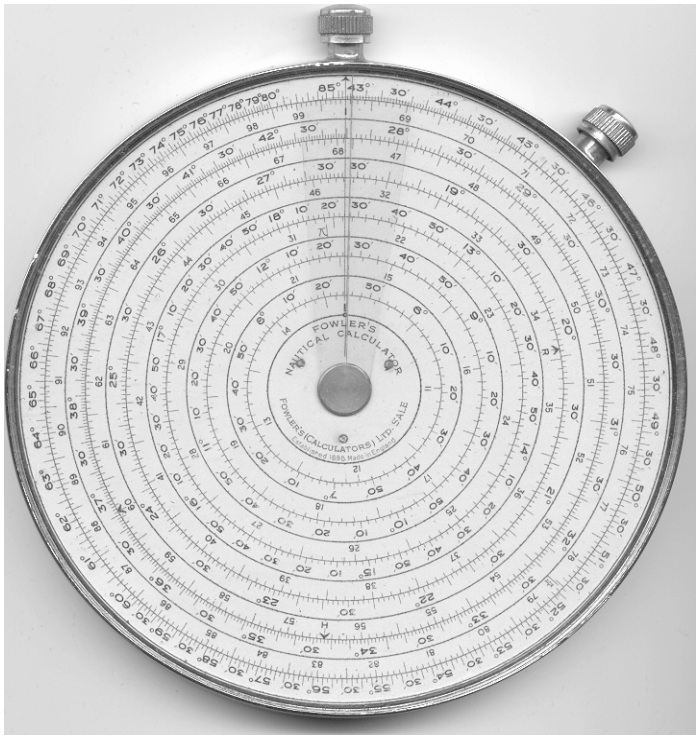

Figure 15. 4MN1, 4-5/8 in. Nautical Calculator.

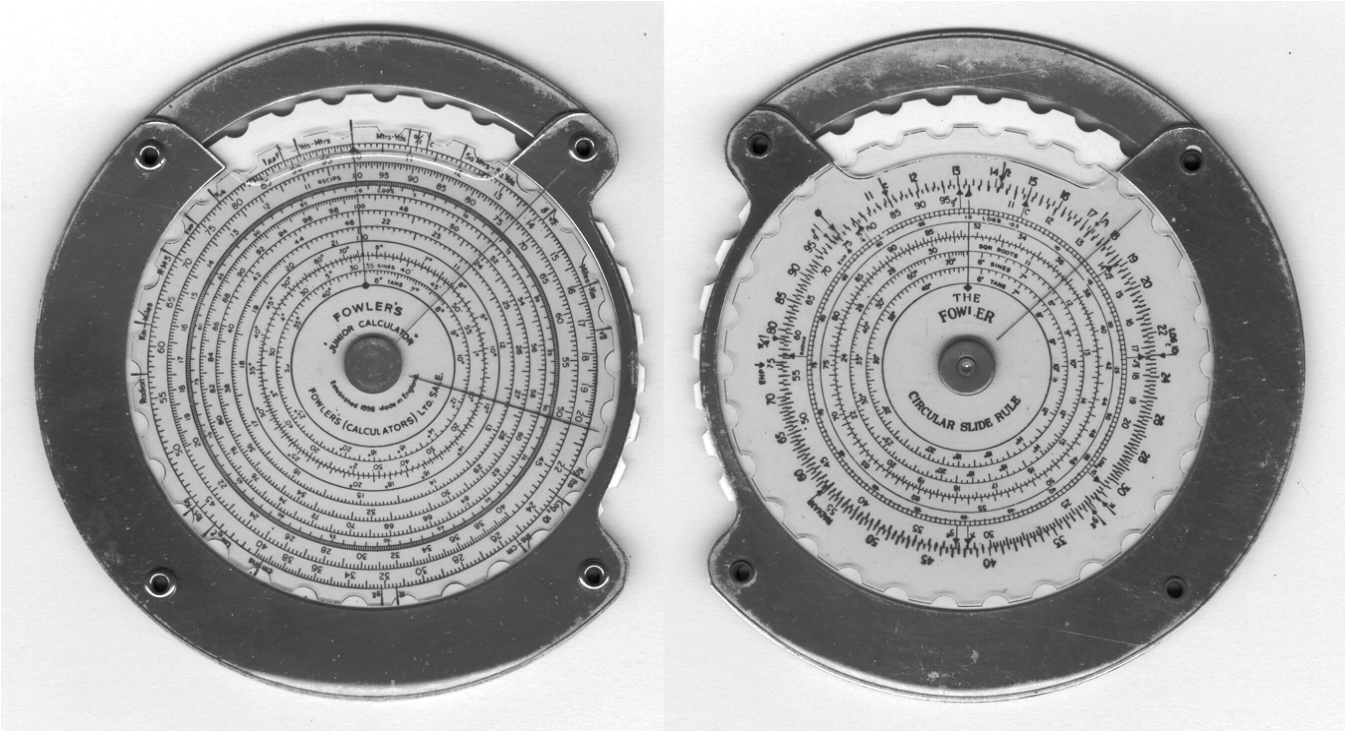

Figure 16. 4MJRG1, The Junior Calculator.

Acknowledgements

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