AccessionIndex: TCD-SCSS-T.20121208.008
Accession Date: 8-Dec-2012
Accession By: Robert Friel
Object name: Facit TK Calculator
Vintage: c.1936
Synopsis: Hand-cranked 13-digit decimal mechanical calculator. S/N: 202895.

Description:
In 1918 'Facit' calculators were introduced by Axel Wibel, Stockholm. In 1924, the business was incorporated as Facit (Facit AB), a subsidiary of Åtvidaberg Industries, a corporation founded in Åtvidaberg, Sweden, in 1922.

Facit initially made hand-cranked Odhner-type decimal calculators with levers for number entry. In 1932 they introduced the 2-row 10-key *Model T* decimal calculator, again hand-cranked, and electrically-cranked *Model E* calculators of the same type in 1934. The *Model TK*, introduced in 1936, was a modest update of the *Model T* design, which with further modest updates continued to be made into the 1970s, by which time Facit was a very successful multi-national corporation, with subsidiaries in over 100 countries.

Odhner-type *pinwheel* mechanisms had a pinwheel rotor fixed in the body of the machine, with the registers in a moving carriage at the front. By contrast, the Facit Model T *inverted-pinwheel* mechanism had registers fixed at the top of the machine, with the pinwheel rotor moving on an internal carriage. The pinwheels were enclosed within the body of the machine, and were operated through a key setting mechanism. A pinned carry rotor at the rear of the machine provided identical carry mechanisms across the full width of both registers.

The model TK had tens transmission, a movable accumulator and tabulator, and sliding quotient coupling to save the user filling out dividends with zeroes. It had a basic ten-key mechanism, a 9-digit entry register, an 8-digit counter register and a 13-digit accumulator register. A lever at the lower right cleared the entry register (setting register), a lever at the upper right cleared the counter (multiplier register), and a lever on the left cleared the accumulator (product register). The accumulator showed the result of adds, subtracts and multiplies, and the remainder from divisions. The counter was more multi-purpose: for add/subtract it showed the number of these executed; for multiply it showed the multiplier; and for divide it showed the quotient (the result).

At the front left ← and → keys shifted the entry register one step left or right. A ←■ key at front right operated the tabulator for division by shifting the entry register fully left and filling in trailing zeroes if the number was less that 6 digits. To execute an operation the crank handle was pulled out to the right then rotated clockwise for add, anti-clockwise for subtract (reverse rotation cancels the operation).

There were manually placed metal *decimal point* indicators for the entry, accumulator and counter registers. Red *position* indicators on the accumulator and counter showed which column the calculator was operating on. A further red indicator (for *negative coupling*) was shown to the right of the counter after the crank handle was rotated anticlockwise about 1cm. This allowed the calculator to be operated with *positive coupling* or *negative coupling*. For positive coupling the counter showed the number

of additions. For negative coupling the counter showed the number of subtractions. However, if the crank handle was rotated anticlockwise about 1cm to invoke negative coupling then reversed that distance, then rotated clockwise, then the counter was decremented (ones-complementing on underflow).

So to add to the accumulator and increment the counter, the entry register was cleared, the number was entered, and the handle was rotated clockwise. To subtract from the accumulator and increment the counter, the handle was rotated anticlockwise. To add to the accumulator but decrement the counter, the handle was rotated anticlockwise about 1cm then fully rotated clockwise. Along with the shift keys, these operations enabled multiplication or division using repeated add & shift or subtract & shift, and other algorithms, e.g. division by multiplication, see [7].

For multiplication, all registers were cleared, the multiplicand was entered, and the handle rotated clockwise a number of times equal to the least-significant digit of the multiplier. Then the ← shift key was pressed, and the handle rotated clockwise as per the next-significant digit of the multiplier, repeating until the counter showed the full multiplier and the accumulator showed the result.

For division, all registers were cleared, the dividend was entered, the ←■ key was pressed to shift the dividend fully left, and the handle rotated clockwise to add it to the accumulator. Then the entry and counter registers were cleared, the divisor entered, the ←■ key pressed to shift the divisor fully left, and the handle rotated anticlockwise until a bell rang, then rotated once clockwise. Then the → shift key was pressed, and the handle rotated anticlockwise until a bell rang, then rotated once clockwise, repeating until the accumulator was zero and the counter showed the quotient (the result).

By modern standards they were barely ‘portable’, in essence large desktop calculators 210 (w) x 185 (d) x 145 (h) mm in size, with overall width including crank 300mm, and weighing 6kg. From 1966 Facit sold large desktop electronic calculators made by Sharp in Japan. The arrival of portable hand-held electronic calculators in 1971 made Facit’s business obsolete, and the company was sold on, eventually closing in 1998.

Early Facit TK calculators were black with a script ‘Facit’ logo, then green with a pressed-metal logo in capital letters from the early-1940s, finally grey from the mid-1950s (but often painted the latest colour when serviced), so going by the logo the Facit TK calculator in this collection was made no earlier than the early-1940s. It was donated by Dr.Robert Friel, Dept.Computer Science, Trinity College Dublin, c.1989.

Also see the Facit NEA calculator elsewhere in this catalog.

Trivia1: The last Facit hand-cranked calculator was made in India in 1982
Trivia2: ‘T’ stands for ‘Tangent’, the Swedish word for ‘Key’
Trivia3: The pinwheel calculator was first described by Leibniz (1646-1716)

The homepage for this catalog is at: https://www.scss.tcd.ie/SCSSTreasuresCatalog/
Click *'Accession Index'* (1st column listed) for related folder, or *'About'* for further guidance. Some of the items below may be more properly part of other categories of this catalog, but are listed here for convenience.

Accession Index	Object and Identification
TCD-SCSS-T.20121208.008	Facit TK Calculator, Hand-cranked 13-digit decimal mechanical calculator. S/N: 202895, c.1936.
TCD-SCSS-T.20121208.001	Lightning Calculator, 7-digit decimal mechanical adding machine with rotary input dials, c.1908.
TCD-SCSS-T.20121208.002	Brunsviga Adding Machine, Decimal pin-wheel mechanical adder/subtractor (pincalculator), c.1913. S/N: 6214, Markings: *AGS No.50*
TCD-SCSS-T.20121208.003	Master Adding Machine, 9-digit decimal mechanical adding machine, c.192x.
TCD-SCSS-T.20121208.004	Brunsviga 13RK Adding Machine, Decimal pin-wheel mechanical adding machine (pincalculator) , c.195x.
TCD-SCSS-T.20121208.005	ADDO Model 9 Sterling Calculator, 8-digit mechanical £-s-d (Sterling) adder/subtractor, c.1927.
TCD-SCSS-T.20121208.006	R.C.Allen Model 8s Sterling Calculator, 8-digit mechanical £-s-d (Sterling) adder/subtractor, c.193x.
TCD-SCSS-T.20121208.007	Burroughs T890-9 Protectograph, Bank cheque embosser, c.195x.
TCD-SCSS-T.20121208.009	Facit NEA Calculator, Electrical motor-driven 13-digit decimal mechanical calculator. S/N: 273356, c.1943.
TCD-SCSS-T.20121208.010	Plus 509 Adder, Quinary mechanical adding machine with 'half keyboard', c.195x.
TCD-SCSS-T.20121208.012	MADAS Portable Calculator, Model 20BTZG 10-digit fully-automatic decimal mechanical calculator. S/N: 96236, c.196x.

References:

1. Wikipedia, *Facit*, see: https://en.wikipedia.org/wiki/Facit
   Last viewed 3-Apr-2016.

2. Christofer Nöring, *History of the Facit Calculators*, see:
   http://www.xnumber.com/xnumber/facit_history.htm
   Last viewed 4-Apr-2016.

3. Christofer Nöring, *Family tree of the Facit calculators*, see:
   http://w1.131.telia.com/~u13101111/facitsv.html
   Last viewed 4-Apr-2016.
   [also see attached folder in this catalog]

4. John Wolff, *"Facit" Calculators*, see:
   http://www.johnwolff.id.au/calculators/Facit/Facit.htm
   Last viewed 4-Apr-2016.

5. John Wolff, *The Original-Odhner Pinwheel Calculator - Technical Description*, see:
http://www.johnwolff.id.au/calculators/Tech/OdhnerPinwheel/OdhnerPinwheel.htm
Last viewed 4-Apr-2016.
[also see attached folder in this catalog]

6. John Wolff, *The Facit C1-13 Pinwheel Calculator - Technical Description*, see:
http://www.johnwolff.id.au/calculators/Tech/FacitC1-13/C113.htm
Last viewed 4-Apr-2016.
[also see attached folder in this catalog]
[useful pictorial guide to internal mechanism]

7. Facit AB, *How to become an expert on the FACIT NTK*, see:
https://mechanicalcalculators.files.wordpress.com/2015/02/facit-ntk-manual-compressed1.pdf
Last viewed 4-Apr-2016.
[also see attached folder in this catalog]
[useful guide to operating a later model Facit inverted-pinwheel calculator]

Figure 1: Facit TK Calculator front three-quarter view

Figure 2: Facit TK Calculator front three-quarter view

Figure 3: Facit TK Calculator front top view

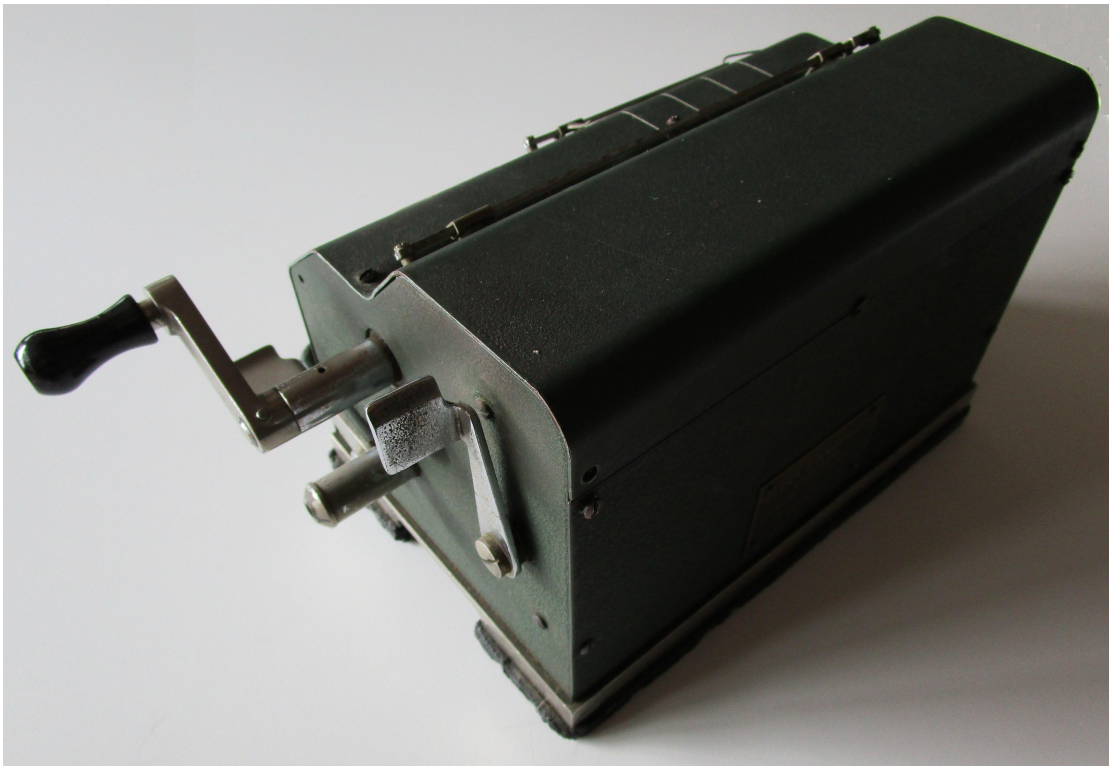

Figure 4: Facit TK Calculator rear three-quarter view

Figure 5: Facit TK Calculator rear view

Figure 6: Facit TK Calculator agent's label
Note faded 'FACIT' label at top right
Also note the presence of another label hidden by the agent's label

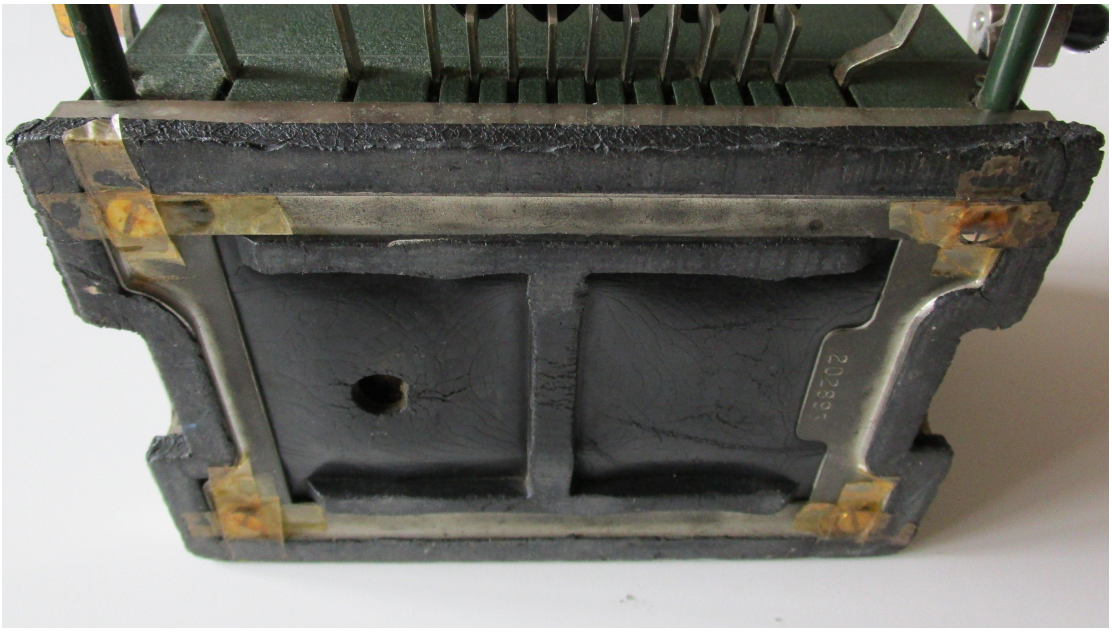

Figure 7: Facit TK Calculator bottom view

Figure 8: Facit TK Calculator serial number
S/N: 202895