

The Internet Craftsmanship Museum Presents:

Tatjana van Vark



Tatja Van Vark. (Photo: Edu Wagtelenberg)

Honoring scientific instruments of the past while expanding on their possibilities

Introduction

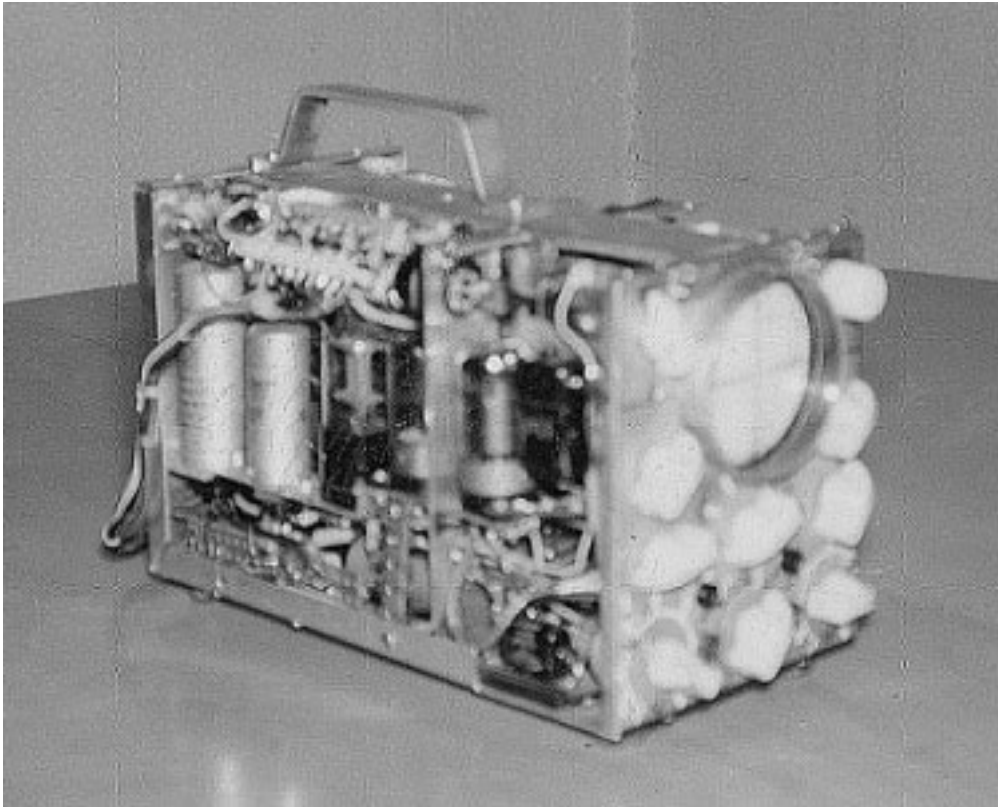
The explorations of Tatjana van Vark of the Netherlands take us to places not usually traveled by the ordinary craftsman. In describing her work it is hard to know where to begin. Of one thing there will be no doubt. When you examine the objects she has created you will immediately recognize the craftsmanship and attention to detail in each piece. Beneath that, however, are levels of understanding of the object itself and its function that will probably leave most of us behind at some point. No doubt the superb craftsmanship is almost a necessity. Some of the objects contain such complex mechanisms that less than masterful craftsmanship is not an option if they are to function properly. Whether or not you are able to achieve a full understanding of the function of the object, you will certainly be able to appreciate its surface beauty. As you gain more understanding of its function, additional layers of beauty are revealed to you.

Explanations of the objects you will see are brief. The beauty and purpose are for you to discover for yourself. To quote Tatja, "Verbalisations involve personal semantic reactions, yours and mine. Verbalisations tend to exclude reality. Just look, maintaining internal silence, until the meaning of

my work becomes clear. Then share my lifelong joy in the mystery Reality with its surprises, limitations and instabilities."

About Tatjana van Vark

Tatja is someone who in the period of the renaissance would have been called *homo universalis*...a person with interests and skills in many areas: artistic, cultural, mechanical and scientific. As an independent researcher, her studies have taken her into many regions of scientific study. She started early, building an oscilloscope from scratch at age 14.



Tatja built this oscilloscope in 1958. She was only 14 years old. An interest in scientific instruments was established at an early age.

For a living, she worked as a scientific consultant for large technological firms, government and military institutions. Using science and instruments as her tools in her analysis, she studied complex problems to get to the very root cause and offer solutions. In doing so, she has had occasion to explore many areas of study in electronics including power systems, logic systems in relays and electronics. In fact, in her home she has a complete operating electromechanical telephone and telex switching system.

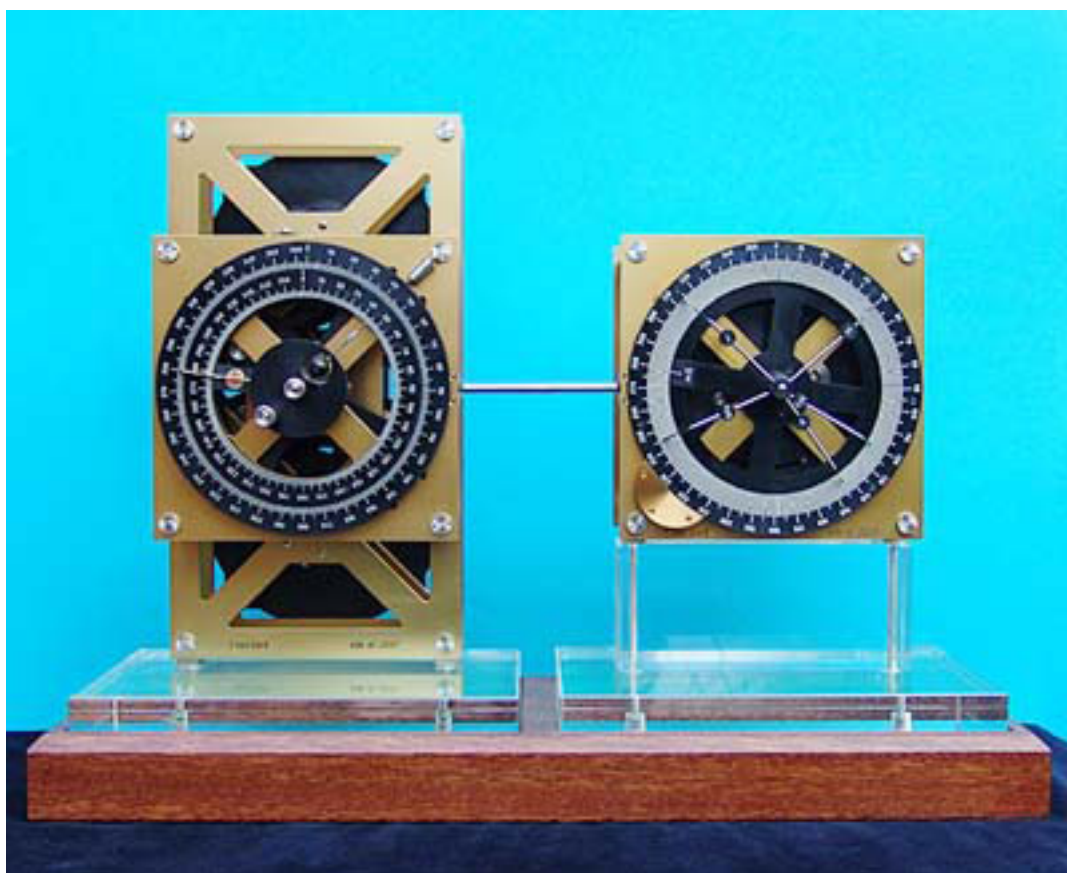
In the field of cryptology she did work that resulted in the design and construction of an improved version of the famous Enigma cipher machine from World War II. She also worked on aircraft avionics, navigational inertial guidance systems, radar, and weapons control systems. In her home she also has restored a highly complex functional navigational and bombing system from the English Vulcan bomber.

Her work took her into the field of optics, including lens coating by vapor deposition. It also included ventures into organic chemistry with the production of instruments for the pharmacology industry including IR/UV spectrophotometers, analytical and micro balances.

She has also produced working models of historically significant telescopes and other instruments from barometers to polarimeters, although what appear to be simply reproductions often include

improvements that have come about through her deep analysis and understanding of the underlying principles of the device. One thing that is constant in all the projects, however, is the stunning craftsmanship, attention to detail and fine finishes that make each piece a pleasure to behold and study. This is made possible in part because she has put together a fine collection of high quality machine tools in her own shop with which she produces these pieces. Following the classical tradition, many of her pieces are signed and dated by the maker: *TvV fecit*.

With permission and the help of her friend and webmaster Tim Samshuijzen we have included images of some of Tatja's most impressive projects. A reference to her web site at www.tatjavanvark.nl will give a much more complete selection of detailed photos of projects covering a broad array of scientific fields. Her poems often augment the work as well—another aspect of her talents. The feature we honor here, however, is the wonderful craftsmanship with which these projects are all constructed. Whether you understand the underlying principles or function of the project, note the care and precision with which each part is built and presented. This is scientific craftsmanship taken to the highest level.



The complex gearing, superb finishes and classic presentation in Tatja's interpretation of the "Essence of the Antikythera Mechanism" is typical of the craftsmanship honored here. See this and more examples in the photos at the bottom of this section. (Photo: Jeroen van Vark)

Tatjana van Vark's workshop

The following photos of her shop were submitted by Ms. Van Vark to the Joe Martin Foundation. We present them here because the craftsmen who visit this site usually find a look inside a fellow artisan's shop to be instructive. Tatja's machining skills are completely self-taught, and you can see her shop is not large, but the machines are of high quality in keeping with the demands of her precision work. I will let Tatja describe her machines in her own words:

“The remark that you make about the desirability of a description of my workshop facilities is a good one, therefore let me present my cast-iron friends:

The lathe (1978) is a non-standard Myford super 7, it has the optional extended and hardened bed. I added digital read-outs, in those days not common at all and a variable DC drive controlled by the hand wheel in front of the stand. Pulling the hand wheel in the zero position, before rotating reverses the direction of the motor. In the zero position there is active electrical breaking, a great convenience. Practically all Myford accessories were acquired over the years.

The milling machine (1983) is a Deckel FP-1 with a wide range of accessories, some homemade. It is not NC but it has a system that allows servo positioning from the keyboard but on one axis at the time only, either to an absolute position or incrementally. The machine is shown in an elementary gear cutting configuration. Please notice the "overhead traveling crane" contraption, a must (for me) to handle the heavier accessories safely.

Next, a Deckel GK-21, an occasion, a 3D copying and engraving milling machine acquired a few years ago. Before that I did all engravings on the much older Lienhard machine. For the Deckel there is a small grinder, Deckel SO, to make or sharpen special cutters.

Then there is the necessary sheet working equipment (1977) of modest size, 65 cm working width. Shears, bending machines, inside corner cutters and a punch.

Of course there is a collection of measuring equipment of good quality.

So far the machine shop, as you see is a modest outfit, nothing exotic or supernatural. I do my own electroplating, by the way."

—TvV



Tatja says her shop contains "nothing exotic or supernatural," although the projects that come out of it certainly contain a little metalworking magic. Photo 1 shows some of the sheet metal bending

equipment. Photo 2 shows the Deckel pantograph mill in the foreground. Photo 3 shows the Deckel FP-1 mill and Myford lathe. Photo 4 shows the tool grinder.

Presented below are just a few of the wide range of Tatjana's projects. We chose to highlight the ones that feature her machining skills, but her own site at www.tatjavanvark.nl covers many more projects that delve into other areas of scientific inquiry. There are also additional photos of the projects we highlight below. If you are impressed by what you see here, please explore further on her site. You may find yourself with more questions than answers, but the more you look at the work, the better you will understand the beauty of items that are perfectly made to suit a very focused function reduced to its essential elements. We also would like to thank Timm Samshuijzen for permission to reproduce his excellent photography in the section below.

Here are several examples of Tatjana van Vark's work:

(Click photos for larger images.)

Essence of the Antikythera Mechanism and Hypothetical Planetarium

[YouTube.com](#)

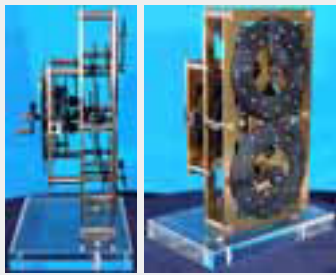


Tatjana van Vark's improved interpretation of the ancient Antikythera Mechanism (on left in first photo) drives the Hypothetical Planetarium (right) reproducing movement of the sun and stars. The second photo shows the reverse side. (Photos of Athikythera Mechanism by Jeroen van Vark.)

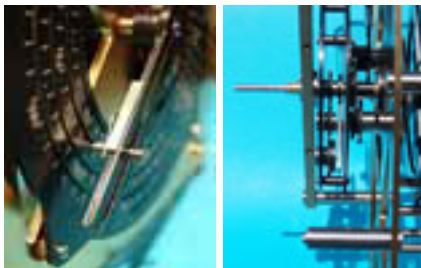


More views of the mechanism. To learn more about the mysterious original ancient mechanism discovered at the bottom of the sea off the Greek island of Antikythera do a Google search for "Antikythera Mechanism" or see the links below:

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The mechanism partially assembled.



Details of the mechanism and its gearing. A short video on her site shows the mechanism in motion.



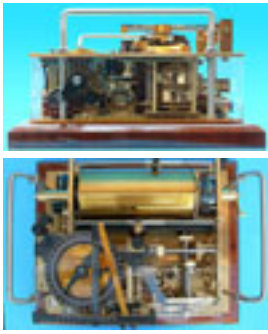
The Hypothetical Geocentric Planetarium (after Apollonius of Perga) driven by the outgoing shaft of Tatja's interpretation of the Antikythera Mechanism. Tatja notes, "My geocentric planetarium is based on modern data of planetary motion and is realised by conventional asymmetrical spur gear differentials as described in engineering text books. It is similar in principle to Mr. Wright's but rather different in details. I do not know of any detailed description of Mr. Wright's excellent work so I worked this out myself. As it represents the same solar mechanism, with good approximations, the differences cannot be great. Mine has 28 gears... My planetarium, after independent use, can be resynchronised with the Antikythera Mechanism from anywhere in a very wide window of time."

Harmonium

Mechanical Fourier Analysis and Synthesis



Two views of the completed Harmonium. (Photos by Tim Samshuijzen)



Side and top views.



Making parts for the Ventosa integrators.



The main gearbox.



Making of the sine generator with mutually independent phase angle and amplitude inputs.



The paper drum and drive mechanism.

Cipher Machine



The capture of a famous German Enigma coding machine and the subsequent breaking of its code played a key roll in World War II intelligence gathering. Tatja says her cryptograph is not an Enigma machine but is based on the same principle. Details of rotor wiring, etc. will not be released until after someone decrypts a coded haiku that can be found on her web site. The electronic component accompanying the mechanical machine is the "super-encipherment switch." (Photos by Tim Samshuijzen)



Wheel mechanics are shown in both free (L) and engaged (R) positions.

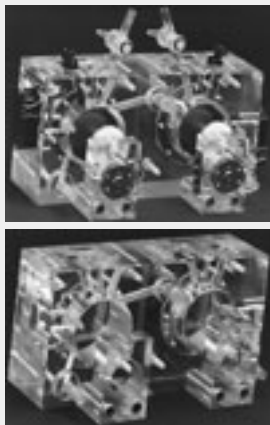


Wheels (L). Each wheel consists of 509 parts.
(R) Coding unit "A"

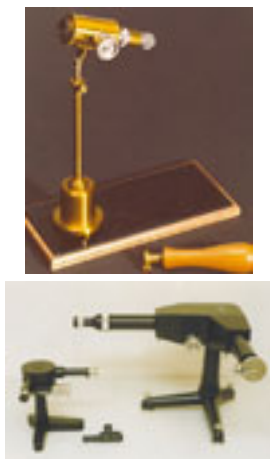
Other Projects (Photos by Tim Samshuijzen)



A vacuumless barometer made in 1977.



Machined plexiglass—a representative sample from 1984.
There is absolutely no way to hide mistakes here...



(L) Direct Vision Spectroscope. T. van Vark *fecit.* 1977

(R) Large, practicum and pocket spectroscopes. Design by miss Dr. C.E. Bleeker in 1937 - 1939. Fully functional replicas by TvV. 1998



The Free Pendulum Timekeeper. Miniature version of the Shortt-synchronome time standard. Tatjana van Vark *fecit*. 1999.
The first image shows the completed timepiece. The others show details of its construction.



A restored Litton LN3-2A inertial navigator platform—
Showcase by TvV—1990



Newtonian Telescope. 1974



A rebuilt navigation and bombing system (NBS) resides in her home. It includes an H2S Mk 9A and Navigation, Bombing and Computer (NBC) of the type used in British V-bombers Victor, Vulcan and Valiant.



An improvised toolset for the handling of the Plessey Mk 4 connectors in the above restoration.