

# The Bulletin



*January, 2017*

*Volume 62, Issue 01*

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***IN THIS ISSUE..***

***2016 Awards Night***

***Jan. 25th***





***The Peterborough Motor  
Sports Club, Inc.***

***PO Box 131***

***Peterborough, ON K9J 6Y5***

**[www.pmsc.on.ca](http://www.pmsc.on.ca)**

***Also on Facebook and Twitter***

## **Meetings**

Club Executive meetings are held on the 2<sup>nd</sup> Wednesday of each month at the call of the President.

Social meetings are held on the 4<sup>th</sup> Wednesday of each month at The Souvlaki Pit, 75 George St. North, Peterborough. (Meetings in June, July & August are often highlighted by fun events and venues.)

## **Affiliations**

The Peterborough Motor Sports Club is a multi-discipline club, organizing ice races, solos, auto crosses and rallies. It is affiliated with the Canadian Automobile Sports Clubs-Ontario Region, Rally Sport Ontario and the Canadian Association of Rally Sport.



**Canadian Automobile Sport Clubs Ontario Region**  
CASC-OR, the Official Sanctioning Body of Motorsports in Ontario.



## **2017 Executive**

President	Mike van Rees <a href="mailto:president@pmsc.on.ca">president@pmsc.on.ca</a>
Vice President	Travis Grubb <a href="mailto:vicepresident@pmsc.on.ca">vicepresident@pmsc.on.ca</a>
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Competition Committee	Joanne Fleguel, Lindsay Webster, Travis Grubb, <a href="mailto:competition@pmsc.on.ca">competition@pmsc.on.ca</a>
Director at Large	Carl Heinlein <a href="mailto:publicrelations@pmsc.on.ca">publicrelations@pmsc.on.ca</a>
Communications	Len Arminio <a href="mailto:bulletin@pmsc.on.ca">bulletin@pmsc.on.ca</a>



## ***From the Editor's Keyboard***

*Len Arminio*

*January 2017*

First of all, on behalf of the PMSC Executive, a very Happy New Year to all our members and friends!

You see by the list of Executives on the previous page we have converted the Competition Director to a Committee with three members; Joanne, Travis and Lindsay. Thanks for stepping up to help.

Dan Demers, the past director will provide guidance and some early support for the portfolio including coordinating with the Kart club on dates at Kawartha Speedway .

Speaking of help, Dan can use two or three more bodies for our Ice Race Weekend, February 18 & 19. A list of workers and their assignments is in this edition. Dan took a drive by the track in Minden a couple weeks ago and things looked good at the time. Lots of snow for banks and a good ice surface already laid down. I'm not sure what the recent fluctuations in weather will mean but here's hoping.

Now...the next BIG THING on our calendar is **Awards Night, Wednesday, January 25<sup>th</sup> at Marty Moo's Family Restaurant** on Keene Road just 200 metres south of Hwy7 (Lansdowne St. East). We need to know how many folks will be attending so the restaurant can have things set up for us. So if you could contact me ASAP it would be appreciated ([lenarminio@gmail.com](mailto:lenarminio@gmail.com)).

We are hoping to get one or two **Snow-crosses** on the calendar for February and March down at Shannonville. Now that will be fun. More details to follow.

Please enjoy this first edition of the Bulletin of 2017.

Your Humble Scribbler,  
Len

## ***The 2016 Awards Night Dinner***



***Wednesday, January 25, 2017***

***Marty Moo's Restaurant  
2205 Keene Rd,  
Peterborough  
(Otonabee/S.Monaghan)***

***Social 6:00 pm***

***Dinner 6:30 pm***

***Awards presentations 7:30pm  
& Draw Prizes***

***Order from the menu.  
Club will provide a \$10 meal coupon  
for all members.***

***(Copies of coupon are on the last page of  
The Bulletin)***

***Please RSVP ASAP  
lenarminio@gmail.com***



***Peterborough Motor Sports  
Club  
2016 Annual Awards***



Club Champion - Dan Demers

Club Runner-up - Travis Grubb

New Member Award - Rich Courneya

Solo Driver Champion – Rich Courneya

Solo Driver Runner-up - Chris Johnson

Solo Driver Rookie - Rich Courneya

Rally Driver Champion - Dan Demers

Rally Navigator Champion – Louis Cabardos

Ice Race Champion - - Dan Demers

Ice Race Runner-up – Amy Chambers

Street Studs Champion - Dan Demers

Rubber to Ice Champion – Richard Poxon

Ice Race Rookie - Richard Poxon

Organizer Award - Len Arminio

Organizer Runner- up – Peter Watt

President’s Prize Driver – Alain Cabardos

President’s Prize Navigator – Louis Cabardos

Watchwinder Weekend – Glenn Austin

Fall Ball Weekend – Dan Demers

***PMSC ICE RACE***

***WEEKEND***

***February 18-19, 2017***

***Round 4 of the CASC-OR  
Ice Race Series***

***Sponsored by Minden Subaru  
& Mobil 1***

***A couple more workers  
needed.***

***Contact Dan Demers***

***ddemers67@gmail.com***

***(We pay \$70/day)***



# January Jaunt Results 2017

## Leg A Results

Car Driver	Navigator	Class	Sub Total	TA Pen	Leg Total
2 Leonard	Leonard	E	0.2	0.0	0.2
1 Cabardos	Cabardos	E	0.9	0.0	0.9
3 Sveda	Gamble	E	2.8	0.0	2.8
4 Mayes	Mayes	E	7.2	0.0	7.2
7 Johnson	Pace	E	7.2	0.0	7.2
6 Neil	Dammeier	E	11.4	0.0	11.4
5 Sexsmith	Tanti	E	15.4	0.0	15.4
10 Marek	Marek	N	2.8	0.0	2.8
8 Skurski	Holland	N	7.2	0.0	7.2
11 Baily	Kirshner	N	13.4	0.0	13.4
9 Plewa	Plewa	N	13.7	0.0	13.7
14 Grant	Grant	N	14.0	0.0	14.0
13 Cheladyn	Feenstra	N	16.4	0.0	16.4
15 Zammit	Shaver	N	16.7	0.0	16.7
16 Szufflita	Oreg	N	21.0	0.0	21.0
12 Cabardos	Reid	N	92.7	0.0	92.7

## Leg B + Overall Results

Car Driver	Navigator	Class	SubT	TA Pen	B Total	A Total	A+B Tot
1 Cabardos	Cabardos	E	4.8	0.0	4.8	0.9	5.7
7 Johnson	Pace	E	8.4	0.0	8.4	7.2	15.6
3 Sveda	Gamble	E	15.1	0.0	15.1	2.8	17.9
5 Sexsmith	Tanti	E	4.2	0.0	4.2	15.4	19.6
6 Neil	Dammeier	E	9.1	0.0	9.1	11.4	20.5
4 Mayes	Mayes	E	16.5	0.0	16.5	7.2	23.7
2 Leonard	Leonard	E	51.0	0.0	51.0	0.2	51.2
10 Marek	Marek	N	4.1	0.0	4.1	2.8	6.9
8 Skurski	Holland	N	10.1	0.0	10.1	7.2	17.3
11 Baily	Kirshner	N	13.8	0.0	13.8	13.4	27.2
14 Grant	Grant	N	17.2	0.0	17.2	14.0	31.2
13 Cheladyn	Feenstra	N	16.1	0.0	16.1	16.4	32.5
9 Plewa	Plewa	N	24.3	0.0	24.3	13.7	38.0
16 Szufflita	Oreg	N	20.9	0.0	20.9	21.0	41.9
15 Zammit	Shaver	N	30.4	0.0	30.4	16.7	47.1
12 Cabardos	Reid	N	4.0	0.0	4.0	92.7	96.7

# PMSC Teams See Success in January Jaunt Rally

(From TAC 's January Jaunt Website)

With  $-10^{\circ}$  C temperatures, bright sunny weather during the day and a dusting of snow after dusk, the Toronto Autosport Club's 58<sup>th</sup> anniversary January Jaunt navigational car rally kicked off 2017 to a good start. This first event of this year's Ontario Road Rally Championship (ORRC) was an endurance style winter navex, with challenging instructions to keep navigators on their toes, and a selection of roads to entertain drivers.

The first car left the traditional start location at the Royal Coachman restaurant in Waterdown at 12:01 PM. The final car checked in at 8:19 PM; preliminary results were posted at 8:31 PM, and awards were handed out at 9:15 PM.

With a change in regional rules that eliminated the small Intermediate class, there was a record seven Expert teams competing. The instructions were challenging, with navigators reporting constant entertainment, and drivers enjoying some of the roads. A couple of teams added their own tricks to enhance the navigational "pleasure" of the event. **Congratulations go out to first place Alain and Louis Cabardos (2016 ORRC series champions), and second place Chris Johnson and Brandon Pace (running Expert for the first time).**

Nine Novices entered in 2017, including many beginner (first-time rallyist) crews. A Beginner's Quick Start guide was distributed and co-organizer Nick Parry held a quick training session to help with navigation. All first-time crews held up to the challenge (with some reporting that the navigation "was a lot of fun"), and all made it to the finish without missing a single checkpoint, although the intricacies of rally timing was (intentionally) not the focus of first-timers. New rallyists should note that RallySport Ontario club membership is required to score in the series, and Novices can join one of the RSO clubs to score points retroactively from the Jaunt. (The clubs are BEMC, KWRC, MCO, MLRC, PMSC, SPDA, St. LAC or, of course, TAC.)

The top three Novices earned awards in the event. Returning Novices Andrew and Teresa Marek secured first place by a good margin. The Michigan-based team of Torry Skurski and Chris Holland placed second, and Kris Baily and Jacob Kirshner placed third.

As a challenging navigational event, we resurrected the “Press-On-Regardless” award to honour the team that perseveres at the rally, overcoming a significant challenge to finish the event. The team selected for this had trouble in the first leg, missing four checkpoints. They seemed very calm and collected at the break, and came back in the second leg with the lowest leg B score of anyone in the rally, although unfortunately still placing last overall. **The 2017 POR recipients were Emile Cabardos, as “Most Persistent Driver”, and Jon Reid, the “Most Persistent Navigator”.**

Thanks to all entrants, and workers. TAC checkpoint crews: Sandy Grant, Rachel Grant, and Dietmar Seelenmayer; Steve Martin; Brian Maxwell; Rob and Sue McAuley; Fred Walker and Jane Worobess (who also did a great job at registration); and Steve Van Rees (KWRC). The KWRC greencrew of Roger Sanderson and Dennis Wharton put in a lot of effort to review and suggest refinements to the instructions and speeds, which helped make the event manageable. And special thanks to co-organizer Nick Parry, and to Rita Moore and Dietmar for helping with administrative preparations for the event.

The next ORRC is coming up quickly: the KWRC Frostbite rally on February 21, organized by RSO VP Navigational Darin Mayes.

See you on the road!

Kurt Seelenmayer



## *First Drive: 2017 Subaru Impreza*



Improvements inside and out bring this sedan and hatchback up to the head of the pack

*Article and photos by Lesley Wimbush | December 19, 2016*

MONTEREY, Calif. – “Not everyone has the good fortune to be born in Salinas,” said John Steinbeck of his beloved Monterey County.



But it’s doubtful he’d even recognize Cannery Row today, with its boutique hotels and trendy restaurants where his

roughnecks once laboured in the sardine packing plants along the coastline. The raucous barking of seals still carries over the tangy sea air, the roads still wind through twisted oaks draped with Spanish moss on their way up into the gently rolling foothills of the Gabilan Mountains. But the grapes are more benevolent than wrathful, lovingly tended as they are in the loamy soils of Salinas Valley. And ours is a journey of leisure, not gruelling hardship, with the road as its focus, rather than the means to an end.

And what great roads they are. There’s very little traffic outside the town of Monterey, and our route serves up miles of serpentine between here and Carmel. It’s an ideal place to get acquainted with the new 2017 Subaru Impreza. Unfortunately, it’s not the bristling, hard-core [WRX](#), terror of the rally stages. That won’t arrive for another year, maybe more. But we’re happy to report that this once frumpy, entry-level Subie pulls off a surprisingly good impersonation of a canyon carver.

It’s mostly due to the chassis. The 2017 Impreza is 95 per cent all-new, and represents the debut of Subaru’s new Global Platform. This is the architecture that, in one form or another, will underpin every future Subaru from now until 2025. This is also the first Impreza to be built on North American soil; Subaru invested US\$1.3 billion in a new plant in Lafayette, Indiana, to meet increasing U.S. demands.



Using high-tensile steel and structural adhesives, Subaru’s engineers have

produced a body that’s 70 per cent stiffer than the previous model’s and 40 per cent more efficient at crash absorption.

That stiffness is terrific news for the driving enthusiast, but what does it mean to the average driver?

Over several hundred kilometres of rough and winding roads, highway driving and a parking lot autocross exercise, the Impreza remained perfectly flat and composed even when pushed hard. A car that doesn't lean or roll during quick avoidance manoeuvres or hard braking produces less rebound, recovers quicker and inspires driver confidence. And while the previous model earned high crash test scores, Subaru predicts the new Impreza should earn five stars across the board.

Subarus have always had a rather niche market appeal. There is a staunchly loyal fan base, but mainstream buyers have tended to overlook the Impreza in favour of the more nicely crafted Mazda3, [Volkswagen](#) Golf or Honda Civic.

With the new Impreza, Subaru has addressed all the previous model's shortcomings – and then some. Once considered too divisive, or weird, for some buyers, Subaru's styling then swung too far into the bland. The new Impreza boasts clean, uncluttered lines, a chiselled face with "hawk eye" headlights, and new 18-inch rims on top trim levels. It's available in either a four-door sedan or a five-door hatch/wagon.

Even more important are the changes to the interior – which has always come under fire for its dated styling and flimsy construction. Sleek and refined, the new cabin boasts stitched leather and soft-touch materials on nearly every surface instead of cheap plastics. More cabin insulation lends a more premium acoustic hush with fewer squeaks and rattles. Even the doors boast a better level of finishing with hidden welds and plugs, and they close with a nice, solid thud.

Passengers now enjoy a much quieter ride with better wind and road noise absorption. They'll also appreciate the increased space – the Impreza is 40 millimetres longer, 38 mm wider and there's 21 mm more shoulder room between them. Rear passengers will notice the extra 127 mm of legroom.



Thanks to the redesigned rear subframe and split taillights,

the trunk opening is now 100 mm wider. Total cargo space with the rear seats folded is 1,566 litres.

There are four trim levels for both body styles; add roughly \$1,000 for the hatchback. The entry-level Convenience trim starts at \$19,995 for the five-speed sedan, making it Canada's cheapest all-wheel-drive vehicle; it comes standard with backup camera, Apple CarPlay and Android Auto, LED taillights and 5.5-inch touchscreen infotainment. Touring models, which Subaru predicts will be the volume seller, start at \$21,895 and add upgraded sound insulation, auto climate control, leather-wrapped wheel, halogen fog lights, a 4.2-inch multi-information display, upgraded gauge cluster, active grille shutter and 6.3-inch colour display. The Impreza Sport starts at \$24,395 and adds power driver's seat, LED headlights, 17-inch alloys, steering responsive headlights, 8.0-inch infotainment, side spoilers and interior stitching accents.



New for 2017 is the Impreza Sport-Tech at \$28,595, with CVT only. It features a sport suspension, active torque vectoring, 18-inch wheels, black front grille, spoiler (sedan), heated steering wheel, Harman Kardon sound/infotainment with navigation and alloy pedals.



We drove the Sport-Tech hatchback with Optional Technology Package (available

only on Sport and Sport Tech trims). We loved this model's quick turn-in, and its ability to rotate nicely on the auto slalom. A new steering ratio of 13:1 (versus the outgoing 16:1) provides quicker response and better feel.

While we predict the enthusiast will love the stiff handling and its ability to tackle any corner absolutely flat, they won't be as enamoured by its gearbox. Opt for this model, and you're stuck with the CVT. You can get the Impreza Sport with a manual, but it doesn't come with the sport suspension or torque vectoring. As far as CVTs go, this is one of the better ones, and does a fairly good job of emulating a traditional stepped automatic when the paddle shifters are employed. The benefit, of course, is improved fuel economy. The hatchback with CVT is rated 8.5 L/100 km in the city, 6.4 L on the highway; with the manual, it's rated at 9.5 L and 7.0 L. We averaged around 8.4 L/100 km.

All Imprezas come with a new 2.0-litre four-cylinder boxer engine, putting out 152 horsepower and 145 lb.-ft. of torque at 4,000 rpm. We found it perfectly adequate during spirited driving on hilly country roads – again, the enthusiast will consider it underpowered. The optional Technology package includes Subaru’s much-lauded “Eyesight” safety suite, with sophisticated adaptive cruise control, lane-keep assist, high beam assist and new “reverse automatic braking,” which senses obstacles when backing up and will apply the brakes if the driver doesn’t.

On sale now, the new Impreza offers a wealth of safety technology in a refined new package that’s really fun to drive. It offers everything that the segment leaders do, with the addition of all-wheel drive.

*Lesley is a former member of PMSC and an award winning automotive journalist. We use her articles with her permission.*



## *Curta calculator: The mechanical marvel born in a Nazi death camp*



[David Szondy](#)

October 11th, 2016

The Curta calculator was a favorite of engineers, pilots, and rally drivers (Credit: [Rick Furr](#))

If you've ever spent time thumbing through back issues of magazines like *Scientific American* or *New Scientist*, you may have seen adverts for the Curta – a strange little device that resembles a pepper mill. It cost a shocking amount of money and was claimed to perform all sorts of arithmetic functions purely mechanically and with incredible precision. Rather than being a scam in the order of upmarket X-ray specs, the Curta lives up to the claims and the story behind its creation has its roots in a Nazi death camp.

For most people today, a calculator is just another phone app. It's one of those devices that we take for less than granted, yet for those of us of a certain age it was nothing less than a technological liberator when it arrived, freeing scientists, engineers, and anyone who routinely used math from hours or days of tedious calculations. Indeed, it's sobering to think of how many years everyone from Johannes Kepler to unknown bank tellers lost due to number crunching prior to its arrival.

Some relief from tedious manual number crunching came in the 17th century with the invention of logarithms followed by mechanical aids like the slide rule and the first adding machines. Unfortunately, they weren't that much of a help. Slide rules couldn't handle numbers to more than two or three decimal places and, for centuries, calculators were little more than curiosities that were about as practical as a toy automaton.

**miniature  
all purpose calculator**

Weights only 8 oz.

**THE CURTA IS A PRECISION  
CALCULATING MACHINE FOR  
ALL ARITHMETICAL OPERATIONS**

Curta adds, subtracts, multiplies, divides, square and cube roots, continuous multiplication, negative multiplication, standard deviations and all statistical calculations, squares and higher powers, co-ordinates and associated land survey formulas, and every other computation arising in science and commerce . . . Available on a trial basis. Price \$125.00. Write for literature.

**CURTA COMPANY**  
DEPT. SA-7 P.O. BOX 3414  
VAN NUYS, CALIFORNIA

130

By the late 19th century, commercial desktop calculators began to appear, which were a definite improvement, but these crank-powered monsters were so expensive that only larger businesses could afford them. They were also about as portable as a fishing anchor, with even the "lightweight" machines clocking in at around 34 lb (15 kg). As the new century dawned, many improvements were added, like multi-key systems, a motorized mechanism, and the ability to automatically

multiply and divide. But they were still huge and expensive, which limited their appeal.



Then along came Curt Herzstark, a young man who in the 1920s regularly traveled through the former Austrian Empire selling mechanical calculators to banks and other businesses. It was on these travels that he heard the same complaints from his customers.

"And again and again, wherever one went, competitors came with wonderful, big machines, which were ever more expensive and electric, but something was missing in the world market," said Herzstark in an [extensive interview](#) (PDF) conducted by the Charles Babbage Institute in 1987. "I would like to have a machine that fits into my pocket and can calculate. I am a building foreman. I am an architect. I am a customs officer. I have to be able to pick something up. I cannot go 10 kilometers to use a calculator in the office. The slide rules are not useful for my purpose. Slide rules cannot add or subtract. And aside from that you can only read three values from the markings on them, not more. For an invoice I have to know exactly.' So, I continually found interest in a pocket calculating machine. Of course, the whole world seemed to be interested in solving this problem."



This would simply have been a keen observation by a perceptive salesman, except that Herzstark was the heir to the firm of Rechenmaschinefabrik der Austria Erstanden Compagnie in Vienna, which was one of the first Austrian calculator manufacturers and sold improved versions of American machines to the local market. Born in 1902,

Herzstark was being groomed to one day take over the business started by his father and, in addition to sales, he had already received extensive training in how to design and build intricate mechanical devices. So it was no small wonder that customer complaints started him thinking along practical lines.

For the next 10 years, Herzstark mulled over the problem of how to radically reduce the size of calculators, but it was far from a simple task. There were handheld calculators of a sort on the market, but these were little more than cheap, crude toys that worked along the lines of an abacus and could do little more than add and subtract – if even that.

Real calculators were so large and heavy because they were enormously complex devices that had to be built

out of solid metal parts if they were to work accurately without jamming. Also, it was common practice to have a complete set of number keys for each column of digits, so the user was faced with a solid slab of keys, including special ones for accounting numbers.

What's worse was that inside the device each digit of a number was set on a separate register with its own mechanism that had to be repeated up to eight to 10 times. Then to compound the problem, subtraction meant duplicating all these in reverse, plus a special mechanism to handle carrying the number when necessary. No wonder a handheld calculator seemed as unobtainable as easy-open blister packages.

Herzstark's answer was to forget about the inside of his tiny calculator and concentrate on designing it from the outside in.

"I started to concentrate on possible solutions and at first, naturally, didn't get any further," said Herzstark. "Later, I had an idea that I should look at everything backwards. I thought to myself, I'll pretend that I have already invented everything. What does this kind of machine really have to look like, so that someone could use it? It cannot be a cube, or a ruler; it has to be a cylinder so that it can be held in one hand. And if one can hold it in one hand, then if is miniaturized, you could adjust it with the other hand. And you could work either its sides or top and bottom. You can make the answer appear on top."



Then in 1937, Herzstark had a breakthrough. Instead of making a machine that could add and subtract, make one

that did nothing but add, but in such a way that it also subtracted.

"I can remember. I sat in a compartment alone and looked out and thought at that moment, 'Good Grief! One can get the result of a subtraction figuratively by adding the complementary number to it.' This has long been seen with the Burroughs machine which only added. When someone entered in something and it was wrong, one could correct it by adding a number, which when added to the wrong number yielded zeros and hence the unwanted number was out again. Then I thought that works exactly the same way as subtraction registers. So if I enlarge the second step register, the

result can be achieved through pure addition ... that was that ... "

What Hertzstark did was apply what's called the method of complements to the problem. Without getting tangled up in the math, this method relies on the numbers you need to make different numbers add up to nine.

In other words, the complement of 9 is 0, 8 is 1, 7 is 2, and so on. The clever thing about complements is that you can use them to subtract by means of addition.

Take the problem of  $872 - 218$ . To solve this without subtraction, convert the larger number into its complement, which is 127 ( $872 + 127 = 999$ ). Now add  $127 + 218$ , which equals 345. Find the complement of this and the final answer is 654. All these are simple operations for a mechanical calculator.

But the clever bit was when Hertzstark got rid of all the number registers and replaced them with a single unit called a step drum. This, as the name implies, is a drum made of metal cut in steps to correspond to different numbers. He then simplified things even further by adding a second drum on top of the first in reverse, so a simple shift in the mechanism changed it from addition to subtraction.

By 1938, Hertzstark had applied for patents for his new design and had made a couple of prototypes of the basic mechanism out of Bakelite plastic to demonstrate the principle. Unfortunately, that's as far as he got because



in March 1938 the [Anschluss](#) took place and Nazi Germany's Wehrmacht marched over the border to annex Austria.

This was very bad for Curt Hertzstark because, though his mother was an Austrian Lutheran, his recently deceased father was Jewish and the Nazis forbade Jews from owning businesses. Though Hertzstark was supposed to inherit the family business, ownership was instead transferred to his mother and he was hired as manager.

When the Second World War broke out in 1939, the firm was commandeered by the army to build precision instruments and the calculator business was abandoned. This state of affairs continued until 1943 when Herzstark

was arrested on trumped up charges and sentenced to the infamous Buchenwald concentration camp run by the Nazi SS – a fate shared by other Jewish and foreign engineers and technicians as the Nazis came to rely more and more on slave labor for projects like the manufacture of their V2 rockets.

It's impossible to overstate the danger that Herzstark found himself in. As a Jew, Buchenwald wasn't just an ordeal, it was a death sentence where he stood a good chance of being worked under brutal conditions until he died of hunger and exposure in a very short time – if he wasn't hanged for some minor or imagined infraction of the rules.

However, Hertzstark was luckier than most when he was put in charge of improving the efficiency of the camp's mechanics factory. It meant that he was spared the worst jobs, but he was still always one step away from execution, such as when he was recognized one day by an old friend, who was visiting on an inspection tour.

"The second time the factory owners came, the following took place: I was called on again and eight to 10 factory owners were there," said Hertzstark. "I praised the machines as before. There was one person who kept looking at me and I thought, 'You know this man.' And by the third or fourth lathe it happened that he walked by me, in front and in back of me and he said to me, 'Herzstark?' I said, 'Yes, Herzstark.' He said, 'Walther.' He was the arms manufacturer, Walther, who made the Walther pistols and Walther calculating machines. He recognized me and he laid a package of cigarettes on the lathe for me. Then I thought, now it is all over, as that was very strictly forbidden, no? But my guard, Hinkel, who had been with me for days, in other words, not the [SS] officer, he saw it and did not want to see it. I was allowed to put the cigarettes in my pocket."

But it was his new calculator that saved the engineer's life after the SS took an interest in it and what it could do.

"The head of the department, Mr. Munich said, 'See, Herzstark, I understand you've been working on a new thing, a small calculating machine. Do you know, I can give you a tip. We will allow you to make and draw everything. If it is really worth something, then we will give it to the Führer as a present after we win the war. Then, surely, you will be made an Aryan.' For me, that was the first time I thought to myself, my God, if you do this, you can extend your life. And then and there I started to draw the Curta the way I had imagined it."

Herzstark didn't believe the promises of the SS, but it was at least a way of staying alive, so he spent the rest of the war making detailed pencil drawings of the Curta. After the Allied forces liberated the camp in 1945, Herzstark took his plans and applied for a job at the Rheinmetallwerk factory at the nearby city of Weimar. However, with the Red Army advancing from the east, he feared capture by the Soviets, so he only stayed long enough at the factory to build three prototypes of the completed Curta.

"The people who did the actual construction at Rheinmetall understood everything right away because my drawings were quite clear." said Hertzstark. "Everything was already calculated with tolerances and dimensions, and they were able to produce three models for me within eight weeks. The people said it was like scales falling from their eyes. The solution was clear and there was not anything more to think about. "

The work finished, Hertzstark dismantled the devices and hid them in his luggage as he fled back to Austria using cigarettes to bribe his way onto a coal train. His homecoming was bittersweet. On the one hand, the family home and factory were in the French-occupied zone of the capital, so there was no danger of being captured by the Communists, but the war had reduced the business to shambles.

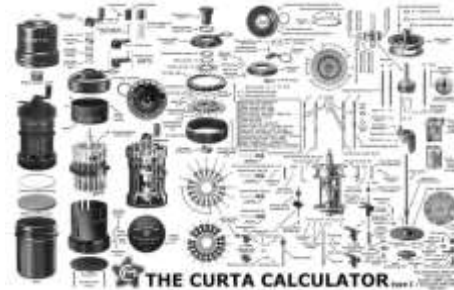
But he did have the plans and the prototypes of the Curta, which was a true marvel of design and construction – as much like a watch movement or the mechanism of a fine camera as it was a calculator. But could he find backers to manufacture it?

In 1945, that was a difficult question. At first glance, the Curta looks as much like a calculator as a pot of geraniums does a turboprop engine. Made of lightweight alloys, the Curta was a squat, palm-sized black cylinder with a crank on the top, which gave the device its distinct look and led to its being nicknamed the "pepper grinder" or "math grenade."

Despite its peculiar looks, the Curta was designed for easy operation that could be done with one hand if necessary. The device was held in the left hand and the carriages were worked by finger control while the right hand did all the other operations. It wasn't anywhere near as fast as a modern calculator, but it was comparable to larger mechanical machines, was more accurate than a slide rule, extremely rugged, and as portable as a pepper pot.

On the side of the Curta are a series of slides and number indicators to input numbers and a readout on the top to give answers to operations. To add, you turn the ring on the top to clear the registers, then input the first number using the slides. Turning the crank puts it into the memory, then the second number is put in and a second turn of the crank gives the answer.

Subtraction is equally easy. Put in the first number, crank, enter the second, then raise the handle to engage the subtraction function. Crank and there's the answer. To multiply, input the number and just keep turning the crank as a display on top of the Curta tells you how many times you've cranked. For large numbers, there's a carriage control to shift the multiplier to the next value. Division is a bit more complicated, but still better than



pencil and paper. And all this without batteries and to 8 to eleven places.

In the late 1940s, Hertzstark had

filed new patents and eventually found a backer in the Prince of Liechtenstein. The country, where Hertzstark resettled until his death in 1988, was looking to expand its economy and the Prince agreed to help set up a company to build and market the Curta, the Contina AG Mauren, with Hertzstark holding 30 percent of the stock.

At first, things seemed to go smoothly, but as time went on, Hertzstark grew concerned about how the company was being run and financed. Eventually, the backers tried to squeeze Hertzstark out by withdrawing all stock and making him buy back his shares with money he didn't have. Lucky for him, the backers had previously tried to protect themselves from lawsuits by making Hertzstark keep the patents in his name, so he could threaten to take his invention with him unless the backers paid him the money they owed them, which they did.

Despite these dealings, the Curta hit the world market in 1949 selling for US\$125 through mail order and in a handful of specialty shops. It was a lot of money in those days, but the Curta was still a hit with engineers, traveling accountants, pilots, and even rally drivers. In the end, 150,000 of them were built in two models over the course of 20 years. It also gained a reputation of toughness with the vast majority of returns for servicing being due to curious owners trying to take their Curtas

apart, only to find that getting one back together again was a whole different matter.

The Curta soon developed a cult following, but by 1966 Contina was on its last legs and sold the rights to the Curta to the Swiss company Hilti. Production continued until 1972, but by then the introduction of the much cheaper electronic pocket calculator proved impossible to compete with and the little mechanical marvel was withdrawn from the market.

But perhaps that was a bit premature. Early electronic calculators weren't very reliable, couldn't handle many digits, and broke easily, so the Curta still had die-hard users. In later years, Hertzark himself said his invention only reached one percent of its potential.

But despite being off the market for over 40 years, the surviving Curtas aren't gathering dust in museums and in the back of junk drawers. Secondhand Curtas sell for as much as US\$1,900 apiece and the devices have developed a cult-like following as enthusiasts try to figure out how to disassemble and assemble the machines, create virtual Curtas to show off their mechanical intricacies in three dimensions, and develop [Curta emulators](#) to allow the public to try their hand at operating the miniature calculator.



One man has even taken things so far as to build his own Curta from scratch using that marvel of 21st century design, the 3D printer. Since 2015, software developer [Marcus Wu](#) has been designing and

constructing his own Curta after being inspired by a YouTube video about how one works. Much of the work has revolved around studying the mechanism and individual parts as well as producing CAD files for 3D printing.



One of the things that Wu soon discovered was that for all the advancements in 3D printing, trying to fabricate a printed part out of thermoset plastic instead of aluminum and manganese alloys was

well beyond the printer's resolution, so Wu had to scale things up a bit. In the end, Wu's Curta wasn't palmable,

but was four times as large (about the size of a coffee can), and weighed about three pounds (1.4 kg).

"My 3D printer is nowhere near precise or accurate enough to print a 1:1 scale Curta," says Wu. "Instead, I will be printing at about 4:1 (possibly a little bit larger than that if I come across anything that I need to print larger). Despite scaling it up 400 percent, the tolerances between mating parts are much too small for most 3D printers – even for some very expensive professional printers."

In the end, Wu fabricated 240 printed parts with 100 non-printed ones for the device's springs, nuts, and ball bearings – still short of the Curta's 605 parts. Part of the reason was that Wu had to redesign many details so his printer could create parts he could assemble and had tolerances and clearances that would allow the mechanism to run smoothly.

When finished, Wu's Curta replica will be painted the same matte black as the original and will serve as a reminder for today's engineers of another time when electronics were in their infancy, electronic computers hadn't been conceived, and the alternatives of the day were mechanical devices that required design and execution skills little appreciated today. It was a time when the calculating machine melded the mind of the engineer and the hands of a Swiss watchmaker. And if nothing else, it shows that out of one of the most horrible episodes in human history, a piece of great art can emerge.

*This article has appeared on the New Atlas website and Facebook and has been edited for space. David Szondy is a freelance writer based in Monroe, Washington. An award-winning playwright, he has contributed to Charged and iQ magazine and is the author of the website Tales of Future Past.*

*Here is a link to the original article with more info and pictures. (The Editor)*

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