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what is your favorite (YOUR OWN) RPN program?

*Message #1 Posted by **bill platt** on 15 Nov 2003, 3:50 p.m.*

I post this question because it will hopefully help to give us all a better idea of:

a: what sorts of things we use our calculators for,

b: why RPN is good (or why keystoke programming in general)

c: why BASIC and other methods are good (Valentin, please feel free to post your favorite non RPN, too!:-))

Be sure that you describe a program that *you yourself* wrote--not something you got out of a book, or modified from someone else. It *has* to be your very own thing.

And it does not have to be big. It does not have to be complex. It it doesn't have to be THE one (we change our minds and perceptions with time, right!). And it does not have to be your latest (mine isn't). But it has to be satisfying--or really effective in your mind (tell us why).

So here goes: my favorite (for the time being) is one that I wrote to compute the 2nd moment of areas of arbitrary rectangular sections, along with adding known arbitrary shapes with known area, centroid, and fundamental 2nd moment about centroid, t oa set of other known shapes or rectangles. In this case, I discovered later that there was some sort of program in the calculator manual that did this--but I didn't bother to look, and I knew what I wanted! and besides, it is *sooooo* much more satisfying to give it a try all on ones own occasionally....

The reason this is such a satisfying program is that if you do mechanical design, and you need to know what the bending stress will be of some arbitrary set of parts, you need to know the "inertia" or "second moment of area" and the "Section modulus" of that section. While yes, I also wrote a spreadsheet program that does this task, the calculator is both "safer" in a way (no cells to mangle etc), but also portable, fast, there with pencil and paper as you are sketching and playing with ideas....And to have it programmed in, rather than doing it by hand, save lots of time! If yo uhave never done this computation, it goes like this:

Area y A*y A*y^2 I

Area2 y2 A2*y2 A2*y2^2 I2

Sum A Sum Ay (SumAy^2)+(Sum I)= Ib

SumAy / sUMA = Y'

Ib - (A*Y'^2) = I about centroid.

Z = section modulus = I / (max fiber - centroid position).

So, you can see that there is a lot of button pressing!

Further, in RPN, it programmed very smoothly--not very different from doing the problem by hand (except all the registers). So, that was satisfying.

Maybe I'll post the code later---but you don't have to post your code---better to get us talking about what we are doing first, not yet how we do it.

Basically, I have a "clear" routine (which is handy for preserving the contents of registers that are in use in other programs--rather than clearing the whole machine's registers), a "rectangles" entry routine, a "summing for I and Z" routine, and a routine for input of known sections (which always must be followed with the "summing" routine).

Best regards, and looking forward to hearing some fun stories!

-Bill Platt

Edited: 15 Nov 2003, 4:58 p.m.

Re: what is your favorite (YOUR OWN) RPN program?

*Message #2 Posted by **Andrés C. Rodríguez (Argentina)** on 15 Nov 2003, 7:24 p.m.,*
in response to message #1 by bill platt

For HP 25, prime number tester or factor finder; and battleship game.

For HP 41: Space Shuttle Landing Simulator (sort of game) and RCA 1802 microprocessor cross assembler (very crude, I admit)

I have some partial listings of the above, and have planned for months a detailed article on the last two, but I have not found the time to advance with such project...

Re: what is your favorite (YOUR OWN) RPN program?

*Message #3 Posted by **jimc (can.)** on 15 Nov 2003, 11:11 p.m.,*

in response to message #1 by bill platt

My favourite is my drilling fluids rheology program. When I was an engineer on the drilling rigs in the 80's, we had slide rules to calculate pressure drops, viscosities, and flow regimes. Using my trusty HP, I wrote a program using a procedure that I continue to use today - that is, define the parameters the user may wish to change, and attach them to a a Lbl instruction. In this way the user could examine several what if scenarios. It forced me to examine a structured programming sequence. To do it though, required over 600 steps. I was grateful for the continuous memory!

While I was using this program (in about 1/5 the time my fellow engineers were doing it using the company supplied slide rules) I was able to finish my am reports, complete with calculations for solids, weight up requirements, and relevant costs. At the time, it was a marvelous time saver.

Sure, its old tech. But then, so are Louis Armstrong's recordings....That doesn't mean it is any less relevant today. Any open minded person can enjoy it!

12345

Re: what is your favorite (YOUR OWN) RPN program?

*Message #4 Posted by **Jim Chumbley** on 17 Nov 2003, 9:08 a.m.,*
in response to message #3 by jimc (can.)

Jim,

Would you please state the machine you ran this program on? I presume it was the HP-41C/CV. And would you explain how you managed the 600 program steps? I am imagining that it was designed as subroutines swapped in and out of working memory.

Edited: 17 Nov 2003, 9:09 a.m.

Re: what is your favorite (YOUR OWN) RPN program?

*Message #5 Posted by **jimc** on 17 Nov 2003, 2:33 p.m.,*
in response to message #4 by Jim Chumbley

Hi Jim. Thanks for your post.

I used a 41 CX, and I reduced the size of the memory registers to less than 50 at start up so I had extra room for all of it. (its kind of fuzzy now, but I believe that this was one of my first errors) - anyway, I did this in about the first ten steps. Since some of the calculations were to be used separately, I wrote some external programs that were called into the main program. As the program grew, I tried to pare it down to where I could manage it.

Therefore, the large number of steps were about 1 program that used around 300 steps, and the other 10 or so programs using the remainder. Not technically one program, however, the external programs (or subroutines) were fairly useless without the main program, as the main program had the

constants (prices, etc) that were "seeded" into the memory. This was one of those decisions that at first blush seemed sound, but upon reflection was fraught with difficulty.

Like I said in the original post, I learned a lot writing the program, however the fundamentals were sound enough that I continue to use them today. I am no longer a drilling guy - so I have had no use for the program. I planned on posting it to the 'net, but over the years it has gotten buried.....However, this thread has re-awakened my interest in digging through my old textbooks.

12345 deletes

Favorite RPN (and BASIC) programs [LONG]

*Message #6 Posted by **Valentin Albillo** on 15 Nov 2003, 11:25 p.m.,*
in response to message #1 by bill platt

Hi, Bill:

These are a few of my choicest ones for assorted HP handhelds (no SHARPs on sight):

HP-25:

```
  WHAT: Numerical solution of 1st-order Differential
        Equations using a 3rd-order Runge-Kutta method


  WHY:  Because at the time, it seemed next to impossible
        to fit such a program on the meager HP-25's 49 steps,
        having to call your f(x) three times with different
        arguments and returning to different locations
        in a machine without GOSUB capability, while still
        leaving enough free steps to define your f(x).


        My approach was clever enough that it inspired my
        close friend Fernando del Rey to try and improve it
        to a 4th-order RK method, which succeeded in
        calling f(x) *four* times, and still left 10 steps
        or so for your f(x). To this day I still consider
        it the most amazing program I've ever seen.
```

HP-67:

```
  WHAT: Elliptical Filter Design


   WHY: Elliptical Filters were superior to any other
        standard filters in that they can be of lower degree
        for a given specs, as they do have true minimax
        properties. Designing them requires elliptic
        trigonometric functions (instead of the usual
        circular ones) and computing them with the required
        accuracy and fast enough was a real challenge in the
        slow HP-67's 224 steps. I had to design quite clever
        algorithms to accomplish it all, but in the end
        my program would compute high-pass, low-pass,
        band-pass and band-stop elliptic filters, would
        compute the zeros and poles and would plot the
        graphics and all other data relevant to the design.
```

HP-41C:

```
  WHAT: 8x8 Othello (aka Reversi) game, the user playing
        against the HP-41C, which played a reasonably
        challenging game at a reasonably fast speed, while
        graphically printing the board, checking your moves
        for legality, being able to play against itself,
        and finally announcing the winner.


   WHY: Because at the time noone had attempted to program
        such a complicated board game on a 41C. It required
        several Memory Modules (no Quad Module or 41CV then)
        and extremely impressed everyone who saw it, so much
        so that local HP used it to increase sales at local
        trade shows, as a demo, and it finally got to the
        hands of HP Corvallis, who where equally impressed.
        They wrote me a letter telling me so, and asking
        for my written permission to use and publish it
        as they saw fit, which I obligued. They then wrote
        a second 'thankyou' letter including a printed
        'Outstanding Achievement' Diploma, redeemable for
        some expensive 41C peripherals. I still keep it.
        'Othello' was also a sensation when I submitted
        it for publication in the legendary Australian
        PPC Technical Notes, where it appeared. Oddly, it
        had been previously submitted to PPC proper, but
        Richard Nelson gave it a miss.
```

HP-12C:

WHAT: Trigonometric functions package

WHY: Because noone else had written an acceptable package which implemented all six trigonometric functions for the HP-12C under serious, strict requirements of accuracy and speed. Some people had tried before and after, but hastily and carelessly implementing a bunch of run-of-the-mill Taylor Series expansions doesn't quite cut it and is bound to offer poor accuracy and unacceptable running times or even outright errors for large arguments or arguments near extremes, i.e.: it's not the same computing arc tan(100000000) than arc tan(1), and it's not the same computing arc sin(0.99999) than arc sin(0.1). My program succeeds in delivering accurate results for extended ranges at the fastest speeds and it does so for all six functions in a single 99-step program.

WHAT: Polynomial root finder and evaluator

WHY: Because this very small, 37 step program, succeded in using the financial functions available in the HP-12C well above and beyond their intended uses to provide the best and fastest polynomial root finder and evaluator among all Voyager series models (HP-15C included) and even faster than any pure RPN programs for the HP-41C. It could find any and all real roots of an Nth-degree polynomial, without any iterations in user code, and it could directly evaluate the polynomial for some given arguments, also without using any user code loops.

HP-15C:

WHAT: Computing E up to 208 digits

WHY: I haven't written that many programs for the HP-15C

```
       but this I consider particularly worthy. While it
       is possible to compute E to more than 400 digits
       on the 15C, my program was intended to do it using
       matrix functions and matrix techniques, as a way
       of demonstrating what they could do. So, it made
       a good use of matrix addition to update the running
       total, and a novel use of the matrix Frobenius Norm
       operation to detect termination, as well as scalar
       matrix division to normalize the final result. You
       don't see matrix operations being used like this
       that often.
```

HP-71B:

```
  WHAT: Chess - Solving mate problems in N moves

   WHY: Because it actually solved any chess problem of the
        'White to play and mate in N moves' kind, in pure
        BASIC with no help from assembly language routines,
        using the powerful technique of *recursive* user
        defined functions that HP-71B's ultra-advanced BASIC
        language allows. There's also a neat trick on my part,
        defining and using variables *local* to the functions,
        which is something apparently not possible. The
        resulting program is quite complex, implements a
        full legal-move generator and recursive move-tree
        generator and evaluator and works for any number
        of moves N, subject only to time and memory constraints.

  WHAT: Scramble

   WHY: Because it implements a really challenging and
        enjoyable *video* game on the smallish HP-71B display.
        It uses a number of commands contained in my 4 Kb
        compilation of LEX words and succeeds in creating
        a very entertaining game in just a dozen lines of
        BASIC, with several levels of difficulty and an
        assortment of tunnels and obstacles that the user
        can add to easily, for extra-fun.
```

Best regards from V.

Re: Favorite RPN (and BASIC) programs [LONG]

*Message #7 Posted by **Angel Martin** on 16 Nov 2003, 2:32 a.m.,*
in response to message #6 by Valentin Albillo

Hola Valentin,

I remember fondly playing Othello on my 41 back then, it was (and still is) a truly amazing feat, one that best showcased the 41 system advantages so I wasn't surprised when HP acknowledged it as such. At least then they could recognize a masterpiece when they saw one.

Since you're an avid Chess aficionado (I'd dare to say you probably exceed such grading), I was wondering if you ever came across a full chess program written on the 41 by a Belgium gentleman by the name of Claude Roeltgen? He managed to create such an ingenious program that I'll always regard this as another incredible achievement. Mind you, it is painfully slow! but again, that's not the point at all.

I dissected the program to see how some things were done. It has synthetics galore, using precompiled GTOS to jump to non-existing labels (to save program lines), amazing manipulation of multi-byte instructions being used separately depending on the jump distance, etc.

Let me know by mail If you're curious, I'll be glad to send you a copy on mag cards.

Best wishes,, AM.

Link to Valentin's Othello program for the HP41

*Message #8 Posted by **Gene Wright** on 16 Nov 2003, 7:47 a.m.,*
in response to message #6 by Valentin Albillo

http://www.rskey.org/gene/calcgene/othello.htm

One of my favorite games. Changed to not require a card reader by inserting the storing of needed constants at the start of the program.

Enjoy!

Actually, it's 'Othello 2'

*Message #9 Posted by **Valentin Albillo** on 17 Nov 2003, 4:46 a.m.,*
in response to message #8 by Gene Wright

Hi, Gene:

Thanks for your kind words and for featuring some of my game programs on your excellent site, but as you fully state in the heading, the program you feature there is not the original 'Othello' I was referring to, but a later version, 'Othello 2'. Matter of fact, 'Othello' was never published in PPC, because Richard Nelson did not deem it proper. He published instead 'Othello 2', at a much later date. The original Othello was published earlier in PPC Technical Notes, and eventually, at the request of HP Corvallis themselves, it was fully documented and submitted to the HP-41C's Users Library.

Anyway, what's the difference ? Isn't 'Othello 2 ' an improved version of original 'Othello', better in all respects ? Well, yes and no. On the one hand, it's a much more complex program, features two levels of play, and so can play better at times. On the other hand, the original Othello was much more elegant, did a lot in significantly fewer program steps, and didn't require a card reader at all, being capable of running in less RAM without external initialization. In other words, O1 was the real gem, IMHO, innovative, elegant and streamlined, a programmer's dream come true, while O2 was clumsier, less elegant, and didn't really make the point, as its only redeeming feature, a better level of play, required significant extra resources, didn't play that much better, and was slower by an order of magnitude or more, so it was pretty useless as a demo and you'd need a lot of patience to play against its 'improved' level, thus greatly diminishing the awe factor and the enjoyment.

Besides having a look at O2, available at your site, I'll heartily suggest anyone interested to try and get the original Othello as well. *That* is the program I consider one of my very best.

Best regards from V.

Available?

*Message #10 Posted by **Patrick** on 16 Nov 2003, 5:35 p.m.,*
in response to message #6 by Valentin Albillo

Are the HP-25 programs you've mentioned publicly accessible? I certainly would like to see the program you consider the most amazing you've ever seen!

Re: Favorite RPN (and BASIC) programs [LONG]

*Message #11 Posted by **Fernando del Rey** on 16 Nov 2003, 6:32 p.m.,*
in response to message #6 by Valentin Albillo

Valentín, thanks for your kind words in referring to my 4th order Runge-Kutta program for the HP-25. I certainly wouldn't have done it, had I not been inspired by your 3rd degree program. It's certainly one of the favourite programs I ever wrote, especially since I did now owe an HP-25 myself, and I wrote and ran the program "in my head", but had to wait until we both tried it together in your machine and it ran perfectly on the first try! I don't think I have achieved such a feat (first try perfect run) in my programming life ever again.

Funny thing is that there is an amazingly similar program in the software library here at the museum, and that one leaves 12 steps to code the function. But I think my program required less external initialization and no precautions to not alter the LAST X register between steps. I wish I had an HP-25 to try and compare both versions.

I also have very fond memories of a program I wrote on the HP-67 to solve systems of up to 7 linear equations in seven unknowns. This must have been 1977, and I was in engineering school (I was a classmate of Valentín). There was one particular day that I was not inspired solving a tough mechanics problem during a final exam. So I did it by brute force, which meant taking all the forces and momentum to set up a system of exactly seven linear equations which I solved with my handy HP-67. Of course, the teacher had no clue that such thing as a programmable calculator existed, so he thought my correct results had simply been copied from someone else. I had to show him that I had solved it with the calculator and he wasn't too happy with my method, but he could do nothing but give me a minimal pass grade. Oh well, at least my trusty 67 saved me from a flunked final!

Re: Favorite RPN (and BASIC) programs [LONG]

*Message #12 Posted by **Fernando del Rey** on 16 Nov 2003, 7:08 p.m.,*
in response to message #11 by Fernando del Rey

Sorry, I meant to say that I did NOT owe an HP-25 myself.

Will you share it with us, Fernando?

*Message #13 Posted by **Patrick** on 16 Nov 2003, 9:41 p.m.,*
in response to message #12 by Fernando del Rey

I'd love to see your 4th order RK program on the HP-25!

Re: Will you share it with us, Fernando?

*Message #14 Posted by **Fernando del Rey** on 17 Nov 2003, 2:22 a.m.,*
in response to message #13 by Patrick

Sure, give me a couple of days and I'll post it.

...NOT OWN... dammit! (NT)

*Message #15 Posted by **FdR** on 17 Nov 2003, 2:24 a.m.,*
in response to message #12 by Fernando del Rey

.

Re: Favorite RPN (and BASIC) programs [LONG]

*Message #16 Posted by **Valentin Albillo** on 17 Nov 2003, 4:59 a.m.,*
in response to message #11 by Fernando del Rey

Fernando posted:

"Funny thing is that there is an amazingly similar program in the software library here at the museum, and that one leaves 12 steps to code the function. But I think my program required less external initialization and no precautions to not alter the LAST X register between steps. I wish I had an HP-25 to try and compare both versions."

I'm not sure if "funny" is the correct word here. When I first saw that program in the software library at the museum, it made me very suspicious. I remember submitting your original program to PPC, PPC TN, and many particular individuals at the time (25 years ago), but if I recall correctly, it never got published (RN strikes again ! :-)

However, facts are that it got somewhat disseminated, and I've always wondered if the person who 'wrote' and submitted the program actually in this forum's Library could perhaps get some 'inspiration' in a copy of your original. If that's not the case, my apologies, but both programs seem far too similar that a 'lucky coincidence' seems unlikely. Even if it were, yours would pre-date the other one by decades.

Best regards from V.

Re: Favorite RPN (and BASIC) programs [LONG]

*Message #17 Posted by **Fred Lusk (CS)** on 19 Nov 2003, 10:21 p.m.,*
in response to message #6 by Valentin Albillo

Bill…

I can be just as long with my post, or even longer :-)

My favorite programs are ones I have written myself while I was in school or as part of my work as a civil engineer. This is not because I claim my programs are better than anyone else's--though I think my best programs are very good--it's because of the time I spent researching the subject of each program and the time I spent actually making the program work. There is great pleasure in both the learning and the accomplishment, and they're useful in my work. Of course, my wife doesn't understand the attraction one bit, but then I don't understand some of what she likes. Good thing we keep our mouths shut about these eccentricities!

In high school and college I wrote simple programs for my HP-55, the best one was probably an interpolation program for finding all of the contour lines between two spot elevations (think topographic maps). I wrote this for my Engineering Graphics course.

Later in college I bought an HP-34C and wrote several nice programs for different engineering subjects. I even wrote a 34C program on the fly during my Hydrology final to solve a complicated iteration…I listed the formulas, the program steps, my initial guesses, and the result, and I explained how the SOLVE feature worked (my professor used an HP-45 so I knew my approach would be OK)…I finished the test after only 45 minutes and ended up with the highest grade…the second person out took another hour. He was totally blown away when I told him what I had done. Of course, he used a TI!

However, my best programs are for the 41/42S series. I started with an HP-41CV and replaced it a couple of years later with an HP-41CX. I added an Advantage ROM the day they arrived at Lewis & Lewis in Ventura, CA (remember when local dealers actually knew something?). I have an HP-32SII and an HP-48G+, but my calculator of choice now - as it has been for 15 years - is my HP-42S.

I have written a number of interchangeable solution programs for hydraulics that are similar to the Time Value of Money program in the original HP-41C Solutions Book (I think that's the name), including: (1) HW (Hazen-Williams for pressure pipes) (2) MEQ (Mannings for pressure pipes) (3) SD/SWR (Mannings for open channel flow in pipes) (4) CANAL (Mannings for open channel flow in a rectangular, triangular, and trapezoidal channels) I also have several HP-42S solver routines that I use for simple interchangeable solutions where I don't need annotated results.

I use these four (and others) on both the 41 and 42S. Programs (1) and (2) also include an overlapping interchangeable solution for the continuity equation (Q=AV). I say "overlapping" because flow rate and pipe diameter are shared by both equations and I use a toggle to determine which equation to use to solve these variables. Program (1) is my most used program over the years. I wrote it about 20 years ago while my wife was having an ultra-sound before our first daughter was born. I actually "wrote" it in my head (I had no paper) and transcribed the 200+ steps when I got home. My memory was much better back then! Program (3) solves sewer flows in gpm and storm drain flows in cfs. Program (4) is interesting because I use the same iteration subroutine for two of the variables. A flag determines which one to iterate.

(5) My favorite program in terms of cleverness is probably FEET, the Feet-Inches-Fractions program I posted here a couple of years ago. For those of you who live metric (and I wish I was one), this may seem unimportant. But, to those of us who have to calculate this stuff, this program is a god-send. I wrote it nearly 20 years ago for a co-worker. The core of the program (the fraction reduction) was adapated from the PPC ROM. I later discovered a simpler way to handle other parts of the program, but I haven't gotten around to finishing the last 10% so I can post the improved version. In any event, y'all may find the original program interesting.

Other programs I wrote for the 41 and/or the 42S and that I use frequently include: (6) VINT (Vector Interpolation) - this is useful for interpolating between rows or columns in a table based on "index values." I wrote this to interpolate the tables in "Circular Concrete Tanks Without Prestressing" and "Rectangular Concrete Tanks" (both by the Portland Cement Association). (7) NGAS (Natural Gas Flow Calculations) - this program solves the isothermal-compressible flow equation for upstream or downstream pressures in one reach of a natural gas system. I have more general Excel and Mathcad versions that handle multiple pipes, but this is good for things like checking the service lateral to a natural gas engine. (8) HYDR (Rational Method Hydrology) - this program solves single basin hydrology using the Rational (Irrational???) Method using either the Kirpich or FAA equations for Time of Concentration.

My last HP-42S program I will describe is a program I wrote a couple of years ago for a basic Statistics class. I had never taken a stat course and was self taught for the things I needed and use (mainly linear regression). I signed up for a lower division, math-oriented stat class at the local junior college (believe it or not, there are non-math-oriented stat classes…my wife took one in college…it was very qualitative with only a little bit of math). Anyway, my class was taught by my old high school physics teacher, who was still sharp as a tack at age 77±. He was (I think) one semester away from his PhD in Psychology when WWII intervened, but was expert in many areas…except calculators (TI). He wanted to know why I was there, and I told him it was to pester him! Of course, I had an unfair advantage since I had more math behind me than any of the other students (he took me off the grading curve). Since it usually took me only 15-20 minutes to do each 90 minute mid-term, I had lots of time to kill. After a test on chi-squares and contingency tables, I wrote a nifty little 77-step program that

makes great use of the HP-42S's matrix capabilities. The best part was it gave a great excuse to tease him about his affinity for TIs. As an aside, when I was a senior in high school, my American Government teacher asked me to determine the correlation between standardized reading scores and class scores for his group of students. My HP-55 was able to handle the regression for about 175 individual data points (student scores). I remember pointing out to my physics teacher that his SR-51 (I think) was internally crippled because TI limited n to 99 data points. He was not amused.

My favorite program by others is CAVES for the HP-41, though I haven't played it in quite a while. It's the ONLY program that got my wife to actually want to use my calculator. She was a child development major in college and never had a need for a real calculator.

I have also played OTHELLO, and remember it as a very good program.

Now you know the rest of the story.

Fred

Re: Favorite RPN (and BASIC) programs [LONG]

*Message #18 Posted by **Chris(FLA)** on 20 Nov 2003, 2:03 p.m.,*
in response to message #17 by Fred Lusk (CS)

> Quote:
>
> My favorite program by others is CAVES for the HP-41, though I haven't played it in quite a while. It's the ONLY program that got my wife to actually want to use my calculator.

Same here with my wife. She really enjoyed that game and played it for many hours. She also used the 11C I got her that she mainly used for work to figure out sales tax % on orders she would take. Still have the 11C and it is in mint condition. Running on the same batteries for 18+ years. I asked her recently if I could have the 11C and I received a direct and stern NO!

I taught her RPN in about an hour one day and she was hooked. I had to get her the 11C, my 41 kept growing legs and moving. She is an HP'er. She says the same thing I do when I have to use an AOS calculator. "How do you use this thing", "This is too hard to use", "Where is an RPN HP when I need it", and I wrote many a program on a TI-59 before I found the HP world and the simplistic beauty of RPN.

Chris

12345

Re: what is your favorite (YOUR OWN) RPN program?