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Programming astronomical data

Message #1 Posted by [Michel Beaulieu](#) on 14 June 2004, 8:15 p.m.

I recently bought a book call " Practical Astronomy With Your Calculator" by Peter Duffett-Smith. I'm very interesting to put all these calculations on a calculator but i don't really know if it will fit the memory of my CX.

I don't know if it's me but i search at HPMUSEUM, HPCALC and TICALC and astronomy programs are not very present. I found interesting programs for the HP-48 but it's not really what i want. I need non graphical astronomy calculations with a calculator and no need of a PC; it'S for "sur le terrain" with my telescope i will use it. No battery problem please ;-)

You know the kind of simple, but lovely programs, that you enter step by step your location and date and time and you get coordinates of planets, messiers objects etc. on of the program can also make coordinates transformation, handling many time remefence.

I read the book and i'm sure that all these programs can be very short even be user friendly. But there is a lot of them!

The 41CX is my favorite calculator but i think the main memory is too small for my needs this time for that project...

Is it possible that the new HP-33S that became the tread leader of this forum will be the one i need for this project?

Any suggestions for the choice of a calculator or a site that already have some astronomy programs for HP or TI.

Perhaps a readers will already have codes of some astronomy programs that i can use for my project?

(I'M sure if i choose a 41, Luiz will help me! :-))

Re: Programming astronomical data

Message #2 Posted by [Palmer O. Hanson, Jr.](#) on 14 June 2004, 8:53 p.m.,
in response to message #1 by Michel Beaulieu

I think that there were some astronomy programs in TI's PPX Exchange. Unfortunately, most of the programs in the exchange are no longer available. I did make about 200 of the PPX programs available to Gene Wright to be put on the net. I can't remember if any were for astronomy. I don't think that work is done yet. Gene can tell you the status.

Hewlett Ladd, who was a subscriber to TI PPC Notes, wrote a number of astronomy programs for the TI-95. I will have to search for those.

Finally, I have a dim recollection of a book of astronomy programs published in the 1980's. If you have access to old EduCalc catalogs you might want to look there.

Re: Programming astronomical data

*Message #3 Posted by [Tom Sherman](#) on 14 June 2004, 9:09 p.m.,
in response to message #1 by Michel Beaulieu*

Michel,

The HP Navigation Module for the 41CX has an almanac that gives the celestial coordinates for the sun, moon, Venus, Mars, Jupiter, Saturn, and 58 bright stars used in navigation. It also contains formulae for solving the navigational triangle, and will hence transform celestial coordinates into local coordinates of altitude and azimuth. Unfortunately, the module seems to go for rather high prices on eBay (\$50 - \$100 or more), but it is a nice package of navigation/astronomy software.

I wrote a program once for the HP Users' Library that makes use of the Navigation Module software and the Time Module of the 41CX to automatically generate, for any given latitude and longitude, the local coordinates of the celestial bodies referenced in the almanac. I would be happy to send you a copy of the program listing if you thought you might have use for it (but it is only useful with the Navigation Module).

Others on this Forum are much more expert on these matters than I am. I hope that you hear from them, and have success with your project.

Cheers, Tom

Re: Programming astronomical data

*Message #4 Posted by [Art Litka](#) on 14 June 2004, 10:56 p.m.,
in response to message #3 by Tom Sherman*

I have started writing some astronomy programs for the 33S. It has the memory for many programs, but the limited number of variables/labels is a problem. I would be happy to collaborate or share on writing some from various source books, including the Duffet-Smith text.

Re: Programming astronomical data

Message #5 Posted by [astro physicist here ???](#) on 15 June 2004, 2:42 a.m.,
in response to message #3 by Tom Sherman

what is this holoywood talking about these days . The day after 2morrow.... first what have you learn about the universe so far ? do you believed it is made by some supreme bein? lol work with out play make jack a lzy boy remnber that

Re: Programming astronomical data

Message #6 Posted by [Trent Moseley](#) on 14 June 2004, 11:19 p.m.,
in response to message #1 by Michel Beaulieu

A more comprehensive source for astronomical programs that can be customized to your geographical location can be found in many books written by the Belgian astronomer/mathematican Jean Meeus. Many of his works have been published by Willmann-Bell, Inc. in the U.S. In addition you might need the annual publication "Astronomical Almanac" available in both the USA and the United Kingdom from their respective government printing offices. Other good sources are Oliver Montenbruck (Springer-Verlag, Brelin), and Aubrey Jones FRAS (John Wiley & Sons, New York).

I have had no problems in writing programs for my RPN HP calcs.

tm

Re: Programming astronomical data

Message #7 Posted by [Karl Schneider](#) on 14 June 2004, 11:52 p.m.,
in response to message #1 by Michel Beaulieu

Michel --

Well, you're in luck. I undertook a similar task last year, got stalled, but plan to resume soon...

I bought the same book, bought an HP-41 Navigation Pac for my 41's, and received Tom Sherman's program from 1985 (see his post above this one). His program seems to give accurate answers, but runs slowly. This is due mainly to the Nav Pac software, which consists entirely of RPN routines, not machine-code functions.

To run Sherman's program without modification requires the following:

HP-41C with at least one memory module (not X-memory) +
Time Module +
Navigation Pac

OR

HP-41CV +
Time Module +
Navigation Pac

OR

HP-41CX +
Navigation Pac

The Time Module could be eliminated if the program is modified to require the user to manually enter date and time.

My objective is to write a program that will calculate the position of the sun and moon only, given complete information of date/time and location (latitude/longitude).

I am developing two versions of the program: one for the 42S and one for the 41C/V/X without any plug-in Pac's. The user-interface code will be different, but the computational engine will be the same. I used the equations in Duffet-Smith's book as the basis for my programs.

The main purpose was to be able to "locate" the two large, bright navigational beacons, using programs that will fit on a 42S and a 41CV/X, and do not require the costly Time Module or Nav Pac.

My software is partially complete, but has bugs that I need to fix. After such a long hiatus, I need to review my work. Therefore, I'm not presently ready to provide to you my work to date.

If you have the money, I'd recommend that you get a 41CV + Time Module or a 41CX, a Navigation Pac, and Sherman's program. That will provide a package that can locate the sun, moon, Venus, Mars, Jupiter, Saturn, and a number of major stars.

-- Karl S.

Edited: 14 June 2004, 11:56 p.m.

Re: Programming astronomical data (are you with me Hrast?)

*Message #8 Posted by [Antoine M. Couëtte \(France\)](#) on 15 June 2004, 4:58 a.m.,
in response to message #7 by Karl Schneider*

June 15, 2004

Hello to you all,

Michel, all the advice and recommendations hereabove in this thread are very clever and sound. All seem realistic solutions within reasonable reach timewise.

Just let me add 2 more options which I will be glad to discuss with you in particular if you so desire.

OPTION 1

I would encourage you to take a look at a wonderful, concise, and very clever HP41 program written by Dr Paul Schlyter and named " PUT THE SOLAR SYSTEM IN YOUR POCKET ".

Probably Dr Paul Schlyter (pausch@saaf.se) can provide you with a copy. If he is unable to do so - and as this program was earlier published in PPC USA some 20 years ago - I can dig out my PPC files and burn a copy to you. (By the way, can anybody confirm me that it is "legal" since I certainly do not want to infringe anybody's copyright), unless this program is already available in some archive file (Again: help needed here please) .

" PUT THE SOLAR SYSTEM IN YOUR POCKET “ computes the positions of Sun + Moon + 7 main planets. Any other planet / or comet can be easily added on. From program structure, I think that any other celestial body (star or Messier object) can be easily added on, at the expense of some additional (and probably limited) programming instructions.

For your own use, PUT THE SOLAR SYSTEM IN YOUR POCKET “ computes bodies coordinates in either heliocentric/ecliptic, or geocentric/equatorial, or geocentric/local (i.e. height and azimuth) reference frames.

In the version I have- very slightly modified for my own use from the original one - Minimum Size to run this program is SIZE 092 with registers 00 to 19 used for computations and registers 20 to 91 used for planetary data. And 2 programs are required, one with 753 bytes and the other one with 350 bytes. It means that you need to commit a total of 250 memory registers to this software, leaving you with 69 registers for other use, including fine tuning this software to your needs.

Accuracies on geocentric coordinates now: in the time frame 1900-2100 I have found that " PUT THE SOLAR SYSTEM IN YOUR POCKET “ gives the following results at 3 sigma - i.e. 99.5 % of the time –

- SUN: +/- 1.5 arc minute around true value
- MOON: +/- 6.0 arc minutes around true value
- MERCURY and VENUS: +/- 1.5 arc minute around true value
- MARS, JUPITER, SATURN, URANUS, NEPTUNE: +/- 3.0 arc minutes around true value
- PLUTO (not included in the original software and I have included it at the expense of 7 additional data registers so my own version requires SIZE 099): +/- 15.0 arc minutes around true value with the “ osculatory elements ” I am using. Here one can do certainly much better with better - but time limited - osculatory elements.

As regards accuracy over time frame validity , this is by far the best trade-off between accuracy over program size I ever found for the plain HP41CX. You most probably will not find any equivalent anywhere else. This is why in my opinion " PUT THE SOLAR SYSTEM IN YOUR POCKET " is one unequalled master piece and I never miss an opportunity to praise and advocate it.

For your information, accuracies delivered by " PUT THE SOLAR SYSTEM IN YOUR POCKET " are definitely insufficient for celestial navigation for which it has been customary to use data accurate to +/- 6 arc seconds. Such accuracies require over 50.000 bytes, so you can guess that in this range a significant increase in accuracy is achieved at the expense of a very important increase in size.

OPTION 2

As you do require a " hand held " solution, and if you own an HP48GX with additional memory cards (One 128k + I think another 128k at the minimum for the full non free version), or an HP49G - and subject to confirmation an HP49G+ - I would strongly encourage you to take a very close look at Hrastprogrammer HP41X/Z Emulator. (Are you with me Hrast?)

One version is free on the web and it can emulate a plain HP41CX.

These emulators are absolutely fantastic!!! For most if not all my applications they run 3 times faster than the standard HP41CX. And I almost totally stopped using my HP41's when I purchased my own custom made version.

Standard non free version will give you 680 Extended Memory Free registers, 3292 Program/Data registers + 8 times 4K blocks for your own programming needs! It is over 20 times the standard program space of the HP41CX with over 95% of it protected from MEMORY LOST! And you can also choose to allocate any HP41 module into these 4K blocks, including the NAVIGATION Module, thus leaving you with the option of following one of the advices given you hereabove in this thread!

For more details, go to <http://hrastprogrammer.tripod.com/> and if you want to directly contact Hrast, let me know.

You may also have a look at the following HP Forum thread:

<http://www.hpmuseum.org/cgi-sys/cgiwrap/hpmuseum/archv014.cgi?read=51496>

Hope all this information is useful to you.

Best Regards from Antoine M. " Kermit " Couëtte

antoine.m.couette@club-internet.fr +33-(0)612 88 06 36

Re: Programming astronomical data (are you with me Hrast?)

Message #9 Posted by [HrastProgrammer](#) on 16 June 2004, 12:52 a.m.,
in response to message #8 by Antoine M. Couët (France)

Are you with me Hrast?

Of course :-)

I really don't have anything to add to your post except that all my emulators are ported to HP-49G+ as well (but I just don't have enough time to put some info on my homepage) ...

Best regards.

Re: Programming astronomical data

Message #10 Posted by [Valentin Albillo](#) on 15 June 2004, 5:17 a.m.,
in response to message #1 by Michel Beaulieu

Hi, Michel:

Michel posted:

"Is it possible that the new HP-33S that became the tread leader of this forum will be the one i need for this project?"

Absolutely **not**. Don't be fooled by the "32 Kb RAM", there are *only* 26 labels and *only* 30+ registers for variables, and astronomical programs are exactly the kind to exhaust both almost immediately. You'd get just a few programs in before running out of both, not to mention the frustration, the cluttered keyboard and bizarre lettering color. If using it "sur le terrain", presumably at night, you're all set up for a monumental disillusion.

"Any suggestions for the choice of a calculator or a site that already have some astronomy programs for HP or TI."

Yes. For your kind of application, the best model by far is [the HP-71B](#). Why? Easy:

- Truly handheld and portable, you can easily hold it with one hand while keying data with the other.
- Extremely robust and sturdy. It will withstand most any weather conditions, be it rainy or cold. I know, I've used it in the field very extensively.
- The best keyboard there is, perfectly lettered, plus QWERTY disposition *and* separate numerical keypad. You can't enter data more comfortably than that.

- Large RAM available for your programs, starting from 16 Kb built in, and going up all the way to more than 400 Kb if needed. Even the minimal 16 Kb RAM should be more than enough for your stated purposes.
- Fast (from 7x to 14x times faster than a 41C) and precise: 12-digit mantisa with exponents up to 499, only model to implement IEEE standards, can denormalize exponents up to 510, if needed. You'll get the best accuracy in your results.
- Extremely easy to program, in its native BASIC language, which is a superset of standard ANSI BASIC but with extremely powerful extensions, such as subprograms and user-defined functions, both single-line and multiline, accepting parameters by value or reference, and allowing recursion.
- It's got a filesystem which will allow you to create any number of program files in RAM, as well as text files, data files, and other types.
- Full I/O supported. You can interface it to any number of peripherals such as printers, tape storage, disk storage, even connect it to other HP-71Bs, HP-41Cs or even PCs with the appropriate connection kits.
- And last but not least, you can find lots and lots of astronomy programs written in BASIC which can be keyed in the HP-71B with just minor changes. Many years ago, I did exactly that with the programs featured in this excellent book:

[Celestial BASIC](#)

which can be obtained second-hand almost inexpensively.

I've used the 71B in the field for a number of purposes, mainly cold nights, and there's no better machine in the world for this. Further, a number of friends of mine are quite good (much better than me) amateur astronomers and do use their 71Bs whenever they go star gazing.

Get one as soon as you can. There are plenty of 71Bs out there, so prices aren't high at all. I got three last year for some \$90-100. For so much power, convenience and reliability, that's a real bargain.

Best regards from V. *A picture of the 71B as well as a complete listing of the BASIC programs available in "Celestial BASIC" follow:*



MoHPC

Moon and Planet Programs

- o Right Ascension and Declination - provides the approximate right ascension and declination of the moon for any date and time.
- o Umbral Eclipses - for a start date of any year, this program tells you when the next umbral eclipse of the moon occurs, gives the magnitude of the eclipse, the local time of mid-eclipse, and the rise and set times of the moon for the day of the eclipse.
- o Dates and Times of Lunar Phases - provides a table of lunar phases for any month with the choice of local or universal time for the phase.

- o Right Ascension and Declination of the Planets - is divided into three parts. The first gives the right ascension and declination based on the 1960 epoch and using the equation of the center. The second gives more accurate right ascension and declination based on the 1980 epoch and uses Kepler's equation. The third gives hard-copy printout of the 1980 epoch data. Each also provides angular distance from the sun and distance in astronomical units from the Earth.
- o Planets/Sun/Moon Finder - This program helps you locate the planets, sun, and moon relative to the stars for any date. The program calculates the position of the object and selects a star map for the appropriate part of the sky, shows the constellations, and plots the chosen planet (or the sun or moon). It also plots other planets in the same region of the sky. You may plot a series of intervals to show the motion of the planet across the star field.
- o Planets/Sun/Moon Rise and Set Times - provides times when the planets, sun, and moon rise, transit, and set for any location on Earth, for any date.
- o Mars Oppositions - This program offers two alternatives: The first finds the next opposition of Mars. The program asks for a start year and month, displays a plot of sun, Earth and Mars seen from above the solar system, counts off month by month and in smaller time intervals as opposition approaches, until the date of opposition, and then provides details such as angular size, constellation Mars is in, distance from Earth, and so on. The second alternative provides observational data about Mars for any date.
- o Mercury and Venus - has three sections: The first tells you when the next eastern or western elongation of either Mercury or Venus occurs after a selected date, and provides information about the planet selected. The second shows graphically how Mercury and Venus swing from side to side of the sun. The third is used to find out when it is best to observe Mercury and Venus at any date and for any locality by indicating the rise times before and after the sun.
- o Jupiter's Satellite Configurations - For any date, and time, this program provides data on the configuration of the Galilean satellites of Jupiter and makes a graphic display of the configuration.
- o Worldwide Horizon Plots - An advanced graphics program which allows you to display the night (or day) sky on the monitor of your computer for any time and date and any location on Earth. In addition, the program displays Halley's comet for the 1910 and 1986 apparitions for times when it is expected to be visible in amateur telescopes. The tail is sized and oriented as expected. A planetarium-type horizon silhouette is displayed on each skyplot. You can select north, south, east, or west horizons, each of which overlaps those on either side and covers 180 degrees of azimuth. This is the most advanced and realistic skyplot program available today and it is updated to 1980 coordinates.

Time and Tutorial Programs

- o Sidereal and Mean Time Conversion
- o Julian Day from Calendar Day
- o Updating Star Coordinates - provides right ascension and declination for any epoch given the right ascension and declination of another epoch.
- o Transits of Pole Star - provides the time for any date when Polaris transits the meridian and is at eastern and western elongation.

- o Astronomical Conversions - provides rapid conversion of astronomical measurements including: light years, parsecs, astronomical units, telescope resolving power, and metric units.
- o Dates of Meteor Showers - provides details of annual meteor showers and shows a graphic star chart for you to identify the point from which the meteors appear to radiate (the radiant).
- o Solar System Data - a long program, loaded with information about the solar system, its planets, and their rings and satellites.
- o Recognizing the Constellation - a tutorial program which teaches you to recognize the constellations in the night sky. Bright stars in many constellations are also presented for you to identify.
- o Photographing the Planets - You are asked to identify your photo configuration - camera at prime focus, camera with eyepiece, or projection with eyepiece - focal lengths involved, and aperture of objective mirror or lens, film speed, and planet being photographed. The program provides advice on size of image obtained and exposure needed.

Re: Programming astronomical data: To you Valentin what are stated accuracies of "Celestial BASIC" ?

*Message #11 Posted by [Antoine M. Couëtte\(France\)](#) on 15 June 2004, 5:57 a.m.,
in response to message #10 by Valentin Albillo*

June 15, 2004

Valentin,

Your suggested "HP71+Celestial BASIC" solution seems outstanding and thank you for sharing it with us.

Going onto the "Celestial BASIC" Web link you indicate, I could not find any information on its accuracy. Could you indicate which accuracies versus validity time frame can be achieved by " Celestial BASIC " ? Any information about the Astronomical Theories themselves (Newcomb, or Leverier/Gaillot or VSOP , or ELP ???) and their degree of truncation, would be an interesting information, as well as any information on their published source also (Jean Meeus ???).

With the main exception being Jean Meeus's publications, I have often noticed that accuracies versus validity time frames are seldom adequately covered (if ever adressed) in a number a celestial publications related to disseminating astronomical data to a wide variety of users.

Thank you in advance for your reply, and

Best Regards from

Antoine

Re: Programming astronomical data: To you Valentin what are stated accuracies of "Celestial BASIC" ?

Message #12 Posted by [Valentin Albillo](#) on 15 June 2004, 6:23 a.m.,
in response to message #11 by Antoine M. Couëttes (France)

Hi, Antoine:

I'm at work right now, but will try and find the book at home tonight and let you know within 24 hours.

Best regards from V.

Re: CELESTIAL BASIC book, details

Message #13 Posted by [Valentin Albillo](#) on 16 June 2004, 6:39 a.m.,
in response to message #11 by Antoine M. Couëttes (France)

Hi, Antoine:

I did find the book ("Celestial BASIC") and had a look at it, to see if the author would mention the data you're interested in (accuracy, formulae, etc). As far as I can see, each program has a number of pages dedicated to explain its innards and how it does work (besides the commented BASIC listing). The following digested extracts are typical of the author's comments on methods and accuracy:

Program 7: PSTAR

Transits and elongations of Polaris

Starting from epoch 1980 the program uses right ascension of Polaris, the hour angle and the sidereal time for a given date to determine the local time at which the transits and elongations take place.

The accuracy is sufficient to set a polar axis except for a very large telescope (10 min. accuracy for any date).

Program 8: RADEM

Right Ascension and Declination of Moon for Any Date and Time

The program determines the position of Moon in its orbit by counting from its position at epoch 1960. It eliminates complete revolutions and also adjusts for the motion of the nodes and the perigee position during the period since or before the epoch. Then it adjusts for the eccentricity of the Moon's orbit and for the inclination of the orbit to the plane of the ecliptic.

The program prints out the right ascension and declination and repeats for the requested number of intervals.

For most purposes, this program provides sufficient accuracy in locating the approximate position of the Moon among the stars for any date and time.

Just the same, I think you might find interesting to read the following digested excerpts from the book, which include interesting comments on the why's and how's and on the intended accuracy and purpose:

Introduction

... the programs in Celestial Basic provide amateur and armchair astronomers and students with important aids to observing and understanding the configurations, motions and apparitions of our Sun and Moon, the planets and stars, planetary positions as well as the rising and setting times of all the planets, Sun and Moon, can be quickly found for any locality in the world, at any time, on any date. Astronomical (star) times can be converted to local times and vice versa. Circles can be set on equatorially mounted telescopes, and true north can be determined with the aid of polaris. you can find out when the next lunar eclipse will occur and how much of our satellite will be covered by Earth's shadow. You can learn when Mars will be in opposition next and how large it will appear in a telescope, or when Venus or Mercury are favorably placed for observation in the morning or evening sky. ...

... this book originated as a practical tool. I began to share the programs with others and the interest was such that I decided to incorporate them into a handbook. in addition to providing current information, these programs provide the convenience of checking observations in the past and predicting them into the future. I have compared the results of several of these programs with my observational notebooks that extend back to the 1930s, and I find them sufficiently accurate for everyday observations.

... it is possible to add further steps within the structure of the program to increase the accuracy ... the references cited in the bibliography provide the information necessary to achieve higher orders of accuracy.

About the author:

An author, consultant, lecturer and journalist, Eric Burgess's byline has appeared internationally in newspapers and magazines for over 40 years. He helped found the British Interplanetary Society in the 1930s and the International Astronautical Federation in the 1950s. He is a Fellow of the Royal Astronomical Society and has held official positions in several amateur astronomical societies. He has written extensively for NASA, providing educational materials and books on the missions and their results.

Observer's Guide to the Programs

In preparing for an evening of observations you might select the following programs:

- 1. Run TIMES to find the sidereal time at the beginning and end of your planned observations.
- 2. Use RISES to tell you the times of sunset, sunrise, moonrise, and moonset.
- 3. PHASE will tell you the phase of the Moon so you can find out if a bright Moon will interfere with your observations.
- 4. If the Moon is full you can find out if there will be an eclipse by using ECLIP.
- 5. Use SKYSET/SKYPLT to show you the sky at the time you plan to begin observing. You can see which planets will be in the sky when you plan to observe, as well as the constellations that can be seen.
- 6. If a planet you are interested in is not above the horizon, you can use RISES to tell you when it will rise. PLNTF will tell you where in the zodiac it is located.
- 7. Use PRISE to find out if Mercury or Venus is visible as an evening star, and how much time after sunset will be available for observation.
- 8. If either Mercury or Venus is visible the evening you plan to observe, use MERVE to provide details of distance, phase, and angular diameter.
- 9. If neither planet is visible you can use MVENC to find out when the next suitable elongation will take place.
- 10. If you are interested in Mars and you have found out that it is visible, you can ascertain its distance and angular diameter by using MARSP. This program will also tell you when Mars will next be close to Earth at opposition.
- 11. If you plan to observe Jupiter, you can use JSATS to identify its large satellites.

- 12. SSTAR will tell you if there is a major meteor shower on the night of your observations.
- 13. When resetting the polar axis of an equatorial mount, you can find the direction and elevation of the pole by observing transits and elongations of Polaris. PSTAR will tell you the times to do this.
- 14. Searching for a faint nebula or other celestial object ? Look up its right ascension and declination in your star atlas and then convert to the current epoch using EPOCH. By using TIMES to get sidereal time, you can then set the hour circle on your telescope and point to the correct right ascension and declination to bring the faint object within the field of view of a finder telescope.
- 15. If you want to use PHOTO to photograph one of the planets, you can find the angular diameter of Mercury and Venus from MERVE and that of Mars from MARSP. Angular diameters of Jupiter, Saturn and Uranus are found by dividing 190, 158, and 68 respectively, by the distance of the planet in astronomical units, obtained from RADEC.
- 16. If you are planning to observe a solar eclipse, you can find out which planets and bright stars will be visible during the eclipse by running SKYSET/SKYPLT for the time and date of totality, changing the latitude and longitude to your observing site. This will provide a guide for you to identify objects surrounding the Sun.
- 17. Making a trip into another hemisphere ? Learn the constellations in advance by using CONST and CONSH. Use SKYSET/SKYPLT to show you what the familiar constellations will look like from the opposite hemisphere, and in which direction to look for the planets.

Hope you'll find some of this useful.

Best regards from V.

Re: CELESTIAL BASIC book, details : to VALENTIN and MICHEL

*Message #14 Posted by [Antoine M. Couëtte \(France\)](#) on 16 June 2004, 1:01 p.m.,
in response to message #13 by Valentin Albillo*

June 16, 2004

Hello Valentin and Michel ,

Valentin, thank for your quick and kind reply.

From the data indicated, I can see that, at least for the Moon - and I should say without great risk for all other bodies also given the information on the (quite low) accuracy of Polaris - the "Celestial BASIC" software is not more accurate than " PUT THE SOLAR SYSTEM INTO YOUR POCKET ". Both have several arc minutes accuracy which I understand is sufficient for telescope settings.

For you Michel, given your last post (Jun 2004, 08:24 am), you are left with at least two viable options:

- either get an HP71B (or an emulator on Hp48GX with 2 ram cards/or HP49G no ram card / or HP49G+ + maybe an SD ram card : ask from somebody who knows the HP49G+) and get the Celestial BASIC Software which offers a number of advantages : it is written by a dedicated and enthusiastic telescope user and you will certainly get there everything you will need, with a lot of flexibility and ease, and even more.
- or use your old faithful HP41CX with " PUT THE SOLAR SYSTEM INTO YOUR POCKET " and you will be able to compute positions of all main planets, while still have sufficient space for adding any extra body given its elliptic orbital elements: either asteroid, comet, minor planet. If you need to compute position of a star or a Messier Object or a different " deep sky object ", let me know. I will be able to program for you (free of charge) within the remaining space of your HP41CX their coordinates accurate to +/- 1 arc minute as long as you can provide their Catalog elements.

Best Regards to both of you,

Antoine

Re: Programming astronomical data: running " Celestial BASIC " on HP71 Emulator by Hrast Programmer

*Message #15 Posted by [Antoine M. Couëtte \(France \)](#) on 15 June 2004, 7:46 a.m.,
in response to message #10 by Valentin Albillo*

June 15, 2004

Michel,

And also, further to the excellent suggestion made by Valentin about using HP71 with the " Celestial BASIC " software, I should add that - in the case you would own an HP48GX or HP49 - there also exists a superb HP71 Emulator by the same Hrastprogrammer. I think it also runs faster (x2 ?) than the original HP71 which is already very fast when compared to the HP41.

I personally do not use HP71 . However I think that it would be very easy to transfer " Celestial BASIC " onto this HP71 Emulator - maybe it has already been done - in order to get all the benefits of this very clever solution indicated earlier by Valentin.

Best Regards from

Antoine

Re: Programming astronomical data

Message #16 Posted by [Tom Sherman](#) on 15 June 2004, 9:17 a.m.,

in response to message #10 by Valentin Albillo

Valentin's suggestion of transcribing Celestial Basic to the HP-71B is a really nice idea.

Still another possibility is to run the programs, just as Eric Burgess wrote them, using GWBASIC on an HP 200LX. I keep Celestial Basic on a PCMCIA memory card, along with lots of other programs, to be used with the 200LX.

Cheers, Tom

Michel, have a look at this link ! :-)

*Message #17 Posted by **Valentin Albillo** on 15 June 2004, 10:02 a.m.,
in response to message #10 by Valentin Albillo*

Hi, Michel:

While you get hold of a copy of "Celestial BASIC" and reinforcing my advice that you use an HP-71B for in-the-field ("sur le terrain") astronomical computations, have a look at this superb link:

[Generic BASIC Astronomy-related programs from "Sky And Telescope"](#)

Here you'll find several dozen plain-vanilla, generic BASIC programs which you can run in the HP-71B with minor modifications, if at all. I think it can be an **excellent** start in order to fulfill your needs, and at the very least it will give you a lot of ideas and sample code.

Best regards from V.

Re: Programming astronomical data

*Message #18 Posted by **Johnny Bjoern Rasmussen** on 16 June 2004, 2:40 a.m.,
in response to message #1 by Michel Beaulieu*

I found this: <http://web.onetel.net.uk/~richardweston/Planetarium.html>

Regards!

Johnny

Re: Programming astronomical data

*Message #19 Posted by [Michel Beaulieu](#) on 16 June 2004, 8:24 a.m.,
in response to message #18 by Johnny Bjoern Rasmussen*

Thank you all for links and books. I still hesitate between a HP-41CX and HP-71B. I still don't have the navigation pac for my 41; perhaps i should take the 71.

Thanks again!

Re: Programming astronomical data

*Message #20 Posted by [JMB](#) on 16 June 2004, 4:19 p.m.,
in response to message #19 by Michel Beaulieu*

Hi! I've written "Astronomical Ephemeris" programs for the HP-41 which are listed in the HP-41C software library. They may be usefull for you. Best regards. JMB

Re: Programming astronomical data

*Message #21 Posted by [Norris](#) on 17 June 2004, 8:39 p.m.,
in response to message #1 by Michel Beaulieu*

By the way, EKSI still markets the HP48 Astro*Card, which is used by surveyors. It only works with the sun, Polaris, and certain other stars. Observation of these features is the most accurate way to locate true north.

<http://www.rollanet.org/~eksi/softprod.htm#card>

EKSI also prepares the annual Sokkia "Celestial Observation Handbook and Ephemeris" book, which is available at low cost (less than \$10) at places where surveying equipment is sold. The older editions of this book included program listings for the HP48, HP41, and HP42S. Don't know if the newer editions still have the calculator programs.

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