MATRIX

>1980

Issue VII MATRIX MAGAZINE

315 Marion Big Rapids, MI 49307
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Note: New Address

THE 1980 JOHNDRO AWARD

TO

NEIL F. MICHELSEN

Commencing in 1978 The Johndro Award for excellence in the technical aspects of Cosmecology is being given to those who have distinguished themselves through some major contribution. Dr. Harlan T. Stetson of M.I.T. coined the term COSMECOLOGY many years ago as the study of the Earth's adaptation to its cosmic environment. While this embraces the ancient science of Astrology, it also includes a number of other sciences. The award is named after the famous American Radio Engineer, Mathematician and Astrologer L. Edward Johndro.

Neil F. Michelsen is, without a doubt one of the real pioneers in the field of computer astrology. In the early 1970s Michelsen's ASTRO-COMPUTING SERVICES provided astrologers with a glimpse of what might be possible through the use of a computer and modern graphic printing techniques. Michelsen achieved printer output including a perfectly round chart wheel and special astrological glyphs at a time when most computer print-out was not acceptable to the average astrologer. Michelsen then produced the first in a series of volumes of the AMERICAN EPHEMERIS which may be the first book ever fully typeset through computer means. This series set a new standard of excellence in astrological ephemerides. Michelsen has continued to benefit astrology by making his computer complex available for astrological research projects. Perhaps the most important computer assisted astrological research in the world today is being performed at his facility.

Michelsen's work and basic generosity has provided modern astrology with direction at a time when it is much appreciated.

- Michael Erlewine

COSMECOLOGY BULLETIN - Charles A. Jayne
JOURNAL OF GEOCOSMIC RESEARCH - Robert Hand
MATRIX MAGAZINE - Michael & Margaret Erlewine

MATRIX MAGAZINE Issue Seven

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MATRIX is produced and edited by
Michael & Margaret Erlewine

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WHAT'S NEW?

For one, we've moved from Ann Arbor to Big Rapids. To the reader, a move of some 200 miles to the north may seem trivial, but for your editor (Sun Sign= Cancer) this counts as a major event. We moved ourselves at the Full Moon Eclipse of March 1st despite an admonition from our dear friend Charles Jayne to the effect that such a move would turn out other than we might expect. My response to Charles is that most events in my life tend to turn out otherwise than I have expected and often that has been a good thing too.

At any rate, three trucks FULL headed north on the day of the Lunar Eclipse filled with computers, belongings and what seems (on arrival) to be lots of junk. Big Rapids is a small town in the middle of the state. We have a lot more room and, better yet, a real yard and neighborhood for our kids. It is beautiful here with a Big Sky and the stars are crystal clear. We even have a room that guests can stay in (no more sleeping in our office!). Altho we are off the beaten track, perhaps some of you will brave it here for a visit.

The first two months were confused and filled with leaky roofs and other traditional house hunters watch-out-fors. Things have calmed down a bit by now (June) and MATRIX Magazine and Software are as back-to-normal as they will get. We have a lot of news items concerning what we have been doing since our last issue- aside from fixing leaky roofs and the like.

MATRIX Programming Manual

Our programming book is, at last, available! A word of explanation about the delay in publishing the MANUAL OF COMPUTER PROGRAMMING FOR ASTROLOGERS. The book was delivered in manuscript form to Llewelyn Publications in time for a scheduled release in Novemeber of 1979. We waited. Nothing happened. Llewelyn was having cash flow problems and scratched some of its publications including ASTROLOGY NOW and (after a long time) our book. We were able to buy back our own manuscript and the AFA offered to go ahead with publication. This was in February of 1980. The book arrived in April and back orders were shipped directly from AFA headquarters in Tempe Arizona. We now have it in stock here at MATRIX. Sorry for the inconvenience and delay. We hope this book will prove useful to those of you who are trying to learn BASIC on the small home computers.

A.C.T. (Astrological Conference on Techniques)

The ACT conference is a 'go' and in the final stages of preparation. The conference is to be a meeting place and get-together that includes over thirty of the world's finest technical and research astrologers. We hope it is the first in a series of future conferences of similar nature. The idea for the ACT conference came in 1976 when Charles Jayne and your editor first met and spent some time together. Robert Hand soon joined in and we have been working towards a major conference of this kind ever since. There had been several failed attempts to have the conference until we approached Bob Cooper of the AFA about holding the conference jointly with the bi-annual AFA convention. The AFA offered to provide ACT with two convention rooms (free of charge) and to include our mini-conference as an integral part of their larger convention. ACT was finally happening.

Charles Jayne flew out to Big Rapids for two hardworking days in April and the final schedule was completed. We hope that some MATRIX readers will be able to attend. If you will take a look at the program for ACT in this issue, you will agree that we have pulled together some top people. It is hoped that the lectures, panel discussions plus the behind the scene chance for many of us to meet one another will serve to strengthen the bonds of cooperation among technical and research astrologers. Both Margaret and myself will be there for the entire convention, so be sure to look us up at the MATRIX suite.

ASTEK I: New Astrological Computer

The article in this issue on the new ASTEK I should interest many of you. We have just completed the software for this machine and are looking forward to delivery of the final product in the fall. The idea of a small hard-wired computer dedicated to astrological work that retails for under $400 should appeal to a great many astrologers. The ASTEK I provides a portable machine designed for the student of astrology who cannot afford or is not ready to commit themselves to a small microcomputer system. MATRIX has provided the software for the ASTEK I in consultation with Charles Jayne and James Neely. This new machine will provide an introduction to computer astrology for a great many who otherwise might have ignored the home computer revolution. Congratulations to Euro-Am on their new product.

A NEW PORTABLE SYSTEM FROM HEWLETT-PACKARD

One of the more noteworthy events in computer hardware since our last issue has been the advent of the HP-85 portable computer system from Hewlett-Packard. The HP-85 weighs only 20 pounds and fits into a small carrying case about the size of a portable typewriter. This small machine contains some very BIG features that include: a CRT (T.V. screen) with high resolution graphics (like the APPLE II), On-Screen editing, Built-in hi-speed tape transport with up to 217K of storage per cartridge. An interactive graphics system that allows graphs, chart wheels and astrological characters. A built in printer that gives instant hard-copy of the hi-res screen and a full 32K of user RAM.

The engineering of the HP-85 is, as those of you who have used HP machines might know, incredibly fine. There is no question that Hewlett-Packard is tops when it come to the engineering department. The BASIC is more refined than that available on any of the other small micro systems and contains many advanced features. The HP-85 allows sharing of variables between a series of programs that can be chain loaded one after another to obtain the effect of almost unlimited memory. File handling is a built in feature.

That is the good news. The bad news is that the HP-85 costs about $3200 in its 16K version. MATRIX has purchased the HP-85 and will support the machine with a full line of astrological software. This new machine will appeal to the same group of astrologers who might purchase Digicomp's DR-70. They are about the same price. The HP-85 offers a flexible and very attractive yet portable machine capable of doing many other tasks aside from astrological computations. The HP-85 supports a wide variety of peripheral devices including large disks, line printers and plotters.

NEW SOFTWARE ADVANCES

The world of astrological software is marching right along. There are so many interesting and noteworthy additions to the general library of astrological software, that we have but space enough here to mention a few. Those of you who are interested in reading in detail about this subject are encouraged to invest in the new 1980 MATRIX Full Catalog just published. This new catalog is a total re-write and contains in-depth information and sample output of a wide variety of astrological software from many sources. The catalog is about the size of an issue of MATRIX and therefore we cannot afford to send out free copies. The price of the catalog is $4 and that price is refundable against any software order. Here then are some of the more striking additions to modern astrological software:

Programs from David B. Black

David B. Black, a professional programmer at the expert level, has written a powerful SORT routine in 6502 machine language code. This sort program, which is being marketed to several large companies aside from MATRIX, includes a number of remarkable features other than the fact that it can sort 1000 items in less than three seconds. The SORT can sort items on matches found up to 20 levels deep! To give you an idea of what this means in practical terms, we might ask the sort to find all individuals in a group with Sun in Aries AND Moon in Taurus AND Mercury in Pisces and so on up to twenty items. Or we can sort on aspects or what-have-you. Needless to say, the SORT allows for instant sorting of midpoints and any other large groups of items. The sort is now available on the Commodore PET and soon on the APPLE II.

David Black is also working on a planetary routine in machine language that will given 'instant' planets. He has completed two other major programs of interest to readers. A program called WHERE-WHEN offers powerful transit analysis of a radix chart. The user may select which planets to consider by transit...the time inteval to be used and even which aspects to consider. The resulting aspects are displayed in chronological order. Black's program includes some 'fancy' programming with quadri-interpolation of planet positions to conserve time. The program is now available on the Commodore PET. A second version being developed will include mundane aspects. For example, when does Mars oppose Jupiter this century? or when does a given planet conjunct a given ascendant? and so on.

A second program developed by David Black, COMPLETE DIRECTIONS PROGRAM was written in consultation with Charles A. Jayne and made available on the Commodore PET. This program, which includes input of optional planets or points, is capable of providing direct and converse Solar Arcs, Solar Declination arcs, Ascendant arcs and Vertical arcs. Included are both ecliptic and declination parallels and contraparallels.

NEW PROGRAMS FROM JAMES NEELY

Neely has developed the new Trans-Neptune elements presented in the article in this issue. In addition, he has made available planetary position programs of high accuracy and increased time span. MATRIX is now able to provide planetary accuracy of about one minute of arc for the time range of 1700 thru 2300 AD. Also accuracy of 1 second of arc is available for the time span from 1800 thru 2000. This is not to mention the Neely development of a mini-graphic ephemeris routine and special astrological glyphs on the Commodore PET printer.

NEW from BUZ OVERBECK

Buz Overbeck has provided some powerful new software for the Commodore PET. A complete Hindu Astrology package provides instant access to this fascinating yet little known area of astrology. Overbeck has also provided a Pythagorean Numerology program, a Sunrise/Moonrise program and a powerful Speculum program that includes the SORTing algorithm developed by David Black. More important, Overbeck has developed the driver routine and the file-handling routines for the new MATRIX turnkey disk system.

MATRIX SEMINAR SERIES

Overbeck has also produced the first volume in the new MATRIX seminar series to be published by the AFA. This new series of books is designed to help astrologers learn about major astrological techniques with the aid of a computer. Overbeck has written the introductory volume to the series entitled AN INTRODUCTION TO THE NEW ASTROLOGY. This volume introduces the beginner to important concepts of modern astrology. The orientation of this book ignores a considerable amount of 'heresay' astrology and concentrates on the major astrological techniques that can be put to use and tested. The book allows the student to learn to use and interpret with the techniques while leaving the calculations to the computer. Other volumes in preparation include Harmonics, Uranian, Heliocentric and Hindu astrology.

TURNKEY DISK PROGRAMS

The home chart service is now a reality. MATRIX software is offering several fully automated disk-based astrological programs. 'Turnkey' means that all you do is turn on the machine, and the rest is handled by the computer system. No loading tapes or even programs from disk.

A disk-based complete astrological system on the TRS-80 has been developed by programmer-astrologer David Cochrane of Florida. The Cochrane system, which requires both disk and line printer, includes a wide variety of options. These include natal charts, transits, harmonic analysis, etc. One of the features of the Cochrane system is a complete traditional synastry package.

Robert Hand and his associates at ASTROGRAPHICS have developed a disk-based system for the TRS-80 and the APPLE II computer. The system can output hardcopy for natal charts and includes a variety of add-on program modules that may be purchased to enlarge the system. The ASTROGRAPHICS as well as the COCHRANE system require 48K and dual disks and are available thru MATRIX Software.

MATRIX has developed its own disk based system for the Commodore PET, APPLE II and TRS-80. The components of the system were designed by the editor and Buz Overbeck on the Commodore system. The system was implemented on the Apple by Barry Karr and on the TRS-80 by Stephen Erlewine. The MATRIX system is available in two styles: Research and Business.

The RESEARCH system is all 'menu' driven and includes client data and chart files. Charts can be 'batch' processed and stored in disk files. Client information, background, etc. is stored too. Charts can be cast and stored in one of several degrees of planet accuracy. The package supports the Uranians (Trans-Neptunians) too. The user may order the disk package with any number of program modules: Solunars, Transits, Progressions, etc. More programs may be added to the system at any time. The package includes some fancy printout capabilities too. A round wheel complete with aspect grid and sorted midpoints is available for hard copy at any time.

The BUSINESS system is designed for the small bookstore and home chart service where quantity output is essential. This system is primarily oriented towards batch processing of orders and hard-copy (printout). The system allows input of many chart orders at a time. Each order can be specified in detail. For instance one can indicate that a natal chart, solar return chart for a given year and several lunar return charts plus a progressed chart is desired. Program accepts multiple orders of this kind. When you have entered the various charts needed, the system takes over and generates all of the different charts for each of the several orders. The MATRIX disk systems are now available.

Thus the era of the home chart service is upon us.

ASTROLOGICAL LINE PRINTERS

David Horbovetz of the ASTROLOGER'S MEDIUM in Chicago has developed and is marketing a high-quality dot matrix printer (TAM Line Printer) for use with home computers. The printer includes the planets, signs and aspect glyphs or symbols as a built in feature. The TAM line printer, available for the PET, APPLE and TRS-80 computers, is a full 80-column tractor feed printer with upper-case only. Custom programs written by MATRIX for the TAM format the special astrological characters on special paper that is used by the TAM. This paper makes use of a printed chart wheel. The result, shown below, is really very handsome. The TAM sells for around $1000 without an interface.

Special astrological characters have also been developed for the Commodore PET printer and the PAPER TIGER printer for use with the APPLE II. MATRIX offers special astrological glyphs on the Commodore Printer and ASTROGRAPHICS has developed the same feature for the PAPER TIGER. Included below is a sample of an 8 1/2 x 11 chart format that can be obtained on ANY 80 column printer. This program is available thru MATRIX for the PET, APPLE and TRS-80 machines.

One last note on astrological printing features. MATRIX has developed a machine language screen dump routine that is a built-in part of almost all MATRIX software on the Commodore PET. The routine allows the user to view program results on the CRT (video display) in the normal manner. When hardcopy of any material displayed on the CRT is desired, the user presses a special key. The program automatically 'dumps' or prints the entire screenfull out to the line printer for a permanent record.

INTERPRETATION PACKAGE

Several natal interpretation programs have been announced in recent months. ASTROGRAPHICS has their ASTRO-SCOPE which provides a quick analysis of the radix planets by sign, house and aspect. The text has been assembled by Rob Hand, Steve Blake and Gary Christen. On another level is the SEX-O-SCOPE with text by none other than the author of PLANETS IN LOVE John Townley. Townley, who has recently added another member to his family, analyzes the sexual potentials of the natal horoscope in a language that is blunt, direct and refreshingly honest.

A more comprehensive interpretation package is being designed by Charles and Vivia Jayne who have had many years of experience writing astrological interpretations. The Jayne Package will be a large professional program fit for the small bookstore or home chart service. It will provide a transit analysis to the radix chart of the client. A years analysis will be assembled and printed out in booklet form on the line printer. The bookstore or chart service will market the finished product to local customers. MATRIX will provide the programming and file handling chores for the Jaynes interpretation package. MATRIX is also preparing a dynamic form of chart interpetation called ASTRO-TALK that assembles an interpretataon by creating its gwf grammar and syntax. All of the above interpetations programs are available from MATRIX.

And that is, in brief, a quick look at some of the new developments in astrological software. These and many more new programs are described and illustrated in detail an the new 1980 MATRIX FULL CATALOG which your editor recommends to MATRIX readers as a worthwhile investment in order to gain an appreciation of the great strides forward astrological software has made in quite a short amount of time. Much of this software wall be on display and demonstrated at the AFA convention in Few Orleans in August of 1980.

MATRIX Software Company a Success!

As editor, I have tried to separate MATRIX the magazine from MATRIX Software the company. I am sure readers want to know how we are making out as a dealer in one of the fastest-moving new industries in the world. MATRIX Software and hardware has been a complete success thus far. We are able to provide astrologers not only with the Commodore system but also with the APPLE, ATARI and Hewlett-Packard HP-85 not to mention Centronics and NEC Spinwriter printers- all from stock. We have grown from a tiny dealer of computer hardware to one of the largest dealers in the country. This is due to the fact that our clients are located in almost every state of the union. Now that we are a 'big' dealer, we can provide much better service on machines in any part of the country. We have learned to really support any hardware problems that develop and have the clout to see that local dealers provide full cooperation. Our software catalog continues to grow with new and more powerful programs and packages from many authors. Keep in mind that a few years ago we had almost no accuracy on these small machines. MATRIX can now offer programs with one minute accuracy that include the time span from 1700 to 2300...or one second accuracy from 1800 to 2000! We are receiving more and more help from programmers around the world in the design and testing of our programs. All in all, we feel that these new developements constitute an important new resource for astrologers. Our goal at this point, for MATRIX Software, is to provide astrologers with the machines and software necessary for thier work. The advent, in recent months, of the new disk-based astrological business and research software packages allows us to offer something in the way of computer software for almost everyone. Thanks are in order to many of our MATRIX readers for their assistance and patience while we learned to build our astrological software into what it is today. When I consider the new Commodore disk-based system developed by Overbeck and myself (using the programs of Neely and others), I cant help but reflect on the incredible changes that have taken place. The advent of computer astrology has got to be one of the most important events in the history of modern astrology. I, for one, am glad to be here and to have had the opportunity to witness this transformation.

MORSELS FROM NEELY

Here are a few tidbits we received from James Neely that should interest you micro and BASIC fans. These are super-slick ways to handle some of the inverse trig functions in BASIC. In these formulas, PI=4*ATN(1) and TP=PI+PI.

FULL QUADRANT ARCTANGENT
(Input X & Y; Output AT):

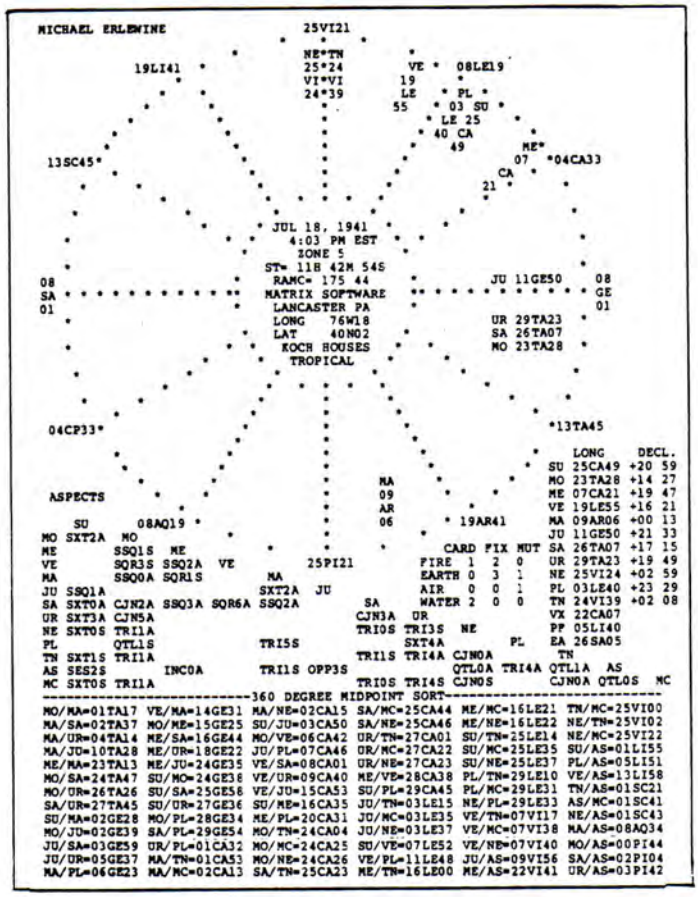
```
AT=ATN(Y/(X-1E-9*(X=0)))-PI*(X<0):
AT=AT-TP*(AT<0)
```

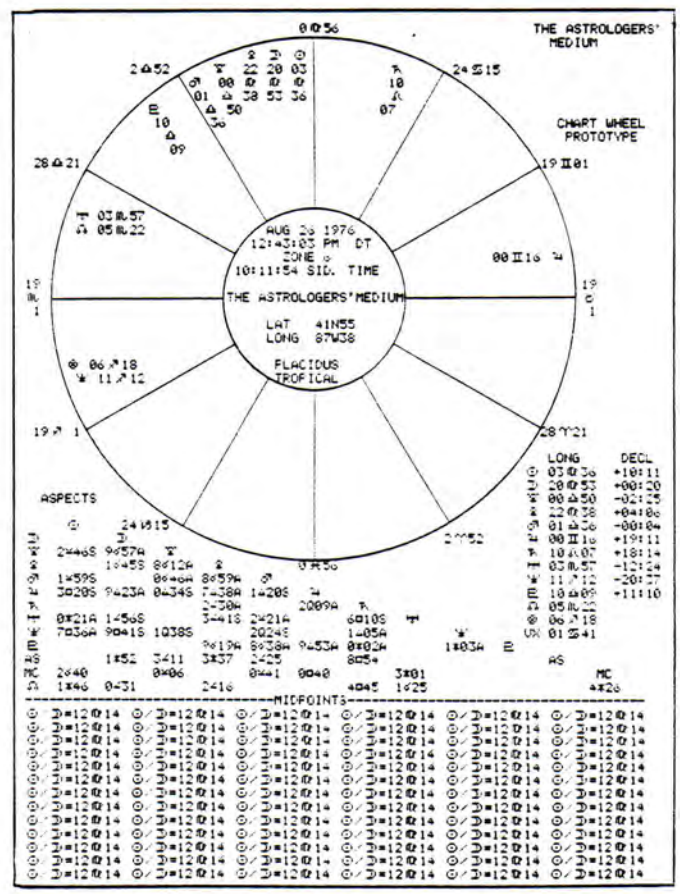
ARCCOSINE (AC=ARCCOS(X)):

```
AC=ATN(SQR(1-X*X)/(X-1E-9*(X=0)))-PI*(X<0)
```

ARCSINE (AS=ARCSIN(X)):

```
Y=SQR(1-X*X):AS=ATN(X/(Y-1E-9*(Y=0))
```





The Above are samples of the new MATRIX 8 1/2x11 chart output. The top example will run on any 80-column printer, the bottom shows the special graphics on the TAM line printer.

STATISTICAL PROGRAMS FROM NEELY & THOMAS

A statistics series, consisting of several modules, is under development by James Neely and William Thomas. Module I gives a tutorial of the foundations of statistical analysis, including elementary probability theory, astrological data presentation and using statistical hypotheses. The written text is designed in an interactive mode; the reader is expected to perform exercises and analyses on an 8K PET as part of the instruction process. Programs for performing chi-square goodness-of-fit tests and contingency table analyses are included.

Module II, currently under development, contains instructions and programs for carrying out several types of statistical analyses, including binomial tests, Kolmogorov-Smirnov tests and Vn tests. Included are data/file management routines, a planetary data generation routine and a decision tree to aid the user in determining the proper analysis to perform with each particular data set. It is anticipated that the programs in this module will require a 16K PET with a disk drive.

A third module is planned which will be devoted to several advanced analysis methods, possibly including cluster analysis, discriminant analysis, principal component analysis and harmonic analysis.

Your editor has seen the first module of the series along with the written text material. It is outstanding, which is what we have grown to expect from Mr. Neely. Astrologers have long awaited a 'painless' way to learn something about statistics and research methods. The goal of this series, is to provide the average astrologer with the know-how needed to make sensible decisions of a research nature in their own particular area of work. The series, which will be made available thru MATRIX Software, is being written on the Commodore PET but will be translated to the APPLE II and the TRS-80.

HARDWARE UPDATE, NEWS , ETC.

The Commodore (PET) system continues to impress the staff here at MATRIX. Let me give some of the news items. Commodore introduced the first intelligent floppy disk some time ago. The Commodore disk differs from that of Radio SHack and APPLE in that it does not require any of the user's RAM memory to operate. It has it's own 6502 microprocessor and is capable of reading and writing to the disk in the background while the PET computer is busy doing something else entirely. We mentioned this disk in a previous MATRIX. Commodore has brought out several other disk related items. First, a new and improved Disk Operating System (DOS) that has some real enhancements. In particular, random-sequential file handling is made so easy that any user can create their own files or data base.

Commodore has released a new one megabyte 5 1/4" dual disk system called the 8050. A 3.2 megabyte 8-inch disk has been announced for the fall of 1980 with a 10 megabyte hard disk early in 1981. Commodore also has released a high quality communications modem for computer to computer talking over the phone lines.

Of greatest interest to astrology, fans is the new PASCAL compiler released in July 1980. This version of PASCAl has a full ten digits precision which makes it the only PASCAl on a micro system with more than six digit precision. What is great about this is that a compiled language is ever so much faster than an interpreted language like most BASICs. Commodore has also announced a 26K BASIC to be released in the fall of 1980. This BASIC will have 18-digit double precision and about every kind of bell and whistle possible. If you consider that the current Commodore BASIC (which is a great BASIC) is an 8K BASIC, this should give you an idea of what a 26K BASIC will be like. And last, but far from least, Commodore is releasing a 64K add-on memory module that will raise the amount of RAM or user memory in a 32K PET to a whopping 96K!

Elsewhere in this issue, I have detailed how the Commodore printer is capable of producing special astro-glyphs. Commodore also has a whole series of really fine word-processing systems- all in machine language. This text is being written using the WORD-PRO III which allows for right-hand justification by spreading spaces between words. The new 12-inch screen 80-column PET is also now available. Commodore has not done much in the waya of a media blitz but they have produced the most complete computer system on the market in the lower price ranges. More detail on these new Commodore products can be found in our new 1980 MATRIX SOFTWARE CATALOG.

APPLE has come across with a really nice small thermal printer that can print anything on the apple screen in a jiffy. In addition, a bit-pad for drawing maps and what not on the high-res screen is available from APPLE. The APPLE III has been announced and we will have more news on that machine in the next issue. A plug-in card for the APPLE has been annonced that contains a Z-80 microprocessor which will allow Z-80 based software to be run on that machine. It will be interesting to see what is done with this.

Radio shack has introduced their large Model II but it is more or less more of the same- not interesting to our staff. Microsoft has produced a BASIC compiler for the TRS-80 that is due for release that should be very interesting. More on that next time.

ATARI has produced a small computer system that very much resembles the APPLE. They have a plug-in ROM game called STAR RAIDERS that is, by far, the best thing I have seen produced on a hi-res system. It employs color, sound and three-dimensional wrap-around techniques to provide you with a real-time STARTREK. Enemy ships swoop at you, over you and come from behind. This program has to be seen and played with to be believed. I am not, in general, prone to games either.

There you have the news highlights for this issue. Give us a call if you have questions of this nature. (616) 796-2483

- Michael Erlewine

ORBITAL ELEMENTS FOR THE TRANSNEPTUNIAN PLANETS

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INTRODUCTION

Do the so-called TransNeptunian Planets (TNP's) behave as true material planets or as some other entity? Some astrologers claim that it is unimportant for the TNP's to act as if they are planets as long as they behave properly on charts. In fact in Germany they are referred to as TransNeptunian Points rather than planets [Ref. 1]. We believe that Witte intended his TNP's to have orbital characteristics of planets for not only does his ephemeris [Ref. 2] include positions of Uranus and Neptune but more importantly he refers to Cupido, Hades, Zeus and Kronos as planets. An analysis of Witte's ephemeris of Uranus enabled the author to confirm [Ref. 3] that the TNP ephemerides of Witte and Sieggruen [Ref. 4] are consistent with Newtonian mechanics.

The purpose of this paper is to present a complete set of orbital elements for the TNP's and a comparision of positions predicted by these elements to those of Witte and Sieggruen. The 'fit' is not exact and so this might be construed as evidence that orbital mechanics cannot be used to predict TNP positions precisely. Such a judgement is certainly the perogative of the reader, however the author feels that most discrepancies can be blamed on imperfections in his analysis rather than upon deviations from orbital theory.

METHOD

The Witte and Sieggruen ephemerides list only the postions of the annual solar conjunctions of the TNP's (to determine TNP positions at other times a "Sonnenlauf" or "Sun Path" correction table must be used). A disk file containing the year and position of each conjunction (at 10 year intervals) was prepared using a Commodore 2001 System. From the position, the time of each conjunction was computed to the nearest 0.001 day using an accurate solar ephemeris program and then the epoch of date position was precessed to epoch 1900.0. The Julian day number and epoch 1900.0 position for each conjunction was added to the disk file. It should be noted that conjunction position ephemerides are simultaneously heliocentric and geocentric; this fact was a considerable aid in the analysis.

Next a difference table was prepared from the disk file by dividing the difference of consecutive positions by the difference of consecutive Julian day numbers. From a difference table it is possible to estimate the perihelion and aphelion positions by noting where the TNP moves most rapidly and most slowly, respectively. From the motion at perihelion and aphelion it is also possible to estimate the eccentricity of the orbit; these estimates were used as preliminary orbital elements. The elements were then improved by a method that can best be described as educated trial and error: a computer program was written that would read the time and position information from the disk file and compute the position from the elements; the elements were then 'tweeked' in an effort to minimize the largest discrepancy between the ephemeris position and the computed position.

After a preliminary best fit had been obtained for all of the TNP's the orbital inclination and ascending node values fiven by Witte for Cupido and Hades were introduced and their eccentricities were again adjusted for a best fit. The inclination of Kronos was taken to be zero since Witte stated that its inclination is "trifling". Witte commented that Zeus was in its nodal position in 1911 but apparently he did not have enough information to decide whether it was the ascending or descending node. Since no value of Zeus' inclination was given it has been set to zero also.

The analysis of the Sieggruen TNP's was exceptionally easy. No inclination information was given and the difference tables of these bodies showed that their motion was uniform (circular). Consequently their inclination and eccentricity could be set equal to zero. In such cases the longitude of the node, the argument and longitude of perihelion and the time of perihelion passage become meaningless. For the sake of defining orbital elements the argument of perihelion was taken to be the position of the body at 0.5 January 1900 at which time T = 0; T is the number of Julian centuries from Julian day 2415020. At T = 0 the mean anomaly M and the node were set equal to zero. The factor of 1.3960 degrees in each node term is the precession per Julian century. The resulting elements are presented in Table I. A comparison of the ephemeris positions and computed positions are presented in Table II.

DISCUSSION

The significance of each column in Table II is: A. Year; B. Ephemeris position, epoch of date; C. Julian day number at conjunction; D. Ephemeris position, epoch of date, in decimal form; E. Ephemeris position of epoch 1900.0; F. Computed position, epoch of date; G. Computed latitude; and H. Position error (column F minus column D). The values in columns D through H are rounded to the nearest 0.01 degree. The value in column H is computed from columns F and D prior to rounding, consequently column H occasionally differs from the difference of the values printed in columns F and D.

An examination of Table II reveals that the largest errors (with the exception of Admetos, which will be discussed later) occur in the Cupido and Hades tables and these are 0.03 degrees; because of rounding this error may be as large as 0.035 degrees, or 2'06". For the Zeus, Kronos and Vulkanus tables the largest error is less than 0.025 degrees or 1'30". For Apollon and Admetos (see below) the error is less than 0.005 degrees or 54" and for Poseidon the error is less than 0.005 degrees or 18".

The 1980 and 1990 figures for Admetos show errors of 0.04 degrees, but the author believes that the source of this error is a miscalculation in the ephemeris itself, and for the following reason. Positions of Admetos are given yearly from 1600 through 1999. By differencing this table it is easily seen that the yearly motion is 35' except that every twelfth year the motion is 36' (1777 and 1778 have identical entries but that occurs because of the "Jahreswende" or "year-end" effect discussed in Ref. 3). This periodic reoccurrence of 36' every twelfth year is natural because the actual yearly motion of Admetos is 35'05" so that every 12 years and additional 1' of motion

accrues. This pattern is broken once and only once in the entire table and that is between the years 1974 and 1975 where the motion given is 33' instead of 36' as it should be for this twelfth year; it is this entry which is in error and has been perpetrated throughout the remainder of the table. Since this table was printed prior to 1974 it is inconceivable that Sieggruen predicted on theoretical or astrological grounds that the motion of Admetos should be retarded by 3' between 1974 and 1975.

The determination of a TNP position at a time other than a solar conjunction is similiar to determining a planet's position by interpolation of the 'prior' and 'next' positions in a standard ephemeris. A linear interpolation is peformed using the TNP's motion between the 'prior' conjunction and the 'next' conjunction positions to obtain the TNP's heliocentric longitude. To determine the geocentric longitude this heliocentric position must be corrected for the Sun's apparent motion from the time of the 'prior' conjunction. The correction factor to be added or subtracted is obtained from the "Sun Path" table for the body.

Table III contains a Sun Path correction for each of the TNP's; it has been computer generated using the mean distances of the TNP's contained in Table I. These tables can be compared to those of Witte and Sieggruen (not reproduced here). The largest discrepancy between the original tables and Table III is 2' for Cupido, Apollon and Poseidon; the largest discrepancy for the remaining tables is 1'. Michelsen has observed [Ref. 5] that these tables are based upon the assumption of circular (uniform) motion of the Earth and the TNP's and hence represent average sun path corrections. For a body with a large eccentricity the sun path correction becomes more complicated. For example, Witte includes six correction tables to be used with Uranus.

The computed latitude of Cupido and Hades, displayed in Column G of Table III cannot be directly compared to the latitude tables given by Witte since the Column G figures include precession whereas Witte's tables do not. Wite does not list the epoch for which his Cupido and Hades latitude tables were generated although he does explicitly state that his latitude table for Uranus and Neptune are for epoch 1880, January 1.0. If we assume that the TNP latitudes are also for epoch 1880, January 1.0, then an approximate comparision can be made as illustrated in the following way: Subtract the year FROM 1880, multiiply the result by 0.014 (or, more precisely, by 0.01396), algebraically add the result to the longitude of the TNP and then enter Witte's table with this unprecessed longitude to determine the epoch 1880 latitude and hence the equivalent latitude of date. For example, Table II list the latitude of Cupido for the 1350 conjunction to be -0.92 degrees (or -55'). Subtract 1350 from 1880 to obtain +530 years of motion thaat must be precessed. Multiply 530 by 0.014 to obtain 7.40 degrees, or 7 deg 24' precession correction. At the 1350 conjunction Cupido was in 4GE04. Algebraically add 7 deg 24' to this figure to obtain the epoch 1880 position of 11GE28. Witte lists the 10GE00 latitude as -56' and the 15GE00 latitude as -53'. Interpolating to 11GE28 we find Cupido's latitude to be -55', which is in agreement with Table II.

CONCLUSIONS

It is evident that Witte treated his TNP's as actual planets. Not only does he call them planets but he also has developed ephemerides which are consistent with orbital mechanics. That the work presented here does not agree exactly with Witte's ephemerides can be attributed for the most part with the nature of the analysis and perhaps in a minor part to possible rounding inconsistencies in the ephemerides themselves even though the ephemerides must be treated as if they are exact.

Siegrruens's TNP's also behave in a manner consistent with orbital mechanics even though it is highly unlikely that all four should have perfectly uniform motion. This unlikely behavior can possibly be attributed to the fact that even the fastest moving of these bodies would have moved only about 15 degres in 25 years and this may not have been enough time for Sieggruen to have detected any small deviation from uniform motion. Certainly enough time has elapsed for his students to have detected deviations of positions in their charts.

ACKOWLEDGEMENTS

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TABLE I

CUPIDO

A = 40.99837, E = 0.00460, I = 1.0833, ARG. PERIHELION = 171.4333
M = 163.7409 + 137.13640T NODE = 129.8325 + 1.3960T

HADES

A = 50.66744, E = 0.00245, I = 1.0500, ARG. PERIHELION = 148.1796
M = 27.6496 + 99.81803T NODE = 161.3339 + 1.3960T

ZEUS

A = 59.21436, E = 0.00120, I = 0, ARG. PERIHELION = 299.0440
M = 165.1232 + 79.00633T NODE = 0 + 1.3960T

KRONOS

A = 64.81690, E = 0.00305, I = 0, ARG. PERIHELION = 208.8801
M = 169.0193 + 68.98746T NODE = 0 + 1.3960T

APOLLON

A = 70.29949, E = 0, I = 0, ARG. PERIHELION = 138.0533
M = 0 + 61.0765T NODE = 0 + 1.3960T

ADMETOS

A = 73.62765, E = 0, I = 0, ARG. PERIHELION = 351.3350
M = 0 + 56.98245T NODE = 0 + 1.3960T

VULKANUS

A = 77.25568, E = 0, I = 0, ARG. PERIHELION = 55.8983
M = 0 + 53.015987T NODE = 0 + 1.3960T

POSEIDON

A = 83.66907, E = 0, I = 0, ARG. PERIHELION = 165.5163
M = 0 + 47.03868T NODE = 0 + 1.3960T

TABLE II: CUPIDO

A	B	C	D	E	F	G	H
1350	04GE04	2214282.34	64.07	71.73	64.06	-0.92	+0.00
1360	17GE53	2217949.22	77.88	85.41	77.88	-0.76	+0.00
1370	01CN42	2221616.13	91.70	99.08	91.68	-0.55	-0.02
1380	15CN28	2225282.99	105.47	112.71	105.46	-0.32	-0.01
1390	29CN14	2228949.82	119.23	126.34	119.24	-0.07	+0.01
1400	13LE00	2232616.60	133.00	139.96	133.02	+0.19	+0.02
1410	26LE48	2236283.34	146.80	153.62	146.81	+0.44	+0.01
1420	10VI37	2239950.00	160.62	167.30	160.62	+0.66	+0.01
1430	24VI28	2243616.60	174.47	181.01	174.45	+0.84	-0.01
1440	08LI19	2247283.08	188.32	194.72	188.31	+0.98	-0.01
1450	22LI12	2250949.49	202.20	208.46	202.20	+1.06	+0.00
1460	06SC07	2254615.82	216.12	222.24	216.12	+1.08	+0.00
1470	20SC04	2258282.09	230.07	236.05	230.06	+1.04	+0.00
1480	04SA02	2261948.31	244.03	249.88	244.04	+0.94	+0.00
1490	18SA00	2265614.47	258.00	263.71	258.03	+0.78	+0.03
1500	02CP01	2269280.66	272.02	277.58	272.05	+0.58	+0.03
1510	14CP38	2272580.21	284.63	290.07	284.67	+0.37	+0.03
1520	28CP41	2276246.44	298.68	303.98	298.70	+0.11	+0.01
1530	12AQ43	2279912.70	312.72	317.88	312.73	-0.15	+0.01
1540	26AQ44	2283579.01	326.73	331.75	326.75	-0.40	+0.01
1550	10PI44	2287245.38	340.73	345.61	340.75	-0.63	+0.02
1560	24PI43	2290911.84	354.72	359.46	354.74	-0.83	+0.02
1570	08AR41	2294578.39	8.68	13.28	8.70	-0.97	+0.01
1580	22AR37	2298245.03	22.62	27.08	22.63	-1.06	+0.01
1590	06TA31	2301911.74	36.52	40.84	36.53	-1.08	+0.02
1600	20TA24	2305578.54	50.40	54.58	50.41	-1.05	+0.01
1610	04GE15	2309245.37	64.25	68.29	64.25	-0.95	+0.00
1620	18GE05	2312912.25	78.08	81.98	78.08	-0.80	-0.01
1630	01CN54	2316579.16	91.90	95.66	91.88	-0.61	-0.02
1640	15CN41	2320246.03	105.68	109.30	105.66	-0.38	-0.02
1650	29CN26	2323912.86	119.43	122.91	119.44	-0.13	+0.01
1660	13LE13	2327579.67	133.22	136.56	133.23	+0.13	+0.01
1670	27LE01	2331246.43	147.02	150.22	147.01	+0.38	+0.00
1680	10VI49	2334913.11	160.82	163.88	160.82	+0.61	+0.00
1690	24VI40	2338579.74	174.67	177.59	174.64	+0.80	-0.02
1700	08LI31	2342246.26	188.52	191.30	188.49	+0.95	-0.02
1710	22LI24	2345912.69	202.40	205.04	202.37	+1.05	-0.03
1720	06SC18	2349579.04	216.30	218.80	216.28	+1.08	-0.02
1730	20SC14	2353245.33	230.23	232.59	230.22	+1.06	-0.01
1740	04SA12	2356911.57	244.20	246.42	244.19	+0.97	-0.01
1750	18SA10	2360577.74	258.17	260.25	258.18	+0.82	+0.01
1760	02CP11	2364243.94	272.18	274.12	272.19	+0.63	+0.01
1770	14CP48	2367543.49	284.80	286.61	284.81	+0.43	+0.01
1780	28CP50	2371209.70	298.83	300.51	298.84	+0.18	+0.01
1790	12AQ53	2374875.96	312.88	314.42	312.87	-0.09	-0.01
1800	26AQ54	2378542.25	326.90	328.29	326.89	-0.34	-0.01
1810	10PI54	2382208.60	340.90	342.15	340.90	-0.58	+0.00
1820	24PI53	2385875.03	354.88	356.00	354.89	-0.78	+0.01
1830	08AR51	2389541.55	8.85	9.82	8.86	-0.94	+0.01
1840	22AR48	2393208.16	22.80	23.63	22.80	-1.04	+0.00
1850	06TA42	2396874.84	36.70	37.39	36.71	-1.08	+0.01
1860	20TA36	2400541.62	50.60	51.15	50.59	-1.06	-0.01
1870	04GE27	2404208.44	64.45	64.86	64.44	-0.98	-0.01
1880	18GE18	2407875.31	78.30	78.57	78.27	-0.85	-0.03
1890	02CN06	2411542.19	92.10	92.23	92.08	-0.66	-0.02
1900	15CN54	2415209.08	105.90	105.89	105.87	-0.44	-0.03
1910	29CN40	2418875.92	119.67	119.52	119.65	-0.19	-0.02
1920	13LE26	2422542.74	133.43	133.15	133.43	+0.06	+0.00
1930	27LE13	2426209.50	147.22	146.79	147.22	+0.32	+0.00
1940	11VI01	2429876.20	161.02	160.45	161.01	+0.55	+0.00

TABLE II: HADES

A	B	C	D	E	F	G	H
1350	21LE01	2214362.84	141.02	148.68	141.03	-0.23	+0.02
1360	01VI07	2218025.71	151.12	158.64	151.14	-0.05	+0.02
1370	11VI15	2221688.56	161.25	168.63	161.25	+0.13	+0.00
1380	21VI22	2225351.33	171.37	178.61	171.36	+0.31	-0.01
1390	01LI30	2229014.07	181.50	188.60	181.48	+0.48	-0.02
1400	11LI38	2232676.74	191.63	198.59	191.61	+0.64	-0.03
1410	21LI46	2236339.36	201.77	208.59	201.74	+0.77	-0.02
1420	01SC54	2240001.92	211.90	218.58	211.89	+0.88	-0.01
1430	12SC03	2243664.44	222.05	228.59	222.04	+0.97	-0.01
1440	22SC13	2247326.94	232.22	238.62	232.20	+1.02	-0.01
1450	02SA23	2250989.40	242.38	248.65	242.37	+1.05	-0.01
1460	12SA33	2254651.83	252.55	258.67	252.55	+1.04	+0.00
1470	22SA44	2258314.26	262.73	268.72	262.74	+1.00	+0.00
1480	02CP55	2261976.68	272.92	278.76	272.93	+0.93	+0.01
1490	12CP05	2265272.86	282.08	287.80	282.10	+0.84	+0.02
1500	22CP17	2268935.29	292.28	297.86	292.30	+0.72	+0.01
1510	02AQ29	2272597.75	302.48	307.92	302.50	+0.58	+0.01
1520	12AQ41	2276260.23	312.68	317.98	312.69	+0.42	+0.01
1530	22AQ53	2279922.75	322.88	328.04	322.89	+0.24	+0.00
1540	03PI04	2283585.30	333.07	338.09	333.08	+0.06	+0.01
1550	13PI16	2287247.92	343.27	348.15	343.27	-0.12	+0.00
1560	23PI27	2290910.57	353.45	358.19	353.45	-0.30	+0.00
1570	03AR38	2294573.27	3.63	8.23	3.63	-0.48	+0.00
1580	13AR48	2298236.02	13.80	18.26	13.80	-0.63	+0.00
1590	23AR58	2301898.83	23.97	28.29	23.96	-0.77	+0.00
1600	04TA07	2305561.69	34.12	38.30	34.12	-0.88	+0.00
1610	14TA16	2309224.59	44.27	48.31	44.27	-0.97	+0.00
1620	24TA25	2312887.54	54.42	58.32	54.41	-1.02	-0.01
1630	04GE33	2316550.52	64.55	68.31	64.54	-1.05	-0.01
1640	14GE40	2320213.51	74.67	78.29	74.67	-1.04	+0.00
1650	24GE47	2323876.53	84.78	88.26	84.78	-1.00	+0.00
1660	04CN54	2327539.56	94.90	98.24	94.90	-0.94	+0.00
1670	15CN01	2331202.59	105.02	108.22	105.00	-0.84	-0.01
1680	25CN07	2334865.58	115.12	118.18	115.11	-0.72	-0.01
1690	05LE13	2338528.57	125.22	128.14	125.21	-0.57	-0.01
1700	15LE19	2342191.53	135.32	138.10	135.31	-0.41	-0.01
1710	25LE24	2345854.43	145.40	148.04	145.41	-0.24	+0.01
1720	05VI30	2349517.30	155.50	158.00	155.52	-0.06	+0.02
1730	15VI38	2353180.16	165.63	168.00	165.62	+0.12	-0.01
1740	25VI45	2356842.95	175.75	177.97	175.74	+0.30	-0.01
1750	05LI53	2360505.69	185.88	187.97	185.86	+0.47	-0.03
1760	16LI01	2364168.38	196.02	197.96	195.98	+0.63	-0.03
1770	26LI09	2367831.00	206.15	207.95	206.12	+0.76	-0.03
1780	06SC17	2371493.57	216.28	217.95	216.26	+0.88	-0.02
1790	16SC26	2375156.10	226.43	227.96	226.42	+0.96	-0.02
1800	26SC36	2378818.62	236.60	237.98	236.58	+1.02	-0.02
1810	06SA46	2382481.09	246.77	248.01	246.75	+1.05	-0.02
1820	16SA56	2386143.52	256.93	258.04	256.93	+1.04	-0.01
1830	27SA07	2389805.96	267.12	268.08	267.11	+1.01	-0.01
1840	07CP18	2393468.38	277.30	278.12	277.30	+0.94	+0.00
1850	16CP28	2396764.55	286.47	287.16	286.47	+0.85	+0.01
1860	26CP40	2400427.00	296.67	297.22	296.67	+0.73	+0.00
1870	06AQ52	2404089.46	306.87	307.28	306.87	+0.59	+0.00
1880	17AQ04	2407751.94	317.07	317.34	317.06	+0.43	+0.00
1890	27AQ15	2411414.43	327.25	327.39	327.26	+0.25	+0.01
1900	07PI27	2415076.99	337.45	337.45	337.45	+0.07	+0.00
1910	17PI39	2418739.59	347.65	347.51	347.64	-0.11	-0.01
1920	27PI50	2422402.23	357.83	357.55	357.83	-0.29	-0.01
1930	08AR01	2426064.94	8.02	7.59	8.00	-0.46	-0.01
1940	18AR11	2429727.67	18.18	17.62	18.18	-0.62	-0.01
1950	28AR21	2433390.47	28.35	27.65	28.34	-0.76	-0.01
1952	00TA23	2434123.04	30.38	29.65	30.37	-0.78	-0.01
1954	02TA25	2434855.62	32.42	31.66	32.40	-0.81	-0.01
1956	04TA27	2435588.18	34.45	33.66	34.43	-0.83	-0.02

TABLE II: ZEUS

A	B	C	D	E	F	G	H
1360	00TA23	2217899.77	30.38	37.91	30.38	+0.00	+0.00
1370	08TA26	2221560.50	38.43	45.82	38.44	+0.00	+0.00
1380	16TA29	2225221.27	46.48	53.73	46.49	+0.00	+0.01
1390	24TA32	2228882.06	54.53	61.64	54.54	+0.00	+0.01
1400	02GE35	2232542.88	62.58	69.55	62.59	+0.00	+0.00
1410	10GE37	2236203.69	70.62	77.44	70.63	+0.00	+0.01
1420	18GE40	2239864.54	78.67	85.35	78.67	+0.00	+0.01
1430	26GE42	2243525.38	86.70	93.25	86.72	+0.00	+0.02
1440	04CN45	2247186.24	94.75	101.16	94.76	+0.00	+0.01
1450	12CN47	2250847.09	102.78	109.05	102.80	+0.00	+0.01
1460	20CN50	2254507.94	110.83	116.96	110.84	+0.00	+0.00
1470	28CN52	2258168.77	118.87	124.86	118.88	+0.00	+0.01
1480	06LE54	2261829.58	126.90	132.75	126.92	+0.00	+0.02
1490	14LE57	2265490.39	134.95	140.66	134.96	+0.00	+0.01
1500	22LE59	2269151.15	142.98	148.55	143.00	+0.00	+0.02
1510	01VI02	2272811.90	151.03	156.46	151.04	+0.00	+0.01
1520	09VI04	2276472.60	159.07	164.36	159.09	+0.00	+0.02
1530	17VI07	2280133.29	167.12	172.27	167.13	+0.00	+0.01
1540	25VI10	2283793.94	175.17	180.18	175.18	+0.00	+0.01
1550	03LI13	2287454.55	183.22	188.09	183.23	+0.00	+0.01
1560	11LI16	2291115.13	191.27	196.00	191.28	+0.00	+0.02
1570	19LI20	2294775.69	199.33	203.93	199.34	+0.00	+0.00
1580	27LI23	2298436.19	207.38	211.84	207.39	+0.00	+0.01
1590	05SC27	2302096.67	215.45	219.76	215.45	+0.00	+0.00
1600	13SC31	2305757.13	223.52	227.69	223.52	+0.00	+0.00
1610	21SC35	2309417.56	231.58	235.62	231.58	+0.00	+0.00
1620	29SC39	2313077.96	239.65	243.54	239.65	+0.00	+0.00
1630	07SA43	2316738.34	247.72	251.47	247.72	+0.00	+0.00
1640	15SA47	2320398.71	255.78	259.40	255.79	+0.00	+0.01
1650	23SA52	2324059.07	263.87	267.34	263.86	+0.00	+0.00
1660	01CP57	2327719.43	271.95	275.28	271.94	+0.00	-0.01
1669	09CP13	2331013.74	279.22	282.43	279.21	+0.00	-0.01
1680	17CP17	2334674.09	287.28	290.35	287.28	+0.00	+0.00
1690	25CP22	2338334.45	295.37	298.30	295.36	+0.00	-0.01
1700	03AQ26	2341994.81	303.43	306.22	303.43	+0.00	+0.00
1710	11AQ31	2345655.19	311.52	314.17	311.51	+0.00	-0.01
1720	19AQ35	2349315.59	319.58	322.09	319.59	+0.00	+0.00
1730	27AQ40	2352976.02	327.67	330.04	327.66	+0.00	-0.01
1740	05PI44	2356636.48	335.73	337.96	335.73	+0.00	+0.00
1750	13PI49	2360296.96	343.82	345.91	343.81	+0.00	-0.01
1760	21PI53	2363957.47	351.88	353.83	351.88	+0.00	-0.01
1770	29PI57	2367618.01	359.95	1.76	359.94	+0.00	-0.01
1780	08AR01	2371278.59	8.02	9.69	8.01	+0.00	-0.01
1790	16AR04	2374939.20	16.07	17.60	16.07	+0.00	+0.01
1800	24AR08	2378599.85	24.13	25.53	24.13	+0.00	+0.00
1810	02TA12	2382260.54	32.20	33.45	32.19	+0.00	-0.01
1820	10TA15	2385921.24	40.25	41.36	40.25	+0.00	+0.00
1830	18TA18	2389581.98	48.30	49.27	48.30	+0.00	+0.00
1840	26TA22	2393242.76	56.37	57.20	56.35	+0.00	-0.02
1850	04GE24	2396903.55	64.40	65.09	64.40	+0.00	+0.00
1860	12GE27	2400564.37	72.45	73.00	72.45	+0.00	+0.00
1870	20GE29	2404225.18	80.48	80.90	80.49	+0.00	+0.01
1880	28GE32	2407886.03	88.53	88.81	88.53	+0.00	+0.00
1890	06CN34	2411546.87	96.57	96.70	96.57	+0.00	+0.01
1900	14CN37	2415207.73	104.62	104.61	104.61	+0.00	+0.00
1910	22CN39	2418868.57	112.65	112.50	112.65	+0.00	+0.00
1920	00LE41	2422529.40	120.68	120.40	120.69	+0.00	+0.01
1930	08LE44	2426190.24	128.73	128.31	128.73	+0.00	+0.00
1940	16LE46	2429851.04	136.77	136.20	136.77	+0.00	+0.01
1950	24LE49	2433511.84	144.82	144.11	144.81	+0.00	+0.00

TABLE II: KRONOS'

A	B	C	D	E	F	G	H
1360	28PI08	2217866.83	358.13	5.66	358.12	+0.00	-0.01
1370	05AR09	2221526.36	5.15	12.54	5.14	+0.00	-0.01
1380	12AR09	2225185.91	12.15	19.40	12.15	+0.00	+0.00
1390	19AR10	2228845.50	19.17	26.27	19.16	+0.00	-0.01
1400	26AR10	2232505.11	26.17	33.13	26.17	+0.00	+0.00
1410	03TA10	2236164.73	33.17	40.00	33.18	+0.00	+0.01
1420	10TA11	2239824.41	40.18	46.87	40.19	+0.00	+0.01
1430	17TA12	2243484.10	47.20	53.75	47.20	+0.00	+0.00
1440	24TA13	2247143.81	54.22	60.63	54.22	+0.00	+0.00
1450	01GE14	2250803.54	61.23	67.50	61.24	+0.00	+0.00
1460	08GE15	2254463.30	68.25	74.38	68.26	+0.00	+0.01
1470	15GE17	2258123.08	75.28	81.27	75.28	+0.00	+0.00
1480	22GE19	2261782.87	82.32	88.17	82.31	+0.00	-0.01
1490	29GE21	2265442.66	89.35	95.06	89.34	+0.00	-0.01
1500	06CN23	2269102.45	96.38	101.96	96.38	+0.00	+0.00
1510	13CN26	2272762.27	103.43	108.87	103.43	+0.00	-0.01
1520	20CN29	2276422.07	110.48	115.78	110.47	+0.00	-0.01
1530	27CN32	2280081.88	117.53	122.69	117.53	+0.00	-0.01
1540	04LE35	2283741.66	124.58	129.60	124.58	+0.00	+0.00
1550	11LE39	2287401.45	131.65	136.52	131.65	+0.00	+0.00
1560	18LE43	2291061.22	138.72	143.45	138.71	+0.00	+0.00
1570	25LE47	2294720.98	145.78	150.38	145.79	+0.00	+0.00
1580	02VI52	2298380.72	152.87	157.32	152.86	+0.00	+0.00
1590	09VI56	2302040.43	159.93	164.25	159.94	+0.00	+0.01
1600	17VI01	2305700.12	167.02	171.19	167.03	+0.00	+0.01
1610	24VI06	2309359.80	174.10	178.14	174.11	+0.00	+0.01
1620	01LI11	2313019.44	181.18	185.08	181.20	+0.00	+0.02
1630	08LI17	2316679.07	188.28	192.04	188.30	+0.00	+0.01
1640	15LI23	2320338.67	195.38	199.00	195.39	+0.00	+0.01
1650	22LI29	2323998.24	202.48	205.96	202.48	+0.00	+0.00
1660	29LI35	2327657.78	209.58	212.92	209.58	+0.00	-0.01
1670	06SC41	2331317.30	216.68	219.88	216.67	+0.00	-0.01
1680	13SC46	2334976.78	223.77	226.82	223.76	+0.00	+0.00
1690	20SC51	2338636.24	230.85	233.77	230.86	+0.00	+0.01
1700	27SC57	2342295.69	237.95	240.73	237.94	+0.00	-0.01
1710	05SA02	2345955.11	245.03	247.67	245.03	+0.00	+0.00
1720	12SA07	2349614.51	252.12	254.62	252.11	+0.00	+0.00
1730	19SA11	2353273.89	259.18	261.54	259.19	+0.00	+0.01
1740	26SA16	2356933.28	266.27	268.49	266.27	+0.00	+0.00
1750	03CP20	2360592.64	273.33	275.41	273.34	+0.00	+0.01
1759	09CP41	2363886.05	279.68	281.64	279.70	+0.00	+0.01
1770	16CP45	2367545.40	286.75	288.56	286.76	+0.00	+0.01
1780	23CP48	2371204.76	293.80	295.47	293.82	+0.00	+0.02
1790	00AQ51	2374864.11	300.85	302.38	300.87	+0.00	+0.02
1800	07AQ54	2378523.48	307.90	309.29	307.91	+0.00	+0.01
1810	14AQ57	2382182.86	314.95	316.20	314.96	+0.00	+0.01
1820	21AQ59	2385842.23	321.98	323.10	321.99	+0.00	+0.01
1830	29AQ02	2389501.64	329.03	330.01	329.03	+0.00	-0.01
1840	06PI03	2393161.04	336.05	336.89	336.05	+0.00	+0.00
1850	13PI05	2396820.48	343.08	343.78	343.08	+0.00	-0.01
1860	20PI06	2400479.93	350.10	350.66	350.10	+0.00	+0.00
1870	27PI08	2404139.41	357.13	357.55	357.11	+0.00	-0.02
1880	04AR09	2407798.91	4.15	4.43	4.13	+0.00	-0.02
1890	11AR09	2411458.41	11.15	11.29	11.14	+0.00	-0.01
1900	18AR10	2415117.97	18.17	18.16	18.15	+0.00	-0.01
1910	25AR10	2418777.53	25.17	25.02	25.16	+0.00	+0.00
1920	02TA11	2422437.14	32.18	31.90	32.17	+0.00	-0.01
1930	09TA11	2426096.76	39.18	38.76	39.18	+0.00	+0.00
1940	16TA11	2429756.40	46.18	45.62	46.20	+0.00	+0.01
1950	23TA12	2433416.08	53.20	52.50	53.21	+0.00	+0.01

TABLE II: APOLLON

A	B	C	D	E	F	G	H
1600	10AQ42	2305477.70	310.70	314.88	310.69	+0.00	-0.01
1610	16AQ57	2309136.29	316.95	320.99	316.95	+0.00	+0.00
1620	23AQ12	2312794.91	323.20	327.10	323.21	+0.00	+0.01
1630	29AQ28	2316453.55	329.47	333.23	329.46	+0.00	+0.00
1640	05PI43	2320112.20	335.72	339.34	335.72	+0.00	+0.01
1650	11PI59	2323770.88	341.98	345.47	341.98	+0.00	+0.00
1660	18PI14	2327429.57	348.23	351.58	348.24	+0.00	+0.00
1670	24PI30	2331088.29	354.50	357.71	354.50	+0.00	+0.00
1680	00AR45	2334747.01	.75	3.82	.75	+0.00	+0.00
1690	07AR01	2338405.77	7.02	9.94	7.01	+0.00	+0.00
1700	13AR16	2342064.54	13.27	16.05	13.27	+0.00	+0.00
1710	19AR32	2345723.35	19.53	22.18	19.53	+0.00	-0.01
1720	25AR47	2349382.16	25.78	28.29	25.79	+0.00	+0.00
1730	02TA03	2353041.02	32.05	34.42	32.04	+0.00	-0.01
1740	08TA18	2356699.88	38.30	40.53	38.30	+0.00	+0.00
1750	14TA34	2360358.77	44.57	46.66	44.56	+0.00	-0.01
1760	20TA49	2364017.65	50.82	52.77	50.82	+0.00	+0.00
1770	27TA05	2367676.59	57.08	58.89	57.08	+0.00	-0.01
1780	03GE20	2371335.51	63.33	65.00	63.34	+0.00	+0.00
1790	09GE36	2374994.47	69.60	71.13	69.59	+0.00	-0.01
1800	15GE51	2378653.42	75.85	77.24	75.85	+0.00	+0.00
1810	22GE07	2382312.39	82.12	83.37	82.11	+0.00	-0.01
1820	28GE22	2385971.35	88.37	89.48	88.37	+0.00	+0.00
1830	04CN38	2389630.34	94.63	95.60	94.63	+0.00	-0.01
1840	10CN53	2393289.32	100.88	101.71	100.89	+0.00	+0.00
1850	17CN09	2396948.31	107.15	107.84	107.14	+0.00	-0.01
1860	23CN24	2400607.28	113.40	113.95	113.40	+0.00	+0.00
1870	29CN40	2404266.26	119.67	120.08	119.66	+0.00	-0.01
1880	05LE55	2407925.21	125.92	126.19	125.92	+0.00	+0.00
1890	12LE11	2411584.18	132.18	132.31	132.18	+0.00	-0.01
1900	18LE26	2415243.11	138.43	138.42	138.43	+0.00	+0.00
1910	24LE42	2418902.05	144.70	144.55	144.69	+0.00	-0.01
1920	00VI57	2422560.96	150.95	150.66	150.95	+0.00	+0.00
1930	07VI13	2426219.86	157.22	156.79	157.21	+0.00	-0.01
1940	13VI28	2429878.73	163.47	162.90	163.47	+0.00	+0.00
1950	19VI44	2433537.59	169.73	169.03	169.73	+0.00	-0.01
1960	25VI59	2437196.43	175.98	175.14	175.98	+0.00	+0.00
1970	02LI15	2440855.25	182.25	181.26	182.24	+0.00	-0.01
1980	08LI30	2444514.04	188.50	187.37	188.50	+0.00	+0.00
1990	14LI46	2448172.81	194.77	193.50	194.76	+0.00	-0.01

TABLE II: ADMETOS

A	B	C	D	E	F	G	H
1600	26VI37	2305709.94	176.62	180.79	176.62	+0.00	+0.01
1610	02LI28	2309368.32	182.47	186.50	182.47	+0.00	+0.00
1620	08LI19	2313026.68	188.32	192.21	188.32	+0.00	+0.00
1630	14LI10	2316685.01	194.17	197.92	194.16	+0.00	+0.00
1640	20LI01	2320343.34	200.02	203.63	200.01	+0.00	+0.00
1650	25LI52	2324001.64	205.87	209.34	205.86	+0.00	-0.01
1660	01SC42	2327659.90	211.70	215.04	211.71	+0.00	+0.01
1670	07SC33	2331318.16	217.55	220.75	217.55	+0.00	+0.00
1680	13SC24	2334976.42	223.40	226.46	223.40	+0.00	+0.00
1690	19SC15	2338634.65	229.25	232.17	229.25	+0.00	+0.00
1700	25SC06	2342292.87	235.10	237.88	235.09	+0.00	-0.01
1710	00SA57	2345951.08	240.95	243.59	240.94	+0.00	-0.01
1720	06SA47	2349609.26	246.78	249.28	246.79	+0.00	+0.00
1730	12SA38	2353267.45	252.63	254.99	252.63	+0.00	+0.00
1740	18SA29	2356925.63	258.48	260.70	258.48	+0.00	+0.00
1750	24SA20	2360583.80	264.33	266.41	264.33	+0.00	+0.00
1760	00CP11	2364241.98	270.18	272.12	270.18	+0.00	-0.01
1770	06CP02	2367900.14	276.03	277.83	276.02	+0.00	-0.01
1780	11CP17	2371192.48	281.28	282.96	281.28	+0.00	+0.00
1790	17CP08	2374850.64	287.13	288.67	287.13	+0.00	+0.00
1800	22CP59	2378508.82	292.98	294.38	292.98	+0.00	+0.00
1810	28CP50	2382166.99	298.83	300.09	298.83	+0.00	-0.01
1820	04AQ41	2385825.17	304.68	305.80	304.67	+0.00	-0.01
1830	10AQ31	2389483.33	310.52	311.49	310.52	+0.00	+0.00
1840	16AQ22	2393141.53	316.37	317.20	316.37	+0.00	+0.00
1850	22AQ13	2396799.74	322.22	322.91	322.21	+0.00	+0.00
1860	28AQ04	2400457.97	328.07	328.62	328.06	+0.00	-0.01
1870	03PI55	2404116.20	333.92	334.33	333.91	+0.00	-0.01
1880	09PI46	2407774.45	339.77	340.04	339.75	+0.00	-0.01
1890	15PI36	2411432.69	345.60	345.74	345.60	+0.00	+0.00
1900	21PI27	2415090.97	351.45	351.45	351.45	+0.00	+0.00
1910	27PI18	2418749.27	357.30	357.16	357.30	+0.00	+0.00
1920	03AR09	2422407.59	3.15	2.87	3.14	+0.00	-0.01
1930	09AR00	2426065.93	9.00	8.58	8.99	+0.00	-0.01
1940	14AR51	2429724.29	14.85	14.29	14.84	+0.00	-0.01
1950	20AR41	2433382.64	20.68	19.98	20.68	+0.00	+0.00
1960	26AR32	2437041.03	26.53	25.69	26.53	+0.00	+0.00
1970	02TA23	2440699.45	32.38	31.40	32.38	+0.00	+0.00
1980	08TA11	2444357.83	38.18	37.06	38.23	+0.00	+0.04
1990	14TA02	2448016.28	44.03	42.77	44.07	+0.00	+0.04

TABLE II: VULKANUS

A	B	C	D	E	F	G	H
1600	13SA10	2305786.42	253.17	257.34	253.17	+0.00	+0.00
1610	18SA37	2309444.21	258.62	262.65	258.62	+0.00	+0.00
1620	24SA04	2313101.99	264.07	267.96	264.07	+0.00	+0.00
1630	29SA31	2316759.76	269.52	273.27	269.52	+0.00	+0.00
1640	04CP58	2320417.54	274.97	278.58	274.97	+0.00	+0.00
1651	10CP25	2324075.30	280.42	283.89	280.42	+0.00	+0.00
1660	15CP20	2327367.32	285.33	288.68	285.32	+0.00	-0.01
1670	20CP47	2331025.09	290.78	293.99	290.77	+0.00	-0.01
1680	26CP14	2334682.88	296.23	299.30	296.22	+0.00	-0.01
1690	01AQ41	2338340.66	301.68	304.61	301.67	+0.00	-0.02
1700	07AQ08	2341998.45	307.13	309.92	307.12	+0.00	-0.02
1710	12AQ35	2345656.25	312.58	315.23	312.57	+0.00	-0.02
1720	18AQ02	2349314.06	318.03	320.54	318.01	+0.00	-0.02
1730	23AQ29	2352971.88	323.48	325.85	323.46	+0.00	-0.02
1740	28AQ56	2356629.71	328.93	331.16	328.91	+0.00	-0.02
1750	04PI23	2360287.55	334.38	336.47	334.36	+0.00	-0.02
1760	09PI49	2363945.39	339.82	341.77	339.81	+0.00	-0.01
1770	15PI16	2367603.26	345.27	347.06	345.26	+0.00	-0.01
1780	20PI43	2371261.15	350.72	352.39	350.71	+0.00	-0.01
1790	26PI10	2374919.05	356.17	357.70	356.16	+0.00	-0.01
1800	01AR37	2378576.97	1.62	3.01	1.61	+0.00	-0.01
1810	07AR04	2382234.90	7.07	8.32	7.06	+0.00	-0.01
1820	12AR31	2385892.85	12.52	13.63	12.51	+0.00	-0.01
1830	17AR58	2389550.81	17.97	18.94	17.96	+0.00	-0.01
1840	23AR25	2393208.79	23.42	24.25	23.41	+0.00	-0.01
1850	28AR52	2396866.80	28.87	29.56	28.86	+0.00	-0.01
1860	04TA19	2400524.81	34.32	34.87	34.30	+0.00	-0.01
1870	09TA46	2404182.84	39.77	40.18	39.75	+0.00	-0.01
1880	15TA12	2407840.86	45.20	45.47	45.20	+0.00	+0.00
1890	20TA39	2411498.93	50.65	50.78	50.65	+0.00	+0.00
1900	26TA06	2415157.00	56.10	56.09	56.10	+0.00	+0.00
1910	01GE32	2418815.07	61.53	61.39	61.55	+0.00	+0.02
1920	06GE59	2422473.16	66.98	66.70	67.00	+0.00	+0.02
1930	12GE26	2426131.27	72.43	72.01	72.45	+0.00	+0.02
1940	17GE54	2429789.39	77.90	77.34	77.90	+0.00	+0.00
1950	23GE21	2433447.51	83.35	82.65	83.35	+0.00	+0.00
1960	28GE48	2437105.64	88.80	87.96	88.80	+0.00	+0.00
1970	04CN15	2440763.77	94.25	93.27	94.25	+0.00	+0.00
1980	09CN42	2444421.91	99.70	98.58	99.70	+0.00	+0.00
1990	15CN09	2448080.03	105.15	103.89	105.15	+0.00	+0.00

TABLE II: POSEIDON

A	B	C	D	E	F	G	H
1600	20AR21	2305547.56	20.35	24.53	20.35	+0.00	+0.00
1610	25AR12	2309204.94	25.20	29.24	25.20	+0.00	+0.00
1620	00TA03	2312862.34	30.05	33.95	30.05	+0.00	+0.00
1630	04TA54	2316519.75	34.90	38.66	34.90	+0.00	+0.00
1640	09TA45	2320177.17	39.75	43.37	39.75	+0.00	+0.00
1650	14TA36	2323834.61	44.60	48.08	44.60	+0.00	+0.00
1660	19TA27	2327492.06	49.45	52.79	49.45	+0.00	+0.00
1670	24TA18	2331149.52	54.30	57.50	54.30	+0.00	+0.00
1680	29TA09	2334806.98	59.15	62.21	59.15	+0.00	+0.00
1690	04GE00	2338464.45	64.00	66.92	64.00	+0.00	+0.00
1700	08GE51	2342121.93	68.85	71.63	68.85	+0.00	+0.00
1710	13GE42	2345779.42	73.70	76.35	73.70	+0.00	+0.00
1720	18GE33	2349436.91	78.55	81.06	78.55	+0.00	+0.00
1730	23GE24	2353094.41	83.40	85.77	83.40	+0.00	+0.00
1740	28GE15	2356751.91	88.25	90.48	88.25	+0.00	+0.00
1750	03CN06	2360409.41	93.10	95.19	93.10	+0.00	+0.00
1760	07CN57	2364066.91	97.95	99.90	97.95	+0.00	+0.00
1770	12CN48	2367724.42	102.80	104.61	102.80	+0.00	+0.00
1780	17CN39	2371381.92	107.65	109.32	107.65	+0.00	+0.00
1790	22CN30	2375039.42	112.50	114.03	112.50	+0.00	+0.00
1800	27CN21	2378696.92	117.35	118.74	117.35	+0.00	+0.00
1810	02LE12	2382354.41	122.20	123.45	122.20	+0.00	+0.00
1820	07LE03	2386011.90	127.05	128.16	127.05	+0.00	+0.00
1830	11LE54	2389669.38	131.90	132.87	131.90	+0.00	+0.00
1840	16LE45	2393326.86	136.75	137.58	136.75	+0.00	+0.00
1850	21LE36	2396984.32	141.60	142.29	141.60	+0.00	+0.00
1860	26LE27	2400641.78	146.45	147.00	146.45	+0.00	+0.00
1870	01VI18	2404299.23	151.30	151.71	151.30	+0.00	+0.00
1880	06VI09	2407956.67	156.15	156.42	156.15	+0.00	+0.00
1890	11VI00	2411614.09	161.00	161.13	161.00	+0.00	+0.00
1900	15VI51	2415271.51	165.85	165.84	165.85	+0.00	+0.00
1910	20VI42	2418928.91	170.70	170.55	170.70	+0.00	+0.00
1920	25VI33	2422586.30	175.55	175.26	175.55	+0.00	+0.00
1930	00LI24	2426243.68	180.40	179.97	180.40	+0.00	+0.00
1940	05LI15	2429901.05	185.25	184.68	185.25	+0.00	+0.00
1950	10LI06	2433558.40	190.10	189.39	190.10	+0.00	+0.00
1960	14LI57	2437215.74	194.95	194.10	194.95	+0.00	+0.00
1970	19LI48	2440873.06	199.80	198.81	199.80	+0.00	+0.00
1980	24LI39	2444530.37	204.65	203.52	204.65	+0.00	+0.00
1990	29LI30	2448187.67	209.50	208.23	209.50	+0.00	+0.00

TABLE III: SONNENLAUF TABLEN

DEG	CUPIDO	HADES	ZEUS	KRONOS	APOLLON	ADMETOS	VULCAN	POSEIDON
	262.512	360.656	455.659	521.834	589.424	631.773	679.040	765.327
	40.998	50.667	59.214	64.816	70.299	73.627	77.255	83.669
10	+0 16	+0 13	+0 11	+0 10	+0 09	+0 09	+0 09	+0 08
20	+0 33	+0 26	+0 22	+0 20	+0 19	+0 18	+0 17	+0 15
30	+0 48	+0 38	+0 33	+0 30	+0 27	+0 26	+0 25	+0 23
40	+1 02	+0 50	+0 42	+0 38	+0 35	+0 33	+0 32	+0 29
50	+1 14	+1 00	+0 51	+0 46	+0 42	+0 40	+0 38	+0 35
60	+1 25	+1 08	+0 58	+0 52	+0 48	+0 46	+0 44	+0 40
70	+1 34	+1 15	+1 03	+0 58	+0 53	+0 50	+0 48	+0 44
80	+1 40	+1 20	+1 08	+1 01	+0 56	+0 53	+0 51	+0 47
90	+1 44	+1 23	+1 10	+1 03	+0 58	+0 55	+0 52	+0 48
100	+1 46	+1 24	+1 11	+1 04	+0 58	+0 56	+0 53	+0 48
110	+1 45	+1 23	+1 09	+1 03	+0 57	+0 55	+0 52	+0 47
120	+1 41	+1 19	+1 07	+1 00	+0 55	+0 52	+0 49	+0 45
130	+1 35	+1 15	+1 02	+0 56	+0 51	+0 49	+0 46	+0 42
140	+1 28	+1 08	+0 56	+0 51	+0 46	+0 44	+0 41	+0 38
150	+1 18	+1 00	+0 50	+0 44	+0 40	+0 38	+0 36	+0 33
160	+1 07	+0 51	+0 42	+0 37	+0 33	+0 32	+0 30	+0 27
170	+0 55	+0 41	+0 33	+0 29	+0 26	+0 25	+0 23	+0 21
180	+0 42	+0 31	+0 24	+0 21	+0 19	+0 17	+0 16	+0 14
190	+0 30	+0 20	+0 15	+0 13	+0 11	+0 10	+0 09	+0 08
200	+0 17	+0 10	+0 07	+0 05	+0 04	+0 03	+0 02	+0 02
210	+0 06	+0 01	-0 01	-0 02	-0 03	-0 03	-0 04	-0 04
220	-0 04	-0 07	-0 08	-0 09	-0 09	-0 09	-0 09	-0 09
230	-0 12	-0 14	-0 14	-0 14	-0 14	-0 14	-0 14	-0 14
240	-0 18	-0 19	-0 19	-0 18	-0 18	-0 18	-0 17	-0 17
250	-0 22	-0 22	-0 22	-0 21	-0 21	-0 20	-0 20	-0 19
260	-0 23	-0 24	-0 23	-0 22	-0 22	-0 21	-0 21	-0 20
270	-0 22	-0 23	-0 23	-0 22	-0 21	-0 21	-0 21	-0 20
280	-0 19	-0 20	-0 20	-0 20	-0 20	-0 19	-0 19	-0 18
290	-0 12	-0 15	-0 16	-0 16	-0 16	-0 16	-0 16	-0 16
300	-0 04	-0 09	-0 11	-0 11	-0 12	-0 12	-0 12	-0 12
310	+0 07	-0 00	-0 04	-0 05	-0 06	-0 06	-0 07	-0 07
320	+0 19	+0 09	+0 05	+0 03	+0 01	+0 00	-0 00	-0 01
330	+0 33	+0 21	+0 14	+0 11	+0 09	+0 08	+0 07	+0 05
340	+0 48	+0 33	+0 25	+0 21	+0 18	+0 16	+0 15	+0 12
350	+1 04	+0 46	+0 35	+0 31	+0 27	+0 25	+0 23	+0 20
360	+1 20	+0 59	+0 47	+0 41	+0 36	+0 34	+0 31	+0 28

MATRIX HOROSCOPE PROGRAM

Authored by Michael Erlewine
James Neely (orbital elements)

We have published several partial natal programs in previous issues of MATRIX. Many of you have these up and running on one computer system or another. Some of you have written asking for an example of a finished program complete with all of the bells & whistles. Here is an sxample of a finished program written in a Microsoft BASIC that should fill the bill.

The chief problem encountered in publishing a detailed program such as this one is that many of the details are, almost by necessity, machine specific. For example, screen format commands vary from computer to computer. It is one thing to calculate natal positions, house cusps, etc. and another to present this information in a usable form. Formatting information on the CRT or display screen is an essential part in finishing up a program for actual use. We have received a number of requests for this kind of detail.

This program was written in Microsoft BASIC on a Commodore PET computer. The PET has a precision of 9 places in floating point (PI= 3.14159265) and the natal program will work for dates from 1900 to 2000. In general, the 'number crunching' portions of the program will run (as written) on the PET, APPLE and TRS-80, all of which feature a version of Microsoft BASIC. The major area of difference between these Microsoft BASICs has to do with screen format. In this case, we are using the special graphic-string method of screen format specific to the Commodore machines. Please read the section on PET screen control in detail.

THE LISTING

The listing is straight forward and should be easy to read. Note that the lines wrap around and are continued on the next line. This will often break up a word or data constant. Common sense should be used in piecing together sections that are separated in this fashion. Ample REMARK statements have been included to advise you as to what is happening in each line.

The enclosed program outputs the chart Angles, Helio and Geocentric planet Longitudes & Latitudes and Right Ascensions & Declinations. The user may select to view a small rectangular chart wheel in either Koch or Placidus house cusps. An Aspectscope is available for planet aspect analysis and midpoints in the wheel center. Also available is an aspect grid that will display the angular separation, aspect names and midpoints between the planets. A midpoint sort is included. All of this is menu driven and includes complete screen formatting.

This program, which represents a large amount of effort on the part of the author and James Neely is for your personal use. The planetary program is the sole copyright of MATRIX Software and James Neely and is not to be made part of any software for sale commercially. That is, use this program with our blessing for anything you may need it for in your work or as part of a home chart service. Our request is that you do not sell the program itself without our written permission. If you have written a program that you feel would interest other astrologers and wish to include this natal routine as part of that program, give us a call. We may be able to help you market it thru MATRIX Software.

PROGRAM OUTPUT

Sample screen output are included below. The output shows how each of the various screenfulls should look. This output assumes a screen 40 columns wide by 24 lines high. All characters are standard ASCII. These sample outputs were obtained thru use of a 6502 machine language program that 'dumps' a screen load of data to a line printer. This screen dump feature is a standard part of most MATRIX software programs. Users may select to print any single screenfull of data by pressing a single key. After the screen dump is accomplished, the program returns to CRT(screen) orientation. The output given here is oriented to the screen rather than to the line printer. It also includes the use of Reverse-Field (black letters on white backgrounds) to highlight certain areas. Reverse Field will not print out on most printers. We have replaced the reverse field used in the rectangular chart wheel arms with asterisks (*). The program lines, however, are written with liberal use of this Reverse-Field feature. See the notes on Commodore screen output for details.

LINE-BY-LINE VARIABLE STATUS

Also included is a line-by-line variable output for at least some of the number crunching sections. This variable printout should prove useful in debugging the program. In particular those of you with systems that use a different dialect of BASIC will find that the variable status can be checked out and errors easily located.

The variable output list is easy to use. The line number, variable name and variable value in memory AT THE COMPLETION of that line are given. Keep in mind that in some lines the value of a variable may change. Listed here are the values held in memory when the given line has been fully executed. We include a run-thru for both the sun, moon and mercury. This should suffice to spot errors. If you can get these to run correctly than you can be sure that errors in subsequent planets can be found in the DATA statements rather than in the number-crunching routines.

Only the heavy number crunching routines are given in detail. It is assumed that the various aspect and house routines plus the screen format can be solved one way or another.

Commodore Screen Format

The area of greatest difference between machines has to do with the way the particular version of BASIC handles screen format work. Each brand (PET, APPLE, TRS-80, ATARI, etc.) has different screen format commands. It is

important that you understand how the PET formats the screen so that you can reproduce the effect on your own machine. The PET makes use of special graphic characters enclosed in quotes for screen formatting. In the enclosed listing, we have indicated these special graphic commands by giving the ASCII code for the command enclosed in brackets.. i.e. [147], [157] and so forth. When you encounter one of these special commands, consult the following table to see what it does to the screen. Then consult the manual for your machine to determine how to duplicate this effect. Here are the commands.

PET Special Cursor Commands

Cursor up one line	[145]
Cursor down one line	[17]
Cursor right one character	[29]
Cursor left one character	[157]
Home cursor to upper left	[19]
Clear screen, Home	[147]
Reverse field (begin)	[18]
Reverse field (end)	[146]

Reverse field gives a white background with a dark character instead of the more usual dark background with a light charcter. reverse field is used particularly in screen menus to hi-light the first letter of an option to be selected. A similar effect can be obtained by enclosing the first letter in parentheses...i.e. (N)EW, (A)SPECTS, etc.

Additional Notes

Some of the sections are more complex than they might be. For instance, in order to save memory space the midpoint values and their reference (two planets that have the midpoint) are combined and stored in a floating point array. The method of encoding and decoding this information might be dispensed with if memory was not a concern. Some of you may have difficulty following the routines that create the aspect and midpoint grids. I am certain that many and any part of this program might be optimized and written differently. The value of the listing as it is written is that it is a running program that has been field tested for about a year. I feel that it is a better idea to use the program as written rather than to re-write it and risk a lot of new 'bugs' that would confuse readers.

DATA INPUT INSTRUCTIONS

The sample chart is that of the author: July 18, 1941 at 4:03 PM EST (5:03 EDT) in Lancaster, PA 76 W 18, 40 N 02. Th birth info format should be followed with care:

DATE:=? Accepts Month, Day and Year in the format MM.DDYYYY where 'MM' is the number of months from 01 to 12, 'DD' is days from 01 to 31 and 'YY' is years from 1900 to 2000. Note use of decimal point between 'MM.DD'. Months and Days that are single digits (less than 10) must be entered as a two-digit number preceded by a zero (1 would be 01, etc.).

AM*PM? Accepts 'AM' if morning birth and 'PM' if afternoon birth.

TIME? Accepts time of the event in HH.MM format where 'HH' stands for the number of hours after midnight or noon (after 'AM' or 'PM' has been selected) and 'MM' stands for the number of minutes after the given hour. NOTE the decimal point (.) is used to separate


```
DATE=? 07.181941
AM*PM? PM
TIME? 4.03
TZ? 5                  RAMC= 175.73
LONG? 76.18              MC= 25VI21
LAT ? 40.02             ASC= 08SA01
DELTA T? 24             VTX= 22CA07

HELIO                  GEO
   LONG     LAT          LONG     LAT

EA 25CP49  +00 00   SU 25CA49  +00 00
ME 03PI57  -06 43   ME 07CA21  -03 28
VE 25VI14  +03 21   VE 19LE55  +01 36
MA 24AQ22  -01 51   MA 09AR06  -03 41
JU 03GE47  -00 46   JU 11GE50  -00 41
SA 20TA37  -02 12   SA 26TA07  -02 06
UR 26TA54  -00 13   UR 29TA23  -00 13
NE 27VI03  +01 17   NE 25VI24  +01 15
PL 03LE53  +04 23   PL 03LE40  +04 16
                    MO 23TA28  -04 20
                    NO 25VI38  +00 00

WHEEL NEW MORE R.A.


        1NE 25VI242VE 19LE550ME 07CA21
        9NO 25VI385          8SU 25CA49
        L          V         LPL 03LE40
        I          I         E
        4          2         1
*13SC45**1***SUN***1****MIDPT9**04CA33*
        *2MON*SXT* 62 24GE38*JU 11GE50
        *3MER    * 18 16CA35*
        *4VEN    * 24 07LE52*
        *5MAR    *107 02GE28*
        *6JUP*SSQ* 44 03CA50*
*08SA01***7SAT*SXT* 60 25GE58***08GE01*
        *8URA*SXT* 56 27GE36*MO 23TA28
        *9NEP*SXT* 60 25LE37*SA 26TA07
        *:PLU    *  8 29CA45*UR 29TA23
        *;NOD*SXT* 60 25LE44*
        *  ASPECTS NEW MORE *
*04CP33**0**KOCH***2*HOUSES**1**13TA45*
        8          5MA 09AR069
        A          P         A
        Q          I         R
        1          2         4
        9          1         1


---------------- ASPECTS --------------
SUN* 62* 18* 24*107* 44* 60* 56* 60*  8
---------------------------------------
SXT*MON* 44* 86* 44* 18*  3*  6*122* 70
---------------------------------------
   *SSQ*MER* 43* 88* 26* 41* 38* 78* 26
---------------------------------------
   *SQR*SSQ*VEN*131* 68* 84* 81* 35* 16
---------------------------------------
   *SSQ*SQR*   *MAR* 63* 47* 50*166*115
---------------------------------------
SSQ*   *   *   *SXT*JUP* 16* 12*104* 52
---------------------------------------
SXT*CJN*SSQ*SQR*SSQ*   *SAT*  3*119* 68
---------------------------------------
SXT*CJN*   *   *   *   *CJN*URA*116* 64
---------------------------------------
SXT*TRI*   *   *   *   *TRI*TRI*NEP* 52
---------------------------------------
   *QTL*   *   *TRI*   *   *SXT*   *PLU
-------- MAJOR ASPECTS ---------------

MIDPT GRID CONT RUN
```

```
  3   REM MATRIX HOROSCOPE ROUTINE
  4   REM AUTHORED BY MICHAEL ERLEWINE
  5   REM ORBITAL ELEMENTS AND HARMONIC TERMS BY J
      AMES NEELY
  6   REM WRITTEN IN MICROSOFT (COMMODORE PET) EXP
      ANDED BASIC
  7   REM COPYRIGHT 1980 BY MICHAEL ERLEWINE & JAM
      ES NEELY
  8   REM PERMISSION TO USE BUT NOT TO SELL (IN AN
      Y PART)
  9   REM
 10   REM NAMES FOR CS ARRAY
 20   DATA EAR,MON,MER,VEN,MAR,JUP,SAT,URA,NEP,PLU
      ,NOD,ASC,"MC "
 30   REM DATA FOR ASPECT AS ARRAY
 40   DATA CJN7000,OPP7180,SQR7090,TRI7120,QTL3072
      ,SXT5060,SSQ5045
 50   DATA SES3135,INC3150
 60   REM SUN ELEMENTS BEGIN AT 358.4758
 70   DATA 358.4758,35999.0498,-.2E-3,.01675,-.4E-
      4,0,1,101.2208,1.7192,.0005,0,0
 80   REM MERCURY ELEMENTS BEGIN AT 102.2794
 90   DATA 0,0,0,0,102.2794,149472.5151,0,.20561,.
      2E-4,0,.387098,28.7538,.3703
100   REM VENUS ELEMENTS BEGIN AT 212.6032
110   DATA .0001,47.1459,1.185,.0002,7.0029,.0019,
      -.2E-4,212.6032,58517.8039,.0013
120   DATA .00682,-.5E-4,0,.7233,54.3842,.5082,-.1
      4E-2,75.7796,.8999,.4E-3
130   REM MARS ELEMENTS BEGIN AT 319.5294
140   DATA 3.3936,.1E-2,0,319.5294,19139.8585,.2E-
      3,.09331,.9E-4,0,1.5237,285.4318
150   REM JUPITER ELEMENTS BEGIN AT 225.4928
160   DATA 1.0698,.1E-3,48.7864,.77099,0,1.8503,-.
      7E-3,0,225.4928,3033.6879,0
170   DATA .04838,-.2E-4,0,5.2029,273.393,1.3383,0
      ,99.4198,1.0583,0,1.3097,-.52E-2
180   REM JUPITER HARMONIC TERMS BEGIN AT -.001
190   DATA 0,-.001,-.0005,.0045,.0051,581.7,-9.7,-
      .0005,2510.7,-12.5,-.0026,1313.7
200   DATA -61.4,.0013,2370.79,-24.6,-.0013,3599.3
      ,37.7,-.001,2574.7,31.4,-.00096
210   DATA 6708.2,-114.5,-.0006,5499.4,-74.97,-.00
      13,1419,54.2,.0006,6339.3,-109
220   DATA .0007,4824.5,-50.9,.0020,-.0134,.0127,-
      .0023,676.2,.9,.00045
230   DATA 2361.4,174.9,.0015,1427.5,-188.8,.0006,
      2110.1,153.6,.0014,3606.8,-57.7
240   DATA -.0017,2540.2,121.7,-.00099,6704.8,-22.
      3,-.0006,5480.2,24.5,.00096
250   REM SATURN ELEMENTS BEGIN AT 174.2153
260   DATA 1651.3,-118.3,.0006,6310.8,-4.8,.0007,4
      826.6,36.2,174.2153,1223.50796
270   DATA 0,.05423,-.2E-3,0,9.5525,338.9117,-.316
      7,0,112.8261,.8259,0,2.4908
280   REM SATURN HARMONIC TERMS BEGIN AT .0009
290   DATA -.0047,0,-.0009,.0037,0,.0134,1238.9,-1
      6.4,-.00426,3040.9,-25.2,.0064
300   DATA 1835.3,36.1,-.0153,610.8,-44.2,-.0015,2
      480.5,-69.4,-.0014,.0026,0,.0111
310   DATA 1242.2,78.3,-.0045,3034.96,62.8,-.0066,
      1829.2,-51.5,-.0078,640.6,24.2
320   DATA -.0016,2363.4,-141.4,.0006,-.0002,0,-.0
      005,1251.1,43.7,.0005,622.8
330   REM URANUS ELEMENTS BEGIN AT 74.1757
340   DATA 13.7,.0003,1824.7,-71.1,.0001,2997.1,78
      .2,74.1757,427.2742,0,.04682
350   REM URANUS HARMONIC TERMS BEGIN AT -.0021
360   DATA .00042,0,19.2215,95.6863,2.0508,0,73.52
      22,.5242,0,.7726,.1E-3,0,-.0021
370   DATA -.0159,0,.0299,422.3,-17.7,-.0049,3035.
      1,-31.3,-.0038,945.3,60.1
380   DATA -.0023,1227,-4.99,.0134,-.02186,0,.0317
      ,404.3,81.9,-.00495,3037.9,57.3
390   DATA .004,993.5,-54.4,-.0018,1249.4,79.2,-.0
      003,.0005,0,.0005,352.5,-54.99
400   REM NEPTUNE ELEMENTS BEGIN AT 30.13294
410   DATA .0001,3027.5,54.2,-.0001,1150.3,-88,30.
      13294,240.45516,0,.00913,-.00127
420   REM NEPTUNE HARMONIC TERMS BEGIN AT .1832
430   DATA 0,30.11375,284.1683,-21.6329,0,130.6841
      5,1.1005,0,1.7794,-.0098,0,.1832
440   DATA -.6718,.2726,-.1923,175.7,31.8,.0122,54
      2.1,189.6,.0027,1219.4,178.1
450   DATA -.00496,3035.6,-31.3,-.1122,.166,-.0544
      ,-.00496,3035.3,58.7,.0961,177.1
460   DATA -68.8,-.0073,630.9,51,-.0025,1236.6,78,
      .00196,-.0119,.0111,.0001
470   REM PLUTO ELEMENTS BEGIN AT 229.781
480   DATA 3049.3,44.2,-.0002,893.9,48.5,.00007,14
      16.5,-25.2,229.781,145.1781,0
490   DATA .24797,.002898,0,39.539,113.5366,.2086,
      0,108.944,1.3739,0,17.1514
500   REM PLUTO HARMONIC TERMS BEGIN AT -.0426
510   DATA -.0161,0,-.0426,.073,-.029,.0371,372,-3
      31.3,-.0049,3049.6,-39.2,-.0108
520   DATA 566.2,318.3,.0003,1746.5,-238.3,-.0603,
      .5002,-.6126,.049,273.97,89.97
530   DATA -.0049,3030.6,61.3,.0027,1075.3,-28.1,-
      .0007,1402.3,20.3,.0145,-.0928
540   DATA .1195,.0117,302.6,-77.3,.00198,528.1,48
      .6,-.0002,1000.4,-46.1
550   REM HORIZ & VERTICAL COORDINATES FOR PRINTIN
      G PLANETS IN HOUSES
560   DATA 0,13,0,19,10,19,20,19,30,19,30,13,30,7,
      30,1,20,1,10,1,0,1,0,7
570   REM CONSTANT 'PI'
580   PI=3.14159265
590   REM DIMENSION ARRAYS
600   DIMC$(13),C(14),K(13),H$(12),M(79),R(12,2),T
      (3)
610   REM RD CONVERTS RADIANS TO DEGREES, DR CONVE
      RTS DEGREES TO RADIANS
620   RD=180/PI:DR=PI/180
630   REM FNS PERFORMS SINE FUNCTION WHEN VALUE IS
       IN DEGREES
640   DEF FNS(X)=SIN(X*DR)
650   REM ZODIAC NAME MASTER STRING
660   ZA$="ARTAGECALEVILISCSACPAQPI"
670   REM 'MO' IS USED IN MODULUS FUNCTION (FNU)
680   MO=360
690   REM CONVERTS NUMBER ENTERED IN DEGREES AND M
      INUTES TO DEGREES AND DECIMALS
700   DEF FNQ(X)=SGN(X)*(INT(ABS(X))+(ABS(X)-INT(ABS
      (X)))*100/60)
710   REM 'QW$','K$' AND 'O$' ARE USED FOR PET SCR
      EEN FORMAT
720   QW$="[19][17][17][17][17][17][17][17][17][17]
      [17][17][17][17][17][17][17][17][17][17][17]
      [17][17][17]":K$="          ":O$="[19][17][17]
      [17][17][17][17][17][17][17]"
730   REM 'FNU' IS UNITY OR MODULUS FUNCTION, RETU
      RNS ANSWER WITHIN A CIRCLE
740   DEF FNU(X)=X-(INT(X/MO)*MO)
750   REM 'FNW' RETURNS DEGREE-DECIMAL RESULT ROUN
      DED TO TWO PLACES
760   DEF FNW(X)=INT(X*100+.5)/100
770   REM 'FNY' IS ARC COSINE ROUTINE
780   DEF FNY(X)=ATN(SQR(1-X*X)/X)
790   REM 'FNX' IS ARCSINE ROUTINE
800   DEF FNX(X)=ATN(X/SQR(1-X*X))
810   REM FILL PLANET AND ASPECT NAME ARRAYS
820   FOR I=1TO13:READ C$(I):NEXT I:FOR I=1TO9:READ
      A$(I):NEXT I
830   REM SELECT BETWEEN TROPICAL AND SIDEREAL OUT
      PUT
840   PRINT "[147][18]T[146]ROPICAL/[18]S[146]IDER
      EAL?":GOSUB 3040:PRINT "[147]";:SD=0:IF Q$="
      S" THEN SD=1
850   REM INPUT DATE STRING AND BREAK IT DOWN X=MO
      NTH, Y=DAY AND Z=YEAR
860   INPUT"DATE=";E$:X=VAL(MID$(E$,1,2)):Z=VAL(MID$
      (E$,6,4)):Y=VAL(MID$(E$,4,2))
870   REM MORNING OR AFTERNOON EVENT INPUT
880   INPUT"AM*PM";A$
890   REM INPUT TIME IN HH.MM FORMAT
900   INPUT"TIME";U
910   REM INPUT STANDARD TIME ZONE IN HH
920   INPUT"TZ";V
```

```
930   REM ENTER GEOGRAPHIC LONGITUDE IN DDD.MM (+=
      WEST, -=EAST)
940   INPUT"LONG";C:L5=FNQ(C)
950   REM ENTER GEOGRAPHIC LATITUDE IN DD.MM (+=NO
      RTH, -=SOUTH)
960   INPUT"LAT ";C:LA=DR*FNQ(C)
970   REM ENTER DELTA CORRECTION (ZERO IF NOT DESI
      RED)
980   INPUT"DELTA T";DT
990   REM ADD TIME ZONE IN HOURS TO EVENT TIME CON
      VERTED TO DECIMALS
1000  U=FNQ(U)+V
1010  REM ADD 12 HOURS IF 'PM' BIRTH
1020  IF A$="PM" THEN U=U+12
1030  REM JULIAN DAY NUMBER ROUTINE
1040  JD=367*Z-INT(7*(Z+INT((X+9)/12))/4):JD=JD+INT
      (275*X/9)+Y+1721013.5:I=1
1050  JD=JD-.5*SGN(100*Z+X-190002.5)+.5:C=(JD-2415
      020)+U/24
1060  REM 'T' IS CENTURY INCREMENT WITHOUT DELTA T
       CORRECTION
1070  T=C/36525
1080  REM 'RA' IS SIDEREAL TIME (RAMC) CALCULATED
      IN DEGREES AND THEN TO RADIANS
1090  RA=DR*FNU((6.6460656+2400.0513*T+2.58E-5*T*T
      +U)*15-L5)
1100  REM MEAN LUUNAR NODE AND NUTATION ROUTINE
1110  GOSUB 2690
1120  REM CALCULATE OBLIQUITY OF ECLIPTIC
1130  OB=DR*(23.452294-.0130125*T)
1140  REM CHECK FOR SIDEREAL OPTION
1150  IF SD=1 THEN GOSUB 5050
1160  REM CENTURY INCREMENT 'T' INCLUDING DELTA T
      CORRECTION
1170  T=(C+DT/86400)/36525
1180  REM CHART ANGLES SUBROUTINE
1190  R2=RA:O=-OB:B=LA:GOSUB 2780:C=MC
1200  REM PRINT OUT CHART ANGLES IN UPPER LEFT HAN
      D CORNER OF SCREEN
1210  PRINT SPC(20)"[145][145][145][145]RAMC="FNW(
      RD*RA):GOSUB 2110:PRINT SPC(20)"  MC= "A$
1220  C=AS:GOSUB 2110:PRINT SPC(20)" ASC= "A$
1230  C=VT:GOSUB 2110:PRINT SPC(20)" VTX= "A$:C(12
      )=AS:C(13)=MC
1240  REM PRINT PLANET POSITION HEADER
1250  PRINT "[17]HELIO"SPC(14)"GEO":A$="   LONG
       LAT":PRINT A$SPC(5)A$:PRINT
1260  REM BEGIN PLANET ROUTINE
1270  REM PLANET LOOP (INCLUDES LUNAR ROUTINE)
1280  FOR I=1TO10
1290  REM LUNAR SUBROUTINE
1300  IF I=2 THEN 1980
1310  REM MODULUS FUNCTION IN RADIANS RATHER THAN
      DEGREES
1320  MO=2*PI
1330  REM CALCULATE MEAN ANOMALY 'M'
1340  GOSUB 2530:M=FNU(S)
1350  REM CALCULATE ECCENTRICITY 'E'
1360  GOSUB 2530:E=RD*S
1370  REM SOLVE KEPLER'S EQUATION FOR ECCENTRIC AN
      OMALY 'EA'
1380  EA=M:FOR A=1TO5:EA=M+E*SIN(EA):NEXT A
1390  REM READ SEMI-MAJOR AXIS 'AU'
1400  READ AU
1410  REM BEGIN VELOCITY COORDINATES ROUTINE
1420  E1=.01720209/(AU^1.5*(1-E*COS(EA)))
1430  REM CALCULATE 'AP' ARGUMENT OF PERIHELION
1440  GOSUB 2530:AP=S
1450  REM CALCULATE PERIFOCAL COORDINATES 'XW' AND
       'YW'
1460  XW=-(AU*E1)*SIN(EA):YW=(AU*E1)*(1-E*E)^.5*COS
      (EA)
1470  REM CALCULATE ASCENDING NODE 'AN'
1480  GOSUB 2530:AN=S
1490  REM CALCULATE INCLINATION 'IN'
1500  GOSUB 2530:IN=S
1510  REM ROTATE VELOCITY COORDINATES
1520  X=XW:Y=YW:GOSUB 2650
1530  REM HELIO ECLIPTIC RECTANGULAR COORDINATES
1540  XH=X:YH=Y:ZH=G
1550  REM SET MODULUS FUNCTION TO DEGREES
1560  MO=360
1570  REM STORE SUN'S VELOCITY COORDINATES
1580  IF I=1 THEN XA=-XH:YA=-YH:ZA=-ZH:AB=0:GOTO 1
      620
1590  REM GEO VELOCITY COMPONENTS FOR PLANETS OTHE
      R THAN THE SUN
1600  XW=XH+XA:YW=YH+YA:ZW=ZH+ZA
1610  REM PERIFOCAL COORDS FOR TRANSFORM TO RECT P
      OSITION COORDINATES
1620  X=AU*(COS(EA)-E):Y=AU*SIN(EA)*(1-E*E)^.5
1630  REM ROTATE FOR RECTANGULAR POSITION COORDINA
      TES
1640  GOSUB 2650:XX=X:YY=Y:ZZ=G
1650  REM CALCULATE HARMONIC TERMS FOR PLANETS BEY
      OND AND INCLUDING JUPITER
1660  IF I>5 THEN GOSUB 2590:XX=XX+T(2):YY=YY+T(1)
      :ZZ=ZZ+T(3)
1670  REM SET RETROGRADE STRING 'RS' AND ABBERATIO
      N 'BR' TO NULL
1680  RS="  ":BR=0
1690  REM CONVERT HELIO RECTANGULAR COORDINATES TO
       HELIO SPHERICAL
1700  GOSUB 2310:AB=1
1710  REM ASSIGN HELIO POSITION TO 'CH' ARRAY
1720  CH(I)=SS
1730  REM COMPUTE HELIO DAILY MOTION IN RADIANS
1740  XK=(XX*YH-YY*XH)/(XX*XX+YY*YY)
1750  REM STORE EARTH/SUN COORDINATES, ASSIGN 'SUN
      ' TO C$(1)
1760  IF I=1 THEN C$(1)="SUN":X1=XX:Y1=YY:Z1=ZZ:GOTO
      1820
1770  REM CONVERT HELIO TO GEOCENTRIC RECTANGULAR
      COORDINATES
1780  XX=XX-X1:YY=YY-Y1:ZZ=ZZ-Z1
1790  REM CALCULATE GEOCENTRIC DAILY MOTION
1800  XK=(XX*YW-YY*XW)/(XX*XX+YY*YY)
1810  REM CALCULATE ABERRATION 'BR'
1820  BR=.0057683*SQR(XX*XX+YY*YY+ZZ*ZZ)*RD*XK
1830  REM IF 'XK' NEGATIVE, SET RETROGRADE FLAG
1840  IF XK<0 THEN RS=" [18]R[146]"
1850  REM CONVERT RECTANGULAR TO SPHERICAL COORDIN
      ATES
1860  GOSUB 2310
1870  REM ASSIGN LONGITUDE TO 'C' ARRAY, LATITUDE
      TO 'M' ARRAY
1880  C(I)=SS:M(I)=P:PRINT
1890  REM STORE AS NEGATIVE NUMBER IF RETROGRADE
1900  IF XK<0 THEN C(I)=-SS
1910  NEXT I
1920  REM PRINT OUT MOON AND NODE POSITIONS
1930  C=C(2):P=LT:PRINT TAB(19);:I=2:RS="  ":GOSUB
      2420
1940  P=0:C=C(11):I=11:PRINT :PRINT TAB(19);:GOSUB
      2420:PRINT
1950  REM MENU TITLE
1960  PRINT "[17][18]W[146]HEEL [18]N[146]EW [18]M
      [146]ORE [18]R[146].A.";:GOTO 2440
1970  REM LUNAR ROUTINE
1980  MO=360:LL=973563+1732564379*T-4*T*T:G=101239
      5+6189*T:M=3600
1990  G1=1203586+14648523*T-37*T*T:L=(LL-G1)/M:D=1
      262655+1602961611*T-5*T*T
2000  L1=((LL-D)-G)/M:F=(LL-LN*M)/M:ML=22639.6*FNS
      (L)
2010  D=D/M:Y=2*D:ML=ML-4586.4*FNS(L-Y)+2369.9*FNS
      (Y)+769*FNS(2*L)-669*FNS(L1)
2020  REM 'ML' IS LUNAR LONGITUDE
2030  ML=ML-411.6*FNS(2*F)-212*FNS(2*L-Y)-206*FNS(
      L+L1-Y)+192*FNS(L+Y)
2040  ML=ML-165*FNS(L1-Y)+148*FNS(L-L1)-125*FNS(D)
      -110*FNS(L+L1):RS="  "
2050  REM 'P' IS LUNAR LATITUDE
2060  P=18465*FNS(F)+1010*FNS(L+F)-999*FNS(F-L)-62
      4*FNS(F-Y)+199*FNS(F+Y-L)
2070  P=P-167*FNS(L+F-Y)+117*FNS(F+Y)+62*FNS(2*L+F
      )-33*FNS(F-Y-L)
2080  LT=(P-32*FNS(F-2*L)-30*FNS(L1+F-Y)-45*FNS(L+
      2*F)+40*FNS(L-2*F))/M:M(2)=LT
2090  C(2)=FNU((LL+ML-55*FNS(2*F-Y))/M+SD):C(11)=FN
      U(LN+SD):GOTO 1910
```

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2100  REM ROUTINE TO CONVERT DEGREE/DECIMAL TO ZOD
      IAC NOTATION
2110  U=ABS(C):Z3=INT(U)
2120  REM 'Q' IS THE NUMBER OF THE ZODIAC SIGN FRO
      M 1 TO 12
2130  Q=INT(Z3/30)+1
2140  REM 'X$' IS THE DEGREES
2150  X$=RIGHT$(STR$(1000+INT(FNW((Z3/30-INT(Z3/30
      ))*30))),2)
2160  REM 'ZZ$' IS THE MINUTES
2170  ZZ$=RIGHT$(STR$(1000+INT(((U-Z3)*60+.5))),2)

2180  REM 'B$' CONTAINS THE TWO-LETTER ZODIAC SIGN

2190  B$=MID$(ZA$,Q*2-1,2)
2200  REM 'A$' INDICATES THE SIGN OF THE LATITUDE
      FACTOR
2210  A$="+":IF C<0 THEN A$="-"
2220  REM 'D$' USED FOR LATITUDE & DECLINATION SIG
      N
2230  D$=A$+X$+" "+RIGHT$(ZZ$,2)
2240  REM RIGHT ASCENSION FORMAT IN 360-DEGREE NOT
      ATION
2250  IF EQ=1 THEN B$=" ":X$=RIGHT$("  "+STR$(Z3),
      3)
2260  REM READ AND CALCULATE DATA VALUES
2270  Z$=LEFT$(C$(I),2)+" "+X$+B$+RIGHT$(ZZ$,2)
2280  REM DEGREES-ZODIAC SIGN-MINUTES STRING
2290  A$=RIGHT$(Z$,6):RETURN
2300  REM RECTANGULAR TO SPHERICAL CONVERSION ROUT
      INE
2310  X=XX:Y=YY:GOSUB 2570
2320  REM ADD NUTATION AND ABERRATION TO POSITION
2330  K=A:C=RD*A+NU-BR
2340  REM ADD 180-DEGREES IF EARTH/SUN
2350  IF I=1 AND AB=1 THEN C=FNU(C+180)
2360  REM STORE PLANET LONGITUDE IN 'C'AND 'SS'
2370  C=FNU(C+SD):SS=C
2380  REM CALCULATE PLANET LATITUDE
2390  Y=ZZ:X=R:GOSUB 2570:IF A>.35 THEN A=A-2*PI
      P=RD*A
2410  REM PRINT LONGITUDE & LATITUDE
2420  GOSUB 2110:P$=Z$+R$:C=P:GOSUB 2110:PRINT P$D
      $"  ";:RETURN
2430  REM MENU SELECTION ROUTINE
2440  GOSUB 3040:REM GET ROUTINE
2450  REM SELECT FOR MORE OPTIONS
2460  IF Q$="M" THEN 2880
2470  REM SELECT RIGHT ASCENSION & DECLINATION
2480  IF Q$="R" THEN 5170
2490  REM SELECT BETWEEN TWO HOUSE SYSTEMS
2500  IF Q$="W" THEN PRINT " [18]K[146]OCH [18]P[146]
      LACIDUS";:GOTO 4040
2510  GOTO 2440
2520  REM READS ORBITAL ELEMENTS
2530  READ S,S1,S2:S=DR*(S+S1*T+S2*T*T):RETURN
2540  REM POLAR TO RECTANGULAR COORDINATE CONVERSI
      ON
2550  X=R*COS(A):Y=R*SIN(A):RETURN
2560  REM RECTANGULAR TO POLAR CONVERSION
2570  R=SQR(X*X+Y*Y):A=ATN(Y/(X-1E-9*(X=0)))-PI*(X
      <0)-2*PI*(A<0):RETURN
2580  REM HARMONIC TERMS FOR OUTER PLANET ROUTINE
2590  K(6)=11:K(7)=5:K(8)=4:K(10)=4:K(9)=4
2600  FOR IK=1TO3:IF I=6 AND IK=3 THEN T(3)=0:RETURN

2610  IF IK=3 THEN K(I)=K(I)-1
2620  GOSUB 2530:A=0:FOR IJ=1TOK(I):READ U,V,W
2630  A=A+DR*U*COS((V*T+W)*PI/180):NEXT IJ:T(IK)=R
      D*(S+A):NEXT IK:RETURN
2640  REM ROTATE ROUTINE USED FOR POSITION & VELOC
      ITY COORDINATES
2650  GOSUB 2570:A=A+AP:GOSUB 2550:D=X:X=Y:Y=0:GOSUB
      2570:A=A+IN:GOSUB 2550:G=Y:Y=X:X=D
2660  GOSUB 2570:A=A+AN:IF A<0 THEN A=A+2*PI
2670  GOSUB 2550:RETURN
2680  REM LUNAR NODE 'LN' AND NUTATION 'NU' ROUTIN
      E
2690  LN=FNU(259.1833-1934.1419*T):MS=FNU(279.6967
      +36000.76*T)
2700  NU=(-(17.2327+.01737*T)*FNS(LN)-1.273*FNS(2*
      MS))/3600:RETURN
2710  REM COORDINATE CONVERSION ROUTINE, INPUT L=L
      ONG VALUE, B= LATITUDE VALUE
2720  REM OUTPUT 'G'= LONG VALUE, 'Q'= LAT VALUE
2730  A=B:R=1:GOSUB 2550:Q=Y:R=X:A=L:GOSUB 2550:G=
      X:X=Y:Y=Q:GOSUB 2570
2740  A=A+O:GOSUB 2550:Q=FNX(Y):Y=X:X=G:GOSUB 2570
      :IF A<0 THEN A=A+2*PI
2750  G=A:RETURN
2760  REM CHART ANGLES SUBROUTINE: MIDHEAVEN, ASCE
      NDANT AND VERTEX
2770  REM MIDHEAVEN ROUTINE
2780  A=R2:R=1:GOSUB 2550:X=X*COS(O):GOSUB 2570:MC
      =FNU(SD+RD*A)
2790  REM ASCENDANT ROUTINE
2800  L=R2:GOSUB 2730:AS=FNU(SD+RD*(G+PI/2))
2810  REM VERTEX ROUTINE
2820  L=R2+PI:B=PI/2-ABS(B):IF LA<0 THEN B=-B
2830  GOSUB 2730:VT=FNU(SD+RD*(G+PI/2)):RETURN
2840  REM ELIMATES NEGATIVE NUMBERS DUE TO RETROGR
      ADE ASSIGNMENT
2850  FOR I=1TO10:C(I)=ABS(C(I)):NEXT I:RETURN
2860  REM BEGIN MORE OPTIONS ROUTINE
2870  REM STRINGS USED FOR GRID DISPLAY
2880  P1$="[145]    *    *    *[160][160][160]*[160][160]
      [160]*    *    *[160] [160]*[160][160][160]* "
      :GOSUB 2850
2890  P2$="----------------------------------------
      -"
2900  REM SELECT GEO OR HELIO POSITIONS
2910  PRINT "[147][18]G[146]EO OR [18]H[146]ELIO [18]
      N[146]EW":GOSUB 3040:IF Q$="H" THEN 3990
2920  REM GEO VARIABLE SET-UP
2930  NM=45:CN=9:NN=10
2940  REM GRID, ANGULAR SEPARATION AND ASPECT NAME
       ROUTINES
2950  GOSUB 3440:GOSUB 3100:GOSUB 3590
2960  REM MENU SELECTION
2970  PRINT "[18]M[146]IDPT GRID [18]C[146]ONT [18]
      R[146]UN":GOSUB 3040
2980  REM MIDPOINT ROUTINE
2990  IF Q$="M" THEN GOSUB 3150:GOSUB 3040
3000  REM OPTION SELECTION
3010  IF Q$="R" THEN 2880
3020  GOTO 3210
3030  REM 'GET' ROUTINE
3040  GETQ$:IF Q$="" THEN 3040
3050  REM RUN PROGRAM FROM START
3060  IF Q$="N" THEN RUN 600
3070  RETURN
3080  REM ANGULAR SEPARATION IN GRID ROUTINE
3090  REM 'TS' USED FOR CURSOR PLACEMENT
3100  TS="[19][17]":Y=3:FOR I=1TONN:PRINT TSSPC(Y)
      ;
3110  FOR J=I+1TONN:IF I=NN AND J=NN+1 THEN 3130
3120  GOSUB 3500:PRINT SPC(1)A$;
3130  NEXT J:Y=Y+4:TS=TS+"[17][17]":PRINT :PRINT :
      NEXT I:RETURN
3140  REM MIDPOINT GRID ROUTINE
3150  PRINT UP$TAB(8)"[145][145][145]---- MIDPOINT
      S":TS="[19][17][17]":Y=40:A=1:N=CN
3160  FOR J=1TONN:WS=TS:PRINT TS;:FOR I=J+1TONN:IF
      J=NN AND I=NN+1 THEN PRINT :RETURN
3170  GOSUB 3760:PRINT WS$PC(Y)RIGHT$("  "+STR$(INT
      (M(A)+.5)),3)"*"
3180  WS=WS+"[17][17]":NEXT I:N=N-1:Y=Y+4:TS=TS+"[17]
      [17]":PRINT :PRINT :NEXT J:RETURN
3190  REM SORTED MIDPOINTS ROUTINE
3200  REM INPUT VALUE FOR SORT DIAL
3210  INPUT"ENTER DIAL 360=360";MO
3220  REM SELECT FOR GEO OR HELIO
3230  RT=13:IF NN=9 THEN RT=9
3240  REM ASSIGN MIDPOINTS TO SORTING ARRAY
3250  A=1:FOR I=1TORT:FOR J=I+1TORT:GOSUB 3760:A=A
      +1:NEXT J:NEXT I:GOSUB 3640:MO=360
3260  REM DISPLAY MIDPOINTS ROUTINE
3270  PRINT "[147]";
3280  PRINT "[19][18]Z[146]OD/[18]3[146]60 [18]M[146]
      ORE":GOSUB 3040:XC=0:IF Q$="3" THEN QE=1:XC=
      1
3290  IF Q$="M" THEN 2880
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3300  PRINT "[147]------------ MIDPOINT SORT -----
      ----"
3310  XZ=0:Y=1:A=1:FOR I=1TO4:PRINT "[19][17]";:FOR
      JI=1TO23
3320  REM GEO OUT
3330  IF A=79 AND NN=10 THEN 3430
3340  REM HELIO OUT
3350  IF A=37 AND NN=9 THEN 3430
3360  REM ROUND MIDPOINT AND PRINT
3370  C=M(A)+.5:GOSUB 2110
3380  IF M(A)>=XZ THEN PRINT SPC(Y)"[157] [18]"BS"
      [146]":XZ=Q*30:JI=JI+1
3390  PX=M(A):GOSUB 3850
3400  REM 360-DEGREE NOTATION FLAG
3410  IF XC=1 THEN XS=RIGHTS(" "+STRS(INT(C)),3)
3420  PRINT SPC(Y)"[157]"XS" "YYS:A=A+1:NEXT JI:Y=
      Y+10:NEXT I
3430  GOTO 3280
3440  PRINT "[147]";"---------------- ASPECTS ----
      ----------":PRINT
3450  PRINT P1$
3460  FOR I=1TO9:PRINT P2$:PRINT P1$:NEXT I
3470  PRINT "-------- MAJOR ASPECTS -------------
      --"
3480  Y=0:PRINT "[19]";:FOR I=1TONN:PRINT TAB(Y)"[17]
      ""[18]"C$(I)"[146]":Y=Y+4:NEXT I:RETURN
3490  REM OUTPUT ROUNDED ANGULAR SEPARATION IN PRI
      NT STRING
3500  X=ABS(C(I)-C(J)):IF X>180 THEN X=360-X
3510  A$=RIGHTS("  "+STR$(INT(X+.5)),3):RETURN
3520  REM RETURNS ASPECT LETTER NAME IF WITHIN RAN
      GE
3530  AS=ABS(C(I)-C(J)):IF AS>180 THEN AS=360-AS
3540  AS="   ":FOR W=1TO9:X=ABS(AS-VAL(RIGHTS(AS(W
      ),3))):
3550  XY=VAL(MIDS(A$(W),4,1)):IF X<XY THEN AS=LEFT$
      (A$(W),3):GOTO 3570
3560  NEXT W
3570  RETURN
3580  REM PRINT ASPECT NAMES IN GRID
3590  TS="[19][17][17]":Y=40:N=CN:FOR J=1TONN
3600  WS=TS:FOR I=J+1TONN:IF J=NN AND I=NN+1 THEN
      RETURN
3610  GOSUB 3530:PRINT WSSPC(Y)A$"*":WS=WS+"[17][17]
      ":NEXT I:N=N-1:Y=Y+4:TS=TS+"[17][17]"
3620  PRINT :PRINT :NEXT J:RETURN
3630  REM SHELL-METZNER SORT
3640  N=78:IF NN=9 THEN N=36
3650  M=N
3660  M=INT(M/2):IF M=0 THEN 3740
3670  J=1:K=N-M
3680  I=J
3690  L=I+M:IF M(I)<M(L) THEN 3720
3700  X=M(I):M(I)=M(L):M(L)=X:I=I-M:IF I<1 THEN 37
      20
3710  GOTO 3690
3720  J=J+1:IF J>K THEN 3660
3730  GOTO 3680
3740  RETURN
3750  REM MIDPOINT SUB
3760  W=0:X=ABS(C(I)-C(J)):IF X<=180 THEN GOTO 379
      0
3770  W=180:IF (C(I)+C(J))/2<180GOTO 3790
3780  W=-180
3790  X=FNU((C(I)+C(J))/2+W):X=(INT((X+.01)*100)/1
      00)+.001
3800  REM STORE MIDPOINT AND PLANET INDICATOR IN S
      TRING ARRAY
3810  MS=LEFTS(STRS(X),8)
3820  MA$=STRS(A):IF A<10 THEN MAS="0"+RIGHTS(MAS,
      1)
3830  M(A)=VAL(STRS(VAL(MS+MAS+"9"))):RETURN
3840  REM ROUTINE TO PULL OUT MIDPOINT COMBINATION
      S
3850  MS=STRS(PX)
3860  REM REMOVES ACCIDENTAL CHARACTERS FROM END O
      F STRING
3870  IF RIGHTS(MS,1)<>"9" THEN X=LEN(MS):MS=LEFTS
      (MS,X-1):GOTO 3870
3880  REM BACK OUT PLANETARY COMBINATION FROM SORT
       ARRAY
3890  AS=RIGHTS(MS,3):X=VAL(LEFTS(AS,2))
3900  REM GEO OR HELIO IN 'RT'
3910  RT=12:IF NN=9 THEN RT=8
3920  REM STEP DOWN ROUTINE
3930  T=1:FOR K=RTTO1STEP-1:IF X<=K THEN 3960
3940  X=X-K:T=T+1:NEXT K
3950  REM CREATE FINAL OUTPUT STRING FOR PRINT TO
      SCREEN
3960  Y1$=YS+STRS(Z1)+" ":YYS=LEFTS(CS(T),2)+"/"+LEFTS
      (CS(T+ABS(X)),2):RETURN
3970  REM HELIO SET-UP ROUTINE
3980  REM RETURNS IF HELIO SET-UP HAS TAKEN PLACE
3990  IF LT=1 THEN 2950
4000  REM POSITIONS HELIO PLANETS & NAMES STRINGS
4010  LT=1:NM=36:CN=8:NN=9:CS(1)="EAR":FOR K=2TO9:
      C(K)=CH(K+1):CS(K)=CS(K+1)
4020  C(1)=CH(1):CS(1)="EAR":NEXT K:CS(10)="   ":GOTO
      2950
4030  REM READS HOUSE PRINT POSITIONS INTO 2 DIMES
      ION 'R' ARRAY
4040  FOR I=1TO12:FOR J=1TO2:READ R(I,J):NEXT J:NEXT
      I:GOSUB 2850
4050  REM CHOICE OF HOUSE SYSTEM AND BRANCH IF KOC
      H IS SELECTED
4060  GOSUB 3040:PRINT " OK":IF QS="K" THEN 5090
4070  REM PLACIDUS HOUSE ROUTINE
4080  Y=0:R1=RA+DR*30:FF=3:GOSUB 4150:M(5)=FNU(L+1
      80):HS$="PLACIDUS "
4090  R1=RA+DR*60:FF=1.5:GOSUB 4150:M(6)=FNU(L+180
      ):FF=1:GOSUB 4150:M(1)=L
4100  R1=RA+DR*120:FF=1.5:Y=1:GOSUB 4150:M(2)=L:R1
      =RA+DR*150:FF=3
4110  GOSUB 4150:M(3)=L:M(4)=FNU(MC+180-SD):FOR I=
      1TO6:M(I)=FNU(M(I)+SD):NEXT I
4120  FOR I=1TO6:C=FNU(M(I)+180):M(I+6)=C:GOSUB 21
      10:HS(I+6)=AS
4130  C=M(I):GOSUB 2110:H$(I)=AS:NEXT I:GOTO 4220
4140  REM SUBROUTINE USED IN PLACIDUS ROUTINE FOR
      ITERATIONS
4150  X=-1:IF Y=1 THEN X=1
4160  FOR I=1TO10:XX=FNY(X*SIN(R1)*TAN(OB)*TAN(LA)
      ):IF XX<0 THEN XX=XX+PI
4170  R2=RA+(XX/FF):IF Y=1 THEN R2=RA+PI-(XX/FF)
4180  R1=R2:NEXT I:L=ATN(TAN(R1)/COS(OB)):IF L<0 THEN
      L=L+PI
4190  IF SIN(R1)<0 THEN L=L+PI
4200  L=RD*L:RETURN
4210  REM RECTANGULAR CHART WHEEL FORMAT ROUTINE
4220  PRINT "[147]";:FOR I=1TO5
4230  PRINT KS"[18]"MIDS(HS(11),I,1)"[146]"KS"[18]
      "MIDS(HS(10),I,1)"[146]"KS;
4240  PRINT "[18]"MIDS(HS(9),I,1)"[146]":NEXT I:PRINT
      "[18] "HS(12)"  "MIDS(HS(11),6);
4250  PRINT KSMIDS(HS(10),6,1)KSMIDS(HS(9),6,1)"
      "HS(8)" [146]"
4260  FOR I=1TO5:PRINT TAB(9)"[18] [146]"TAB(29)"[18]
       [146]":NEXT I
4270  PRINT "[18] "HS(1)"   [146]"TAB(29)"[18]""
       "HS(7)" [146]"
4280  FOR I=1TO5:PRINT TAB(9)"[18] [146]"TAB(29)"[18]
       [146]":NEXT I
4290  PRINT "[18] "HS(2)"  "MIDS(HS(3),1,1)HSSMIDS
      (HS(4),1,1);
4300  PRINT " HOUSES  "MIDS(HS(5),1,1)"  "HS(6)" [146]
      ":FOR I=1TO5:PRINT KS;
4310  PRINT "[18]"MIDS(HS(3),I+1,1)"[146]"KS"[18]"
      MIDS(HS(4),I+1,1)"[146]"KS;
4320  PRINT "[18]"MIDS(HS(5),I+1,1)"[146]":NEXT I:
      PRINT OSTAB(15)ES
4330  REM REMOVE RETRO FLAG IF PRESENT
4340  FOR I=1TO11:K(I)=ABS(C(I)):NEXT I
4350  REM SORT PLANETS IN ZODIAC ORDER, STORE IN '
      K' ARRAY
4360  FOR I=1TO11-1:FOR J=I+1TO11:IF K(J)>=K(I) THEN
      4380
4370  K1=K(I):K(I)=K(J):K(J)=K1
4380  NEXT J:NEXT I
4390  REM MATCH SORTED PLANETS WITH PLANET NAMES A
      ND RETRO/DIRECT STATUS
4400  A=1:FOR I=1TO11:FOR J=1TO11
```

```
4410  IF K(A)=ABS(C(J)) THEN GOSUB 4950:H$(A)=LEFT$
      (C$(J),2)+R$
4420  NEXT J:A=A+1:NEXT I
4430  REM PLACEMENT ON PLANETS IN APPROPRIATE HOUS
      ES ROUTINE
4440  REM 'HH' IS SUBSEQUENT HOUSE CUSP
4450  AB=0:M(13)=M(1):FOR I=1TO12:HH=M(I+1)
4460  REM CHECK FOR ZERO ARIES POINT AND SET FLAG
      IF PRESENT
4470  IF M(I)>M(I+1) THEN HH=M(I+1)+360:AB=1
4480  REM 'GG', 'G' USED FOR HOUSE OVERFLOW
4490  I$=O$:GG=0:G=0
4500  REM POSITION CURSOR AT TOP OF APPROPRIATE HO
      USE
4510  PRINT LEFT$(QW$,R(I,2));
4520  REM ROUTINE TO CHECK PLANETS FOR EACH HOUSE
4530  FOR J=1TO11:CC=K(J)
4540  REM IF ZERO ARIES FLAG SET AND THIS PLANET <
       90 DEGREES, ADD 360
4550  IF AB=1 AND CC<90 THEN CC=CC+360
4560  REM HOUSE OVERFLOW FLAG SET HERE
4570  IF G>4 THEN GG=1
4580  REM PRINTS PLANET IF IN HOUSE
4590  IF CC>M(I) AND CC<HH THEN GOSUB 4980:G=G+1
4600  NEXT J:AB=0:NEXT I
4610  REM POSITION CURSOR FOR ASPECT ROUTINE
4620  PRINT LEFT$(QW$,16);:GOTO 4840
4630  REM PRINT ASPECT ROUTINE HEADER
4640  PRINT "[19][17][17][17][17][17]"TAB(13)"[18]
      "C$(I)"[146]"SPC(8)"[18]MIDPT[146]":L=L+1
4650  REM PLANET LOOP, IGNORES MATCHES
4660  FOR J=1TO11:IF C(I)=C(J) THEN 4820
4670  REM PRINT MENU PLANET KEY NUMBER AND NAME
4680  PRINT TAB(10)"[18]"+CHR$(J+48)+"[146]"C$(J)"
       ";
4690  REM 'AS' IS ANGULAR SEPARATION
4700  AS=ABS(C(I)-C(J)):IF AS>180 THEN AS=360-AS
4710  REM ASPECT LOOP
4720  FOR K=1TO8
4730  REM 'D' IS DIFFERENCE BETWEEN ANGULAR SEPARA
      TION AND PERFECT ASPECT
4740  D=ABS(AS-VAL(RIGHT$(A$(K),3))):X$="    *"
4750  REM IF WITHIN ASPECT ORB, PRINT ASPECT NAME
      AND LEAVE LOOP
4760  IF D<VAL(MID$(A$(K),4,1)) THEN PRINT "[157]*
      "LEFT$(A$(K),3);:K=9:X$="*":GOTO 4790
4770  NEXT K
4780  REM PRINT ROUNDED ANGULAR SEPARATION
4790  PRINT X$RIGHT$("  "+STR$(INT(AS+.5)),3)"[221]
      ";
4800  REM MIDPOINT ROUTINE

4810  GOSUB 3760:C=X:GOSUB 2110:PRINT A$
4820  NEXT J
4830  REM ASPECT MENU ROUTINE
4840  ZX=11:PRINT U$TAB(12)"[18]A[146]SPECTS [18]N
      [146]EW [18]M[146]ORE":I=1
4850  GOSUB 3040
4860  REM ERASE PORTION OF SCREEN
4870  PRINT "[19][17][17][17][17][17][17]";:FOR K=
      1TO11:PRINT TAB(10)"                    ":NEXT
      K
4880  REM IF 'GET' CHARACTER ON MENU, SET 'I'
4890  IF ASC(Q$)>48 AND ASC(Q$)<60 THEN I=ASC(Q$)-
      48
4900  REM BRANCH TO OTHER OPTIONS
4910  IF Q$="M" THEN 2880
4920  REM BRANCH TO BEGINNING ASPECT ROUTINE
4930  GOTO 4640
4940  REM SET RETROGRADE/DIRECT STATUS
4950  R$=" ":IF C(J)<0 THEN R$="[18]R[146]"
4960  RETURN
4970  REM PRINT PLANET IN HOUSE ROUTINE
4980  C=K(J):GOSUB 2110
4990  REM OVERFLOW PRINTS EXTRA PLANETS IN HOUSE C
      ENTER
5000  IF GG=1 THEN PRINT I$;TAB(17);STR$(I);:GG=0:
      I$="":GOTO 5030
5010  REM PRINT PLANET NAME
5020  PRINT TAB(R(I,1));
5030  PRINT H$(J)A$:RETURN

5040  REM SIDEREAL 'AYANAHMSA' ROUTINE
5050  SD=(259205536*T+2013816)/3600
5060  SD=17.23*SIN(DR*C(11))+1.27*SIN(DR*SD)TAB((5
      025.64+1.11*T)*T
5070  SD=(SD-84038.27)/3600:RETURN
5080  REM KOCH HOUSE ROUTINE
5090  MO=360:A1=FNX(SIN(RA)*TAN(LA)*TAN(OB)):FOR I
      =1TO12:D=FNU(60+30*I)
5100  A2=D/90-1:KN=1:IF D>=180 THEN KN=-1:A2=D/90-
      3
5110  A3=DR*FNU(RD*RA+D+A2*RD*A1)
5120  X=ATN(SIN(A3)/(COS(A3)*COS(OB)-KN*TAN(LA)*SIN
      (OB))):IF X<0 THEN X=X+PI
5130  IF SIN(A3)<0 THEN X=X+PI
5140  REM ASSIGN HOUSE POSITION TO REAL AND STRING
       ARAYS
5150  C=FNU(RD*X+SD):M(I)=C:GOSUB 2110:H$(I)=A$:NEX
      I:HS$="  KOCH    ":GOTO 4220
5160  REM RA & DECLINATION ROUTINE
5170  PRINT O$;:FOR I=1TO14:PRINT "
        ":NEXT I:R$="  "
5180  PRINT O$;"EQUATORIAL SPACE":PRINT "    R.A.
        DECL":PRINT
5190  REM TRANSFORM LONG & LAT TO RA & DECL
5200  REM LONG=C(I), LAT=M(I), RA=C, DECL=P
5210  EQ=1:O=OB:FOR I=1TO11:L=DR*FNU(ABS(C(I))-SD)
      :B=DR*M(I):GOSUB 2730
5220  P=RD*Q:C=RD*G:GOSUB 2420:PRINT :NEXT I:EQ=0:
      GOTO 2440
```

```
---------------- ASPECTS --------------
SUN* 62* 18* 24*107* 44* 60* 56* 60*  8
---------------------------------------
 85*MON* 44* 86* 44* 18*  3*  6*122* 70
---------------------------------------
107* 75*MER* 43* 88* 26* 41* 38* 78* 26
---------------------------------------
128* 97*119*VEN*131* 68* 84* 81* 35* 16
---------------------------------------
 62* 31* 53* 75*MAR* 63* 47* 50*166*115
---------------------------------------
 94* 63* 85*106* 40*JUP* 16* 12*104* 52
---------------------------------------
 86* 55* 77* 98* 33* 64*SAT*  3*119* 68
---------------------------------------
 88* 56* 78*100* 34* 66* 58*URA*116* 64
---------------------------------------
146*114*136*158* 92*124*116*117*NEP* 52
---------------------------------------
120* 89*111*132* 66* 98* 90* 92*150*PLU
------------ MIDPOINTS ----------------

MIDPT GRID CONT RUN
```

```
ZOD/360 MORE MIDPOINT SORT ---------
 TA       29 MO/PL  28 UR/NO  23 ME/AS
01 MO/MA  00 SA/PL  29 ME/VE  25 NE/MC
03 MA/SA   CA       00 SU/PL  26 NO/MC
04 MA/UR  02 UR/PL   LE       26 NE/NO
10 MA/JU  02 MA/MC  04 JU/MC   LI
23 ME/MA  02 MA/NE  04 JU/NE  02 SU/AS
25 MO/SA  02 MA/NO  04 JU/NO  06 PL/AS
26 MO/UR  04 SU/JU  08 SU/VE  14 VE/AS
28 SA/UR  07 MO/VE  12 VE/PL   SC
 GE       08 JU/PL  16 ME/MC  02 AS/MC
02 SU/MA  08 VE/SA  16 ME/NE  02 NE/AS
03 MO/JU  10 VE/UR  17 ME/NO  02 NO/AS
04 JU/SA  16 VE/JU  26 SU/MC   AQ
06 JU/UR  17 SU/ME  26 SU/NE  09 MA/AS
06 MA/PL  21 ME/PL  26 SU/NO   PI
15 VE/MA  24 MO/MC  00 PL/MC  01 MO/AS
15 MO/ME  24 MO/NE  00 NE/PL  02 SA/AS
17 ME/SA  25 MO/NO  00 PL/NO  04 UR/AS
18 ME/UR  26 SA/MC   VI
25 ME/JU  26 SA/NE  08 VE/MC
25 SU/MO  26 SA/NO  08 VE/NE
26 SU/SA  27 UR/MC  08 VE/NO
28 SU/UR  27 UR/NE  10 JU/AS
```

```
860 E$= 07.181941
860 X,Y,Z= 7  18  1941
880 A$= PM
900 U= 4.03
920 V= 5
940 C,L5= 76.18  76.3
960 C,LA= 40.02  .698713477
980 DT= 24
1000 U= 9.05
1020 U= 21.05
1040 JD= 2430193.5
1050 JD,C= 2430193.5  15174.3771
1070 T= .415451802
1090 RA= 3.06699085
2690 LN= 175.640562
1130 OB= .409225393
1170 T= .41545181
2780 X,MC=-.914877553  175.342552
2800 AS= 248.01248
2820 B= .872082848
2110 U,Z3= 175.342552  175
2130 Q= 6
2150 X$= 25
2170 ZZ$= 21
2190 B$= VI
2210 A$= +
2230 D$= +25 21
2270 Z$= EA 25VI21
1340 M= 3.39198033
1360 E= .0167333819
1380 EA= 3.38790032
1400 AU= 1
1420 El= .0169273864
1440 AP= 1.77910366
1460 XW,YW= 4.12731539E-03 -.0164142077
1480 AN= 0
1500 IN= 0
2650 G,Y,X= 0  7.43261838E-03  .0152058255
2660 A= .454648106
1540 XH,YH,ZH= .0152058255            7.43261838E-03            0
1620 X,Y=-.986552696 -.24379059
2650 G,Y,X= 3.34572607E-09 -.914808864  .442543577
2660 A= 5.16295652
1640 XX,YY,ZZ= .442543571 -.914808867  3.34572607E-09
1660 XX,YY,ZZ= .442543571 -.914808867  3.34572607E-09
2310 X,Y= .442543571 -.914808867
2330 K,C=-1.12022879 -64.184465
2350 C=-64.184465
2370 C,SS= 295.815535  295.815535
2390 Y,X,A= 3.34572607E-09  1.01622836  3.7252903E-09
2400 P= 2.13443412E-07
2110 U,Z3= 295.815535  295
2130 Q= 10
2150 X$= 25
2170 ZZ$= 49
2190 B$= CP
2210 A$= +
2230 D$= +25 49
2270 Z$= EA 25CP49
1720 C(I)= 295.815535
1740 XK= .0166547373
1820 BR= 5.59370512E-03
2310 X,Y= .442543571 -.914808867
2330 K,C=-1.12022879 -64.1900587
2350 C= 115.809941
2370 C,SS= 115.809941  115.809941
2390 Y,X,A= 3.34572607E-09  1.01622836  3.7252903E-09
2400 P= 2.13443412E-07
2110 U,Z3= 115.809941  115
2130 Q= 4
2150 X$= 25
2170 ZZ$= 49
2190 B$= CA
2210 A$= +
2230 D$= +25 49
2270 Z$= SU 25CA49
```

```
1880 C(I),M(I)= 115.809941  2.13443412E-07
1980 LL,G= 720770570            1014966.23
1990 G1,L,D 7289335.01  198189.232  667215957
2000 L1,F,ML 14594.3462  200038.407 -3631.97341
2010 D,Y,ML= 185337.766  370675.532 -1860.70126
2030 ML=-2291.18202
2040 ML=-2129.11613
2060 P=-15773.8895
2070 P=-15695.96
2080 LT,M(2)=-4.33111566 -4.33111566
1340 M= 4.90274088
1360 E= .205618309
1380 EA= 4.69714646
1400 AU= .387098
1420 E1= .0712017823
1440 AP= .504533829
1460 XW,YW= .0275588658 -4.11122596E-04
1480 AN= .831444222
1500 IN= .122237379
2650 G,Y,X= 1.58050328E-03  .0128653239  .0243237652
2660 A= 1.31795921
1540 XH,YH,ZH= 6.88332398E-03            .0266417335            1.58050328E-03
1580 XA,YA,ZA=-.0152058255           -7.43261838E-03            0
1600 XW,YW,ZW=-8.32250158E-03            .0192091151            1.58050328E-03
1620 X,Y=-.0854945577 -.378782586
2650 G,Y,X=-.0454706261 -.370131692  .108261349
2660 A= 5.82838973
1640 XX,YY,ZZ= .346439764 -.169403305 -.0454706261
1660 XX,YY,ZZ= .346439764 -.169403305 -.0454706261
2310 X,Y= .346439764 -.169403305
2330 K,C=-.454795578 -26.0579505
2350 C=-26.0579505
2370 C,SS= 333.94205  333.94205
2390 Y,X,A=-.0454706261  .385639715 -.117367698
2400 P=-6.72467375
2110 U,Z3= 333.94205  333
2130 Q= 12
2150 X$= 03
2170 ZZ$= 57
2190 B$= PI
2210 A$= +
2230 D$= +03 57
2270 Z$= ME 03PI57
2110 U,Z3= 6.72467375  6
2130 Q= 1
2150 X$= 06
2170 ZZ$= 43
2190 B$= AR
2210 A$= -
2230 D$= -06 43
2270 Z$= ME 06AR43
1720 C(I)= 333.94205
1740 XK= .069902866
1760 X1,Y1,Z1= .442543571 -.914808867  3.34572607E-09
1780 XX,YY,ZZ=-.0961038078  .745405562 -.0454706295
1800 XK= 7.71435089E-03
1820 BR= 1.91971041E-03
2310 X,Y=-.0961038078  .745405562
2330 K,C= 7.98220251  457.344513
2350 C= 457.344513
2370 C,SS= 97.3445125  97.3445125
2390 Y,X,A=-.0454706295  .751575275 -.0604267779
2400 P=-3.46219935
2110 U,Z3= 97.3445125  97
2130 Q= 4
2150 X$= 07
2170 ZZ$= 21
2190 B$= CA
2210 A$= +
2230 D$= +07 21
2270 Z$= ME 07CA21
2110 U,Z3= 3.46219935  3
2130 Q= 1
2150 X$= 03
2170 ZZ$= 28
2190 B$= AR
2210 A$= -
2230 D$= -03 28
2270 Z$= ME 03AR28
1880 C(I),M(I)= 97.3445125 -3.46219935
1340 M= .766740218
1360 E= 6.79922741E-03
1380 EA= .771480622
1400 AU= .7233
1420 E1= .0281012438
```

ABOUT PRINTERS

Charles A. Jayne

There is a wide variety of printers that will enable you to output your microcomputer in hard copy. Line Printers print a whole line at a time and are fast to extremely fast. Pricewise they are more expensive than the serial printers that most owners of Microcomputers buy. A Serial Printer prints one character (byte) at a time. Usually the least expensive printers are the thermal ones that operate by a heat process. They tend to be rather slow and one can't make any copies of the original. A somewhat different process is used by COMPRINT, a fast printer (222 characters per second or 225 cps) which is limited to 80 columns. But it does require special silvery (aluminized) paper and one can only print the original. The print quality is fairly good as it is a 9x11 matrix printer.

A large number of printers are of the matrix type, the head varying from a low 5x7- typical of the cheaper ones- to as much as 18x24. With a 5x7 print head the matrix is so coarse that the dots that make up the characters do not give a very high quality of printing. On the other hand one can make several copies at the same time and many of them also have GRAPHIC capabilities such as is the case with the $795 Commodore Printer with the superior tractor feed for feeding the paper to the printer. As with nearly all of the less expensive printers below $1000 this is an 80 column printer. One puts 80 columns on a standard 8 1/2x11 inch wide sheet of paper. The full width of a larger printer is usually 132 columns for paper up to 13 1/2 inches wide.

The least expensive matrix printer with a better 9x7 print head is the MICROTEK, an 80 column printer selling at about $750. But it has yet no graphic capabilities. One of the least expensive 80 column matrix printers is the BASE2. There are also the EPSON from Japan and the EXCEL. The PAPER TIGER has a good reputation and a graphics option, but is more expensive. The least expensive 9x7 matrix printer with a full 132 columns and graphics is a model by ANADEX at about $1500. Prices vary as some printers can be bought from certain vendors at discounted prices. The TAM Line Printer sold by the Astrologer's Medium of Chicago at around $1000 has astrological symbols, but no lower case letters. It is an 80 column dot matrix printer. Using a program from Erlewine's MATRIX Software one can have not only lower case letters but also astrological symbols via the Commodore PET matrix printer.

Some may require a 'letter quality' printer. Under this special category there is the Diablo, Hytype I and II- the latter prints at 45 cps, the former at only 30 cps. The QUME has a special model with two heads at 75 cps, the fastest printer in this category. These printers sell from $2500 to $3500 plus the cost of the interface. More recent is the excellent Japanese Spinwriter by NEC at 55 cps, and most recent the ZYMEC at only 22 cps, but with more capabilities that the others. They are still having some initial production problems with this printer which is an adapted Olivetti typewriter. IBM's SELECTRIC has been widely adapted as a printer at different price levels and at different quality grades. It has been widely sold in spite of it's demerits. It operates at a slow 14.9 cps (only the 10 cps noisy teletype is slower). Even the heavy duty selectrics have more maintainance problems that they should. Most of these 'print quality' printers can be had with keyboards as well as without them. The ones with keyboards, which are 'terminals', can be used off-line as typewriters. The SELECTRICS (all of which are refurbished machines in the under $1000 price range) are less expensive than the others but it is dubious whether it pays to buy them.

An ideal printer would be a matrix serial printer which would be fast in one mode, would be slower but have letter quality in a second mode. The expensive ($5500) FLORIDA DATA BNY has all three options! It operates normally at a very fast 600 cps with a 7x7 dot matrix head for upper case and 8x7 for lower case letters. It operates at 150 cps with a close approximation to letter quality in a two-pass mode (15x16), will give letters two, four and eight times normal size and has a graphics capability at 128 individual addressable dots per inch. The SANDERS MEDIA 12/7 makes no less than four 'passes' to attain real letter quality at 50 cps from its dot matrix printer as well as having a much faster normal speed, but it does not have graphics. Its price is $4100. The MALIBU MODEL 165 sells for $2500 (all printer prices are without their interfaces; the Commodore one requires no interface to the PET). The 165 has a 10x9 dot matrix print head and operates normally at a good 165 cps. In two passes and an approximation to letter quality its speed is 90 cps. In its graphic mode it can individually address 60x70 dots per inch. CENTRONICS, the largest manufacturer of printers, has a new model 737 for about $900 which is an 80 column 9xN matrix printer. In one mode it prints 9x9 at 50 cps. In the other mode it more closely approximates to letter quality than any inexpensive matrix printer at 80 cps and proportional spacing. Most of the 132 column more expensive letter quality printers have this proportional spacing capability. Centronics sells many other models at very variable quality and price levels.

What to buy will depend on both your pocket book and your application. Before you buy BE SURE THAT YOU CAN OBTAIN SERVICE ON YOUR PRINTER WHEN IT BREAKS DOWN WHICH ITS BOUND TO DO ONE DAY.

[Editor's note: Charles Jayne knows whereof he speaks since he has spent almost two years trying to get a hi-speed ODEC printer operational.)

CONVERSATIONAL MATH

Buz Overbeck

"Al·gor·i·thm, who could ask for anything more"
George Gershwin

Admittedly, even I was underwhelmed by the response to Part One of this series! To the best of my knowledge, the piece was read by only two persons, neither of which needed it. James Neely enjoyed the article, and Michael Erlewine enjoyed the equations. He doesn't recall having read the article. And so, masochistically inspired by such thinly veiled apathy, I submit Part Two of this continuing, two part series, but first a word of caution concerning the subject of part one: Julian Day Numbers.

JULIAN/GREGORIAN CALENDAR

In Part One of this Series, Issacsons formula for converting dates to JD numbers was given. This algorithm is valid for the period: March 1, 1900 through February 28, 2100. There are, however, equations available which will compute JD numbers for any date since January 1st, 4713 BC (see Matrix Three, The Determination of the "Julian Day Number" by Alexander Borg; specifically the formulas by Singleton, Danby, and Fliegel & Van Flanderen.) These formulas are often given in two parts the first for Julian Calendar computations and the second for Gregorian. However, in computer implementation, a 'trap' is built in so that the program itself decides whether a given date belongs to the Julian or Gregorian calendar, and then processes it accordingly, and it's instructive to see how this is done, because there are times when it is necessary to defeat it!

The date of adoption for the Gregorian Calendar is October 15, 1582, and equates to JD 2299171.0 (noon). A typical computer program will first compute the Julian JD Number of a given date, and them compare this JD Number with JD Number 2299171. If the computed JD Number is larger than 2299171, the program knows that the given date must be Gregorian, and so applies part two of the formula, which corrects the original JD Number for the Gregorian Calendar.

In other words, the computer 'assumes' that any date greater or equal than October 15, 1582 is given in terms of the Gregorian Calendar. This is a dangerous assumption.

Unfortunately, all countries did not adopt the Gregorian Calendar on October 15, 1582. For example, Great Britain and its Dominions changed in September 1752, Japan in January 1873, USSR in February 1918 and Turkey in January 1927! (For a complete list of dates of adoption, see the Explanatory Supplement to the AE and AENA, pages 414 to 416.)

This means that the above mentioned computer program would have processed all data given for these countries prior to the dates above as Grogorian dates, with the resulting charts being 10 to 12 days in error. One way to protect against this happening would be to have the program prompt for verification of all dates later than October 15, 1582, as being in fact, Gregorian. In any case, keep this in mind when implimenting JD routines on your computer.

WIERD "WHERES"

This issues mystery equation if for determining the Right Ascension of the Midheaven, and Local Sidereal Time. The 1st is abbreviated R.A.M.C. (and all the time you thought that stood for Russian American Countess, Right?) and the 2nd, LST.

The equations are deceptivly simple.

$$\underline{RAMC} = Rg + L \text{ (Mod 360)} \;\&\; \underline{LST} = RAMC \times 15$$

All you need to know is what Rg and L are, right? The complete equation with all the 'wheres' follow:

$$\underline{LST} = RAMC \times 15$$

Where
$$RAMC = Rg + L$$
$$L = \text{Geographic Longitude of the Event}$$
$$Rg = GMST \times 15$$
$$GMST = tg + (23925.836+8640184.542T+0.0929T^2)/3600 \text{ (Mod 24)}$$
$$T = (tg/24 + JD\ (1900) - 0.5)/36525$$
$$tg = \text{GMT of Event}$$
$$JD\ (1900) = JD - 2415020$$
$$JD = \text{Well, see Part I, Matrix VI}$$

If all of that intimidates you, you're in the right 'article', however, it is necessary for you to have read part one of this series in order to solve this one.

This is an important equation for, from the RAMC comes the MC, ASC, EP, Vertex, and all the houses regardless of which House System you're sporting this week. In keeping with the original intent of this series, the 'grammer' will be kept to a minimum. Solve now; pay later. It's probably a good idea to restate the rules of solving equations:

1. List and define all variables
2. Break down the formula into modules or "phrases"
3. Solve the individual modules
4. Reassemble individual solutions and solve the equation.

If you follow these rules, the above equation will fall into place. Before taking on this equation you will need to know two things:

1. How to convert minutes & seconds to decimals and back.
2. How to compute Julian Day Numbers.

Both were covered in Part One of this series so review if you have to.

The equations, and the sample data to follow, were adapted from MATRIX ONE, Astro 1, 2, & 3 by James Neely, page 9.

EXAMPLE DATA

Date:	April 20, 1976
GMT:	01:48
Longitude:	121° W 55'

"All roads lead to Gnome...Yukon bet on it"...Sgt. Preston

There are many ways to approach the solution of an equation, if you know how to solve it to begin with (?) But, if you don't know how to solve it where do you begin? At the end, of course. The RAMC equation "wheres" you to death, so one place to begin is with the last possible 'where' and work your way up the ladder. Further, Rule I says list and define all variables so we'll apply it as we go.

JD NUMBER

Using the techniques outlined in part one you will, of course, have determined that the JD Number for April 20, 1976 (noon) is:

JD = 2442889.0

JD (1900)

This is the number of days between noon January 0, 1900 and noon on the day of the Event:

JD (1900) = JD - 2415020 = 2442889.0 - 2415020.0 = 27869.0 Days

tg

This is the GMT of the Event in hours and decimals of an hour:

tg = 1h 48m = 1.8h

T

'T' is the number Julian Centuries from Greenwich Mean Noon, January 0, 1900.

$$T = (tg/24 + JD\ (1900) - 0.5)/36525$$

At this point, you want to do two things:

1. Plug in the known variables
2. Follow the "Order of Operations"

(If you've forgotten the order of operations, review Matrix VI, page 49.)

SO: $T = (1.8/24 + 27869 - 0.5)/36525$

Solve the parenthesis (division before addition)

$$\begin{aligned} &(1.8/24 + 27869 - 0.5) \\ = &(0.075 + 27869 - 0.5) \\ = &(\quad 27868.575 \quad) \end{aligned}$$

Then $T = 27868.575/36525 = 0.7630$

GMST

This is the next variable, and stands for Greenwich Mean Sidereal Time.

GMST = $tg + (23925.836 + 8640184.252T + 0.0929T^2)/3600$ (Mod 24) for now, ignore the (Mod 24).

If you haven't yet learned the "Order of Operations" you're sure to crash on this one. First, rewrite it with the variables thus defined.

GMST = $1.8 + (23925.836 + 8640184.252 \times 0.7630 + 0.0929 \times 0.7630^2)/3600$

The value within the parenthesis = 6616386.474

Try it and see what you get...

If you got a different answer, follow this:

a. $0.7630^2 = 0.58217$
b. $0.0929 \times 0.58217 = 0.05408$
c. $8640184.252 \times 0.7630 = 6592460.584$

then d. $23925.836 + 6592460.584 + 0.05408 = 6616386.474$

The equation now becomes:

GMST = 1.8 + 6616386.474/3600 (Mod 24)

= 1.8 + 1837.88513

= 1839.68513 (Mod 24)

OK, but 1839.68513 What!? Degrees? Days? Years? The answer is 1839.68513 hours, for we are seeking the Greenwich Mean Sidereal Time, and Sidereal Time is expressed as hours, minutes, and seconds. This serves as a clue to the (Mod 24). "Non-grammatically", (Mod 24) says "subtract 24 from the number of interest until you arrive at a remainder which is less than 24. With small numbers, this is no problem. For example, 26 (Mod 24) = 2, For 26-24 = 2. Similarly, 56 (Mod 24) = 56-24 = 32 which is still larger than 24, so do it again: 32-24 = 8 which is less than 24, so 56(Mod 24) = 8.

Obviously this method is unsatisfactory for a number such as 1839.68513. So another method is required.

The following method is the correct way of finding the Modulus (Mod) of any number:

1. Divide the number by the modulus (in this case, 24)
2. Multiply the Integer portion of the remainder by the Modulus.
3. Subtract this product from the original number.

In mathspeak: X(mod Y) = X -int(X/Y)xY

or 1839.68513 (Mod 24) = 1839.68513 -int (1839.68513/24)x24

= 1839.68513 -int (76.65355)x24

= 1839.68513 - 76x24

= 1839.68513 - 1824

= 15.68513h

So...GMST = 15.68513h

Or...GMST = 15h 41m 07s

The rest is almost anti-climatic.

Rg

This is the GMST expressed as Right Ascension

Rg = GMST x 15

= 15.68513h x 15

= 235.27698°

L

The Geographic Longitude of the Place (East = + West = -)
= 121 W 55 = -121° 55' = 121.91667°

And finally (pant!) RAMC

RAMC = Rg + L (Mod 360)

= 235.27698° + (-121.91667°)

Or = 235.27698° - 121.91667°

= 113.36031° = 113° 21' 37"

Or if you prefer LST

Which is the RAMC expressed as Sidereal Time

LST = RAMC/15

= 113.36031/15

= 7.55735 = 7h 33m 27s

Note that the (Mod 360) routine was not needed as the RAMC was already less than 360. However, if it wasn't, you would use the same algorithm used for the (Mod 24).

"What's your Sine?"...John Addey, overheard at a cocktail party.

In part three, we'll take up the Trigonometric functions and the calculation of the MC and Ascendent. In the meantime, here is some practice data to work with:

1. Date: Oct. 12, 1937 GMT: 7h 46m Long. 118° W 30'
   = RAMC: 19° 28' 15" LST: 1h 17m 53s
2. Date: July 2, 1925 GMT: 10h 00m Long. 95° W 51'
   = RAMC: 334°04'30" LST: 22h 16m 18s
3. Date: Dec. 25, 7BC GMT: 19h 59m 08s Long: 35° E 13'
   = RAMC: 66°40'15" LST: 4h 26m 41s

The last one is thrown in to test your resourcefullness! Give it a try and we'll work through it next time. Until then, I'll leave you with a great 'one liner' sent to me by James Neely:

AC=ATN (SQR(1-XxX)/(X-1E-9x(X=Ø)))-3.1416x(X<Ø)

That Neely's quite a kidder!

☉ ☽ ☿ ♀ ♂ ♃ ♄ ♅ ♆ ♇ ☊ ♈ ♉ ♊ ♋ ♌ ♍ ♎ ♏ ♐ ♑ ♒ ♓

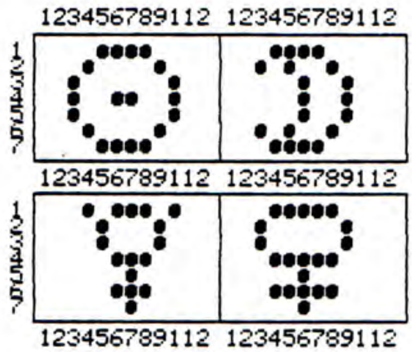
MATRIX GRAPHICS

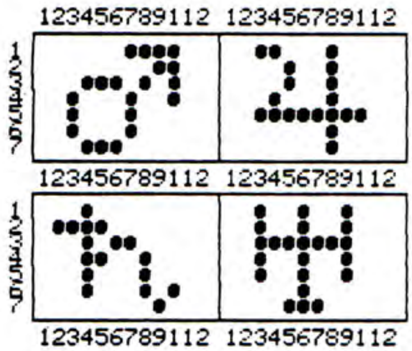
by Michael Erlewine

'Matrix' here refers to the matrix grid used in dot-matrix printers. Many of us have dreamed of having the astrological symbols as a built-in feature of our hard copy devices. How many petitions have been circulated trying to get the astro-glyphs on an IBM typewriter element? I know that I have been designing astro-glyphs in my mind and on paper for a good many years while waiting for a technology that matched my pocketbook. The time is now. Both the PAPER TIGER and the Commodore 2022 or 2023 printers are capable of programmable characters. David Horbovetz has recently brought out his TAM line printer which has astro-glyphs in ROM (READ ONLY MEMORY) as a built in feature.

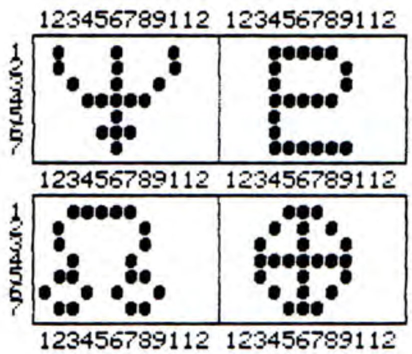
In MATRIX VI we ran a copy of Neil Michelsen's beautiful 16x24 dot-matrix astro-glyphs. Unfortunately, I can't quite swing the 8 grand or so that is needed to purchase the Versatec printer-plotter that Michelsen uses. While some dot-matrix printers have a 7x9 character matrix, most printers have a 5x7 matrix (5 wide by 7 high). The 5x7 matrix is barely adequate for the alphabet and numbers let alone symbols with the complexity of the Zodiac glyphs. The answer to this is to combine two 5x7 to form each glph. This gives a 7x10 or a 7x12 matrix (including the spacing between characters9.

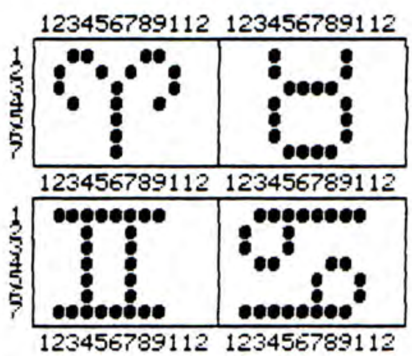
Most printing programs available today use two-letter combinations to represent the zodiac symbols. Thus 'SU' stands for Sun, 'MO' for moon and so forth. By using two-characters for each of the planet and Zodiac symbols, some quite nice looking astro-glyphs are possible. Here are the set of astro-glyphs that we use here at MATRIX Software on the Commodore printer.



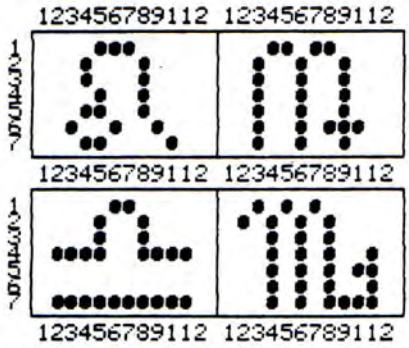


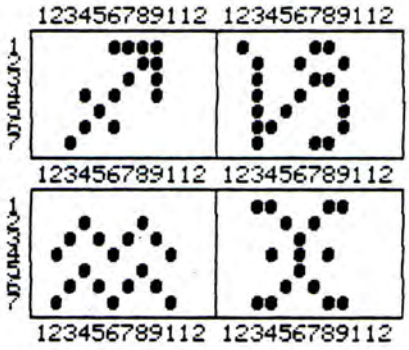
A few remarks on creating these symbols. I have been designing astro-glyphs since the late sixties. My brother Stephen designed an entire PRESS-TYPE sheet for use with our CIRCLE BOOKS CALENDAR. To look at these matrix characters, one might think that a set like this could be put together in a half-hour or so. Not in my experience. I have spent many days time and not a little anguish working on the aesthetic quality of these symbols . I have tried to stay close to the conventional set of symbols used by modern astrology with the exception of the signs Virgo and Pisces. For these signs, I have elected to give the symbols as used by the ancient Greeks.

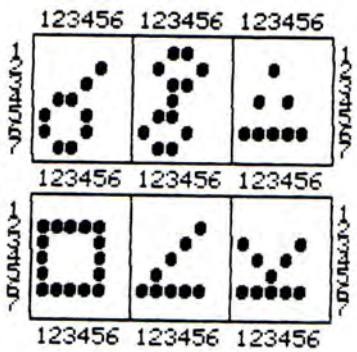


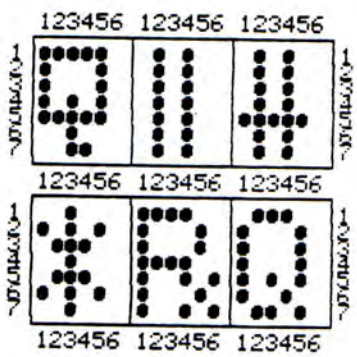


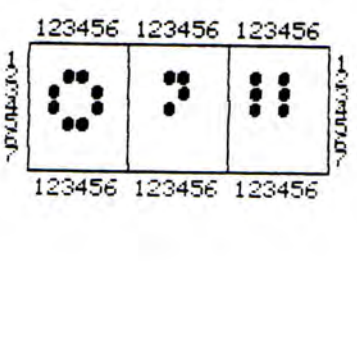
Both the regular and the oversize matrices were produced on a Commodore PET using the tractor-feed 2022 dot-matrix printer. It is hoped that this set of symbols will prove useful to those of you seeking to produce astro-glyphs on some of the new hi-speed dot-matrix line printers.











```
10    DATA 358.47584,35999.0498,-.00015,.016751,-.
      41E-4,0,1.00000013,101.22083
12    DATA 1.71918,.00045,0,0,0,0,0,0,102.27938,14
      9472.515,0,.205614,.2E-4,0
14    DATA .387098,28.75375,.37028,.00012,47.14594
      ,1.1852,.00017,7.00288,.00186
18    DATA -.1E-4,212.60322,58517.8039,.00129,.006
      82,-.4E-4,0,.723332
20    DATA 54.38419,.50819,-.00139,75.77965,.89985
      ,.00041,3.39363,.001,0,319.5293
22    DATA 19139.8585,.00018,.09331,.9E-4,0,1.5236
      9,285.43176,1.06977,.00013
28    DATA 48.78644,.77099,0,1.85033,-.00068,.1E-4
      ,225.32833,3034.69202
32    DATA -.00072,.04833,.00016,0,5.202561,273.27
      754,.59943,.0007,99.44338
34    DATA 1.01053,.00035,1.30874,-.005696,0,175.4
      6622,1221.55147,-.0005
38    DATA .05589,-.00035,0,9.55475,338.30777,1.08
      522,.00098,112.79039,.873195
39    DATA -.00015,2.49252,-.00392,-.2E-4,72.64882
      ,428.37911,.8E-4,.046344
44    DATA -.3E-4,0,19.21814,98.07155,.98577,-.001
      07,73.4771,.49867,.00131
46    DATA .77246,.00063,.4E-4,37.73067,218.46134,
      -.7E-4,.008997,0,0
48    DATA 30.10957,276.04597,.32564,.00014,130.68
      136,1.09894,.000249,1.77924
50    DATA -.00954,0,229.94722,144.91306,0,.24864,
      0,0,39.51774,113.52139,0,0
54    DATA 108.95444,1.39601,.00031,17.14678,0,0
```

AN INTRODUCTION TO MICROGRAPHICS

by Charles Paul Jones
Box 1500
Bath, Ontario, Canada, K0H-1G0

During the course of its history, many new and revolutionary things have appeared on the pages of this publication. We've had James Neely, the 'Wizard of California', show us how to save time and improve the accurcy of our charts. Many of us have been guided by Michael Erlewine, Rob Hand, Charles Jayne and many other unsung heroes into the Aquarian Age of calculators and small computers. We've read numerous articles written by all of these pioneers intended to increase our knowledge of Astrology and its related fields, improve the quality of life for ourselves and our clients, and remove the tedious elements from our path of greater knowledge.

With the advent of the new small computer systems, we can now generate hundreds of finished charts in the time it would have taken to do only one without them, not to mention the fact that research projects far too large to even consider a couple of years ago are now quite commonplace. Yes, the new micro computers can truly be a great blessing for an astrologer, but they have their drawbacks too.

How do we sort and store this new mountain of computer generated data??? The computers themselves are quite small, but their output is awesome piles of printout and tabulated results. With the cost of mass memory still so high, few of us can justify the expense of putting it ALL on floppy disk or other mass storage devices. Nor will our disk systems help with books, letters, publications, data sheets, completed charts, and all the other wonderful junk we seem to collect.

Almost every student of the art can clearly remember his great relief when he purchased his first filing cabinet, shortly after undertaking his study. It was a large investment, but now he could rid himself of the paper boxes under the furniture, and for the first time, find something when he wanted it. Then there was the second set of cabinets, the third, ... and on and on with no end in sight.

Most astrologers have reached the point where they are destroying data they would like to save for future reference, or are living with a wall of filing cabinets, and are still often unable to find the information they require when they need it. There must be a better way!!!

Enter the small world of micrographics. A world created by the dynamically increasing need on the part of commerce, industry, personal services, and the government to provide more and more information resources to more and more people.

Micrographics combines the science, the art, and the technology by which information can be quickly reduced to the medium of microfilm, stored conveniently, and then easily retrieved for reference use.

The total micrographics story is truly one of efficiency, speed, and economy. Microfilms in a few square feet of storage space replace the original documents that previously required a few thousand square feet. They may be retrieved, displayed, and reproduced in seconds for just pennies per copy. Microfilm enjoys its immense popularity because of its unmatched ability to store today's mountains of information and deliver the right data to the right place at the right time- at far lower over all costs than would otherwise be possible.

The wide variety of user needs and applications has given rise to a number of different forms in which microfilm is made, stored and used. Each has a range of applications designed to fulfill certain specific user requirements, and the most important planning consideration is to select the form to match the need. Primary factors to consider in selecting the appropriate form of microfilm include type of input, the nature of the information to be stored, how it is to be used, and overall system cost. Of the many systems available, I'm only going to cover briefly the forms I feel would be of greatest benefit to the astrological community.

Microfilm for all of these systems, regardless of its ultimate format for storage, is first produced on 16mm high contrast black and while roll film. Roll film is the least expensive form in which microfilm can be produced and duplicated. This is a special film, designed specifically for microfilm application.

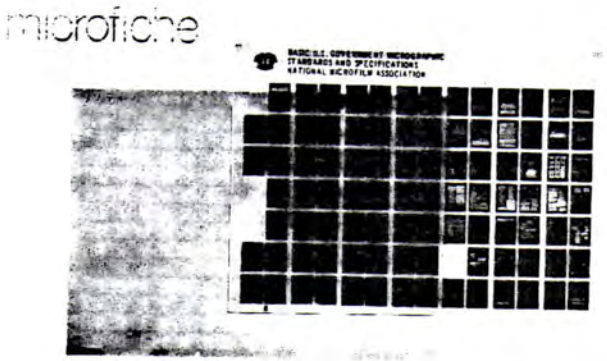
REELS-

Microfilm on reels was one on the first microforms. It is still a popular choice because large quantities of information may be stored in very little space, at very low cost. Microfilm on reels provide a high measure of file integrity, are desirable where information is added continuously in sequence and updating is infrequent. 16mm reels are primarily used for alpha and numeric data, such as correspondance, checks, and similar information. 35mm reels are used for graphics and large documents such as engineering drawings, x-rays, newspapers and maps.

MICROFICHE-

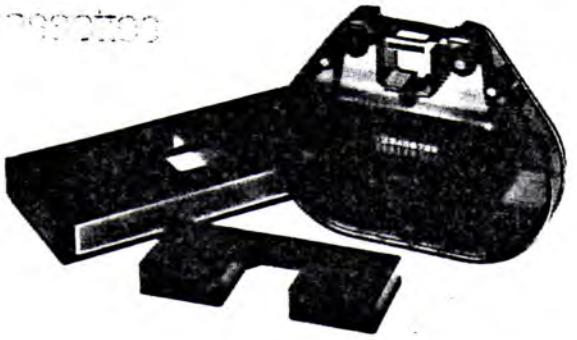
The word 'microfiche' is a combination of the prefix 'MICRO' and the French word 'fiche' meaning a file index card. A microfiche, or 'fiche', is a sheet of film containing multiple microimages in a grid pattern. It usually contains identification information which can be read without magnification. Available in a variety of styles, microfiche usually permit unitized data storage and updating. They are easily duplicated for mailing, security or reference purposes. Microfiche may contain from a few to several hundred images in a reduction range of 18X to 48X.

This form is ideal for publications such as MATRIX. The standard format contains 98 pages of information on each fiche. An entire issue of MATRIX will easily fit on one fiche, and in fact adready has!! [Edators note: The authgr sent us all of MATRIX published to date on microfiche in a leter sized envelope!] Copies of these can be produced at a very small cost in volume. Already most magazines and many books are available in this form, and that number will grow in the coming years. Most libraries use this system as well.



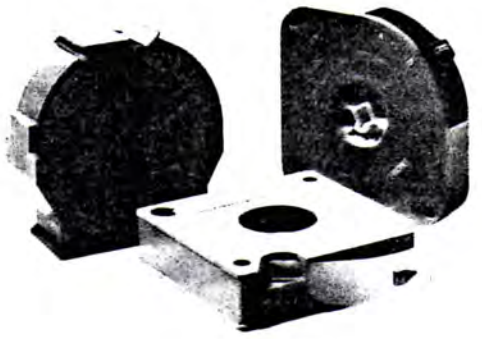
CASSETTES-

Microfilm in cassettes gives added convenience to the handling of continuous rolls of microfilm. Each cassette contains two film cores- the feed and the take up-. There is no need to rewind a cassette when it is removed from the reader. Any frame may be held in viewing position for further reference at a later time.



CARTRIDGES-

Microfilm catridges function as convenience packaging for rolls of microfilm. Unlike microfilm on reels, which require threading, cartridges can be self threading. Microfilm in cartridges is well protected, and not subject to fingerprints and other possible sources of damage.



JACKETS-

A jacket is a plastic carrier with single or multiple sleeves or channels designed to accept strips of 16mm or 35mm film. Jackets both protect the microfilm and also facilitate organization of material. Images may be copied or read directly from the jacket without removing the film. Jackets can be visibly titled for quick, easy file reference and update.

This form is the one I would choose in setting up a system. The cost is a bit more than roll film, but since jackets are formatted the same as microfiche, the two systems use the same readers and printers. Also, microfiche can be generated directly from jackets at any time, should more microfilm copies be desired. For the small scale user, this appears to be somewhat of a standard, and one I feel should be adopted by any new user in the astrological community. For once, perhaps a standard can be set before everyone runs out and wastes money on many different systems, only to later find that it is of use only to him, and that he can't trade information without a lot of bother.

Now that we have our information stored on microfilm, how do we get it back? There are many systems for this, but again I'll briefly cover those most applicable to the needs of the average astrologer.

READERS-

A variety of readers are available for viewing microfilms. The choice will depend upon the environment in which they will be used, the user's needs, the specific microfilm system in use, and the cost. Basic types of readers are:

1) LAP READERS. Designed for compactness and personal use, they are available at present only as microfiche and jacket readers.

2) PORTABLE READERS. Designed to be inserted or folded into a case similar to a portable typewriter case. Indicative of their portability, most lap and portable readers offer the option of AC, battery, or 12-volt operation.

3) DESK READERS. Designed for use on a desk, table, or stnd.

4) FREE-STANDING UNITS. Designed to stand alone as self contained units.

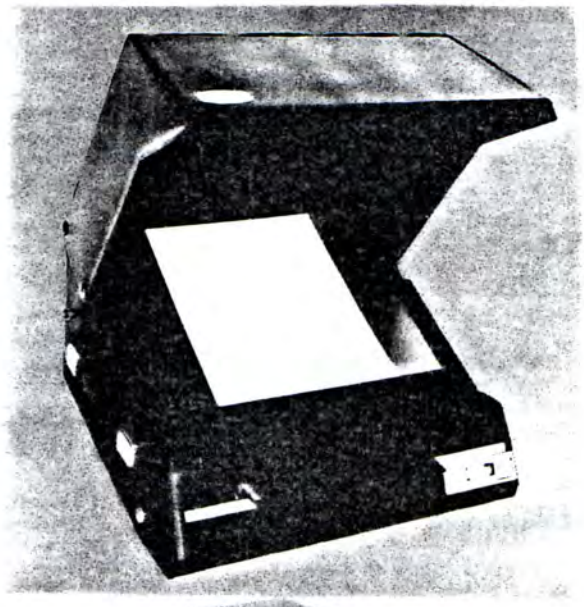
Many manufactures offer a list of accessories as well, such as extra lenses, floor stands, combination stands and microfilm storage units, adaptors for other types of microfilm, and other capabilities. The number of operating features, controls and accessories on any unit is directly related to its intended functions and affects costs.

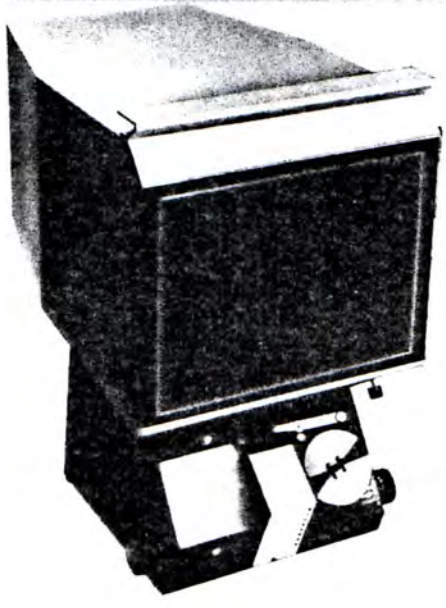
READER-PRINTERS-

A reader-printer is a device both for viewing and producing occaisional hard copy reproductions from a microform. Several processes are used by manufacturers to reproduce microfilm information. With the exception of the transfer electrostatic printing process, which uses plain paper, all papers used in the printing processes are coated papers. The cost of supplies will vary with the manufacturer, the usage volume and the process.

There is a range of microfilm storage and retieval systems available, depending upon the user's specific microform and his subsequent retrieval requirements. The most cost effective and easiest to use for microfiche and jackets is a simple file drawer as illustrated here.

And now for the bottom line- what it all costs. There are many microfilm service companies that will take your documents and put them on microfilm for a fee. Their prices are not standard by any measure, and unfortunately, most are set up to do large volumes of data, such as hospital records. Your cost will depend directly on the number of documents to be filmed, what type they are, and what microform you choose to use. I hesitate to even quote a price here without knowing all of this information in advance, but I realize a ballpark figure is needed. Therefore I will hazard a guess. A <u>estimate</u> for an astrologer with 10,000 documents, all 8 1/2 x 11 in size, prepared for filming, and converted to jackets using all 98 frames, would be around $500. About what you could get for your used filing cabinets!! Once the system was set up, you could estimate a new client file cost of $4-$6. Little more than its present cost.

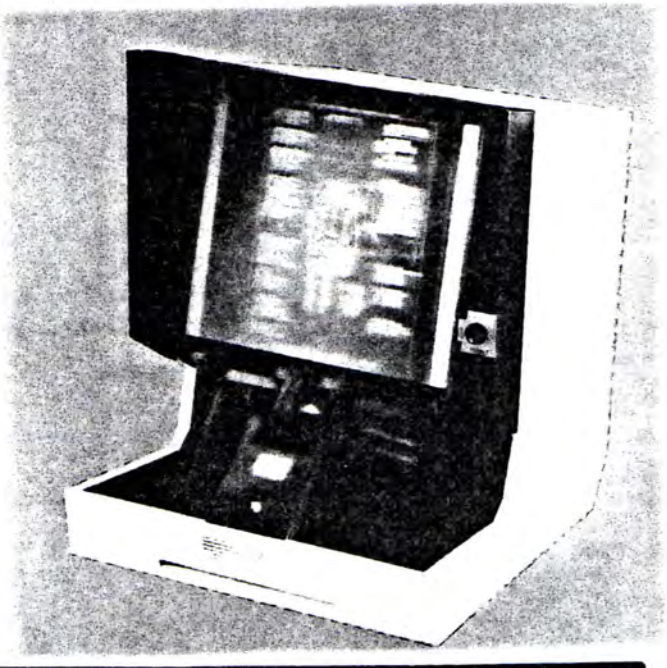


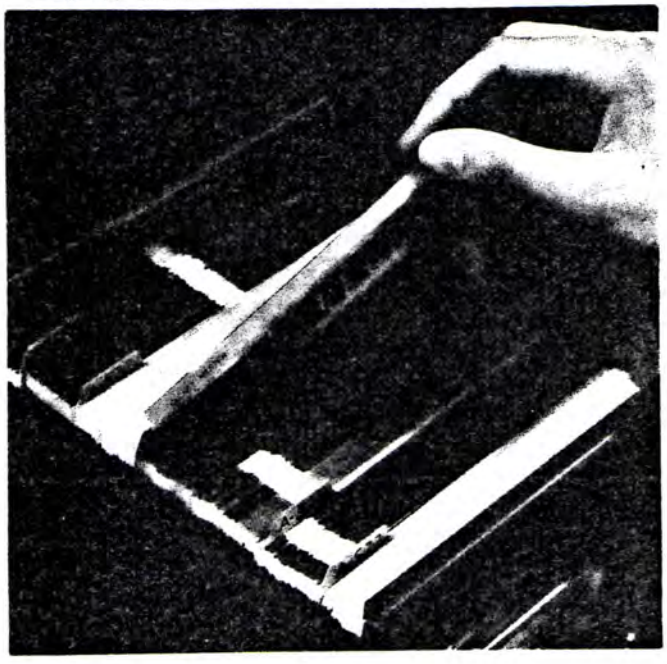


Readers and printers also vary greatly in cost, depending again on the type of microform you are using, and the features you are willing to pay for. A lap reader, such as the one illustrated, costs less than $100. Reader-printers are from $200 up to $6000 and more. All of these units can also be rented for a small montly charge.

Your editor has asked about setting up a microfilm service specifically for astrologers, to insure an understnding of the material, and a fair price. This is a workable idea, however it would have to be supported by the people who would use it. I'm open to the idea, now what about the rest of you?

So there you have it, a good, cheap solution to our growing mounds of files and information. On the surface it may seem to be a large investment, but over all it will end up saving both time and money, two items none of us seem to have enough of.





ERRATA

Here are the bugs from MATRIX past that have come to our attention:

MATRIX II, page 5, Planetary Velocity Program supposed to replace lines 270-490 in BASIC listing page 54 & 55. Some changes required.

275 GOSUB 900: M=FNR(FNU(S)): GOSUB 900: E=S

320 GOSUB 900: AP=FNR(S): GOSUB 900: AN=FNR(S): GOSUB900:IN=FNR(S): X=XW1: Y=YW1: GOSUB3550

400 IF D>20 THEN D=D-360

MATRIX V, Perturbation Corrections, page 5 to 9. Page 9.

980 DATA EAR,MER,VEN, etc.

3115 IF I>4 THEN etc.

3270 K(5)=11:K(6)=5:K(7)=4:K(8)=4:K(9)=4

3275 FOR IK=1TO3:IFI=5ANDIK=3THENT(3)=0:RETURN

The Subroutine 1190 referenced in line 1190 accepts a planet position in degreee/decimal format and returns it in Degree-Sign-Minute format.

Page 8, line 62

62 DATA -.0016,2363.4,-141.4,.0001, etc.

MATRIX II, page 27, the steps should read:

#443 43 RCL
#444 30 30
#445 71 SBR
#446 95 =

MATRIX II, page 21

085 09 9 +29 SIN(
086 85 + ℓ-ℓ'-2D)

page 42, last line under the Longitude para:

-29" sin(l-l'-2D) should read +29"sin(l-l'-2D)

page 48, correct line 97 to read:

97 ST+7 35-55 07

MATRIX V, second column on page 21

line 7: -24092523265 should be -24902523265

line 14: 936718 should be 936708

page 22, second column, BASIC line 508, third constant should be:

-3171471356 and not -3171471656

MATRIX VI, page 12 should be between pages 14 and 15

and last, but certainly not least, is from MATRIX II, page 57. The Alternate Set of Orbital Data for Other Centuries given there is not correct. The correct elements are as follows:

See PAGE 27

Notes on BASIC Dialect Differences

by Mark Pottenger

The BASIC I use is the 14 digit version from North Star. This is a somewhat different dialect than that available with most of the home computers.

Multiple statements on a line are separated by a backslash '/' rather than a colon ':'. If an IF statement is followed by other statements on the same line, all statements on the line will be executed whether the IF condition is true or false. The only time the rest of the line is not executed is when the IF executes a GOTO. The exclamation mark '!' is used as a single character form of 'PRINT'. The INT is a floor (next lower integer) rather than a truncate (drop decimals). This affects the modulus function for negative values. All numeric variables take 8 bytes of memory, which is reflected in the numbers used in disk access. No multiple letter variable names are permitted. The index variables in a FOR...NEXT loop is tested before executing the loop. Some BASICs don't test till after executing the loop once.

North Star string handling is all done with substrings rather than arrays of short strings. The DIMensioning of a string specifies how many characters long the string is allowed to get. Strings can read values from data statements or be assigned directly with a 'LET' statement. For example:

```
DIM P$(40)/P$="SUN
MOONMERCVENUMARSCEREPALLJUNOVESTJUPI"
```

In this string P$(1,4) is 'SUN ', p$(5,8) is the 'MOON', etc.

```
FOR I=1 to 10: PRINT P$(I*4-3,4*I): NEXTI
```

The above will print the ten planet names in the string.

The biggest difference I am aware of between North Star and other BASICs is the handling of user defined funcions. North Star BASIC permits multiple variable and multiple line functions. All such functions will have to be converted to subroutines in BASICs that do not permit this. Either leave such functions in place and put in a GOTO to skip them or move them all to the end of the program. Multiple line functions start with a DEF statement by itself on a line (not followed by an '=' expression). They end with a RETURN X/FNEND. Variables actually named in the function call are treated as local. Any other variables used in the functions are global. I use this to return multiple answers in several functions.

On Astro-Geography

by Mark Pottenger

Jim Lewis of San Francisco developed and sells a product he calls ASTRO*CARTOGRAPHY. This is a world map with lines drawn on it by a computer plotter to show where the planets were angular at a given instant. The program CARTOGRA following this introduction permits a microcomputer to print out the series of terrestrial coordinates necessary to produce an astrocartographic map by hand.

In drawing a map of planetary contacts to angles, the first decision you have to make is how you are going to define the contacts. The two most obvious kinds of angle contacts are ecliptic and mundane (ascensional). Jim Lewis' A*C*G gives the mundane contacts. He says he tried both when he was developing the A*C*G and the mundane contacts worked better. The mundane contact lines give you those places on earth at which the planets would be actually rising, culminating, or setting at the time in question. The ecliptic contacts give you those places on earth at which the planets would be conjunct the Ascendant, Midheaven, Descendant, or Immum Coeli in celestial longitude. Thus, ecliptic contacts are what you will see if you do a conventional relocation chart (erecting the chart for the new location, keeping the Greenwich time constant). The CARTOGRA program, because it is not actually producing a plot, is set up to give both ecliptic and mundane contacts and leave the choice of which to plot to the user.

The CARTOGRA program reads planetary positions stored on disk by my chart program. This section of code should be replaced by either an INPUT loop for manual input of planetary positions or statements to access positions in whatever form you store them in. You need the Greenwich Sidereal Time, the Obliquity of the ecliptic and the celestial longitudes, right ascensions, and declinations of all bodies you want to plot. If you want only mundane contacts you can leave out planetary longitudes. If you want only ecliptic contacts you can leave out RA and Declination. The Julian function is only used to get the obliquity, so if you store obliquity with natal positions it can be omitted. In the listing, GST is obtained from LST and birth longitude because that is what was included in the file. After getting obliquity, get the sine and cosine of it and leave them globally available.

To get the terrestrial longitude (E long) at which a planet will be on the meridian, subtract the RA of the planet from the GST (both in degrees). The result is West longitude-- if it is greater than 180 degrees, subtract 360 degrees to get east longitude as a negative number. This is the E long at which the planet is at upper culmination. To get the E Long of lower culmination, add or subtract 180 degrees if the E long is negative or positive, respectively. The terrestrial latitude (E Lat) at which the planet is at the zenith is the declination of the planet. The planet is at the zenith (straight overhead) for someone at the E long determined for upper culmination and the E lat just determined. The planet is at the nadir (straight underfoot) at the E Long of lower culmination and the E Lat opposite in sign to the planet's declination. (Note: IC and Nadir are not the same-- please dont confuse them.)

The above procedure for getting the E Long of meridian contacts is actually the core procedure used for all contacts. Get the RA (sidereal time) of whatever contact qou are interested if, subtract it from the GST, and convert to plus or minus 180 if necessary.

The next section of the program gets the earth longitudes of all 30 degree multiple ecliptic aspects to the midheaven. A relocation chart for a place at a longitude on the list will show the aspects.

The last loop gets the contacts to the horizon and the Ascendant-Descendant axis. The columns labelled 'ON ASC' and 'ON DES' are the ecliptic conjunctions to those angles. The columns labelled 'RISING' and 'SETTING' are the mundane contacts. The ecliptic contacts call a function which gets the sidereal time (RA) at

Fixed Stars

by Mark Pottenger

The 'fixed' stars are one of the oldest features of astrology, but one not much used these days. One reason for not using them is the large amount of time required just to determine what contacts there are between the stars and other features in a chart. As with any other technique for which time consumption is a critical factor, stars are ideal subject matter for microcomputer work.

First, the stars are not 'fixed'. They come close to being fixed for people who use a sidereal zodiac, but even then there are changes. The proper motions of the stars cause their relative positions to change slightly over long time periods. For users of the tropical zodiac (most of us), precession adds a much larger component of change. Precession is the change of orientation of the earth's axis with respect to the stars, and amounts to about 50 seconds of arc per year. This means if you use tropical positions from an atlas 72 years old, the positions will be a degree off. Since most work with stars limits the orb to 1 degree, this can be a serious problem. The positions in Vivian Robson's book are for 1920, so they are nearly a degree off by now. He gives annual variations for correcting the positions, which means considerably more work if you want to trust the positions. Also, correction by annual variation is only fully accurate within a decade or two of the epoch of the atlas.

For accurate star positions, proper motion should be applied first in the coordinate framework of the original atlas, then rigorous formulas used to precess the resulting positions to the coordinate framework of the date you want. The result is the mean position of the star. If you use apparant positions you must also include corrections for nutation and aberration.

Once you have accurate positions, there is still the lengthy process of comparing the positions to those of your planets. In addition to the conjunction in longitude looked for by most modern astrologers, ancient astrologers used ascensional contacts (parans). This involves checking if a star rises, culminates or sets at the same time a planet rises, culminates or sets-- a large number of comparisons.

Finally, once you have gotten accurate star positions and compared them in all desired ways to your planets, you know what stars contact your chart in what way. To know how to read the contacts you need some kind of meaning for each star. For this, Robson's and Ebertin's books are about the only available modern sources. They are at least partly organized by the names of the stars. Another possible way to get meanings is that suggested by George Noonan on the basis of his work with ancient astrology. He says there is a direct correlation between spectral type and planetary meaning (O=Moon, B=Jupiter, A=Venus, F=Mercury, G=Sun, K=Mars, M=Saturn).

Explanation of the Listings

There are two separate listings given here. The first is simply the list of stars and their positions and proper motions. The name field stars with the star's proper name, and has its constellation designation, spectrum, magnitude, and General Catalog number. The Right Ascension is given in hours, minutes, seconds and its proper motion in seconds of time. The declination is given in degree, minute, second and its proper motion in seconds of arc. Some of the commoner alternate names are also given with a reference to the preferred name (if I couldnt find out what form was most preferred, I decided arbitrarily). The spectral class, magnitude, GC#, coordinates, and proper motions are from the Bevcar Atlas of the Heavens (a gift from Rob Hand that helped this project immensely). A few of the nebulae and clusters were not in the Bevcar Atlas and are from a variety of sources.

The star names are from a variety of sources. Vivian Robson's complete list is included (with some corrections). A list handed out at a couple of conferences by George Noonan is included. The lists from the Becvar Atlas and about 20 popular astronomy books and articles were used. I used R H Allen's Star Names to resolve conflicts wherever possible, but did not try to include all stars he lists (too many). A few conflicts I settled from star maps. A number of special problem areas are listed at the beginning of the list of names and positions. I generally tried to stick to occidental names. Most of the star names we use are english transliterations of arabic words and phrases which were translations of Ptolemy's descriptions of the positions of the stars in terms of the constellation figures. (E.g. Deneb Adige is the Hen's Tail-- the tail of Cygnus the Swan.) The list as given here has 290 stars with 427 names. I would appreciate it if any readers of MATRIX who spot any errors or important omissions would write.

This list is used to create a disk file with star names and positions. Duplicate names are left out of the file. RA and RA proper motion are multiples by 15 to store them in degrees. Since the whole list is in DATA statements, any corrections are just made in the data statements and the file re-written.

The second program actually gets the stars' positions for someones date of birth and compares them to the chart. The person's date and time of birth and planetary positions are read from a data file and the star data from the file created by the first program. The star positions are corrected for proper motion and precessed by the rigorous trigonometric formulas from the Explanatory Supplement. The resulting positions are mean positions for the ecliptic and equator of date. If you want to work with apparent positions, add corrections for nutation and aberration. The main loop compares these positions with the longitudes of the planets and does a full set of parens(rise-rise, rise-culm, rise-set, rise-low culm, culm-rise, culm-culm, culm-set, culm-low culm, etc.). The test in line 2580 finds circumpolar stars and forces values out gf 360 range for the cgeparasons of rise and set time. All the values are sidereal times in degrees.

A couple possible re-writes have come to mind since I first wrote the program. The parens could be put in a loop if the sidereal times of rising, culminating, etc were all in one multi-dimensional array instead of in separate one dimensional arrays. If computer memory is a problem, the main comparison loop can be put inside the loop that reads the star data from the disk file. I did them separately to avoid a lot of on and off disk activity. Short forms of the program, omitting the parans or parts of the printout, are also easy changes.

Editors Note: Included below are the actual listings for the two programs as received from Mark Pottenger. The list of Fixed Stars was sent in two forms: (1) a program containing the information and (2) a print-out of this same information formatted. There is not room (nor reason) to include both lists. Pottenger suggests that we present the complete printed list of stars and the final page of the program that stores this information. In this way, readers can see a sample showing how the star list is stored in data statements as well as how those statements are accessed. In addition, three sample outputs are included: Astrocartographic points (2 pages) and Fixed Star output (one page). Readers may contact the program author:

Mark Pottenger
838 5th Ave
Los Angeles, CA 90005

```
4350 DATA "VFSPEPTILIO    SEE ANTARES"
4360 DATA "VINDEMIATRIX   EPSILO VIR G6 3.0 17687",12,59,41.2,-.019,11,13,39,.02
4370 DATA "WASAT          DELTA  GEM A8 3.5  9755",7,17,8.3,-.001,22,4,34,-.02
4380 DATA "WAZN           BETA   COL K1 3.2  7364",5,49,11.7,.004,-35,-47,-10,.40
4390 DATA "WEGA           SEE VEGA"
4400 DATA "WEZEN          DELTA  CMA G3 2.0  9443",7,6,21.5,0,-26,-18,-45,0
4410 DATA "YED POSTERIOR  EPSILO OPH G8 3.3 21920",16,15,40.4,.006,-4,-34,-20,.04
4420 DATA "YED PRIOR      DELTA  OPH M1 3.0 21838",16,11,43.3,-.003,-3,-34,-2,-.15
4430 DATA "YILDUN         DELTA  UMI A0 4.4 24236",17,48,18.5,.012,86,36,35,.05
4440 DATA "ZANIAH         ETA    VIR A0 4.0 16813",12,17,20.8,-.004,0,-23,-21,-.02
4450 DATA "ZAURAK         GAMMA  ERI M0 3.2  4778",3,55,41.7,.004,-13,-38,-58,-.11
4460 DATA "ZAVIJAH        SEE ZAVIJAVA"
4470 DATA "ZAVIJAVA       BETA   VIR F8 3.8 16215",11,48,5.4,.050,2,2,47,-.28
4480 DATA "ZIBAL          ZETA   ERI A3 4.9  3899",3,13,24.1,0,-9,0,-15,.05
4490 DATA "ZIBEL          SEE ZIBAL"
4500 DATA "ZOSMA          DELTA  LEO A2 2.6 15438",11,11,27.1,.010,20,47,52,-.14
4510 DATA "ZUBEN ELAKRAB  GAMMA  LIB G6 4.0 20949",15,32,43.5,.004,-14,-37,-28,0
4520 DATA "ZUBEN ELAKRIBI DELTA  LIB A1 VAR 20195",14,58,17.8,-.004,-8,-19,-18,-.01
4530 DATA "ZUBEN ELGENUPI ALPHA2 LIB A3 2.9 19975",14,48,6.5,-.007,-15,-50,-7,-.07
4540 DATA "ZUBENELSCHEMALIBETA   LIB B8 2.7 20539",15,14,18.7,-.007,-9,-11,-59,-.03
4550 DATA "ZUBENESCH      SEE ZUBEN ELSCHEMALI"
4560 DATA "ZUBENESCHEMALI SEE ZUBEN ELSCHEMALI"
4570 DATA "ZUBEN HAKRABI  NU     LIB K5 5.3 20311",15,3,49.9,-.003,-16,-3,-51,-.03
4580 DIM S$(38)
4590 !
4600 !"STAR NAME      CONSTELLAT SP MAG  GC #       RA          PM      DEC         PM"
4610 OPEN #1,"STARFILE"
4620 WRITE#1%0,0
4630 N=0
4640 FOR I=1 TO 427
4650   IF (I+30)/80<>INT((I+30)/80) THEN 4680
4660   !CHR$(12)
4670   !"STAR NAME      CONSTELLAT SP MAG  GC #       RA          PM      DEC         P
4680   READ S$
4690   !S$,
4700   IF S$(16,18)="SEE" THEN 4790
4710   READ H,M,S,P,D0,M0,S0,P0
4720   !%5I,H,%3I,M,%5F1,S,%7F3,P,%5I,D0,%4I,M0,S0,%6F2,P0,
4730   R=H+M/60+S/3600
4740   R=R*15
4750   P=P*15
4760   D=D0+M0/60+S0/3600
4770   WRITE#1,S$,R,P,D,P0
4780   N=N+1
4790   !
4800 NEXT I
4810 WRITE#1%0,N,NOENDMARK
4820 CLOSE#1
4830 !
4840 !N," RECORDS WRITTEN TO FILE"
4850 FILL 3328,0
4860 !FREE(0)
4870 END
```

SAMPLE DATA PAGE

FROM FIXED STAR PROGRAM

```
10 REM CARTOGRA--PRINT COORDINATES ON EARTH OF ANGLE CONTACTS
20 REM BY MARK POTTENGER
30 REM DATE 4/18/79
40 REM REV 7/30/79 ECLIPTIC ASPECTS REFORMATTED
50 REM REV 9/19/79 TO ALLOW FOR NON-RISING (AT HIGH LATITUDES) PLANETS
60 REM REV 9 DEC 79 UPGRADED JULIAN ROUTINE, ADDED WARNING ON ASC ROUTINE
70 DIM D1(20), L(20), L1(20), R1(20)
80 DIM E$(2), N$(2), N0$(10), N1$(30), P$(80), T$(10)
90 REM STRINGS FOR DIRECTION OF LONGITUDE & LATITUDE
100 E$="WE"
110 N$="NS"
120 REM PLANET NAMES
130 P$(1,40)="SUN MOONMERCVENUMARSCEREPALLJUNOVESTJUPI"
140 P$(41,80)="SATUURANNEPTPLUTMC  ASC ANVXEP  N NDS ND"
150 REM TYPE OF TIME STRING
160 T$=" S D WLMDD"
170 REM PI, DEGREES TO RADIANS, RADIANS TO DEGREES
180 P1= 3.1415926535898
190 P2=P1/180
200 P3=180/P1
210 REM SINE OF DEGREES
220 DEF FNS(U)=SIN(U*P2)
230 REM COSINE OF DEGREES
240 DEF FNC(U)=COS(U*P2)
250 REM TANGENT OF DEGREES
260 DEF FNT(U)=SIN(U*P2)/COS(U*P2)
270 REM ARCSIN IN DEGREES
280 DEF FNA1(U)=ATN(U/SQRT(1-U*U))*P3
290 REM QUADRANT CHECKING ARCTAN IN DEGREES--ALTERS U1 WITHOUT RESTORING
300 DEF FNA4(U,U0)
310 U1=ATN(U/U0)*P3
320 IF U1<0 THEN U1=U1+180
330 IF U<0 THEN U1=U1+180
340 RETURN U1
350 FNEND
360 REM GET DEGREE, MINUTE, & DIRECTION FLAG FROM LONGITUDE OR LATITUDE
370 REM ALTERS W1,W2,W9--GLOBALLY AVAILABLE ANSWERS
380 REM PUTS ZERO WITH POSITIVE FLAG
390 DEF FND1(U)
400 IF U<0 THEN W9=2 ELSE W9=1
410 W1=INT(ABS(U))
420 W2=INT((ABS(U)-W1)*60+.5)
430 IF W2<>60 THEN 460
440 W2=0
450 W1=W1+1
460 RETURN W1
470 FNEND
480 REM JULIAN DATE, OBLIQUITY OF ECLIPTIC
490 REM ARGUMENTS ARE MONTH, DAY, YEAR, UNIVERSAL TIME
500 REM ALTERS U3,D1,E,J,O0,O1,T WITHOUT RESTORING
510 REM RETURNS J (JULIAN DAY #)
520 REM GLOBALLY AVAILABLE ARE D1 (DAYS FROM 1900 JAN 0.5),
530 REM T (JULIAN CENTURIES FROM 1900 JAN 0.5),
540 REM E (OBLIQUITY OF ECLIPTIC), O0 (COS OBL), O1 (SIN OBL)
550 DEF FNJ(U,U0,U1,U2)
560 IF U<3 THEN U1=U1-1
570 U3=U1+4712
580 U=U+1
590 IF U<4 THEN U=U+12
600 J=INT(U3*365.25)+INT(30.6*U)+U0+U2/24-63.5
610 J=J-((INT(ABS(U1)/100)-INT(ABS(U1)/400))*SGN(U1))+2
620 IF U1<0 AND U1/100=INT(U1/100) AND U1/400<>INT(U1/400) THEN J=J-1
630 D1=J-2415020
640 T=D1/36525
650 E=23.45229444+(-.0130125+(-.00000164+.000000503*T)*T)*T
660 O0=FNC(E)
670 O1=FNS(E)
680 RETURN J
690 FNEND
700 REM MODULUS 360 (CIRCULARLY CORRECT FOR MINUS BECAUSE INT IS FLOOR)
710 DEF FNM0(U)=(U/360-INT(U/360))*360
720 REM GET RIGHT ASCENSION OF POINT ON ECLIPTIC (0 CELESTIAL LATITUDE)
730 DEF FNR0(U2)=FNA4(FNS(U2)*O0,FNC(U2))
740 REM GET SIDEREAL TIME (IN DEGREES=RA) AT WHICH ECLIPTIC POINT IS ASC
750 REM ALTERS V1,V2,V3,V4 WITHOUT RESTORING
760 REM ARGUMENTS ARE CELESTIAL LONGITUDE, TERRESTRIAL LATITUDE
770 REM FORMULA FOR RISING TIME IS RA-ASCENSIONAL DIFF-90
780 REM = RA ASC - ARCSIN (TAN LAT*TAN DEC) - 90
790 REM = ATAN2(SIN ASC*COS OBL,COS ASC)-ARCSIN(TAN LAT*
800 REM   TAN(ARCSIN(SIN ASC*SIN OBL)))-90
810 REM ATAN2 (FNA4) IS QUADRANT CHECKING ARCTAN
820 REM *****WARNING--CAN BLOW UP IN ARCTIC REGIONS (IF ABS(V3)>1)
830 REM **IF LATITUDE LOOP IS EXTENDED TO ARCTIC REGIONS ADD CHECK
840 DEF FNR2(V,V0)
850 V1=FNS(V)
860 V2=FNC(V)
870 V3=FNT(FNA1(V1*O1))*FNT(V0)
880 V4=FNA4(V1*O0,V2)-FNA1(V3)-90
890 IF V4<0 THEN V4=V4+360
900 RETURN V4
910 FNEND
920 REM READ DATA FROM POSITION FILE WRITTEN BY CHART
930 INPUT #1, "GIVE FILE ID ",N0$(1,10)
940 OPEN #1, "POSITION"
950 REM B SAYS WHERE NEXT BLANK IS IN FILE
960 READ #1 %0, B
970 REM FIRST RECORD IS AT ADDRESS OF 10
980 P=10
990 READ #1 %P, N1$
1000 IF N0$(1,10)=N1$(1,10) THEN 1100
1010 REM RECORD LENGTH IS 1418 BYTES
1020 P=P+1418
1030 REM IF POINTER IS LESS THAN BLANK (END OF ENTRIES), TRY AGAIN
1040 IF P<B THEN 990
1050 CLOSE #1
1060 ! #1, "NO SUCH ENTRY"
1070 GOTO 930
1080 REM NAME,MONTH,DAY,YEAR,TIME,ZONE,TIME TYPE,COMPRESSED GREENWICH DATE,
1090 REM GREENWICH TIME,LONGITUDE,LATITUDE,LOCAL LAT,LOC LONG,LOC SIDEREAL TIME
1100 READ #1 %P, N1$
1110 READ #1, M,D,Y,H,Z,T1,G0,G4,L0,L1,L2,L3,S9
1120 REM LONGITUDE, LATITUDE, RIGHT ASCENSION, DECLINATION
1130 FOR I=1 TO 19
1140   READ #1, L(I),L1(I),R1(I),D1(I)
1150 NEXT I
1160 CLOSE #1
1170 REM SWITCH FROM SCREEN TO PRINTER
1180 FILL 3328, 255
1190 REM !=PRINT
1200 !"ASTROCARTOGRAPHIC POINTS FOR ",N1$(11,30)
1210 W1=FND1(H)
1220 !"BORN",%2I,M,"/",D,"/",%4I,Y," AT",%3I,W1,":",%2I,W2,
1230 !" ",T$((T1+1)*2-1,(T1+1)*2)," TIME IN ZONE",%7F2,Z
1240 W1=FND1(L1)
```

```
1250 !"AT LATITUDE",%3I,W1," ",N$(W9,W9),W2,
1260 W1=FND1(L0)
1270 !" AND LONGITUDE",%4I,W1," ",E$(W9,W9),%3I,W2
1280 REM UNPACK GREENWICH DATE (G1=MONTH,G2=DAY,G3=YEAR)
1290 G3=INT(G0/10000)
1300 F=G0-G3*10000
1310 G1=INT(F/100)
1320 G2=F-G1*100
1330 REM CALL JULIAN FUNCTION SO OBLIQUITY WILL BE AVAILABLE
1340 J=FNJ(G1,G2,G3,G4)
1350 REM GET GREENWICH SIDEREAL TIME IN DEGREES (FROM LST IN HOURS FROM FILE)
1360 G5=FNM0(S9*15+L0)
1370 !
1380 !"PLANET  ON UPPER MERIDIAN  ZENITH        LOWER MERIDIAN   NADIR"
1390 !"              LONGITUDE  LATITUDE          LONGITUDE  LATITUDE"
1400 REM L=LONGITUDE ON EARTH OF CONTACT
1410 REM GREENWICH RA (ST) MINUS RA OF PLANET GIVES WEST LONGITUDE
1420 REM AT ZENITH WHEN ON MERIDIAN & EARTH LATITUDE = DECLINATION
1430 FOR I=1 TO 19
1440   REM SKIP FROM PLUTO TO NORTH NODE
1450   IF I>14 AND I<19 THEN 1600
1460   L=FNM0(G5-R1(I))
1470   REM CONVERT LONGITUDE TO +/- 180
1480   IF L>180 THEN L=L-360
1490   !P$(I*4-3,4*I),
1500   W1=FND1(L)
1510   !%15I,W1," ",E$(W9,W9),%3I,W2,
1520   W1=FND1(D1(I))
1530   !%5I,W1," ",N$(W9,W9),%3I,W2,
1540   REM GO OPPOSITE FOR LOWER MERIDIAN & NADIR
1550   IF SGN(L)=1 THEN L=L-180 ELSE L=L+180
1560   W1=FND1(L)
1570   !%15I,W1," ",E$(W9,W9),%3I,W2,
1580   W1=FND1(-D1(I))
1590   !%5I,W1," ",N$(W9,W9),%3I,W2
1600 NEXT I
1610 !
1620 !"LONGITUDES ON EARTH OF ECLIPTIC ASPECTS TO MIDHEAVEN"
1630 !"0 IS CONJUNCT MIDHEAVEN, 180 IS CONJUNCT IC"
1640 !
1650 REM DO TWO PASSES TO GET ASPECTS
1660 REM SET LIMITS OF ASPECTS FOR 1ST PASS
1670 I1=-150
1680 I2=0
1690 !"ASPECTS",
1700 FOR I0=I1 TO I2 STEP 30
1710   !%8I,I0,"  ",
1720 NEXT I0
1730 !
1740 !"PLANETS"
1750 REM LOOP PLANETS, INNER LOOP ASPECTS
1760 REM A=ECLIPTIC ASPECT POINT, R=RA OF POINT
1770 FOR I=1 TO 19
1780   IF I>14 AND I<19 THEN 1890
1790   !P$(I*4-3,4*I),"    ",
1800   FOR I0=I1 TO I2 STEP 30
1810     A=FNM0(L(I)+I0)
1820     R=FNR0(A)
1830     L=FNM0(G5-R)
1840     IF L>180 THEN L=L-360
1850     W1=FND1(L)
1860     !%5I,W1," ",E$(W9,W9),%3I,W2,
1870   NEXT I0
1880   !
1890 NEXT I
1900 !
1910 REM SET LIMITS FOR SECOND PASS ON ASPECTS
1920 IF I1=30 THEN 1970
1930 I1=30
1940 I2=180
1950 GOTO 1690
1960 REM FORM FEED
1970 !CHR$(12)
1980 !"PLANETS ON ASC, RISING, ON DESC, & SETTING FOR ",N1$(11,30)
1990 !
2000 REM A4 IS ASCENSIONAL DIFFERENCE + 90, P IS PA
2010 REM LOOP PLANETS, INNER LOOP LATITUDES
2020 REM IF LATITUDE INCREMENT IS CHANGED, FORM FEED PAGING MUST CHANGE
2030 REM DITTO IF PICA INSTEAD OF ELITE PRINTER
2040 REM T2 TEST IS CHECK FOR PLANET NOT RISING AT HIGH LATITUDE
2050 FOR I=1 TO 19
2060   IF I>14 AND I<19 THEN 2360
2070   !P$(I*4-3,4*I),"    ON ASC      RISING      ON DESC     SETTING"
2080   !"LAT     LONGITUDE   LONGITUDE   LONGITUDE   LONGITUDE"
2090   FOR I0=-60 TO 60 STEP 10
2100     !%3I,I0,
2110     T2=FNT(D1(I))*FNT(I0)
2120     IF ABS(T2)>1 THEN 2150
2130     A4=FNA1(T2)+90
2140     REM ON ASCENDANT
2150     R=FNR2(L(I),I0)
2160     GOSUB 2430
2170     REM RISING
2180     IF ABS(T2)<=1 THEN 2210
2190     !"          ",
2200     GOTO 2240
2210     R=FNM0(R1(I)-A4)
2220     GOSUB 2430
2230     REM ON DESCENDANT
2240     R=FNR2(FNM0(L(I)+180),I0)
2250     GOSUB 2430
2260     REM SETTING
2270     IF ABS(T2)<=1 THEN 2300
2280     !
2290     GOTO 2330
2300     R=FNM0(R1(I)+A4)
2310     GOSUB 2430
2320     !
2330   NEXT I0
2340   !
2350   IF I=5 OR I=10 THEN !CHR$(12),"RISINGS & SETTINGS FOR ",N1$(11,30)
2360 NEXT I
2370 !CHR$(12)
2380 REM SWITCH BACK TO SCREEN
2390 FILL 3328, 0
2400 END
2410 REM SUBROUTINE TO GET & PRINT EARTH LONGITUDES
2420 REM CALLED FROM ASC-RISE-DESC-SET LOOP
2430 L=FNM0(G5-R)
2440 IF L>180 THEN L=L-360
2450 W1=FND1(L)
2460 !%7I,W1," ",E$(W9,W9),%3I,W2,
2470 RETURN
```

calculates geo. long. of culminating upper planet ≈ GST − RA of planet

do not need.

do not need.

section I want

leader for new page

```
1290 CLOSE #1
1300 ! #1, "NO SUCH ENTRY"
1310 GOTO 1170
1320 REM NAME,MONTH,DAY,YEAR,TIME,ZONE,TIME TYPE,COMPRESSED GREENWICH DATE,
1330 REM GREENWICH TIME,LONGITUDE,LATITUDE,LOCAL LAT,LOC LONG,LOC SIDEREAL TIME
1340 READ #1 %P, N1$
1350 READ #1, M,D,Y,H,Z,T1,G0,G4,L0,L1,L2,L3,S9
1360 REM LONGITUDE, LATITUDE, RIGHT ASCENSION, DECLINATION
1370 FOR I=1 TO 19
1380   READ #1, L(I),L1(I),R1(I),D1(I)
1390 NEXT I
1400 CLOSE #1
1410 REM SWITCH FROM SCREEN TO PRINTER
1420 FILL 3328, 255
1430 REM !=PRINT
1440 !"FIXED STARS FOR ",N1$(11,30)
1450 W1=FNH(H)
1460 !"BORN",%2I,M,"/",D,"/",%4I,Y," AT",%3I,W1,":",%2I,W2,
1470 !" ",T$((T1+1)*2-1,(T1+1)*2)," TIME IN ZONE",%7F2,Z
1480 W1=FND4(L1)
1490 !"AT LATITUDE",%3I,W1," ",N$(W9,W9),W2,
1500 W1=FND4(L0)
1510 !" AND LONGITUDE",%4I,W1," ",E$(W9,W9),%3I,W2
1520 REM UNPACK GREENWICH DATE (G1=MONTH,G2=DAY,G3=YEAR)
1530 G3=INT(G0/10000)
1540 F=G0-G3*10000
1550 G1=INT(F/100)
1560 G2=F-G1*100
1570 REM CALL JULIAN FUNCTION SO OBLIQUITY WILL BE AVAILABLE
1580 J=FNJ(G1,G2,G3,G4)
1590 !
1600 W1=FNH(S9)
1610 !"NATAL SIDEREAL TIME IS",%3I,W1,W2
1620 REM GET SIDEREAL TIME IN DEGREES
1630 S9=S9*15
1640 !
1650 REM T0 IS TAN OF EARTH LATITUDE
1660 T0=FNT(L1)
1670 REM GET ALL PLANETS' RISE, SET, & LOWER CULMINATE TIMES
1680 REM PRINT ALL COORDINATES & TIMES FOR PLANETS IN GOSUB
1690 !"PLANET LONGITUDE    LAT       DEC       RISE    R A     SET  LOW CULM"
1700 FOR I=1 TO 19
1710   IF I>14 AND I<19 THEN 1890
1720   !P$(I*4-3,4*I),
1730   L4=L(I)
1740   L5=L1(I)
1750   D=D1(I)
1760   R1=R1(I)
1770   REM A4 IS ASCENSIONAL DIFFERENCE + 90
1780   A4=FNA1(FNT(D)*T0)+90
1790   REM RISING
1800   R0(I)=FNM0(R1-A4)
1810   R0=R0(I)
1820   REM SETTING
1830   S(I)=FNM0(R1+A4)
1840   S=S(I)
1850   REM LOWER CULMINATION
1860   R2(I)=FNM0(R1+180)
1870   R2=R2(I)
1880   GOSUB 3500
1890 NEXT I
1900 REM PUT IN NATAL SIDEREAL TIME AS PLANET 0
1910 R1(0)=S9
1920 L(0)=800
1930 R0(0)=800
1940 S(0)=800
1950 R2(0)=800
1960 REM SET COUNT OF NON-RISING STARS TO ZERO
1970 N0=0
1980 REM SET COUNTS OF CONTACTS TO ZERO
1990 N1=0
2000 N2=0
2010 OPEN #1, "STARFILE"
2020 READ #1 %0, N
2030 DIM R(N), P0(N), D(N), P1(N), S1$(N*38)
2040 !
2050 !"STAR CONTACTS OUT OF A LIST OF",%4I,N," STARS"
2060 !"ALL ORBS GIVEN IN MINUTES OF ARC"
2070 !
2080 !"STAR NAME      CONSTELLAT SP MAG   ",
2090 !"LONGITUDE    LAT       DEC       RISE    R A     SET  LOW CULM"
2100 !
2110 FOR I=1 TO N
2120   READ #1, S1$(I*38-37,38*I),R(I),P0(I),D(I),P1(I)
2130 NEXT I
2140 CLOSE #1
2150 REM SET # OF LINES PRINTED ON PAGE SO FAR
2160 N3=28
2170 REM SET # OF PAGES
2180 N4=1
2190 REM GET PRECESSIONAL CONSTANTS
2200 REM TROPICAL CENTURIES
2210 T1=36524.21988
2220 REM REDEFINE T FOR TROPICAL CENTURIES FROM 1950.0
2230 T=(J-2433282.423)/T1
2240 T2=T*T
2250 T3=T2*T
2260 REM ZETA SUB ZERO IN SUPPLEMENT
2270 C=2304.948*T+.302*T2+.0179*T3
2280 REM Z IN SUPPLEMENT
2290 Z=2304.948*T+1.093*T2+.0192*T3
2300 REM THETA IN SUPPLEMENT
2310 C0=2004.255*T-.426*T2-.0416*T3
2320 C=C/3600
2330 Z=Z/3600
2340 C0=C0/3600
2350 REM SINE THETA
2360 C1=FNS(C0)
2370 REM COSINE THETA
2380 C2=FNC(C0)
2390 REM START MAIN LOOP--ADD PROPER MOTION, PRECESS, GET LONGITUDE
2400 REM & LATITUDE, RISE, SET, LOWER CULMINATE TIMES, & COMPARE TO PLANETS
2410 REM R1=RA, D=DEC, L4=LONG, L5=LAT, R0=RISE, S=SET, R2=LOWER CULMINATION
2420 REM FORCE OUT OF RANGE TIME FOR STARS THAT DON'T RISE OR SET
2430 FOR I=1 TO N
2440   R(I)=R(I)+(P0(I)*(T*100))/3600
2450   D(I)=D(I)+(P1(I)*(T*100))/3600
2460   C3=R(I)+C
2470   C4=FNC(D(I))
2480   C5=FNS(D(I))
2490   C6=FNC(C3)
2500   D=FNA1(C2*C5+C1*C4*C6)
2510   C7=C4*FNS(C3)
2520   C8=C2*C4*C6-C1*C5
2530   C9=FNA4(C7,C8)
2540   P1=C9+Z
2550   R1=FNM0(R1)
2560   L4=FNL(R1,D)
```

```
10 REM FIXSTAR--FIXED STARS COMPARED TO NATAL PLANETS
20 REM STAR COORDINATES PRECESSED & CORRECTED FOR PROPER MOTION
30 REM DATE 5/6/79 REV 7/17
40 REM REV 7/30/79 SECONDS DROPPED TO FIT COORDS ON ONE LINE WITH NAME
50 REM REV 18 DEC 79 TO PUT PROPER MOTION CORRECTION BEFORE PRECESSION
60 LINE 110
70 DIM M(13), D1(20), L(20), L1(20), R1(20)
80 DIM R0(20), R2(20), S(20)
90 DIM C$(55), C1$(55), E$(2), N$(2), N0$(10), N1$(30), P$(80), S$(24), T$(10)
100 REM TYPES OF CONTACT
110 C$="CONJUNCT    RISING     CULMINATINGSETTING    AT LOW CULM"
120 C1$="IN LONGITUDRISING     CULMINATINGSETTING    AT LOW CULM"
130 REM STRINGS FOR DIRECTION OF LONGITUDE & LATITUDE
140 E$="WE"
150 N$="NS"
160 REM PLANET NAMES
170 P$(1,40)="SUN MOONMERCVENUMARSCEREPALLJUNOVESTJUPI"
180 P$(41,80)="SATURANNEPTPLUTMC  ASC ANVXEP  N NDS ND"
190 REM SIGNS
200 S$="ArTaGeCnLeViLiScSaCpAqPi"
210 REM TYPE OF TIME STRING
220 T$=" S D WLMDD"
230 REM PI, DEGREES TO RADIANS, RADIANS TO DEGREES
240 P1= 3.1415926535898
250 P2=P1/180
260 P3=180/P1
270 REM SINE OF DEGREES
280 DEF FNS(U)=SIN(U*P2)
290 REM COSINE OF DEGREES
300 DEF FNC(U)=COS(U*P2)
310 REM TANGENT OF DEGREES
320 DEF FNT(U)=SIN(U*P2)/COS(U*P2)
330 REM ARCSIN IN DEGREES
340 DEF FNA1(U)=ATN(U/SQRT(1-U*U))*P3
350 REM ARCCOS IN DEGREES
360 DEF FNA2(U)=(P1/2-ATN(U/SQRT(1-U*U)))*P3
370 REM QUADRANT CHECKING ARCTAN IN DEGREES--ALTERS U1 WITHOUT RESTORING
380 DEF FNA4(U,U0)
390 U1=ATN(U/U0)*P3
400 IF SGN(U1)=-1 THEN U1=U1+180
410 IF SGN(U)=-1 THEN U1=U1+180
420 RETURN U1
430 FNEND
440 REM GET ANGULAR SEPARATION (0-180) BETWEEN TWO FACTORS
450 REM OUTER ABSOLUTE IS TO GET AROUND VALUES > 360 FORCED WHEN STARS DON'T RISE
460 REM NOT NEEDED WITH NORMAL 0 TO 360 VALUES
470 DEF FNA(U,U0)=ABS(180-ABS(180-ABS(U-U0)))
480 REM DEGREE TO DEGREE, SIGN, MINUTE
490 REM ALTERS U0 WITHOUT RESTORING
500 REM ANSWERS ARE W1,W2,W3 (DEG, SIGN, MIN)
510 DEF FND2(U)
520 U0=INT(U/30)
530 W1=INT(U-U0*30)
540 W2=U0+1
550 IF W2=13 THEN W2=1
560 W3=INT((U-INT(U))*60+.5)
570 RETURN W1
580 FNEND
590 REM GET DEGREE, MINUTE & DIRECTION FLAG
600 REM ANSWERS ARE W1,W2,W9
610 DEF FND4(U)
620 IF SGN(U)=-1 THEN W9=2 ELSE W9=1
630 W1=INT(ABS(U))
640 W2=INT((ABS(U)-W1)*60+.5)
650 RETURN W1
660 FNEND
670 REM HOURS TO HOURS, MINUTES
680 REM ANSWERS ARE W1,W2
690 DEF FNH(U)
700 W1=INT(U)
710 W2=INT((U-W1)*60+.5)
720 RETURN W1
730 FNEND
740 REM JULIAN DATE, OBLIQUITY OF ECLIPTIC
750 M(1)=0\M(2)=31\M(3)=59\M(4)=90\M(5)=120
760 M(6)=151\M(7)=181\M(8)=212\M(9)=243
770 M(10)=273\M(11)=304\M(12)=334\M(13)=365
780 REM ARGUMENTS ARE MONTH, DAY, YEAR, UNIVERSAL TIME
790 REM ALTERS U3,U4,U5,U6,U7,D1,E,J,O0,O1,T WITHOUT RESTORING
800 REM RETURNS J (JULIAN DAY #)
810 REM GLOBALLY AVAILABLE ARE D1 (DAYS FROM 1900.0), E (OBLIQUITY OF ECL),
820 REM O0 (COS OBL), O1 (SIN OBL), T (JULIAN CENTURIES FROM 1900.0)
830 DEF FNJ(U,U0,U1,U2)
840 U3=U2/24
850 U4=INT(U1/100)
860 U5=U1-U4*100
870 J=(U4+47)*36524+4435.5
880 U6=U5/4
890 U7=U5*365+INT(U6)+M(U)+U0+U3
900 IF (U6=INT(U6)) AND (U<3) AND ((U5<>0) OR (U4/4=INT(U4/4))) THEN U7=U7-1
910 J=J+U7
920 D1=J-2415020
930 T=D1/36525
940 E=23.45229444+(-.0130125+(-.00000164+.000000503*T)*T)*T
950 O0=FNC(E)
960 O1=FNS(E)
970 RETURN J
980 FNEND
990 REM LONGITUDE AND LATITUDE FROM RIGHT ASCENSION AND DECLINATION
1000 REM U1 IS ALTERED BY CALL TO FNA4, U2,U3,U4,U6,U7,U8,U9 ALTERED HERE
1010 REM U2 IS LONGITUDE, U4 IS LATITUDE
1020 DEF FNL(U,U0)
1030 U9=FNS(U)
1040 U8=FNS(U0)
1050 U7=FNC(U)
1060 U6=FNC(U0)
1070 U=U9*U6*O0+U8*O1
1080 U0=U6*U7
1090 U2=FNA4(U,U0)
1100 U3=U8*O0-U6*U9*O1
1110 U4=FNA1(U3)
1120 RETURN U2
1130 FNEND
1140 REM MODULUS 360 (CIRCULARLY CORRECT FOR MINUS BECAUSE INT IS FLOOR)
1150 DEF FNM0(U)=(U/360-INT(U/360))*360
1160 REM READ DATA FROM POSITION FILE WRITTEN BY CHART
1170 INPUT #1, "GIVE FILE ID ",N0$(1,10)
1180 OPEN #1, "POSITION,2"
1190 REM B SAYS WHERE NEXT BLANK IS IN FILE
1200 READ #1 %0, B
1210 REM FIRST RECORD IS AT ADDRESS OF 10
1220 P=10
1230 READ #1 %P, N1$
1240 IF N0$(1,10)=N1$(1,10) THEN 1340
1250 REM RECORD LENGTH IS 1418 BYTES
1260 P=P+1418
1270 REM IF POINTER IS LESS THAN BLANK (END OF ENTRIES), TRY AGAIN
1280 IF P<B THEN 1230
```

```
2570   L5=U4
2580   IF (90-ABS(D))<ABS(L1) THEN 2650
2590   A4=FNA1(FNT(D)*T0)+90
2600   R0=R1-A4
2610   IF R0<0 THEN R0=R0+360
2620   S=R1+A4
2630   IF S>=360 THEN S=S-360
2640   GOTO 2680
2650   R0=1000
2660   S=1000
2670   N0=N0+1
2680   R2=FNM0(R1+180)
2690   P0(I)=0
2700   GOSUB 3490
2710   FOR I0=0 TO 19
2720     IF I0>14 AND I0<19 THEN 3230
2730     A=FNA(L(I0),L4)
2740     S6=1
2750     S7=1
2760     IF A<=1 THEN GOSUB 3370
2770     A=FNA(P0(I0),R0)
2780     S6=2
2790     S7=2
2800     IF A<=1 THEN GOSUB 3370
2810     A=FNA(R1(I0),R0)
2820     S7=3
2830     IF A<=1 THEN GOSUB 3370
2840     A=FNA(S(I0),R0)
2850     S7=4
2860     IF A<=1 THEN GOSUB 3370
2870     A=FNA(R2(I0),R0)
2880     S7=5
2890     IF A<=1 THEN GOSUB 3370
2900     A=FNA(R0(I0),R1)
2910     S6=3
2920     S7=2
2930     IF A<=1 THEN GOSUB 3370
2940     A=FNA(R1(I0),R1)
2950     S7=3
2960     IF A<=1 THEN GOSUB 3370
2970     A=FNA(S(I0),R1)
2980     S7=4
2990     IF A<=1 THEN GOSUB 3370
3000     A=FNA(R2(I0),R1)
3010     S7=5
3020     IF A<=1 THEN GOSUB 3370
3030     A=FNA(R0(I0),S)
3040     S6=4
3050     S7=2
3060     IF A<=1 THEN GOSUB 3370
3070     A=FNA(R1(I0),S)
3080     S7=3
3090     IF A<=1 THEN GOSUB 3370
3100     A=FNA(S(I0),S)
3110     S7=4
3120     IF A<=1 THEN GOSUB 3370
3130     A=FNA(R2(I0),S)
3140     S7=5
3150     IF A<=1 THEN GOSUB 3370
3160     A=FNA(R0(I0),R2)
3170     S6=5
3180     S7=2
3190     IF A<=1 THEN GOSUB 3370
3200     A=FNA(S(I0),R2)
3210     S7=4
3220     IF A<=1 THEN GOSUB 3370
3230   NEXT I0
3240 NEXT I
3250 FOR I=1 TO N
3260 N1=N1+P0(I)
3270 NEXT I
3280 !
3290 !"THERE WERE CONTACTS WITH",%4I,N1," OF THE STARS ON THE LIST"
3300 !"THERE WERE",%5I,N2," CONTACTS ALTOGETHER"
3310 !%3I,N0," OF THE STARS ON THE LIST NEITHER RISE NOR SET"
3320 REM SWITCH BACK TO SCREEN
3330 FILL 3328, 0
3340 !FREE(0)
3350 END
3360 REM PRINT NATURE AND ORB OF CONTACT
3370 P0(I)=1
3380 IF I0<>0 THEN 3410
3390 !"   ",C$(S6*11-10,11*S6)," AT NATAL SIDERL TIME ",
3400 GOTO 3430
3410 !"   ",C$(S6*11-10,11*S6)," WITH ",P$(I0*4-3,4*I0),
3420 !" ",C1$(S7*11-10,11*S7),
3430 !" WITH ORB",%5F1,A*60
3440 N2=N2+1
3450 N3=N3+1
3460 IF N3=80 THEN GOSUB 3680
3470 RETURN
3480 REM PRINT STAR NAME & COORDINATES & TIMES
3490 !S1$(I*38-37,I*38-6),
3500 W1=FND2(L4)
3510 !%5I,W1," ",S$(W2*2-1,2*W2),%3I,W3,
3520 W1=FND4(L5)
3530 !%5I,W1," ",N$(W9,W9),%3I,W2,
3540 W1=FND4(D)
3550 !%5I,W1," ",N$(W9,W9),%3I,W2,
3560 W1=FNH(R0/15)
3570 IF W1<=24 THEN !%5I,W1,%3I,W2, ELSE !"        ",
3580 W1=FNH(R1/15)
3590 !%5I,W1,%3I,W2,
3600 W1=FNH(S/15)
3610 IF W1<=24 THEN !%5I,W1,%3I,W2, ELSE !"        ",
3620 W1=FNH(R2/15)
3630 !%5I,W1,%3I,W2
3640 N3=N3+1
3650 IF N3=80 THEN GOSUB 3680
3660 RETURN
3670 REM FORM FEED & REPEAT HEADERS FOR NEW PAGES
3680 !CHR$(12)
3690 N4=N4+1
3700 !"FIXED STARS FOR ",N1$(11,30),"          PAGE",%3I,N4
3710 !"STAR NAME      CONSTELLAT SP MAG    ",
3720 !"LONGITUDE    LAT       DEC      RISE    R A     SET  LOW CULM"
3730 !
3740 N3=4
3750 RETURN
```

STARLIST--NAMES, CONSTELLATION DESIGNATIONS, SPECTRAL CLASSES,
MAGNITUDES, AND GC #S OF NAMED STARS IN ALPHA FIELD
(IF SPECTRUM IS TWO LETTERS STAR IS VERY CLOSE DOUBLE)
(P IS A PECULIAR SPECTRUM, N IS A NEBULA, C IS A CLUSTER)
(FOR NEBULAS & CLUSTERS, NGC # IS GIVEN INSTEAD OF GC #)
1950.0 RIGHT ASCENSION (HOUR, MINUTE, SECOND) & PROPER MOTION (FOR 1 YR),
1950.0 DECLINATION (DEGREE, MINUTE, SECOND) & PROPER MOTION (FOR 1 YR)
IF DEC IS MINUS, ALL THREE VALUES ARE MADE MINUS
PROPER MOTIONS ARE IN SECONDS (TIME FOR RA, ARC FOR DEC)
IF STAR NAME IS FOR PARTICULAR COMPONENT OF MULTIPLE, # IS 5TH CHARACTER
OF GREEK LETTER
IF NAME DOESN'T INDICATE WHICH COMPONENT OF MULTIPLE, # IS 6TH CHARACTER
OF GREEK LETTER--INDICATES WHICH STAR WAS USED (USUALLY THE BRIGHTER)
FOR STARS WITH MORE THAN ONE NAME, ONLY ONE GIVES ALL DATA
OTHERS REFER TO THAT NAME (WITH 'SEE' IN 1ST 3 CHAR OF GREEK LETTER)

PROBLEMS:
'DENEB' MEANS TAIL AND IS APPLIED TO MANY STARS--THE BRIGHT ONE IS
DENEB ADIGE IN CYGNUS (I HAVE SPELLED PORSON'S PLAIN DENEB AS DHENEB).
LESATH IS UPSILON SCO, JABBAH IS NU SCO--NU FOR LESATH IS A MISREAD.
MARKEB IS KAPPA VELA--NOT PUPPIS AS GIVEN IN SEVERAL PLACES (THERE IS NO KAPPA PUP)
MENKIB IS XI PERSEUS, NOT ZETA AS GIVEN SOME PLACES.
MUSCIDA HAS BEEN USED FOR BOTH OMICRON & PI 2 URSA MAJOR,
BUT THE CASE FOR OMICRON SEEMS BETTER
SPICULUM FROM ROBSON IS THREE THINGS SPREAD OVER 45' RA & 2 DEG DEC
I USED THE BRIGHTEST OF THE THREE (M8--THE LAGOON NEBULA)
ROBSON MESSED UP IN GEMINI ON IOTA, MU, & ETA. ETA SHOULD BE PROPUS,
MU IS TEJAT POSTERIOR, & IOTA DOESN'T HAVE A LEGITIMATE NAME.
THERE IS SOME UNCERTAINTY ABOUT THE ZUBENs IN LIBRA-SCORPIO.

STAR NAME	CONSTELLAT	SP	MAG	GC #	RA	PM	DEC	PM
ACAMAR	THETA1 ERI	A2	3.4	3584	2 56 21.9	-.005	-40 -30 -15	.03
ACAMER	SEE ACAMAR							
ACHERNAR	ALPHA ERI	B9	0.6	1979	1 35 51.2	.011	-57 -29 -25	-.03
ACHIRD	ETA CAS	F9	3.6	962	0 46 3.4	.137	57 33 3	-.52
ACRAB	BETA 1 SCO	B1	2.9	21609	16 2 31.5	.000	-19 -40 -13	-.03
ACRUX	ALPHA1 CRU	B1	1.6	16952	12 23 48.0	-.005	-62 -49 -20	-.03
ACUBENS	ALPHA CNC	F0	4.3	12406	8 55 45.3	.002	12 3 9	-.04
ACULEUS	M6 SCO	C	5.3	6405	17 36 48.0	.000	-32 -11 0	.00
ACUMEN	M7 SCO	C	3.2	6475	17 50 42.0	.000	-34 -48 0	.00
ADARA	EPSILO CMA	B1	1.6	9188	6 56 39.6	.000	-28 -54 -10	.00
ADHAFERA	ZETA LEO	F0	3.6	14107	10 13 54.8	.001	23 40 2	-.01
ADHARA	SEE ADARA							
ADHIL	XI AND	G9	5.0	1647	1 19 23.1	.003	45 16 3	.01
AGENA	BETA CEN	B3	0.9	18971	14 0 16.5	-.003	-60 -7 -58	-.03
AIN	EPSILO TAU	G0	3.6	5430	4 25 41.6	.008	19 4 16	-.04
ALAMAK	SEE ALMACH							
ALARAPH	SEE ZAVIJAVA							
ALBALDAH	PI SGR	F3	3.0	26386	19 6 47.4	.000	-21 -6 -18	-.04
ALBALI	EPSILO AQR	A1	3.8	28978	20 44 58.2	.002	-9 -40 -48	-.03
ALBIREO	BETA 1 CYG	K1	3.2	26953	19 28 42.2	.000	27 51 12	-.01
ALBIREOR	SEE ALBIREO							
ALCHIBA	SEE ALCHITA							
ALCHITA	ALPHA CRV	F2	4.2	16586	12 5 49.8	.006	-24 -27 0	-.05
ALCOR	80 UMA	A1	4.0	18155	13 23 13.5	.014	55 14 53	-.02
ALCYONE	ETA TAU	B7	3.0	4541	3 44 30.4	.002	23 57 8	-.04
ALDEBARAN	ALPHA TAU	KM	1.1	5605	4 33 2.9	.005	16 24 37	-.19
ALDERAMIN	ALPHA CEP	A7	2.6	29848	21 17 23.2	.021	62 22 24	.05
ALDIB	SEE NODUS II							
ALFARD	ALPHA HYA	K3	2.2	13044	9 25 7.8	-.001	-8 -26 -27	.03

STAR NAME	CONSTELLAT	SP	MAG	GC #	RA	PM	DEC	PM
ALFIRK	SEE ALPHIRK							
ALGEDI	SEE GIEDI							
ALGEIBA	SEE ALGIEBA							
ALGENIB	GAMMA PEG	P2	2.9	238	0 10 39.4	.000	14 54 20	-.01
ALGENIB(AL PER)	SEE MIRFAK							
ALGENUBI	SEE RAS ELASED AUSTRALI							
ALGIEBA	GAMMA1 LEO	K0	2.6	14177	10 17 13.1	.022	20 5 43	-.15
AL GIEDI	SEE GIEDI							
ALGOL	BETA PER	B8	VAR	3733	3 4 54.4	.000	40 45 52	.00
ALGORAB	DELTA CRV	A0	3.1	17029	12 27 16.4	-.015	-16 -14 -14	-.14
ALHAJOTH	SEE CAPELLA							
AL HECKA	ZETA TAU	B2	3.0	6985	5 34 39.3	.000	21 6 50	-.02
ALHENA	GAMMA GEM	A1	1.9	8633	6 34 49.4	.003	16 26 37	-.05
ALIOTH	EPSILO UMA	A0	1.7	17518	12 51 50.1	.014	56 13 51	-.01
AL JABHAH	ETA LEO	A0	3.6	13899	10 4 36.6	.000	17 0 26	-.01
ALKAID	ETA UMA	B3	1.9	18643	13 45 34.3	-.012	49 33 44	-.02
ALKALUROPS	MU 1 BOO	A7	4.5	20724	15 22 36.0	-.012	37 33 5	.00
ALKAUROPS	SEE ALKALUROPS							
ALKES	ALPHA CRT	K1	4.2	15106	10 57 20.2	-.032	-18 -1 -56	.12
ALMACH	GAMMA1 AND	K2	2.3	2477	2 0 49.2	.004	42 5 27	-.05
ALMAK	SEE ALMACH							
ALMUREDIN	SEE VINDEMIATRIX							
ALNAIR	ALPHA GRU	B5	2.2	30942	22 5 5.4	.012	-47 -12 -15	-.15
ALNASL	GAMMA SGR	K0	3.1	24632	18 2 35.7	-.004	-30 -25 -36	-.19
AL NATH	SEE EL NATH							
ALNILAM	EPSILO ORI	B0	1.8	6960	5 33 40.5	.000	-1 -13 -56	.00
ALNITAK	ZETA ORI	B0	2.0	7089	5 38 14.1	.000	-1 -58 -3	.00
ALPHARD	SEE ALFARD							
ALPHECCA	ALPHA CRB	A0	2.3	20947	15 32 34.2	.009	26 52 54	-.10
ALPHERATZ	ALPHA AND	B8	2.2	127	0 5 47.8	.010	28 48 52	-.16
AL PHERG	ETA PSC	G3	3.7	1839	1 28 48.2	.002	15 5 19	-.01
ALPHIRK	BETA CEP	B2	3.3	30118	21 28 1.4	.002	70 20 20	.01
ALPAI	GAMMA CEP	K1	3.4	32875	23 37 16.6	-.020	77 21 12	.15
ALRAKIS	SEE ARRAKIS							
ALRAMI	SEE RUKBAT							
ALRISHA	ALPHA PSC	A2	3.9	2452	1 59 27.4	.002	2 31 23	.00
ALRUCCABA	SEE POLARIS							
ALSHAIN	BETA AQL	G8	3.9	27587	19 52 51.4	.003	6 16 50	-.48
ALSHAT	NU CAP	A0	4.8	28282	20 17 53.5	.001	-12 -55 -5	-.02
ALSUHAIL	LAMBDA VEL	K4	2.2	12623	9 6 9.3	-.002	-43 -13 -48	.01
ALTAIR	ALPHA AQL	A7	0.9	27470	19 48 20.6	.036	8 44 5	.30
ALTAIS	SEE NODUS II							
AL TARF	BETA CNC	K4	3.8	11254	8 13 48.3	-.003	9 20 20	-.05
ALTERF	LAMBDA LEO	K5	4.5	13143	9 20 52.3	-.002	23 11 22	-.04
ALUDRA	ETA CMA	B5	2.4	9886	7 22 7.0	.000	-29 -12 -16	.00
ALULA AUSTRALE	XI UMA	G0	3.9	15537	11 15 31.2	-.034	31 48 39	-.59
ALULA BOREALE	NU UMA	K3	3.7	15547	11 15 47.0	-.002	33 22 2	.02
ALWAID	BETA DRA	G2	3.0	23741	17 29 18.1	-.002	52 20 15	.01
AL WAZOR	SEE WEZEN							
ALYA	THETA1 SER	A5	4.5	25991	18 53 44.0	.003	4 8 13	.03
ALZIRR	XI GEM	F5	3.4	8823	6 42 29.0	-.008	12 57 4	-.20
ANCHA	THETA AQR	G6	4.3	31152	22 14 11.8	.008	-8 -1 -59	-.02
ANGETENAR	TAU 2 ERI	K0	4.8	3429	2 48 46.2	-.004	-21 -12 -33	-.01
ANKAA	ALPHA PHE	G5	2.4	519	0 23 49.0	.018	-42 -34 -39	-.40
ANTARES	ALPHA SCO	MP	1.2	22157	16 26 20.2	-.001	-26 -19 -22	-.03
ANTILICUS	SEE KORNEPHOROS							
ARCTURUS	ALPHA BOO	K2	0.2	19242	14 13 22.8	-.078	19 26 31	-2.00
ARICH	SEE PORRIMA							
ARIDED	SEE DENEB ADIGE							
ARKAB POSTERIOR	BETA2 SGR	A9	4.5	26718	19 19 36.6	.009	-44 -53 -45	-.06

STAR NAME	CONSTELLAT	SP	MAG	GC #	RA	PM	DEC	PM
ARKAB PRIOR	BETA1	SGR	B8	4.2 26703	19 19 2.8	.000	-44 -33 -18	-.02
ARKEB POSTERIOR	SEE ARKAB POSTERIOR							
ARKEB PRIOR	SEE ARKAB PRIOR							
ARMUS	ETA	CAP	A4	4.9 29419	21 1 33.7	-.003	-20 -3 -14	-.04
ARNEB	ALPHA	LEP	F0	2.7 6875	5 30 31.4	.000	-17 -51 -24	.00
ARRAI	SEE ALRAI							
ARRAKIS	MU	DRA	F6	5.1 23092	17 4 17.4	-.009	54 32 8	.08
ASCELLA	ZETA	SGR	A4	2.7 26161	18 59 25.9	-.002	-29 -57 -13	.00
ASELLUS AUSTRAL	DELTA	CNC	K0	4.2 12022	8 41 50.8	-.001	18 20 22	-.24
ASELLUS BOREALI	GAMMA	CNC	A0	4.7 11982	8 40 23.7	-.007	21 38 59	-.04
ASPIDISKE	SEE TUREIS							
ASTERION	BETA	CVN	G0	4.3 17127	12 31 22.3	-.063	41 37 44	.28
ASTEROPE	21	TAU	B9	5.8 4502	3 42 55.4	.001	24 24 0	-.04
ATIKS	OMICRO	PER	B1	3.8 4461	3 41 10.6	.001	32 7 53	-.01
ATLAS	27	TAU	B9	3.8 4586	3 46 11.0	.001	23 54 7	-.04
ATPIA	ALPHA	TRA	K5	1.9 22558	16 43 21.0	.004	-68 -56 -20	-.04
AUVA	DELTA	VIR	M3	3.7 17543	12 53 5.0	-.031	3 40 7	-.06
AVIOR	EPSILO	CAR	K0	1.7 11463	8 21 29.4	-.004	-59 -20 -53	.01
AZELFAFAGE	PI 1	CYG	B3	4.8 30391	21 40 19.0	.000	50 57 39	.00
AZHA	ETA	ERI	K2	4.0 3539	2 53 59.0	.005	-9 -5 -46	-.21
AZIMECH	SEE SPICA							
AZMIDISKE	XI	PUP	G6	3.5 10562	7 47 11.4	.000	-24 -43 -59	.00
BAHAM	SEE BIHAM							
BATEN KAITOS	ZETA	CET	K0	3.9 2249	1 48 59.4	.002	-10 -34 -53	-.04
BECRUX	SEE MIMOSA							
BEID	OMIC1	ERI	F1	4.1 5056	4 9 25.4	.001	-6 -58 0	.09
BELLATRIX	GAMMA	ORI	B2	1.7 6668	5 22 26.9	.000	6 18 22	-.01
BENETNASH	SEE ALKAID							
BETELGEUSE	ALPHA	ORI	M2	VAR 7451	5 52 27.8	.002	7 23 58	.01
BIHAM	THETA	PEG	A2	3.7 31013	22 7 40.6	.018	5 57 4	.03
BOS	RHO	CAP	F1	5.0 28481	20 26 .6	-.001	-17 -58 -50	-.02
BOTEIN	DELTA	ARI	K2	4.5 3805	3 8 45.9	.011	19 32 20	-.01
BUNGULA	SEE TOLIMAN							
CANICULA	SEE SIRIUS							
CANOPUS	ALPHA	CAR	F0-0.9	8302	6 22 50.5	.002	-52 -40 -4	.02
CAPELLA	ALPHA	AUR	GG	0.2 6427	5 12 59.5	.008	45 56 58	-.43
CAPH	BETA	CAS	F2	2.4 147	0 6 29.8	.068	58 52 27	-.18
CAPHIR	SEE PORRIMA							
CAPULUS	33Hvi	PEP	C	4.4 869	2 15 30.0	.000	56 55 0	.00
CASTOR	ALPHA	GEM	AA	1.6 10120	7 31 24.7	-.013	31 59 58	-.11
CASTRA	EPSILO	CAP	B5	4.7 30252	21 34 17.0	.001	-19 -41 -20	.00
CEBALRAI	SEE KELB ALRAI							
CEGINUS	PHI	POO	G5	5.4 21032	15 36 1.8	.005	40 30 55	.05
CELAENO	16	TAU	B7	5.4 4475	3 41 49.5	.001	24 8 1	-.04
CHARA (AL CVN)	SEE COR CAROLI							
CHARA (BE CVN)	SEE ASTERION							
CHELEB	SEE KELB ALRAI							
CHERTAN	SEE COXA							
CHORT	SEE COXA							
CIH	GAMMA	CAS	B0	VAR 1117	0 53 40.3	.004	60 26 47	.00
COPULA	M51	CVN	N	8.1 5194	13 27 48.0	.000	47 27 0	.00
COR CAROLI	ALPHA2	CVN	A0	2.9 17557	12 53 41.5	-.020	38 35 17	.05
COR HYDRAE	SEE ALFARD							
COR LEONIS	SEE REGULUS							
COR SCORPII	SEE ANTARES							
COR SERPENTIS	SEE UNUKALHAI							
COXA	THETA	LEO	A4	3.4 15441	11 11 37.1	-.004	15 42 11	-.08
CUJAM	SEE KAJAM							
CURSA	BETA	ERI	A3	2.9 6274	5 5 23.4	-.006	-5 -8 -58	-.08
CYNOSURA	SEE POLARIS							

STAR NAME	CONSTELLAT	SP	MAG	GC #	RA	PM	DEC	PM
DABIH	BETA	CAP	FP	3.2 28295	20 18 12.2	.003	-14 -56 -27	.00
DENEB (AL CYG)	SEE DENEB ADIGE							
DENEB (ZE AQL)	SEE DHENEB							
DENEB ADIGE	ALPHA	CYG	A2	1.3 28846	20 39 43.5	.000	45 6 3	.00
DENEB ALGEDI	DELTA	CAP	A5	3.0 30491	21 44 17.0	.010	-16 -21 -19	-.29
DENEB CYGNI	SEE DENEB ADIGE							
DENEB KAITOS	BETA	CET	K0	2.2 865	0 41 4.8	.016	-18 -15 -39	.04
DENEB OKAB	DELTA	AQL	A5	3.4 26816	19 22 58.6	.017	3 0 49	.08
DENEBOLA	BETA	LEO	A4	2.2 16189	11 46 30.6	-.034	14 51 6	-.12
DHENEB	ZETA	AQL	B9	3.0 26270	19 3 6.7	-.001	13 47 15	-.10
DIADEM	ALPHA	COM	F4	4.3 17833	13 7 33.3	-.030	17 47 36	.13
DIFDA	SEE DENEB KAITOS							
DIPHDA	SEE DENEB KAITOS							
DIRAH	SEE TEJAT POSTERIOR							
DORSUM	THETA	CAP	A0	4.2 29460	21 3 8.3	.006	-17 -25 -58	-.06
DSCHUBBA	DELTA	SCO	B0	2.5 21489	15 57 22.3	-.001	-22 -28 -52	-.03
DUBHE	ALPHA	UMA	K0	2.0 15185	11 0 39.5	-.017	62 1 17	-.07
DUHR	SEE ZOSMA							
DZIBAN	PSI 1	DRA	F5	4.9 24089	17 42 49.3	.004	72 10 26	-.27
EDASICH	IOTA	DRA	K2	3.5 20747	15 23 48.8	-.001	59 8 26	.01
ELACRAB	SEE ACRAB							
ELECTRA	17	TAU	B5	3.8 4477	3 41 54.1	.002	23 57 28	-.04
ELGOMAISA	SEE PROCYON							
EL KOPHRAH	CHI	UMA	K1	3.8 16137	11 43 25.0	-.014	48 3 24	.02
EL NATH	BETA	TAU	B7	1.8 6681	5 23 7.8	.002	28 34 2	-.18
ELTANIN	SEE ETAMIN							
ENIF	EPSILO	PEG	K2	2.5 30431	21 41 43.7	.002	9 38 41	.00
ENSIS	M42	ORI	N	4.0 1976	5 32 49.0	.000	-5 -25 -16	.00
ERAKIS	MU	CEP	M2	VAR 30440	21 41 58.5	.000	58 33 0	.00
ERRAI	SEE ALRAI							
ETAMIN	GAMMA	DRA	K5	2.4 24432	17 55 26.6	-.001	51 29 38	-.02
FACIES	M22	SGR	C	5.9 6656	18 33 18.0	.000	-23 -58 0	.00
FOM	SEE ENIF							
FOMALHAUT	ALPHA	PSA	A2	1.3 32000	22 54 53.5	.025	-29 -53 -16	-.16
FORAMEN	ETA	CAR	P	VAR 14799	10 43 6.9	.000	-59 -25 -16	.00
FURUD	ZETA	CMA	B5	3.1 8170	6 18 23.6	.000	-30 -2 -24	.00
GACRUX	GAMMA	CRU	M4	1.6 17052	12 28 22.7	.003	-56 -50 -1	-.27
GEMMA	SEE ALPHECCA							
GIANFAR	SEE GIANSAR							
GIANSAR	LAMBDA	DRA	M0	4.1 15799	11 28 27.5	-.008	69 36 26	-.02
GIAUSAR	SEE GIANSAR							
GIEDI PRIMA	ALPH1	CAP	G5	4.6 28189	20 14 52.6	.001	-12 -39 -51	.00
GIEDI SECUNDA	ALPH2	CAP	G8	3.8 28200	20 15 16.9	.004	-12 -42 -5	.00
GIENAH (CRV)	GAMMA	CRV	B8	2.8 16740	12 13 13.9	-.011	-17 -15 -52	.02
GIENAH (CYG)	EPSILO	CYG	K0	2.6 28959	20 44 11.2	.028	33 46 55	.32
GNOSIA	SEE ALPHECCA							
GOMEISA	BETA	CMI	B8	3.1 9947	7 24 26.4	-.003	8 23 30	-.04
GORGONA	SEE ALGOL							
GRAFIAS	ZETA 2	SCO	K5	3.8 22751	16 51 3.6	-.011	-42 -16 -40	-.24
GRAFFIAS	SEE ACRAB							
GREDI	SEE GIEDI							
GRUMIUM	XI	DRA	K3	3.9 24364	17 52 39.7	.011	56 52 47	.07
HADAR	SEE AGENA							
HAMAL	ALPHA	ARI	K2	2.2 2538	2 4 20.9	.014	23 13 37	-.15
HAN	ZETA	OPH	O9	2.7 22332	16 34 24.1	.001	-10 -28 -3	.02
HARIS	SEE SEGINUS							
HASSELEH	IOTA	AUR	K3	2.9 6029	4 53 44.0	.001	33 5 20	-.02
HATSYA	IOTA	ORI	O9	2.9 6937	5 32 59.2	.000	-5 -56 -28	.00
HEKA	SEE MEISSA							
HEZE	ZETA	VIR	A2	3.4 18351	13 32 8.6	-.019	0 -20 -20	.03

STAR NAME	CONSTELLAT	SP	MAG	GC #	RA	PM	DEC	PM
HOEDUS I	ZETA AUR	KB	VAR	6137	4 58 58.7	.001	41 0 10	-.02
HOEDUS II	ETA AUR	B3	3.3	6226	5 3 .2	.003	41 10 8	-.07
HOMAN	ZETA PEG	B8	3.6	31664	22 38 58.0	.005	10 34 11	-.01
HYADUM I	SEE PRIMA HYADUM							
HYADUM II	DELTA TAU	G8	3.9	5304	4 20 2.9	.008	17 25 37	-.03
ISIDIS	SEE DSCHUBBA							
IZAR	EPSILO BOO	K0	2.7	19856	14 42 48.2	-.004	27 17 2	.01
JABBAH	NU SCO	B2	4.3	21773	16 9 5.1	-.001	-19 -19 -57	-.03
KAFFA	SEE MEGREZ							
KAFFALJIDHMA	GAMMA CET	AF	3.6	3276	2 40 42.4	-.009	3 1 34	-.15
KAITAIN	SEE ALRISHA							
KAJAM	OMEGA HER	A2	4.5	22090	16 23 6.4	.003	14 8 49	-.06
KALB	SEE REGULUS							
KAUS AUSTRALIS	EPSILO SGR	B9	2.0	25100	18 20 51.2	-.003	-34 -24 -37	-.13
KAUS BOREALIS	LAMBDA SGR	K1	2.9	25180	18 24 53.0	-.004	-25 -27 -4	-.19
KAUS MEDIUS	DELTA SGR	K2	2.8	25024	18 17 47.6	.003	-29 -51 -5	-.03
KEID	OMIC2 ERI	K0	4.5	5138	4 12 58.2	-.150	-7 -43 -46	-3.42
KELB ALPAI	BETA OPH	K1	2.9	24048	17 41 .0	-.003	4 35 11	.15
KEPP	TAU PEG	A5	4.6	32503	23 18 9.5	.002	23 27 59	-.01
KHAMBALIA	LAMBDA VIR	A2	4.6	19311	14 16 24.0	-.001	-13 -8 -31	.02
KIFFA AUSTRALIS	SEE ZUBEN ELGENUBI							
KIFFA BOREALIS	SEE ZUBEN ELSCHEMALI							
KITALPHA	ALPHA EQU	FA	4.1	29735	21 13 19.4	.004	5 2 24	-.09
KOCHAB	BETA UMI	K4	2.2	20029	14 50 49.7	-.008	74 21 35	.01
KORNEPHOROS	BETA HER	G8	2.8	22193	16 28 4.1	-.007	21 35 50	-.02
KRAZ	BETA CRV	G4	2.8	17133	12 31 45.4	.000	-23 -7 -14	-.06
KSORA	SEE RUCHA							
KUMA	NU 1 DRA	A8	5.0	23797	17 31 11.3	.017	55 13 4	.05
KURDAH	XI CEP	FG	4.6	30877	22 2 20.5	.032	64 23 2	.09
KURHAH	SEE KURDAH							
KURSA	SEE CURSA							
LABRUM	DELTA CRT	K0	3.8	15567	11 16 50.3	-.009	-14 -30 -28	-.20
LESATH	UPSILO SCO	B3	2.8	23693	17 27 21.7	.000	-37 -15 -29	-.04
MAASYM	LAMBDA HER	K4	4.5	23726	17 28 43.0	.001	26 8 49	.02
MAIA	20 TAU	B9	4.0	4500	3 42 50.8	.002	24 12 47	-.04
MANUBRIUM	OMICRO SGR	G8	3.9	26224	19 1 41.2	.006	-21 -49 0	-.06
MARFIK	LAMBDA OPH	A1	3.8	22203	16 28 23.4	-.002	2 5 31	-.08
MARKAB	ALPHA PEG	B9	2.6	32149	23 2 16.1	.004	14 56 9	-.04
MARKEB	KAPPA VEL	B3	2.6	12938	9 20 33.9	-.001	-54 -47 -48	.00
MARSIK	KAPPA HER	G4	5.3	21696	16 5 49.0	-.003	17 10 43	-.02
MATAR	ETA PEG	G2	3.1	31706	22 40 39.3	.001	29 57 33	-.02
MEBSUTA	EPSILO GEM	G8	3.2	8786	6 40 51.4	.000	25 10 57	-.02
MEGREZ	DELTA UMA	A3	3.4	16736	12 12 57.6	.013	57 18 37	.00
MEISSA	LAMBDA ORI	O8	3.7	6915	5 32 22.9	.000	9 54 8	-.01
MEKAR	SEE MENKAR							
MEKPUDA	ZETA GEM	G0	VAR	9313	7 1 8.7	.000	20 30 43	.00
MELLELAH	SEE METALLAH							
MENKALINAN	BETA AUR	A2	VAR	7543	5 55 51.6	-.005	44 56 41	.00
MENKAR	ALPHA CET	M2	2.8	3643	2 59 39.8	-.001	3 53 41	-.07
MENKENT	THETA CEN	G9	2.3	19033	14 3 43.9	-.043	-36 -7 -30	-.52
MENKHIB	SEE MENKIB							
MENKIB	XI PER	O7	4.0	4779	3 55 42.9	.001	35 38 56	.00
MEPAK	BETA UMA	A1	2.4	15145	10 58 50.3	.010	56 39 3	.03
MEREZ	SEE NEKKAR							
MERGA	38 BOO	F4	5.8	19959	14 47 31.7	.000	46 19 25	-.08
MEROPE	23 TAU	B5	4.2	4512	3 43 21.2	.002	23 47 39	-.04
MESARTHIM	GAMMA1 ARI	A0	4.8	2290	1 50 46.9	.005	19 3 6	-.11
METALLAH	ALPHA TRI	F2	3.6	2272	1 50 13.4	.001	29 20 10	-.23
MIAPLACIDUS	BETA CAR	A0	1.8	12764	9 12 39.7	-.029	-69 -30 -40	.10
MIMOSA	BETA CRU	B1	1.5	17374	12 44 47.1	-.005	-59 -24 -57	-.03

STAR NAME	CONSTELLAT	SP	MAG	GC #	RA	PM	DEC	PM
MINELAUVA	SEE AUVA							
MINKAR	EPSILO CRV	K3	3.2	16618	12 7 32.9	-.005	-22 -20 -30	.01
MINTAKA	DELTA ORI	O9	2.5	6847	5 29 27.0	.000	0 -20 -4	.00
MIRA	OMICRO CET	M6	VAR	2796	2 16 49.0	-.001	-3 -12 -13	-.23
MIRACH	BETA AND	M0	2.4	1400	1 6 55.5	.014	35 21 22	-.11
MIRAK	SEE IZAR							
MIRAM	ETA PER	K4	3.9	3390	2 47 2.0	.002	55 41 22	-.01
MIRFAK	ALPHA PER	F5	1.9	4041	3 20 44.4	.003	49 41 6	-.02
MIRZAM	BETA CMA	B1	2.0	8223	6 20 29.8	.000	-17 -55 -47	.00
MISAM	KAPPA PER	G8	4.0	3755	3 6 6.8	.017	44 40 10	-.16
MIZAR	ZETA UMA	A2	2.4	18133	13 21 55.0	.014	55 11 9	-.03
MOTHALLAH	SEE METALLAH							
MUFRID	ETA BOO	G0	2.8	18805	13 52 18.2	-.004	18 38 51	-.36
MULIPHEIN	GAMMA CMA	B8	4.1	9320	7 1 29.8	.000	-15 -33 -29	-.01
MURZIM	SEE MIRZAM							
MUSCIDA	OMICRO UMA	G1	3.5	11593	8 26 7.7	-.018	60 53 14	-.11
MUSEIDA	SEE MUSCIDA							
NAOS	ZETA PUP	O5	2.3	10947	8 1 49.6	-.003	-39 -51 -41	.01
NASH	SEE ALNASL							
NASHIRA	GAMMA CAP	F2	3.8	30320	21 37 19.4	.013	-16 -53 -21	-.02
NATH	SEE EL NATH							
NEKKAR	BETA BOO	G5	3.6	20226	15 0 3.7	-.004	40 35 12	-.04
NIHAL	BETA LEP	G2	3.0	6762	5 26 6.1	.000	-20 -47 -53	-.09
NODUS I	ZETA DRA	B5	3.2	23182	17 8 38.2	-.003	65 46 34	.02
NODUS II	DELTA DRA	G8	3.2	26520	19 12 32.9	.016	67 34 25	.09
NORTH ASELLUS	SEE ASELLUS BOREALIS							
NORTH SCALE	SEE ZUBEN ELSCHEMALI							
NUNKI	SIGMA SGR	B3	2.1	25941	18 52 9.9	.001	-26 -21 -39	-.06
NUSAKAN	BETA CRB	A8	3.7	20795	15 25 46.0	-.014	29 16 37	.08
NUSHABA	SEE NASH							
OCULUS	PI CAP	B8	5.2	28442	20 24 27.6	.001	-18 -22 -38	-.01
OKDA	SEE ALRISHA							
PALILICIUM	SEE ALDEBARAN							
PEACOCK	ALPHA PAV	B3	2.1	28374	20 21 42.2	.001	-56 -53 -50	-.09
PELAGUS	SEE NUNKI							
PHACT	ALPHA COL	B8	2.8	7878	5 37 50.2	.000	-34 -5 -59	-.03
PHAD	SEE PHECDA							
PHAKT	SEE PHACT							
PHECDA	GAMMA UMA	A0	2.5	16268	11 51 12.6	.011	53 58 22	.00
PHERKAD	GAMMA UMI	A2	3.1	20692	15 20 47.4	-.004	72 0 43	.02
PHERKAPD	SEE YILDUN							
PLEIONE	28 TAU	B8	VAR	4587	3 46 12.4	.001	23 59 7	-.05
POLARIS	ALPHA UMI	F8	2.1	2243	1 48 48.5	.181	89 1 44	.00
POLIS	MU SGR	B8	VAR	24856	18 10 46.3	.000	-21 -4 -26	.00
POLLUX	BETA GEM	K0	1.2	10438	7 42 15.6	-.047	28 8 55	-.05
PORRIMA	GAMMA VIR	FF	2.9	17270	12 39 7.5	-.038	-1 -10 -32	.00
PRAECIPUA	OMICRO LMI	K2	3.9	14961	10 50 31.3	.007	34 29 5	-.29
PRAESAEPE	M44 CNC	C	3.7	2632	8 37 30.0	.000	19 52 0	.00
PRIMA HYADUM	GAMMA TAU	G9	3.9	5226	4 16 56.7	.008	15 30 31	-.02
PRINCEPS	DELTA BOO	G4	3.5	20523	15 13 29.1	.007	33 30 1	-.12
PROCYON	ALPHA CMI	F5	0.5	10277	7 36 41.1	-.047	5 21 16	-1.03
PROPUS	ETA GEM	M3	VAR	7969	6 11 51.5	-.005	22 31 23	-.02
PULCHERRIMA	SEE IZAR							
RANA	DELTA ERI	K0	3.7	4458	3 40 51.1	-.006	-9 -55 -53	.74
RAS ALGETHI	ALPHA1 HER	M5	VAR	23277	17 12 22.0	-.001	14 26 45	.03
RAS ALHAGUE	ALPHA OPH	A5	2.1	23837	17 32 36.7	.008	12 35 42	-.23
RAS ELASED AUSTE	PSILO LEO	G3	3.1	13443	9 43 1.0	-.003	24 0 19	-.02
RAS ELASED POPE	MU LEO	K3	4.1	13590	9 49 55.4	-.016	26 14 36	-.06
RASSALAS	SEE RAS ELASED BOREALIS							
RASTABAN(B DRA)	SEE ALWAID							

STAR NAME	CONSTELLAT	SP	MAG	GC #	RA	PM	DEC	PM
RASTABAN(G DRA)	SEE ETAMIN							
REDA	SEE TARAZED							
REGULUS	ALPHA LEO	B7	1.3	13926	10 5 42.7	-.017	12 12 44	.00
RESCHA	SEE ALRISHA							
RIGEL	BETA ORI	B8	0.3	6410	5 12 8.0	.000	-8 -15 -29	.00
RIGEL KENT	SEE TOLIMAN							
ROTANEV	BETA DEL	F3	3.7	28709	20 35 12.2	.007	14 25 12	-.03
RUCHA	DELTA CAS	A5	2.8	1715	1 22 31.5	.040	59 58 34	-.05
RUCHBAH	SEE RUCHA							
RUCKBAR	SEE RUCHA							
RUKBAT	ALPHA SGR	B9	4.1	26737	19 20 25.5	.003	-40 -42 -43	-.12
RUTICULUS	SEE KORNEPHOROS							
SAAK	SEE MUFRID							
SABIK	ETA OPH	A2	2.6	23158	17 7 30.5	.002	-15 -39 -53	.09
SADACHBIA	SEE SADALACHBIA							
SADALACHBIA	GAMMA AQR	A0	4.0	31257	22 19 4.4	.008	-1 -38 -24	.01
SADALBARI	MU PEG	G6	3.7	31851	22 47 35.2	.011	24 20 14	-.04
SADALMELEK	ALPHA AQR	G1	3.2	30896	22 3 12.9	.001	0 -33 -49	.00
SADALSUUD	BETA AQR	G0	3.1	30137	21 28 55.6	.001	-5 -47 -32	-.01
SADATONI	SEE HOEDUS I							
SADIR	SEE SADOR							
SADOR	GAMMA CYG	F8	2.3	28338	20 20 25.9	.000	40 5 44	.00
SADP	SEE SADOR							
SAIPH	KAPPA ORI	B0	2.2	7264	5 45 23.0	.000	-9 -41 -9	.00
SALM	SEE KEPP							
SAPGAS	THETA SCO	F0	2.0	23857	17 33 43.4	.001	-42 -58 -5	.00
SARIN	DELTA HER	A3	3.2	23294	17 12 58.6	-.002	24 53 48	-.16
SCEPTRUM	53 ERI	K4	4.0	5657	4 35 53.3	-.005	-14 -24 -2	-.16
SCHEAT	BETA PEG	M2	2.6	32135	23 1 20.8	.014	27 48 40	.14
SCHEAT (DE AQR)	SEE SKAT							
SCHEDDI	SEE DENEB ALGEDI							
SCHEDAR	SEE SCHEDIR							
SCHEDIR	ALPHA CAS	K0	2.5	792	0 37 39.3	.006	56 15 49	-.03
SEGIN	EPSILO CAS	B3	3.4	2289	1 50 46.4	.005	63 25 30	-.02
SEGINUS	GAMMA BOO	A7	3.0	19607	14 30 3.9	-.010	38 31 34	.15
SERTAN	SEE ACUBENS							
SHAM	ALPHA SGE	F8	4.4	27215	19 37 51.6	.001	17 53 51	-.02
SHARATAN	SEE SHERATAN							
SHAULA	LAMBDA SCO	B2	1.7	23769	17 30 12.6	.000	-37 -4 -10	-.03
SHELIAK	BETA LYR	BB	VAR	25847	18 48 14.0	.000	33 18 12	-.01
SHERATAN	BETA ARI	A5	2.7	2309	1 51 52.3	.007	20 33 52	-.11
SINISTRA	NU OPH	K0	3.5	24468	17 56 16.3	-.001	-9 -46 -9	-.12
SIRIUS	ALPHA CMA	A1	-1.4	8833	6 42 56.7	-.037	-16 -38 -46	-1.21
SIRRAH	SEE ALPHERATZ							
SITULA	KAPPA AQR	K1	5.3	31581	22 35 10.0	-.005	-4 -29 -11	-.11
SKAT	DELTA AQR	A2	3.5	31943	22 51 59.9	-.003	-16 -5 -14	-.02
SOUTH ASELLUS	SEE ASELLUS AUSTRALIS							
SOUTH SCALE	SEE ZUBEN ELGENUBI							
SPICA	ALPHA VIR	B2	1.2	18144	13 22 33.3	-.003	-10 -54 -4	-.04
SPICULUM(M20M21M8)	SGR N		6.0	6523	18 1 36.0	.000	-24 -20 0	.00
STEROPE	SEE ASTEROPE							
SUALOCIN	ALPHA DEL	B8	3.9	28780	20 37 18.9	.004	15 44 4	.00
SUPPA	OMICRO LEO	A8	3.8	13366	9 38 29.8	-.010	10 7 15	-.04
SUHAIL	SEE ALSUHAIL							
SUHEL	SEE CANOPUS							
SULAPHAT	GAMMA LYR	B9	3.3	26086	18 57 4.3	.000	32 37 11	.00
SVALOCIN	SEE SUALOCIN							
SYRMA	IOTA VIR	F5	4.2	19244	14 13 23.3	-.001	-5 -45 -46	-.43
TABIT	PI 3 ORI	F5	3.3	5875	4 47 7.4	.031	6 52 32	.02
TALITHA	IOTA UMA	A4	3.1	12407	8 55 47.6	-.044	48 14 22	-.24

STAR NAME	CONSTELLAT	SP	MAG	GC #	RA	PM	DEC	PM
TANIA AUSTRALIS	MU UMA	M0	3.2	14232	10 19 21.5	-.007	41 45 6	.02
TANIA BOREALIS	LAMBDA UMA	A2	3.5	14113	10 14 5.4	-.015	43 9 53	-.04
TARAZED	GAMMA AQL	K3	2.8	27354	19 43 52.9	.001	10 29 24	.00
TAYGETA	19 TAU	B7	4.4	4486	3 42 13.6	.002	24 18 43	-.04
TEJAT POSTERIOR	MU GEM	M3	3.2	8208	6 19 56.1	.004	22 32 28	-.11
TEJAT PRIOR	SEE PROPUS							
TEREBELLUM	OMEGA SGR	G5	4.8	27583	19 52 46.7	.015	-26 -26 -2	.08
THEEMIN	UPSI2 ERI	K0	3.9	5614	4 33 36.3	-.004	-30 -39 -49	-.01
THUBAN	ALPHA DRA	A0	3.6	19019	14 3 2.0	-.008	64 36 51	.01
TOLIMAN	ALPHA CEN	GK	0.1	19728	14 36 11.2	-.498	-68 -37 -49	.70
TUREIS	IOTA CAR	F0	2.2	12031	9 15 45.1	-.002	-59 -3 -54	.00
TYL	EPSILO DRA	G3	4.0	27471	19 48 21.1	.015	70 0 26	.04
UNUKALHAI	ALPHA SER	K2	2.8	21158	15 41 48.2	.009	6 34 53	.04
VEGA	ALPHA LYR	A1	0.1	25466	18 35 14.7	.017	38 44 9	.28
VERTEX	M31 AND	N	4.8	224	0 40 .0	.000	41 0 0	.00
VESPERTILIO	SEE ANTARES							
VINDEMIATRIX	EPSILO VIR	G6	3.0	17687	12 59 41.2	-.019	11 13 39	.02
WASAT	DELTA GEM	A8	3.5	9755	7 17 8.3	-.001	22 4 34	-.02
WAZN	BETA COL	K1	3.2	7364	5 49 11.7	.004	-35 -47 -10	.40
WEGA	SEE VEGA							
WEZEN	DELTA CMA	G3	2.0	9443	7 6 21.5	.000	-26 -18 -45	.00
YED POSTERIOR	EPSILO OPH	G0	3.3	21920	16 15 40.4	.006	-4 -34 -20	.04
YED PRIOR	DELTA OPH	M1	3.0	21838	16 11 43.3	-.003	-3 -34 -2	-.15
YILDUN	DELTA UMI	A0	4.4	24236	17 48 18.5	.012	86 36 35	.05
ZANIAH	ETA VIR	A0	4.0	16813	12 17 20.8	-.004	0 -23 -21	-.02
ZAURAK	GAMMA ERI	M0	3.2	4778	3 55 41.7	.004	-13 -38 -58	-.11
ZAVIJAH	SEE ZAVIJAVA							
ZAVIJAVA	BETA VIR	F8	3.8	16215	11 48 5.4	.050	2 2 47	-.28
ZIBAL	ZETA ERI	A3	4.9	3899	3 13 24.1	.000	-9 0 -15	.05
ZIBEL	SEE ZIBAL							
ZOSMA	DELTA LEO	A2	2.6	15438	11 11 27.1	.010	20 47 52	-.14
ZUBEN ELAKRAB	GAMMA LIB	G6	4.0	20949	15 32 43.5	.004	-14 -37 -28	.00
ZUBEN ELAKRIBI	DELTA LIB	A1	VAR	20195	14 58 17.0	-.004	-8 -19 -18	-.01
ZUBEN ELGENUBI	ALPHA2 LIB	A3	2.9	19975	14 48 6.5	-.007	-15 -50 -7	-.07
ZUBENELSCHEMALI	BETA LIB	B8	2.7	20539	15 14 18.7	-.007	-9 -11 -59	-.03
ZUBENESCH	SEE ZUBEN ELSCHEMALI							
ZUBENESCHEMALI	SEE ZUBEN ELSCHEMALI							
ZUBEN HAKRABI	NU LIB	K5	5.3	20311	15 3 49.9	-.003	-16 -3 -51	-.03

2980 RECORDS WRITTEN TO FILE

ASTROCARTOGRAPHIC POINTS FOR MICHAEL ERLEWINE
BORN 7/18/1941 AT 16: 3 S TIME IN ZONE 5.00
AT LATITUDE 40 N 2 AND LONGITUDE 76 W 18

PLANET	ON UPPER MERIDIAN LONGITUDE	ZENITH LATITUDE	LOWER MERIDIAN LONGITUDE	NADIR LATITUDE
SUN	134 W 14	20 N 59	45 E 46	20 S 59
MOON	160 E 12	14 N 25	19 W 48	14 S 25
MERC	154 W 14	19 N 47	25 E 46	19 S 47
VENU	109 W 10	16 N 21	70 E 50	16 S 21
MARS	117 E 47	0 N 13	62 W 13	0 S 13
CERE	14 E 6	27 S 41	165 W 54	27 N 41
PALL	10 W 39	22 N 29	169 E 21	22 S 29
JUNO	85 W 7	7 N 38	94 E 53	7 S 38
VEST	82 W 50	10 N 55	97 E 10	10 S 55
JUPI	178 E 24	21 N 32	1 W 36	21 S 32
SATU	162 E 17	17 N 15	17 W 43	17 S 15
URAN	165 E 12	19 N 49	14 W 48	19 S 49
NEPT	75 W 45	2 N 59	104 E 15	2 S 59
PLUT	124 W 57	23 N 29	55 E 3	23 S 29
N ND	76 W 2	1 N 44	103 E 58	1 S 44

LONGITUDES ON EARTH OF ECLIPTIC ASPECTS TO MIDHEAVEN
0 IS CONJUNCT MIDHEAVEN, 180 IS CONJUNCT IC

ASPECTS PLANETS	-150	-120	-90	-60	-30	0
SUN	76 E 2	104 E 8	131 E 54	161 E 27	166 W 36	134 W 14
MOON	10 E 53	43 E 19	73 E 47	102 E 0	129 E 42	159 E 4
MERC	57 E 43	87 E 1	114 E 43	142 E 58	173 E 30	154 W 2
VENU	98 E 43	126 E 22	155 E 27	172 W 59	140 W 28	109 W 41
MARS	35 W 19	4 W 38	27 E 52	59 E 30	88 E 40	116 E 20
CERE	133 W 26	103 W 14	75 W 11	47 W 23	17 W 46	14 E 14
PALL	169 W 26	136 W 59	106 W 29	78 W 16	50 W 34	21 W 13
JUNO	121 E 47	150 E 30	178 W 19	145 W 45	114 W 34	85 W 51
VEST	122 E 31	151 E 18	177 W 27	144 W 54	113 W 46	85 W 6
JUPI	30 E 50	62 E 16	91 E 13	118 E 51	147 E 22	178 E 18
SATU	13 E 44	46 E 5	76 E 20	104 E 24	132 E 11	161 E 46
URAN	17 E 18	49 E 31	79 E 29	107 E 25	135 E 18	165 E 9
NEPT	131 E 31	161 E 2	167 W 3	134 W 40	104 W 22	76 W 15
PLUT	83 E 33	111 E 21	139 E 24	169 E 38	158 W 1	126 W 2
N ND	131 E 44	161 E 17	166 W 47	134 W 24	104 W 7	76 W 2

ASPECTS PLANETS	30	60	90	120	150	180
SUN	103 W 58	75 W 52	48 W 6	18 W 33	13 E 24	45 E 46
MOON	169 W 7	136 W 41	106 W 13	78 W 0	50 W 18	20 W 56
MERC	122 W 17	92 W 59	65 W 17	37 W 2	6 W 30	25 E 58
VENU	81 W 17	53 W 38	24 W 33	7 E 1	39 E 32	70 E 19
MARS	144 E 41	175 E 22	152 W 8	120 W 30	91 W 20	63 W 40
CERE	46 E 34	76 E 46	104 E 49	132 E 37	162 E 14	165 W 46
PALL	10 E 34	43 E 1	73 E 31	101 E 44	129 E 26	158 E 47
JUNO	58 W 13	29 W 30	1 E 41	34 E 15	65 E 26	94 E 9
VEST	57 W 29	28 W 42	2 E 33	35 E 6	66 E 14	94 E 54
JUPI	149 W 10	117 W 44	88 W 47	61 W 9	32 W 38	1 W 42
SATU	166 W 16	133 W 55	103 W 40	75 W 36	47 W 49	18 W 14
URAN	162 W 42	130 W 29	100 W 31	72 W 35	44 W 42	14 W 51
NEPT	48 W 29	18 W 58	12 E 57	45 E 20	75 E 38	103 E 45
PLUT	96 W 27	68 W 39	40 W 36	10 W 22	21 E 59	53 E 58
N ND	48 W 16	18 W 43	13 E 13	45 E 36	75 E 53	103 E 58

mundane

PLANETS ON ASC, RISING, ON DESC, & SETTING FOR MICHAEL ERLEWINE

SUN LAT	ON ASC LONGITUDE	RISING LONGITUDE	ON DESC LONGITUDE	SETTING LONGITUDE
-60	177 E 25	177 E 25	85 W 53	85 W 53
-50	162 E 59	162 E 59	71 W 26	71 W 26
-40	154 E 33	154 E 33	63 W 1	63 W 1
-30	148 E 34	148 E 34	57 W 2	57 W 2
-20	143 E 48	143 E 48	52 W 16	52 W 16
-10	139 E 39	139 E 39	48 W 7	48 W 7
0	135 E 46	135 E 46	44 W 14	44 W 14
10	131 E 53	131 E 53	40 W 21	40 W 21
20	127 E 44	127 E 44	36 W 12	36 W 12
30	122 E 58	122 E 58	31 W 26	31 W 26
40	116 E 59	116 E 59	25 W 27	25 W 27
50	108 E 34	108 E 34	17 W 1	17 W 1
60	94 E 7	94 E 7	2 W 35	2 W 35

MOON LAT	ON ASC LONGITUDE	RISING LONGITUDE	ON DESC LONGITUDE	SETTING LONGITUDE
-60	104 E 51	96 E 39	146 W 42	136 W 15
-50	92 E 47	88 E 2	134 W 39	127 W 39
-40	85 E 31	82 E 39	127 W 23	122 W 16
-30	80 E 18	78 E 44	122 W 10	118 W 21
-20	76 E 8	75 E 34	117 W 59	115 W 11
-10	72 E 29	72 E 48	114 W 20	112 W 24
0	69 E 4	70 E 12	110 W 56	109 W 48
10	65 E 40	67 E 36	107 W 31	107 W 12
20	62 E 1	64 E 49	103 W 52	104 W 26
30	57 E 50	61 E 39	99 W 42	101 W 16
40	52 E 37	57 E 44	94 W 29	97 W 21
50	45 E 21	52 E 21	87 W 13	91 W 58
60	33 E 18	43 E 45	75 W 9	83 W 21

MERC LAT	ON ASC LONGITUDE	RISING LONGITUDE	ON DESC LONGITUDE	SETTING LONGITUDE
-60	164 E 2	154 E 19	112 W 6	102 W 47
-50	146 E 45	141 E 9	94 W 49	89 W 37
-40	137 E 6	133 E 20	85 W 9	81 W 48
-30	130 E 20	127 E 45	78 W 23	76 W 13
-20	124 E 58	123 E 17	73 W 2	71 W 46
-10	120 E 19	119 E 24	68 W 23	67 W 52
0	115 E 58	115 E 46	64 W 2	64 W 14
10	111 E 37	112 E 8	59 W 41	60 W 36
20	106 E 58	108 E 14	55 W 2	56 W 43
30	101 E 37	103 E 47	49 W 40	52 W 15
40	94 E 51	98 E 12	42 W 54	46 W 40
50	85 E 11	90 E 23	33 W 15	38 W 51
60	67 E 54	77 E 13	15 W 58	25 W 41

VENU LAT	ON ASC LONGITUDE	RISING LONGITUDE	ON DESC LONGITUDE	SETTING LONGITUDE
-60	172 W 22	168 W 37	47 W 1	49 W 43
-50	178 E 43	178 W 42	38 W 6	39 W 38
-40	173 E 9	175 E 5	32 W 32	33 W 25
-30	169 E 7	170 E 35	28 W 30	28 W 55
-20	165 E 51	166 E 58	25 W 14	25 W 18
-10	162 E 59	163 E 48	22 W 22	22 W 8
0	160 E 19	160 E 50	19 W 41	19 W 10
10	157 E 38	157 E 52	17 W 1	16 W 12
20	154 E 46	154 E 42	14 W 9	13 W 2
30	151 E 30	151 E 5	10 W 53	9 W 25
40	147 E 28	146 E 35	6 W 51	4 W 55
50	141 E 54	140 E 22	1 W 17	1 E 18
60	132 E 59	130 E 17	7 E 38	11 E 23

MARS LAT	ON ASC LONGITUDE	RISING LONGITUDE	ON DESC LONGITUDE	SETTING LONGITUDE
-60	32 E 36	28 E 9	159 W 56	152 W 35
-50	30 E 38	28 E 2	157 W 59	152 W 28
-40	29 E 22	27 E 58	156 W 42	152 W 24
-30	28 E 25	27 E 54	155 W 45	152 W 21
-20	27 E 39	27 E 52	154 W 59	152 W 18
-10	26 E 58	27 E 49	154 W 18	152 W 15
0	26 E 20	27 E 47	153 W 40	152 W 13
10	25 E 42	27 E 45	153 W 2	152 W 11
20	25 E 1	27 E 42	152 W 21	152 W 8
30	24 E 15	27 E 39	151 W 35	152 W 6
40	23 E 18	27 E 36	150 W 38	152 W 2
50	22 E 1	27 E 32	149 W 22	151 W 58
60	20 E 4	27 E 25	147 W 24	151 W 51

FIXED STARS FOR MICHAEL ERLEWINE
BORN 7/18/1941 AT 16: 3 S TIME IN ZONE   5.00
AT LATITUDE 40 N 2 AND LONGITUDE 76 W 18

NATAL SIDEREAL TIME IS 11 43

PLANET	LONGITUDE	LAT	DEC	RISE	R A	SET	LOW CULM
SUN	25 Cn 48	0 N 0	20 N 59	0 36	7 51	15 6	19 51
MOON	23 Ta 29	4 S 22	14 N 25	20 39	3 29	10 19	15 29
MERC	7 Cn 20	3 S 28	19 N 47	23 21	6 31	13 42	18 31
VENU	19 Le 55	1 N 36	16 N 21	2 34	9 31	16 29	21 31
MARS	9 Ar 6	3 S 41	0 N 13	18 39	0 39	6 40	12 39
CERE	26 Sa 34	4 S 17	27 S 41	13 29	17 45	21 60	5 45
PALL	23 Sc 12	42 N 21	22 N 29	8 44	16 5	23 27	4 5
JUNO	14 Vi 60	1 N 52	7 N 38	4 42	11 8	17 34	23 8
VEST	15 Vi 47	5 N 46	10 N 55	4 39	11 17	17 54	23 17
JUPI	11 Ge 50	0 S 41	21 N 32	21 24	4 42	11 59	16 42
SATU	26 Ta 6	2 S 6	17 N 15	20 37	3 37	10 38	15 37
URAN	29 Ta 23	0 S 13	19 N 49	20 38	3 49	10 59	15 49
NEPT	25 Vi 24	1 N 15	2 N 59	5 35	11 45	17 55	23 45
PLUT	3 Le 40	4 N 16	23 N 29	1 3	8 28	15 54	20 28
N ND	25 Vi 38	0 N 0	1 N 44	5 38	11 44	17 50	23 44

STAR CONTACTS OUT OF A LIST OF 290 STARS
ALL ORBS GIVEN IN MINUTES OF ARC

STAR NAME	CONSTELLAT	SP	MAG	LONGITUDE	LAT	DEC	RISE	R A	SET	LOW CULM
ACAMAR	THETA1 ERI	A2	3.4	22 Ar 27	53 S 45	40 S 32	23 60	2 56	5 52	14 56
ACHERNAR	ALPHA ERI	B9	0.6	14 Pi 29	59 S 23	57 S 32		1 36		13 36
ACHIRD	ETA CAS	F9	3.6	9 Ta 25	47 N 1	57 N 30		0 46		12 46
ACRAB	BETA 1 SCO	B1	2.9	2 Sa 22	1 N 1	19 S 39	11 12	16 2	20 52	4 2
CULMINATING	WITH PALL CULMINATING WITH ORB				1.7					
ACRUX	ALPHA1 CRU	B1	1.6	11 Sc 4	52 S 52	62 S 47		12 23		0 23
ACUBENS	ALPHA CNC	F0	4.3	12 Le 50	5 S 5	12 N 5	2 14	8 55	15 37	20 55
SETTING	WITH SATU AT LOW CULM WITH ORB				7.1					
ACULEUS	M6 SCO C		5.3	24 Sa 55	8 S 50	32 S 11	13 44	17 36	21 29	5 36
RISING	WITH MERC SETTING			WITH ORB	35.5					
SETTING	WITH VENU AT LOW CULM			WITH ORB	42.3					
CULMINATING	WITH JUNO SETTING			WITH ORB	40.8					
AT LOW CULM	WITH NEPT RISING			WITH ORB	17.9					
AT LOW CULM	WITH N ND RISING			WITH ORB	28.8					
ACUMEN	M7 SCO C		3.2	27 Sa 56	11 S 22	34 S 48	14 13	17 50	21 27	5 50
CULMINATING	WITH VEST SETTING			WITH ORB	59.2					
SETTING	WITH JUPI RISING			WITH ORB	45.7					
CULMINATING	WITH N ND SETTING			WITH ORB	4.7					
ADARA	EPSILO CMA	B1	1.6	19 Cn 57	51 S 22	28 S 53	2 47	6 56	11 6	18 56
SETTING	WITH JUNO CULMINATING WITH ORB				27.0					
ADHAFERA	ZETA LEO	F0	3.6	26 Le 45	11 N 52	23 N 43	2 47	10 13	17 40	22 13
ADHIL	XI AND G9		5.0	7 Ta 3	33 N 50	45 N 13	15 27	1 19	11 10	13 19
RISING	WITH MOON AT LOW CULM WITH ORB				21.0					
SETTING	WITH JUNO CULMINATING WITH ORB				39.6					
AGENA	BETA CEN	B3	0.9	22 Sc 59	44 S 8	60 S 6		13 60		1 60
CONJUNCT	WITH PALL IN LONGITUD WITH ORB				13.3					
AIN	EPSILO TAU	G8	3.6	7 Ge 39	2 S 34	19 N 3	21 18	4 25	11 33	16 25
AT LOW CULM	WITH VENU SETTING			WITH ORB	49.7					
ALBALDAH	PI SGR	F3	3.0	15 Cp 26	1 N 27	21 S 7	14 22	19 6	23 51	7 6
ALBALI	EPSILO AQR	A1	3.8	10 Aq 54	8 N 5	9 S 43	15 18	20 45	2 11	8 45
AT LOW CULM	WITH PALL RISING			WITH ORB	6.6					
ALBIREO	BETA 1 CYG	K1	3.2	0 Aq 26	48 N 58	27 N 50	11 43	19 28	3 14	7 28
RISING	AT NATAL SIDERL TIME			WITH ORB	1.9					
RISING	WITH NEPT CULMINATING			WITH ORB	30.9					
RISING	WITH N ND CULMINATING			WITH ORB	14.6					
ALCHITA	ALPHA CRV	F2	4.2	11 Li 26	21 S 45	24 S 24	7 35	12 5	16 36	0 5
ALCOR	80 UMA	A1	4.0	15 Vi 3	56 N 33	55 N 18		13 23		1 23
CONJUNCT	WITH JUNO IN LONGITUD			WITH ORB	3.0					
CONJUNCT	WITH VEST IN LONGITUD			WITH ORB	44.8					
ALCYONE	ETA TAU	B7	3.0	29 Ta 11	4 N 3	23 N 56	20 16	3 44	11 12	15 44
SETTING	WITH JUNO CULMINATING			WITH ORB	58.4					
CONJUNCT	WITH URAN IN LONGITUD			WITH ORB	12.6					
ALDEBARAN	ALPHA TAU	KM	1.1	8 Ge 58	5 S 28	16 N 24	21 35	4 33	11 30	16 33
RISING	WITH VENU AT LOW CULM			WITH ORB	58.5					
ALDERAMIN	ALPHA CEP	A7	2.6	11 Ar 59	68 N 55	62 N 20		21 17		9 17
ALFARD	ALPHA HYA	K3	2.2	26 Le 28	22 S 23	8 S 24	3 53	9 25	14 56	21 25
AT LOW CULM	WITH JUPI RISING			WITH ORB	7.7					
ALGENIB	GAMMA PEG	B2	2.9	8 Ar 20	12 N 36	14 N 52	17 19	0 10	7 2	12 10
CONJUNCT	WITH MARS IN LONGITUD			WITH ORB	45.3					
ALGIEBA	GAMMA1 LEO	K0	2.6	28 Le 48	8 N 49	20 N 8	3 5	10 17	17 29	22 17
CULMINATING	WITH MOON SETTING			WITH ORB	30.5					
ALGOL	BETA PER	B8	VAR	25 Ta 21	22 N 25	40 N 44	17 59	3 4	12 10	15 4

THE NEW ASTEK I ASTROLOGICAL COMPUTER

-Editor's notes

The ASTEK I computer is a new chapter in the continuing story of astrological computing machines. Most readers can well remember that less than four years ago we had no small astrological computers. That was before the PETs, APPLEs, TRS-80s and DIGICOMPs appeared. Here now is a hand-held unit, weighing less than two pounds, that will perform a wide variety of very accurate astrological tasks and yet costs less than $400!

I am sure what this little machine can do in the way of astrological calculations since MATRIX wrote the software that is being used in the new ASTEK I. What follows are excerpts taken from a detailed presentation of the ASTEK I by EURO AMERICAN ASTROLOGY, the machine's designers. EURO-AM is a california based outfit that is headed by Richard Fairbairn and Carolyn Wesenberg. Fairbairn is a professional businessman while Wesenberg is a graphics designer and amateur astrologer.

EURO-AM approached MATRIX about the possibility of our providing software for a new astrological computer being designed that could be sold for under $400. While the new computer would not have all of the bells and whistles to be found on the home computer systems (PET, APPLE, etc.), it could provide all of the astrological basics and even a little more. Here was the perfect machine for the student of astrology. A portable cosmos that was about as expensive as a television set. Here are some details on the new computer.

WHAT IT DOES

The ASTEK I accepts the standard birth or event information (DATE, TIME, ZONE, GEOGRAPHIC LONG & LAT) and outputs a complete natal chart that includes the nine planets, Moon, Lunar Node and the Placidus House cusps listed in Degrees-Sign-Minutes notation (25AR40= 25 degrees Aries 40 minutes). The ASTEK I has an alpha-numeric 16-digit display panel that is larger than but similar to an LED display.

The ASTEK I provides aspect analysis and angular separations for all planets. In addition, secondary charts are availble. Transit and Progressed charts are provided. Progression is by Solar Arc Direction. Any number of transit or Solar Arc charts are possible...with provision for cross-aspects between the secondary charts and the natal horoscope (which remains in memory). Secondary charts include house cusps too.

The program uses the planetary elements (MATRIX AA1) developed by James Neely of California. They are accurate for dates in this century to within 2-3 minutes for the outer planets and about one minute or so for the inner planets- usually better. The terrestrial planets (Sun thru Mars) can be used for dates outside of this century with very little loss of accuracy. Both James Neely and Charles Jayne were consulted while writing this software. The program developed by MATRIX will be implemented in machine language in the final product. This insures great speed.

The planned design of the ASTEK I astrological calculator is based on a 32-key mylar membrane keyboard, a 16-digit alphanumeric vacuum florescent display, a control micro-processor and an external play-mounted transformer power supply. Estimates assume a 6502 microprocessor with 16K bytes of masked programmed ROM for program and constant data storage. The initial five prototypes of the ASTEK I will have commercially available cases which are similar to the production unit.

Mylar membrane switches are used as the keyboard because they are low cost and widely used in calculator applications. The conventional calculator appearance in the application is achieved by using a plastic button over each key. Also a good tactile feel is received by molding a plastic dome into the upper mylar layer, giving definite switch action.

A vacuum florescent display was chosen mainly because of its quality appearance, readability and low cost. An alphanumeric display is required for the identifying messages accompanying the numbers displayed by the calculator. A 16-digit alphanumeric display was chosen. It should be noted, fo example, that the Craig language translator display is a multi-digit vacuum florescent alphanumeric. Liquid crystal displays are an alternative at this time.

A conventional, high volume 6502 microprocessor was chosen as the control device. The 6502 is the largest selling, multi-sourced, 8-bit microprocessor, and is used in the PET, APPLE and ATARI computers. The program fits into 16K bytes of mask programmed ROM. The actual amount of ROM required will be determined during the software conversion phase of the prototype unit.

An external plug-mounted power transformer and rectifier unit is used to supply power to the calculator. This technique is inexpensive and the devices are available from several sources in volume production. Since this transformer is UL approved and supplies low voltage to the calculator, the calculator body will not have to be UL approved. These transformer units are available for both the USA and European power sources. The unit is small, measuring 6" x 6 1/2" x 1 1/2" and weighs two pounds.

ASTEK I : THE IDEA

Carolyn Wesenberg, who often answers to "Candy" had this to say about the idea for the new machine. "For the past several years I had been looking to buy something to calculate charts for me. I'd seen a hand-held biorhythm calculator which convinced me that there must be something similar for astrology buffs. When it became apparent that such a product was not available, it occurred to me that perhaps I could make one available, convinced that there must be many would-be astrologers like myself who would benefit."

"The notion was mostly fantasy until my friend Richard visited me from the east coast last summer. An astrological non-believer, he was curious about the astrological tape I'd had done for him by professional astrologer, Robert Cole. Robert had asked for feedback so, a luncheon meeting was arranged among the three of us."

"It was at that meeting that Richard mentioned the computer unit idea to Robert Cole. I feel it was Robert's enthusiasm that actually launched ASTEK I. Richard returned to his business Euro American Technology, in Washington D.C. We pursued the investigation of our astro-computer concept independently on opposite sides of the country. The situation became inefficient at best. Richard relocated to California to open a branch office of Euro American Technology in November 1979. The astrol-computer project intensified. A business partnership, EURO AMERICAN Astrology, was formalized on Feb. 20, 1980 to enable us to function appropriately in turning ASTEK I into reality."

"Getting a new product to market is an incredible process. ASTEK I is the most intense and exciting adventure I've ever attempted. EURO-AM is making ASTEK I happen. And thanks to the fantastic support and production of MATRIX Software, and Mike Erlewine in particular, ASTEK I will be introduced at the 1980 AFA Convention in New Orleans in August."

EURO·AMERICAN
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Calculating the Day of the Week and the Planetary Ruler of the Hour

by Dwight William Johnson

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The planetary hours method for assigning a planetary ruler to any moment of time during the day has come down to us from ancient times and is based on the inverse geocentric order of the seven visible planets, namely, (1) Saturn, (2) Jupiter, (3) Mars, (4) Sun, (5) Venus, (6) Mercury and (7) the Moon.

Using this method the interval of time between sunrise and sunset is divided into 12 equal subinterval hours and the time between sunset and sunrise is divided into 12 equal subinterval hours. The first day of the week and the first hour following sunrise on that day are said to be ruled by Saturn. The next hour is said to be ruled by Jupiter, the next by Mars, the next by the Sun, and so on in inverse geocentric order of the planets. After the hour ruled by the Moon, the next hour is ruled by Saturn and the sequence is repeated.

After elements of the sequence have been assigned for 24 hours it turns out that the Sun rules the hour following sunrise of the following day, and thus the Sun is said to rule the second day of the week. After elements of the sequence have been assigned for 24 more hours we find that the Moon rules the third day of the week. So for the first three days of the week we have Saturday, Sunday and Monday. The remaining days of the week have also been named after their planetary rulers, the Norse and Anglo-Saxon names having merely been substituted for the Latin names, i.e., Tyr=Mars, Woden=Mercury, Thor=Jupiter and Freya=Venus, to give us Tuesday, Wednesday, Thursday and Friday.

Following the sequence through Friday we find that sunrise of the following or eighth day is once again ruled by Saturn, thus establishing the seven day week. We see, therefore, that the seven day week and the names of the days are based on the ancient method of the planetary hours.

Each hour may be further subdivided into 15 "degrees", each ruled in succession by a planet in the sequence. The total subdivisions of the day established by the seven planet sequence are thus 24X15=360. The planetary "degrees" are subordinate to the planetary hours. They are rarely used and will not be referred to further in this article.

The planetary hours are used in electional astrology to determine suitable times to initiate certain actions based on a principle of affinity with the planets. For example, an activity requiring aggressive energy would most suitably be initiated in a Mars hour, a letter begun in a Mercury hour or a gift given to one's sweetheart in a Venus hour. The ruler of the day and the ruler of the hour may be combined together as, for example, by writing a love letter on a

Mercury hour of a Venus day, i.e., on a Friday.

The approximate determination of the planetary hour at a True Solar Time z is a simple problem in spherical astronomy. We may assume that the right ascension a_S and the declination d_S of the Sun are known. In figure 1 SD represents an arc of the parallel of declination of the Sun at time z, the celestial north pole is represented by P, the zenith by Z and the approximate point of setting of the Sun by D, neglecting the change in the Sun's declination.

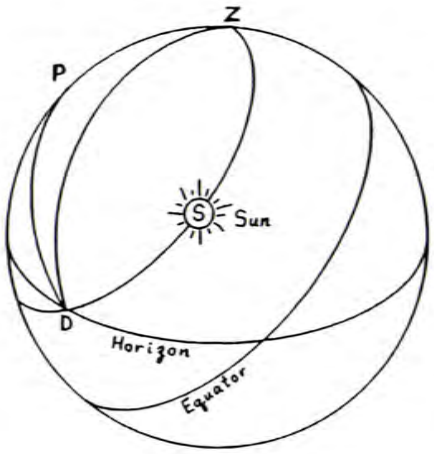

figure 1

From the cosine formula of spherical trigonometry we have

$$\cos ZD=\cos PZ\cos PD+\sin PZ\sin PD\cos ZPD \qquad ...(I)$$

But D is on the horizon so that $ZD=90^\circ$, and D is also on the declination circle of the Sun so that $PD=90^\circ-d_S$. Also, if f is the latitude of the observer, then $PZ=90^\circ-f$. Let the angle $ZPD=H$. Then the above equation becomes

$$\cos 90^\circ=\cos(90^\circ-f)\cos(90^\circ-d_S)+\sin(90^\circ-f)\sin(90^\circ-d_S)\cos H,$$

$$0=\sin(f)\sin(d_S)+\cos(f)\cos(d_S)\cos H,$$

$$\cos H=-\tan(f)\tan(d_S),$$

$$H=\arccos(-\tan(f)\tan(d_S)) \qquad ...(II)$$

Now H is the approximate hour angle between noon and sunset, so let $Z_D=2H$ be the approximate number of hours between sunrise and sunset and let $Z_N=24-Z_D$ be the approximate number of hours between sunset and sunrise on the true solar day in which z occurs, neglecting the change in the Sun's declination.

Whether the Sun is above or below the horizon is easily determined. We may assume that we know the right ascension of the M.C. which is simply the sidereal time expressed in hours. Let a_{MC} be the right ascension of the M.C., and let $a_A=a_{MC}+H$ and $a_D=a_{MC}-H$ be the right ascensions of the rising and setting points respectively of the Sun's declination circle at time z. Now if $a_D<a_S<a_A$, the Sun is above the horizon. Otherwise, the Sun is below the horizon.

Suppose the Sun is above the horizon. Then we subtract increments of $Z_D/12$ from a_A until we find an $i=1,2,\cdots,12$, such that $a_A-iZ_D/12<a_S$. If the Sun is below the horizon, we subtract increments of $Z_N/12$ from a_D until we find an $i=13,14,\cdots,24$, such that $a_D-(i-12)Z_N/12<a_S$. The integer i gives us the hour of the day from 1 to 24.

To determine the day of the week, it is necessary to establish an epoch when the day of the week was known. Let the epoch be Saturday, December 31, 1949 at noon TLT, and let t be the interval of time in true solar days which has elapsed from the epoch to true local noon on the day of z. Then $t/7=I_0+F_0$ is the number of true solar weeks

which have elapsed since the epoch, where I_0 is the integer part and F_0 is the fractional part, and also $7F_0=I_1$ is the number of days which have elapsed within the current week, where I_1 is an integer.

The method of planetary hours sets the start of each day at sunrise rather than at noon or midnight. We may, therefore, determine the day of the week if $i>12$ and the Local Mean Time is before noon by $j=7$ for $I_1=0$, or $j=I_1$ otherwise. In all other cases $j=I_1+1$.

Here, when j=1 it is Saturday and Saturn is the 1st planet,

" "=2 " " Sunday " Sun " " 4th " ,

" "=3 " " Monday " Moon " " 7th " ,

" "=4 " " Tuesday " Mars " " 3rd " ,

" "=5 " " Wednesday " Mercury " " 6th " ,

" "=6 " " Thursday " Jupiter " " 2nd " ,

" "=7 " " Friday " Venus " " 5th "

in inverse geocentric order of the planets. We now use j to define the integer $k=A_j$, where the ordered set A=(1,4,7,3,6,2,5).

Finally, the planetary ruler of the hour is determined from the hour of the day i and the integer k by the smallest integer $n=(k+i-1) \bmod 7$.

Here, when n=1 the ruler is Saturn,

" "=2 " " " Jupiter,

" "=3 " " " Mars,

" "=4 " " " Sun,

" "=5 " " " Venus,

" "=6 " " " Mercury,

" "=7 " " " Moon.

We now summarize the method of calculating the day of the week and

planetary ruler of the hour at a True Local Time z. We are given:

1) the days of the week are numbered consecutively from 1 to 7 with Saturday=1, Sunday=2, Monday=3, Tuesday=4, Wednesday=5, Thursday=6, Friday=7;
2) the planets are numbered consecutively from 1 to 7 in inverse geocentric order with Saturn=1, Jupiter=2, Mars=3, Sun=4, Venus=5, Mercury=6, Moon=7;
3) the ordered set A=(1,4,7,3,6,2,5) gives the number of the planet ruling each day of the week;
4) the epoch is December 31, 1949 at noon TLT; this is a Saturday;
5) a_S is the right ascension of the Sun at z;
6) d_S is the declination of the Sun at z;
7) f is the latitude of the observer;
8) a_{MC} is the sidereal time and right ascension of the M.C. at z;
9) t is the number of true solar days from the epoch to true local noon on the day of z.

We compute:

1) $H=\arccos(-\tan(f)\tan(d_S))$ is the approximate hour angle between noon and sunset on the true solar day in which z occurs;
2) $Z_D=2H$ is the approximate number of true solar hours between sunrise and sunset, and $Z_N=24-Z_D$ is the approximate number of true solar hours between sunset and sunrise;
3) $a_A=a_{MC}+H$ and $a_D=a_{MC}-H$ are respectively the rising and setting

right ascensions of the Sun's declination circle at time z (if $a_A \geqslant 24$, then $a_A = a_A - 24$, and, if $a_D < 0$, then $a_D = a_D + 24$);

4) if $a_D < a_S \leqslant a_A$, the Sun is above the horizon; otherwise, it is below the horizon;

5) find the smallest $i = 1,2,\cdots,12$, such that $a_A - iZ_D/12 < a_S$, if the Sun is above the horizon, or find the smallest $i = 13,14,\cdots,24$, such that $a_D - (i-12)Z_N/12 < a_S$, if the Sun is below the horizon; i is the number of the hour of the day from 1 to 24;

6) $t_W = t/7 = I_0 + F_0$ is the number of true solar weeks elapsed since the epoch where I_0 is the integer part and F_0 is the fractional part;

7) $I_1 = 7F_0$ is the number of true solar days elapsed within the current week, where I_1 is an integer;

8) if $i > 12$ and the LMT is before noon, $j = I_1$ (if $I_1 = 0$, then $j = 7$), or, otherwise, $j = I_1 + 1$ gives the number of the day of the week;

9) $k = A_j$ gives the number of the planet ruling the day of the week;

10) the smallest integer n such that $n = (k+i-1) \bmod 7$ gives the the number of the planet ruling the hour.

Practical notes:

1) If $f + |d_S| > 90^\circ$, there is no solution to computation step 1), since then $|-\tan(f)\tan(d_S)| > 1$. This condition may arise only above the artic circle and indicates a day in which either the Sun never sets or else it never rises.

2) In computation steps 4 and 5), the correct solution of the inequality $a < x \leqslant b$ depends upon noting the position of the $24^h = 0^h$ boundary. The following logical procedure may be employed to determine if $a < x \leqslant b$:

1: $m = 1$;

2: if $a > b$, go to 5;

3: if $a < x$ and $x \leqslant b$, go to 6;

4: $m = 0$ and go to 6;

5: if $a \geqslant x$ and $x > b$, go to 4;

6 if $m = 1$, then $a < x \leqslant b$.

3) For south latitudes and declinations we have $f < 0$ and $d_S < 0$.

4) To convert x degrees into y hours, use the relation $y^h = x^\circ(24^h/360^\circ)$; for radians, use $y^h = x(24^h/\pi)$.

5) Equation (II) given above computes the approximate hour angle of sunset from the estimated position of the solar center as it passes below the horizon with the observer on the same altitude as the horizon. If it is considered desirable to compute from the upper limb of the solar disk (figure 2) or to allow for the horizontal refraction of the Sun's light or the altitude of the observer above the horizon, then the zenith distance of the Sun, that is, ZD, does not equal 90°, and the hour angle H between noon and sunset must be computed from the relation

$$H = \arccos(-\tan(f)\tan(d_S) + \cos(z)/(\cos(f)\cos(d_S))) \quad \ldots(III)$$

developed directly from equation (I) with z=ZD. Equation (III) will then replace equation (II) in computation step 1).

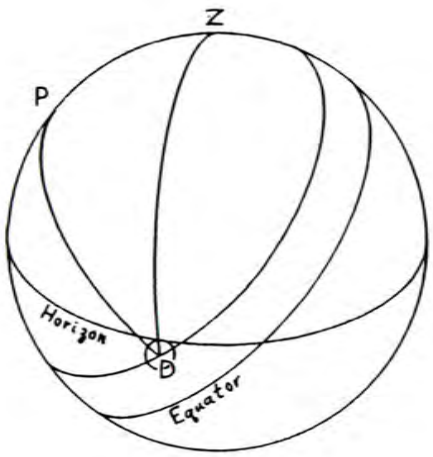

figure 2

For example, the American Ephemeris and Nautical Almanac is tabulated for $z=90°50'$, where 34' is allowed for the Sun's horizontal refraction and 16' for the Sun's semi-diameter. For an altitude h feet above the horizon the Explanatory Supplement, p. 401, gives the formula $z=90°50'+1'.17h^{\frac{1}{2}}$. This correction is developed in Woolard and Clemens, Spherical Astronomy, pp. 211-219.

6) More precise procedures for determining the times of sunrise and sunset which allow for the change in declination of the Sun are given in the Explanatory Supplement, pp. 403-406.

Example: What is the day of the week and ruler of the hour at Oceanside, California on December 13, 1950 at 8:00a.m. Pacific Standard Time?

1) The latitude of Oceanside, California is $f=33°12'N$ and the GMT is midnight. The declination of the Sun for this time is $d_S=-23°6'4''$. So, $H=\arccos(-\tan(33°12')\tan(-23°6'4''))=73°.79(24/360)=4^h.92$;
2) $Z_D=2H=9^h.84$ and $Z_N=24^h-Z_D=14^h.16$;
3) The sidereal time at Oceanside at z is $a_{MC}=13^h.64$, so $a_A=a_{MC}+H=13.64+4.92=18^h.56$ and $a_D=a_{MC}-H=13.64-4.92=8^h.72$;
4) $a_S=17^h.30$ and $a_D=8^h.72<a_S=17^h.30\leq 18^h.56$, so the Sun is above the horizon;
5) $18^h.56-2(9^h.84)/12=16^h.92<a_S=17^h.30$, making i=2 the smallest i such that $a_A-iZ_D/12<a_S$;
6) t=347.0 days, so $t_W=t/7=49.57=I_0+F_0$, where $I_0=49$ and $F_0=0.57$;
7) $I_1=7F_0=7(0.57)=4$;
8) $i=2<12$, so $j=I_1+1=5$;
9) $k=A_j=6$=Mercury, i.e., Wednesday;
10) The planet ruling the hour is the smallest integer $j=(k+i-1)\bmod 7$, or $j=(6+2-1)\bmod 7=7$=Moon.

Thus it was a Mercury day and a Moon hour in Oceanside, California on December 13, 1950 at 8:00 a.m. Pacific Standard Time.

References:

1) The American Ephemeris and Nautical Almanac for 1950;
2) Explanatory Supplement to the Astronomical Ephemeris and The American Ephemeris and Nautical Almanac, H.M.S., 1977;
3) W.M. Smart, Spherical Astronomy, Cambridge, 1977;
4) Woolard and Clemens, Spherical Astronomy, Academic Press, 1966.

THE FIRST A.C.T

Astrological Conference on Techniques

August 4 thru 8 1980

Part of the A.F.A. Convention

ACT (Astrological Conference on Techniques) is a attempt to unify modern astro-research on a worldwide basis. The ACT convention includes a distinguished group of astro-researchers devoted to opening new lines of communication with one another and with the astrological community. Act is under the direction of a group of American Astrologers that include Michael Erlewine, Robert Hand and Charles Jayne. The first ACT conference will be held at the convention of the American Federation of Astrologers (AFA) located at the Marriott Hotel in New Orleans from August 4 thru 8 of 1980. The ACT conference will not be separate from the AFA convention. It will exist simultaneoulsy with the AFA convention in every respect.

This first ACT conference will be comprised of thirty well known technical experts from six countries. ACT will be given two lecture halls at the AFA convention which will be put to constant use. Our goal will be to establish an international information cooperative concerned with the theory and techniques necessary to a modern astrology.

Speakers at the ACT Conference

David B. Black
Arthur Blackwell
Dr. Alexander Borg
Dr. Miquel Charneco
David Cochrane
Malcolm Dean
Dr. Zipporah Dobyns
Dr. Robert Donat
Roger Elliot
Charles Emerson
Michael Erlewine
Robert Hand
Axel Harvey
Lee Holt
Charles Jayne
John McCormick
Ian McKinnon
Neil Michelsen
Michael Munkasey
Dr. Kenneth Negus
Buz Overbeck
Ann Parker
Count Guy de Pengern
Doug Pierce MA
Maritha Pottenger MA
Mark Pottenger
Caroline Rupert
Dr. Thomas Shanks
John Townley
Noel Tyl
Dr. Joseph Vidmar
Henry Weingarten
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ACT Program Schedule

Monday August 4 [8:30am - 10:00am]

Dr. Thomas Shanks (USA): One of the leading astrological researchers in the world and research director of Michelsen's ASTRO-COMPUTING Services.
TOPIC: Computer Implementation of the Helio Work of John Nelson

Robert Hand (USA): Hand is a well known author and practicing astrologer.
TOPIC:House Systems- A New View.

Monday August 4 [10:15am - 11:45am]

Dr. Alexander Borg (Switzerland): With a PHD in Physics (Celestial Mechanics), Borg is one of astrologys most expert programmers. His ASTRODATA chart service is the most advanced in Europe.
TOPIC: The Realization of an Ephemeris of True Angles

Mark Pottenger (USA): A leading programmer and expert on asteroid ephemeris generation.
TOPIC: Programming Formulas for Popular Astrological Techniques (returns, etc.)

Monday August 4 [1:15pm - 2:45pm]

PANEL DISCUSSION: ASTROLOGY & PSYCHOLOGY: The current relationship between Astrology and Psychology will be the subject.
Panel Members: Dr. Miguel Charneco, Dr. Zipporah Dobyns, Caroline Rupert (moderator), Noel Tyl, Dr. William Whisenant

PANEL DISCUSSION: THE REIGN OF QUANTITY: Is it necessary for astrologers to use the scientific method?
Panel Members: David B. Black (moderator), Michael Erlewine, Charles Jayne, Dr. Kenneth Negus

Monday August 4 [3:00pm - 4:30pm]

Charles Emerson (USA): Emerson is a well known uranian astrologer and a director of NCGR
TOPIC: Techniques of Medical Astrology

Arthur Blackwell (USA): A leading siderealist and radical thinker.
TOPIC: Modern Sidereal Astrology

Tuesday August 5 [8:30am - 10:00am]

Noel Tyl (USA): Well known astrological author, lecturer and editor of The Source (telecomuting network)
TOPIC: An Astrological Information Network

Charles Jayne (USA): Well known author, lecturer and practicing astrologer.
TOPIC: The Technique of the Conception Chart

Tuesday August 5 [10:15am - 11:45am]

David Cochrane (USA): Cochrane, one of the brightest of the younger astrologers, is an accomplished programmer, harmonic researcher, author and editor of the magazine SIRIUS.
TOPIC: The Use of Harmonics in Synastry

Dr. Joseph Vidmar (USA): Vidmar received a Doctorate in Education by repeating the Vernon-Clark experiment with astrologers.
TOPIC: The Vernon-Clark Experiment

Tuesday August 5 [1:15pm- 2:45pm]

Panel Discussion: COUNSELING TECHNIQUES
Panel Members: Dr. Miguel Charneco, Roger Elliot, Charles Emerson, Michael Erlewine (moderator), Buz Overbeck, Maritha Pottenger

Panel Discussion: NEW COMPUTER GRAPHIC TECHNIQUES
Panel Members: Robert Hand (Moderator), Axel Harvey, Neil Michelsen, John Townley

Tuesday August 5 [3:00pm - 4:30pm]

Dr. Kenneth Negus (USA): Assistant director of German Language Literature at Rutgers University, Education director of NCGR and driving force behind the new curiculum of the NCGR
TOPIC: A New Method of Using the 90-Degree Dial and the Fifth Harmonic

Caroline Rupert (USA): Former head of NCGR in Chicago, Rupert is a practicing astrologer with a degree in psychology.
TOPIC: Correlation of Personality Assessment by Astrological Evaluation and Psychological Testing

Wednesday August 6 [8:30am - 10:00am]

Buz Overbeck (USA): A well known siderealist, expert computer programmer and uranian astrolgger
TOPIC: Modern Uranian Techniques

Dr. William Whisenant (USA): A degree in clinical psychology plus extensive original astrological research makes Dr. Whisenant one of our most distinguished speakers.
TOPIC: Astropsychology- A Resume

Wednesday August 6 [10:15am - 11:45am]

John Townley (USA): Former president of the Astrologers Guild of America, Research astrologer and original thinker
TOPIC: Planetary Cycles- New Concepts

Dr. Miquel Charneco (Puerto Rico): Clinical psychologist with extensive experience as a consultant
TOPIC: Clinical Psychology and Astrology

Wednesday August 6 [1:15pm - 2:45pm]

Panel Discussion: ASTRO-TALK: ADVANCES IN COMPUTERISED INTERPRETATION
Panel members: Roger Elliot, Michael Erlewine, Lee Holt (Moderator), Doug Pierce, John Townley

Panel Discussion: CELESTIAL MECHANICS: The Leading Edge of Planetary Theory
Panel Members: Alexander Borg, Robert Hand, Charles Jayne (moderator), Ian McKinnon, Neil Michelsen, Mark Pottenger

Wednesday August 6 [3:00pm - 4:30pm]

Axel Harvey (Canada): A Leading Canadian astro-technician with many innovative techniques and articles to his credit
TOPIC: An Objective Method of Rectification

David B. Black (USA): Expert Programmer, practicing astrologer and one of astrology's leading theorists
TOPIC: What Constitutes Valid Astrological Research

Thursday August 7 [8:30am - 10:00am]

Roger Elliot (UK): Well Known English astrologer and theorist
TOPIC: Similes of Nature- Astrology Reflects The Structure of the Universe

Michael Erlewine (USA): Computer programmer, theorist and editor of MATRIX Magazine
TOPIC: Heliocentric Research: The Archetypes

Thursday August 7 [10:15am - 11:45am]

Neil Michelsen (USA): Well known researcher, lecturer and Director of Astro-Computing Services
TOPIC: The Gauquelin 'KEYWORD' Research Results

Dr. Robert Donat (USA): Research astrologer with a doctorate in mechanical engineering
TOPIC: 250 Engineer/Scientist Work at Same Laboratory- Astrologically Why?

Thursday August 7 [1:15pm - 2:45pm]

Panel Discussion: HARMONICS 1980
Panel members: David Cochrane, Marc Joseph Cohen, Michael Munkasey, Dr. Kenneth Negus, Buz Overbeck (moderator), Ann Parker

Panel Discussion: ASTROLOGY VS THE ESTABLISHMENT- Does Astrology belong in the Establishment?
Panel members: David Black, Malcolm Dean (moderator), Robert Hand, John McCormick, Dr. Kenneth Negus, Dr. Joseph Vidmar, Dr. William Whisenant

Thursday August 7 [3:00pm - 4:30pm]

Maritha Pottenger (USA): M.A. in psychology and prominent consultant astrologer
TOPIC: Astropsychology and the Client

Count Guy de Pengern (FRANCE): French researcher and theoretician
TOPIC: Humano-Cosmic-Time: A Radical Technique

Friday August 8 [8:30am - 10:00am]

John McCormick (USA): Well known lecturer and author
TOPIC: Circadian Rhythms

Michael Munkasey (USA): Advanced programmer, researcher and a Director of NCGR
TOPIC: Compatibility: Using Harmonic Aspects between Planets in the Charts

Friday August 8 [10:15am - 11:45am]

Henry Weingarten (USA): Well known lecturer and publisher
TOPIC: The Technique of Forecasting

Panel Discussion: MODERN ASTROLOGICAL RESEARCH
Panel Members: Charles Jayne, Robet Donath, Doug Pierce, Neil Michelsen (moderator), Buz Overbeck, Dr. Joseph Videmar, Dr. William Whisenant

Additional Panel Speakers

Lee Wayne Holt (USA): Professional astrologer and film maker

Ian McKinnon (Canada): Electronic engineer and advanced programmer

Malcolm Dean (Canada): Editor of PHENOMENA and lecturer

Ann Parker (USA): Research astrologer

Doug Pierce (USA): MA in statistics, research astrologer

James Eshelman (USA): Well known astrologer and siderealist.
TOPIC: ASTRONOMY Free-For-All (question & answer period)

Gary Duncan (USA): One of our top mathematicians and programmers.
TOPIC: Modern Astrological Research Methods

Gary Christen (USA): Well known Uranian astrologer

TOPIC: Transit Tracking Tools

There will no doubt be other last minute additions to the ACT speaker list. Check in at the MATRIX suite for last minute details. Address any questions concerning ACT to Michael Erlewine at (616) 796-2483.

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