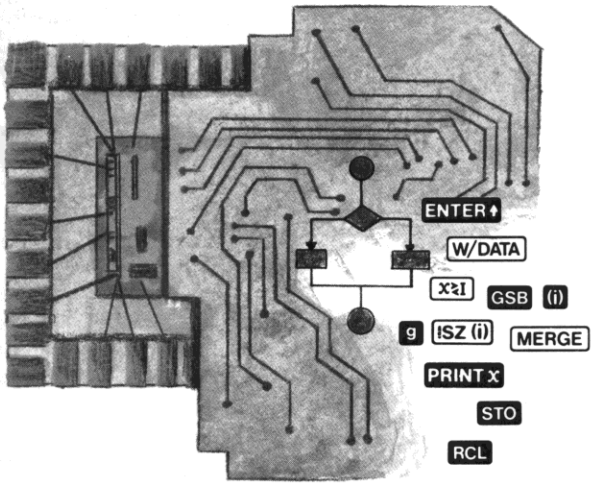


HEWLETT hp PACKARD

HP Key Notes

August 1978 Vol. 2 No. 3

Calculators in Continuing Education

Occasionally, we hear about progress being made in the use of calculators in the classroom. This is gratifying because, like you, we believe that calculators can make life easier, more useful, and less constricted.

Here's a letter to our HP-67/97 Product Manager.

Dear Sir:
Recently, Louisiana Tech's Division of Continuing Education conducted a week-long workshop on Heat Transfer for the Industrial Insulation Industry. The key to the program was your HP-97. Each participant was required to bring his own calculator to the activity.

You may be pleased to know that, in addition to the favorable comments about our program, each participant was very pleased with the operation and performance of the HP-97.

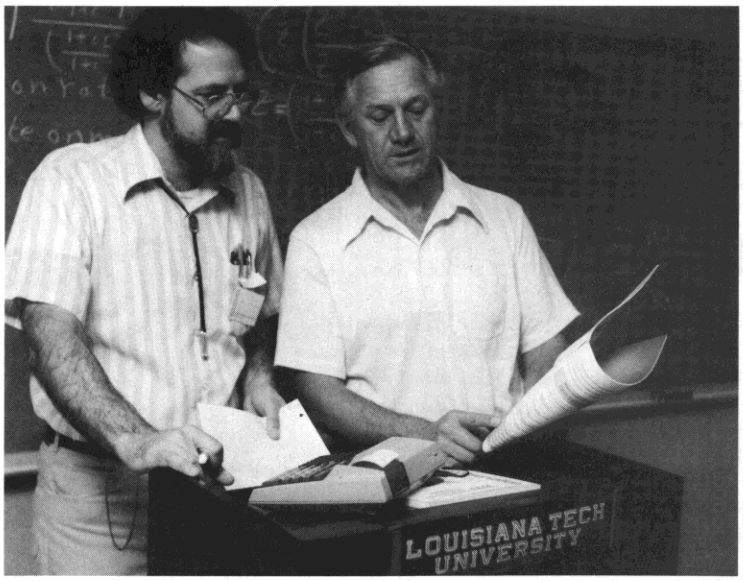
I am enclosing a couple of photos, obviously staged, of our instructor and some of the participants.

A second session of the Heat Transfer program will be held August 21-25, 1978. If you or any of your representatives are in the area, feel free to stop by our office for a visit and observation of the workshop.

In addition to the regular activity, we have scheduled a special HP-97 work session on Sunday, August 20, from 2:00 to 5:00 p.m. This session is for anyone who is unfamiliar with the operation of the calculator.
Sincerely,

John R. Williams
Dean of Continuing Education
Louisiana Tech University, Ruston, Louisiana

Thank you, Dean Williams, for sharing with our readers this news and the photos. As you can imagine, we thoroughly enjoy hearing about such workshops. And anyone in that area of the country will be interested to know that more workshops are being planned.



Dr. Ben Blackwell (Ph.D., Stanford), Course Director and Associate Professor in the Department of Mechanical Engineering and **Mr. Ray Wopperer** of Frontier Insulation in Buffalo, New York, discussing some aspects of the workshop. Mr. Wopperer is also Chairman of the Technical Committee of the National Insulation Contractors' Association.

Some Price Reductions...

That title looks out of place in the modern world of ever-increasing inflation! But it is a true statement. On August 1, 1978, Hewlett-Packard lowered the prices for the HP-19C and the HP-29C, as follows:

	OLD PRICE	NEW PRICE
HP-19C	$345.00*	$275.00*
HP-29C	$195.00*	$175.00*

And what is really nice is that this price reduction is just in time for the back-to-school season. So stop in at your local HP dealer and take another look at these two "mid-range" programmable calculators with *Continuous Memory*.

** U.S. dollars. See note at bottom edge of cover.*

Another Timer Check

In the October 1977 KEY NOTES (Vol. 1, No. 3, p. 6) we published information about the National Bureau of Standards time broadcasts so that readers could get a very accurate check on "timer" programs. Here's another source.

Dear Editor:
It may be of interest to your readers who do not have access to a shortwave radio that the exact same *(WWV)* information is available via telephone from the National Bureau of Standards in Boulder, Colorado. The telephone number is (303) 499-7111.
Sincerely,
Richard V. Dutchik
W. Melbourne, Florida

(Thanks for the tip, Mr. Dutchik, and for the rest of your letter with the nice remarks about KEY NOTES. Ed.)

All prices in this newsletter are suggested retail prices excluding applicable state and local taxes–Continental U.S.A., Alaska and Hawaii

Library Corner

Despite the usual doldrums brought on by fair weather, summer fun, and vacations, you continue to pour a never-ending flood of programs into the Library. This issue includes quite a bunch of new ones, and we hope you will like at least a few of them.

HP-67/97 NEWS

Around the end of August, the Library will be sending out renewal notices for HP-67/97 Library subscriptions. If you haven't received a notice by the end of September and you think your subscription has expired, contact the Library.

We hate to tell you this, but...please do not request copies of HP KEY NOTES Vol. 1 No. 1 (January 1977). Supplies ran out some time ago, and there are no plans to reprint that issue.

But don't let that spoil your day; here is some good news:

FOUR NEW LIBRARY BARGAINS

Maybe these three sets of programs and one giant program will not appeal to a wide audience, but they *will* be a tremendous boon to anyone in the fields of Optometry or Fluid Mechanics, including students.

These Optometry programs were written by **Terry E. Cowgill, Tom Myslick,** and **Lee Nelson** as the basis for a thesis project, "Optometric Applications of Programmable Calculators," while they attended Pacific University's College of Optometry at Forest Grove, Oregon. They received an "A" for the thesis!

The fourth bargain, actually one gigantic program, was written by **Gerard A. A. Westen** of Newark, Delaware. It is the equivalent of six to eight ordinary programs.

Because of the unusual nature of these optometry programs, they are being offered in groups—or sets—and at reduced prices if purchased this way. (The group price includes magnetic cards.) And each **numbered** program is available as a separate purchase and under standard rules: a charge of $3 for a program and $5 for a program and magnetic card.

At the present time, **single programs are not available in Europe**; However, we will honor orders *from anywhere* for the four "67000-"type numbers if the order includes a negotiable check (or money order) in U.S. dollars, drawn on a U.S. bank. Here is the list.

I. #67000-99980
General Optometry $35*

02536D Effective Prism Power (23 steps, 4 pages)
02537D Crossed Prism Resultant (57 Steps, 4 pages)
02538D Lens Power Needed at New Vertex Distance (58 steps, 4 pages)
02539D Positional Effective Power (58 steps, 4 pages)
02540D Effective Power/Equivalent (46 steps, 4 pages)
02541D Minimum Blank Size (123 steps, 5 pages)
02542D Oblique Cylinder Sum (115 steps, 5 pages)
02543D Conversion: Keratometer Diopters to Radius, Radius to Keratometer Diopters (24 steps, 4 pages)
02544D Aniseikonia I (223 steps, 5 pages)
02545D Aniseikonia II (223 steps, 5 pages)
02546D Low Vision; Calculation of Needed Magnification Add, and Working Distance (35 steps, 4 pages)
02547D Low Vision; Determation of Acuity Demand from Letter Size, Working Distance (35 steps, 4 pages)
02548D Low Vision; Contact Lens Telescope Calculations (150 steps, 5 pages)
02549D Shape, Power, and Spectacle Magnification (51 steps, 4 pages)

II. #67000-99981
Optometry Case Analysis $18*

N/A OEP Analysis (OEP I) (999 steps, 8 cards, 41 pages)
02551D Pratt Sheard, Percival Methods of Near R_x (170 steps, 5 pages)
02552D Four Accommodative R_x's and Their Average (101 steps, 4 pages)
02553D Linear Transform of R_x^{16} to R_x^d (16 steps, 4 pages)

III. #67000-99982
Optometry Contact Lens $32*

02561D May-Grant Contact Lens of First Approximation (66 steps, 4 pages)
02562D Tabb Contact Lens of First Approximation (186 steps, 5 pages)
02563D Roggenkamp Specs. for Prism Ballast Front Toric or Prism Ballast Contact Lens (215 steps, 5 pages)
02564D Effective Power of Spectacle Lenses at Corneal Plane (35 steps, 4 pages)
02565D Back Vertex Power of PMMA Contact Lens (56 steps, 4 pages)
02566D Residual Cylinder Induced at Tear/Cornea Interface by Contact Lens (37 steps, 4 pages)
02567D Cylinder Induced by Toric Contact Lens (67 steps, 4 pages)
02568D Contact Lens Power Necessary to Correct Ametropia (72 steps, 4 pages)
02569D Toric Contact Lens Parameters (73 Steps, 4 pages)
02570D Extended Keratometer Range (19 steps, 4 pages)
02571D Magnification Difference Between Spectacle and Contact Lenses (11 steps, 4 pages)
02572D Sag Formula (25 steps, 4 pages)
02573D Brungardt I &II (189 steps, 10 pages)

IV. #67000-99983
Orifices For ME's $16*

N/A Orifice Program for Five Square-Edge Orifice Tap Types

This program solves the orifice equations for square-edged, flat plate, concentric orifices. Given two of the following three variables, the program calculates the third: meter differential, mass flowrate, and orifice hole diameter. The program is applicable in English, Metric and SI unit systems; for liquid, gas and steam service; for flange, radius, corner, vena contracta and pipe tap locations; and for drain/vent hole provisions; according to ASME/ISO equations. The program prints all input, intermediate, and final results. This printout tape can be attached to an HP-97 orifice calculation form to produce a permanent record of the calculation. The complete program has 6 cards, 1316 steps, and 44 pages.

N/A = Not available as a separate program.

**U.S. dollars. See note at bottom edge of cover.*

ORDERING PROGRAMS

Any program you see in HP KEY NOTES can be ordered either from the Users' Library in Corvallis, Oregon, or from the Users' Library in Geneva, Switzerland. (Both addresses are on the back cover.) For most of the world, use the program number listed next to the program's title, then order it from Corvallis. The only exception is if you live in the European area; in that case use the number listed in italic type below the program abstract, then order it from Geneva. Payment for programs must conform with the instructions from *your* area Library. **Always use order forms if possible** or, better still, use the new order form in this issue, and be sure to include any state or local taxes.

NEW HP-67/97 PROGRAMS

Here are some new programs from recent submittals. Quite of few of these are actually sets of programs on the same subject, and they are highlighted here as fine examples of programming the HP-67/97 to fit the requirements of professional people. Also, we are happy to be able to include some programs from the Geneva Library. However, before you order *any* of these programs, please read the paragraph on **ordering programs.**

67/97 Crandall's Rule Auto-Adjustment (#01791D)*

This program provides traverse adjustment by the Crandall's rule method, without keyboard input. Program operation requires insertion of data cards (generated by the program below, "Traverse Computation and Storage"), and one initial keystroke. Adjusted data may be output in either "auto" (print) or "manual" (R/S) mode. (216 steps, 8 pages)

Author: **Earl L. Kubaskie, Jr.**
Juneau, Alaska

**In European areas, order by number 00322D.*

Continued on page 4

Letters To The Editor

When you consider the amazing number of card-programmable calculators we have sold, and then also consider that KEY NOTES is read all over the world, a startling statistic begins to emerge: *You* have *me* greatly outnumbered. Thus, if only one reader in 1000 decides to write a letter to me, my mail box is filled to the brim.

So..., much as I hate to do it, here's a new policy on letters to the editor:

Letters to the editor should be addressed to:

Henry Horn, Editor
HP KEY NOTES
Hewlett-Packard Company
1000 N.E. Circle Boulevard
Corvallis, OR 97330

We cannot guarantee a reply to every letter, but we will guarantee that every letter received will be read by the editor, and as many as possible will be answered either in KEY NOTES or in a personal response. Please be sure to put your return address on the face of your letter. Letters sometimes get separated from envelopes!

At present, there is a huge backlog, but progress is steady. Just remember that I cannot answer many letters during the 2 weeks before and the 2 weeks after a KEY NOTES mailing. (Next issue is scheduled to be mailed on November 3.)

Now, please don't stop writing. Very few letters have NOT been answered in the last 4 years. (Has it been *that* long?) I thoroughly enjoy your letters and derive much pleasure from answering them—or in using them in KEY NOTES. And, as you can imagine, I get some of the most fantastic letters the world has ever seen.

Over the years, through our correspondence, I've met a considerable number of you; now *all* of you know who "Ed." really is. Don't be bashful; keep those cards and letters coming. Remember: I merely put it together; KEY NOTES is *your* newsletter.

Speaking of letters...here's a "tongue-in-cheek" letter no doubt precipitated by the article on 8-year-old Zvi Schreiber (in the last issue).

Gentlemen:

I have been so impressed with the programming accomplishments of some of your younger readers that I decided to give my son Gabriel (age 2) the same opportunity. To my surprise, he promptly noted that, on occasions when it is necessary to selectively reset particular storage registers before rerunning a program, it is possible not only to save program steps but to do so without disturbing the stack. When the contents of an accumulating register, for example, are recalled for final display, the storage register may be reset to zero with "STO-n", or, a register used as a counter may be initialized to the value "1" by executing "STO ÷ n". Similarly, he pointed out, a single register arithmetic statement may also be used, at any point within a program and without affecting the stack, to initialize registers with arbitrarily large or small values, in preparation for relational tests in a successive run.

Needless to say, I was impressed. Especially when, as I was attempting to install an HP-25C on the handlebar of his trike, he observed that it seemed illogical not to have "un-register arithmetic", such as "RCL x n", which would combine the two steps presently required. What a cute little guy!

Bruce J. Schaffer
University Hts., Ohio

How About HP NP Kits?

What is an NP Kit? Read on and you'll find out the same way we did. This is a letter we received 6 months ago, but it's better late than never.

Dear Henry,

Enclosed with this letter are some photos I took of one of my Christmas gifts this year. A needlepoint rendition of two generations of calculators!!

Starting with the sales pamphlet for the HP-67/97, my mother, Doris, had a woman at a local "handycraft" shop custom-draw the pamphlet cover on the needle-point gridwork (back plane?). She had intended it to be a "gag" gift, because she knows how I like calculators (of a certain manufacturer).

After working on it a bit, she didn't like how the HP-67 was coming out (since it was drawn on an angle), so Mom managed to find a pamphlet for the older HP-65, then redrew the unit on the "grid." Starting over, she matched the colors with available goods as closely as possible, and the results are what you see in my photos. Pretty darn good, isn't it?

Needless to say, this "gag" gift turned out to be one of my favorites, and I now have the frame proudly hanging in my office for everyone to see. (Maybe HP should offer needlepoint kits as well??)

Yours sincerely,
Craig A. Pearce
Berwyn, Illinois

(Yes, Craig, it's pretty "darn" good, and it is just a terrible shame that we can't produce it in the vivid, true-to-life colors of your photo. Ed.)

How to Clear g

Although the HP-67 handbook tells you how to clear an inadvertently pressed f-key or h-key, it does not do the same for the g-key. So thanks to **George E. Thatcher** (Staten Island, NY), who brought this to our attention, here is a method that will always work: Slide the W/PRGM-RUN switch back and forth, regardless of the mode it is in. You will cancel the unwanted g-key and not affect any other operation or function.

Enthusiast Becomes Author

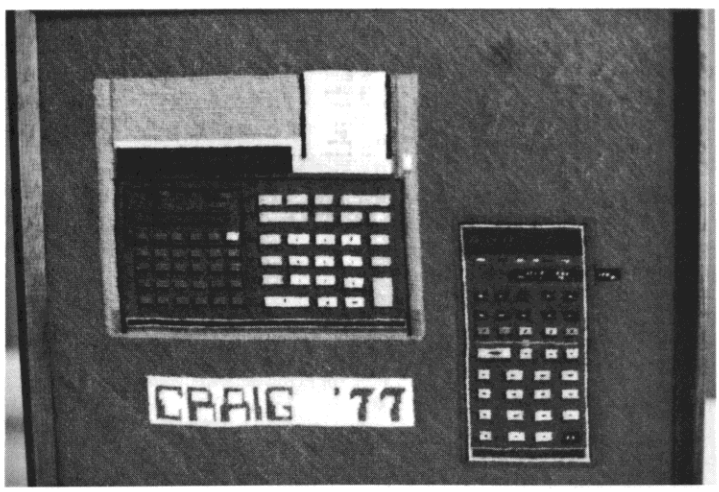
It is doubtful that any HP calculator owner is a greater HP enthusiast than **Craig A. Pearce** of Berwyn, Illinois. If you don't believe us, see, on page **3**, how his mother feels about it.

Anyway, Craig has written a very fine article on the HP-67/97 and has had it published, replete with photos, on pages 112-117 in the June 1978 issue of BYTE magazine. The article elaborates on some of the niftier features of the HP-67/97. It also includes the listing and instructions for Craig's inimitable "Pinball Wizzard" program. (They spell it with one "z" but Craig used two "z's" on the original.)

Craig also mentions the independent Users' Club and its PPC JOURNAL newsletter, plus some of the startling "advanced applications" the Club has found for our calculators.

Good reading, good article, good job, Craig. We're all proud of you. We cannot supply copies of the article, but here's the magazine's address.

BYTE Publications
70 Main Street
Peterborough, NH 03458



67/97 Compass Rule Auto-Adjustment (#01792D)*

This program provides traverse adjustment by the compass rule, without keyboard input. Program operation requires insertion of data cards (generated by the program below, "Traverse Computation and Storage") and one initial keystroke. Adjusted data may be output in either "auto" (print) or "manual" (R/S) mode. (117 steps, 8 pages)

Author: **Earl L. Kubaskie, Jr.**
Juneau, Alaska

**In European areas, order by number 00323D.*

67/97 Traverse Computation and Storage (#01793D)*

This program performs traverse computations from bearing or field angle data. Traverse courses and computed data are arranged by the program for storage on magnetic cards, in the form required for adjustment by either of the above two programs: "Compass Rule Auto-Adjustment" or "Crandall's Rule Auto-Adjustment." (162 steps, 13 pages)

Author: **Earl L. Kubaskie, Jr.**
Juneau, Alaska

**In European areas order by number 00324D.*

(Well done, Mr. Kubaskie! Excellent and neat documentation. These programs will save a lot of time, because adjustment is automatic, and there is no need to re-input all the coordinates. Ed.)

Now, here is a set of payroll programs that were developed for a tool company. If you have a small business and cannot afford a computer, let your HP-67 (or better still, an HP-97) do most of the work for you. And if some of these tax or deduction parameters have changed, just reprogram that part of the listing. Two of these programs have appeared in Library Catalogs. They are #01555D "Payroll With Tax Table Generator" (#00325D in Europe), and #01608D "Payroll Phase II Data Loader" (#00326D in Europe).

67/97 Payroll Phase II, Tax Deposit (#02209D)*

This program keeps a tab on payroll tax deposits to the State and Federal governments and avoids late tax payment penalties. Feeding in the "Payroll Phase II" payroll data cards lets you know at any time how much combined FICA, withholding, and State taxes are owed and if you are under or over the $2000 figure. Key in the amount you want to deposit, and the tax payment record is updated and retained on a separate tax data card. (173 steps, 13 pages)

Author: **Otto Barth**
Roselle, Illinois

**In European areas, order by number 00328D.*

67/97 Payroll Phase II (#2121D)*

This program does not require State and Federal tax tables. Prepared for each employee is a data card that contains wages/salary, dependent status, single or married, and the tax table. A running total is kept on FICA, Withholding Tax, State Tax, miscellaneous deductions, gross FICA limit, and even the total hours worked. After loading the data card, enter the hours worked (or gross pay). Gross, taxes, and net pay will be printed. Data cards are updated upon rerecording. (See also program #01608D or, in Europe, #00326D). (224 steps, 16 pages)

Author: **Otto Barth**
Roselle, Illinois

**In European areas, order by number 00327D.*

67/97 Payroll Phase II, Quarterly Summary (#2277D)*

This program transfers data collected from payroll data cards to quarterly summary data cards necessary for accounting and tax purposes in the "Payroll Phase II" payroll program. It clears certain registers of the payroll data cards for a new tax quarter. It sets up and updates quarterly summary data cards. It is necessary to acquire the "Payroll Phase II" payroll program and the data loader program before the "Quarterly Summary" program can be run efficiently. (213 steps, 21 pages)

Author: **Otto Barth**
Roselle, Illinois

**In European areas, order by number 00329D.*

(Outstanding, Mr. Barth! An elegant, neat, complete set of programs. They have already helped two or three small companies set up a payroll system on HP-97's.Congratulations! Ed.)

67/97 Simplified Flight Planning of Stored or Preferred Routes (#02406D)*

This program will enable the user to compute flight plans from routing information stored on data cards. Inputs are: fuel flow, true airspeed, wind, and variation. Outputs are: magnetic course, ground speed, distance, time, and fuel comsumption in gallons and pounds for any type of aircraft. Inputs may be altered for each leg of flight as well as a separate print option. Total running time is under 5 minutes, and maximum data is limited to the number of data cards available. (210 steps, 7 pages) (See also next program.)

Author: **Saul Gilman**
Brooklyn, New York

**In European areas, order by number 00330D.*

67/97 Flight Plan Data Card Programming (#02407D)*

This program was designed as an aid to #02406D. It enables the user to store airway routing information onto data cards in proper sequence, quickly and easily, prior to use in flight planning computations. (210 steps, 7 pages)

Author: **Saul Gilman**
Brooklyn, New York

**In European areas, order by number 00331D.*

(Very well documented, carefully described, and completely annotated. A superior set, Mr. Gilman, and an asset to any pilot. Well done! Ed.)

(And here is another set of programs that is absolutely top-notch! While not of universal appeal, I'll bet that **most** *engineers will want most or all of these programs. A superior accomplishment, Mr. Kuyt, in application, programming and documentation. Too bad I don't have space to include the projection drawing of your new house. What a fantastic and splendid piece of work! Mr. Kuyt's projection even "unearthed" an error in the architect's drawings! Congratulations! Ed.)*

67/97 Spiral Projections (#02400D)*

The program computes x and y coordinates of any points of 3-D projection views of two different types of spirals, as determined by their radius, the radial increase and number of points to be plotted per 360°, the tilt angle about a horizontal axis, swing angle about a vertical axis, and rotation angle about its own axis. The program also translates the calculations axially, to a parallel plane, and/or laterally in the same plane to allow plotting of associated projections. (135 steps, 6 pages)

Author: **Frits Kuyt**
McKinney, Texas

**In European areas, order by number 00332D.*

67/97 Flower Projections (#02421D)*

The program computes x and y coordinates of all points of 3-D projection views of shapes from a simple circle or polygon to multi-petal flowers. The program contains several routines, each performing its own specific flower-shaping function, and each of which can be used in different combinations to achieve various effects. The user selects the parameters of the flower (radius, depth, number of petals, number of plotted points, projection angle, etc.). (122 steps, 6 pages)

Author: **Frits Kuyt**
McKinney, Texas

**In European areas, order by number 00333D.*

67/97 Polygon Projections (#02422D)*

The program computes x and y coordinates of any points of 3-D projection views of a circle or polygon, as determined by its radius, the number of points per 360° to be plotted, the tilt angle about a horizontal axis, swing angle about a vertical axis, and rotation angle about its own axis. The program also translates the calculations axially, to a parallel plane, and/or laterally in the same plane to allow plotting of associated projections. (98 steps, 6 pages)

Author: **Frits Kuyt**
McKinney, Texas

**In European Areas, order by number 00334D.*

67/97 Projection of Points, Line Sections, Rectangular Shapes (#02423D)*

With given coordinates of a point on a plane, the program computes the new coordinates of this point after the plane has been tilted about a horizontal axis,swung about a vertical axis, or rotated in its own plane (or any combination of these three motions), as projected onto the

original plane. The program also translates the calculations axially, to a parallel plane, and/or laterally in the same plane to allow plotting of associated projections. (101 steps, 6 pages)

Author: **Frits Kuyt**
McKinney, Texas

**In European areas, order by number 00335D.*

67/97 Compound Angle Conversions for Projection Programs (#02424D)*

The program converts compound projection angles into their minimum included angle and incline angle; in other words, when isometric drawings require the use of an ellipse template, the program finds the ellipse angle as marked on the template, and its angular position on the drawing, or vice-versa. It also converts the contents of the data registers, resulting in a projection view turned 90° from the original. (85 steps, 6 pages)

Author: **Frits Kuyt**
McKinney, Texas

**In European areas, order by number 00336D.*

67/97 Helix Projections (#02425D)*

The program computes x and y coordinates of any points of 3-D projection views of a helix, as determined by its radius, the number of points per coil, coil spacing, and the two angles constituting the compound projection angle. The program plots projections of such helical shapes as coil springs, winding stairs, propeller blades, etc. It also translates the calculations axially, to a parallel plane, and/or laterally in the same plane to allow plotting of associated projections. (131 steps, 6 pages)

Author: **Frits Kuyt**
McKinney, Texas

**In European areas, order by number 00337D.*

(Although Mr. Kuyt has done a lot of research during compilation of the above programs, he would welcome communication with other engineers or educators who purchase these programs and have ideas to improve them. Ed.)

67/97 Aerobic Points for Running and for Walking (#02622D)*

Given the distance either run or walked and the elapsed time, this program calculates "Aerobic Points" (explained below) for all distances from one mile through the marathon and for all running speeds from 3 through 10½ miles per hour. All secondary storage registers and 100 program steps are available for use. (122 steps, 5 pages)

Author: **Hugo E. Mayer, Jr.**
Warrensburg, Missouri

**In European areas, order by number 00338D.*

(The body can store food, but it cannot store oxygen. Each exercise requires a certain amount of energy; consequently, a certain amount of oxygen. This oxygen requirement can be measured, and this is the basis of the point system. Each exercise is assigned a certain number of points, based on the amount of oxygen required to perform it. Ed.)

Next, a treat from West Germany. Here are two programs for you mathematicians who are curious about how it's done in Europe.

67/97 Exponential Integral, Integer Order (#02623D)*

The program calculates for integer order of $n>=0$ the exponential integral $E_n(x)$ very efficiently to 9-digit accuracy using a power series expansion for $x<=1$ and a continued fraction approximation for $x>1$. In all cases, accuracy and calculating time are dependent on the number of decimal places selected by the user. (159 steps, 6 pages)

Author: **Gunter Schnell**
Lilienthal, West Germany

**In European areas, order by number 51311D.*

67/97 Sine and Cosine Integral (#02624D)*

This program calculates, simultaneously, $S_i(x)$ and $C_i(x)$ for real $x>0$. For small x, power series expansion is used. For large x, the complex exponential integral $E_1(ix)$ is calculated, using a continued fraction approximation and is converted to the related sine and cosine integrals (complex computation is used only internally). Accuracy and calculating time are dependent on the number of decimal places selected by the user. (128 steps, 6 pages)

Author: **Gunter Schnell**
Lilienthal, West Germany

**In European areas, order by number 51253D.*

(Very good, Mr. Schnell! The documentation is excellent, expecially your program description. Ed.)

To wind up our column this issue, here is a set of programs from an HP-67 owner in a coastal city nearly 200 miles north of Lisbon. With this set of five programs, any polynomial curve fit problem can be easily solved (equally or unequally point spacing, scattered or not scattered points).

67/97 Approximation by Legendre Polynomials Up to Degree 7 (#02625D)*

This program approximates a function, defined by a set of equally spaced data points, by Legendre polynomials of any degree up to 7, using the least squares method. It offers simultaneous computation of up to 8 coefficients and of the sum of squared errors for each degree. There is also a choice between trapezium, Simpson, or Newton-Cotes (5) integration. Projections of y values can be made. The orthogonal Legendre functions avoid long matrix operations, so that the program is very short and safe. (223 steps)

Author: **Dr. Henrique E. Adler**
Oporto, Portugal

**In European areas, order by number 50520D.*

67/97 Conversion of Legendre Polynomials into Power Series (#02626D)*

This program is an optional complement to #50520D (02625D in U.S.), which gives the coefficients of a series of Legendre polynomials up to degree 7. This program converts those coefficients into the coefficients of an ordinary power series with argument x. (217 steps)

Author: **Dr. Henrique E. Adler**
Oporto, Portugal

**In European areas, order by number 50813D.*

67/97 First Order Smoothing of Unequally Spaced Data Points (#02627D)*

Data points that are scattered due to random errors of observation or other random influences should be smoothed before polynomial approximation or any other curve fit is carried out. This program was specially conceived for scattered data points that are not equally spaced, and it performs first-order single, double, or triple smoothing. (188 steps, 5 pages)

Author: **Dr. Henrique E. Adler**
Oporto, Portugal

**In European areas, order by number 51253D.*

67/97 Third Order Smoothing of Equally Spaced Data Points (#02628D)*

Very similar to the above program except that the smoothing is of third order. (180 steps, 5 pages)

Author: **Dr. Henrique E. Adler**
Oporto, Portugal

**In European areas, order by number 51254D.*

67/97 Legendre Approximation for Unequally Spaced Data Points (#02629D)*

This program approximates a function, defined by a set of unequally spaced data points, by Legendre polynomials of any degree up to 7, using the least squares method. It permits simultaneous computation of up to eight coefficients and of the sum of squared errors for each degree. A generalized Simpson formula giving third order approximation is used for the integrations. Projections of y values can be made. The program *can* be used for equally spaced points but #50520D (02625D in U.S.) would be better for that. (212 steps, 5 pages)

Author: **Dr. Henrique E. Adler**
Oporto, Portugal

**In European areas, order by number 51255D.*

(About this last program, Dr. Adler wrote, "The program is a novelty because the integration formula used in it is not generally known. I never found this formula anywhere in the literature; I had to derive it by myself." Perhaps some of our readers will be able to comment on that subject. Anyway, Dr. Adler, thanks for the contribution and for the good job of programming. Ed.)

Most Popular Programs?

Because a lot of readers ask us what are the most asked-for programs, we put the question to our all-knowing computer and came up with some surprises.

By far, the "best-selling" HP-65 program was #00268A "65-Stopwatch," by **Grant Munsey** of Sunnyvale, California. There were many, many "stopwatch" Programs and still are (see #2 below), but 00268A outsold all of them.

There is a different pattern for the HP-67/97 Library. The top 13 programs are listed below in order of quantity sold. The first on the list is almost 33% ahead of the second one, but only three times larger in sales than the lowest one.

1. **#00369D Star Trek, Advanced, *Larry G. Schneider*, Wilkes-Barre, PA.**
2. **#00192D 67/97 Timer, HP Users' Library***
3. **#00732D Curve Plotting Routine, *A. E. Anderson III*, Mt. View, CA**
4. **#00764D 97-Graph of a Function, *M. M. Breiner*, Cambridge, MA**
5. **#00179D Space War, HP Users' Library***
6. **#00191D Biorhythms, HP Users' Library***
7. **#00321D Pinball Wizzard, *Craig A. Pearce*, Berwyn, IL**
8. **#00162D Multiple Linear Regression for 3 Independent Variables, HP Users' Library***
9. **#00174D The Game of 21 (Blackjack), HP Users' Library***
10. **#00442D Telephone Directory, *R. J. Carril*, Glendora, CA**
11. **#00177D Submarine Hunt, HP Users' Library***
12. **#00785D 97-Plot Subroutine, *J. A. Weber*, Renton, WA**
13. **#00866D Traverse, Inverse, and Sideshots, HP Users' Library***

Congratulations to all of these authors for their "best sellers." Keep up the good work. All are outstanding programs.

(A lot of these earlier programs in the Catalog were written here at Corvallis. However, many were based on programs written by HP-65 owners. In particular,* **Walter Lee Gregory's** *#04200A "Space Ware," a monumental programming job by any standard, formed the basis for best-seller #5, above. Ed.)*

Author! Author!

Even when you treat computers with great care and respect and use correct software, they are still machines, and they sometimes embarrass us. Like, for instance, in the last HP-67/97 Library Catalog Addendum; there, the computer gave HP credit as the author for programs written by HP-67/97 owners in foreign countries. On checking further, we realized that, because our computer is programmed to accept only certain information, it regarded a foreign address as a particular programmed code we use to keep track of foreign subscribers to the Library. Thus, HP became the author of any program written by a non-U.S. author.

So please mark your Addendum 2 with the following *correct* and actual authors.
000961D, 000962D, 000963D, 01180D, 01449D—**Ian McKinnon,** Toronto Islands, Canada.
01089D—**Dick Jensen,** Parkville, Australia.
01102D, 01103D, 01104D, 01226D, 01618D—**Lorne J. White,** Winnipeg, Canada.
01111D—**Alan V. Fernihough,** Riverton, W. Australia.
01216D, 01621D, 01623D—**Naresh K. Sinha,** Hamilton, Canada.
01232D—**Wilic Gabrielian,** Teheran, Iran.
01282D, 01367D—**David B. Westcott,** Islington, Canada.
01366D—**Dr. Lee M. Wolfe,** Blacksburg, VA.*
01392D, 01393D—**Eli Cohen,** Vancouver, B. C.
01397D—**Masao Takahashi,** Tokai-Mura, Japan.
01423D—**R. Milton Johnson,** Carlton, Australia.
01433D—**Brian D. Kenn,** Turramurra, Australia.
01434D, 01542D—**Cedric A. Power,** Suva, Fiji.
01463D, 01464D, 01466D, 01625D—**Keith Neighbour,** Adelaide, Australia.
01467D—**William S. Anglin,** Prince George, B. C.
01531D—**Bruce D. Gough,** Ottawa, Canada.
01605D—**John Beckett,** Gore Hill, Australia.
01610D—**Shannon D. Holt,** Campbell River, B. C.
01615D—**Howard A. Bennett,** Vancouver, B. C.

* *No, that's not a foreign address. We can't explain how this error occurred.*

How to Make a Million $

You've all seen those ads that claim *you* too can become a millionaire in real estate, in the stock market, or as a financial wizard. Well ... there's more to making a megabuck fortune than just reading a book or "following my foolproof formula." However, if financial computations and calculations have caused you some sleepless nights, here is a "foolproof formula" that will clear up your insomnia. Buy this new program and you might not be on your way to your first million, but you will be able to handle financial problems with verve, elan, and confidence.

#02630D HP Top-Row Financial Keys with Sign Convention (#00339D in European areas)

This program will show users who are unfamiliar with financial concepts the background they need in order to solve complex financial problems. The program duplicates the five top-row financial keys of current HP financial calculators (HP-92, -37E, -38E). The program uses the cash flow sign convention (+ or −) as well as the special store-or-solve capability of each of the financial keys. The BEGIN/END toggle, 12×, 12÷, and CL FIN (clear financial registers) complete the function set, and HP-97 users will appreciate LIST FIN (print financial registers) and the print/no-print option.

However, without some training in financial concepts, the program would not be useful for the financial neophyte. Therefore, 27 pages of documentation lead the user from the basics of percent to simple and compound interest and then to cash flow diagrams and the sign convention. Twelve examples allow the user to apply the concepts from the training section to real-world financial problems. This program should fill a real gap for users who have financial problems to solve but no financial background.

Author: **Eric L. Vogel**
Corvallis, Oregon

(Many of you have "met" Eric on the telephone or by mail. He works in our Customer Support group. Nice job, Eric. It looks like the answer to a long-standing problem. Ed.)

Software Flags

You might want to study this contribution from **Micky R. Burnette** of Anderson, South Carolina, if you need additional flags for some of your exotic programs. Here's his idea:

Up to 10 additional flags may be added to the HP-67 *(and HP-97)* by developing a software flag register. This scheme is more useful when input conditions must be saved for later use by the program. The ten flags are 0 to 9, and any memory register may be used, although the use of a primary register simplifies programming. Register R_9 will be used in the following example.

R_9 digit position: 10 9 8 7 6 5 4 3 2 1
Corresponding flag #: 9 8 7 6 5 4 3 2 1 0

Setting a flag: (stack X-register contains flag #) LBL A, 10^x, STO+9, RTN.

Interrogating a flag: (stack X-register contains flag #):

LBL B	RCL9	EEX	
1	x⇆y	1	
+	÷	×	
10^x	FRAC	INT	
		RTN	(X-register contains "1" or "0")

If LBL B were a subroutine, then the main program could perform a test (x=0, x≠0, etc.) to determine the state of the "flag," and the operation of the software flag would be similar to that of the hardware flag.

Since this routine uses little program memory, it should find many uses. One use for this routine would be for storing two "signed" numbers in one memory register. In that case, the software flag could be used for correcting the sign of one number.

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Hard Leather Case (HP-67)	82016A*	$ 35.00
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* Also usable on the HP-65.

You may order any of the HP-67 and HP-97 accessories and software shown by calling our toll-free number, 800-648-4711 (in Nevada 800-992-5710), and asking for the nearest Hewlett-Packard Accessory Dealer. (Toll-free number not available in Alaska or Hawaii.)
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"25 Words or Less"

You evidently like this column and want to keep it alive. Mail about "25 Words or Less" has been "more," not "less." So, as long as *we* get inputs, *all of you* will get outputs.

One of the contributors in the last issue sent another letter as a follow-on to his original contribution. From **Richard H. Baker** of Queen Creek, Arizona, came:

I finally got the May 1978 issue of HP KEY NOTES, and enjoyed it as I have every issue, especially since you included my store-in-order routine.

Only fair, though, to give you the routine that I use to get these out of the registers once you have them all in:

```
001   *LBLb      008    PRTX
002      0       009    ISZI
003    STOI      010    GTOB
004   *LBLB      011   *LBL2
005    RCLi      012    PRTX
006    X=0?      013     RTN
007    GTO2      014     R/S
```

As you will see, this is very similar to, but shorter than, the Schüle routine (May 1978, "What's in an HP-67 Register") for checking registers in an HP-67. Mine does not flash the number of the register, but HP-97 users would not need that since mine and Schüle's on an HP-97 will print the contents.

(Thanks, Mr. Baker. However, I must remind our readers that this routine will handle only 24 values. Ed.)

Next a clever routine from **Arnold M. Miller** of Des Plaines, Illinois.

I have a routine that I think would be appropriate for your column, "25 Words or Less." Many times I have found that it would be nice if the calculator cleared only a small group of registers; for example, the summation registers R_{s9} through R_{s4}, without disturbing any of the other registers. *(Whoops! Except the I-register. Ed.)* Here is a subroutine I have found to work well.

```
001   *LBLE      012      R↓
002      N       013    RCLI
003      N       014    X≠Y?
004    ENT↑      015    GTO9
005      N       016     CLX
006      N       017    STOI
007    X≠I       018    ENT↑
008   *LBL5      019    ENT↑
009     CLX      020    ENT↑
010    STOi      021     RTN
011    ISZI      022     R/S
```

Instead of putting the register locations in the program memory, they could be put in the stack, with y holding the highest register and x holding the lowest. Also, it is not necessary to clear the stack, but it is a good idea to clear the I-register.

From Santa Cruz, California, our next contributor, **Grant O. Heninger** sends us:

Re: "25 Words or Less" from J. S. Hayden, in the February 1978 KEY NOTES. Mr. Hayden's program, "Order and Store 23 Values," can be enhanced by adding a test zero before sorting. Since all registers (storage) should be cleared to start, about one-half of the execution time will be saved.

```
001   *LBLA      013    STO0
002    STO0      014      R↓
003       2      015    STOi
004       3      016    DSZI
005    STOI      017    GTO1
006   *LBLi      018   *LBLa
007    RCLi      019    RCLE
008    RCL0      020       1
009    X=0?      021       +
010    GTOa      022    STOE
011    X>Y?      023     RTN
012     X≠Y      024     R/S
```

Only three steps are added to the original program. These are indicated by underlines.

Here is a routine that is somewhat similar to Mr. Hayden's original "Order and Store 23 Values." However, **George A. Furford** of Salinas, California, has a different slant on the routine, and his instructions and example are first-rate. Here's the routine:

```
001   *LBLA      013      F1?
002      CF1     014    GTOA
003    RCL0      015    RCL0
004    STOI      016     RTN
005    RCLi      017   *LBL2
006    DSZI      018    ISZI
007   *LBL1      019    STOi
008    RCLi      020     X≠Y
009    X>Y?      021    DSZI
010    GSB2      022    STOi
011    DSZI      023     SF1
012    GTO1      024     RTN
```

To use the routine, store random quantities, beginning with register 1, then up through register 24. Then store the number of random quantities in register 0. Execute the program, which will stop and display the number of quantities, which will have been rearranged so that the lowest value is in register 1, the next lowest in register 2, and so on. By pressing h REG (or f REG) you get a check on what is in the primary registers; then repeat those keys after an f P≥S and you see the contents of the secondary registers.

This routine is actually part of a complete SORT program that Mr. Furford uses. The program includes routines for storing data, recalling data, and inserting and deleting individual quantities. He also uses this routine as a subroutine in two other programs.

This contribution arrived slightly after we buttoned-up the last issue. It is from **Edward W. Tillitson** of Grosse Pointe Farms, Michigan.

A good idea, "25 Words or Less" deserves promotion. In connection with a sort program for up to 24 numbers, the following number entry routine works well. Key RTN, then the number of entries, "N" in your list, followed by R/S to initialize the routine.

```
001    STO0      010    ISZI
002       1      011    RCL0
003    STO1      012    RCLI
004    DSP0      013    X≠Y?
005   *LBL1      014    GTO1
006    RCLI      015     RTN
007     RTN      016   *LBLB
008   *LBLA      017    DSP2
009    STOi      018     R/S
```

The initialization stops at LBL A. Each entry is then keyed in, followed by keying A. This routine *does not allow* more than "N" entries to be made, and prior to each entry, it displays the register number for the next entry. If the RTN at stop 015 is deleted, the balance of the program takes off automatically after n_N has been entered. If the balance of the program needs debugging, retain the RTN step until debugging is complete, record the list of entries on a data card and thereafter use it for making the entries after the initialization step, then press B.

Sorry about not making it in 25 words. However, I expect the editor is quite capable of appropriate condensations if necessary.

(No need to condense it, Mr. Tillitson, you did a good job, and I'd rather it was complete than compact. Don't take the column title too seriously. Ed.)

Now, how about a little longer one, actually a small program, from **James R. Grandstaff** of Oak Park, Illinois.

I have written a program to compute factorials of numbers larger than 69. The program uses only 45 lines of program memory.

```
001   *LBLA      016       6    031    ST+0
002    CLRG      017       9    032    DSZI
003    STO9      018      N!    033    GTOC
004       7      019     LOG    034   *LBLD
005       0      020    STO0    035    RCL0
006    X≠Y?      021    RCL9    036     INT
007    GTOB      022     LOG    037    STO2
008     X≠Y      023    ST+0    038    LSTX
009      N!      024      F2?   039     FRC
010     RTN      025    GTOD    040    10^x
011   *LBLB      026   *LBLC    041    STO1
012       -      027       1    042    PRTX
013    STOI      028    ST-9    043     R↓
014    X=0?      029    RCL9    044    PRTX
015     SF2      030     LOG    045     RTN
```

The program uses the log of 69!, then adds the log of 70 to it and loops, adding the logs of consecutive numbers until it reaches the input number. Numbers smaller than 70 use the calculator's built-in N! function. The answer is displayed (or printed) and stored in register 1 (N) and register 2 (exponent).

(It works, all right, but it does take a while. I clocked a bit over 8½ minutes to run the answer for N=521. Ed.)

From **Leslie D. Paul** of Madison, Wisconsin, came another contribution to this column. In his words: "The program really shows the power of RPN logic!"

t-Statistic for Two Means: Given the mean, standard deviation, and sample size from

independent random samples of two normal populations, the following program can be used to test the null hypothesis H_0: $\mu_1 = \mu_2$.

```
001  *LBLA     014   ST+9
002   CLRG     015   X≷Y
003  *LBL1     016   RTN
004    R/S     017    -
005     X²     018   GSB1
006    R/S     019   RCL9
007    1/X     020   RCL8
008   ST+7     021    ÷
009    1/X     022   RCL7
010      1     023    x
011      -     024   √X
012   ST+8     025    ÷
013      x     026   R/S
```

After keying in the program:

ENTER	PRESS	DISPLAY
$\bar{x}_1$	A	$\bar{x}_1$
S_1	R/S	S_1^2
n_1	R/S	$\bar{x}$
$\bar{x}_2$	R/S	$\bar{x}_1 - \bar{x}_2$
S_2	R/S	S_2^2
n_2	R/S	T

The program solves the t-statistic formula:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\frac{S_1^2(n_1-1) + S_2^2(n_2-1)}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

by efficient use of the stack, and with storage register arithmetic. The program can be used by itself or as part of a larger statistical program.

There are flag tests galore, but here is one we have not seen before. And it *is* short. It's from **J. David Byrd III** of Arlington, Virginia.

I have a submission to your "25 Words or Less" column. Unfortunately, it is the overworked "Flag Test Routine," but I think that the solution that I have reached is just about as short as you can get and still restore the *test cleared* flags (F2 and F3) to their proper status. As a matter of fact, if the user wishes to *install* this program in steps 001 through 018, he or she can even eliminate the label (LBL A) and access the routine *manually* by pressing RTN (to get to step 000) and R/S (to execute).

```
001  *LBLA     011   X≠0?
002      0     012    SF2
003    F0?     013      0
004   10ˣ      014    F3?
005      0     015   10ˣ
006    F1?     016   X≠0?
007   10ˣ      017    SF3
008      0     018   PRST
009    F2?     019    RTN
010   10ˣ      020   R/S
```

This Flag Test Routine (non-destructive) is the minimum-length version which, alas, annihilates the stack but does give a positive indication of each flag status in the printout, (or stack review) as opposed to only displaying those flags that are "set." A sample output is shown below: T=F0, Z=F1, Y=F2, and X=F3 (1 if set, 0 if clear).

1.	T	F0	"set"
0.	Z	F1	"clear"
0.	Y	F2	"clear"
0.	X	F3	"clear"

Only F0 is set.

1.	T	
0.	Z	Flag 0 and
1.	Y	flag 2 set.
0.	X	

Flag 2 and Flag 3 are reset to their prior state via the X≠0 test, which uses the number (1 or 0) resulting from the flag test itself as the test condition for setting or not setting the flag(s).

Non-Function Plotting Routine

Every so often, one of our readers comes up with a truly elegant routine or program. You are about to see one right here.

Just before the last issue went to press, we received the following letter. It was terribly tempting to make a last-minute effort to squeeze it into that issue, but to do so would have required some heavy editing. The routine was too good to do that, so we saved it, and here it is in its entirety. *Glückwunsch,* Herr Dr. Stöcklmair!

Dear Editor,

In the June 1977 issue of HP KEY NOTES, various plotting routines for the HP-97 printer were described. To work with these programs, always a function f(x) must be given, and only the graph of this function can be printed out.

In everyday life, often a sequence of data may appear that cannot be expressed by a function; e.g., production volumes, price movements, daily maximum temperatures, and a lot of other data series, where a graphical performance may be useful, because it will give a quick and clear impression of the actual variations.

In cases of that kind, the short program given below may be of some use. It consists of two parts: in the preparation routine (LBL a), the minimum and the maximum value determining the printout scale must be keyed in the Y- and X-registers (always enter the minimum value in the Y-register!); these values may be positive and/or negative. When "a" is pressed, the constants needed for the main routine will be stored in registers A and B (or any other registers available), and the maximum and minimum limits will be printed on the tape. After this preparation step, the given data can be entered in the X-register and key "A" must be pressed after each data input.

```
001  *LBLa     015   RCLB
002   STOA     016    ÷
003   PRTX     017      9
004   X≷Y      018    +
005   PRTX     019   DSP0
006      -     020   RND
007      9     021   10ˣ
008    ÷       022      9
009   STOB     023   1/X
010    SPC     024      8
011    RTN     025    +
012  *LBLA     026    x
013   RCLA     027   PRTX
014      -     028   R/S
```

The program version in the sample offers a range of 9 intervals (10 print positions) and the printed values of the data input are represented by an "8" on top of a column of 1's. The range of the printout can be extended to 10 intervals (11 print positions), if the zero-line (minimum-line) is laid on the decimal point. To achieve this result, the figure "9" in step 007 must be replaced by the number "10" (the figures "9" in steps 017 and 022 remain unchanged!). In this program version, the minimum value in the printout will not be represented by an "8" but by a "1," thus indicating that this value actually belongs to the next print position on the right (= decimal point).

To achieve a correct sequence of the values in the printout, when the tape is turned by 90° (first value on the left side!), it is recommended to enter the data in reverse sequence, beginning with the last value of the given data series.

Zinc—Prices LME
(monthly averages)

Key in each value, press PRINT X, then max. & min. & again each value, followed by key A.

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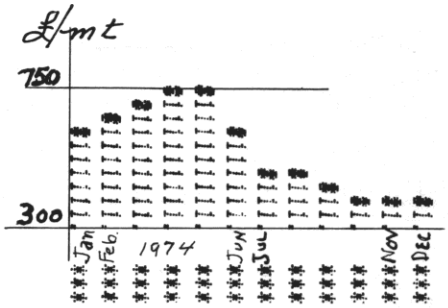
Max.→	750.0	***
Min.→	300.0	***



Continued

The sample displays movement of zinc prices at the London Metal Exchange from January 1974 to December 1974.

Yours sincerely,
Dr. Hans Stöcklmair
Klagenfurt, Austria

Algorithms for RPN Calculators

The title of this column is in italic type because it is also the title for a new, spectacular, hardcover book by **Dr. John A. Ball.**

Dr. John A. Ball is a radio astronomer at the Center for Astrophysics (Harvard College Observatory and Smithsonian Astrophysical Observatory) in Cambridge, Massachusetts. He has a B.S. degree from the University of Nebraska (his home state) and a Ph.D. in astronomy from Harvard. With such a background, there is little wonder how he wrote such a fabulous book. It is 330 pages of pure delight for HP calculator aficionados. Herewith is a quote from the cover jacket:

"Few calculator users are aware of the computational power beneath their fingers. Algorithms designed for one of the many handheld calculators that use RPN (Reverse Polish Notation) can solve remarkably complex numerical problems, ordinarily given to large computers.

"This book explains how to write concise and elegant algorithms for meeting specific, individual needs and for solving numerical problems of surprising complexity. Using only an RPN calculator and the methods supplied, scientists, engineers, and students can numerically integrate differential equations, fit curves to data using least-squares techniques, solve transcendental algebraic equations, and evaluate many special functions (such as Bessel functions). In addition, existing algorithms can be simplified and streamlined.

"*ALGORITHMS FOR RPN CALCULATORS* progresses logically: you will understand and benefit from the first chapters even if your background includes only high-school mathematics; later chapters deal with more complex problems involving calculus. And, a large section of the book gives actual RPN algorithms for a variety of common problems. These are written to be readily adapted or directly used on any RPN calculator. This section alone constitutes a valuable practical reference.

"Each chapter ends with exercises (problems sets), and an appendix contains numerical answers. In addition, the book includes a critique of present calculator designs, with suggestions for future developments."

The book was published by:

John A. Wiley & Sons, Inc.
One Wiley Drive
Somerset, New Jersey 08873

If you cannot find it at your bookstore, write to the above address.

KEY NOTES extends hearty congratulations to Dr. Ball. When you see the book, you'll know why we are enthusiastic about it.

Computer Program For HP-67 Codes

About a month ago we received in the mail a large package that contained all of the information about a program in PL/I (Programming Language One) for the IBM 360-370 computers. The program translates HP-67 key codes to HP-67 keystrokes.

The program was written by **Dr. Allen Joel Harris** of Winthrop, Massachusetts, who stated that he finds this program useful for both debugging and documenting HP-67 programs.

Dr. Harris has stated that he would like to share his program with KEY NOTES readers who have access to computers with PL/I compilers. For the cost of materials and postage, he will mail the necessary listings and tab card decks, and will not limit his offer to the U.S. So if you are interested, contact Dr. Harris and include a stamped and self-addressed envelope for his reply to you. His address is:

Dr. Allen Joel Harris
600 Governors Dr., Apt. 32
Winthrop, Massachusetts 02152

Star Trek Complaints

We have had an unusual number of complaints about program #00369D, "Star Trek-Advanced." So we contacted the author, Larry Schneider. Here is a typical complaint, then Mr. Schneider's answer.

User: There is one important part of the program that is in need of revision. When an enemy ship is destroyed, it still registers on the sensor, and if you are too close you have to fight it all over again. This puts a damper on the game, so a revision would be greatly appreciated by all.

Mr. Schneider: I have been receiving many letters about this and other problems that users have been having with my program. They all occur because of something that each user is forgetting to do. And that is, setting the appropriate flags and display prior to recording the program on a card. For example, I will explain this user's particular complaint.

The program steps that flag the enemy ships upon destruction are 92 to 95 in program #5. Notice that the register is flagged with 1000 only if flag 0 is set. However, because this user neglected to preset the flag, his program doesn't work properly.

There are just too many users who have written for me to possibly respond to all of them. And 95 percent of the complaints are because of this flag and display presetting problem. I suggest that perhaps you might include an article in KEY NOTES. If I can be of any more help, please don't hesitate to contact me.

(Glad to help, Larry. We hope this clears up the complaints and satisfies our customers, and that it takes the load off of you. Thanks for the explanation, Larry. We also suggest that readers **always** *check the "Set Status" box at the bottom of the "Program Listing" page* **before** *they record any program onto a magnetic card. Ed.)*

Ersatz Memory Bursts!

On page 5 of the last KEY NOTES (May 1978, Vol. 2 No. 2), we printed a neat trick and called it "HP-67/97 'Ersatz' Continuous Memory." It was—and still is—a very good program. But two very astute and sharp-eyed individuals caught a sneaky problem in the program, one that eluded even our technical review.

The two letters about the problem are nearly identical, so we have printed the first one received. The second letter, from **Murray L. Lesser** of Yorktown Heights, New York, ends: "It is a lovely idea, but you should warn your readers not to count on it. And that should tell you something. But read for yourself:

Dear Editor:

In the last issue of KEY NOTES, there appeared an interesting technique, written by **Pierre Flament** of Belgium, that provides the HP-67/97 with a substitute (ersatz) Continuous Memory.

This technique caught my eye because it was very similar to one I devised a while back. Well, I hate to be a burster of bubbles, but, in this case, there is a big bubble that is just waiting to be burst! You see, Mr. Flament's routine (as well as mine or I suppose that of anyone else) just doesn't always work. When doesn't it work? Well, not for any program that possibly could be stopped in the middle of a subroutine; that is, before it reached the return statement of an internally called subroutine. Why? Because the subroutine return addresses cannot be stored on a card. Virtually everything else can be stored (as Mr. Flament showed us), but not subroutine return addresses.

Since neither Pierre Flament nor HP mentioned this fact, I felt obliged to alert fellow users to this limitation.

Because one never knows where a program will stop when R/S is pressed, I suggest not using any "continuous memory" technique for programs with subroutines. Do not despair, however, because many programs do not have any internally called subroutines.

I doubt the possibility, but maybe—just maybe—someone will discover a way around the limitations.

Sincerely,
Joseph V. Saverino
Brooklyn, New York

Calculators/Computers Magazine

Except for material published by HP or the independent Users Club (PPC), you can't find very much literature about calculators. There *is* a magazine, however, and here is a letter from the editor of that magazine.

Your readers may be interested in calculator material appearing in our magazine, *CALCULATORS/COMPUTERS.* Enclosed are the lead pages of two articles to appear this fall. We will be running a series by **Dr. John Wavrik,** on the use of the HP-25 in elementary schools.

Sincerely,
Don Inman, Editor

Continued

Thanks for the notice, Mr. Inman. The HP-25 articles by Dr. Wavrik are very good. The material was designed for a course for students (grades 4 to 6), accompanied by a parent, through the University of California, San Diego Extension. Dr. Wavrik is an Associate Professor of Mathematics at the University of California at San Diego.

Although a good bit of the calculator material in *CALCULATORS/COMPUTERS* is in algebraic notation, it is easily used with HP's RPN system, which is one of the assets of our system.

The magazine is published seven times a year (January through May, October and November) at the subscription price of $12* a year by:

DYMAX
P.O. Box 310
Menlo Park, CA 94025

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** U.S. dollars. See note at bottom edge of cover.*

Electronic Burp

We have an incredibly large number of name and address files on our computer. Therefore, it takes a special, coded program to obtain labels *only* for the people who get KEY NOTES. It was during one of these label runs, earlier this year, that a power failure occurred during the night, precisely when the labels were being updated and printed. Because of some electronic quirk, the computer did not indicate it had "lost" some files.

However, because of the number of queries we've had about the February 1978 (Vol. 2 No. 1) and May 1978 (Vol. 2 No. 2) issues, it leads us to believe that some files *were* dropped that night. So, if you missed one of those issues and we haven't already caught the omission and sent you the newsletter, please let us know.

New Book on Programming Calculators

A few months ago, we managed to discover that a book was being written about programmable calculators. In fact, we learned that the title was: *How to Program Your Programmable Calculator*, so we called the publisher and they graciously sent us a copy of the *manuscript*, because the book was still in production.

This book has been written by **Stephen L. Snower** and **Mark A. Spikell**, both of whom have extensive educational and teaching backgrounds,especially in mathematics. Mr. Snower presently teaches at Babson College in Wellesley, Massachusetts, and has taught at Michigan State University. He has a BS degree in mathematics from M.I.T. and has other degrees in teaching and mathematics (from Harvard). Mr. Spikell teaches at Lesley College in Cambridge, Massachusetts and is the author of other books on mathematics. He has an AB in mathematics from Miami University, an ED.M. from Xavier University, and an ED.D. from Boston University. As you can see, both authors have good credentials.

It would take a full issue of KEY NOTES to describe *How to Program Your Programmable Calculator*. To say the least, it is *complete*. It covers everything from the evolution of calculating machines to AOS and RPN calculators. Of course, of interest to *our* readers is the material on RPN calculators...and it is extensive. Basically, the book covers the least-expensive models of programmable calculators, including the HP-33E and HP-38E. Thus, it does not cover the incredible range of the HP-65/67/97 calculators. But, if you are wary of learning to program a programmable calculator, this is the book that can get you started. It gets into basics, flow charting, sample programs, how-to-do-it routines, and even gives answers to problems.

Or, if you have a youngster in school or a son or daughter in college, here is a most appropriate book for the upcoming back-to-school season or for a fine Christmas present.

The book will come off the presses in November or December and will be offered in both hardcover and softcover versions. If you can't at that time locate it at your bookstore, write to:

Prentice-Hall, Inc.
Spectrum Books Div.
Attn: Lou-Ann E. Leahy
Englewood Cliffs, NJ 07632

We Get Letters

Sometimes we like to share with you the lovely letters we get from satisfied customers. Here is one such letter.

Gentlemen:

I would like to pass on several comments to the Users' Library staff and to the readers of HP KEY NOTES.

I have just returned from an extended business trip to Europe. Naturally, I had my HP's with me (22 and a 67). For reasons unknown, several keys on the 67 lost the resistance that is normally present. It became uncomfortable to use, although it did continue to calculate properly.

I did a little research and discovered that HP had an office in Vienna, Austria. I adjusted my schedule and visited the office. I met Mr. Friedrich Ritter, Customer Service Engineer, who quickly assessed the problem and replaced the keyboard.

It's a very nice feeling to discover that HP service is available; and *that,* folks, is a very big plus. Needless to say, I'm one more of your very satisfied customers.

Kindest regards,
Robert E. Barbutti
Juneau, Alaska

HP KEY NOTES

August 1978 Vol. 2 No. 3

Programming and operating tips, answers to questions, and information about new programs and developments. Published periodically for owners of Hewlett-Packard fully programmable personal calculators. *Reader comments or contributions are welcomed. Please send them to one of the following addresses.*

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