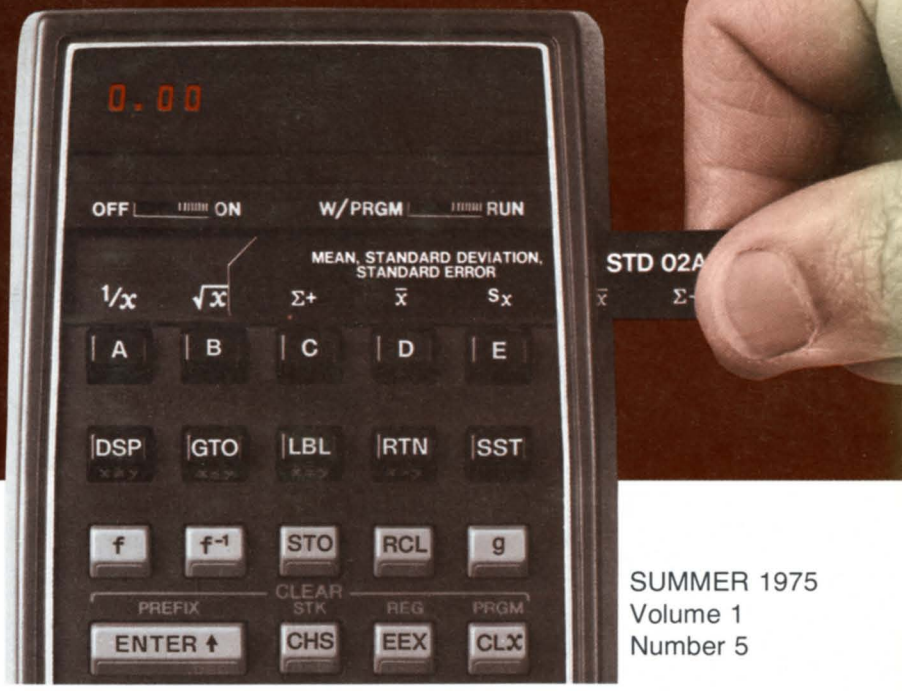
HP-65 KEY NOTE

for HP-65 owners

HEWLETT hp PACKARD



SUMMER 1975
Volume 1
Number 5

An Amazing Young Man!

Present a challenge to a 13-year-old who can write his own programs for the HP-65, and who has some knowledge of and a great deal of interest in astronomy, and the possibilities are limitless.

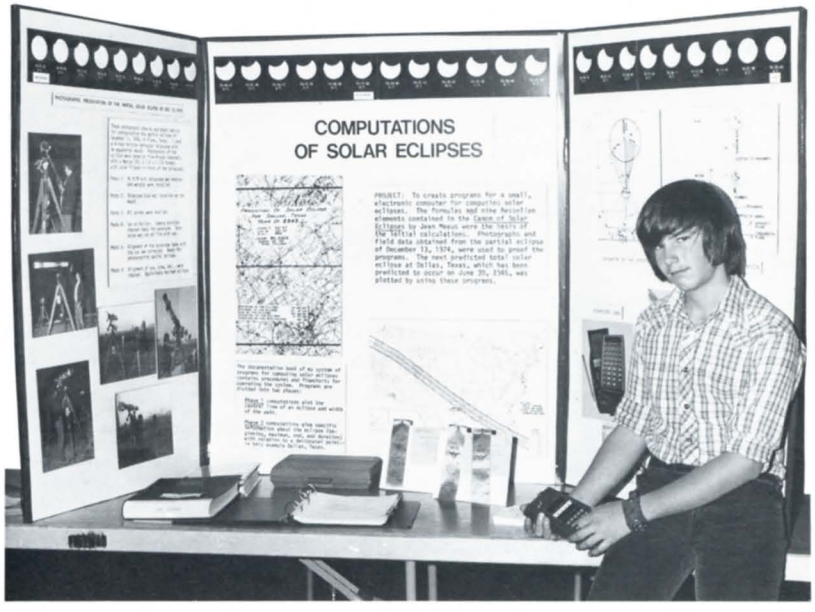
Nickey Naumovich, Jr., a Dallas, Texas junior high student, wanted to see if he could convert to HP-65 programs some of the complex formulas that are used on much larger computer equipment to compute solar eclipses. He did it, and it works!

The system *Nickey* designed consists of 21 programs with approximately 100 steps each, covering 53 equations and 80 variables that compute the time, duration, and curve of a predicted solar eclipse in relation to a specific point. HP program Math 1-33A—*Finite Difference Interpolation*—was revised to suit the problems of interpolating the instant time of the central line of the eclipse. Running time of the programs is about one hour. His documentation includes codes, flowcharts, programs, and input and output with sample problems and solutions. He proofed his programs by checking data on the last partial solar eclipse of December 13, 1974, then set about to plot the next total solar eclipse at his hometown—predicted for June 30, 2345. He doesn't expect to be around to see if his computations are correct, but they do coincide with those of scientists who programmed the formulas in FORTRAN for IBM equipment.

Nickey entered his system of HP-65 programs in the annual Association for Educational Data Systems Computer Contest and won Honorable Mention in the Physical Science category. He then enlarged the project to include his photography and field work done during the partial eclipse last year and entered it in his school's Science Fair where he won First Place and Grand Prize. Next came the Regional Science Fair, and there he took honors as Runner-Up Grand Prize in the Junior Division, First Place in the eighth grade, and a NASA Special Award. The HP-65 was prominently displayed at his booth at the Regional Science Fair, and its operation was demonstrated by the young exhibitor. Now *Nickey* is working up his documentation for submitting the programs to the HP-65 Users' Library.

No stranger to computers, large or small, *Nickey* "helped out" last summer in the computer room of a large data processing center, an IBM 370-145 installation, in Dallas. He was such an eager learner and so obviously enjoyed the work, that this summer the Center has asked him to fill in during their vacation schedule.

No, *Nickey's* father is not in the computer business—he's in land development in the Dallas area, but it was the father who introduced the son to the HP-45 first and then the HP-65. *Nickey, Jr.* has an eighth grader's knowledge of math, understands how to read mathematical formulas, possesses outstanding logic comprehension, and just lets the HP-65 take it from there!



Library Corner

As of September 15, there were 3,538 programs logged into the HP-65 Users' Library. And it continues to grow at a steady rate. But what is most astonishing is the enormous variety of subjects and sciences represented by these programs. It seems that HP-65 owners are indeed a most elite and inventive group of people.

CANADA JOINS US

Because of problems in mailing and exchanging currency, we had not—up until now—been able to include Canadian HP-65 owners in the Users' Library. However, those problems have been solved and we will soon have our northern neighbors joining the Library and contributing programs. We're looking forward to seeing some unique programs from Canada.

CATALOG NEWS

In the last KEY NOTE we told you that the first supplement to the new loose-leaf *Catalog of Contributed Programs* would be mailed by mid-August. However, a late printing commitment made us decide to take advantage of the delay and include over 200 more new programs. So you will see the Catalog perhaps six weeks later than reported, but it will be well worth the wait: there will be over 1000 new programs in this first supplement.

Remember that the "Abstracts Section" of this supplement will include *only the new programs* that have been added since your last Catalog. All other sections are completely reprinted.

RENEWALS

If you have a subscription that has, or will, expire by October 31, you should have received by now a letter inviting you to renew your subscription. The cost of renewal is $8.00 plus your local state sales tax. And, don't forget that *you get your choice of one free program with each renewal*. So, if your subscription has expired, be sure to renew now to make certain you receive the next catalog update.

NEW PROGRAMS

It will take a while to compile another supplement to the Catalog so, in the meantime, here are some programs that were submitted after we went to press with the first Catalog supplement. One program (03110A) actually is in the supplement but is included here by virtue of its enormity. It took the author 3 weeks to complete the eight cards and 671 steps; in fact, it took 10 days to finalize. However, with it, you can become an organic chemist in 5 minutes. (Chemistry students and teachers take note!)

If possible, use an order form from the Catalog to order these programs. **Use the program number shown here.** Send only checks or money orders, payable to Hewlett-Packard Company. Be sure to include any state or local taxes. (Each numbered program has a nominal charge of $3.00.)

Benzene Synthesis Electrophilic Aromatic Substitution (Order #03110A)

This program enables the HP-65 user to synthesize benzene ring compounds (mono and poly ring) via electrophilic aromatic substitution. The calculator indicates the strongest predominant director and its orientation (ortho-para or meta), compensates for this, tests for steric hindrance, selects the proper card, indicates the bonding site, and indicates when bonding is impossible. A steric hindrance factor, entered by the user, compensates for temperature, catalyst, and other factors that affect bonding, if so desired. Complete instructions are provided.
Author: *Lee M. LaMunyon*
Picayune, Mississippi

SAR: Probability of Detection (POD) by Random Probability (Order #03472A)

Computes Search and Rescue (SAR) Probability of Detection (POD) by use of the Random Probability Curve, POD = $1 - e^{-nc}$, where n is the number of searches and c is the average coverage factor. This gives more realistic POD's than the curves in the National SAR Manual (1 July 1973) for over-water searches with poor navigational aids or for inland searches. User may enter the number of searches and the average coverage factor or merely enter each sorties' coverage factor. (63 steps) *(Note: Lt. Wilson is also the author of two more SAR programs: "Area, Time, and Resources Planning Formula," Order #03473A, and "Priority Areas by Canadian Search Method," Order #03474A. Ed.)*
Author: *1st Lt. Gary C. Wilson*
Westbury, New York

Ballistic Trajectory with Drag (Order #03497A)

This program computes the approximate trajectory of a projectile with atmospheric drag through the use of a series of successive linearized approximations. The program is valid only for low-speed projectile motion (300 miles per hour or less). However, the limits of the program can be expanded when detailed knowledge of the program and aerodynamics are known. (191 steps)
Author: *John L. Korchick*
El Cajon, California

Minimum Reflux-Ratio—Binary Distillation (Order #03479A)

Calculates the minimum reflux ratio for a binary distillation that can be characterized by an average relative volatility, constant molal latent heat, and constant molal overflow. Input variables are relative volatility, feed and distillate compositions, and thermal quality of the feed. The result is helpful in selecting the operating reflux ratio for program #03480A. (96 steps)

Binary Distillation—McCabe-Thiele Method (Order #03480A)

This program computes the number of theoretical plates and the boil-up ratio for a binary distillation by an analytic application of the McCabe-Thiele graphical method using average relative volatilities for the two-column sections. Other input variables are feed, distillate, and tails compositions, and feed thermal quality and reflux ratio. (99 steps)
Author: *Edward P. Goffinet, Jr.*
Wilmington, Deleware

Crandall's Rule (Order #03487A)

Of special interest to surveyors, this program adjusts a traverse by Crandall's Rule where accidental errors of linear measurements are likely to be greater than those of angular measurements. After any small angular error of closing has been distributed among the bearings of a traverse, it is assumed that the bearings are without appreciable error and the adjustments should properly be made to the linear measurements. (268 steps)
Author: *Robert W. Tatge*
Arvada, Colorado

(Continued on page 5)

Three New Pacs

The big news this month is the three new application pacs released for the HP-65. And all three are available now! Just fill in the handy *HP-65 Accessory Order Form* included with this KEY NOTE and send the order back to us in the included business reply envelope.

Rather than write a discourse on each new pac, here are the titles of the programs in each pac. And, remember, each program from these pacs is available separately in the HP-65 Users' Library. You'll find them listed in the new Catalog Supplement.

MACHINE DESIGN PAC 1 (00065-67052) contains 35 programs (on 40 magnetic cards) that provide solutions for the machine designer in dynamics, vibrations, linkages, cams, gears, springs, power transmission, and machine geometries as follows:

Constant Acceleration—Time
Constant Acceleration—Velocity
Kinetic Energy
Free Vibrations
Vibration Forced by $F_0\cos\omega t$
Forced Oscillator With Arbitrary Function
Fourier Series
Critical Shaft Speed
Four-Bar Function Generator
Progression of Four-Bar System
Linear Progression of Slider Crank
Angular Progression of Slider Crank
Cam Data Storage
Harmonic Cam Design—Radial Roller Follower
Harmonic Cam Design—Flat-Faced Follower
Roller Follower Cam Function Generator
Flat Faced Follower Cam Function Generator
Linear Cam Function Generator
Spur Gear Reduction Drive
Standard External Involute Spur Gears
Spur/Helical Gear Forces
Bevel Gear Forces
Worm Gear Forces
Spring Constant
Helical Spring Design
Torsion Spring Design
Flat Spring Design
Cone and Plate Clutches
Power Screws
RPM/Torque/Power
Line-Line Intersection/Grid Points
Circle-Line Intersection
Circle-Circle Intersection
Points On A Circle
Belt Length

STAT PAC 2 (00065-67053) contains 31 programs (on 40 magnetic cards) that provide solutions in the areas of general statistics, distribution functions, curve fitting, analysis of variance, test statistics, probability, quality contol, and queuing theory as follows:

Partial and Multiple Correlation Coefficients
Moving Averages (Order 2 to 8)
Histogram (12 Intervals)
F Distribution With Odd Degrees of Freedom
Erlang Distribution (Gamma Distribution)
Geometric Curve Fit
Gompertz Curve Fit
Weibull Distribution Parameter Calculation
Weighted Regression (Special Case)
Polynomial Approximation
Two-Way Analysis of Variance (No Replications)
Two-Way Analysis of Variance (With Replications)
Latin Square
Analysis of Covariance (One Way)
One Sample Test Statistics for the Mean
Test Statistics for the Correlation Coefficient
Differences Among Proportions
Behrens-Fisher Statistic
Kruskal-Wallis Statistic
Mean-Square Successive Difference
3×K Contingency Table
The Run Test for Randomness
Intraclass Correlation Coefficient
Fisher's Exact Test for a 2×2 Contingency Table
Probability of No Repetitions in a Sample (Birthday Problem)
$\bar{x}$ and R Control Charts
p and c Control Charts
Operating Characteristic Curve (Type A)
Operating Characteristic Curve (Type B)
Single- and Multi-Server Queues (Infinite Customers)
Single- and Multi-Server Queues (Finite Customers)

E.E. PAC 2 (Microwave) (00065-67056) contains 27 programs (on 40 magnetic cards) that will assist the microwave circuit designer in making microwave measurements, designing transistor amplifiers, computing transmission line properties and certain system properties, and performing difficult related mathematical operations as follows:

Mismatch Error Limits
Multiple Mismatch Error Limits
Smith Chart: Radially Scaled Parameters
Smith Chart: Impedance-Reflection Coefficient
Microstrip Calculations (three cards)
Transmission Line Calculations (three cards)
Cutoff Frequency in Coax
Rectangular Waveguide Calculations
Frequency Conversions
Pulse Spectrum Analysis
Spurious Responses
FM Sideband Level
Modulation Index for Specified Carrier Suppression
Constant-Excess Noise Measurement
Noise Figure of Cascaded Networks
Impedance Matching
Unilateral Design: Figure of Merit, Maximum Unilateral Gain
Unilateral Design: Gain Circles
Unilateral Design: Noise Figure Circles
Bilateral Design: Stability Factor, Maximum Gain, Optimum Matching (three cards)
Bilateral Design: Gain Circles
Bilateral Design: Stability Circles
Load and Source Mapping
Linear and Lagrangian Interpolation
Parameter Conversion: S/Y, Z, G, H (six cards)
Parameter Conversion: S/T (two cards)
Complex Matrix Operations (two cards)

Programming Tips

In the Spring 1975 KEY NOTE we ran a tip about "Easy Fibonacci Numbers"—and it caught some flack. There are many ways to generate Fibonacci sequences, as many of you wrote to tell us. However, in *John Taylor's* defense, we must explain that his program was listed only as a "trick" he devised for his own use, and one he wanted to share with others. It was not meant to be the authority on Fibonacci numbers. However, the letters do add to the science of programming an HP-65, so here are some of them.

From *Carl M. King* in Sarasota, Florida: "I recommend to him *(John Taylor)* the following program:

LBL	g R↓
A	g R↓
ENTER	+
ENTER	RTN

For example, press: 0 ENTER↑ 1 A A A A . . .etc. Each time you press A you get the next number in the sequence. However, there are many different Fibonacci sequences, depending upon the first two numbers that you enter."

From *M.E. Patrick* in Coeur D'Alene, Idaho: "In the spring 1975 issue of KEY NOTE the article 'Easy Fibonacci Numbers' states that it was not possible to use only the stack of the HP-35 to calculate the Fibonacci sequence. I find that it is not only possible to construct the Fibonacci sequence and other 'table-of-values,' but preferable to use only the stack and ENTER↑, R↓, and x≷y keys. If one considers R↑ the same as R↓ R↓ R↓, then the Fibonacci sequence would be constructed as follows:

1)	1 ENTER↑	#1
2)	ENTER↑ +	#2
3)	ENTER↑ R↓ +	#3
4)	ENTER↑ R↓ R↓ R↓ +	#5
	Repeating step 3	#8
	Repeating step 4	#13
	etc, etc. .	

Note: I find this more convenient than hunting for STO, RCL, and LAST x keys."

From *Ralph O. Erickson* in Philadelphia, Pennsylvania: "In the spring issue of KEY NOTE is an article on calculating Fibonacci numbers using only the stack for storage. Here is a briefer program that does the same, using the stack more efficiently, without using the roll-down key:

f	LBL	R/S
STK	1	ENTER
R/S	ENTER	GTO
1	g R↑	1
R/S	+	*(continued)*

Start the program by pressing [A], then [R/S] repeatedly. A modification of this program will generate the Fibonacci sequence and other additive sequences which have the property that the limiting ratio of one term to the next is ½ ($\sqrt{5}$ − 1), the Golden Mean.

ENTER	g R↑	GTO
LBL	+	1
1	R/S	
ENTER	ENTER	

Start with the first two terms, U_1 and U_2, of the desired sequence. For example: [1] [ENTER↑] [3] [A], [R/S], [R/S],. . ., will generate the sequence: 1, 3, 4, 7, 11, ... After a number of terms have been calculated, pressing [÷] will display 0.618.

This can also be done on a machine lacking a roll-up key, using one additional step in the loop. For example, this program for the HP-25:

01	ENTER	05	+
02	ENTER	06	f PAUSE
03	R↓	07	ENTER
04	R↓	08	GTO 02

will display successive terms of an additive sequence automatically. Start with [f] [PRGM] U_1 [ENTER↑] U_2 [R/S].

For readers who may be interested in these sequences, I would like to put in a plug for the article in *Science,* volume 181, pages 705-716 (24 August 1973), which shows their applicability to a sphere-packing problem. And a plug for the HP-65. Solving the equations in this article was a challenge to our FORTRAN programming ability, but we now solve them with the HP-65.''

(Note: Though too modest to admit it, Ralph Erickson *is the author of the above mentioned* Science *article and is Professor of Botany at the University of Pennsylvania, Philadelphia. Ed.)*

Now, here are two good inputs about the "Two Is Better Than One" tip (by *Ed Puckett*) in the spring KEY NOTE.

From *Jay P. Sage* in Waltham, Massachusetts: ''It was interesting to read 'Two Is Better Than One' in the Spring 1975 issue. This technique for programming more than five functions has the disadvantage that the functions can only be accessed manually and not as subroutines. I have occasionally needed all five keys for manual program calls but have had enough common coding in those functions to want to do some of it as subroutines. The following example illustrates a way to use a letter key for both functions:

```
LBL, E
f, TF, 1, GTO, 5
(code for function one: F1)
RTN
LBL, 5
(code for function two: F2)
f-1, SF, 1
RTN
```

Flag 1 is assumed to be OFF normally so that F_1 is accessed when the [E] key is pressed in RUN mode. This function can also be accessed as a subroutine in the usual way. To access F_2 as a subroutine, the usual call in the program is preceded by the code f SF 1. The overhead for handling the setting and clearing of flag 1 can be handled in other ways that may minimize the number of program steps, depending on the number and type of such subroutine calls.

It is interesting to note that program E can call itself as a subroutine. The following program for example, evaluates $F_1\{F_2(X)\}$ when E is pressed:

```
                LBL, E
                f, TF, 1, GTO, 5
Subroutine call { f, SF, 1
                { E
                (code for F1)
                RTN
                LBL, 5
                (code for F2)
                f-1, SF, 1
                RTN
```

I was intrigued by the 'HP-65 Babysitter' article. I have often wondered about the meaning of the numbers that flash during program execution. Could you tell us something about that in a future issue of KEY NOTE?'' *(Sure will; in the next (Autumn) issue. Ed.)*

From *Harold Lamport* in Westport, Connecticut: ''I was intrigued with *Ed Puckett's* brilliant way of providing 12 addressable functions for the HP-65. Without in any way detracting from his accomplishment, the following variation may have more utility where the program memory steps remaining per function—after the memory steps lost for addressing and stopping are deducted—must be higher than by *Ed Puckett's* method.

For *Ed Puckett's* method, I figure the steps remaining per function as 55 ÷ 12, or 4.6 per function. Here, I provide 10 functions instead of 12, but they have 72 remaining steps for functions, or 7.2 per function. (The HP-65 A to E without R/S provides 85 ÷ 5 = 17 and with R/S, 84 ÷ 6 = 14.)

Instead of LBL 0, I use LBL E as the separator of the two sets of functions. This saves memory space because E is one step fewer than GTO 0 but loses two functions. The addressing is the same as *Ed Puckett's,* including the fact that the first function after entering the program is in the first set, whereas all later ones are in the second set unless RTN is first keyed.

First set	Second set
f_1	f_6
E	E
LBL	LBL
A	A
f_2	f_7
E	E
•	•
•	•
•	•
LBL	LBL
D	D
f_5	f_{10}
LBL	E
E	
R/S	

28 steps, omitting functions, leaving 72 for 10 functions, or 7.2 per function.

The addressing is the same as *Ed Puckett's,* including the fact that the first function key after entering is in the first set (unless [E] is first keyed), whereas all subsequent ones are in the second set unless [RTN] is keyed before each entry.

It might be thought that keying [E], a letter function, within another letter function, as in described here, would return the program to that other letter function, as is usually the case. However, this does not occur here, I have found, probably because [R/S] is involved.'' *(That is correct. Ed.)*

Application Pac Corrections

If you own some of our application pacs, check the following corrections and mark them in your copy. If your copy is correct, you have a later, revised issue of the book and/or card.

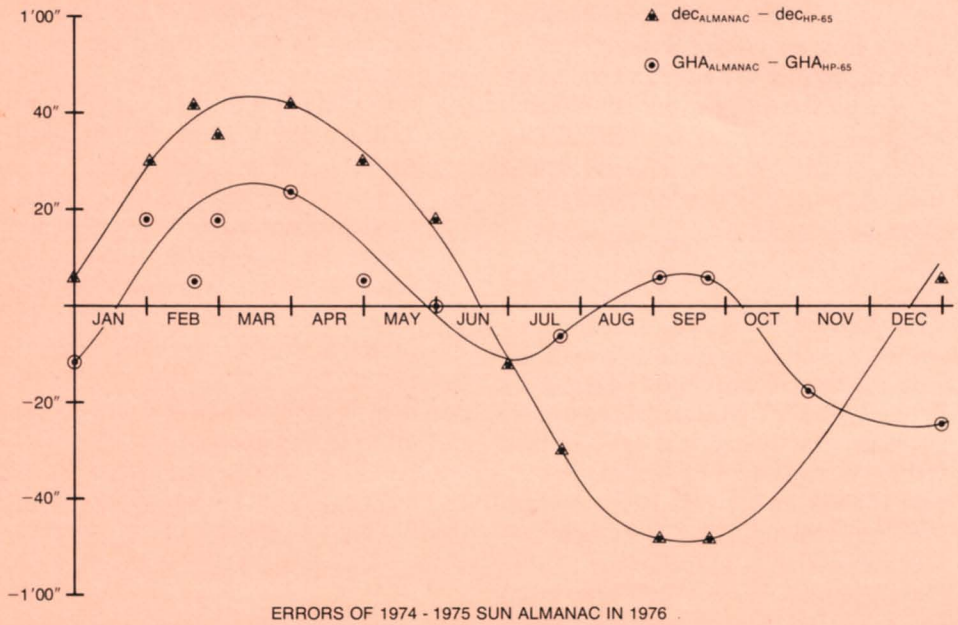
STAT PAC 1

Random Number Generator, STAT 1-08A, has been revised and changed to STAT 1-08B. The ''B'' version is a better (more reliable) program. With it, you can generate far more numbers without fear of cycling through the same sequence of numbers. So, if you have this pac and need the new magnetic card, send in your old card and order the new ''B'' card (by number) from APD Customer Communications (address on back cover).

NAVIGATION PAC 1

There has been some concern about using the *1974-1975 Sun Almanac* program (NAV 1-15A) in 1976. An experiment with the program shows that the maximum errors will be no greater than ±0.8 in Greenwich Hour Angle (GHA) and ±1.2 in declination for calculations in 1976.

The GHA and declination of the sun were obtained for a number of times throughout 1976 from both the *1975 Almanac* and the *1974-1975 Sun Almanac* program. These values were compared and the error was plotted showing a cyclical variation not exceeding 0.4 in GHA and 0.8 in declination. Since 1976 almanac entries calculated from the *1975 Almanac* may be in error by as much as ±0.4, errors from using the *1974-1975 Sun Almanac* program in 1976 are 0.8 in GHA and 1.2 in declination.



ERRORS OF 1974 - 1975 SUN ALMANAC IN 1976

(Continued from page 2)

Computation of Electricity Costs (Order #03448A)

This program is designed to compute an estimated monthly electric bill to allow annual cost comparisons. For a given set of rates and the ranges in which they apply, the basic bill is computed and the total is displayed. (99 steps)

Author: *Thomas S. Catlin*
Tempe, Arizona

Corporate Tax—Fiscal/Calendar Years (Order #03508A)

With taxable income as the input, this program calculates Corporate Income Tax for calendar years 1974 or 1976 and for calendar year 1975. With additional input, the program calculates the fiscal year tax. For *full* fiscal years, only the number of days within 1975 need be input. For *short periods,* the number of days of the period falling in each calendar year is input. The program indicates an error if the total days in the short period exceed 365. (100 steps)

Author: *Howard B. Kutner*
New York, New York

Pinball Machine (Order #03458A)

This program converts the HP-65 into a high-scoring pinball machine. A special initiation routine for the first ball, combined with four functioning flippers and a "tilt" option, afford the player an infinite number of possible games. Breaking 100,000 points with five balls is no easy task, even (especially?) for pinball masters. Can you beat this pinball machine? (100 steps)

Author: *Peter C. Wang*
San Francisco, California

Three-Dimensional Sub Hunt (Order #03420A)

Five submarines are hidden in a square grid at several depths. (Player can choose size of grid and number of depths.) Player fires depth charge at any square; if it hits, the submarine disappears. If the shot is a miss or near-miss, the HP-65 indicates 1 or 0. (192 steps) *(Note: This is a modification of program #00406A, "Underwater Submarine Hunt." However, it is more sophisticated, having five new features. Ed.)*

Author: *John K. Appeldoorn*
Bernardsville, New Jersey

15-Ball Rotation Table Pool (Order #03427A)

The game proceeds by random selection of player shots to be scoring shots. The balls are pocketed in rotation (1 through 15). Player skills can be varied by selecting a "skill factor" between 1 and 20. This determines the relative number of scoring shots to total shots. The random sequences are variable by seed number selection. The program continuously tallies each of two players' scores and the total number of shots taken per game. (100 steps)

Author: *Robert A. Plack*
Phoenix, Arizona

Gear Train Design (Order #03463A)

This program computes the number of teeth on each gear of a reverted compound gear train (with gears of common diametral pitch) to provide a specific desired speed ratio. (98 steps)

Author: *Howard C. Clayton*
Stillwater, Oklahoma

Satellite Azimuth and Elevation Tracking Coordinates (Order #03492A)

Calculates azimuthal and elevation angles (AZ/El) for tracking an earth satellite from a fixed ground station. Satellite orbital data and ground station positional coordinates are inputted and stored; then the routine computes AZ/EL for specified times following the ascending node. The program is written to provide antenna pointing data for amateur radio satellites—OSCAR-6 and 7—but is applicable for any satellite in an approximately circular, sun-synchronous, polar orbit. (99 steps)

Author: *Dr. Earl F. Skelton*
Washington, D.C.

Multiple-Function Digital Timer (Order #03621A)

A program that allows the HP-65 to be used as a digital timer. Functions of the timer include: three splits, average time,

(continued)

and a signal at a set time. The "timer" has an accuracy of 0.37 second. (99 steps)

Author: *Gregory J. Galvin*
West Hartford, Connecticut

EIA Standard Resistor Color Code Chart
(Order #03605A)

This program calculates resistance (in ohms) given the three color bands of the resistor. The program uses the Standards adopted by the Electronic Industries Association (black=0, brown=1, red=2, etc.). Keys A thru E each define two colors, using R/S as a prefix key. Colors available: black thru white. (88 steps)

Author: *Thomas Chrapkiewicz*
Sault Ste Marie, Michigan

Music Mentor
(Order #03623A)

From a user-defined "standard" frequency, the program determines an equal temperament tone frequency in any octave in any order. It searches through eight octaves for coincidental partials, displaying beat frequency and order of coincident harmonics, when given any two tones and a user-defined beat frequency limit. The program also generates a pythagorean scale or any series of perfect intervals starting from any pitch, automatically converting notes to a single octave. Useful in music theory, tuning chain analysis, piano tuning, etc.(100 steps)

Author: *Donald P. Sanders*
Flemington, New Jersey

Bicycle Spoke Length
(Order #03619A)

Bicycle spoke lengths are computed, given dimensions of the hub and rim and the pattern of lacing. The effects of rear wheel dishing are included. (84 steps)

Author: *Alan T. Koski*
Santa Cruz, California

A "Must-Read" Article!

In the September 1975 issue of *Reader's Digest*, on page 115, there is an article, "Put a Computer in Your Pocket," that will interest any HP-65 owner who has not already read it. If you haven't thought a great deal about the tremendous impact that pocket calculators have had on our lives, this article is going to enlighten you. It even elaborates, in simple terms, just how a tiny calculator is able to do Herculean mathematical problems in a matter of seconds—even split seconds.

In the article there are some pretty spectacular feats that pocket calculators have accomplished. And there are some statements about unusual tortures that these electronic marvels have endured. Now, we'll give you one guess as to which calculator they are talking about!

By the way, if you have a son or daughter who presently finds your HP-65 rather magical and mystifying, let them read this article. It will give them a pretty good insight on the present state of the calculator phenomenon.

We Get Letters

When the picture on the cover of the Spring 1975 KEY NOTE first came to our attention, exactly one year ago, we must confess that we were excited at the prospect of showing it to our HP-65 owners. You have to admit that it *is* a deceptively accurate outline of a "calculator" in the Mayan figure's hands. Well, after many pro and con sessions about the picture, after taking the effort to gain permission to use the picture, and after waiting several issues just to get space on the front cover, what do you think happened? You'd never guess! We got only one letter (so far), and we think you'll really enjoy reading it. It's from *Thomas J. Albert* in Bethesda, Maryland.

"About the 1200-year-old hand-held calculator in your Spring 1975 issue:

Further examination of the picture from that Mayan vase indicates that what we may have here is an early–possibly the very first–editorial cartoon, the subject being a not-so-subtle critique of hand-held calculators.

If you look just to the left of the fellow with the abacus, you will notice another man sharing the platform. By way of comparison, this fellow is larger in stature, has a much more elaborate headpiece, has a fancier basket and stand, and his basket is far more bountiful–in fact–is heaped as full as it could be. . .

And note, HP, that this second, more successful fellow, is counting on his fingers!"

(Mr. Albert, you really know how to hurt a guy! Ed.)

Another Display Trick

Here's another display trick prompted by "The HP-65 Babysitter!" article in the Spring issue of KEY NOTE. This is an excerpt from a letter from *Thomas Chrapkiewicz* in Sault Ste Marie, Michigan.

"I have found some interesting displays by using the "intermediate results" the HP-65 leaves in register 9 after the TAN or TAN^{-1} function is performed. This may be of interest to the KEY NOTE reader who uses his HP-65 as an electronic babysitter:

1. Calculate TAN^{-1} (1×10^{-5}) and RCL 9 (DSP 9). Note that this will not set the proper DSP mode.
2. Now calculate the reciprocal of this "intermediate result." The calculator blanks out; however, a "counter" is actually running within the HP-65. This can be proven as follows:
3. In RUN mode, calculate TAN^{-1} (1×10^{-5}).
4. Switch to W/PRGM and key in the following program:

f	g π
PRGM	RCL 9
LBL	÷
A	RTN

5. Switch back to RUN, press A, and observe the display!

There are many other variations of this. One more interesting thing is that while the display is "running," the entire keyboard is locked out!" *(Note: What you see in the display is the HP-65 exercising its "divide" registers, using invalid inputs. Naturally, this also results in a wrong answer. Ed.)*

Omission in E.E. Pac 2?

It is possible that some EE2-12A prerecorded cards might have been recorded without the segment of code corresponding to the C key. To determine if your EE2-12A program is affected, enter the program into your calculator, press GTO C and switch to W/PRGM mode. The display will show 13 if the card is correctly recorded; 3302, if not. The program may be corrected by single-stepping to the end of the program and keying in LBL, C, g, π, x, 1, 8, 0, ÷, RTN. The corrected program may now be recorded on a blank magnetic card. Alternatively, a corrected card may be obtained by sending your incorrect card to APD Customer Communications (address on back cover).

AND/OR Decisions on the HP-65!

Is the HP-65 a computer? *That* always starts an argument. But, whatever you believe, here's a letter from *Alfred E. Williams* in San Luis Obispo, California, that should interest you.

"Minimum-Stroke Tests for Boolean Combinations of Flags. The way in which the HP-65 makes flag tests enables the user to perform tests for several useful combinations of flag states with minimum expenditure of memory. Several examples follow. In the following, (true) will indicate a label where the HP-65 is to go if the condition being tested is true; likewise (false) will be the label to which it will go if false. If the other condition holds, the HP-65 will bypass the GTO and continue on.

1. Flags 1 and 2 both on (Boolean AND).

f	TF 2
TF 1	GTO
f^{-1}	(false)

In certain applications, this can be used like a third flag. (F1 alone is one, F2 alone is two, and both together are the third.)

2. Flag 1 or flag 2 or both on (Boolean inclusive OR).

f^{-1}	TF 2
TF 1	GTO
f	(true)

3. Flags 1 and 2 both off (NOT-AND)

f^{-1}	TF 2
TF 1	GTO
f	(false)

4. Flag 1 on, but flag 2 off.

f	TF 2
TF 1	GTO
f	(false)

By inspection, the test for flag 2 on, flag 1 off is the same as the above, with the tests reversed.

5. Flag 1 or flag 2 or both off.

f	TF 2
TF 1	GTO
f^{-1}	(true)

These are the combinations I've found to be useful. They can also reduce the storage required to do the more complex exclusive OR (1 or 2, but not both) test.

Incidentally, case 3 is an obvious derivation from 2 and case 5 from case 1. So, remembering cases 1, 2, and 4 is enough to give you the others."

Enter The HP-22:

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We've even included the HP-22 on the handy *HP-65 Accessory Order Form* included with KEY NOTE to make it easy to order this indispensable business management tool. Don't need one with an HP-65? Then tell your manager about the HP-22. If *he* doesn't own an HP-65, *he surely needs an HP-22!*

An HP-65 In The White House?

There sure is! One of our most avid HP-65 fans is *Gus Weiss,* a Senior Staff Member at the White House and an economist on the Council on International Economic Policy.

Mr. Weiss says that when he first heard about the HP-65, "I just had to have one." He was excited by the prospect of being able to literally hold a "computer" in one hand. And that meant a lot to him because when he needed a computer capability, there wasn't always one quickly available. So his first thought about the HP-65 was that it would save a great deal of time.

Mr. Weiss uses the remarkable calculator for all sorts of problems: analysis of variance in business cycles, grain forecasts, tracking growth paths in the economy, equations concerning ballistic missile accuracy, and even calculating uranium enrichment. He claims that he "just amazes people (including himself!) in the middle of a staff meeting" when he obtains answers so quickly.

Mr. Weiss himself is quite amazing. He has a Ph.D. in Economics, a Masters in Business Administration, "and four or five bachelors' degrees in the sciences." With great modesty, he says he's "a terrible programmer but I manage to get the job done." He also relies quite heavily on the Users' Library, by making use of programs that other HP-65 owners have written to solve complex problems. He tells us he stands in awe of the ingenuity shown by their authors. His own "meager efforts" include Bayes Theorem, a program to recover the standard errors in multiple regression, and a paired differences test.

As for his HP-65, *Mr. Weiss* thinks this "computer" is a great example of American technical know-how and enterprise.

Reduced Prices

With Christmas coming up in a few months, it's nice to hear about prices going down. On September 15, HP lowered the price of the HP-55 from $395.00 to $335.00 and the price of the HP-45 from $245.00 to $195.00. And. . .just to keep you up to date on all prices, here's a complete listing:

HP-21 Scientific	$125.00
HP-22 Business Management	$165.00
HP-25 Programmable Scientific	$195.00
HP-45 Scientific	$195.00
HP-55 Programmable Scientific	$335.00
HP-65 Programmable Scientific	$795.00
HP-80 Financial	$295.00

Address Corrections

When you move or change your address, we would like to ask a favor of you. Please either copy your old address label or cut it out and send it back to us. Since it will soon be affixed directly to the back of your KEY NOTE—and we know you want to save each issue—that is why we ask that you copy it. Of special importance is the "match code" that appears above your name. With this code we can easily change your address on our computer and give you far better service.

The HP-35 Retires

Many of you staunch HP-65 owners started your keystroking on the "venerable" HP-35, the first "electronic slide rule." So for you (and for us), it probably is somewhat saddening to hear that on July 1 it was officially retired. At the ripe old age of 30 months it became a collector's item. But you will be glad to hear that HP will continue to stock parts for the HP-35 for another 5 years.

HEWLETT-PACKARD COMPANY

Advanced Products Division
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Cupertino, California 95014

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Reader comments or contributions are welcomed. Please send them to the above address.

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