PPX EXCHANGE

Vol. 1 Number 5 Copyright 1977 September 1977

HAPPY BIRTHDAY PPX-52! PPX-52 is now one year old, celebrating its first birthday this month. Since birthdays are special occasions when gifts are exchanged, PPX-52 is presenting free one year memberships to our first ten members:

Wm. McNeal Gillespie, Stephen C. Owen, James Wilson, Henry M. Salisbury, Dorsey MacDonald, Gray Hoffman, Reese Alberts, Richard T. Malone, John W. Kelly, Emmett M. Jordan

PPX-52 began in September of 1976 with the offer of charter memberships to those people who submitted 2 accepted programs by September 30, 1976. The response was overwhelming with the influx of hundreds of programs. In November of 1976, our first catalog was released containing over 400 programs. The need for the bond of communication between PPX and its members resulted in the advent of the newsletter, PPX Exchange. From late June to the middle of July (1977), PPX underwent the traumatic experience of moving from Dallas to Lubbock, Texas. This resulted in some delays in order processing but it has hopefully served as a learning experience which shall help us improve our service to our members. This brings us up to date. Looking toward the future, we see the addition of PPX-59 in October and expect to be celebrating many more PPX birthdays.

PPX POTPOURRI

1. By now, everyone has received and become familiar with their "C" Addendum to the Software Catalog. March's Software Catalog contained program abstracts for 78 categories. With the addition of the "C" (July) Addendum, the Software Catalog now offers programs from 83 categories. The five new categories covered include: Transportation (06), Probability Theory (25), Pharmacology (56), Seismology (76), and Water Resources (88). There are still 16 categories waiting to be employed by PPX-52 members. We hope to see the next Catalog Addendum contain abstracts in all 99 categories.

2. Solid State Software has become a versatile educational tool used to support the many Industrial Seminars conducted around the world. These Industrial Seminars are custom made for an audience with specific objectives. Whether it be a seminar for a company or for a university, programs from the many solid state software libraries and from PPX support these efforts. These Industrial Seminars are available to eligible companies and schools. Please send your inquiries to PPX for determination of your seminar eligibility.

A LOOK INTO YESTERDAY

Dr. Pierre Brind'Amour
Dept of Classical Studies, University of Ottawa

One sunny morning, in the spring of 1973, while I was supervising an examination, the idea came to mind to check whether there was any relation, in Republican Rome, between the market days recurring at every 9th day and the state religious festivals. The investigation into this matter led me to write a paper. The paper was never published because it grew so much in size that it had become a thorough study of the Roman Pre-Julian calender. I, therefore, decided to make a book out of it. Three years later, a 300 page manuscript was ready and sent to a specialized editor in Belgium; it was accepted for publication. This work represented hours upon hours of manual computations. Simple additions and subtractions, multiplications and divisions were done by the thousands. I remember how often the dining-room floor was covered with papers where I had garbled my computations. So much work was nevertheless rewarded and the book was to appear shortly.

Then, early in 1976, while I was browsing in the huge volumes of the *Corpus of Latin Inscriptions,* I came across the following inscription, only partially preserved within an Etruscan sarcophagus: ". . . Salvius . . . having received all honours . . . in dying. The fifth day before the Ides of October . . . Piso and M. Acilius being consuls, month . . . third day of the moon." In other words, the calender date October 11, 67 B.C. was the third day after and including the New-Moon. Before 45 B.C., the year when Caesar instituted the Julian Calender, the Roman Calender had a year of 355 days, with intercalary months every now and then. The objective of my book was to formulate a theory to evaluate the relationship, day by day, between this calender and the Julian Calender, had it existed previously. The inscription that I stumbled upon was providing me with a test to check the validity of my theory. I suddenly became very nervous. According to my manuscript, October 11 Roman, in 67 B.C., was equivalent to September 10 Julian. I rushed to Goldstine's tables of New and Full-Moons, opened them, found the year, checked the month . . . I was the happiest man in the world for a few minutes. I was jumping all over the place. Archimedes out of his bath had not felt any lighter. September 8 Julian was a New-Moon date, therefore September 10 was the third day of the moon and the validity of my theory was confirmed. But . . . I suddenly realized that my document was dated 67 B.C., while I had been considering the year -67 in Goldstine's tables. A slight difference of one year. I looked in Goldstine's tables for the year -66, which is the astronomical equivalent of 67 B.C., but this time the agreement did not materialize. My theory was failing at its first testing.Three years of hard work had been in vain. I wrote to Belgium to tell them to stop the presses — I needed to examine my theory!

I despaired. But a sabbatical year was ahead of me and I decided to re-examine the whole thing. I bought a portable calculator for $10 and found it so much better than a pencil, however finely sharpened. Then I bought an SR-56 and learned about programming. The results were so good that I bought an SR-52. Now, after a single sabbatical year, a new manuscript is ready, containing well over a thousand pages. The book contains 7200 date conversions, as many market

day determinations and age of the moon evaluations. It contains horoscope analysis, investigations of local circumstances for about 20 solar eclipses, evaluations of the altitude of celestial bodies, statistics about the frequency of intercalations, etc. All of this would have been unthinkable in so short a time without the use of my SR-52. I have also changed my theory. I now believe October 11 Roman, in 67 B.C. to be equivalent to October 30 Julian, a third day of the moon. This new theory is in the new manuscript that I am preparing to send to the editors. I hope that if any new inscription turns up, it will not contradict my theory again. So, I knock on wood . . .

To aid in the preparation of my book, I wrote some programs for my SR-52. These programs now available through PPX-52 are: Egyptian Calender (PPX #990011C), Julian — Egyptian (PPX #990022C), Papyrus Carlsberg 9 (PPX #990023C), Alexandrian Calender (PPX #990024C), Julian Calender (PPX #990025C), Roman Pre-Julian Calender (PPX #990027C).

I must also express appreciation for the help that some programs from PPX-52 brought to me: mainly Kepler's Equation (PPX #400007) by Bernard Kaufman, Date of Easter (PPX #990012) by G.W. Anderson and Trend Line Analysis (PPX #199005) by Mr. TI himself. I am convinced that within a decade all professional historians around the world will use something like the SR-52 with a Calender & Chronology Software Package that will enable them to go through the jungle of calender conversions and chronological interpretations with the ease and elegance of wild cats!

CALCULATOR DOCTOR

This column is intended to answer frequently occurring questions relating to either SR-52 operation or programming. These questions are obtained from TI's Consumer Relations Department. If you are having difficulty with your calculator or with programming, please contact TI's Consumer Relations Department for assistance.

QUESTION: I use my SR-52 to assist me in small boat navigation. Are there any special precautions which should be taken against salt water contamination?

ANSWER: There are no specific precautions during use, but you might want to keep the calculator in a clear plastic bag in heavy seas. If the calculator is accidently immersed in salt water, you should remove the battery pack and thoroughly flush both the calculator and battery pack in fresh water at your first opportunity, allowing time to dry before using. Whenever above deck, I would suggest keeping the calculator in a buoyant container, with a safety lanyard, to prevent its loss overboard.

QUESTION: I recently sent my SR-52 into the Service Facility for repair because the drive motor would not run. It was returned promptly and the needed repair was apparently performed satisfactorily. However, I now find that the calculator will not read many of the programs which I had previously recorded. Why?

ANSWER: The repair of your calculator entailed replacing the entire card-read mechanism, including the read/write heads and the sensor circuit. Just as there is no guarantee that a program recorded on one SR-52 can be read by another machine, a program recorded on a calculator with one card reader may not read on that same machine after the card-read mechanism has been changed. This is due to tolerance differences in motor speed, read/write head orientation, etc. It will be necessary for you to re-record your programs.

QUESTION: Is there any sequence of code which will cause the SR-52 to execute a "PAUSE"?

ANSWER: No. In the SR-52, contents of the display register are displayed only when control is returned to the keyboard (i.e. when a HLT instruction is executed). Once this happens, the only way to cause program execution to re-commence is to manually execute a RUN command from the keyboard.

OIL AND GAS DRILLING WITH THE SR-52

A.T. Mannon Jr.

The drilling industry has come a long way since the first oil well was drilled to a total depth of 69½ feet in the year 1859. Today, wells are drilled routinely to depths below 20,000 feet and have been drilled deeper than 30,000 feet (nearly six miles into the earth). Such advances in our drilling capabilities have been accompanied by tremendous advances in technology. The technology is such today that a computer is virtually an indispensable tool in drilling an oil or gas well. Rarely is a well drilled today that a computer is not used at some point during the drilling of the well.

The computer is usually located in a remote office and accessed through a terminal on a time share basis. Very often it's not available when needed. A few attempts have been made to install a computer terminal at the well site but these for the most part have been unsuccessful because of the remoteness of the locations and the lack of static free communications. The alternative has been to make the calculations by slide-rule or hand calculator. Often simplifying and approximating formulas are used which speed the calculations but reduce the accuracy and reliability. The advent of the programmable hand held calculator has provided the rig site engineer with a calculating tool of computer speed and accuracy.

One of the first uses of the SR-52 on a drilling site was to calculate the surveys taken in a directionally drilled well. A large percentage of the wells today are not drilled straight down but are aimed at a bottom hole location which is displaced horizontally several thousand feet from the surface location. This is particularly true offshore where virtually all wells are drilled directionally. When a well is being drilled directionally it is necessary to survey the position of the bore hole at various intervals during the course of drilling. The data from these surveys includes the drilled depth of the well, the angle the hole makes with vertical and the compass direction of the hole at the survey point. From these data one calculates the true vertical depth and the N/S and E/W coordinates relative to the surface location.

These calculations are accurately done on a computer. The SR-52, using a program such as "Directional Well Survey" (PPX #860011), provides at the rig site the same speed and accuracy. When this program is modified, the PC-100 (A) printer provides a permanent record of each survey station in sequence. Very often while drilling a directional well, the drill bit will stray from its intended course. When this occurs, "Directional Well Survey-Part II" (PPX #860013) takes the survey information directly from the storage registers of the SR-52, compares it to the location of the target and computes the new required course. There is a third program which can be very helpful in planning a directional well. "Directional Well Program" (PPX

#860010) calculates the maximum angle, the horizontal reach, the direction and the drilled length of the hole required to drill to a given target.

One of the prime responsibilities of a drilling engineer is to drill a well as cheaply as possible but, at the same time, consistent with good and safe practice. Obviously, one way to reduce costs is to drill faster. One factor which can affect drilling rate, particularly in deep, hard formations, is the nature of the hydraulic forces acting at the bit. The SR-52 can be programmed to determine the hydraulic conditions at the bit for any combination of bit nozzle sizes and pump rate. More appropriately, the program can be used to determine the proper nozzle size and pump rate required to attain a desired set of hydraulic conditions. As a well penetrates deeper into the earth the pressures contained in the formations increase. These pressures follow a gradient of 50 psi per 100 feet of depth. However, sometimes a formation is encountered which has an abnormally high pressure. When this occurs, it is important to have a fluid in the hole of sufficient density to contain the pressure, lest a blowout occur. It is usually not practical to have drilling fluid heavy enough to meet all pressure conditions. Therefore, it is important to be able to anticipate when an abnormally pressured zone is preceded by a pressure transition zone which is reflected by the drillability of the formations. Formulas have been developed to determine the drillability factor, or "d" exponent, of the formation. By continuously making the calculation over short intervals and plotting the "d" exponent against the depth, the impending high pressure zones can be anticipated by the changes in the slope of the plot. "D and D(C) Exponent" (PPX #860002) by John F. Lacy and "Drilling Performance — Drill Rate & D Exponent" (PPX #860014) by Richard V. Nelson Jr. can make this calculation.

Occasionally the formation pressure exceeds the fluid hydrostatic pressure and the well threatens to blowout. At this point, the well must be shut in and procedures begun to bring the well under control before a blowout does occur. Several calculations must be made at this point. A mistake in the calculation could prove disastrous. Since this is usually a moment of stress for the drilling engineer, a program such as "Well Control — Engineers Method" (PPX #860007) is very helpful in assuring the required accuracy.

The SR-52 is an indispensable tool for the drilling engineer who has little or no access to a computer. With his calculating needs at his fingertips, he is able to save time and money while reducing risks where they are most apt to occur — at the drilling site.

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Everybody is ignorant, only on different subjects.
— Will Rogers

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

FROM THE ANALYST'S DESK

- PPX-52 would like to apologize to Mr. C.E. Warlick, Houston, Texas, whose program "Polynomial Problem Solver" (PPX #330031, page 2-38, March Catalog) was incorrectly attributed to Stephen O. Saltsman.

- Dennis Jaecks, Janesville, Wi. sends along the following suggestion to ease accessibility of the magnetic cards in your library card holding case:
  1. Cut a piece of scotch tape ¾ inch long and a tab of paper ¼ inch long (the same width as the tape).
  2. Lay the tape over the tab matching the corners of the tape to the corners of the tab.
  3. Adhere the taped tab to any plastic page of the holder.
  4. To use the tab, remove it from the holder, adhere the taped edge to the magnetic card, and pull the card out.

- Let us take this opportunity to apologize to J.D. McLaughlin of San Pedro, California for not including his program, "Diagnostic A & B" (PPX #900087), in the "C" Addendum to the Software Catalog. We found this program (which required over 200 hours to develop) to be a major improvement over the Basic Library's "Diagnostic 1 & 2". Although both programs follow the same basic concept, "Diagnostic A & B" provides an additional 40 tests, including tests of the CMS and rset functions. If an error condition is found, the program displays an error code which can be used to pinpoint the problem.

- Until the "C" Addendum to the Software Catalog, the professional category of Transportation (06) was dormant. Then, Mr. Jeremiah Murphy, PE, sent PPX-52 several transportation engineering programs that were originally written to be run on the Massachusetts Department of Public Work's computer. These programs include: Optimization of Traffic Signal Cycle Length (PPX #060001C), Intervening Opportunities Model (Traffic) (PPX #060002C), Length of Yellow Traffic Signal Clearance Level (PPX

HELP PPX HELP YOU

Individuals or companies may have a need for a program for their programmable calculator within 24 hours. Texas Instruments is considering installing a tele-communications system that would be available to PPX members who desire such service. Before any definite plans can be put into action, TI must know how many members would be interested in a wire-service with an order turnaround time of 24 hours. If you are interested in this service, please fill in the questionaire below and mail it to PPX by November 1.

1. Approximately how many programs do you order from PPX per year? _____
2. What percentage of the programs that you order would you like one day service on? _____
3. What is the maximum price you would be willing to pay for one program? $5_____ $10_____ $15_____ $20_____ $25_____
4. What equipment would you like your program(s) sent on? (Please fill in equipment name)
   Facsimile (e.g. Xerox, Dex) _____
   Word Processor (e.g. Lexitron, IBM) _____
   Computer Terminal (e.g. TI, IBM) _____

Name _____
Address _____
_____

Thank you for answering our questions.

#060003C). By using the SR-52, the transportation engineer has the capacity to make real-time traffic operation decisions.

• We have received several program memos about "Biorhythm Compatibility" (PPX #919012). The question has been, "If the same date is used for both the birth date and the test date, why does the calculator indicate 1 day instead of 0 days?" Research of articles about biorhythm indicates the program is correct. Biorhythm calculation considers the birthday as day 1 in a person's lifespan (i.e. you are 1 day old on the day you are born). However if you would like to rectify the days between dates found in step 3 and 7 of the user's instructions:

Delete steps	165 +
	166 1
	167 =
Insert steps	024 *if zro
	025 =
	029 *LBL
	030 =

In addition, to effectively calculate the amplitude of a curve in step 10, key in INV *fix prior to keying in the "days into" value.

• This is for the benefit of those members who own two guard digit calculators. In the July issue of PPX Exchange, we printed an article about fractured displays. The example used in the article simulated a LRN mode display. If you had a two guard digit calculator, the last digit was a 0 instead of a 5. We promised to print a modification that would shift both the mask and the number to be fractured one digit to the left to enable the two guard digit calculator to display the 5. To do this, key in the following under program control:

*LBL A STO 02 1.033339993 EE 33 +/- STO 01 9.9 EE 43 +/- SUM 01 CLR HLT STO 03 *LBL B 1 EE 22 STO 04 CLR RCL 02 EE 14 SUM 04 CLR RCL 03 EE 11 SUM 04 RCL 01 ÷ SUM 60 RCL 04 HLT

Key in a one, two, or three digit number (for our example, 979) and press A. Then key in a one or two digit number (for our example, 55) and press RUN. When a number appears in the display, press =. Regardless of whether you have a two or three guard digit calculator, your display will appear as 979 550.

• A word to those who have purchased "Almanac Data for the Stars" (PPX #940010) or "Almanac Data for Aries, Sun, Moon and Planets" (PPX #940016) — the reference "Almanac for Computers, 1977" is no longer in print. E.S. Maloney has informed us that the **1978** edition should be available in December. The price is not known at this time but is expected to be about $2.00. You may obtain a copy by writing to:

Director Nautical Almanac Office
U.S. Naval Observatory
Washington, D.C. 20390

• Reminder: It is unfortunate but excellent programs have had to be rejected because of inability to duplicate. Please don't forget to submit your program(s) typed or neatly printed in black ink.

• There are two programs (one in the March Catalog, the other in the July Addendum) which share a common PPX number — "Cylinder Volume" (PPX #390012A) by Thomas N. Ferguson and "Calculus Functions and Roots of f(x)" (PPX #390012C) by Izzy Nelken. If you order either program, please be sure to specify which of the two programs you desire by including the suffix letter, A or C, as shown in the catalog.

• With the increased number of available data memories on the SR-52 (registers 60-99) comes the need to indirectly address non-sequential registers. When using the indirect addressing feature, the SR-52 only recognizes the units and tens place of the pointer register. This can be demonstrated by keying in the following: 99 STO 10 88884510 STO 11 *IND RCL 11. Your display should now be "99". By using this feature to your advantage, it is possible to construct a sequence to address non-sequential registers. For example, we will construct a sequence to address the non-sequential registers 15, 05, 99, 17, and 07. The sequence will consist of using a routine to shift the contents of the pointer register (for our example, we will use register 01) so that the register to be recalled will be in the correct position, namely the units and tens place. The following is a simple shift routine.

In LRN mode, key in:

*LBL A 5 STO OO *LBL B 100 *PROD 01 *IND RCL 01 HLT *dsz B HLT

In the above, all is constant except where underlined:

5 = the number of registers to be indirectly accessed (maximum of 5)

01 = the pointer register

Next, load a code (composed of the registers to be recalled, preceded by a decimal point) into the pointer register. For our example, to recall registers 15, 05, 99, 17, 07, take the calculator out of LRN mode and store .1505991707 into register 01. The next step is to place values into the registers that we wish to indirectly address (to keep our example simple, we will store the register number into its corresponding register). Therefore, key in (still out of learn mode): 15 STO 15 5 STO 05 99 STO 9917 STO 177 STO 07. To execute the shift routine and indirectly address registers 15,05,99, 17, and 07, press A, your display should show a "15" (this is the value stored in register 15). To access the other four registers, press RUN four times. By using the above sequence, you have manipulated the pointer register and sequentially addressed non-sequential registers.

The PPX Exc hange is published every other month and is the only newsletter published by Texas Instruments for SR-52 owners. You are invited to submit items you feel are of general interest to other SR-52 users. Inputs should be limited to 3 double-spaced typed pages. Please forward your newsletter inputs and any questions to:

TEXAS INSTRUMENTS PPX
P. O. Box 53
Lubbock, TX 79408