PPX EXCHANGE

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PPX offers you more savings . . . Until November 30, TI-59 Leisure Libraries will be available for the low price of $16.95. (Suggested retail price is $35.00.) Limit is 1 Library per member. To order, simply use a blank order form and enclose your **check or money order (only).** You must include taxes (required by your state) and handling charges to have your order filled.

PPX POTPOURRI

1. As mentioned in the January and March issue of the PPX Exchange, November's issue will be the final newsletter for PPX-52 members. Beginning in January 1979, the newsletter will focus on the TI-59 programmable calculator.

2. The problem of PPX-59 members ordering 52 programs/accessories on PPX-59 order forms and vice-versa continues to occur. **You may only order** those items offered by your Exchange (PPX-52 or PPX-59). If you are a member of both Exchanges, use the appropriate order form. Should you desire, as a PPX-59 member, to have access to SR-52 programs, see the article "PPX-52: A Source of TI-59 Software" in this issue of the PPX Exchange.

3. New members: If you would like to reinforce those subjects presented in the TI-59 Personal Programming manual, PPX has the answer for you. The **"TI-59 Workbook"** offers sample problems and corresponding exercises (specifically referencing each exercise with pages in the Personal Programming manual). This book is written on an **elementary** level. To obtain this workbook, enter **"TI-59 Workbook"** on your PPX-59 order form and enclose $4.95, plus tax and handling.

4. In the March 1978 issue of the PPX Exchange, we announced the depletion of SR-52 Finance Libraries from our Inventories. Since then, we have replenished our supply. The current status of SR-52 Libraries is as follows: Basic, Math, and Statistics Libraries **are not** available. Aviation, Electrical Engineering, Finance, Games, Navigation, and Surveying Libraries **are** still available.

5. **International members** - PPX has been encountering ever increasing problems with orders from international members. If you are restricted (by government regulation) from **including** payment with your order, you **must** attach a copy of your check or money order to the order. If payment or proof of payment is not received with an order, PPX will return the order unfilled, for lack of payment. If payment must be sent separately, please be sure that it is sent to the proper "PPX Address" and is made payable to PPX-52 or PPX-59, **not** Texas Instruments. Always reference your membership number on your payment. By following these guidelines, you can be assured of minimum confusion when having your order filled.

MORE JOY OF THE PC-100A

Maurice E.T. Swinnen

My article "The Joy of PC-100" appeared in the July 1977 issue of the PPX Exchange. It was written in March of that year with the intention of writing a follow-up article at a later date named "More Joy of the PC-100". As the TI-59 was not on the market at that time, I hadn't the foggiest notion how I would be able to top the SR-52/PC-100 combination that I was writing about. But, in the back of my mind, I had a feeling that TI had something up their sleeve and would provide me with more ammunition.

The TI-59/PC-100A combination has fulfilled my wildest dreams and more. With its alphanumeric capability, it can output results with descriptors, plot, draw pictures, and even sense the presence of the printer The latter trick is simple - one of the "why didn't I think about it" kind.

To use the printer sensing trick, the following sequence should be part of your initialization routine (i.e., executed in the beginning of your program): 20 *Op 07 *Op 19 CLR. When this sequence is executed, the following will occur: As Op 07 requires a number between 0 and 19, the number 20 creates an error condition. **This only occurs when the printer is attached.** If an error condition exists, Op 19 sets flag 7. CLR prevents flashing and question mark printing. The final result: Flag 7 is set only when the printer is attached. For example, let's look at the routine: LBL A . . . Prt if flg 7 B R/S LBL B . . . . When the printer **is not** attached, the program stops at R/S; but, when the printer **is** attached, the program jumps over R/S to LBL B.

The TI-59/PC-100A combination can enhance program results using alphanumeric descriptors. The Prt instruction will print up to 10 digits, on the left hand side of the paper tape. In the right margin, descriptors up to four characters long may be added. To economically use alphanumeric descriptors, the t register should be used. For example, use the routine: RCL nn x:t vv xx yy zz Op 04 x:t Op 06 INV SBR, where RCL nn brings the result into the display and vv xx yy zz are the alphanumeric codes for the descriptor. One caveat has to be mentioned here - the calculator should be in floating point, otherwise the descriptor may misprint. A safe sequence is: RCL nn INV fix x:t vv xx yy zz Op 04 x:t fix m Op 06 rtn, where m is the fix format you desire.

If you are not satisfied with the above and yearn to print any digit **anywhere** in the 20 spaces of the tape, you could enter the code by hand and print with Op 05. However, this proves to be very tedious. Here is a routine that will automatically generate the print code for **any number** up to 5 digits long and print it in any of the 4 sectors of your choice. The number must be in the display and the print sector digit (1 to 4) in register 01. To run, press A. The routine is:

000	76	LBL	013	28	LOG	026	02	2	039	97	DSZ
001	11	A	014	76	LBL	027	85	+	040	00	00
002	29	CP	015	24	CE	028	76	LBL	041	24	CE
003	67	EQ	016	85	+	029	23	LNX	042	25	CLR
004	23	LNX	017	32	X:T	030	01	1	043	48	EXC
005	55	÷	018	01	1	031	75	-	044	02	02
006	28	LOG	019	00	0	032	59	INT	045	84	DP*
007	59	INT	020	00	0	033	44	SUM	046	01	01
008	42	STO	021	49	PRD	034	02	02	047	69	DP
009	00	00	022	02	02	035	95	=	048	05	05
010	69	DP	023	08	8	036	65	×	049	92	RTN
011	20	20	024	77	GE	037	01	1			
012	22	INV	025	23	LNX	038	00	0			

You can make this routine even more useful by having your program change the digit in register 01, or perform four times in a row (filling each of the four sectors). Only the sky is the limit. I used this routine in "20-digit Multiplication Printer" (PPX-59 #398028) in order to print the result, up to 20 digits long, in one single row.

The TI-59/PC-100A combination makes it possible to create interactive, computer-like programs that allow the user to initiate the program by pressing only one user defined key. Examples of such programs are "Wiseguy Interactive Arithmetic Teacher" (PPX-59 #928008) by E.S. Maloney and "Learning Nim" (PPX-59 #918009) by Texas Instruments.

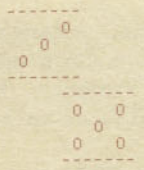
Bar graphs are now a cinch. With the SR-52 the only character we could use was 1. Now, almost any character will do. The 0 (code 32) seems to be ideal. The following is an example of a routine that will print one bar of a bar graph, using 0's, of a height 1 through 20.

000	03	3	025	02	2	050	68	NOP	075	68	NOP
001	02	2	026	68	NOP	051	68	NOP	076	03	3
002	68	NOP	027	68	NOP	052	03	3	077	02	2
003	68	NOP	028	03	3	053	02	2	078	69	DP
004	03	3	029	02	2	054	68	NOP	079	04	04
005	02	2	030	68	NOP	055	68	NOP	080	69	DP
006	68	NOP	031	68	NOP	056	03	3	081	05	05
007	68	NOP	032	03	3	057	02	2	082	91	R/S
008	03	3	033	02	2	058	69	DP	083	76	LBL
009	02	2	034	68	NOP	059	03	03	084	11	A
010	68	NOP	035	68	NOP	060	03	3	085	69	DP
011	68	NOP	036	03	3	061	02	2	086	00	00
012	03	3	037	02	2	062	68	NOP	087	75	-
013	02	2	038	69	DP	063	68	NOP	088	02	2
014	68	NOP	039	02	02	064	03	3	089	00	0
015	68	NOP	040	03	3	065	02	2	090	54	)
016	03	3	041	02	2	066	68	NOP	091	65	×
017	02	2	042	68	NOP	067	68	NOP	092	04	4
018	69	DP	043	68	NOP	068	03	3	093	54	)
019	01	01	044	03	3	069	02	2	094	50	I×I
020	03	3	045	02	2	070	68	NOP	095	42	STO
021	02	2	046	68	NOP	071	68	NOP	096	00	00
022	68	NOP	047	68	NOP	072	03	3	097	83	GO*
023	68	NOP	048	03	3	073	02	2	098	00	00
024	03	3	049	02	2	074	68	NOP			

Once the above code is keyed in the user merely places the height of the bar in the display and presses A.

Notice the length of this routine. In construction of programs in general, and especially in this type of routine, essentially two types of schools of thought have emerged. On the one hand, there are the economy minded, whose aim it is to write a program with the least amount of steps. The other school whose followers I belong to sacrifice everything for speedy execution. After all, there are 960 steps available to be used. If you care for speed, all the print code should be put "in line" (i.e., in the program steps rather than in data memory) as close to the top of the program as possible. Further, use of direct addresses, as opposed to SBRs or LBLs, will earn a high rating in our camp. With my lengthy routine, a bar of height 20 is produced in less than 3 seconds. Routines using the indirect instruction, although very economical in program steps, have been observed struggling along at 20 seconds per bar. If you consider that a graph with 60 bars is not unusual, it will take 20 minutes for Mr. Optimization and only 3 minutes for Speedy Gonzales. You can drink only so many cups of coffee a day, waiting for the calculator to finish.

Another way to put "pzazzz" in your printing is to draw pictures of your results rather than outputting numbers alone. In "Craps Revisited" (PPX-59 #918021), I had the calculator draw pictures of the two dice in each roll. It looks like:



It is all done by recalling prestored alphanumeric codes. In the same manner, large banner characters can be formed. Mark K. House's "TI-59 Banner Program" (PPX-59 #908015) produces 2-inch high characters. I have written a more modest one which forms 1-inch high characters called "Large Alphanumerics" (PPX-59 #908045). Both programs are handy to create impressive signs for the office such as: "NO SMOKING", or "KEEP YOUR HANDS OFF MY TOOLS".

In my two articles, "Joy of PC-100" and "More Joy of PC-100A", I talk about the many things that I've done with my TI programmables and printer. I am sure that I have only touched the tip of the iceberg.

PPX-59 PROGRAMMING CORNER

This column is devoted to PPX-59 programming suggestions. If you have a program(s) that you would like to see made available through PPX-59, send your suggestions to PPX. In this way, members who enjoy programming are made aware of your program needs. ***PPX-59 is not staffed to do custom programming; therefore, member suggested programs will become available only if another member of PPX-59 comes to the rescue.***

Our members would like to see:

- A program to handle the calculations on the Federal Estate Tax Return Form 706.
- A TI-59 version of the program "Interest Rebate-Rule of 78's" (PPX-52 #139016). This program should automatically print the entire schedule of rebates and remaining balances for the entire term of the loan.
- A program for optical ray tracing of conventional lens and mirror systems.
- Programs for spur and helical gearing, and spring design.
- A program for multiple linear regression analysis for at least 8 independent variables, similar to "Multiple Linear Regression - 5 Ind. Variables" (PPX-59 #208007).

PPX-52: A SOURCE OF TI-59 SOFTWARE

Since PPX-52's inception two years ago, SR-52 software has increased tremendously. PPX-52 Catalogs and Addendums now include abstracts of over 1700 programs covering 93 categories.

Many PPX-59 members have expressed an interest in the software that PPX-52 has to offer. Since SR-52/TI-59 conversion is a relatively easy process, PPX-59 members could greatly benefit by having access to SR-52 programs. For this reason, **PPX-52 is offering memberships to PPX-59 members.** The standard $15 membership fee provides you with all of the PPX-52 Catalogs and Addendums, and a "3 Introductory Programs" Order Form (a $9 value). In addition to converting PPX-52 programs for your own personal use, you may wish to submit your conversions to PPX-59. (PPX-59 program submission forms will be sent to you as a part of your initial PPX-52 mailing.) Such converted programs will be considered on the same basis as all other PPX-59 submissions. Upon acceptance, you will receive a PPX-59 "1 Complimentary Program" Order form and replacement TI-59 magnetic cards at a 4 to 1 ratio. To join PPX-52, send check or money order to PPX, P.O. Box 53 Lubbock, Texas, 79408. Please include your PPX-59 membership number.

To aid you in your SR-52 to TI-59 conversions, the following table (November 1977 issue) is reprinted.

register(s)	SR-52 keystrokes	TI-59 keystrokes	register(s)
	$\sqrt[x]{y}$	INV y^x	
	*rtn	INV SBR	
	HLT; RUN	R/S	
00	*dsz	① *Dsz	0-9
	*x!	② *Pgm 16 C	
00	*P/R	③ *P→R	t
	*if pos	④ $x \geq t$	t
	INV *if pos	④ INV $x \geq t$	t
	*if zro	④ $x = t$	t
	INV *if zro	④ INV $x = t$	t
any accessible	1 SUM *(2 digit register)*	⑤ *Op 2 *(1 digit register)*	0-9
any accessible	1 +/− SUM *(2 digit register)*	⑤ *Op 3 *(1 digit register)*	0-9
	*if err	⑥ *Op 19	
	INV *if err	⑥ *Op 18	
	*IND *RCL*	⑦ *RCL* *Ind	

NOTES:

① There are up to ninety-nine nested loops possible using the *Dsz key on the TI-59. The TI-59 manual discusses ten registers, 0-9. The format of the *Dsz instruction is *Dsz nn followed by a transfer address where nn is the register to be decremented and tested. Actually with a little more effort, the other 89 registers (excluding register 40 which implies indirect) can be used with the *Dsz key. To take advantage of the additional 89 registers, the nn can be generated by the following sequence: LRN, *Dsz, STO, n, n, BST, BST, *Del, SST, -- LRN. Only two BST are needed because the 2 digit register number is merged and occupies one location on the TI-59. If the *Dsz instruction is followed by an absolute address, the following sequence should be used: LRN, *Dsz, 0, m, m, m, BST, BST, BST, BST, RCL, n, n, BST, BST, *Dsz, SST, SST, SST, ---LRN (where nn is the register to be decremented and mmm is the absolute address to be transferred to).

② *Pgm 16 is one of the many TI-59 subroutines within the Master Library Module. Module subroutines can replace portions of an SR-52 program.

③ On the SR-52, register 00 is used when making polar/rectangular conversions. The TI-59 uses the t register, a data memory register where values can be stored, recalled, and compared against the display register.

④ When performing comparisons on the SR-52, the display register is compared to zero, whereas the t register is used when performing comparisons on the TI-59. When $*x \geq t$, INV $*x \geq t$, $*x = t$, or INV $*x = t$ is pressed, the TI-59 compares the contents of the display register to the value in the t register.

⑤ The TI-59 has a series of operations that are accessed by the *Op key. It is comparable to the 2nd key in that it provides more functions to the user. Only those *Op codes which replace an SR-52 keystroke sequence are shown here. (See page V-27 in the Personal Programming manual for additional *Op codes.)

⑥ Same as 5 above. *Op 18 and 19 use flag 7 for error checking. (See page V-67 in the Personal Programming manual for further explanation.)

⑦ Leading to more efficient programming, the indirect address capabilities have been increased on the TI-59. The TI-59 has twenty-seven indirect instructions compared to the SR-52's nineteen instructions. (See page V-68 in the Personal Programming manual for a list of indirect instructions.)

THERE'S MAGIC IN NUMBERS

4 x 4 MAGIC SQUARE

In a 4 x 4 magic square, the sum of any column, any row, any diagonal, the four corners, the four center cells, and many other sets of four cells will always be the same. The two central columns or the two outer columns may be interchanged with the sum remaining the same. The two central rows or the two outer rows may also be interchanged.

This program generates a magic square by the clever summing of four user-input variables (these variables may be whole, mixed, fractional, positive, or negative numbers, or zero). Close inspection reveals that, in any four cells being summed, three of the four variables cancel out, leaving only the first variable. Thus the sum of any 4 cells is four times the first variable.

Figure A contains the expressions used in calculating eight of the sixteen cells.

	x-y-z+w	x-y-z	
x-y+z-2w			x-y+z+w
	x-y+z-w	x-y+z	
x-y-z+2w			x-y-z-w

Figure A

Your mission, should you decide to accept it, is to determine how the numbers in the Completed Magic Square (See Example) were derived. This is best accomplished in two steps.

- First, assign the values given x, y, z, and w (in the Example) to the eight expressions shown in Figure A, above. Notice that the resultant values duplicate those shown in the Completed Magic Square.
- Second, using the other values of the Completed Magic Square, determine the eight missing expressions in Figure A.

See "From the Analyst's Desk" for the answers to this puzzle.

USER INSTRUCTIONS:

1. Enter Program (TI-59, Partition 319.79).
2. If you have a TI-59 and PC-100A, store the following alphanumeric codes in register 14-29. Otherwise, go to Step 3.

Codes	Reg
15270200.	14
15270300.	15
15270400.	16
15270500.	17
15270600.	18
15270700.	19
15271000.	20
15271100.	21
15271200.	22
15270201.	23
15270202.	24
15270203.	25
15270204.	26
15270205.	27
15270206.	28
15270207.	29

3. Enter the value of x, press A.
4. Enter the value of y, press B.
5. Enter the value of z, press C.
6. Enter the value of w, press D.
7. Press E, the value of cell #1 will be displayed. (TI-59 with printer, the value of all cells will be printed.) Press RUN (TI-59, R/S) to display each of the remaining values of cells #2-16 respectively.

The cells are set up as follows:

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

NOTE: To review the assigned values of x, y, z, w, RCL registers 01-04 respectively.

EXAMPLE:

Construct a 4 x 4 magic square using the following four numbers: **x = 5.5; y = 2; z = 2.5; w = -1.**

Enter	Press	Display	Comment
-5.5	A	-5.5	Enter value of x
2	B	2.	Enter value of y
2.5	C	2.5	Enter value of z
-1	D	-1.	Enter value of w
	E	-2.	Value of cell 1
	RUN*	-11.	Value of cell 2
	RUN	-10.	Value of cell 3
	RUN	1.	Value of cell 4
	RUN	-3.	Value of cell 5
	RUN	-6.	Value of cell 6
	RUN	-7.	Value of cell 7
	RUN	-6.	Value of cell 8
	RUN	-5.	Value of cell 9
	RUN	-4.	Value of cell 10
	RUN	-5.	Value of cell 11
	RUN	-8.	Value of cell 12
	RUN	-12.	Value of cell 13
	RUN	-1.	Value of cell 14
	RUN	0.	Value of cell 15
	RUN	-9.	Value of cell 16
	RUN	flashing 0	Magic Square complete

*TI-59, R/S.

Completed Magic Square

-2	-11	-10	1
-3	-6	-7	-6
-5	-4	-5	-8
-12	-1	0	-9

MAGIC . . .

SR-52 LISTING*

000	46	LBL	028	01	1	056	43	RCL	084	01	1	112	81	HLT	140	01	1	168	01	1	196	81	HLT
001	11	A	029	85	+	057	00	0	085	03	3	113	43	RCL	141	03	3	169	75	-	197	43	RCL
002	42	STO	030	43	RCL	058	01	1	086	02	2	114	01	1	142	85	+	170	43	RCL	198	01	1
003	00	0	031	00	0	059	75	-	087	65	×	115	02	2	143	43	RCL	171	00	0	199	00	0
004	01	1	032	02	2	060	43	RCL	088	43	RCL	116	81	HLT	144	00	0	172	04	4	200	81	HLT
005	81	HLT	033	85	+	061	00	0	089	00	0	117	43	RCL	145	04	4	173	95	=	201	43	RCL
006	46	LBL	034	43	RCL	062	02	2	090	04	4	118	01	1	146	95	=	174	81	HLT	202	01	1
007	12	B	035	00	0	063	75	-	091	95	=	119	00	0	147	81	HLT	175	43	RCL	203	00	0
008	42	STO	036	03	3	064	43	RCL	092	42	STO	120	75	-	148	43	RCL	176	01	1	204	75	-
009	00	0	037	95	=	065	00	0	093	00	0	121	43	RCL	149	01	1	177	01	1	205	43	RCL
010	02	2	038	42	STO	066	03	3	094	05	5	122	00	0	150	01	1	178	81	HLT	206	00	0
011	81	HLT	039	01	1	067	95	=	095	43	RCL	123	05	5	151	85	+	179	43	RCL	207	04	4
012	46	LBL	040	00	0	068	42	STO	096	01	1	124	95	=	152	43	RCL	180	01	1	208	95	=
013	13	C	041	43	RCL	069	01	1	097	00	0	125	81	HLT	153	00	0	181	03	3	209	81	HLT
014	42	STO	042	00	0	070	02	2	098	85	+	126	43	RCL	154	04	4	182	85	+	210	43	RCL
015	00	0	043	01	1	071	43	RCL	099	43	RCL	127	01	1	155	95	=	183	43	RCL	211	01	1
016	03	3	044	75	-	072	00	0	100	00	0	128	01	1	156	81	HLT	184	00	0	212	02	2
017	81	HLT	045	43	RCL	073	01	1	101	04	4	129	75	-	157	43	RCL	185	05	5	213	75	-
018	46	LBL	046	00	0	074	85	+	102	95	=	130	43	RCL	158	01	1	186	95	=	214	43	RCL
019	14	D	047	02	2	075	43	RCL	103	81	HLT	131	00	0	159	03	3	187	81	HLT	215	00	0
020	42	STO	048	85	+	076	00	0	104	43	RCL	132	05	5	160	75	-	188	43	RCL	216	04	4
021	00	0	049	43	RCL	077	02	2	105	01	1	133	95	=	161	43	RCL	189	01	1	217	95	=
022	04	4	050	00	0	078	75	-	106	02	2	134	81	HLT	162	00	0	190	02	2	218	81	HLT
023	81	HLT	051	03	3	079	43	RCL	107	85	+	135	43	RCL	163	04	4	191	85	+			
024	46	LBL	052	95	=	080	00	0	108	43	RCL	136	01	1	164	95	=	192	43	RCL			
025	15	E	053	42	STO	081	03	3	109	00	0	137	03	3	165	81	HLT	193	00	0			
026	43	RCL	054	01	1	082	95	=	110	04	4	138	81	HLT	166	43	RCL	194	05	5			
027	00	0	055	01	1	083	42	STO	111	95	=	139	43	RCL	167	01	1	195	95	=			

PPX wishes to thank the author of "4 x 4 Magic Square", Michael S. Benjamin, for his excellent SR-52 program.

**Listing produced with a TI-59/PC-100A using the program "SR-52 Program Listing" (PPX-59 #908010).*

TI-59 LISTING

000	76	LBL	033	04	04	066	43	RCL	099	02	2	132	43	RCL	165	95	=	198	85	+	231	69	OP
001	11	A	034	43	RCL	067	01	01	100	65	×	133	10	10	166	17	B'	199	43	RCL	232	04	04
002	42	STO	035	03	03	068	75	-	101	43	RCL	134	75	-	167	16	A'	200	05	05	233	01	1
003	01	01	036	69	OP	069	43	RCL	102	04	04	135	43	RCL	168	43	RCL	201	95	=	234	44	SUM
004	04	4	037	06	06	070	02	02	103	95	=	136	05	05	169	13	13	202	17	B'	235	00	00
005	04	4	038	91	R/S	071	85	+	104	42	STO	137	95	=	170	75	-	203	16	A'	236	92	RTN
006	69	OP	039	76	LBL	072	43	RCL	105	05	05	138	17	B'	171	43	RCL	204	43	RCL	237	76	LBL
007	04	04	040	14	D	073	03	03	106	01	1	139	16	A'	172	04	04	205	10	10	238	17	B'
008	43	RCL	041	42	STO	074	95	=	107	04	4	140	43	RCL	173	95	=	206	17	B'	239	22	INV
009	01	01	042	04	04	075	42	STO	108	42	STO	141	11	11	174	17	B'	207	16	A'	240	87	IFF
010	69	OP	043	04	4	076	11	11	109	00	00	142	75	-	175	16	A'	208	43	RCL	241	05	05
011	06	06	044	03	3	077	43	RCL	110	18	C'	143	43	RCL	176	43	RCL	209	10	10	242	02	02
012	91	R/S	045	69	OP	078	01	01	111	16	A'	144	05	05	177	11	11	210	75	-	243	45	45
013	76	LBL	046	04	04	079	75	-	112	43	RCL	145	95	=	178	75	-	211	43	RCL	244	91	R/S
014	12	B	047	43	RCL	080	43	RCL	113	10	10	146	17	B'	179	43	RCL	212	04	04	245	69	OP
015	42	STO	048	04	04	081	02	02	114	85	+	147	16	A'	180	04	04	213	95	=	246	06	06
016	02	02	049	69	OP	082	75	-	115	43	RCL	148	43	RCL	181	95	=	214	17	B'	247	92	RTN
017	04	4	050	06	06	083	43	RCL	116	04	04	149	13	13	182	17	B'	215	16	A'			
018	05	5	051	91	R/S	084	03	03	117	95	=	150	17	B'	183	16	A'	216	43	RCL			
019	69	OP	052	76	LBL	085	95	=	118	17	B'	151	16	A'	184	43	RCL	217	12	12			
020	04	04	053	15	E	086	42	STO	119	16	A'	152	43	RCL	185	11	11	218	75	-			
021	43	RCL	054	98	ADV	087	12	12	120	43	RCL	153	13	13	186	17	B'	219	43	RCL	313	76	LBL
022	02	02	055	43	RCL	088	43	RCL	121	12	12	154	85	+	187	16	A'	220	04	04	314	18	C'
023	69	OP	056	01	01	089	01	01	122	85	+	155	43	RCL	188	43	RCL	221	95	=	315	69	OP
024	06	06	057	85	+	090	85	+	123	43	RCL	156	04	04	189	13	13	222	17	B'	316	08	08
025	91	R/S	058	43	RCL	091	43	RCL	124	04	04	157	95	=	190	85	+	223	00	0	317	86	STF
026	76	LBL	059	02	02	092	02	02	125	95	=	158	17	B'	191	43	RCL	224	35	1/X	318	05	05
027	13	C	060	85	+	093	75	-	126	17	B'	159	16	A'	192	05	05	225	00	0	319	92	RTN
028	42	STO	061	43	RCL	094	43	RCL	127	16	A'	160	43	RCL	193	95	=	226	91	R/S			
029	03	03	062	03	03	095	03	03	128	43	RCL	161	11	11	194	17	B'	227	76	LBL			
030	04	4	063	95	=	096	95	=	129	12	12	162	85	+	195	16	A'	228	16	A'			
031	06	6	064	42	STO	097	42	STO	130	17	B'	163	43	RCL	196	43	RCL	229	73	RC*			
032	69	OP	065	10	10	098	13	13	131	16	A'	164	04	04	197	12	12	230	00	00			

Key in all the program code. The last seven steps (locations 313-319) are part of a printer sensing technique, described in "From The Analyst's Desk", May 1978, PPX Exchange.

FROM THE ANALYST'S DESK

• Those members who have the program "Yahtzee" (PPX-59 #918015), please change program location 101 from 01 to 00.

• PPX is constantly receiving suggestions and ideas from its members. We would like to pass along some of these ideas . . . .

From Gerald J. Groccia, Shrewsbury, Mass.: For those people who need to keep data on record, the perfect solution for keeping PC-100A printouts clean and fade-proof has been found. The solution— picture coater used for Polaroid black and white prints. This coater is readily available and costs very little.

From Dr. Henry L. Green, Southfield, Michigan: Sanford's Sharpie 59 #3000 fiber tipped pen writes indelibly on magnetic cards. This pen is available in several colors and can be found at larger office supply stores.

From Mr. Glenn T. McLain Jr., Miami, Fla: The CB Carry Case from Radio Shack (catalog #21-542) is ideal for carrying the PC-100(A) with a few accessories. It retails for $14.95.

• Flags and more flags . . . Many members have written to tell PPX that there are 99 flags on the TI-59. They have been mislead. Although one can indirectly key in 2 digit flags, the calculator will only execute one digit. For example, key in LRN mode: *LBL A *St flg STO 42 BST BST *Del SST INV SBR *LBL B *If flg 2 C R/S *LBL C 555 R/S. Press A then B. Notice that flag 2 is set instead of flag 42.

• Mr. Robert Fergusson, Regina, Sask., Canada, passes along the following information:

1. One of the best ways to "flip" a flag is to use the following sequence:

```
000  22 INV
001  87 IFF
002  03  03
003  00  00
004  06  06
005  22 INV
006  86 STF
007  03  03
```

2. Sometimes it is desirable to be able to perform a sign test while preserving the contents of the t-register. To do this, the following routine may be used:

```
000  76 LBL
001  10 E'
002  22 INV
003  86 STF
004  40 IND
005  00  00
006  42 STO
007  00  00
008  69 OP
009  10  10
010  48 EXC
011  00  00
012  69 OP
013  20  20
014  86 STF
015  40 IND
016  00  00
017  92 RTN
```

This sets flag 0, 1, or 2 when the display is negative, zero, or positive, respectively, while preserving the display and t register.

• Joseph A. Crider and Chorman W. Ching have discovered a method of entering LRN (code 31) as a step within a program. This can be especially useful when a program (recorded on a magnetic card) requires that the user supply a subroutine each time the program is used. To best facilitate this, the user-supplied subroutine should be assigned a user-defined key as its label and placed at the very end of the program. The following keys are pressed immediately following the label assignment: STO 31 BST BST *Del. To enter a subroutine, the user simply presses the user-defined key to which the subroutine has been assigned. Control will be returned to the keyboard. Backstep one step in order to delete the LRN instruction and proceed with subroutine entry.

• Mr. C. Douglas Langston, Houston, Texas, recently wrote a program, "Extended Data Plotting" (PPX-59 #908036), which involved plotting 2 halves of a graph independently and then joining them together to form a complete graph. While plotting the bottom half of the graph, he encountered data that was to be plotted on the top half. To accomplish this, an Adv statement was used. However, when the two halves were joined together a tremendous discontinuity resulted. To eliminate this problem, he replaced the Adv statement with Op 05 (assuming that an Op 00 had previously been performed) to obtain a partial paper advance. The result - a perfectly continuous graph.

• Labels, Labels, Labels . . . It has been brought to our attention that SST, BST, LRN, and 2nd (May, PPX Exchange) are not fully functional labels. Chorman W. Ching, Steven E. Buchen, and Dennis Grundler have written to PPX-59 to tell which labels are fully functional. There are 82 labels available on the TI-59, 72 of which are accessible from the keyboard (Personal Programming manual, p. V-56). The other 10 labels, not accessible from the keyboard, are: PG* (62), EX* (63), PD* (64), ST* (72), RC* (73), SM* (74), HIR (82), GO* (83), OP* (84), and RTN (92) (See p. VI-6). So ends the saga of labels, labels, labels.

ANSWERS TO 4 x 4 MAGIC SQUARE

x+y+z+w	x-y-z+w	x-y-z	x+y+z-2w
x-y+z-2w	x+y-z	x+y-z+w	x-y+z+w
x+y-z-w	x-y+z-w	x-y+z	x+y-z+2w
x-y-z+2w	x+y+z	x+y+z-w	x-y-z-w

The PPX Exchange is published every other month and is the only newsletter published by Texas Instruments for SR-52 and TI-59 owners. You are invited to submit items you feel are of general interest to other SR-52 or TI-59 users. Inputs should be limited to 3 double-spaced typed pages. Please forward your newsletter inputs and any questions to:

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