PPX EXCHANGE

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PPX-59 has been in existence for over a year now. As promised in previous issues of the PPX Exc hange, this month's issue discusses the renewal of PPX-59 memberships in the article "It's Renewal Time at PPX-59!" Program submittal is a very important aspect of a successful program exchange; therefore, we would like to take this opportunity to thank all members who have contributed their program(s). PPX would like to give special recognition to the top five submitters in the form of a complimentary one year membership. These members are:

Michael D'Elia Theodore Bones Jr. Maurice Swinnen Charles Kluepfel Jared Weinberger

PPX POTPOURRI

1. **Two new pakettes,** Marketing/Sales and Production Planning, have been added to the PPX-59 library. With the publication of these collections of programs, PPX now offers 16 pakettes in various specialized areas. The December 1978 Addendum lists the contents of each pakette on pages 6-1 and 6-2. Descriptions of the individual programs within each pakette can be found in the "Program Abstracts" section of your Catalog and Addendum. Pakettes may be ordered by writing the name and catalog number of each pakette on a PPX-59 order form and enclosing $10 for each pakette (plus taxes, postage and handling as required).

2. For better service, all correspondence and orders should include your membership number. If you have misplaced your number, please check the mailing label on your latest newsletter package from PPX.

3. As you are probably aware, the PPX-59 Catalog is prepared and maintained on a computer. Due to the way the input parameters are specified, it is not possible for PPX to list co-authored programs. Therefore, when a program written by multiple authors is accepted, only one author can be given credit in the Catalog. (However, all authors' names will appear in the program documentation sent to PPX members.) PPX uses the first author listed in the submittal agreement for Catalog purposes.

4. Only those accessories and programs listed in your Catalog and Addendum may be ordered through PPX. All other items must be ordered from:

Texas Instruments
Accessory Sales
P. O. Box 53
Lubbock, Texas 79408

Any items that are announced in the PPX Exc hange are usually immediately available through PPX. Simply write the item on your PPX order form. New Pakettes and Libraries announced by PPX as being available, are priced at $10 and $35, respectively. Materials described in your newsletter that are **not** available from PPX will include the name and address of the outlet making those items available.

5. Everyone has received the December 1978 Addendum to the July 1978 PPX-59 Catalog. The July 1978 Catalog contained abstracts of programs in 73 categories. With the publication of the C Addendum, ten new categories have been put to use. They are: Auditing(11), Consumer Finance(13), Quality Assurance(27), Reliability/Maintainability(28), Nutrition/Food Science(58), Programming(75), Seismology(76), Political Science(80), Law Enforcement(83), Water Resources(88). There are 16 categories still awaiting discovery by PPX members. The next Addendum will hopefully offer programs in all 99 categories.

6. It's a good idea to check your Catalog and Addendum to see if your program duplicates a PPX-59 program before you submit it to PPX. It is possible that you may submit a duplicate program between Addendum releases. Since you would have no way of knowing this, a "1 Complimentary Program" order form and replacement magnetic cards will be forwarded to you along with your program (duplicate) in accordance with normal PPX policy.

IT'S RENEWAL TIME AT PPX-59!

It's renewal time for many members of PPX-59. Here is the latest information on obtaining your second year of PPX-59 membership.

To insure continuation of your PPX-59 benefits, check the last four digits of your membership number against the table shown below for your renewal date. Your membership number corresponds with your original membership date.

Membership number	Must be postmarked by
0001-4842	February 28
4843-6014	March 15
6015-7056	April 15
7057-7525	May 15
7526-8257	June 15
8258-8923	July 15

Members with numbers greater than 8923 will be informed of their renewal dates in a future issue of PPX Exc hange.

A renewal subscription card and reminder will be sent to each member in ample time to renew. The subscription card must be returned with a check or money order for $15. Be sure to include your membership number on both your subscription card and check.

MANIPULATION OF ALPHANUMERIC CODES

Douglas E. MacLean

Editor's Note: This article is directed towards those TI-59 users who are curious about how the printer Op codes are handled by the TI-59.

One of the most unique features of the TI-59 is its ability to induce the PC-100A printer to produce alphanumeric printouts. The data utilized for these printouts is stored in the last four hierarchy pending registers. By directly accessing these registers with the HIR (hierarchy), code 82, instruction the innovative programmer can realize a great savings of time and valuable program space.

Using the HIR instruction with a proper suffix permits the user to treat the hierarchy pending registers as though they were data registers. This gives the programmer the capability of shifting or altering the contents of the print registers without the need for totally re-entering the alphanumeric data. Multiplication by an even power of ten will shift the contents of the print registers to the left and division by an even number of ten will shift the print codes to the right. The deletion, alteration, and addition of letters (alphanumeric codes) may be accomplished by addition and subtraction into the correct hierarchy register.

The HIR command cannot be directly keyed in, but may be inserted into a program by going into learn mode, pressing STO 82 and then deleting the STO. There is a two digit suffix, XY, which follows the HIR command. X stands for the required hierarchy register operation; where 0 is STO, 1 is RCL, 3 is SUM, 4 is *Prd, 5 is INV SUM, and 6-9 are INV *Prd. Y stands for the hierarchy register to be accessed (1-8). XY may be entered in the same manner as code 82.

Following are the hierarchy registers utilized in conjunction with the alphanumeric codes:

Op 01 is stored in H-05
Op 02 is stored in H-06
Op 03 is stored in H-07
Op 04 is stored in H-08

where H-05 through H-08 are the fifth through eighth hierarchy registers, respectively.

Data for the alphanumeric print codes is stored in decimal format (beginning at the third position to the right of the decimal point) in its respective hierarchy register. Given code 13 for the letter "A" there are five positions per register in which the code can be stored:

Print Code Position	Storage Positions
1st (leftmost)	13×10^{-4}
2nd	13×10^{-6}
3rd (middle)	13×10^{-8}
4th	13×10^{-10}
5th (rightmost)	13×10^{-12}

For example, enter 1314151617 in the display and press *OP 04. Go into learn mode and key in *LBL A HIR 18 R/S. (As HIR 18 cannot be keyed directly from the keyboard, press *LBL A STO 82 STO 18 R/S and delete the STO instructions.) Out of learn mode, press A, the display will be .0013141516. You have recalled the contents of hierarchy register 8. As mentioned earlier in describing XY, 1=RCL and 8=hierarchy register 8. (Only 10 digits can be displayed at one time; therefore, to observe the last 2 digits (17), you must multiply the display by 100.)

Let's try some input and modification without using the *Op code. First key in the following in learn mode:

```
000  76 LBL
001  11  A
002  42 STO
003  82  82
004  42 STO
005  08  08
006  91 R/S
007  76 LBL
008  12  B
009  42 STO
010  82  82
011  42 STO
012  18  18
013  91 R/S
014  76 LBL
015  13  C
016  42 STO
017  82  82
018  42 STO
019  38  38
020  91 R/S
021  76 LBL
022  14  D
023  42 STO
024  82  82
025  42 STO
026  48  48
027  91 R/S
028  76 LBL
029  18 C'
030  42 STO
031  82  82
032  42 STO
033  58  58
034  91 R/S
035  76 LBL
036  19 D'
037  42 STO
038  82  82
039  42 STO
040  68  68
041  91 R/S
```


Now delete the STO instructions beginning at the end of the listing. The result will be:

```
000  76 LBL
001  11  A
002  82 HIR   } STO 08
003  08  08   }
004  91 R/S
005  76 LBL
006  12  B
007  82 HIR   } RCL 08
008  18  18   }
009  91 R/S
010  76 LBL
011  13  C
012  82 HIR   } SUM 08
013  38  38   }
014  91 R/S
015  76 LBL
016  14  D
017  82 HIR   } PRD 08
018  48  48   }
019  91 R/S
020  76 LBL
021  18 C'
022  82 HIR   } INV SUM 08
023  58  58   }
024  91 R/S
025  76 LBL
026  19 D'
027  82 HIR   } INV PRD 08
028  68  68   }
029  91 R/S
```

The italicized instructions to the right are the instruction equivalents of the HIR command. For example, HIR 08 (under LBL A) means STO (coded as 0) the display value into hierarchy register 8. This manipulates *Op 04. To change alphanumeric codes in *Op 03, 02, or 01 simply change the 8 to 7, 6, or 5, respectively.

Let's manipulate some alphanumeric codes. We'll begin by storing the letter "A" (alphanumeric code 13) in the leftmost print position. Key into the display 13×10^{-4} and

store by pressing A. Clear the display (this is necessary after using the EE key) and recall the result by pressing B (0.0013 will appear in the display). If *Op 05 is pressed, nothing will be printed. It should be noted that prior to the printing of any alphanumeric (that has been input or altered via the HIR instruction), it is necessary to sum 1 into the affected register by means of HIR 3n where n is the register being altered. Alphanumeric data that has been input with an Op code will not contain or require a 1 in the integer portion of the stored data. In order to execute *Op 05, sum the integer 1 into the register by placing 1 in the display and pressing C. To check the contents of the register, press B. Now press *Op 05 and the letter "A" will be printed in the first *Op 04 print position. Now let's move this letter one position to the right. First, remove the integer 1 by placing 1 in the display and pressing C'. Now shift the alphanumeric code to the right by entering 100 and pressing D'. Check the register contents by pressing B. Again enter 1 and press C. Press *Op 05 and note that the letter "A" has moved one print position to the right. To add the letter "T" to the printout enter 37 x 10^{-8} and sum into register 08 by pressing C. Press Op 05 and notice that the "T" is now next to the "A". (Note: the integer 1 must only be removed during multiplication and division operations.)

By using these techniques in your programs, it is possible to expand the scope of printout and usefulness of the already powerful TI-59/PC-100A combination.

ALL PPX-59 PROGRAMS AVAILABLE IN ONE PACKAGE

After examining our order records we have found that some PPX members are ordering very large quantities of single programs. For those members that need a large library of programs we believe we have the answer.

PPX-59 programs are now being put on microfiche. This microfiche contains the PPX-59 Catalog (with Addendums), instructions on how to use the microfiche, and the documentation for all the programs available. Also included in this offer are ten copies of the PPX Exchange each time a newsletter is printed during your one year microfiche membership. For further information, write:

Texas Instruments
PPX
P. O. Box 53
Lubbock, Tx. 79408

FLAG SORTING

William R. Bowman

Editor's Note: This article is presented in hopes that it will stimulate more sorting ideas.

The following discussion and demonstration presents a method of sorting and selecting numbers that contain a specified numeral in a specific position within a number. Though not very practical for general sorting, the method is interesting and provides a simple means for performing the specialized sorting as demonstrated below.

When performing the IF FLAG INDIRECT XX instruction, the TI-59 only recognizes the first digit to the left of the decimal point of the number stored in the indirect register XX. For example, if 96124.03129 is stored in indirect register XX, *IFF *IND XX tests for flag 4. Normally, when using the Indirect Flag Test, the flag number (by itself) is placed in the indirect register and is changed by the program to another flag number when certain conditions are met in the running program.

In the "Flag Sorting" method, a certain flag is set from the keyboard before the program is executed. The program places each number to be sorted into the indirect flag register, then tests to see if the numeral in the position just to the left of the decimal point matches the flag number set from the keyboard. If a match is found a transfer takes place. If no match is found, a transfer does not take place. The numbers to be sorted may be modified before they are placed in the indirect register, by shifting the decimal point to the right of the position you wish to test.

The brief demonstration program listed below obtains the numbers to be sorted from the random number generator program in the Master Library. The numbers obtained by this program are changed from decimal to whole numbers before sorting. The sort is made on the last position to the right of the decimal point.

Enter the following in learn mode (be sure to have the Master Library inserted):

```
000  76 LBL
001  11  A
002  36 PGM
003  15  15
004  71 SBR
005  88 DMS
006  65  ×
007  05  5
008  22 INV
009  28 LOG
010  95  =
011  42 STO
012  15  15
013  87 IFF
014  40 IND
015  15  15
016  33 x²
017  66 PAU
018  61 GTO
019  11  A
020  76 LBL
021  33 x²
022  91 R/S
```

Set a flag (let's set flag 2) from the keyboard and press A (no entry is required). Generated numbers which do not contain a 2 in the position preceding the decimal point are briefly displayed. The program then generates another number. When a 2 is found, the number is displayed and program execution stops. To restart the program, simply press A, again.

To change the numeral to be tested, press RST (to clear flag 2) and set the flag of your choice, or better still, set several flags as they will all work simultaneously. If you set flags 0, 2, 4, 6, and 8, all even numbers will halt program execution. You can also reverse the logic, as with any conditional transfer, by inserting INV in the program just before the *IFF *IND instruction at location 013. One final note, if the calculator is connected to the PC-100(A) printer, flag 9 cannot be used. When flag 9 is set, the printer is placed in TRACE mode.

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 for least-mean-square best fit logistic forecasting curve of the form $f(x) = \frac{1}{a+bc^t}$ to determine a, b, and c coefficients.

CALENDAR PRINT GENERATOR

This program prints calendar months and years from 1581 to 4000 AD. The Master Library Module and PC-100A printer are required for execution. Each month takes from 60 to 75 seconds to be printed. The equations and limitations are shown in the Master Library Manual, ML-20, pages 74-76.

PPX wishes to thank the author of "Calendar Print Generator", Tom P. Douglas, for his excellent program.

USER INSTRUCTIONS:

1. Partition to 559.49.
2. Enter Program.
3. Key in starting month number, press A.
4. Key in starting year number, press B.
5. Key in number of months to be printed, press C.
   Steps 3, 4, and 5 may be executed in any order.
6. Execute program, press E.

EXAMPLE:
Generate the calendar for the month January 1979.

Enter	Press	Display	Comments
1	A	1.	January month number
1979	B	1979.	Year number
1	C	1.	Number of months to print
	E	0.	Execute program

```
   JAN 1979
 S  M  T  W  T  F  S
    1  2  3  4  5  6
 7  8  9 10 11 12 13
14 15 16 17 18 19 20
21 22 23 24 25 26 27
28 29 30 31
```


TI-59 LISTING

000	25	CLR
001	61	GTO
002	02	02
003	30	30
004	00	0
005	00	0
006	02	2
007	92	RTN
008	00	0
009	00	0
010	03	3
011	92	RTN
012	00	0
013	00	0
014	04	4
015	92	RTN
016	00	0
017	00	0
018	05	5
019	92	RTN
020	00	0
021	00	0
022	06	6
023	92	RTN
024	00	0
025	00	0
026	07	7
027	92	RTN
028	00	0
029	01	1
030	00	0
031	92	RTN
032	00	0
033	01	1
034	01	1
035	92	RTN
036	00	0
037	01	1
038	02	2
039	92	RTN
040	02	2
041	00	0
042	01	1
043	92	RTN
044	02	2
045	00	0
046	02	2
047	92	RTN
048	02	2
049	00	0
050	03	3
051	92	RTN
052	02	2
053	00	0
054	04	4
055	92	RTN
056	02	2
057	00	0
058	05	5
059	92	RTN
060	02	2
061	00	0
062	06	6
063	92	RTN
064	02	2
065	00	0
066	07	7
067	92	RTN
068	02	2
069	01	1
070	00	0
071	92	RTN
072	02	2
073	01	1
074	01	1
075	92	RTN
076	02	2
077	01	1
078	02	2
079	92	RTN
080	03	3
081	00	0
082	01	1
083	92	RTN
084	03	3
085	00	0
086	02	2
087	92	RTN
088	03	3
089	00	0
090	03	3
091	92	RTN
092	03	3
093	00	0
094	04	4
095	92	RTN
096	03	3
097	00	0
098	05	5
099	92	RTN
100	03	3
101	00	0
102	06	6
103	92	RTN
104	03	3
105	00	0
106	07	7
107	92	RTN
108	03	3
109	01	1
110	00	0
111	92	RTN
112	03	3
113	01	1
114	01	1
115	92	RTN
116	03	3
117	01	1
118	02	2
119	92	RTN
120	04	4
121	00	0
122	01	1
123	92	RTN
124	04	4
125	00	0
126	02	2
127	92	RTN
128	76	LBL
129	11	A
130	42	STO
131	07	07
132	92	RTN
133	76	LBL
134	12	B
135	42	STO
136	08	08
137	92	RTN
138	76	LBL
139	13	C
140	42	STO
141	09	09
142	92	RTN
143	02	2
144	05	5
145	01	1
146	03	3
147	03	3
148	01	1
149	92	RTN
150	02	2
151	01	1
152	01	1
153	07	7
154	01	1
155	04	4
156	92	RTN
157	03	3
158	00	0
159	01	1
160	03	3
161	03	3
162	05	5
163	92	RTN
164	01	1
165	03	3
166	03	3
167	03	3
168	03	3
169	05	5
170	92	RTN
171	03	3
172	00	0
173	01	1
174	03	3
175	04	4
176	05	5
177	92	RTN
178	02	2
179	05	5
180	04	4
181	01	1
182	03	3
183	01	1
184	92	RTN
185	02	2
186	05	5
187	04	4
188	01	1
189	02	2
190	07	7
191	92	RTN
192	01	1
193	03	3
194	04	4
195	01	1
196	02	2
197	02	2
198	92	RTN
199	03	3
200	06	6
201	01	1
202	07	7
203	03	3
204	03	3
205	92	RTN
206	03	3
207	02	2
208	01	1
209	05	5
210	03	3
211	07	7
212	92	RTN
213	03	3
214	01	1
215	03	3
216	02	2
217	04	4
218	02	2
219	92	RTN
220	01	1
221	06	6
222	01	1
223	07	7
224	01	1
225	05	5
226	92	RTN
227	76	LBL
228	15	E
229	81	RST
230	86	STF
231	08	08
232	43	RCL
233	07	07
234	71	SBR
235	04	04
236	33	33
237	36	PGM
238	20	20
239	11	A
240	04	4
241	42	STO
242	06	06
243	22	INV
244	86	STF
245	05	05
246	87	IFF
247	02	02
248	02	02
249	91	91
250	86	STF
251	02	02
252	42	STO
253	02	02
254	71	SBR
255	04	04
256	40	40
257	42	STO
258	00	00
259	00	0
260	42	STO
261	12	12
262	07	7
263	32	X:T
264	01	1
265	00	0
266	49	PRD
267	00	00
268	33	X²
269	49	PRD
270	12	12
271	43	RCL
272	00	00
273	59	INT
274	22	INV
275	44	SUM
276	00	00
277	77	GE
278	02	02
279	82	62
280	75	-
281	02	2
282	85	+
283	03	3
284	95	=
285	44	SUM
286	12	12
287	97	DSZ
288	02	02
289	02	02
290	64	64
291	01	1
292	03	3
293	32	X:T
294	43	RCL
295	07	07
296	42	STO
297	10	10
298	69	OP
299	27	27
300	43	RCL
301	07	07
302	22	INV
303	77	GE
304	03	03
305	14	14
306	22	INV
307	86	STF
308	02	02
309	01	1
310	42	STO
311	07	07
312	69	OP
313	28	28
314	71	SBR
315	04	04
316	33	33
317	36	PGM
318	20	20
319	12	B
320	42	STO
321	11	11
322	07	7
323	49	PRD
324	10	10
325	01	1
326	03	3
327	06	6
328	44	SUM
329	10	10
330	69	OP
331	00	00
332	43	RCL
333	12	12
334	69	OP
335	03	03
336	71	SBR
337	40	IND
338	10	10
339	69	OP
340	02	02
341	69	OP
342	05	05
343	43	RCL
344	04	04
345	36	PGM
346	20	20
347	71	SBR
348	01	01
349	77	77
350	32	X:T
351	43	RCL
352	05	05
353	75	-
354	48	EXC
355	04	04
356	95	=
357	49	PRD
358	06	06
359	03	3
360	06	6
361	00	0
362	00	0
363	00	0
364	00	0
365	03	3
366	00	0
367	69	OP
368	01	01
369	03	3
370	07	7
371	00	0
372	00	0
373	00	0
374	00	0
375	69	OP
376	02	02
377	04	4
378	03	3
379	00	0
380	00	0
381	00	0
382	00	0
383	03	3
384	07	7
385	00	0
386	00	0
387	69	OP
388	03	03
389	02	2
390	01	1
391	00	0
392	00	0
393	00	0
394	00	0
395	03	3
396	06	6
397	69	OP
398	04	04
399	69	OP
400	05	05
401	69	OP
402	00	00
403	01	1
404	67	EQ
405	04	04
406	74	74
407	02	2
408	67	EQ
409	04	04
410	79	79
411	03	3
412	67	EQ
413	04	04
414	86	86
415	04	4
416	67	EQ
417	04	04
418	91	91
419	05	5
420	67	EQ
421	05	05
422	16	16
423	06	6
424	67	EQ
425	05	05
426	23	23
427	00	0
428	67	EQ
429	05	05
430	28	28
431	35	1/X
432	92	RTN
433	65	×
434	01	1
435	00	0
436	00	0
437	85	+
438	01	1
439	85	+
440	43	RCL
441	08	08
442	55	÷
443	04	4
444	22	INV
445	28	LOG
446	95	=
447	92	RTN
448	22	INV
449	28	LOG
450	52	EE
451	22	INV
452	52	EE
453	65	×
454	87	IFF
455	05	05
456	00	00
457	30	30
458	04	4
459	44	SUM
460	11	11
461	43	RCL
462	06	06
463	32	X:T
464	43	RCL
465	11	11
466	22	INV
467	77	GE
468	04	04
469	72	72
470	86	STF
471	05	05
472	83	GO÷
473	11	11
474	06	6
475	71	SBR
476	04	04
477	48	48
478	85	+
479	00	0
480	71	SBR
481	04	04
482	48	48
483	95	=
484	69	OP
485	01	01
486	04	4
487	71	SBR
488	04	04
489	48	48
490	85	+
491	02	2
492	94	+/-
493	71	SBR
494	04	04
495	48	48
496	95	=
497	42	STO
498	01	01
499	59	INT
500	22	INV
501	44	SUM
502	01	01
503	69	OP
504	02	02
505	43	RCL
506	01	01
507	65	×
508	01	1
509	00	0
510	22	INV
511	28	LOG
512	52	EE
513	22	INV
514	52	EE
515	85	+
516	02	2
517	71	SBR
518	04	04
519	48	48
520	95	=
521	69	OP
522	03	03
523	06	6
524	71	SBR
525	04	04
526	48	48
527	85	+
528	00	0
529	71	SBR
530	04	04
531	48	48
532	95	=
533	69	OP
534	04	04
535	69	OP
536	05	05
537	22	INV
538	87	IFF
539	05	05
540	04	04
541	74	74
542	98	ADV
543	97	DSZ
544	09	09
545	02	02
546	40	40
547	00	0
548	98	ADV
549	98	ADV
550	98	ADV
551	98	ADV
552	92	RTN

WILL THE SILENT MAJORITY PLEASE STAND UP?

The following articles ask for your support in two major areas, newsletter input and program submission. PPX-59 needs your ideas and submissions to maintain its high level of TI-59 software excellence.

THE PPX EXCHANGE NEEDS YOU

The PPX Exchange is **your** newsletter. In the past, both PPX-52 and PPX-59 members have supported the PPX Exchange with feature articles and programming hints. Beginning with this issue, PPX-52 members are no longer contributing to or receiving this newsletter. In order to keep your newsletter as informative as it has been in the past, it now becomes more important than ever that we hear from you. We know many of you have TI-59 programming techniques, accomplishments and stories of interest that others would enjoy reading. As with any other membership, PPX-59 membership becomes more gratifying when you are actively involved. So let's hear from our silent majority — with a PPX Exchange input.

When submitting an article, keep to a maximum of approximately 3 typed double spaced pages. Examples of keystroke sequences should be included to aid the reader when appropriate. We try to get as much variety as possible into each newsletter. Therefore, publication of articles and programming hints is sometimes postponed to later issues. Also should space or subject matter become a problem, feature articles are published in a condensed form under the column "From the Analyst's Desk".

PROGRAM SUBMISSION CHECKLIST

Active membership participation in submitting programs to PPX-59 is a must to ensure continued success of your program exchange. The following checklist will help insure acceptance of your programs upon submission.

1. Check the Catalog to determine that your program does not duplicate an existing program.
2. Type or neatly print your program in black ink. **Submitted programs are photocopied to fill orders.** For this reason, **blue ink and pencil are not acceptable as they will not reproduce adequately.**
3. Be sure to document all methods, equations, and sources used by your program. In addition, mention any input limitations of your program. For example — 'division by zero is not legal as the program does not have a recovery routine to handle it.'
4. Run the sample program several times to be certain that it operates as indicated in your documentation. Be sure to include run time for any step which exceeds one minute.
5. Compare the keycodes recorded on your magnetic card(s) to the listing in your documentation. They must be exactly alike. **Apply glue to complete back surface of PC-100A listing.**
6. Review your program to see that there are no documentation errors or omissions. Refer to your Member's Guide for assistance in this area.
7. Remember to sign the submission abstract.
8. Be sure to enclose your magnetic card(s) with your submission.

Above all, remember that your documentation is reproduced and forwarded to other members. Put yourself in the place of the user, when you document your program.

PROGRAMMING SYSTEMS

The November 1978 issue of the PPX Exchange introduced the concept of programming systems. PPX has received two more systems, bringing the total offering to four. A program is classified as a programming system when the documentation length exceeds the general format of PPX-59. Although the **number of program steps usually exceeds** the **960 steps** available on the TI-59 calculator, these programs can still be run on your TI-59. This is possible because the programs are split into segments which are executed one at a time. The registers retain data needed between each segment.

To order a programming system, write the program number and title on your PPX-59 order form and enclose $15 plus tax, postage, and handling. Documentation **only** will be sent (magnetic cards are not included). The four programming systems available are:

000001 STAR TREK

You are in command of the starship Enterprise. The TI-59/PC-100A generates a 9 quadrant galaxy complete with Klingon battle cruisers, starbases, and an array of stars to deter your movement through space. As commander, your mission is to seek out and destroy all Klingons in the galaxy. Your battle computer will respond to 6 major commands: set course, long range scan, phaser control, shield control, library computer, and short range scan.

William G. Bryson, Houston, Tx.
6295 steps, PC-100A

000002 COMPLETE PAYROLL SYSTEM (NEW YORK)

Handles complete payroll calculations for weekly and quarterly reports. Incorporates tax tables, provisions for sick days, vacation days, etc. With modification, this program may be used in other states.

Analyst Note: Documentation is clear but complex due to separate tables, etc.

Merton A. Sigoda, Roslyn Heights, N.Y.
5000 steps, PC-100A

000003 FHWA TRAFFIC NOISE PREDICTION MODEL

Calculates LEQ and LIO, in decibels, for autos, medium trucks, and heavy trucks. In addition, calculates path length difference, fresnel number, and attenuation. Determines LEQ and LIO values for barrier attenuation and finite highway sections, and distance to noise contour line.

Robert C. Rutland, Austin, Tx.
1250 steps, PC-100A

000004 REINFORCED CONCRETE ANALYSIS

Determines the positive and negative bending moments, the associated curvature at which the system cracks and steel yields, and the ultimate strength for reinforced concrete members subject to flexure and axial loads.

P.J. Thompson, Lower Hutt, New Zealand
5160 steps, PC-100A, Mod 1

- A program to convert navigational data in the LORAN A
- system to data in the LORAN C system.
- Within the area of radio immunology, a program to convert standard curve measurements of counts per minute to clinical doses.
- A program to convert Chinese years to Gregorian Years.
- In the area of mathematics, programs to calculate the incomplete Gamma and Beta Function, and the incomplete Elliptical Integral.

Proof that our system works . . . In July, our PPX-59 Programming Corner requested Civil Engineering programs dealing with hydraulics. Mr. Robert C. Thacker Jr. came quickly to the rescue with the following information: A book containing 40 programs written for the SR-52, TI-57/58/59 entitled "Hydrologic and Hydraulic Computations on Small Programmable Calculators" is available for $15.95 plus tax. To obtain your copy write to the Iowa Institute of Hydraulic Research, The University of Iowa, Iowa City, Iowa 52242.

FROM THE ANALYST'S DESK

- A typographical error in the article "SR-52/TI-59: The Art of Data Packing" (November 1978, PPX Exchange) has been brought to our attention. Please make the following corrections to your newsletter:

  The italics next to **steps 005-007 of the TI-59 listing** for "packing both positive and negative numbers" should read as 10^{x+1} instead of 10^{x+y}.

  The italics next to **steps 036-038 of the TI-59 listing** for "unpacking both positive and negative numbers" should read as 10^{x+y} instead of 10^{x+1}.

- Mr. David R. Hockman has passed along the following suggestion: The product "Wet Ones®" by Lehn & Fink Division of Sterling Drug Inc. has done an excellent job of cleaning magnetic cards when they slip or misread. In Mr. Hockman's work, it is necessary for him to read about 20 cards per day per customer. In one year's time, none of his cards have worn out or become unreadable.
- Mr. Michael J. Dhuey suggests the following: If you use your calculator to evaluate algebraic expressions and forget which variables are stored in which registers, here is a handy programming technique to keep track of your variables.

Suppose the expression you want to evaluate is D = A x SIN(B) + C. You could remember register 5 is A, 7 is C, and so forth, but there is a far simpler way to do it. Just use the user defined keys as the operand in a register instruction. This will work in learn mode for all ten user defined keys. It will use registers 10-19 by using the keycode as the register number (e.g. A is register 11). If you want to store the value of A, just press STO A. Using this technique, a program to evaluate D could be entered: *Lbl A STO A RTN * Lbl B STO B RTN *Lbl C STO C RTN * Lbl D RCL A x RCL B *sin + RCL C = RTN.

Given this program, you can evaluate D for A = 5, B = 30, C = 17 by the following key sequences: 5 A 30 B 17 C D which leaves D(19.5) in the display.

- Our readers have sent in more suggestions for labeling magnetic cards. Mr. George S. Flanik recommends the "Pilot" SC-UF fine point permanent-ink felt marker. PPX Program Analysts have been using this pen with excellent results. Mr. David W. Childs prefers using presstype (Helvicta 6-pt.) to label his magnetic cards. Presstype will not come off during card reads but may be wiped off with a wet cloth. Check which your local office supply store to obtain your personal preference.
- It has been brought to our attention by Mr. John Turpin that Program 05 in the Business Decisions Library contains an undocumented feature. By pressing SBR *Prt after SBR CLR, the pause command will be eliminated for those people using the PC-100A — thus, saving execution time.
- Have you ever needed more data registers yet you could not sacrifice the program steps? If you have, Mr. J.R.M. Vaughan may have a simple solution for you based on the fact that TI-59 memory is partitioned into program steps and data registers. (This relationship is described on page V-42 of your Personal Programming Manual).

Mr. Vaughan solves this problem by reassigning the space that had been taken up by 'earlier executed' program steps (e.g., initialization routines). By placing such routines at the end of his current partition and repartitioning after the 'early execution', the number of available registers is increased. One word of warning . . . after repartitioning the newly freed registers will contain the program steps which formerly occupied those locations in memory. Therefore, if you intend to SUM into these registers, be sure to clear the registers(nn) with 0 STO nn prior to use.

- To clear a portion of memory, Paul B. McDowell offers the following suggestion: The program should be written such that the registers to be cleared are in blocks of 10 registers. Then, the following subroutine should be included as an initialization routine: *Lbl CLR M *Op 17 CMS N *Op 17 INV SBR where registers 00 through (Mx10)-1 are to be cleared and N returns the program to the original partition. For example, to clear registers 00-19 with an original partition of 479.59 (i.e. 6 *Op 17), the subroutine would be: *Lbl CLR 2 *Op 17 CMS 6 *Op 17 INV SBR. This is useful when you want to clear registers containing data, yet you do not want to clear registers containing alphanumeric print codes.
- If you want to halt a TI-59 program in progress, one of two keys will do it. R/S will stop a program executing in the user program memory; RST will stop a program in a library module. If a program is alternating between a user program and library module, press R/S and RST simultaneously.
- The Personal Programming Manual mentions a method for tracing program execution through the display. If the GTO key is pressed while the program is running, the contents of the display register will be displayed as the program is running. This can be handy for debugging a program if you do not have a PC-100A to trace the program.
- "Multiple Linear Regression—5 Ind. Variables" (PPX-59 #208007) is no longer being offered by PPX. The December 1978 Addendum contains abstracts of 2 new programs that will handle these types of computations. They are: "Multiple Regression — Nine Independent Variables" (PPX-59 #208029) and "Multiple Regression — 5 Independent Variables" (PPX-59 #208016).

The PPX Exchange is published every other month and is the only newsletter published by Texas Instruments for TI-59 owners. You are invited to submit items you feel are of general interest to other 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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