

* T I P P C N O T E S *

V6N6-7, 1981

NEWSLETTER OF THE TI PROGRAMMABLE CALCULATOR CLUB.

9213 Lanham Severn Road, Lanham, Maryland 20706 USA

Please note the change in zip code: 20706 from the old 20801. You may also use P.O. Box 710, Lanham MD 20706.

The lady who stood by my side for the last thirty three years suddenly passed away on June 18th. Annie had been very ill for the last fourteen years. But in spite of her illness she actively worked on the newsletter by stuffing envelopes, licking stamps and providing general encouragement to her hubby when things got difficult and the deadline was near. We will all miss her here in Lanham.

We finally located Fred Fish. He is alive and well and working. Fred is the author of the famous SURVIVAL GUIDE FOR THE MASTER LIBRARY, which has been a best seller for years. And rightly so. It contains a wealth of information on how to use the ML module more effectively, tricks to bypass a lot of key punching and make good use of the subroutines within the programs. It has a listing of each program and a flow chart with explanation how it works.

But, first for the sad news, Fred doesn't have any more copies for sale. Now, for the good news: we made a deal with Fred to have the manual printed by the TI PPC Club. I still had a copy which was in mint condition, which the printer used as the master for his photo-offset process. The 119 pages have been printed on 8½ by 11 inches paper, both sides of the paper, three-hole punch, one staple and with front and back in heavy yellow semi card-board. Exactly 100 copies is all what I have to distribute, which will be done on a strictly first-come-first-serve basis. The original price was \$ 12.50 but we were able to cut that down to \$ 8.00. Add to this \$ 2.00 for first class delivery in the US and Canada. (\$ 3.50 for A.O. Mail delivery overseas.)

Please allow six weeks for delivery, as at the time you receive this issue I will be on a one-month vacation.

Have a happy summer. I will see you back in September.

Maurice E.T. Swinnen

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I'm glad to see all the new ideas. I am amazed at all the new discoveries that have been uncovered since you started writing *TI-PPC Notes*. Keep up the good work.

---Richard

I'm giving in to an overpowering urge to tell you how really excellent your *TI* newsletter is. Even though my use of my -59 keeps falling as I become more dependent upon my computer, I always read the *Notes* cover to cover and I always learn something new. And usually I end up trying out some new programming trick or new program that you've written up. I do hope it keeps going well, and that you take good care of yourself, too.

---Burt
Potomac, MD

A real bargain. You have done a wonderful job with the newsletter. Each issue is better than the last. If you ever get to Dallas, be sure to call. I would like to meet you face to face, even though I feel that I know you from our correspondence and your revelations in print. Hope you can keep up the good work.

---John
Dallas, TX

Notes have helped me a lot and I find uses for the calculator I never knew existed. Thank you again, and keep up the good work. I would like to hear more about the new module when it is available.

---Raymond
Carlsbad, CA

Please pardon this belated thanks for the copy of *Display* that you so graciously sent me. The latest issue of *TI-PPC* is superb. Your quality is better than the (*) Keep up the excellent work. The programs are good. I found a number of useful tricks to improve my programs. In your previous letter you said that you really like RPN. So do I, but I believe that AOS is nearly as powerful. Based upon my extensive experience, I often find AOS easier to program. Next time I'll send you the names of a few people who may wish to subscribe to the *TI-PPC*. Thank you again for your prompt attention. My best wishes and regards.

---F
Edmonton, Alberta, Canada

I have received my final issue of *TI-PPC Notes*, and like all of the other issues, it contained a wealth of very creative programming ideas. During the year that I have been receiving the *Notes*, my programming skills have advanced more than I can measure. You are to be congratulated for editing a publication of this quality. Now for the negative news: I shall not be renewing my subscription. The reason is that I have become a "Deserter" and have purchased an HP 41-C. I am now in the process of learning RPN and I am attempting to translate my large library of TI programs into the new language. The frustration of hundreds of upon hundreds of misreads of my cards, plus the time it took to load all Alpha in machine code, etc. became too much. If some day in the future, you too look to new horizons on a 41-C and start a new newsletter, please contact me to become a charter subscriber. Your clear analytical thinking would make great reading on ANY topic or new hardware

---Josef
Santa Monica, CA

Are you sure you didn't leave the calculator in FIX 2, each time you tried to read a card? Ed.

Thank you for the rapid response to my letter. I received the 1st class (certainly in quality if not in postage) copy yesterday. The bulk rate one arrived last Wednesday or Thursday. Perhaps it is time for a new addition to Murphy's Law. "The probability of receiving the item in question increases greatly after you send the letter of complaint." I think that the *TI-PPC Notes* is so much better than the (*) that it is not funny. The *Notes* have given me a lot of help in programming the TI-59 as well as providing some interesting programs. It's publication is much more of a (*) designed to persuade one to buy more (*) programs. As for the \$2. per issue complaint; even if you are making a little money on this, I think you would deserve it for all the work that you do! Since I now have two copies of the *Notes*, I shall give the second one to a friend who is thinking of buying a TI-59.

---Evan
Seattle, WA

(*) Expletive deleted. Ed.

CONTOUR GRAPH, FAST MODE.- As with the original HOEHENLINIENDIAGRAM program in ----- v5n9/10p5, Harald M. Otto is also the author of this one. It permits you to plot in Fast Mode, at an increase of a factor of two in speed and in Normal Mode, at a snail's pace.

I received several attempts at putting this program in Fast Mode, but I judge the one from Harald the most friendly to the user. On top of that, it is also the fastest one, as Harald did not only convert it to Fast Mode, but did some clever optimizations which gained considerable execution time.

The instructions are:

1. Key in all the program steps up to step 380 and record them on sides 1 and 2 of a mag card.
2. In use, read in sides 1 and 2 of the mag card. Make sure the ML module is plugged in if you plan to use the Fast Mode. Otherwise, ML module is not needed.
3. Press E. Calculator goes automatically into LRN mode. Start writing your function. See examples at the end of the program listing. The variable X_1 is in R07 and X_2 is in R08. The value of the function must be in the display at the end of the routine. End the routine with GTO 118. Press LRN.
4. Enter parameters: press A. Printer will prompt you. See also original program in v5n9/10p5. Press R/S after each parameter has been put in the display. The prompting will be in this order:
 X_1 =start value for X_1 , X_2 =start value for X_2 , NL=number of paper strips,
 e =sharpness parameter, dX_1 =increment in X_1 , dX_2 =increment in X_2 ,
 N =number of steps in the X_1 direction, L_0 through L_n = values of each level,
5. Select between Normal Mode and Fast Mode. Press either B or C.
 If you select B, Normal Mode, the display goes blank and the plotting will start right away.
 If you select C, Fast Mode:
 - a. Display goes blank. Slide side 2 in the slot, to re-record that side, this time with your function included.
 - b. A "4" is printed. Take a new mag card and slide it into the slot. Bank 4 will be recorded, containing the parameter data.
 - c. The calculator nows goes automatically into Fast Mode. This wipes out program and data.
 - d. Slide side 1 into the slot, to reload that side, a 1 will be printed.
 Slide side 2 into the slot, a 2 will be printed.
 Slide side 4 into the slot, a 4 will be printed.
 - e. The display stays blank and the plotting starts.

While I am writing this, the postman brings the latest Programbiten from Sweden. One of their members, Bo Nordlin, has put Harald's program into Fast Mode in a slightly different way, reducing the program steps to a mere 314. It is, however, slower than the one done by the guru himself.

Bo has a really impressive curve which he describes as a hyperbolic curve of the form:

$$f(X_1:X_2) = \frac{(X_1)^2}{2ca^2} - \frac{(X_2)^2}{2cb^2}$$

and in which his parameters are : $X_1=X_2=-10$, $dX_1=dX_2=.25$, the level values are: -12, -8, -4, 0, 4, 8, and 12. The e -value = .4 . He used about 90 steps in printing this curve and employed four paper strips.

SEE HARALD'S PROGRAM ON NEXT PAGE.

SURVEY CALCULATIONS JOURNAL, P.O.BOX 6674, San Bernardino, CA 92412, USA is, as the ----- name implies, a newsletter especially for surveyors. It contains a lot of useful programs for that profession. Issue 4 of this year's volume even has a hardware article about putting a complete computing-printing-I/O system together. *HOWEVER, EVERYTHING I SAW SO FAR IS DEDICATED TO THE HP-41-C*. I have nothing against that calculator or its adherents. I think it is a fine piece of computing machinery. I just don't want to mislead all you TI-59 monolingual calculator fans. The editor, Joe Bell, tells me all this is going to change and soon he will have a host of good TI-59 programs and routines. I wish him every luck with his fine journal.

CONTOUR GRAPH, Fast Mode,-Harald M. Otto.

000 00 0	059 12 12	118 42 STD	177 65 X	236 76 LBL	295 03 3	354 25 CLR
001 00 0	060 69 DP	119 03 03	178 43 RCL	237 11 A	296 06 6	355 38 RTN
002 00 0	061 06 06	120 43 RCL	179 13 13	238 69 DP	297 03 3	356 75 LBL
003 00 0	062 07 7	121 11 11	180 95 =	239 00 00	298 07 7	357 19 D'
004 00 0	063 05 5	122 32 XIT	181 22 INV	240 07 7	299 18 C'	358 85 +
005 36 PGM	064 04 4	123 43 RCL	182 44 SUM	241 42 STD	300 01 1	359 07 7
006 02 02	065 04 4	124 09 09	183 08 08	242 06 06	301 04 4	360 05 5
007 71 SBR	066 00 0	125 42 STD	184 43 RCL	243 25 CLP	302 69 DP	361 04 4
008 02 02	067 03 3	126 00 00	185 12 12	244 16 A'	303 02 02	362 04 4
009 39 39	068 69 DP	127 43 RCL	186 44 SUM	245 01 1	304 03 3	363 00 0
010 09 9	069 04 04	128 25 25	187 07 07	246 16 A'	305 01 1	364 02 2
011 00 0	070 43 RCL	129 42 STD	188 97 DSZ	247 03 3	306 69 DP	365 61 GTD
012 69 DP	071 13 13	130 04 04	189 01 01	248 01 1	307 03 03	366 03 03
013 00 00	072 69 DP	131 43 RCL	190 01 01	249 02 2	308 01 1	367 76 LBL
014 22 INV	073 06 06	132 03 03	191 00 00	250 07 7	309 03 3	368 76 LBL
015 58 FIX	074 98 ADV	133 75 =	192 43 RCL	251 17 B'	310 05 5	369 10 E'
016 22 INV	075 06 6	134 73 RC+	193 14 14	252 42 STD	311 03 3	370 85 +
017 57 ENG	076 00 0	135 04 04	194 65 =	253 01 01	312 00 0	371 02 2
018 98 ADV	077 07 7	136 95 =	195 43 RCL	254 35 +	313 01 1	372 07 7
019 01 1	078 05 5	137 77 GE	196 12 12	255 01 1	314 03 3	373 00 0
020 99 PPT	079 07 7	138 01 01	197 95 =	256 04 4	315 02 2	374 01 1
021 25 CLR	080 05 5	139 51 51	198 22 INV	257 95 =	316 07 7	375 61 GTD
022 21 P/S	081 07 7	140 50 INV	199 44 SUM	258 42 STD	317 18 C'	376 03 03
023 99 PPT	082 05 5	141 22 INV	200 07 07	259 25 25	318 98 ADV	377 76 LBL
024 25 CLR	083 07 7	142 77 GE	201 02 2	260 03 3	319 21 P/S	378 76 LBL
025 21 P/S	084 05 5	143 02 02	202 00 0	261 01 1	320 76 LBL	379 15 E
026 99 PPT	085 69 DP	144 20 20	203 65 X	262 03 3	321 13 C	380 92 RTN
027 76 LBL	086 01 01	145 69 DP	204 43 RCL	263 06 6	322 02 2	
028 12 B	087 69 DP	146 34 34	205 13 13	264 17 B'	323 99 PPT	
029 98 ADV	088 02 02	147 97 DSZ	206 95 =	265 05 5	324 96 WRT	
030 04 4	089 69 DP	148 00 00	207 44 SUM	266 04 4	325 04 4	
031 04 4	090 03 03	149 01 01	208 08 08	267 17 B'	326 99 PPT	
032 00 0	091 69 DP	150 31 31	209 98 ADV	268 25 CLR	327 96 WRT	
033 02 2	092 04 04	151 02 2	210 97 DSZ	269 19 D'	328 31 PPT	
034 69 DP	093 69 DP	152 22 INV	211 10 10	270 01 1	329 76 LBL	
035 04 04	094 05 05	153 44 SUM	212 00 00	271 19 D'	330 16 A'	
036 43 RCL	095 98 ADV	154 26 26	213 29 29	272 03 3	331 85 +	
037 07 07	096 43 RCL	155 43 RCL	214 98 ADV	273 01 1	332 04 4	
038 69 DP	097 14 14	156 13 13	215 98 ADV	274 17 B'	333 04 4	
039 06 06	098 42 STD	157 44 SUM	216 52 EE	275 43 RCL	334 00 0	
040 04 4	099 01 01	158 08 08	217 23 INV	276 09 09	335 02 2	
041 04 4	100 01 1	159 97 DSZ	218 52 EE	277 75 =	336 95 =	
042 00 0	101 42 STD	160 02 02	219 31 P/S	278 43 RCL	337 76 LBL	
043 03 3	102 06 06	161 01 01	220 43 RCL	279 01 01	338 17 B'	
044 69 DP	103 04 4	162 15 15	221 26 26	280 95 =	339 18 C'	
045 04 04	104 42 STD	163 43 RCL	222 33 INV	281 10 E'	340 31 P/S	
046 43 RCL	105 27 27	164 05 05	223 39 LOG	282 97 DSZ	341 72 ST+	
047 08 08	106 25 CLR	165 84 DP+	224 65 =	283 01 01	342 06 06	
048 69 DP	107 42 STD	166 06 06	225 43 RCL	284 02 02	343 69 DP	
049 06 06	108 05 05	167 69 DP	226 00 00	285 75 75	344 06 06	
050 07 7	109 05 5	168 26 26	227 95 =	286 98 ADV	345 69 DP	
051 05 5	110 42 STD	169 97 DSZ	228 52 EE	287 01 1	346 26 26	
052 04 4	111 02 02	170 27 27	229 22 INV	288 05 5	347 32 RTN	
053 04 4	112 08 8	171 01 01	230 52 EE	289 69 DP	348 76 LBL	
054 00 0	113 42 STD	172 06 06	231 44 SUM	290 02 02	349 18 C'	
055 02 2	114 26 26	173 84 DP+	232 05 05	291 02 2	350 69 DP	
056 69 DP	115 61 GTD	174 06 06	233 61 GTD	292 01 1	351 04 04	
057 04 04	116 03 03	175 02 2	234 01 01	293 01 1	352 69 DP	
058 43 RCL	117 81 81	176 00 0	235 51 51	294 03 3	353 05 05	

PATENTS.- Patent # 4,151,596 describes the principle behind DC-59, the \$ 250.00 interface unit produced by the Science Accessories Corp. of Southport, Conn., which we mentioned in v5n6. Not much of a schematic, just block diagrams. But at least it explains a little more than what they themselves mention in their promotional literature. For this patent, write the Patent Bureau in Washington DC, as mentioned in v6n2p4.

TI-59 PRICES.- At some stores in this part of the country, the TI-59 has been offered at extremely low prices. I thought I had found an even lower price when I saw an ad from Olympic Sales, which offered the TI-59 at \$ 199.95. However, W.J. McGonigle, in Wilmington, Delaware, sent me this ad from the Philadelphia Inquirer. I couldn't believe my eyes. So I called up the firm. The ad is for real. At my question why they did offer the calculator at such a ridiculously low price, they hinted at the imminent possibility of TI common on the market with "something new." What it was exactly I could not ascertain. Everybody seems to be rather tightlipped about it.

Sunday, June 7, 1981

Philadelphia Inquirer ♦ ♦

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Software Programs for Structural Beam Design by George F. Poland

Available from: Olana Press, Box 212, 77 Ives Street, Providence, Rhode Island 02906. Price: \$29.95

This manual contains a series of 42 programs, one for each of the loading conditions shown in the American Institute of Steel Construction's Manual of Steel Construction.

Each program gives a sketch of the example showing the loading of the beam and the shear and moment diagrams. Included are the procedures one must use to operate the program. These procedures are consistently incorrect. Example: "Press E, R/S. Enter load, press A, R/S" when the program is similar to "LBL E CMS R/S LBL A STO 00 R/S ...". Both pressings of R/S will place the program in a location it is not yet intended to be at.

Many program listings contain errors -- too many open parentheses, program steps not in correct order, and wrong memory being recalled (RCL 08 instead of RCL 18). The programs that require more than 480 steps do not repartition themselves and none of the programs have any provisions for a printer. When the author was confronted with the errors, he replied that "an extremely thorough analysis of the programs" had been made by this reviewer and that the author's programming skills had improved since 1978 when these programs were written, but made no mention of correcting (or even acknowledging) the errors.

The equations and diagrams given in the AISC Manual are basic enough for anyone to write programs from. If this manual is obtained, a copy of mistakes found during this review may be obtained by sending a SASE to Frank Blachly, 5024 53rd Place, Hyattsville, Maryland 20781.

DAY OF THE WEEK.- Although the ML module has provisions for computing the day of the week, some members would like to know how they may compute it when using some other module. So I asked around and found out that a fellow named Zeller has his name attached to the algorithm, called, not surprisingly, Zeller's Congruence:

$$f = ([2.6m - 0.2] + k + D + [D/4] + [C/4] - 2C) \bmod 7$$

in which m is the month (March is 1, April is 2, etc. January and February are 11 and 12 respectively, of the previous year)

k is the day of the month

D is the year of the century

C is the century

f is a single digit, 0 for Sunday, 1 for Monday, etc.

$\bmod 7$ means "find the remainder after dividing by 7."

The square brackets $[]$ mean "greatest integer in."

For example, on what day will January 1, 1982 fall?

$m=11$, $k=1$, $C=19$, $D=81$ (remember, "previous year")

$$f = ([2.6 \times 11 - 0.2] + 1 + 81 + [81/4] + [19/4] - (2 \times 19)) \bmod 7$$

$$f = ([28.4] + 1 + 81 + [20.25] + [4.75] - (38)) \bmod 7$$

$$f = (28 + 1 + 81 + [20] + [4] - 38) \bmod 7$$

$$f = (96) \bmod 7$$

$$f = 96 / 7 = 13 \dots 5 \qquad 96 - (7 \times 13) = 5$$

$f = 5$ for Friday.

Note that ML-20 returns a "6" for the same date, meaning "Friday."

MILEAGE AND EXPENSES SYSTEM by John Worthington and Emil Regelman

John Worthington and Emil Regelman have again combined efforts in their typically masterful way to provide for our pleasure and information a complete programming system, designed to help us all save money. The system, entitled "Mileage and Expenses" consists of three different programs to store expense information in a variety of categories (such as total trip expenses, non-fuel costs, etc.), manipulate the data in several ways, and print out information in an extremely useful format. The system must be seen to be believed! As a bonus to their monumental efforts, the three programs contain a number of unique and interesting routines.

A data packing routine (program #1 - DATA ENTRY, steps 083-153) keeps track of the day, month, and amount of a purchase, # of gallons, mileage for the purchase, and whether the expense was local or on a trip. ALL OF IT IN ONE MEMORY. Here's how it works, folks !!

The information is stored as +/- M.MMMCCCCGGG DD, where...

"+" = local purchase, "-" = trip purchase, "M." = month of purchase, "MMM" = # of miles, "CCCC" = cost, "GGG" = gallons, and "DD" = day of month

The value in the memory is made negative for trip purchases.

The number of the month (through August) are stored directly as "M.". September through December are stored by adding 50 to the day of the month, then subtracting 8 from the number of the month (for example, May 17th would be stored as 5.xxxxxxxxxx 17, while September 17th would be stored as 1.xxxxxxxxxx 67).

Mileage (to the nearest 0.1) is stored directly as the next 4 digits, Costs (to the nearest cent) are stored as the next 5 digits. Gallons (to the nearest 0.1) are stored as the final 3 digits.

An interesting flag setting/testing routine was used in program #2 (steps 038-057/164-193). The flags are set in various combinations by the program to selectively determine the types of purchases to be printed or summed.

Flag 1 is set to skip the printing or summing of local fuel purchases; Flag 2 is set to skip the printing or summing of non-fuel purchases; Flag 3 is set to skip the printing or summing of trip fuel purchases;

DMS is used in an interesting way (program #1, step 126), to multiply the fractional portion of a number by 100, and store it in HIR 8.

P/R is used (program #1, step 021, and program #2, step 440) to store the contents of both the display and "t" register in HIR 7 and HIR 8 in a single step.

LBL invalidates the CLR instruction (LBL CLR, program #3, step 050) unless the CLR step is called by a direct address.

X is used (program #1, steps 175 and 180, program #2, steps 344 and 354) to compute total MPG and total cost/mile, by storing the appropriate values in R01, R03 and R04.

The Mileage and Expenses System consists of three programs, each designed to perform a different function.

Program #1 is used at the time of purchase to enter and record the data and provide some initial calculations.

Program #2 may be used to tabulate or manipulate raw purchase data.

Program #3 may be used to tabulate accumulated data.

The system will provide the following information:

- Vehicle descriptor.
- Initial and last odometer readings.
- Total number of purchases.
- Purchase #, date, miles, gallons, and cost of each purchase.
- Accumulated miles (local, trip and total).
- Accumulated gallons (local, trip and total).
- Accumulated costs (local, trip, fuel, non-fuel and total).
- Miles per gallon (local, trip and total).
- Cents per mile (local, trip, fuel, non-fuel and total).
- Summations of selected purchases.
- Listings or summations of selected purchases by type (local, trip, fuel, non-fuel and total).

Initial Operations

Initialize the system (only the 1st time used) as follows:

- 1) Read in side one of card #1
- 2) Store the initial odometer reading in memory 09
- 3) Store a descriptor in memory 00, if desired.
- 4) Press [E] and insert side 2 of card #1 to record data

Program #1 - DATA ENTRY

Program #1 will simultaneously sum entered the mileage, fuel usage, and cost data, store the raw purchase data, and calculate MPG and cents per mile.

- 1) Read in sides 1 and 2 of program card #1.

2a) For Fuel Purchases:

- i) Enter the current odometer reading...[X ≥ T]
- ii) Enter the date as MM.dd (e.g. Nov. 1 = 11.01)...[A]
- iii) Enter # of gallons (to the nearest 1/10, up to 99.9) ...[X ≥ T]
- iv) Enter the cost (up to \$999.99)...[A]. The display will show the MPG for the current purchase.

2b) For Non-fuel Purchases:

- i) Enter date as MM.dd (e.g. Nov. 1 = 11.01)...[A]
- ii) Enter the cost (up to \$999.99)...[A]. The display will show total cents per mile for all purchases.

- 3) Repeat 2a or 2b for additional purchases, as desired.
- 4) To record data, press [E] and insert side 2 of card #1. (also, see Note B for permanently preserving the data).
- 5) For error corrections see Note C.
- 6) Optional Calculations:

[C] = MPG for local fuel purchases
 [C'] = " " trip " "
 [D] = " " all " "
 [B] = cents/mile for current purchase
 [B'] = " " fuel purchases
 [D'] = " " all

As each new purchase (in excess of 20) is entered, the earliest purchase is deleted. To retain the raw data for more than 20 purchases (for subsequent listing or manipulation), record every 20 purchases on one side of a separate mag card, as they are completed (if desired). Each storage mag card can thus hold the data for up to 40 purchases.

C. Correcting data entry errors (program #1)...

Error condition	Corrective Action Required
Incorrect data entered and [A] pushed once	Press [RST] [R/S] and enter the correct data
Incorrect data entered and [A] pushed twice	Read in the data card again and enter the correct data
Incorrect data entered, [A] pushed twice, and data recorded	The correction is complex. Call John Worthington for required adjustments, at (301) 262-3851

- D. The program is designed to process data from the lowest selected purchase to the highest. If the necessary data are not currently in memory, "card" will be printed to indicate that the program is waiting for a card containing the correct data to be inserted.

- E. The system (program #2) permits the separate manipulation of the raw data and the accumulated data. When new raw data are required (see D above), the program automatically stores the accumulated data, reads the new data card, and then returns the accumulated data to their respective memories.

These operations may also be conveniently performed from the keyboard to permit the summing of non-consecutive purchases from different data cards. To store the accumulated data totals, enter 0 and press [D]. Read the appropriate data card read into the calculator and press [E]. To restore the accumulated data to their respective memories, enter 50 and press [D] again.

Data manipulated by program #2 may be used by programs #2 and #3 (and recorded on data storage cards), but will not be operated on by program #1.

- F. Program #1 may be used to provide the "optional calculations" on data accumulated by program #2 (see 5 of program #1), if no printer is available,

- G. Program #2 will operate with the M/U library. Change step 218 from "12" to "04."

- H. The values listed for Initial and Last purchases are the corresponding odometer readings. These two listings are automatically deleted if the data is assembled by Program #2. The number of purchases value is the number of purchases summed to result in the tabulated values.

Program #2 - DATA MANIPULATION

Program #2 will either list or accumulate the raw data which has previously been stored by Program #1 (either in memories or on magnetic cards).

- 1) Read in the raw data stored on side 2 of program card #1 or from the appropriate data storage card (if the appropriate raw data are not currently in the calculator).
- 2) Enter the number of the first purchase to be listed or summed and press [X>T].
- 3) Enter the number of the last purchase to be listed or summed. (If no value is entered into the t register, only the displayed purchase will be designated.)
- 4) [A] will list the designated purchases. (see Note D)
 [B] will clear the accumulating memories and sum the designated purchases. (see Note D)
 [C] will sum the designated purchases to previously accumulated data. (see Note D and E)
- 5) The program may also be used to list or accumulate specific types of purchases, by pressing [A'] - [D'] before [A], [B] or [C].
 [A'] = fuel purchases only
 [B'] = non-fuel purchases only
 [C'] = local fuel purchases only
 [D'] = trip fuel purchases only
 After pressing [A], [B] or [C] the types of purchases must be designated again for a subsequent operation.
- 6) If an error is made in pressing [A'] through [D'], press [RST].

Program #3 - PRINT ROUTINE

Program #3 will provide a complete tabulation of the accumulated data whether accumulated by the Data Entry program or the Data Manipulation program.

- 1) Read in the data from side 2 of card #1, if the data are not currently in the calculator from either Program #1 or Program #2 operations.
- 2) [A] prints...
 - Purchases (Initial, Last and Number) See Note C.
 - Miles (total, local and trip)
 - Gallons (total, local and trip)
 - Costs (total, fuel, non-fuel, local fuel, and trip fuel)
 - Miles per Gallon (total, local and trip)
 - Cents/Mile (total, fuel, non-fuel, local fuel and trip)
- 3) [A'] prints only the tabulated miles
 [B'] " " " " gallons
 [C'] " " " " costs
 [D'] " " " " MPG
 [E'] " " " " cents/mi.

NOTES

- A. MPG data are always displayed in FIX 1 mode, and cost data are always displayed in FIX 2 mode.
- B. The vehicle descriptor (R00), accumulated data (R01-08), odometer reading (R09), and the raw data (R10-29) may be recorded by pressing [E] in program #1. R10-29 contain the raw data for the most recent 20 purchases.

To designate a purchase as a trip purchase:
 Enter the date as a negative number and
 press A. This is relevant to program #1.

PROGRAM 1										PROGRAM 2														
000	CP	060	30	30	120	94	+/	180	79	000	92	RTH	060	35	35	120	28	LDB	180	01	01	300	43	RCL
001	RTN	061	00	00	121	44	SUM	181	32	001	76	LBL	061	32	XIT	121	22	INV	181	87	87	301	01	01
002	76	062	55	55	122	10	10	182	76	002	10	E	062	43	RCL	122	77	GE	182	87	IFF	302	67	E0
003	10	063	25	CLR	123	82	HIR	183	15	003	22	INV	063	09	09	123	01	01	183	40	IND	303	03	03
004	65	064	67	E0	124	17	17	184	58	004	52	EE	064	50	1X1	124	29	29	184	49	49	304	13	13
005	01	065	00	00	125	50	00	185	22	005	85	EE	065	22	INV	125	85	+	185	03	03	305	32	XIT
006	00	066	74	74	126	88	DNS	186	04	006	01	1	066	77	GE	126	07	7	186	71	71	306	02	02
007	00	067	43	RCL	127	58	INT	187	04	007	02	2	067	03	03	127	05	5	187	85	+	307	02	02
008	95	068	31	31	128	22	INT	188	96	008	22	INV	068	73	73	128	00	0	188	01	1	308	01	1
009	58	069	74	SM*	129	77	GE	189	08	009	28	LDB	069	85	+	129	54	0	189	95	=	309	03	03
010	02	070	37	37	130	01	01	190	08	010	54	0	070	01	1	130	55	+	190	97	DS2	310	03	03
011	81	071	82	HIR	131	39	39	191	81	011	82	HIR	071	00	0	131	93	0	191	49	49	311	06	6
012	76	072	18	18	132	75	-	192	76	012	08	08	072	75	-	132	01	1	192	01	01	312	10	E
013	11	073	85	+	133	05	5	193	17	013	00	0	073	03	3	133	42	STO	193	78	RCL	313	44	44
014	87	074	42	STO	134	00	0	194	43	014	32	XIT	074	00	0	134	43	43	194	48	08	314	44	44
015	01	075	32	32	135	82	HIR	195	02	015	69	DP	075	00	0	135	33	X2	195	03	RCL	315	58	FIX
016	00	076	48	EXC	136	38	38	196	85	016	06	06	076	95	=	136	42	STO	196	29	CP	316	02	02
017	38	077	10	10	137	08	8	197	07	017	69	DP	077	77	GE	137	44	44	197	67	E0	317	44	SUM
018	86	078	95	=	138	95	=	198	07	018	00	00	078	03	03	138	35	1X	198	02	02	318	04	04
019	01	079	42	STO	139	44	SUM	199	95	019	92	RTH	079	73	73	139	42	STO	199	13	13	319	65	5
020	32	080	09	09	140	10	10	200	55	020	76	LBL	080	42	STO	140	45	45	200	87	IFF	320	43	RCL
021	37	081	43	RCL	141	82	HIR	201	43	021	15	E	081	30	30	141	95	=	201	05	05	321	43	43
022	02	082	32	32	142	18	18	202	03	022	43	RCL	082	02	2	142	48	EXC	202	02	02	322	69	DP
023	42	083	52	EE	143	28	INV	203	10	023	09	09	083	42	STO	143	42	42	203	13	13	323	10	10
024	37	084	03	3	144	28	LDB	204	76	024	29	CP	084	32	32	144	65	X	204	04	+	324	50	50
025	39	085	94	+	145	52	EE	205	12	025	22	INV	085	52	EE	145	52	EE	205	07	7	325	74	SM*
026	82	086	48	EXC	146	65	X	206	43	026	77	GE	086	29	CP	146	52	EE	206	69	DP	326	32	32
027	17	087	10	10	147	87	HIR	207	32	027	00	00	087	73	RC*	147	04	4	207	02	02	327	43	RCL
028	77	088	44	SUM	148	17	17	208	29	028	32	32	088	30	30	148	75	INT	208	05	05	328	04	04
029	00	089	03	03	149	69	DP	209	67	029	43	RCL	089	77	GE	149	59	INT	209	05	05	329	04	04
030	36	090	87	IFF	150	10	10	210	11	030	08	08	090	00	00	150	49	PRD	210	61	61	330	01	1
031	05	5	91	02	151	95	=	211	35	031	94	+	091	93	93	151	43	43	211	02	02	331	05	5
032	44	SUM	96	96	152	49	PRD	212	65	032	42	STO	092	22	INV	152	95	=	212	20	20	332	03	03
033	37	93	00	00	153	10	10	213	43	033	09	09	093	22	INV	153	65	X	213	08	8	333	02	02
034	86	94	44	SUM	154	58	FIX	214	31	034	25	CLR	094	86	STF	154	01	1	214	36	PGM	334	06	6
035	02	95	05	05	155	02	02	215	10	035	22	INV	095	07	07	155	52	EE	215	01	01	335	06	6
036	25	96	25	CLR	156	25	CLR	216	76	036	58	FIX	096	50	1X1	156	05	5	216	11	58R	336	04	4
037	91	97	09	9	157	29	CP	217	13	037	92	RTH	097	55	+	157	75	-	217	12	12	337	06	6
038	22	98	32	XIT	158	43	RCL	218	43	038	76	LBL	098	53	+	158	59	INT	218	12	12	338	10	10
039	58	99	42	STO	159	33	33	219	05	039	17	B	099	52	EE	159	49	PRD	219	38	HDV	339	03	03
040	69	100	33	33	160	67	E0	220	55	040	86	STF	100	55	+	160	44	44	220	69	DP	340	04	04
041	28	28	101	44	161	19	19	221	06	041	01	01	101	52	EE	161	95	=	221	38	RCL	341	03	03
042	04	04	102	01	162	43	RCL	222	16	042	86	STF	102	00	0	162	45	45	222	43	RCL	342	03	03
043	04	103	87	IFF	163	32	32	223	76	043	03	03	103	00	0	163	45	45	223	35	35	343	03	03
044	42	104	02	02	164	55	+	224	18	044	92	RTH	104	54	+	164	43	RCL	224	35	35	344	71	71
045	31	105	01	01	165	43	RCL	225	43	045	76	LBL	105	42	STO	165	43	43	225	35	35	345	71	71
046	02	106	09	09	166	33	33	226	03	046	19	D	106	40	40	166	65	X	226	35	35	346	03	03
047	00	107	04	SUM	167	76	LBL	227	75	047	17	B	107	95	=	167	73	RC*	227	35	35	347	03	03
048	42	108	06	06	168	16	A	228	43	048	22	INV	108	75	-	168	90	30	228	07	07	348	00	0
049	30	109	52	EE	169	58	FIX	229	43	049	76	LBL	109	22	INV	169	95	=	229	35	35	349	03	03
050	09	110	01	1	170	01	01	230	05	050	18	0	110	59	INT	170	69	DP	230	05	5	350	03	03
051	48	111	01	1	171	95	=	231	95	051	86	STF	111	42	STO	171	10	10	231	32	32	351	01	1
052	09	112	94	+	172	81	RST	232	55	052	03	03	112	42	STO	172	32	XIT	232	32	32	352	10	E
053	82	113	44	SUM	173	6	6	233	53	053	76	LBL	113	85	+	173	03	3	233	05	5	353	10	E
054	58	114	10	10	174	14	D	234	43	054	16	A	114	53	+	174	43	STO	234	04	4	354	07	07
055	69	115	25	CLR	175	35	1X	235	75	055	86	STF	115	05	5	175	49	49	235	04	4	355	03	03
056	69	116	43	RCL	176	16	A	236	61	056	02	02	116	00	0	176	01	1	236	10	E	356	03	03
057	69	117	31	31	177	16	A	237	02	057	82	RTH	117	32	XIT	177	94	+	237	10	E	357	01	1
058	09	118	52	EE	178	16	16	238	02	058	15	E	118	43	RCL	178	2							

PROGRAM 2 CONTINUED										PROGRAM 3														
360	95 =	000	76 LBL	060	06	6	120	06	6	180	46	46	240	00	0	300	07	7	360	43	43	420	14	D
361	32 XIT	001	15 E	061	03	3	121	29 CP	6	181	13 C	46	241	00	0	301	03	3	361	22 INV	43	421	32	INV
362	01 1	002	85 +	062	07	7	122	14 D	14	182	44 SUM	46	242	49 PRD	45	302	06	6	362	44 SUM	43	422	58	FIX
363	05 5	003	24 CE	063	03	3	123	58 FIX	46	183	46 46	46	243	45 45	45	303	15 E	5	363	44 44	43	423	04	4
364	06 6	004	01 1	064	06	6	124	01 01	01	184	43 RCL	06	244	49 PRD	49	304	03	3	364	43 RCL	43	424	01	1
365	03 3	005	02 2	065	29 CP	29	125	71 SBR	06	185	06 06	06	245	46 46	46	305	01	1	365	07 07	43	425	42	STD
366	03 3	006	28 INV	066	14 D	D	126	03 03	03	186	13 C	13 C	246	95 =	=	306	02	2	366	42 STD	42	426	41	41
367	00 0	007	28 LDG	067	71 SBR	71 SBR	127	35 35	35	187	44 SUM	44 SUM	247	35 1/X	1/X	307	01	1	367	46 46	46	427	43	RCL
368	03 3	008	95 =	068	03 03	03	128	61 GTD	45	188	45 45	45	248	49 PRD	49	308	04	4	368	44 SUM	44	428	09	09
369	03 3	009	82 HIR	069	49 49	49	129	02 02	02	189	43 RCL	43 RCL	249	42 42	42	309	01	1	369	43 43	43	429	42	STD
370	10 E	010	08 08	070	61 GTD	61 GTD	130	76 76	76	190	01 01	01	250	49 PRD	49	310	03	3	370	22 INV	22	430	43	43
371	15 E	011	29 CP	071	02 02	02	131	76 LBL	76	191	13 C	13 C	251	43 43	43	311	06	6	371	44 SUM	44	431	75	-
372	92 RTH	012	01 1	072	82 82	82	132	19 D	19 D	192	44 SUM	44 SUM	252	49 PRD	49	312	15 E	5	372	44 44	44	432	43	RCL
373	15 E	013	41 SUM	073	76 LBL	76 LBL	133	03 3	3	193	42 42	42	253	44 44	44	313	02	2	373	92 RTH	92	433	03	03
374	69 DP	014	41 41	074	17 B	17 B	134	02 2	2	194	61 GTD	61 GTD	254	43 RCL	43 RCL	314	07	7	374	76 LBL	76	434	95	=
375	05 05	015	73 RC*	075	03 3	3	135	03 3	3	195	02 02	02	255	04 04	04	315	03	3	375	11 H	11 H	435	42	42
376	01 1	016	41 41	076	01 1	1	136	01 1	1	196	76 76	76	256	13 C	C	316	02	2	376	98 ADV	98	436	42	42
377	05 5	017	22 INV	077	03 3	3	137	58 FIX	58 FIX	197	76 LBL	76 LBL	257	44 SUM	44 SUM	317	01	1	377	02 2	2	437	02	2
378	01 1	018	76 LBL	078	06 6	6	138	08 08	08	198	10 E	10 E	258	45 45	45	318	05	5	378	07 7	7	438	04	4
379	03 3	019	00 00	079	32 XIT	XIT	139	69 DP	69 DP	199	06 6	6	259	43 RCL	43 RCL	319	03	3	379	03 3	3	439	03	3
380	03 3	020	69 DP	080	02 2	2	140	04 04	04	200	03 3	3	260	07 07	07	320	06	6	380	06 6	6	440	01	1
381	05 5	021	23 23	081	02 2	2	141	06 6	6	201	03 3	3	261	13 C	C	321	15 E	5	381	58 FIX	58	441	02	2
382	01 1	022	06 06	082	01 1	1	142	03 3	3	202	00 0	0	262	44 SUM	44 SUM	322	03	3	382	06 06	06	442	04	4
383	06 6	023	69 DP	083	03 3	3	143	02 2	2	203	02 4	4	263	46 46	46	323	07	7	383	69 DP	69	443	04	4
384	69 DP	024	00 00	084	02 2	2	144	02 2	2	204	04 4	4	264	43 RCL	43 RCL	324	03	3	384	04 04	04	444	06	6
385	04 04	025	92 RTH	085	07 7	7	145	01 1	1	205	02 2	2	265	03 03	03	325	05	5	385	08 8	8	445	15	15
386	69 DP	026	76 LBL	086	02 2	2	146	03 3	3	206	07 7	7	266	13 C	C	326	02	2	386	00 0	0	446	02	2
387	05 05	027	14 D	087	02 2	2	147	02 2	2	207	01 1	1	267	44 SUM	44 SUM	327	04	4	387	03 3	3	447	07	7
388	69 DP	028	58 FIX	088	03 3	3	148	07 7	7	208	07 7	7	268	42 42	42	328	04	4	388	07 7	7	448	01	1
389	00 00	029	08 08	089	02 2	2	149	02 2	2	209	32 XIT	XIT	269	44 SUM	44 SUM	329	02	2	389	03 3	3	449	03	3
390	00 0	030	69 DP	090	14 D	D	150	07 7	7	210	01 1	1	270	43 43	43	330	15 E	5	390	02 2	2	450	03	3
391	14 D	031	02 02	091	58 FIX	58 FIX	151	32 XIT	XIT	211	05 5	5	271	44 SUM	44 SUM	331	69 DP	69 DP	391	03 3	3	451	06	6
392	04 4	032	32 XIT	092	01 01	01	152	03 3	3	212	01 1	1	272	44 44	44	332	05 05	5	392	07 7	7	452	04	4
393	22 INV	033	69 DP	093	43 RCL	43 RCL	153	00 0	0	213	07 7	7	273	61 GTD	61 GTD	333	25 CLR	25 CLR	393	01 1	1	453	06	6
394	96 WRT	034	03 03	094	01 01	01	154	02 4	4	214	03 3	3	274	02 02	02	334	92 RCL	92 RCL	394	03 3	3	454	15	15
395	15 E	035	69 DP	095	42 STD	42 STD	155	04 4	4	215	01 1	1	275	82 82	82	335	43 RCL	43 RCL	395	32 XIT	32	455	43	RCL
396	87 IFF	036	05 05	096	42 42	42	156	02 2	2	216	03 3	3	276	01 1	1	336	03 03	03	396	43 RCL	43	456	08	08
397	05 05	037	69 DP	097	42 STD	42 STD	157	07 7	7	217	07 7	7	277	94 +/-	+/-	337	42 STD	42 STD	397	00 00	00	457	42	STD
398	00 00	038	00 00	098	46 46	46	158	01 1	1	218	03 3	3	278	42 STD	42 STD	338	42 STD	42 STD	398	14 D	D	458	44	44
399	58 58	039	58 FIX	099	43 RCL	43 RCL	159	07 7	7	219	06 6	6	279	44 44	44	339	42 STD	42 STD	399	69 DP	69	459	03	3
400	05 5	040	02 02	100	06 06	06	160	03 3	3	220	14 D	D	280	42 STD	42 STD	340	46 46	46	400	05 05	05	460	01	1
401	00 0	041	92 RTH	101	42 STD	42 STD	161	04 4	4	221	71 SBR	71 SBR	281	43 43	43	341	43 RCL	43 RCL	401	01 1	1	461	03	3
402	14 D	042	76 LBL	102	45 45	45	162	06 6	6	222	03 03	03	282	04 4	4	342	05 05	5	402	03 3	3	462	02	2
403	61 GTD	043	13 C	103	22 INV	22 INV	163	16 16	16	223	49 49	49	283	01 1	1	343	42 STD	42 STD	403	03 3	3	463	04	4
404	00 00	044	99 CP	104	46 46	46	164	03 03	03	224	43 RCL	43 RCL	284	42 STD	42 STD	344	45 45	45	404	06 6	6	464	09	09
405	58 58	045	22 INV	105	46 46	46	165	35 35	35	225	03 03	03	285	41 41	41	345	22 INV	22 INV	405	01 1	1	465	15	15
406	76 LBL	046	67 EO	106	61 GTD	61 GTD	166	43 RCL	43 RCL	226	55 +	+	286	03 3	3	346	44 SUM	44 SUM	406	07 7	7	466	69	DP
407	14 D	047	00 00	107	02 02	02	167	01 01	01	227	53 +	+	287	07 07	07	347	46 46	46	407	03 3	3	467	05	05
408	00 00	048	58 58	108	76 LBL	76 LBL	168	22 INV	22 INV	228	CE	CE	288	03 3	3	348	92 RTH	92 RTH	408	06 6	6	468	71	SBR
409	40 40	049	28 LDG	109	76 LBL	76 LBL	169	49 PRD	49 PRD	229	75	75	289	02 2	2	349	43 RCL	43 RCL	409	32 XIT	32	469	01	01
410	75 -	050	76 LBL	110	16 H	16 H	170	42 42	42	230	43 RCL	43 RCL	290	03 3	3	350	04 04	04	410	03 3	3	470	11	11
411	05 5	051	95 CLR	111	00 0	0	171	43 RCL	43 RCL	231	05 05	05	291	07 07	07	351	42 STD	42 STD	411	03 3	3	471	18	18
412	00 0	052	92 RTH	112	00 0	0	172	43 RCL	43 RCL	232	22 INV	22 INV	292	03 3	3	352	42 STD	42 STD	412	04 4	4	472	18	18
413	95 =	053	76 LBL	113	02 2	2	173	06 06	06	233	49 PRD	49	293	06 6	6	353	43 RCL	43 RCL	413	01 1	1	473	19	19
414	50 1	054	18 C	114	04 4	4	174	22 INV	22 INV	234	45 45	45	294	15 E	E	354	44 SUM	44 SUM	414	03 3	3	474	10	10
415	42 STD	055	01 1	115	02 2	2	175	45 45	45	235	54 +	+	295	02 2	2	355	43 RCL	43 RCL	415	05 5	5	475	98	ADV
416	39 39	056	05 05	116	07 7	7	176	45 45	45	236	22 INV	22 INV	296	01 1	1	356	44 SUM	44 SUM	416	06 6	6	476	98	ADV
417	08 8	057	43 RCL	117	01 1	1	177	95 =	=	237	49 PRD	49	297	04 4	4	357	42 STD	42 STD	417	05 05	05	477	98	ADV
418	42 STD	058	02 02	118	07 7	7	178	22 INV	22 INV	238	46 46	46	298	01 1	1	358	45 45	45	418	02 02	02	478	25	CLR
419	38 38	059	03 03	119	03 3	3	179	49 PRD	49 PRD	239	01 1	1	299	01 1	1	359	42 STD	42 STD	419	03 03	03	479	92	RTH

KEYED LABEL PRINTER.- Don Lambert, of Lambert Programming Service, Los Angeles, CA, wrote this version. It is shorter and easier to use than the one published in v6n3p8.

To use it, press RST R/S. When the display shows a flashing zero, the program is ready. Press any key and in a few seconds you will see

478 CC LLL in which CC is the code corresponding to the key you pressed and in which LLL is the mnemonic of the key you pressed.

You cannot use the keys LRN, SST, BST, DEL, INS, the 2nd key all by itself. But you can use the 2nd key in combination with all the other keys, to obtain the second function of each key. For example, you can even press 2nd CP and your program will NOT be wiped out.

478 12 B	000 25 CLR	048 91 R/S	096 76 LBL	144 76 LBL	192 76 LBL	240 76 LBL
	001 61 GTO	049 09 9	097 80 GRD	145 36 PGM	193 34 FX	241 10 E'
478 42 STD	002 02 02	050 76 LBL	098 08 8	146 03 3	194 03 3	242 01 1
	003 74 74	051 19 D'	099 00 0	147 76 LBL	195 76 LBL	243 52 EE
478 43 RCL	004 76 LBL	052 01 1	100 76 LBL	148 61 GTO	196 42 STD	244 95 =
	005 99 PRT	053 76 LBL	101 77 GE	149 06 6	197 04 4	245 52 EE
478 32 X:T	006 09 9	054 90 LST	102 07 7	150 76 LBL	198 76 LBL	246 00 0
	007 76 LBL	055 09 9	103 76 LBL	151 16 A'	199 24 CE	247 01 1
478 34 FX	008 98 ADV	056 00 0	104 76 LBL	152 01 1	200 02 2	248 59 INT
	009 09 9	057 76 LBL	105 07 7	153 76 LBL	201 04 4	249 35 1
478 24 CE	010 76 LBL	058 88 DMS	106 76 LBL	154 60 DEG	202 76 LBL	250 07 7
	011 89 1	059 08 8	107 67 EQ	155 06 6	203 14 D	251 69 DP
478 25 CLR	012 08 8	060 76 LBL	108 06 6	156 00 0	204 01 1	252 17 17
	013 76 LBL	061 87 IFF	109 76 LBL	157 76 LBL	205 76 LBL	253 09 9
478 13 C	014 97 DSZ	062 08 8	110 75 -	158 55 -	206 40 IND	254 02 2
	015 09 9	063 76 LBL	111 07 7	159 05 5	207 04 4	255 00 0
478 65 X	016 76 LBL	064 78 Z+	112 76 LBL	160 76 LBL	208 00 0	256 00 0
	017 79 Z	065 07 7	113 57 ENG	161 54 5	209 76 LBL	257 93 .
478 43 RCL	018 07 7	066 76 LBL	114 05 5	162 05 5	210 33 X2	258 07 7
	019 76 LBL	067 86 STF	115 07 7	163 76 LBL	211 03 3	259 06 6
478 55 +	020 96 WRT	068 08 8	116 76 LBL	164 45 YX	212 76 LBL	260 00 0
	021 09 9	069 76 LBL	117 47 CMS	165 04 4	213 32 X:T	261 08 8
478 91 RST	022 76 LBL	070 68 NOP	118 04 4	166 76 LBL	214 03 3	262 06 6
	023 69 DP	071 06 6	119 07 7	167 53 C	215 76 LBL	263 09 9
478 31 R/S	024 06 6	072 76 LBL	120 76 LBL	168 05 5	216 23 LNX	264 95 =
	025 76 LBL	073 85 +	121 37 P/R	169 76 LBL	217 02 2	265 42 STD
478 47 CMS	026 95 =	074 08 8	122 03 3	170 35 L/X	218 03 3	266 60 60
	027 09 9	075 76 LBL	123 07 7	171 03 3	219 76 LBL	267 06 6
478 50 INI	028 76 LBL	076 58 FIX	124 76 LBL	172 76 LBL	220 13 C	268 69 DP
	029 59 INT	077 05 5	125 37 INV	173 52 EE	221 01 1	269 17 17
478 39 COS	030 05 5	078 09 8	126 02 2	174 05 5	222 76 LBL	270 71 SBR
	031 76 LBL	079 76 LBL	127 76 LBL	175 76 LBL	223 30 TAN	271 04 04
478 29 CP	032 94 +/-	080 48 EMO	128 71 SBR	176 25 CLR	224 03 3	272 75 75
	033 09 9	081 04 4	129 07 7	177 02 2	225 00 0	273 98 ADV
478 63 NOP	034 76 LBL	082 08 8	130 76 LBL	178 05 5	226 76 LBL	274 07 7
	035 49 PPD	083 76 LBL	131 17 B'	179 76 LBL	227 23 INV	275 69 DP
478 89 1	036 04 4	084 38 SIN	132 01 1	180 15 E	228 02 2	276 17 17
	037 76 LBL	085 03 3	133 76 LBL	181 01 1	229 02 2	277 07 7
478 25 CLR	038 93 .	086 08 8	134 70 RAD	182 76 LBL	230 76 LBL	278 01 1
	039 09 9	087 76 LBL	135 07 7	183 50 INI	231 12 B	279 42 STD
	040 76 LBL	088 28 LOG	136 00 0	184 05 5	232 01 1	280 60 60
	041 39 COS	089 02 2	137 76 LBL	185 00 0	233 76 LBL	281 06 6
	042 03 3	090 76 LBL	138 66 FNU	186 76 LBL	234 20 CLR	282 69 DP
	043 09 9	091 81 PST	139 06 6	187 44 SUN	235 02 2	283 17 17
	044 76 LBL	092 08 8	140 76 LBL	188 04 4	236 00 0	284 25 CLR
	045 29 CP	093 76 LBL	141 65 X	189 76 LBL	237 76 LBL	285 61 GTO
	046 02 2	094 18 C'	142 06 6	190 43 RCL	238 11 A	286 04 04
	047 76 LBL	095 01 1	143 05 5	191 04 4	239 01 1	287 79 79

PROGRAMS TO COME.- In spite of summer and "everybody being on vacation", the reviewers have been busy. They have returned to me with recommendations to publish a lot of good programs. Those will appear in future issues, space permitting:

TRUTH IN LENDING, by Glenn Ellis, a well documented financial program.

KENDALL'S COEFFICIENT OF CONCORDANCE, by Glenn Ellis. A fine statistics program, with all the bells and whistles, for the TI-59.

XOR, a Logic game program, by Dejan Ristanović.

REGISTER OPERATIONS, by Philip Brassine.

13-DIGIT LIST, by Lem Matteson. The ultimate 13-digit lister. This one is superb, though. Does everything by brush your shoes.

COMPLEX KEYBOARD, by Bill Beebe, Jr. Converts your calculator into a complex one. It even sports an RPN-type single-level push stack.

ANNUITIES II, by Bill Beebe, Jr. Similar to ML-19, with a new twist.

PRINTED WIRING BOARD, by Wally Agy. It isn't a Computervision Cadds IV CAD-CAM yet, but we are getting closer.

SHOPPING LIST, by Jules Bell. This is THE program that will put you in good stead with the sweetheart in your life.

HANDBOOK OF OCEANIC PIPELINE COMPUTATIONS by A. Marks

Publishers: PennWell Books, P.O. Box 1260, Tulsa, Oklahoma, 74101. Price: \$50.00

This book is one of the first books published specifically for oceanic pipeline computations. The book covers the technical and economical feasibility, design and construction of oceanic pipelines. The author divides the handbook into three principal sections; 1) Preliminary Pipeline Sizing, 2) Preliminary Corridor Selection, and 3) Final Design. Each section is well written with numerous technical references and programmable calculator programs. The author states in his forward that the programs have been included for convenience and portability. The programs were written for the HP-67.

For each program the author includes the theoretical formulae and its source, the required input and what is being computed, the user instructions, an example problem and the program listing. The write-up for the programs are clear, concise and easy to follow. Even though the programs are in RPN, the write-up provides all the necessary information to translate the program into AOS or even BASIC if one so desires.

The general asset of this handbook is the accumulation of a wide variety of technical and economical data on oceanic pipeline design. The calculator programs assist in the technical and economical feasibility studies by freeing the design engineer from time consuming and error-prone computations. Overall the handbook is an invaluable aid to those who are involved in oceanic pipeline computations.

Review by Barry Franz.

GRAPHICS MODE.- Dave Leising has found that besides at step 024 it is also possible to insert the 1F hexadecimal code into steps 008 and 016. The basic procedure to put hexadecimal codes into TI-59 user RAM is as follows:

1. Insert code MN in user RAM at the first step in an octet. Leave RAM program counter positioned at this step.
2. Get machine into the "Display Firmware" mode.
3. Position the firmware program counter at the same step number as RAM counter, displaying code PQ.
4. Execute : 2nd INS.
5. Exit "Display Firmware" mode, reset fix and partitioning as required.
6. The result of the hexadecimal subtraction MN-PQ will be found in place of the original MN code in RAM.

EXAMPLE: From turn-on: GTO 016 LRN) BST LRN 9 OP 17 PGM 12 SBR 444
 R/S F/R LRN INS LRN RST INV ENG 6 OP 17 CLR
 Go into TRACE mode, GTO 016 LRN LRN LRN

Step 016 in RAM is FF and displays as 016 05 or 017 05 and trace-prints as 169 5.
 This is the result of the hexadecimal subtraction of 55 from 54.

GRAPHICS MODE.- The results of the discovery of the Graphics Mode are coming in. Dave ----- Leising, who has an emulator at his disposition (lucky stiff) has discovered that it is possible to put the "magic hex code" that produces Graphics Mode at several other program locations: 008, 016 and 184. Several other members, including Dave, discovered also that the number of NOPs in front of the location where you place the hex code will determine how many dots of the original character you are going to print. I will publish a summary in next issue I hope.

Here are a few selected samples of new programs in Graphics Mode. Some of them are, admittedly, rather silly, but serve only as demonstrators.

The first one is by Dave Leising and he calls it "Mosaic." The finished product looks like hieroglyphics or inscriptions found on the tikis of Easter Island. The instructions are deliberately omitted, as a challenge to you to come up with the correct ones.

The next one, also by Dave Leising, is a modification of Richard Snow's Print Code Table of v6n4/5p4. It is self-contained and also prints reference code lines above the partial lines. Because Dave put the hex code at 008, the partial lines consists of only two elements (dots) printed each time.

To use this program:

1. Load card side 1.
2. From the keyboard : GTO 008 9 OP 17 PGM 12 SBR 444 R/S P/R LRN INS LRN
RST GTO 009 LRN INV SBR LRN A
3. After printout is completed, just press R/S or A for another copy.

The last one is by Frédéric De Mees. He took up my "Mickey Mouse" challenge and did the little critter in Graphics Mode.

To key in the program: Key in the commands, steps 000 through 147 and registers 90 through 99 in 10 OP 17 partition. Then go to 6 OP 17 partitioning and record bank 1 on side 1 of a mag card.

Next key in the print code in registers 00 through 89. Use, of course, 10 OP 17 partitioning. Record banks 2, 3 and 4 respectively on sides 2, 3 and 4 of mag cards, still in 10 OP 17 partitioning.

And lastly, key in new print code data in registers 30 through 59 and record bank 3 on one side of the third mag card. Mark it as "side 5." Still in 10 OP 17.

You now should have three mag cards: sides 1 and 2 on the first one, sides 3 and 4 on the second one and side 5 on the third one.

As you will undoubtedly have noticed, most of the registers have been listed by means of a "13-digit list" program. And you might have noticed also that most of the registers contain a 12-digit number. Just to remind you how it is done:

Take, for example, register 30, side 5:

Enter 83 19 82 70 37 STO 30 100 PROD 30 19 SUM 30

To use the program: Press CLR and load in side 1. Then initialize the Graphics Mode by : E CLR PGM 19 GTO 024 SBR 045 P/R LRN INS LRN RST A

At this point the paper will advance. You now read, in any order, sides 2, 3 and 4. DO NOT PRESS CLR OR ANY OTHER KEY. Just slide in the mag cards, one after another. The program contains automatic read instructions.

Be patient and watch the print out. It will take about a quarter of an hour. When everything is silent for a while, slide in side 5, after which some more printing will be produced. Take a clean towel from the linen closet, put all the printing in it and throw it in the garbage. Sorry, take scissors and a bottle of your best paste or glue and from this unsightly mess try to compose a nice drawing representing Mickey himself. That's all !

Dave Leising says, and several other members have echoed this sentiment in one way or another, "I strongly feel that time will show that this discovery may be the most significant yet made on the TI-59. There are 156 two-digit hex codes to be investigated as initial operators, modifiers, indirect modifiers, addresses, etc.etc. Who knows what wonderful new capabilities will be discovered over the next year or so."

Somewhere else in this issue you will find Dave's recipe for emplacing hexadecimal code into user RAM. It is a sound basis to investigate all possible hex codes and their possible effects. The only thing you need is time, which sometimes translates into patience, perseverance and dilligence.

on the next page you will find the program listings for the three programs described above.

MOSAIC- Dave Leising

000 92 RTN	012 12 12	023 71 SBR	034 24 CE
001 76 LBL	013 71 SBR	024 00 00	035 65 X
002 11 R	014 00 00	025 06 06	036 05 5
003 61 GTD	015 29 29	026 61 GTD	037 22 INV
004 00 00	016 84 DP*	027 00 00	038 28 LOG
005 10 10	017 12 12	028 10 10	039 95 *
006 69 DP	018 97 D62	029 36 PGM	040 65 X
007 05 05	019 12 12	030 15 15	041 05 5
008 00 00	020 00 00	031 71 SBR	042 22 INV
009 92 RTN	021 13 13	032 88 DMS	043 28 LOG
010 04 4	022 25 CLR	033 85 +	044 95 *
011 42 STD			045 92 RTN

PRINT CODE TABLE- Dave Leising

0 1 2 3 4 5 6 7	010 00 0	040 00 0	070 00 0	100 25 CLR	130 55 +
0 0 1 2 3 4 5 6	011 00 0	041 00 0	071 02 2	101 71 SBR	131 01 1
1 7 8 9 A B C D E	012 00 0	042 06 6	072 00 0	102 00 00	132 00 0
2 - F G H I J K L	013 00 0	043 69 DP	073 00 0	103 06 06	133 00 0
3 M N O P Q R S T	014 00 0	044 03 03	074 69 DP	104 98 ADV	134 85 +
4 . U V W X Y Z +	015 00 0	045 07 7	075 02 02	105 01 1	135 01 1
5 X * F * () ,	016 98 ADV	046 00 0	076 03 3	106 85 +	136 95 *
6 ↑ ↓ : ; = ' X R	017 22 INV	047 00 0	077 00 0	107 09 9	137 82 HIR
7 * ? + - ! ~	018 58 FIX	048 00 0	078 00 0	108 09 9	138 36 36
	019 25 CLR	049 08 8	079 00 0	109 09 9	139 82 HIR
	020 22 INV	050 00 0	080 04 4	110 09 9	140 38 38
	021 57 ENG	051 00 0	081 00 0	111 09 9	141 69 DP
	022 01 1	052 69 DP	082 00 0	112 00 0	142 05 05
	023 69 DP	053 04 04	083 00 0	113 35 1/X	143 25 CLR
	024 01 01	054 69 DP	084 05 5	114 95 *	144 71 SBR
	025 02 2	055 05 05	085 69 DP	115 82 HIR	145 00 00
	026 00 0	056 69 DP	086 03 03	116 35 35	146 06 06
	027 00 0	057 00 00	087 06 6	117 01 1	147 98 ADV
	028 00 0	058 69 DP	088 00 0	118 85 +	148 82 HIR
	029 03 3	059 05 05	089 00 0	119 09 9	149 18 18
	030 00 0	060 01 1	090 00 0	120 09 9	150 59 INT
	031 00 0	061 52 EE	091 07 7	121 09 9	151 22 INV
	032 69 DP	062 06 6	092 00 0	122 93 *	152 77 GE
	033 02 02	063 22 INV	093 00 0	123 09 9	153 01 01
	034 04 4	064 52 EE	094 69 DP	124 35 1/X	154 06 06
	035 00 0	065 69 DP	095 04 04	125 95 *	155 25 CLR
	036 00 0	066 01 01	096 07 7	126 82 HIR	156 92 RTN
	037 00 0	067 01 1	097 32 X:T	127 37 37	157 61 GTD
	038 05 5	068 00 0	098 69 DP	128 22 INV	158 11 R
	039 00 0	069 00 0	099 05 05	129 59 INT	

There is not enough space to fit the MICKEY MOUSE program here. See next page.

PATENTS.- In our ongoing, and never satisfied, quest for knowledge (translate this one ----- as "we are nosey") we have discovered a few more relevant patents:

Patent # 3,934,233. READ-ONLY MEMORY FOR PROGRAMMABLE CALCULATORS. Jan.20, 1976. Roger J. Fisher and Gerald D. Rogers. This patent describes the ROM, implemented as a large-scale-integrated circuit chip.

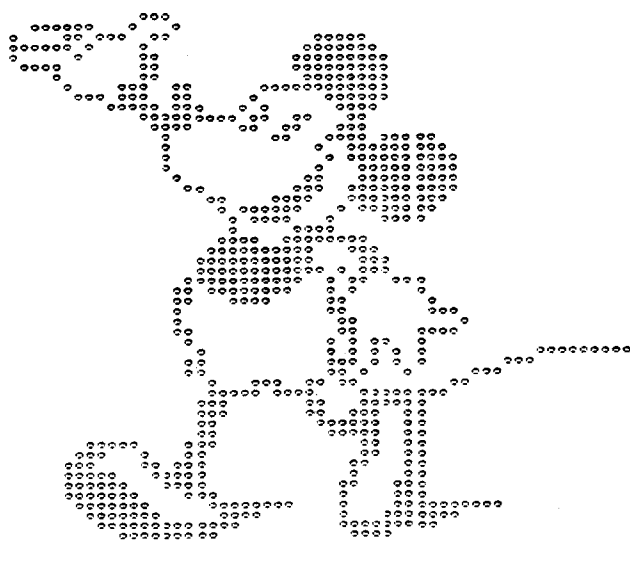
Patent # 4,020,465. THERMAL LINE PRINTER. April 26, 1977. Michael J. Cochran and Stephen B. Hamilton. From the date, I would say "this is not the PC-100, because it existed already by that time. It might be an improved version we haven't seen as yet.

Both patent descriptions contain a wealth of flow charts, detailed mechanical drawings and tables.

By the way, the US Patent Office tells me that the reason it usually takes about six weeks to fill an order is not so much bureaucratic sloth as it takes time for your check to be cashed, logged at several places, etc. A much quicker way if you order patents very often, they say, is to buy 50 coupons at \$ 25.00. That is still \$ 0.50 if my TI-59 is correct. You just send them a coupon each time you need a copy of a patent and they will fill your order within 20 days, they tell me. Booklets with 50 coupons may be purchased from U.S. Patent and Trade Mark Office

Office of Finance
Washington DC 20231, USA.

MICKEY MOUSE- Frederic De Mees.

	1100111100. 90 1100111111. 91 1111000000. 92 1111000011. 93 1111001100. 94 1111001111. 95 1111100000. 96 111110011. 97 1111111100. 98 1111111111. 99		064 42 STD 065 65 65 066 83 GO* 067 65 65 068 55 + 069 01 1 070 00 0 071 95 = 072 42 STD 073 65 65 074 22 INV 075 59 INT 076 65 x 077 02 2 078 75 - 079 59 INT 080 82 HIR 081 04 04 082 95 = 083 65 x 084 05 5 085 95 = 086 42 STD 087 64 64 088 73 PC+ 089 65 65 090 84 DP+ 091 64 64 092 39 CP 093 82 HIR 094 14 14 095 67 EQ 096 01 01 097 03 03 098 16 A+ 099 69 DP 100 00 00 101 16 A+ 102 97 DSZ 103 58 58 104 00 00 105 35 35		106 01 1 107 44 SUM 108 59 59 109 04 4 110 42 STD 111 58 58 112 61 GTO 113 00 00 114 35 35 115 78 LBL 116 15 E 117 01 1 118 00 0 119 69 DP 120 17 17 121 92 PTN 122 43 RCL 123 66 66 124 69 DP 125 01 01 126 43 RCL 127 67 67 128 69 DP 129 02 02 130 43 RCL 131 63 63 132 69 DP 133 03 03 134 98 ADV 135 69 DP 136 05 05 137 02 2 138 00 0 139 69 DP 140 00 00 141 69 DP 142 04 04 143 69 DP 144 05 05 145 61 GTO 146 01 01 147 03 03
MICKEY MOUSE		000 92 PTN 001 76 LBL 002 11 A 003 98 ADV 004 22 INV 005 58 FIX 006 25 CLR 007 22 INV 008 96 WRT 009 25 CLR 010 22 INV 011 96 WRT 012 25 CLR 013 22 INV 014 96 WRT 015 61 GTO 016 00 00 017 33 33 018 78 LBL 019 16 A+ 020 25 CLR 021 69 DP 022 05 05 023 41 SST 024 74 SM+ 025 80 80 026 00 0 027 00 0 028 00 0 029 00 0 030 00 0 031 00 0		032 69 DP 033 00 00 034 43 RCL 035 58 58 036 22 INV 037 28 LOG 038 52 EE 039 22 INV 040 57 ENG 041 65 x 042 33 33 043 95 = 044 35 1/X 045 65 x 046 73 PC+ 047 59 59 048 95 = 049 32 INV 050 59 INT 051 65 x 052 02 2 053 00 0 054 00 0 055 32 XIT 056 03 3 057 22 INV 058 28 LOG 059 95 = 060 59 INT 061 77 GE 062 00 00 063 69 69	

969992853709. 00 701712823809. 01 711982843849. 02 701632928691. 03 962929722929. 04 702713879632. 05 453879753959. 06 9498397294739. 07 229729703699. 08 639629689639. 09 689629689689. 10 699719719709. 11 709419689689. 12 699629689689. 13 639629689689. 14 991699692923. 15 459712843859. 16 712963839712. 17 709759713993. 18 699692943849. 19 499229833996. 20 712999689689. 21 689689139689. 22 609633849993. 23 929692999969. 24 692992969993. 25 969632999369. 26 842753969851. 27 762713929961. 28 902953849691. 29	00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	972713849742. 30 759919773999. 31 753999763999. 32 423999241673. 33 923999460175. 34 653999731942. 35 703999701982. 36 723799701640. 37 468751872993. 38 049801990853. 39 923991990284. 40 569991990943. 41 469991990733. 42 879801980738. 43 711235748748. 44 718716733809. 45 841733789841. 46 753729841743. 47 359761360453. 48 001901284399. 49 961923999961. 50 939999216331. 51 439921755919. 52 921919841939. 53 84169859341. 54 693699841713. 55 719421703719. 56 12000000000. 57 4. 58	30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58	0. 60 0. 61 0. 62 3001419617. 63 0. 64 0. 65 3024. 66 1526174500. 67 0. 68 0. 69 11. 70 1111. 71 110000. 72 110011. 73 111100. 74 111111. 75 11000000. 76 11000011. 77 11001100. 78 11001111. 79 11110000. 80 11110011. 81 11111100. 82 11111111. 83 1100000000. 84 1100000011. 85 1100001100. 86 1100001111. 87 1100110000. 88 1100110011. 89	60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89	831982703719. 90 751842703759. 91 981713999921. 92 633996986886. 93 689689123689. 94 689689689689. 95 689689689689. 96 689689689689. 97 986868686868. 98 986868686868. 99 689689689689. 100 689689686868. 101 841833999941. 102 712948967716. 103 968846846846. 104 846846846846. 105 967986266866. 106 686668686866. 107 1350000000000. 108 4. 109 30. 110	90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110
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MICKEY MOUSE

ASTRONOMY.- Turner F. Morgan, of Omaha, Nebraska, is an HP PPC member who received the ----- Astro programs I translated from the German. Turner is a senior field engineer with Westinghouse and works on the Defense Meteorological Satellite Program. He is one of the few people I know who are able to "legally" play with a hobby at work.

Turner also has a few colleagues at work who are receiving the TI PPC NOTES and he noted that David Bartholomew had some trouble using the Astro programs. (see v6n1p11) So he set out to check into the matter and has converted most of the Astro programs for HP-41C use. Neither the Solar nor the Planets programs had some real problems. But the Phase programs showed some discrepancies. On top of that, the Lunar program is still giving him some problem he has not been able to solve as yet.

I have a total of 17 pages of HP-41C listings and sample runs which I will sent to anyone needing it. Please send me \$ 3.00 to cover copying and mailing costs. Just ask for the updated HP-41C Astro programs.

TI-59 RESERVOIR ENGINEERING MANUAL by R. Hollo and H. Fifadara of Keplinger and Assocs. Publishers: PennWell Books, P.O.Box 1260, Tulsa, Oklahoma, 74101. Price: \$50.00

This book is one of the first books published specifically for the TI-59 for use in reservoir engineering (petroleum engineering). The authors assume that the user has a strong understanding of reservoir engineering and a basic understanding of the TI-59. The book is divided into five sections: (1) Basic reservoir engineering, (2) Economic analysis, (3) Geology, (4) Log interpretation, and (5) Advanced reservoir engineering. Each section contains either four or eight calculator programs for use. The documentation of these programs is among the finest one could come across. The documentation begins with a write-up of what the program is calculating, formulas used, and excellent reference sources where additional discussions may be found. Next, a well devised and well thought out flow charting of the paths the program will take. An example problem follows written on the TI program record sheets with a printout of the results. Finally the actual program listing is given. The programs have excellent alphanumeric descriptors utilizing the OP 04- OP 06 sequence. The book is well written with much thought given to the sequences and sectioning. Overall the book is complete, concise, and easy to comprehend. Reservoir engineers or those involved in some aspect of reservoir engineering will have an invaluable aid through the use of this book and its programs.

Review by Barry Franz.

LOCAL CLUB.- James Goodwin has organized a TI-59 club in the Thousand Oaks, CA area. Meetings are held each 3th Tuesday of the month from 7 to 9 PM at the TI-store in Thousand Oaks.

Newcomers please call James at home (805) 492-3488 or write him at 2932 Hyacinth Court, Thousand Oaks CA 91360.

CARRYING CASE.- Charles G. Stipp, one of the early pioneers dating back to SR-52 days, got slightly unhooked when he saw the astronomical price of the super-deluxe TI-59/PC-100 carrying case I was promoting in v6n3. He reminds me of availability of a more "democratic" type of case at Radio Shack. It is # 21-542 and retails for \$ 14.95. (The price has gone up a bit, according to Radio Shack, but it is still under \$ 20.00) Charles has carried his machine around in it on airplanes all over the country. (I did too, Charles, until somebody thoughtful sent me the \$ 85.00 variety one.) I thank Charles for reminding me to keep both feet sturdily on the ground.

by Bob Arendt

Why it Exists: 'Fast-Mode' is really the natural state of the calculator when executing code in a library ROM. Actually, it might be more appropriate to call the user-mode of operation the 'Slow-Mode'. During Slow-Mode program execution, the calculator performs a series of display formatting calculations after the execution of every op-code. This ensures that the display register contains a displayable value after the execution of each op-code. This feature is necessary for the operation of the TI-59 trace features (PAUSE every step, or TRACE). During execution of the library modules (which supposedly contain fully debugged software) this feature is disabled, resulting in a faster executing program (Notice that a library module will not trace or pause!). By properly bollixing the calculator it is possible to halt the calculation while in this state, enabling the user to run his/her programs under the auspices of Fast-Mode.

A Demonstration and Explanation: The code to the right was entered into the calculator and saved on a magnetic card. The code of steps 000-015 shall be referred to as the "Header Program" and is the section which starts the calculator off in Fast-Mode. I shall now explain the program's execution step-by-step, starting at instruction zero.

1) RST R/S: The calculator reads in instructions in blocks of 8 from the RAM memory (user program) into a command buffer. It executes steps 000-007 without undue difficulty (note the subroutine call lies on a memory boundary). Instructions 008-015 are read into the command buffer, and the subroutine jump is executed. But while executing the code in ROM the calculator comes across a LRN code (the module was not intended to be entered at this point) which stops it dead in its tracks. The calculator is halted with a FIX 0, portion 479.59, and in the infamous Fast-Mode. The program memory is cleared. The command buffer still contains instructions 008-015, and is ready to resume execution (still in Fast-Mode) from step 010. Pressing any non-numeric key except LRN, CLR, or CE results in the execution of that key and resumption of program execution. RST or PGM will result in an exit from Fast-Mode if used inside or outside of a program.

2) Read Card or R/S: The program memory is cleared, so we must enter the program by card (or by hand . . . but I'll let you figure it out). CLR may be pressed, and a card read in. After the card is read in the calculator immediately executes step 010-013, where it is halted by a R/S. A PAU must precede the R/S. In order for the calculator to recognize a R/S it must first have a valid number in the display register; the PAU, PRT, or EE INV EE sequence will perform this operation. If this is not done, the R/S might be treated as a NOP.

H E A D E R	000	00	0
	001	00	0
	002	00	0
	003	00	0
	004	00	0
	005	36	PGM
	006	02	02
	007	71	SBR
	008	02	02
	009	39	39
	010	09	9
	011	00	0
	012	66	PAU
	013	91	R/S
	014	66	PAU
	015	91	R/S
P R O G R A M	008	02	2
	009	39	CDS
	010	09	9
	011	00	0
	012	66	PAU
	013	91	R/S
	014	66	PAU
	015	91	R/S
	016	69	DP
	017	00	00
	018	01	1
	019	06	6
	020	03	3
	021	02	2
	022	03	3
	023	01	1
	024	01	1
	025	07	7
	026	00	0
	027	00	0
	028	69	DP
	029	01	01
	030	69	DP
	031	03	03
	032	69	DP
	033	05	05
	034	66	PAU
	035	91	R/S

3) CLR, Read Card or R/S: The display now shows a 90. Hit the CLR key, and read in the next card (or R/S). Steps 014-015 are executed, again halting the calculator.

4) CLR, Read Card or R/S & Program: Aha! I bet you were wondering why I repeated steps 008-015 in the program listing. During the previous steps 1) - 3) the calculator was executing the contents of the command buffer, which was unchanged when the calculator entered Fast-Mode. The three R/S's provide ample opportunity to reload the calculator memory without affecting the contents of the command buffer. When finished executing the contents of the buffer it grabs its next buffer-full starting at step 008-015. For convenience I assume the header exists on the same card the program resides in. If not, the calculator starts execution at step 008 of the new user program. If it's the same data, then the execution sequence continues as shown. Note that there are a total of 5 halts where cards may be read into memory.

Program execution proceeds 'normally' from step 008, but executing at approximately twice the normal rate.

See SUMMARY of Fast Mode on next page.

FAST MODE.- Of the many comments I have received lately about Fast Mode, most of them ----- seem to have little or no practical value. However, Frederic De Mees tells me that Fast Mode initialization does not clear the HIR registers. Now, that might have some very practical value. Suppose you have a Normal Mode program that has to be followed by a Fast Mode program. The Fast Mode program has to use some data generated by the Normal Mode program. Normally, the data would be wiped out by the Fast Mode initialization. Now, just keep them, temporarily, in the HIR registers, from which the Fast Mode program will retrieve them.

WANTED.- This time we need two programs. I will publish the best ones and will mention ----- all contributors. (honestly, I will not forget this time. I know you love to see your name printed on something other than a traffic ticket.)

The first challenge is a (fast) program to add, subtract, multiply and divide entries of mixed feet, inches, fractions of inches. Both calculator-only and printer versions combined are preferred, as this program would appeal to civil engineers working both "on the job" and at the office.

The second program challenge is a multi-strip Cartesian Plot. Unlike Jared Weinberger's celebrated contribution, this one should have at least a 60 by 60 point plot capability. Speed is good, but not a must.

ANGLE CONVERTERS.- Ralph H. Donnelly writes: " Dear Maurice, I have been flattered to ----- have my name appear linked to Frank Blachly's in your valuable publication. The routine which I submitted and you printed in v5n4/5p25 was developed specifically to solve the problem you mention in v6n3p10. Since most of my programs are for coordinate geometry, much use is made of the R/P capability which gives the negative angle in what we surveyors call the fourth quadrant. After every INV P/R, add 360 to the angle and then follow it with the program which you have impeached and you will get a positive answer less than 360. Don't worry about changing D.dd because that is the way it will have been computed. I assume that the word than was omitted in your comments."

Yes, it was, unfortunately, Ralph. My apologies. ED.

LBL A PRT X:T 360 X:T P/R INV P/R CP GE STO + 360) LBL STO PRT RTN
 LBL B PRT + 360 = DIV 360 = INV INT X 360 = PRT RTN

Summary: (Fast Mode)

- (A) General Header must be entered & executed to secure Fast-Mode privileges:

000	00	0
001	00	0
002	00	0
003	00	0
004	00	0
005	36	PGM
006	02	02
007	71	SBR
008	02	02
009	39	39
010	09	9
011	00	0
012	66	PAU
013	91	R/S
014	66	PAU
015	91	R/S

3 stops occur:
(cards may read
after hitting CLR)

RAM memory cleared;

← STOP 1

← STOP 2

← STOP 3

- (B) Program continues after stop 3 at step 008 in Fast-Mode

OLD PROGRAM
(with Header at start)

NEW PROGRAM
(Header not on this card
or keyed in by hand)

008	43	RCL
009	03	03
010	54)
011	95	=
012	42	STD
013	05	05
014	03	3
015	00	0
016	42	STD
017	00	00
018	42	STD
019	06	06
020	73	RC*
021	00	00
022	75	-
023	43	RCL
024	03	03
025	95	=
026	65	x
027	43	RCL

OR

Start →

008	02	2
009	39	CDS
010	09	9
011	00	0
012	66	PAU
013	91	R/S
014	66	PAU
015	91	R/S
016	69	DP
017	00	00
018	01	1
019	06	6
020	03	3
021	02	2
022	03	3
023	01	1
024	01	1
025	07	7
026	00	0
027	00	0
028	69	DP
029	01	01
030	69	DP
031	03	03
032	69	DP
033	05	05
034	66	PAU

Re-Run
Header
code

Hydrologic and Hydraulic Computations on Small Programmable Calculators and Synthetic-Hydrograph Computations on Small Programmable Calculators by Dr. Thomas E. Croley II, Ph.D.

Available from: Iowa Institute of Hydraulic Research, The University of Iowa, Iowa City, Iowa 52242. Price: \$17.95 and \$12.00, respectively.

Wow! What a collection of programs! Hydrologic & Hydraulic Computations contains over 870 programs (some of the calculators with a smaller capacity require more than one program per topic) in 40 areas for 11 programmable calculators (HP25 thru HP97 and SR52 thru TI59). Synthetic-Hydrograph Computations contains over 130 programs for the same machines.

Hydrologic & Hydraulic Computations is broken into two sections. Included in the Hydrologic Problem Section are: unit hydrograph derivation, construction, convolution and duration transformation; infiltration; evaporation, four routing methods; well hydraulics (steady and unsteady radial flow); Log-Pearson Type III distribution and fit; as well as routines for data sorting (increasing, decreasing, or into intervals) and Fourier Analysis. Included in the Hydraulic Problem Section are: uniform flow through various channel shapes or circular pipe; open channel momentum and specific energy function; hydraulic jump in rectangular channels; water surface profiles (direct step; numerical integration and standard step); turbulent pipe flow and the Hardy-Cross method of pipe networks.

Synthetic-Hydrograph Computations includes overland flow hydrographs (Izzard and kinematic wave); synthetic hydrographs (Horton-Izzard, given runoff volume, or given inflection time); unit hydrographs (kinematic wave, linear reservoirs cascade, desired durations); and dimensionless hydrographs. Also included is a section on numerical convolution.

Each section in both books includes a good background of the topic, starting with common equations and quickly develops the theory and equations required so that the assumptions, limitations and requirements of each program are understood. User directions and program listings (unfortunately typed, not from the printers when available) are given separately for each machine as the directions differ slightly for the various calculators. Also included are worked-out examples (several per section), references and comments on the programs (limitations, quirks, etc.).

The programs for the TI58 and TI59 are fairly basic since they are also written for the other calculators. A few programs on similar topics may be combined (example: uniform flow in 4 channel types) by the user for his convenience. It is also up to the user to add any alphanumerics he desires since none are in the listings provided.

These books are well written and contain a wealth of information that should prove useful to anyone dealing with hydraulics or hydrology.

Review by Frank Blachly.

ACCOUNTS.- Bill Carpenter of Bakersfield CA, reworked Dick Blayney's Talley Sheet ----- from v6n3p5, such that it has become one of the most user-friendly programs you can imagine. It allows to enter up to 99 accounts, update the same, record them, read them in again, almost completely automatic.

Key in the program and record it on one card side, which you mark "1", in 6 OP 17 partitioning. (normal turn-on.)

User instructions:

1. Read in the program by pressing CLR and sliding card side 1 into the slot.
2. Key in the account number, 1 through 99, and press A. See the account # in the display.
3. Enter the amount you want to credit to that account and press B.
See the account number printed, followed by the amount you just entered, followed by the total in that account. You will see two different print-outs once you have called the same account two or more times.
4. Repeat 2 and 3 as many times as needed to enter all your accounts and the amounts corresponding to them.
In case of error, enter the account number and press A. Enter the amount and press +/- B. That will subtract the erroneous amount. Now enter the account number again, and press A. Then enter the correct amount and press B.
You may call the same account as many times during an entry session as you want.
5. When the session is over, press E. You will get a complete listing as shown in the example. Only those accounts that have an amount in them will be listed. The listing should be interpreted as follows:
example: 1.003 means account number 1 with three entries.
1298.50 is the total amount in that account.
After the listing, a "1" will be printed, inviting you to slide side 1 of the card in the slot. It will record your program again, BUT ALSO REGISTERS 90 THROUGH 99. Then a "2" will be printed, prompting you to enter side 2. When that is done, a "3" is printed. Take a new card and slide in side 3. Lastly, a "4" is printed inviting you to slide side 4 into the slot. Program stops with 459.79 in the display.
6. For a total wipe-out at the end of the fiscal year, just press D'.
It will leave only your program on side 1.

For a new entry session, read in sides 1 through 4 and go to 2 and 3 above.

Note also that at the end of the listing, a grand total is printed.

000 58 FIX	032 32 NIT	063 16 A'	094 42 STD	125 98 ADV	1	2.
001 00 00	033 58 FIX	064 18 C'	095 00 00	126 98 ADV	1235.12	2000.00
002 06 6	034 02 02	065 43 RCL	096 18 C'	127 98 ADV	1235.12	7569.12
003 69 DP	035 52 EE	066 00 00	097 69 DP	128 71 SBR		99.
004 17 17	036 22 INV	067 85 +	098 20 20	129 00 00	2.	2000.00
005 32 NIT	037 52 EE	068 53 +	099 01 1	130 00 00	4569.12	3254.10
006 58 FIX	038 29 CP	069 73 PC+	100 00 0	131 58 FIX	4569.12	
007 02 02	039 99 PRT	070 00 00	101 00 0	132 00 00		
008 92 RTN	040 77 GE	071 65 +	102 32 NIT	133 01 1		
009 76 LBL	041 00 00	072 01 1	103 43 RCL	134 99 PRT	3.	1.001
010 18 C'	042 47 47	073 00 0	104 00 00	135 96 MRT	4569.12	1235.12
011 58 FIX	043 75 -	074 00 0	105 77 GE	136 02 2	4569.12	
012 00 00	044 61 STD	075 54 +	106 01 01	137 99 PRT		2.003
013 01 1	045 00 00	076 22 INV	107 22 22	138 96 MRT	2.	7569.12
014 00 0	046 48 48	077 59 INT	108 29 CP	139 03 3	1000.00	
015 69 DP	047 85 +	078 95 =	109 73 PC+	140 99 PRT	5569.12	
016 17 17	048 01 1	079 58 FIX	110 00 00	141 96 MRT		3.001
017 92 RTN	049 52 EE	080 03 03	111 67 EQ	142 04 4	36.	4569.12
018 76 LBL	050 05 5	081 99 PRT	112 00 00	143 99 PRT	2369.23	
019 11 A	051 94 +/-	082 73 PC+	113 97 97	144 96 MRT	2369.23	36.001
020 42 STD	052 95 =	083 00 00	114 71 SBR	145 98 ADV		2369.23
021 00 00	053 74 SM+	084 58 FIX	115 00 00	146 98 ADV		
022 58 FIX	054 00 00	085 02 02	116 65 65	147 98 ADV	38.	
023 00 00	055 25 CLR	086 99 PRT	117 82 HIF	148 98 ADV	2364.45	98.001
024 92 RTN	056 73 PC+	087 98 ADV	118 38 38	149 81 PST	2364.45	2364.45
025 76 LBL	057 00 00	088 92 RTN	119 61 STD	150 76 LBL		
026 12 B	058 99 PRT	089 76 LBL	120 00 00	151 19 D'	99.	99.002
027 32 NIT	059 98 ADV	090 15 E	121 97 97	152 18 C'	1254.10	3254.10
028 18 C'	060 32 NIT	091 25 CLR	122 32 HIF	153 47 CMS	1254.10	
029 43 RCL	061 81 PST	092 69 DP	123 18 18	154 81 PST		21361.14
030 00 00	062 76 LBL	093 00 00	124 99 PRT			
031 99 PRT						

CHECKSUM-NUMBER ROUTINE ASSURES CORRECT PROGRAM ENTRY.- This program appeared in ----- Electronic Design, May 28, 1981, pp133-135. It was written by Colin Gyles, a senior engineer at Data Precision Corp. in Danvers, MA, 01923. Although the program seems to be OK, the author doesn't seem to know how to handle 8's or 9's in the p-digit position of an octet. So, he recommends checking those locations manually. Does anybody have a better way?

DATA STORAGE AND FUNCTION PLOTTER.- This super program was written by Lonnie Mount, ----- of Technical Calculator Programs in Riverside, California. This program consists of two sub-programs:

Sequential Data Storage Sub-Program:

1. Stores input data into sequentially ascending data registers beginning at any register desired.
2. Prompts for data by sequentially ascending numbers beginning with item 1.
3. Pauses after each data entry to indicate register number in which last data input was stored.
4. Uses register 00, one merged label and no flags nor absolute addresses.

Function Plotting Sub-Program:

1. Will plot curves generated by a user-supplied routine that will yield a y-value for an input x-value. User routines may be entered manually, 284 steps maximum or by magnetic card, 240 steps maximum.
2. Program uses merged labels, leaving the non-merged ones free for the user to employ in routines. User program uses no flags nor absolute addresses and should run with any user-routine not using registers 50 through 59. Program may be placed in either bank 1 or bank 2.
3. Plots curves either upright or inverted on a 19 line scale. Program is able to provide a mirror plot of either the upright or the inverted plot. If the curve runs off the plot, the program stops and indicates which range number has been exceeded.
4. Program locates absolute zero when it falls within the plot and brackets the plotted curve with a y-scale of 20 points at both the beginning and the end of the plot. The user may specify an arbitrary reference line within the plot itself.
5. The program prints the beginning address of the plotted curve, the value of the y-increment and the x-increment.

As noted above, the programs contain merged labels, which enable them to run with almost any user-supplied program or routine, with no conflict of labels whatsoever. Because of their very nature, merged labels are seldom, if ever, used in a normal programming. The merged labels used here are those associated with indirect functions. The procedure for program duplication of merged labels is shown below:

TO DUPLICATE: PRESS:

```
LBL ST* ..... 2nd LBL SST BST STO 2nd IND
GTO ST* ..... GTO SST BST STO 2nd IND
LBL EX* ..... 2nd LBL SST BST 2nd EXC IND
SBR PG* ..... SBR SST BST 2nd PGM IND
```

This same technique is used for LBL PG*, LBL RC*, SBR RC*, SBR EX*, LBL PG*, LBL PD*, GTO PD* and LBL SM*. Two merged labels need special attention:

```
GE SM* ..... 2nd X>T SST BST SUM 2nd IND
GE DEL ..... STO 56 BST BST X>T SST
```

The variations between the four plotting programs are minor. It is suggested that Plot 1 be keyed into the program memory and recorded on a mag card. Plots 2, 3 and 4 are then created by revising Plot 1. This will require you to enter the merged labels only once. The program does not contain absolute addresses, so don't be afraid to delete and insert steps when creating Plots 2, 3 and 4 out of Plot 1.

User Function Routine Requirements:

1. User routine must not use registers 50 through 59.
2. User routine must not exceed 284 steps. Routines that exceed 240 steps should begin at step 000. The first 240 steps may be entered by means of a mag card. Program steps between 240 and 283 must be entered manually by overwriting the sequential data storage sub-program, LBL ST0, which is immediately in front of the plotter program, LBL R/S.
3. User-supplied routines must not use the common labels ST nor R/S. Neither must they use merged labels nor absolute addresses to program locations greater than 283.
4. User routines should end in RTN. (INV SBR)

Data Storage and Function plotter (cont.)

5. For best results, the user-supplied routine should not do any printing of its own.

Plotter Program Requirements:

The plotter program itself requires only seven items of input data and a user-supplied routine before it can be run. The seven items of input data are:

- Item # 1, R50 A three digit number which locates the beginning step of the user-supplied routine. (function routine)
- Item # 2, R51 Upper y-range value, a number, either positive or negative, which is slightly larger than the maximum anticipated value of y, calculated by the function routine.
- Item # 3, R52 Lower y-range value, a number, either positive or negative, which is slightly smaller than the anticipated minimum value of y, calculated by the function routine.
- Item # 4, R53 Y-value of a user-specified x-reference line. If entered value of y is not within the range of the plot, the reference line will be omitted.
- Item # 5, R54 X-value at the start of the plot, minimum value of x.
- Item # 6, R55 X-value at the end of the plot, maximum value of x.
- Item # 7, R56 Plotting increment of x, which must be positive.

Sample problem: Beginning at step 036, enter the function $f(x) = 4 \sin(x^2)$
 Plot $f(x)$ between 0 and 30 degrees at 1 degree interval.
 The x-reference is not to appear in the first four plots. However, repeat plot 4 with a zero-reference line.

Key in as follows:

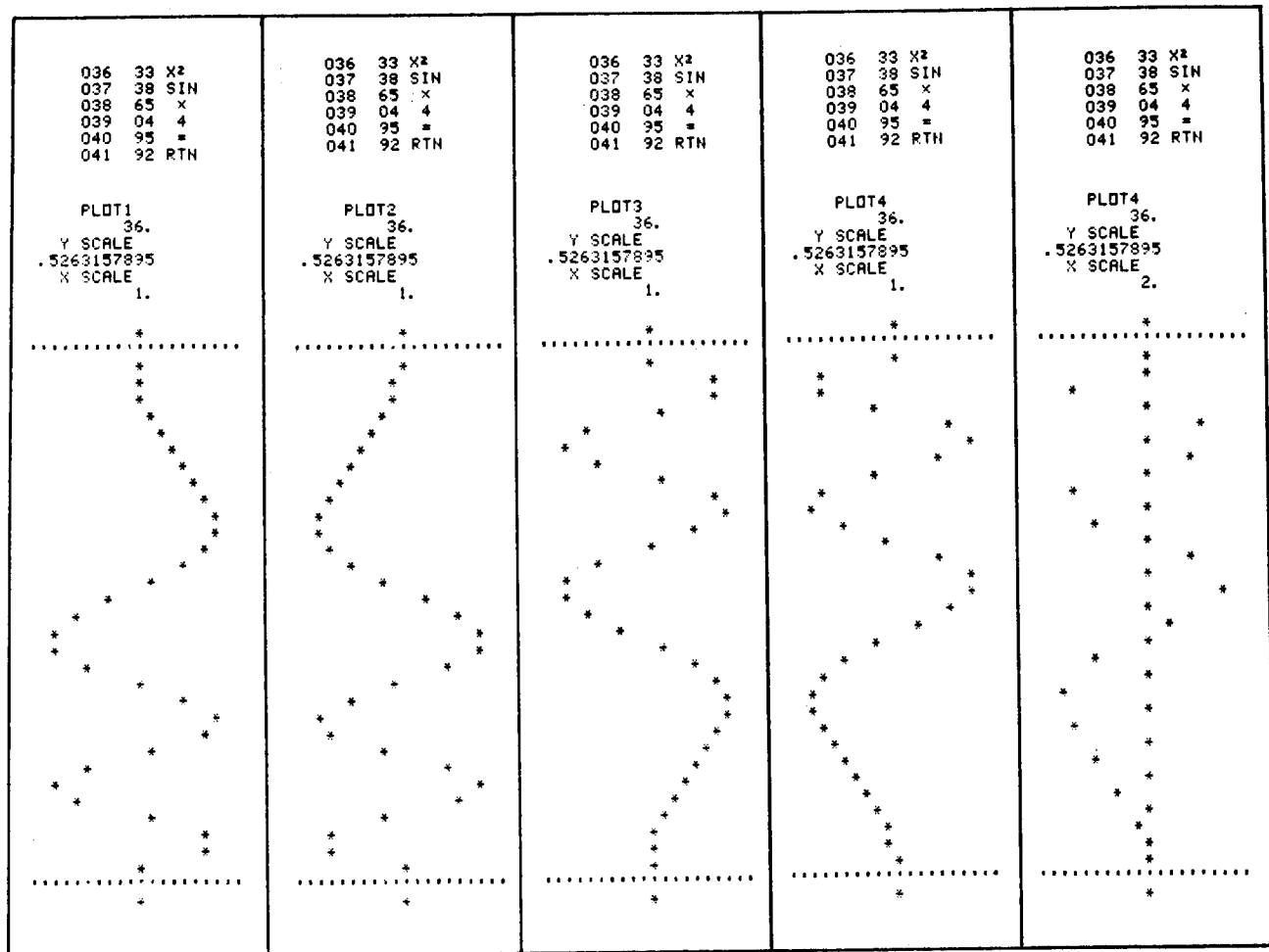
- 50 SBR STO, which initializes the sequential data storage.
 36 R/S, tells the program the beginning step of the function routine.
 5 R/S, upper y-range value
 5 +/- R/S, lower y-range value.
 6 R/S, puts the reference out of the range of 5 to -5 and thus will not appear. In the repeated plot 4, enter a zero here.
 0 R/S, the beginning x-value of $f(x)$
 30 R/S, the end x-value of $f(x)$
 1 R/S, x-plotting increment. In the repeated plot 4, use a 2.
 SBR R/S

SEE THE FIVE PLOTTED CURVES AND THE INPUT ROUTINE SAMPLE ON NEXT PAGE.

PLOT 1. Listing.

240 00 0	275 00 00	310 06 6	345 91 R/S	379 55 +	413 43 RCL	447 01 1
241 00 0	276 43 RCL	311 05 5	346 69 DP	380 01 1	414 54 54	448 52 EE
242 00 0	277 00 00	312 06 6	347 00 00	381 09 9	415 42 STO	449 08 8
243 00 0	278 59 INT	313 05 5	348 03 3	382 95 =	416 57 57	450 94 +/-
244 00 0	279 66 PRU	314 69 DP	349 03 3	383 42 STO	417 76 LBL	451 95 =
245 00 0	280 69 DP	315 01 01	350 02 2	384 58 58	418 64 PD*	452 22 INV
246 00 0	281 20 20	316 69 DP	351 07 7	385 50 1<1	419 71 SBR	453 52 EE
247 00 0	282 61 GTD	317 02 02	352 03 3	386 99 PRT	420 40 IND	454 22 INV
248 00 0	283 72 ST*	318 69 DP	353 02 2	387 04 4	421 50 50	455 27 GE
249 76 LBL	284 76 LBL	319 03 03	354 03 3	388 04 4	422 32 XIT	456 74 SM+
250 42 STO	285 63 EX*	320 69 DP	355 07 7	389 00 0	423 43 RCL	457 43 RCL
251 59 INT	286 75 -	321 04 04	356 00 0	390 00 0	424 51 51	458 59 59
252 85 +	287 43 RCL	322 69 DP	357 02 2	391 69 DP	425 22 INV	459 69 DP
253 35 1<X	288 52 52	323 05 05	358 69 DP	392 01 01	426 77 GE	460 07 07
254 55 +	289 95 =	324 69 DP	359 02 02	393 71 SBR	427 56 DEL	461 24 CE
255 02 2	290 55 =	325 00 00	360 69 DP	394 73 PC*	428 43 RCL	462 32 XIT
256 95 =	291 43 RCL	326 32 RTH	361 05 05	395 43 RCL	429 52 52	463 61 GTD
257 42 STO	292 58 58	327 76 LBL	362 43 RCL	396 56 56	430 77 GE	464 64 PD*
258 00 00	293 95 =	328 73 PC*	363 50 50	397 99 PRT	431 56 DEL	465 76 LBL
259 76 LBL	294 58 FIX	329 03 3	364 99 PRT	398 43 RCL	432 32 XIT	466 74 SM+
260 72 ST*	295 00 00	330 06 6	365 04 4	399 53 53	433 71 SBR	467 71 SBR
261 43 RCL	296 52 EE	331 01 1	366 05 5	400 71 SBR	434 63 EX*	468 62 PG*
262 00 00	297 22 INV	332 05 5	367 00 0	401 63 EX*	435 69 DP	469 25 CLR
263 75 -	298 52 EE	333 01 1	368 00 0	402 42 STO	436 07 07	470 71 SBR
264 22 INV	299 22 INV	334 03 3	369 69 DP	403 59 59	437 43 RCL	471 63 EX*
265 59 INT	300 58 FIX	335 02 2	370 01 01	404 25 CLR	438 56 56	472 69 DP
266 35 1<X	301 32 RTH	336 07 7	371 71 SBR	405 98 ADV	439 44 SUM	473 07 07
267 55 -	302 76 LBL	337 01 1	372 73 PC*	406 71 SBR	440 57 57	474 25 CLR
268 02 2	303 62 PG*	338 07 7	373 43 RCL	407 63 EX*	441 43 RCL	475 98 ADV
269 85 +	304 06 6	339 69 DP	374 51 51	408 69 DP	442 57 57	476 98 ADV
270 01 1	305 05 5	340 02 02	375 75 -	409 07 07	443 32 XIT	477 98 ADV
271 95 =	306 06 6	341 69 DP	376 43 RCL	410 24 CE	444 43 RCL	478 98 ADV
272 59 INT	307 05 5	342 05 05	377 52 52	411 71 SBR	445 55 55	479 92 RTH
273 21 R 3	308 06 6	343 32 RTH	378 95 =	412 62 PG*	446 85 +	
274 72 ST*	309 05 5	344 76 LBL				

SAMPLE PLOTTINGS.



PLOT 2, listing.

240 00 0	275 00 00	310 06 6	345 91 R/S	379 55 +	413 43 RCL	447 01 1
241 00 0	276 43 RCL	311 05 5	346 69 DP	380 01 1	414 54 54	448 52 EE
242 00 0	277 00 00	312 06 6	347 00 00	381 09 9	415 42 STD	449 08 8
243 00 0	278 59 INT	313 05 5	348 03 3	382 95 =	416 57 57	450 94 +/-
244 00 0	279 66 PAU	314 69 DP	349 03 3	383 42 STD	417 76 LBL	451 95 =
245 00 0	280 69 DP	315 01 01	350 02 2	384 58 58	418 64 PD*	452 22 INV
246 00 0	281 20 20	316 69 DP	351 07 7	385 50 IxI	419 71 SBR	453 52 EE
247 00 0	282 61 GTD	317 02 02	352 03 3	386 99 PRT	420 40 IND	454 22 INV
248 00 0	283 72 ST+	318 69 DP	353 02 2	387 04 4	421 50 50	455 77 GE
249 76 LBL	284 76 LBL	319 03 03	354 03 3	388 04 4	422 32 XIT	456 74 SM*
250 42 STD	285 63 EX*	320 69 DP	355 07 7	389 00 0	423 43 RCL	457 43 RCL
251 59 INT	286 75 -	321 04 04	356 00 0	390 00 0	424 51 51	458 59 59
252 85 +	287 43 RCL	322 69 DP	357 03 3	391 69 DP	425 22 INV	459 69 DP
253 35 1/X	288 51 51	323 05 05	358 69 DP	392 01 01	426 77 GE	460 07 07
254 55 -	289 95 =	324 69 DP	359 02 02	393 71 SBR	427 56 DEL	461 24 CE
255 02 2	290 55 +	325 00 00	360 69 DP	394 73 RC+	428 43 RCL	462 32 XIT
256 95 =	291 43 RCL	326 92 RTN	361 05 05	395 43 RCL	429 52 52	463 61 GTD
257 42 STD	292 58 58	327 76 LBL	362 43 RCL	396 56 56	430 77 GE	464 64 PD*
258 00 00	293 95 =	328 73 RC*	363 50 50	397 99 PRT	431 56 DEL	465 76 LBL
259 76 LBL	294 58 FIX	329 03 3	364 99 PRT	398 43 RCL	432 32 XIT	466 74 SM*
260 72 ST+	295 00 00	330 06 6	365 04 4	399 53 53	433 71 SBR	467 71 SBR
261 43 RCL	296 52 EE	331 01 1	366 05 5	400 71 SBR	434 63 EX*	468 62 PG*
262 00 00	297 22 INV	332 05 5	367 00 0	401 63 EX*	435 69 DP	469 25 CLR
263 75 -	298 52 EE	333 01 1	368 00 0	402 42 STD	436 07 07	470 71 SBR
264 22 INV	299 22 INV	334 03 3	369 69 DP	403 59 59	437 43 RCL	471 63 EX*
265 59 INT	300 58 FIX	335 02 2	370 01 01	404 25 CLR	438 56 56	472 69 DP
266 35 1/X	301 92 RTN	336 07 7	371 71 SBR	405 98 ADV	439 44 SUM	473 07 07
267 55 +	302 76 LBL	337 01 1	372 73 RC+	406 71 SBR	440 57 57	474 25 CLR
268 02 2	303 62 PG*	338 07 7	373 43 RCL	407 63 EX*	441 43 RCL	475 98 ADV
269 85 +	304 06 6	339 69 DP	374 52 52	408 69 DP	442 57 57	476 98 ADV
270 01 1	305 05 5	340 02 02	375 75 -	409 07 07	443 32 XIT	477 98 ADV
271 95 =	306 06 6	341 69 DP	376 43 RCL	410 24 CE	444 43 RCL	478 98 ADV
272 59 INT	307 05 5	342 05 05	377 51 51	411 71 SBR	445 55 55	479 92 RTN
273 91 R/S	308 06 6	343 92 RTN	378 95 =	412 62 PG*	446 85 +	
274 72 ST*	309 05 5	344 76 LBL				

PLOT 3, listing.

240 00 0	275 00 00	310 06 6	345 91 R/S	379 55 -	413 43 RCL	447 75 -
241 00 0	276 43 RCL	311 05 5	346 69 DP	380 01 1	414 55 55	448 01 1
242 00 0	277 00 00	312 06 6	347 00 00	381 09 9	415 42 STD	449 52 EE
243 00 0	278 59 INT	313 05 5	348 03 3	382 95 =	416 57 57	450 08 8
244 00 0	279 66 PAU	314 69 DP	349 03 3	383 42 STD	417 76 LBL	451 94 +/-
245 00 0	280 69 DP	315 01 01	350 02 2	384 58 58	418 64 PD*	452 95 =
246 00 0	281 20 20	316 69 DP	351 07 7	385 50 I X I	419 71 SBR	453 22 INV
247 00 0	282 61 GTD	317 02 02	352 03 3	386 99 PRT	420 40 IND	454 52 EE
248 00 0	283 72 ST*	318 69 DP	353 02 2	387 04 4	421 50 50	455 77 GE
249 76 LBL	284 76 LBL	319 03 03	354 03 3	388 04 4	422 32 X:IT	456 74 SM*
250 42 STD	285 63 EX*	320 69 DP	355 07 7	389 00 0	423 43 RCL	457 43 RCL
251 59 INT	286 75 -	321 04 04	356 00 0	390 00 0	424 51 51	458 59 59
252 85 +	287 43 RCL	322 69 DP	357 04 4	391 69 DP	425 22 INV	459 69 DP
253 35 1/X	288 52 52	323 05 05	358 69 DP	392 01 01	426 77 GE	460 07 07
254 55 +	289 95 =	324 69 DP	359 02 02	393 71 SBR	427 56 DEL	461 24 CE
255 02 2	290 55 +	325 00 00	360 69 DP	394 73 RC*	428 43 RCL	462 32 X:IT
256 95 =	291 43 RCL	326 92 RTN	361 05 05	395 43 RCL	429 52 52	463 61 GTD
257 42 STD	292 58 58	327 76 LBL	362 43 RCL	396 56 56	430 77 GE	464 64 PD*
258 00 00	293 95 =	328 73 RC*	363 50 50	397 99 PRT	431 56 DEL	465 76 LBL
259 76 LBL	294 58 FIX	329 03 3	364 99 PRT	398 43 RCL	432 32 X:IT	466 74 SM*
260 72 ST*	295 00 00	330 06 6	365 04 4	399 53 53	433 71 SBR	467 71 SBR
261 43 RCL	296 52 EE	331 01 1	366 05 5	400 71 SBR	434 63 EX*	468 62 PG*
262 00 00	297 22 INV	332 05 5	367 00 0	401 63 EX*	435 69 DP	469 25 CLR
263 75 -	298 52 EE	333 01 1	368 00 0	402 42 STD	436 07 07	470 71 SBR
264 22 INV	299 22 INV	334 03 3	369 69 DP	403 59 59	437 43 RCL	471 63 EX*
265 59 INT	300 58 FIX	335 02 2	370 01 01	404 25 CLR	438 56 56	472 69 DP
266 35 1/X	301 92 RTN	336 07 7	371 71 SBR	405 98 ADV	439 94 +/-	473 07 07
267 55 -	302 76 LBL	337 01 1	372 73 RC*	406 71 SBR	440 44 SUM	474 25 CLR
268 02 2	303 62 PG*	338 07 7	373 43 RCL	407 63 EX*	441 57 57	475 98 ADV
269 85 +	304 06 6	339 69 DP	374 51 51	408 69 DP	442 43 RCL	476 98 ADV
270 01 1	305 05 5	340 02 02	375 75 -	409 07 07	443 57 57	477 98 ADV
271 95 =	306 06 6	341 69 DP	376 43 RCL	410 24 CE	444 32 X:IT	478 98 ADV
272 59 INT	307 05 5	342 05 05	377 52 52	411 71 SBR	445 43 RCL	479 92 RTN
273 91 R/S	308 06 6	343 92 RTN	378 95 =	412 62 PG*	446 54 54	
274 72 ST*	309 05 5	344 76 LBL				

PLOT 4, listing.

240 00 0	275 00 00	310 06 6	345 91 R/S	379 55 +	413 43 RCL	447 75 -
241 00 0	276 43 RCL	311 05 5	346 69 DP	380 01 1	414 55 55	448 01 1
242 00 0	277 00 00	312 06 6	347 00 00	381 09 9	415 42 STD	449 52 EE
243 00 0	278 59 INT	313 05 5	348 03 3	382 95 =	416 57 57	450 08 8
244 00 0	279 66 PAU	314 69 DP	349 03 3	383 42 STD	417 76 LBL	451 94 +/-
245 00 0	280 69 DP	315 01 01	350 02 2	384 58 58	418 64 PD*	452 95 =
246 00 0	281 20 20	316 69 DP	351 07 7	385 50 I X I	419 71 SBR	453 22 INV
247 00 0	282 61 GTD	317 02 02	352 03 3	386 99 PRT	420 40 IND	454 52 EE
248 00 0	283 72 ST*	318 69 DP	353 02 2	387 04 4	421 50 50	455 77 GE
249 76 LBL	284 76 LBL	319 03 03	354 03 3	388 04 4	422 32 X:IT	456 74 SM*
250 42 STD	285 63 EX*	320 69 DP	355 07 7	389 00 0	423 43 RCL	457 43 RCL
251 59 INT	286 75 -	321 04 04	356 00 0	390 00 0	424 51 51	458 59 59
252 85 +	287 43 RCL	322 69 DP	357 05 5	391 69 DP	425 22 INV	459 69 DP
253 35 1/X	288 51 51	323 05 05	358 69 DP	392 01 01	426 77 GE	460 07 07
254 55 +	289 95 =	324 69 DP	359 02 02	393 71 SBR	427 56 DEL	461 24 CE
255 02 2	290 55 +	325 00 00	360 69 DP	394 73 RC*	428 43 RCL	462 32 X:IT
256 95 =	291 43 RCL	326 92 RTN	361 05 05	395 43 RCL	429 52 52	463 61 GTD
257 42 STD	292 58 58	327 76 LBL	362 43 RCL	396 56 56	430 77 GE	464 64 PD*
258 00 00	293 95 =	328 73 RC*	363 50 50	397 99 PRT	431 56 DEL	465 76 LBL
259 76 LBL	294 58 FIX	329 03 3	364 99 PRT	398 43 RCL	432 32 X:IT	466 74 SM*
260 72 ST*	295 00 00	330 06 6	365 04 4	399 53 53	433 71 SBR	467 71 SBR
261 43 RCL	296 52 EE	331 01 1	366 05 5	400 71 SBR	434 63 EX*	468 62 PG*
262 00 00	297 22 INV	332 05 5	367 00 0	401 63 EX*	435 69 DP	469 25 CLR
263 75 -	298 52 EE	333 01 1	368 00 0	402 42 STD	436 07 07	470 71 SBR
264 22 INV	299 22 INV	334 03 3	369 69 DP	403 59 59	437 43 RCL	471 63 EX*
265 59 INT	300 58 FIX	335 02 2	370 01 01	404 25 CLR	438 56 56	472 69 DP
266 35 1/X	301 92 RTN	336 07 7	371 71 SBR	405 98 ADV	439 94 +/-	473 07 07
267 55 -	302 76 LBL	337 01 1	372 73 RC*	406 71 SBR	440 44 SUM	474 25 CLR
268 02 2	303 62 PG*	338 07 7	373 43 RCL	407 63 EX*	441 57 57	475 98 ADV
269 85 +	304 06 6	339 69 DP	374 52 52	408 69 DP	442 43 RCL	476 98 ADV
270 01 1	305 05 5	340 02 02	375 75 -	409 07 07	443 57 57	477 98 ADV
271 95 =	306 06 6	341 69 DP	376 43 RCL	410 24 CE	444 32 X:IT	478 98 ADV
272 59 INT	307 05 5	342 05 05	377 51 51	411 71 SBR	445 43 RCL	479 92 RTN
273 91 R/S	308 06 6	343 92 RTN	378 95 =	412 62 PG*	446 54 54	
274 72 ST*	309 05 5	344 76 LBL				

COMPUTERS IN MEDICINE AND BIOLOGY.- This journal is looking for good articles using TI-59 programs related to statistics, optics, physiology, stress analysis, etc. with a potential use to biologists, physiologists, dentists and physicians, such as reducing errors in lab procedure.

Please contact TIPPC Club member Dr. Cliff Lieberman, 1020 N. Quincy St., Apt. 1006, Arlington, VA, 22201, USA. Cliff is willing to help you in any way he can to make your article a success.

If you get one published, please tell the TI PPC NOTES about it. I would like to inform our members about it. Thank you.

THE POEM MACHINE II. - We recently acquired the youngest member of the club, 13-year old Michael Malik. I suspect Michael did not get his exalted state of calculator fanaticism by pure chance. His father is a fellow scientist of John Worthington and Emil Regelman at EPA. Whatever the "aggravating circumstances", Michael is a fine programmer. Among the several letters I received from him a found a new version of the famous POEM MACHINE. Michael's is not version II in reality, as about a year ago I had a rather lively exchange of different versions with the Snow brothers. (which program didn't they write?) We ended up with three basic versions: one suitable for a party at which you could invite the preacher, rabbi or priest, (it was clean enough to invite even mother superior) one suitable for a party at which the first three might come (but I would definitely leave out mother superior) and a last version good for a party at which I would only invite my bachelor friends.

Well, Michael's program is of the first variety. It does not rely on the ML module, as it contains its own random number generator. Both reviewers told me to publish it, even when they didn't know Michael's age.

The instructions are simple:

1. Put your calculator in 10 OP 17 partitioning and key in both program steps and data registers.
2. Put your calculator in 6 OP 17 partitioning and record four card sides.

To use the program:

1. Read in four card sides in 6 OP 17, turn-on partitioning. Program repartitions automatically to 10 OP 17.
2. Enter any seed and press A. The printer will print lovely nonsense verses, free non-rhyming lines of California-style poetry.

POEMS	THE POEM MACHINE II							
	000	001	002	003	004	005	006	007
PAT HIS SICK DOG	76 LBL	17 B'	89 "	22 INV	59 INT	82 HIR	34	53
KISS YOUR LAZY PIG	006	34	34	007	53	008	02	009
LOVE YOUR GRIMY MJLE	009	04	4	010	02	2	011	09
SELL OUR HAIRY NOSE	012	08	8	013	65	X	014	82
BUY MY SOFT HAND	015	14	14	016	85	+	017	09
BAKE ONE SLIMY APE	018	09	9	019	09	9	020	09
MISS THE PUNY TJE	021	01	1	022	54	+	023	55
GRAB A SHY EGG	024	01	1	025	09	9	026	09
HELP SOME SUPER BEER	027	00	0	028	01	1	029	07
TAKE SOME SWEET COW	030	95	=	031	22	INV	032	59
BEAT THAT SWELL RAG	033	22	RTN	034	76	LBL	035	11
EAT HER WILD BIKE	036	82	HIR	037	04	04	038	01
RUB HIS DIRTY DOG	039	00	0	040	69	DP	041	17
FEEL YOUR LAZY CAR	042	69	DP	043	00	00	044	03
LOVE OUR EVIL BJD	045	03	3	046	03	3	047	02
SELL MY UGLY BIRD	048	01	1	049	07	7	050	03
BUY MY CRAZY HAND	051	00	0	052	03	3	053	06
PITY ONE SLIMY TOAD	054	69	DP	055	01	01	056	69
NAIL THE LARGE LEG	057	05	05	058	98	ADV	059	17
GET A HEAT EGG	060	65	X	061	02	2	062	05
	063	85	+	064	01	1	065	95
	066	59	INT	067	42	STD	068	00
	069	73	PC*	070	00	00	071	69
	072	01	01	073	17	B'	074	65
	075	01	1	076	00	0	077	85
	078	09	9	079	00	0	080	95
	081	59	INT	082	42	STD	083	00
	084	73	PC*	085	00	00	086	69
	087	02	02	088	17	B'	089	65
	090	03	3	091	02	2	092	85
	093	02	2	094	06	6	095	95
	096	59	INT	097	42	STD	098	00
	099	73	PC*	100	00	00	101	69
	102	03	03	103	17	B'	104	65
	105	03	3	106	02	2	107	85
	108	05	5	109	08	8	110	95
	111	59	INT	112	42	STD	113	00
	114	73	PC*	115	00	00	116	69
	117	04	04	118	69	DP	119	05
	120	61	GT0	121	00	00	122	58
	123	58	58	124	58	58	125	58
	126	58	58	127	58	58	128	58
	129	58	58	130	58	58	131	58
	132	58	58	133	58	58	134	58
	135	58	58	136	58	58	137	58
	138	58	58	139	58	58	140	58
	141	58	58	142	58	58	143	58
	144	58	58	145	58	58	146	58
	147	58	58	148	58	58	149	58
	150	58	58	151	58	58	152	58
	153	58	58	154	58	58	155	58
	156	58	58	157	58	58	158	58
	159	58	58	160	58	58	161	58
	162	58	58	163	58	58	164	58
	165	58	58	166	58	58	167	58
	168	58	58	169	58	58	170	58
	171	58	58	172	58	58	173	58
	174	58	58	175	58	58	176	58
	177	58	58	178	58	58	179	58
	180	58	58	181	58	58	182	58
	183	58	58	184	58	58	185	58
	186	58	58	187	58	58	188	58
	189	58	58	190	58	58	191	58
	192	58	58	193	58	58	194	58
	195	58	58	196	58	58	197	58
	198	58	58	199	58	58	200	58
	201	58	58	202	58	58	203	58
	204	58	58	205	58	58	206	58
	207	58	58	208	58	58	209	58
	210	58	58	211	58	58	212	58
	213	58	58	214	58	58	215	58
	216	58	58	217	58	58	218	58
	219	58	58	220	58	58	221	58
	222	58	58	223	58	58	224	58
	225	58	58	226	58	58	227	58
	228	58	58	229	58	58	230	58
	231	58	58	232	58	58	233	58
	234	58	58	235	58	58	236	58
	237	58	58	238	58	58	239	58
	240	58	58	241	58	58	242	58
	243	58	58	244	58	58	245	58
	246	58	58	247	58	58	248	58
	249	58	58	250	58	58	251	58
	252	58	58	253	58	58	254	58
	255	58	58	256	58	58	257	58
	258	58	58	259	58	58	260	58
	261	58	58	262	58	58	263	58
	264	58	58	265	58	58	266	58
	267	58	58	268	58	58	269	58
	270	58	58	271	58	58	272	58
	273	58	58	274	58	58	275	58
	276	58	58	277	58	58	278	58
	279	58	58	280	58	58	281	58
	282	58	58	283	58	58	284	58
	285	58	58	286	58	58	287	58
	288	58	58	289	58	58	290	58
	291	58	58	292	58	58	293	58
	294	58	58	295	58	58	296	58
	297	58	58	298	58	58	299	58
	300	58	58	301	58	58	302	58
	303	58	58	304	58	58	305	58
	306	58	58	307	58	58	308	58
	309	58	58	310	58	58	311	58
	312	58	58	313	58	58	314	58
	315	58	58	316	58	58	317	58
	318	58	58	319	58	58	320	58
	321	58	58	322	58	58	323	58
	324	58	58	325	58	58	326	58
	327	58	58	328	58	58	329	58
	330	58	58	331	58	58	332	58
	333	58	58	334	58	58	335	58
	336	58	58	337	58	58	338	58
	339	58	58	340	58	58	341	58
	342	58	58	343	58	58	344	58
	345	58	58	346	58	58	347	58
	348	58	58	349	58	58	350	58
	351	58	58	352	58	58	353	58
	354	58	58	355	58	58	356	58
	357	58	58	358	58	58	359	58
	360	58	58	361	58	58	362	58
	363	58	58	364	58	58	365	58
	366	58	58	367	58	58	368	58
	369	58	58	370	58	58	371	58
	372	58	58	373	58	58	374	58
	375	58	58	376	58	58	377	58
	378	58	58	379	58	58	380	58
	381	58	58	382	58	58	383	58
	384	58	58	385	58	58	386	58
	387	58	58	388	58	58	389	58
	390	58	58	391	58	58	392	58
	393	58	58	394	58	58	395	58
	396	58	58	397	58	58	398	58
	399	58	58	400	58	58	401	58
	402	58	58	403	58	58	404	58
	405	58	58	406	58	58	407	58
	408	58	58	409	58	58	410	58
	411	58	58	412	58	58	413	58
	414	58	58	415	58	58	416	58
	417	58	58	418	58	58	419	58
	420	58	58	421	58	58	422	58
	423	58	58	424	58	58	425	58
	426	58	58	427	58	58	428	58
	429	58	58	430	58	58	431	58
	432	58	58	433	58	58	434	58
	435	58	58	436	58	58	437	58
	438	58	58	439	58	58	440	58
	441	58	58	442	58	58	443	58
	444	58	58	445	58	58	446	58
	447	58	58	448	58	58	449	58
	450	58	58	451	58	58	452	58
	453	58	58	454	58	58	455	58
	456	58	58	457	58	58	458	58
	459	58	58	460	58	58	461	58
	462	58	58	463	58	58	464	58
	465	58	58	466	58	58	467	58
	468	58	58	469	58	58	470	58
	471	58	58	472	58	58	473	58
	474	58	58	475	58	58	476	58
	477	58	58	478	58	58	479	58
	480	58	58	481	58	58	482	58
	483	58	58	484	58	58	485	58
	486	58	58	487	58	58	488	58
	489	58	58	490	58	58	491	58
	492	58	58	493	58	58	494	58
	495	58	58	496	58	58	497	

PRINT CODE PROCESSOR
by John Worthington and Emil Regelman

This program will permit the convenient storage and manipulation of print code data, up to a total of 14 lines.

Initialization

Press [E'] to clear all previously stored data, and initialize appropriate memories. The 1.01 in the display indicates that the pointer is located at the first character of the first line (L.nn).

Storage of Print Codes

1. To store print codes, enter up to 5 and press [A]. The program will store these codes appropriately. The pointer is adjusted to indicate the next available location. (This operation takes about 9 seconds). Repeat, as desired.
2. When a line of text is completed it is automatically printed.
3. To end a line before 20 characters have been entered, press [A'].
4. To relocate the pointer, specify the line and character position desired (L.nn), and press [E].
5. To print the stored data, press [B]. [B] will only print data up to and including the line indicated by the pointer.

Error Correction

1. Move the pointer to the location of the error as in #4, above.
2. To write over existing text, enter up to 5 print codes and press [A].

To insert print codes into the existing text, press [C]. (If there is a large amount of text after the insertion this operation may take several minutes!)

To delete one or more characters, enter the number of deletions desired and press [D]. If zero is in the display, only one pair of codes will be deleted. (If there are a large number of deletions, this operation may take several minutes!)

SEE PROGRAM NEXT PAGE.

PRINT CODE PROCESSOR

000	76 LBL	060	86 STF	120	52 EE -	180	00 00	240	87 IFF	300	42 STD	360	74 SM*	420	04 04
001	17 B*	061	01 01	121	55 -	181	54)	241	01 01	301	02 02	361	00 00	421	46 +
002	23 INV	062	43 RCL	122	56 EE	182	X:T HIR	242	00 00	302	43 RCL	362	73 RC*	422	55 +
003	28 LRG	063	00 00	123	00 0	183	82 HIR	243	06 06	303	00 00	363	00 00	423	01 1
004	52 EE	064	55 +	124	01 1	184	16 16	244	06 06	304	32 X:T	364	22 INV	424	52 EE
005	54 RTN	065	04 4	125	91 +/-	185	55 +	245	91 R/S	305	71 SBR	365	59 INT	425	01 1
006	54 RTN	066	75 -	126	54)	186	43 RCL	246	43 RCL	306	02 02	366	22 INV	426	00 0
007	76 LBL	067	59 INT	127	65 X	187	01 01	247	00 00	307	67 67	367	74 SM*	427	72 ST*
008	18 C*	068	42 STD	128	34 FX	188	54)	248	75 -	308	82 HIR	368	00 00	428	00 00
009	23 DP	069	02 02	129	22 INV	189	82 HIR	249	05 5	309	14 14	369	29 CP	429	52 EE
010	23 DP	070	54)	130	59 INT	190	68 68	250	85 +	310	61 GTD	370	67 EQ	430	08 8
011	23 DP	071	55 +	131	69 DP	191	64 PD*	251	42 STD	311	15 E	371	03 03	431	75 -
012	23 RC*	072	05 5	132	10 10	192	00 00	252	02 02	312	76 LBL	372	08 08	432	22 INV
013	23 RC*	073	83 +	133	17 B*	193	73 RC*	253	04 4	313	13 C	373	65 X	433	59 INT
014	02 02	074	53 +	134	82 HIR	194	00 00	254	95 =	314	86 STF	374	01 1	434	64 PD*
015	84 DP*	075	05 5	135	06 06	195	75 -	255	61 GTD	315	01 01	375	02 2	435	00 00
016	03 03	076	75 -	136	54)	196	59 INT	256	02 02	316	85 +	376	17 B*	436	69 DP
017	23 RTN	077	43 RCL	137	82 HIR	197	44 SUM	257	67 67	317	28 LRG	377	85 +	437	30 30
018	26 LBL	078	01 01	138	07 07	198	03 03	258	76 LBL	318	32 X:T	378	69 DP	438	95 =
019	10 E*	079	34 FX	139	71 SBR	199	95 =	259	12 B	319	43 RCL	379	20 20	439	74 SM*
020	47 CMS	080	38 LRG	140	00 00	200	65 X	260	98 ADV	320	02 02	380	73 RC*	440	00 00
021	01 1	081	85 +	141	95 95	201	82 HIR	261	03 3	321	82 HIR	381	00 00	441	69 DP
022	76 LBL	082	01 1	142	82 HIR	202	18 18	262	42 STD	322	04 04	382	95 =	442	20 20
023	15 E	083	54)	143	16 16	203	85 +	263	02 02	323	03 3	383	55 +	443	61 GTD
024	88 DMS	084	55 +	144	75 -	204	32 X:T	264	43 RCL	324	77 GE	384	02 2	444	04 04
025	59 INT	085	02 2	145	59 INT	205	54)	265	00 00	325	03 03	385	17 B*	445	14 14
026	04 4	086	17 B*	146	42 STD	206	72 ST*	266	32 X:T	326	46 46	386	72 ST*	446	43 RCL
027	54)	087	44 SUM	147	03 03	207	00 00	267	22 INV	327	00 0	387	00 00	447	02 02
028	42 STD	088	02 02	148	54)	208	69 DP	268	58 FIX	328	95 =	388	61 GTD	448	42 STD
029	00 00	089	25 CLR	149	65 X	209	30 30	269	42 STD	329	29 CP	389	03 03	449	00 00
030	00 00	090	43 RCL	150	43 RCL	210	43 RCL	270	42 STD	330	29 CP	390	64 64	450	57 DSG
031	32 HIR	091	02 02	151	01 01	211	01 01	271	03 03	331	43 RCL	391	76 LBL	451	03 03
032	18 +	092	58 FIX	152	55 +	212	02 2	272	18 C*	332	03 03	392	14 D	452	04 04
033	85 +	093	02 02	153	82 HIR	213	55 +	273	18 C*	333	67 EQ	393	86 STF	453	01 01
034	39 INT	094	92 RTN	154	16 16	214	32 X:T	274	18 C*	334	03 03	394	01 01	454	61 GTD
035	59 INT	095	53 +	155	16 16	215	82 HIR	275	18 C*	335	08 08	395	42 STD	455	91 R/S
036	75 -	096	43 RCL	156	74 SM*	216	16 16	276	69 DP	336	55 +	396	03 03	456	76 LBL
037	01 1	097	01 01	157	00 00	217	95 =	277	05 05	337	16 16	397	43 RCL	457	19 D*
038	54)	098	82 HIR	158	82 HIR	218	77 GE	278	43 RCL	338	95 =	398	00 00	458	05 5
039	55 +	099	47 47	159	17 17	219	02 02	279	02 02	339	16 16	399	42 STD	459	06 6
040	05 5	100	22 INV	160	75 -	220	27 27	280	22 INV	340	71 SBR	400	02 02	460	52 EE
041	75 -	101	64 PD*	161	59 INT	221	65 X	281	77 GE	341	01 01	401	71 SBR	461	01 1
042	59 INT	102	00 00	162	74 SM*	222	69 DP	282	02 02	342	37 37	402	00 00	462	02 2
043	44 SUM	103	63 EX*	163	00 00	223	20 20	283	69 69	343	61 GTD	403	95 95	463	55 +
044	00 00	104	00 00	164	54)	224	01 1	284	61 GTD	344	03 03	404	02 2	464	09 9
045	54)	105	75 -	165	29 CP	225	00 0	285	91 R/S	345	30 30	405	17 B*	465	09 9
046	65 X	106	59 INT	166	67 EQ	226	17 B*	286	76 LBL	346	71 SBR	406	22 INV	466	55 =
047	01 1	107	64 PD*	167	02 02	227	42 STD	287	16 H*	347	00 00	407	59 INT	467	53 INT
048	00 0	108	00 00	168	10 10	228	42 STD	288	43 RCL	348	95 95	408	65 X	468	82 HIR
049	94)	109	54)	169	69 DP	229	25 CLR	289	02 02	349	93 93	409	43 RCL	469	05 05
050	85 +	110	65 X	170	65 X	230	43 RCL	290	59 INT	350	00 0	410	01 01	470	82 HIR
051	01 1	111	92 RTN	171	65 X	231	02 02	291	82 HIR	351	01 1	411	95 =	471	06 06
052	00 0	112	76 LBL	172	01 1	232	59 INT	292	04 04	352	82 HIR	412	74 SM*	472	82 HIR
053	95 =	113	11 A	173	52 EE	233	32 X:T	293	65 X	353	52 HIR	413	00 00	473	07 07
054	17 B*	114	22 INV	174	01 1	234	43 RCL	294	04 4	354	41 41	414	69 DP	474	82 HIR
055	42 STD	115	58 FIX	175	00 00	235	00 00	295	75 -	355	95 =	415	20 20	475	08 08
056	01 01	116	55 +	176	82 HIR	236	55 +	296	01 1	356	65 X	416	73 RC*	476	69 DP
057	76 LBL	117	52 EE	177	08 08	237	4 4	297	82 HIR	357	43 RCL	417	00 00	477	05 05
058	91 R/S	118	53 +	178	22 INV	238	95 =	298	34 34	358	01 01	418	39 CP	478	61 GTD
059	22 INV	119	53 +	179	64 PD*	239	59 INT	299	34 34	359	95 =	419	67 EQ	479	91 R/S

PARABOLIC CURVE FIT.- Bob Patton, Arlington, Texas, wrote this program. It does a
----- least squares fit to a parabola according to:

$$y = A + Bx + Cx^2.$$

It gathers sums and solves the following equations using PGM 02 of the ML-module:

$$nA + \sum xB + \sum x^2C = \sum y$$

$$\sum xA + \sum x^2B + \sum x^3C = \sum xy$$

$$\sum x^2A + \sum x^3B + \sum x^4C = \sum x^2y$$

and the correlation coefficient

$$r^2 = [B(\sum xy - 1/n \sum x \sum y) + C(\sum x^2y - 1/n \sum x \sum xy)] / [\sum y^2 - 1/n (\sum y)^2]$$

Recording instructions:

1. Put your calculator in 8 OP 17 partitioning and key in program and data registers.
2. Put the calculator in 6 OP 17 partitioning and record banks 1 and 2 on a mag card.

User instructions:

1. Load sides 1 and 2.
2. Press 2nd A'. Titles are printed.
3. Enter data: x_i , press A; y_i , press B. Repeat this step for all data pairs.
4. To remove data: x_i , press A; y_i , press 2nd B'.
5. Solve determinant, press C. A, B and C printed.
6. Solve correlation factor, press D. R^2 printed.
7. Find predicted values: x, press E, see \hat{y} .

3313251314.	60	000	76 LBL	064	65	128	43 PCL	191	05	5	254	20	20
3237241510.	61	001	16 A'	065	33	129	01 01	192	69 DP		255	95	+
1541354217.	62	002	47 CHS	066	65	130	32	193	04 04		256	91	F 3
31243700.	63	003	03 2	067	44 SUM	131	55	194	43 PCL		257	76 LBL	
450064.	64	004	69 DP	068	13 12	132	43 PCL	195	32 22		258	10	E'
13004700.	65	005	17 17	069	44 SUM	133	03 03	196	69 DP		259	43 STD	
1444004700.	66	006	06 6	070	15 15	134	35	197	06 06		260	00 00	
1544700000.	67	007	00 0	071	43 PCL	135	42 STD	198	98 ADV		261	73 PC+	
16.	68	008	50 1-1	072	07 07	136	38 38	199	06 6		262	00 00	
1737173510.	69	009	06 6	073	35	137	03 3	200	69 DP		263	69 DP	
2431133137.	70	010	04 4	074	44 SUM	138	42 STD	201	17 17		264	01 01	
0.	71	011	10 E'	075	16 16	139	07 07	202	21 F 3		265	69 DP	
16133713.	72	012	69 DP	076	43 PCL	140	06 6	203	76 LBL		266	30 30	
		013	00 00	077	03 03	141	08 8	204	19 D'		267	73 PC+	
		014	43 PCL	078	31 31	142	10 E'	205	25 +		268	00 00	
		015	72 72	079	76 LBL	143	36 PGM	206	01 1		269	69 DP	
PARABOLIC CURVE FIT		016	69 DP	080	13 C	144	02 02	207	09 9		270	02 02	
Y = A + BX + CX^2		017	02 02	081	43 PCL	145	13 C	208	36 =		271	69 DP	
DATA		018	69 DP	082	06 06	146	98 ADV	209	42 STD		272	30 30	
0.	X	019	05 05	083	42 STD	147	04 4	210	00 00		273	73 PC+	
3.135	Y	020	98 ADV	084	34 34	148	42 STD	211	32 STD		274	00 00	
0.1	X	021	25 CLR	085	75	149	05 05	212	76 LBL		275	69 DP	
3.23	Y	022	21 F 3	086	43 PCL	150	43 PCL	213	14 D		276	03 03	
		023	76 LBL	087	04 04	151	17 17	214	03 3		277	29 DP	
0.2	X	024	11 A	088	42 STD	152	12 D'	215	05 5		278	30 CLR	
3.253	Y	025	42 STD	089	09 09	153	41 PCL	216	07 7		279	73 PC+	
		026	07 07	090	42 STD	154	32 23	217	00 0		280	00 00	
0.3	X	027	42 STD	091	11 11	155	72 ST+	218	69 DP		281	69 DP	
3.261	Y	028	08 08	092	65	156	00 00	219	04 04		282	04 04	
		029	49 FRD	093	43 PCL	157	43 PCL	220	40 PCL		283	69 DP	
0.4	X	030	08 08	094	01 01	158	18 18	221	21 21		284	05 05	
3.261	Y	031	32 XIT	095	42 STD	159	19 D'	222	65		285	32 STD	
		032	04 4	096	23 23	160	43 PCL	223	43 PCL		286	76 LBL	
0.4	X	033	04 4	097	55	161	24 24	224	36 26		287	17 E'	
3.252	Y	034	69 DP	098	43 PCL	162	72 ST+	225	35 +		288	49 FRD	
		035	04 04	099	03 03	163	00 00	226	43 PCL		289	08 08	
0.5	X	036	25 CLR	100	42 STD	164	43 PCL	227	32 22		290	32 XIT	
3.223	Y	037	21 F 3	101	08 08	165	19 19	228	65		291	69 DP	
		038	76 LBL	102	35	166	19 D'	229	43 PCL		292	06 06	
0.6	X	039	12 E	103	42 STD	167	43 PCL	230	27 27		293	02 2	
3.181	Y	040	49 FRD	104	26 26	168	52 25	231	35 =		294	00 0	
		041	02 02	105	43 PCL	169	72 ST+	232	35 =		295	07 7	
0.7	X	042	32 XIT	106	25 25	170	00 00	233	43 PCL		296	07 7	
3.127	Y	043	69 DP	107	75	171	36 PGM	234	28 28		297	69 DP	
		044	06 06	108	43 PCL	172	02 02	235	35 =		298	04 04	
0.8	X	045	04 4	109	05 05	173	15 E	236	69 DP		299	43 PCL	
3.059	Y	046	05 5	110	42 STD	174	01 1	237	06 06		300	07 07	
		047	69 DP	111	10 10	175	03 3	238	98 ADV		301	32 XIT	
		048	04 04	112	42 STD	176	69 DP	239	21 F 3		302	69 DP	
		049	43 PCL	113	12 12	177	04 04	240	76 LBL		303	06 06	
		050	07 07	114	42 STD	178	43 PCL	241	15 E		304	98 ADV	
		051	32 XIT	115	14 14	179	20 20	242	65		305	22 INV	
		052	69 DP	116	65	180	69 DP	243	53		306	78 2+	
		053	06 06	117	43 PCL	181	06 06	244	24 CE		307	43 PCL	
		054	38 ADV	118	01 01	182	01 1	245	55		308	08 08	
		055	78 2+	119	55	183	04 4	246	43 PCL		309	22 INV	
		056	43 PCL	120	43 PCL	184	69 DP	247	22 32		310	44 SUM	
		057	08 08	121	03 03	185	04 04	248	35 +		311	25 25	
3.134242424	A	058	44 SUM	122	95	186	43 PCL	249	42 PCL		312	43 PCL	
.4529220774	B	059	35 25	123	42 STD	187	21 21	250	21 21		313	07 07	
-.7807359301	C	060	43 PCL	124	27 27	188	69 DP	251	34 +		314	34 +	
		061	07 07	125	43 PCL	189	06 06	252	85 +		315	61 STD	
.9990009132	R2	062	76 LBL	126	02 02	190	01 1	253	43 PCL		316	85 +	
		063	85 +	127	75								

PRINT CODE TABLE.- P.D. Forbes of Philadelphia, PA gave me this chart at the recent
----- seminar in that city. His comments:"I found that entering print
information was slow enough without the added disadvantage of trying to read the chart
in the manual. Maybe the large print says something about the creeping myopia of age."
All us older fellas thank you, Don.

	0	1	2	3	4	5	6
00	01	02	03	04	05	06	07
7	8	9	A	B	C	D	E
10	11	12	13	14	15	16	17
-	F	G	H	I	J	K	L
20	21	22	23	24	25	26	27
M	N	O	P	Q	R	S	T
30	31	32	33	34	35	36	37
•	U	V	W	X	Y	Z	+
40	41	42	43	44	45	46	47
x	*	√	π	e	()	,
50	51	52	53	54	55	56	57
↑	%	:	/	=	'	x	\bar{x}
60	61	62	63	64	65	66	67
$\frac{2}{=}$?	÷	!	∏	Δ	∏	Σ
70	71	72	73	74	75	76	77

NEWCOMER'S CORNER.-Subroutines. The Personal Programming manual states on page IV-47:
 ----- "Actually, up to six return addresses can be stored in the subroutine return register at any one time. This means that a subroutine can contain and use or call a subroutine that can also call a subroutine, etc. up to six times." Then, towards the bottom of the page comes the most important part: "When a program part is labeled with a user-defined key, that part can be executed from the keyboard simply by pressing the applicable key as we have seen. The same thing happens when one of these keys is encountered in a program - the program pointer goes to that label and processing continues. These user-defined keys have an automatic SBR instruction built in. So, if you label a program part with a user-defined key and end it with INV SBR, that part is processed just as though you had called it with a the SBR instruction."

I get letters, sometimes up to fifty a day. Among them I find people saying: "I wrote this program (enclosed) which does a certain routine six times. Then it goes haywire."

Or I teach TI-59 seminars and one of the more advanced students approaches me with "Somebody at the office wrote this program. It works alright, as long as I don't tell it to go through the loop more than six times. Otherwise it prints all kinds of garbage."

In all of these cases you can be sure they are suffering from subroutine trouble. And especially the kind where user-defined labels are involved.

Take, for example, this sequence:

```
LBL E .....ADV E ( the writer told me that his common label routine always
worked alright: LBL COS .....ADV GTO COS.)
```

The LBL E routine executes six times and goes to never-never land. Why? Because the call to E after the ADV is in reality a SBR E call. It is as if you nested six subroutines into each other. The remedy? Simply say "GTO E". That is the reason why the common label version always worked, because it does not say "SBR COS" but "GTO COS. When the command GTO is used, no address is stored and thus no return register can get full. But if you say simply E, you say in effect SBR E, and each time the contents of the subroutine return register is increased by one. When it reaches seven it lets you know that you broke the rules and refuses to go on.

A mechanical engineer in one of the seminars had a rather involved program, which he wrote himself. From the coding one immediately recognized an experienced programmer. He stated he just attended the seminar "to pick up a few pointers here and there." Ironically, the "pointers" were his downfall. After cutting through all the "hash" his program boiled down to:

```
LBL COS.....GTO SIN. Then somewhere else LBL SIN.....GTO +. And finally
at the very end of his program LBL + .....SBR COS.
```

Again, the same complaint: the program iterates six times, then it stops and winks at you." The SBR COS is, of course, the offending sequence. Replace it with GTO COS and the program will iterate till the year 2000 and beyond.

On the other hand, some people believe that, by placing a RTN (INV SBR) instruction at the end of a branch, they effectively convert it into a subroutine. Wrong!!!

The instruction following immediately after a comparison is always a branch and cannot be converted into a subroutine by simply placing a RTN at the end:

```
....RCL NN X>T COS PRT R/S LBL COS.....R/S or GTO NNN or GTO some(common)label.
```

The COS after the comparison is a branch and, as branches on a tree, never returns to the main tree. If you insist to make LBL COS a subroutine, go ahead and end it in RTN But then re-write your main program as

```
.....RCL NN INV X>T PRT SBR COS LBL PRT PRT R/S LBL COS.....RTN
```