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(J.E.McGECHIE)
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John McGechie (3324)

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## BILL WICKES' SYNTHETIC PROGRAMMING MANUAL

This was mentioned in Technical Notes #2. (See p.63.) On Press Day I made three complete photo copies while the slaves were collating #2 upstairs, and by now quite a few have read and digested the contents of this remarkable document. Bill sent it to me for our reaction and constructive criticism, but it is so very good already that many who have been working on it are simply blinded by its present excellence. If you don't suffer too much from stars in your eyes and are willing to work hard at it, contact me to get hold of a copy. Not too much praise, now, look for ways in which it can be improved, made easier to follow, made of even more use to those who study it. As with the PPC ROM, here is a way in which we can make a real, even though small contribution. (Remember that Bill was born here in Melbourne. Explains a great deal, of course...) I have sent Bill several long and detailed letters already, but being hooked by the subject matter, tend to be biased in favour of the subject. Some here are, or have been almost hostile to the topic (mother HP in her wisdom put on the keyboard all on this 41c that we may know and need to know... If she thought it necessary, there would not have been an angelic microcode bar to the tree of the knowledge of status register access, synthetic text lines....) Forbidden fruit is delicious! Synthetic programming is not always the answer to every problem, and often, after hours of exotic code generation one finds that the normal functions <u>are</u> shorter and faster after all. It is, however, an enormously valuable extension of the repertoire of the efficient programmer, and should be seen in just that way. Imagine what those Grundys would have been saying if HP had left it to their users to discover the indirect functions on the 41c - simply by leaving that feature out of the programming manual. The same things, no doubt, would have been said of them.

## MORE PPC PUBLICITY

Hugh Kenner, one of the PPC foundation members, no. 103, has been commissioned to write an article for a new magazine likely to reach an audience of perhaps a million, an article on the Club and its most active members, but especially on the synthetic programming activity. This has been, of course, an extension of the NNN activity on earlier machines, and no doubt Hugh will be covering that as well. He wrote to me recently, wanting to know what makes us tick, or perhaps rather, what we suppose makes us tick. Why the captivity of programming? I'm told, or rather my wife is told, by sympathetic friends, that it lasts for approximately ten years - she is taking it very well. The figure may not be reliable, of course. As it is only eight since the HP-65 started to weave the spell, we can't rely on mere computer derived figures. Anyway, do you think you know the answer? I have some ideas that fit my own case, but they can't readily be generalised. Let me know. Apparently the news of synthetic programming is interesting the technical press: Bill Wickes tells me that he is being sought out by reporters, most of whom spend as much as two hours asking questions. (Now what is the explanation of <u>that</u>, pray?)

# P P C C L U B

# M E L B O U R N E C H A P T E R

# N E W S L E T T E R

# O C T O B E R - 1 9 8 0



The main meeting for October is to be held at the usual time and place on October 28th - Monash University, Menzies Building, room 903, 9th floor, 8pm. Richard Collett will be telling how he burrowed under the skin of the HP-34c and discovered its hidden secrets, there may be cards to be collected from our third bulk purchase (at the time of writing about half are bespoken), and several HP-41c's are planned to be filled with interesting programs for you to try. Fred Roche has been busy working through the Holdings Forms (over 30 of these) and preparing a listing of their contents. While there is as yet no news of the belated arrival of the wand in Melbourne, several of us have plans to do something about this, and will report to you at the meeting. There are further interesting things being found out about the 41c (see Overseas News), using a new technique due to Charles Close, and if they are wanted, the latest programs for that machine will be available from several of us. Ron Eades should be in a position to report on our finances, and both PPC Technical Notes and this Newsletter should be registered with Australia Post. If the pattern of the September meeting is any indication, local activity is accelerating, and this meeting should be even livlier. Expect at least five new faces. Telephone inquiries have increased, and are running at the rate of four each week. I have produced a new stack and alpha analysis form - collect a copy at the meeting to multiply as you wish by photocopying.

*See later*

*PPCTN #3*

## CLOSING RANKS

Last month's Newsletter was the last in another sense - except to new inquirers, copies will be sent only to financial members of our local Chapter, and to overseas correspondents and Chapters. All on our mailing list were sent last month's Newsletter, but the second Technical Notes went only to the financial. The final edition was just under 90 copies, whereas the edition of no 1 was 120. That and the August Newsletter went to all on our mailing list. Both issues seem to have been well received here and overseas, judging from the letters Ron Eades and I have received. While the mailing costs have been too high, something that should be remedied by the pending Australia Post registration, production costs are very low. Each side of an A4 sheet costs only one cent: thus the cost of each copy of no. 2 was 32c. To that must be added photoreduction at 5c. per button push, but that spread over about 100 copies is negligible.

## *NOVEMBER MEETINGS*

*Editorial meeting: Wednesday, November 7th.*
*Tutorial session: Wednesday, November 12th.*
*Monthly meeting: Tuesday, November 25th.*

*NO FORMAL MEETINGS IN DECEMBER*

THE SEPTEMBER MEETING

This took place as scheduled - on the 23rd. More than usual turned up, and when I arrived, a little late, the meeting room was alive with activity. Ron Eades was collecting subscriptions, counting out magnetic cards, writing receipts, several card copying/swapping sessions were on, and the look of one group hunched over an operating 41c demonstrated its being made to byte-jump. The Canon BX-10 was receiving some slightly puzzled attention - equipped with a manual for an earlier model, three were engaged in 'Hunt-the-key', and fighting with arguments for competing conjectures about the habits of programmers who spoke Japanese. (It was found later.) There was a large box at the front of the room half full of PPC Technical notes #2, and the Newsletter (which had received some of the overflow at the last minute).

The formal meeting didn't really get under way for about half an hour, once Ron had managed to deal with money gathering matters and start shouting above the din. No formal topic had been arrangedand the 3/4 hour that this phase lasted was occupied with discussing finances and organisational matters.

There was some discussion of the second Technical Notes, but since only a handful had seen it before the meeting, that didn't last long. None complained this time that it was too technical as they had about the first issue, but there was some discussion, carried over from the previous meeting, about the proper methods of documentation of programs. Ron argued for the HP Users' Library systematic methods and categories of information about programs and drew attention to the supply of HP-41c Users Library forms which had been supplied by Jed Maartens. One or two horrors were cited (the offenders, anonymous, took note), an account of the production of PPCTN no. 2 was given, members with time and ideas or willingness to help in selection, typing, editing, were invited to participate in planning the next issue - or to offer advice if unable to come to the editorial planning meeting. The date of October 8th was proposed for this, though it subsequently lapsed, and had to be held later. (See later for details.) Topics for the next tutorial session were invited, and after some discussion, programming calculators to do formal logic was selected at the suggestion of several engineering students who had encountered the subject in their courses (of logic, that is, not its calculator programming). That, then, is scheduled for October 15th, a date in the past for those reading this.

The latest news from overseas was given, including rumours of new machines still in the pipelines of You-Know-Who and that Other Kind. Most of us seem to expect the direction that will be followed to be that of the pocket computer with many built in functions - a direction pointed by the Sharp PC-1211. Otto van Look, at the first local meeting for several months, had brought one of these, and also another machine of the same size and format - a Sharp multi-lingual pocket translator. This accepts plug in modules for additional languages, while the basic machine is the master of two. (A few more details of this later on.)



Personally it seems sad that the computer, in shrinking, will gobble up the programmable calculator, since the programming language of our calculators, extended to allow string manipulation of the kinds common in computers, has many advantages. Another instance of the inertia of our species - too many 'speak' Basic, or another programming language, everyone has heard about computers, and calculators are those cheap things used for balancing cheque (=US check) books, aren't they?

A long and fascinating letter from Valentin Albillo had arrived a few days before the meeting, reporting on his latest incredible work (see Overseas News), producing delighted cheers, *PPCTN #3* especially when it was observed that he was one of the two or three overseas members of our Melbourne Chapter. (We are prepared to take all credit, of course...) The suggestion about a survey and report on the contents of Display was taken up, and with the help of Joe Hannigan and Jed Maartens we should have information for the November meeting, if not sooner. After this slightly more formal session, in which the only really firm decision was that the collection for coffee be discontinued (the hand that is in the till buys the coffee), the former active buzz resumed, the BX-10 torture resumed, and Cary Reinstein's new and delightful Star Trek program multiplied, probably beyond necessity. Some diehards were still hard at it at 12.30 am, but the last left with me at 12.45.

A WORD OF THANKS AND APPRECIATION

The help and advice given at the editorial meeting in September was very valuable. Richard Kahoutek had had one of Valentin's papers retyped by a reluctant but obviously quite expert typist in his Department at Melbourne University, Ernie Gibbs prepared follow-up material with an adapted version of Valentin's program, and prepared the article on a novel printer justifying method he had devised (casually mentioned at that editorial session, and taken up with enthusiasm). These were written up on a terminal in the Monash Computer centre, using a word processor package available on one of the computers. We may be using this again later on. Robert Groom and Geoff Smith had typed their own contributions (or tricked others into doing it for them), while I wrote up Alf van der Poorten's and Tom Cadwallader's items from their letters, and typed up the execution times note. The other small items were added as space fillers on the evening before the mighty presses began to roll. That was on the Sunday before the main meeting, when Andris Kaimins, Robert Groom and David Nicholson turned up at Monash and worked very hard with me from 2 pm through to after 8. They helped run off the Newsletter and Technical Notes, collated and stapled the lot, then helped on a 'stuffing' session with some copies of Technical Notes and the newsletter, and all the rest of the copies of the Newsletter. By their own confession, they enjoyed it too. (Who said hair shirts were a thing of the past?) Our second issue, then, was the result of the efforts of a team, and I think was much the better for it. With more experience we should be able to organise a systematic schedule for such things, and will take advantage wherever we can of any offers to assist. Unfortunately those copies of Technical Notes not collected at the meeting were delayed in posting - even more so when I ran out and had to run off another 20 copies, My apologies, especially to our overseas people, some of whose copies were not mailed until a week after the meeting.

And on that note of appreciation: John Kennedy, writing after he had received the first Technical Notes commented that I would now be in a better position to appreciate Richard Nelson's astonishing contribution since 1974 to our art. I'm sure he is right, there is a quite surprising amount of very hard work in this thing. I doubt whether I could keep it up for so very long. There is a lesson in this too: it is seductively easy to sit back and criticise, non-constructively, and easy too not to realise the appropriate answer: pitch in and show how to do it better. Don't snipe at Richard, then, he is doing an incredible best.

## THREE NEW KEY ASSIGNMENT PROGRAMS

Nothing ever really stands still, it often seems, and this is certainly true of key assignment programs. Locally, both Geoff Smith and Richard Collett have been busy recently in this area. Geoff was all for economy, while Richard was going in for elaboration. (With the HP-41c, it is not appropriate to make remarks about bells and whistles any longer, what with all its TONEs, and talk about flag waving is likewise disbarred.) Richard had swapped his 34c for a week with a friend's 41c, and the results were very good. Both of these will be in the next Technical Notes. The third new program, or rather set of programs, is by Roger Hill, and is a candidate for the PPC ROM. Even the most recent of the key assignment programs I had written needed care in its use, especially when program space was beginning to run out, since there was no warning of over-running the 'permanent' END, the .END., and dumping a register's worth of assignments on top of it. It had (they had) another disadvantage, in that unless the contents of the register keeping a count of the number of assignments, or rather of assignment pairs, had had its contents preserved, when executing 'KAC' would load in further assignments without disturbing the old ones, starting afresh would overwrite the existing assignments, and leave any keys not used the second time around, with default functions. Both Richard's and Roger's programs avoid these two faults. In addition, both provide rapid clearing of all existing assignments, as well as allowing assigning a single key at a time. (With the steam-driven older KA's, at least two assignments had to be effected at a time.) Now there is a brand new feature, which the 41c itself lacked, and which should have been written into its microcode by HP: packing of the key assignment registers. If, say, ten keys are assigned, and thus five assignment registers are used, clearing one of the two assignments in each of those five registers does nothing toward freeing further registers for either more key assignments, or program use. PACK, there, does not pack, unless there is a whole register clear to be recovered.. Roger Hill has fixed that. His 'PKA' packs those assignments, and would squeeze five assignments, occupying five registers, one per register, into two and a half registers, thus freeing two in the way that the 41c should. Roger's routine seems very efficient, and executes quickly, considering the hard work it has to do. I expect that Roger's program set, seriously proposed for the ROM, will be in the next Journal, due very soon I expect, so we will not put them in PPCTN this time, but a set of cards for the whole ROM synthetic program contents can be provided by our librarian, Fred Roche, and several of us have sets also.

## NEW WICKES' TRICKS

Bill Wickes has been at it again, despite his very hard work on the manual. He sent me a short routine to put the pointer in the last file of program memory - very convenient when there are more than a few ENDs and global labels in memory and you are looking for that last file. There is such a routine in the proposed ROM set, though I have not checked to see whether it is the same one.

Sharp eyed readers of our Technical Notes would perhaps have noticed that the new Black Box programs in TN #2 made judicious use of register P. The last three bytes of this register are the three left-most bytes of the alpha register, the remaining four being designated as 'scratch'. (Now there's an odd term for you! Suggests all sorts of very bad puns...) This scratch is also a temporary rubbish basket for the alpha register, Bill found. As these things always are, obvious - once thought of. It took Bill to do so, as so often happens. I have not yet myself fully explored this,

but when 28 characters are keyed into alpha, the first four are supposed to be lost. (You will have heard four protesting bips as the last four on the right were keyed in.)

Despite mother HP's testimony to the contrary, those 'lost' four are all in P, and can be immediately recovered by a RCL P, or a similar instruction. This immediately suggests many more uses of P, with due caution until we have found out just when those leftmost four bytes of P are disturbed by other operations - e.g. shifting bytes left, temporary storage, and so on. Some alpha manipulations, though I am not sure quite which, will alter the fourth byte, while leaving the others untouched, as I found to my disappointment when developing the RH alpha slicing routines described (I hope!) in this month's Technical Notes. So here is s nice little research project for you, dear reader: to ascertain the conditions under which P is preserved, and if changed, what changes take place. This is true of all the four registers used for scratch, in whole or in part. Tom Cadwallader found out ages ago that Q contains the absolute addresses in mainframe ROM of the locations in microcode of the corresponding microcode routines when its contents are recalled immediately after such a function has been assigned. The same was true, as Tom also found, of the key codes of the keys. Q is used, by the 41c itself, to assemble the contents of the assignment register about to have a key assignment stored in it. That is 'Q-loaded', in the same way as the alpha text is when a global label is being keyed into program.

The point is this: by now we should have worked out which scratch is being used, and for what, and when (and by whom?). So far, apart from Tom Cadwallader's methodical explorations of Q, whose results should by now be available to all, we know very little. Hardly any such information is useless, whatever the Grundys in our midst may think. Even when there is no immediate application, and even when no application is found, it still affords insight into internal operation, and that kind of insight frequently has quite practical application. Aside, then, from this speculation and exhortation, the message is this: under some circumstances, we have a 28 character alpha register, not just one of 24.

Since the first of this item was typed I have been able to find a way to exploit this new information. I had been working on further routines for the word processor programs - specifically on routines which would effect right and left justifications of text previously keyed in. I had been working on one register's worth of alpha characters at a time, which seemed to require a fair overhead in the way of program bytes. It would be good to be able to work on a whole 24 character line of text, and to effect the right justifying in the alpha register with all characters in place. The idea was to search from the right, slicing a digit at a time until a non-space was encountered, then to search for the next space, and insert those end-of-line spaces to displace the last word to the right hand end of the line. (With too many spaces they should, of course, be distributed between the words, and not all be in a clump of three or more.) To do this, I needed a routine that would slice the rightmost character from alpha for test comparison purposes. With only six at the start, or even twelve, that is not too difficult, but with 24? And it had to be compact and fast, using as few registers as possible. By employing the new property of P, I was able to write a slicer subroutine for up to 22 characters using only 35 bytes, but one for the full 24 took over 80, though I have hopes of improving on that. Without using the property? Very slow, with a large overhead, I would guess. Bill' new information arrived just in time.

THE PPC ROM MODULE

*lo - in :he Sept. ournal*

On October 9th a letter arrived from Keith Jarrett enclosing a listing and a brief description of the currently proposed contents of this very valuable item. I will reproduce it in Technical Notes no. 3, and if that issue is not out in time for the October meeting (likely), will circulate copies of it with this Newsletter. We have a collective responsibility here. All who care about the matter should examine those programs very carefully indeed, try them out for themselves, bearing in mind their ease of use, their execution speed, their compactness, and their utility. Richard Nelson hopes to have the final versions of these lodged with HP by the end of the year, or early in 1981. The modules should be available quite soon after. I intend to key up these programs as quickly as possible, probably enlisting the help of others, with the idea of having complete sets of cards ready for copying at the tutorial session and at the main meeting. Try them, as quickly as you can, pass on your reactions to me, and I will transmit them back to the ROM committee members - mainly to Keith himself. Remember that if it is possible to shorten them, there may be room for further routines. Here is some pleasant hard work you can do that will pay dividends for us all. Since they only arrived this afternoon (this is being typed on the evening of the 9th), I've not done more than glance over them, but there should be more comment below. There could well be a second PPC ROM next year, and whether there is or not will very much depend on the response to this one. Some months ago I asked in this Newsletter for local commentary on the ROM and heard very little. Don't let that happen again. (Informed sources in the US believe we hold our 41c's upside down. What they don't know is that we are the ones who have discovered the ghost keys all over the surface of the battery pack. It must be made manifest that we are the ones who have them the right way up, and here is the chance.)

SOME ROMDOM THOUGHT ABOUT THE ROM

We have to be quick off the mark if we are to get our names on the order list for the ROM, it seems, and the more of us that order them, the lower the price should be. LOOK VERY HARD, THEN, AT THE LISTING AND DESCRIPTION IN THE SEPT. JOURNAL! Get a set of cards at the meeting to save the effort of keying them in (over 15), and try them out, compact them if you can, and write to Keith Jarett. A few things for starters: no labels, even though they may be coded in the ROM by only two bytes, should have more than three alpha characters - it is very tedious to key in as many as seven or six, or even five, when a manual or program execution is demanded. Secondly, no single letter alpha labels should be used - see, for example, the SIZE finder with label "S", and when only two are used, they should be uncommon pairs, unlikely to be wanted in RAM programs. Some further general observations may be in place.

Virtually all the routines that use RAM addresses in any way, use the absolute addresses in decimal form, even though the 41c uses hex coding for the registers. Some, such as STAX and RCAX have to have this absolute address, and need it for a B2 kind of application. As a result, when you wish to use such routines, you must first decode the pointer, obtained by a RCL b, operated at the storing or recall location. That address must then be coded into a register c format used for pulling down the veil. Why not do both at the same time? RCL b at the wanted location, and execute STAX or RCAX. The stack need not even be disturbed, apart from the RCL. Then what are you going to store there anyway? An NNN of course (of course, almost always). How to get that? You have to painfully key in 14 alpha char-

acters into alpha, and then wait, fretfully sitting on your hands, for it to be made. Using the decimal byte numbers has become second nature by now, and they are used for the elegant key assignment program. Can't they be used here? An NNN is completely specified by seven such numbers, and many know quite a few off by heart. (127 is append, or CLD or e, 144 is RCL, etc., etc.) An artificial B2 will be storing BYTES into program, not digits, and they should be specified by an NNN routine, readily added to the key assignment program, and using its subroutines. (So put your programming where your mouth/typewriter keys is/are! So I will...) Without belittling Bill Wickes beautiful new hex-in-alpha-to-NNN-in-X routine, it is 170 bytes, and a decimal byte number to NNN need take no more than about 20, freeing another 150bytes for some other purpose.

Similar remarks apply to Roger Hill's C↑D and D↓C. If you need to know the ASCII code/decimal byte no of the last character is alpha, RCL M, and decode, and if you want to append a specified byte to alpha, use again the routines of the key assignment set.

A final query: do we need to use bytes for such long alpha prompts? Nice to have, but costly. A quick check suggests that about 70 to 80 could be saved by contracting the prompts in those 3000 odd bytes. Over 8000, that may mean another valuable routine could be fitted in.

Sitting back and sniping like this won't do, of course. WE (I) must detail the amendments, and argue for them, and try the amended versions carefully. We must help, not hinder the ROM committee in their work. My only reason for making these remarks here is to suggest the kinds of things we can do. A CONCRETE suggestion, then: lets make the ROM the topic of the next tutorial session? You will have plenty of homework to do for it, so don't hesitate, start on it now, and come to that session thoroughly clued up. The ideal is to compact the routines already published, or if not that (since all would be nice to have), to propose alternative ways of effecting the same ENDs.

THE SYNTHETIC PROGRAMMING MANUAL AGAIN

We may be able to economise on this by placing a bulk order for the Chapter. When the attendance form makes its rounds, indicate on it whether you want one. (You are mad if you don't...) Those not at the meeting could ring me, or write to let me know. The main saving would be on postage. As a tantaliser: Bill writes that it will contain some new tricks - a simple method to place any 15 bytes in a program text line - or less, of course. Don't ask me how, he didn't say, maddeningly, just revealed it in confidence to two others to test out. It's afforded a new bug for me - been bugging me ever since.

THE WAND IS HERE!

Completely out of the blue, as they say (as who says?), Otto van Look received the first order of wands on October 14th, the day before the tutorial meeting. As it happened, I had called in to buy some card wallets (over 200 cards in two wallets is no joke), and spent some time with Otto experimenting with bar code photo copies. All three Sharp copiers made excellent, readily read copies, even unto the second and third generation, though the intensity setting becomes critical, and the latitude smaller as the number of generations increases. (Lighter, rather than darker settings seemed best.) The wand I carried away with me seems to be free of crash inducing features of the kind I had noticed with the pre-production model we had been lent before (was that a reason for the delay?), and all the code in the recent copies of the Journal is very easily read.

I gather that there are some differences between wands apart from this, and they may account for several anomalies I noticed in reading some of the codes in the latest (September) Journal. Jake Schwartz must have either a different wand model from the one I have, or his 41c behaves differently, but none of the bar codes on pp.22-3 of the Journal insert append text lines in my 41c, as described in Jake's article, and all of the En and Fn codes cause my calculator to crash, needing a battery removal for recovery, when they are read in RUN mode. That wouldn't be such a hardship, but they don't put the bytes into alpha either! In addition, the RCL M, STO Q codes do not execute in RUN mode, as I had inferred from Jake's article, but rather put the two instructions into program, replacing any program at which the 41c is currently positioned. It is still possible, except for the En and Fn bytes, to read them into alpha in RUN, read a RCL M and STO Q into program, and operate the Q loader after single stepping on those two in program. Have I utterly missed something? If a bar code manual is to be produced, these oddities will have to be cleared up first.

And we are not doing so badly after all - some places in the States are still without supplies...

One important difference: this wand reads code much more readily than the other one I had tried, even the very small samples in the Journal, and the code in the Wand Manual has been very much improved, being twice the height it was in the original copy, and there are several new wand programs at the back. Better all round - except for the local price - $142 before tax, in comparison with the US price, according to Graeme, of US$120.

TECHNICAL NOTES #3

There is enough material to hand to produce this very soon, but not in time for the October meeting. Early November seems feasible. A new method of printing will be used. For an overall cost of 2.3 cents per A4 sheet, printed on both sides as at present, from the equivalent of four original A4 sheets, we will be able to have a complete edition run off in about two hours. The reduction quality will be equal to the PPCJ at its best, but a fixed reduction of the same order as the xerox 5 will have to be used. For program listings, a column format of single width printout will be used, but in the original size. Several remarked to me that the listings that have appeared to date were not clear enough to read accurately. When this is not done, we will make double width listings to be photoreduced with the rest of the text.

Many had hoped that we could go to double columns on an A4 size page, but for each such page a plate would need to be produced at a cost of ove $10. Since an edition in the present A5 size format of 100 copies will cost only about $35, and would cost up to $100 more, we will have to stick to the existing size. There are other ways that can be explored, and I may have more information at the meeting.

The good news in this area is that both the Newsletter and Technical Notes are now registered with Australia Post, which should cut our mailing costs to half or a third of what they have been.

More at the meeting, then!

John McCredie (3324)

*The PPC Club Melbourne Chapter Newsletter, with PPC Technical Notes, is registered for transmission by post (Category B).*