OTTAWA IBM P.C. USERS' GROUP NEWSLETTER

Feb 15, 1986 -- issue 86(1)

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Executive:

		home:	work:
President:	Gord Hopkins	828 - 3834	726 - 3590
Past President:	Harry Gross	733 - 7989	----------
Treasurer:	Mike Luckham	832 - 3829	592 - 6500 x 2034
Secretary:	Eric Clyde	749 - 2387	993 - 3291
Membership Secretary:	Anne Moxley	592 - 4993	230 - 9096
Meeting Facilities:	Stu Moxley	592 - 4993	----------
Publicity:	John Pryzbytek	231 - 4318	----------
Software Librarian:	Chris Taylor	727 - 5453	995 - 4987
Assistant:	Michel Lemire	568 - 8429	993 - 5033
Assistant:	John Ings		
Newsletter Editor:	Sandy Harris	230 - 5201	238 - 6709
SIG Co-ordinator:	Chris McKelvic		
Bulk Purchasing:	Terry Mahoney		
Bulletin Board:	Don Chandonnet		
	Mike Schupan	820 - 0293	----------

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Meeting schedule:

8:00 pm, last Wednesday of every month except July and December,

Feb. 26, March 26, April 30, May 28, June 25, . . .

They will be at the NRC Auditorium, 100 Sussex, until at least June.

(Gothic building opposite city hall - parking in rear)

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I need all the material I can get for the newsletter. Unfortunately I don't have a modem (yet), but if you give me a call I can drop round with a disk.

There is an index of previous issues at the back of this one, thanks to Willi Wahl.

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February meeting speakers:

Les Horn on laser printers and the software driving them.

Jack Valero, who runs the Heath bulletin board, on boards in and his in particular.

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Report on the PC Users' Group Meeting, 30th October 1985 Eric Clyde

Harry Gross opened the meeting, announcing that elections for the next executive would be held at the next meeting. Mike Luckham, Chairman of the Nominating Committee, was unable to be present, so Cord Hopkins read the list of nominees to date, stating that nominations could be made from the floor up to the time of the election. A Bulletin Board Committee has been set up under Don Chandonnet to make recommendations to the Group.

It was announced that the Ottawa Computer Group is going to consider winding down at its next meeting. The OGG is incorporated as a non-profit organization, which gives it a number of advantages, including the possibility of avoiding sales tax in purchases for the club. The possibility of taking over the articles of incorporation should be investigated.

The program part of the meeting dealt with the Infoglobe Online Database System. It was started in 1975 to enable reporters to review articles. All stories in the Globe and Mail are entered into the computer system. Most reporters use terminals linked to a HP3000 in Toronto, where a laser camera etches the plates from which the printing is done. All sections of the paper are included except for the obituaries, a decision made in 1977. The software was written so that users could get at the stories. Initially these tended to be corporate libraries, but with the spread of micros, most users are now executives or individuals.

The Globe and Mail Online began in November 1977. It comprises over six editions, and is updated before the newspaper is on the street. It contains 670 thousand stories, growing at 300 per day. Of the top 500 Canadian companies, ??0 use it daily.

Other services available include Market Scan (information from six stock exchanges), and the Canadian Financial Database (contents of annual reports).

Attendance at the meeting was about 90.

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AT Stuff:

The user group's AT SIG (Special Interest Group) meets on the second Wednesday of each month. Contact Cord Hopkins at 818 - 3834 for details on topics and location.

Various bulletin board and word-of-mouth reports indicate that speeding up the AT by installing a higher-frequency crystal is cheap, easy and efective. The AT uses a 12 MHz crystal. This signal is divided by two to form a 6MHz clock for the 80286 and by three to give a 4MHz clock for the 80287 math processor. A 16 MHz crystal runs the two chips at 8 MHz and 5.33 MHz, 33' faster.

Very early AT's and IBM's latest version with 30 meg disk are reported to have some problems with this. Also some peripherals such as the Microsoft Mouse and a Tecmar expansion board.

Report on the PC Users' Group Meeting, 27th November 1985 Eric Clyde

The following were elected by acclamation as Officers for next year:

Past President:	Harry Gross
President:	Gord Hopkins
Newsletter Editor:	Sandy Harris
Software Librarian:	Chris Taylor
Treasurer:	Mike Luckham
Secretary:	Eric Clyde
Committee Heads:	
Publicity:	John Przybytek
Membership:	Anne Moxley
Bulletin Board:	Don Chandonnet
	Mike Schupan
SIG Coordinator:	Mike Luckham
Bulk Purchases:	Terry Mahoney

The speaker of the evening was Berne Rush, Director of Research, Perceptron Computing, Inc. The company, which is based in Toronto, specializes in the development of user interface and program development software systems to facilitate the use of scientific computer software by non-technical users and to enable programmers to develop transportable software more effectively. The major portion dealt with EASI/PACE (Engineering Analysis and Scientific Interface/ Picture Analysis, Correction and Enhancement), showing images as received from satellites and how these were corrected and enhanced. Judging from the extent of interest shown during the demontrations during the tea break, that was a very popular topic.

Attendance at the meeting was about 90.

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The New PC RT:

IBM's latest baby, announced in January, is the PC RT. "RT" stands for RISC Technology; RISC in turn stands for Reduced Instruction Set Computer. The basic idea is a simple ultra-fast processor with a smaller set of machine instructions. The main simplification is eliminating all the usual memory addressing modes and just having a whole lot of register-to-register operations plus "store" and "load". Both of these require the address in a register.

The RT is definitely an upmarket product; the minimum configuration has one megabyte of memory on a 32-bit bus and 40-meg hard disk. IBM estimate speed on CPU-bound tasks at four times that of an AT model 99. Options include 1024 by 768 dot monochrome graphics, 70 meg drives, tape backup, and AT compatibility via an add-in '286 board. There's also a software DOS emulator on the RISC processor; one report said this was faster than an AT.

The operating system is AIX, another Unix port from Interactive who also did PC/IX for the XT and VM/IX for IBM mainframes. This is basically AT&T System V with some extra goodies.

Report on the PC Users' Group Meeting, 29th January, 1986 Eric Clyde

Gord Hopkins, the new President, opened the meeting, welcoming new members, and introduced the Executive.

Chris Taylor, Software Librarian, described the facilities of the Heath Bulletin Board, on which user and file aresa have been set aside for the use of the PC Users' Group. The telephone number is 829-0539. Messages should be addressed to Chris. It is operating at 300 and 1200 baud, and is running the FID software.

Other bulletin boards of interest are:

-- Eaton's Business Centre 234-5488
-- IBM Personally Developed Software 1-800-387-6100

Chris McEvoy described the intentions of a survey, distributed at the meeting, to determine members' interest in SIGs, workshops, and special courses. Mike Luckham will be giving a course on assembly language programming, starting with an introductory meeting [later arranged for Tuesday 4th February].

Peter Wilson, BNR, described the new hardware and software which he saw at COMDEX, 20th-24th November in Las Vegas. *There were* 1400 exhibits and attendees included Bill Gates (Microsoft), Philippe Khan (Borland International) and John Sheppard (President of HP). Items described ranged from the new extended or expanded memory boards, through the DCA Fastlink Modem (up to l0K baud over a standard phone line and the Intel 80386 chip to the new IBM RT Personal Computer. Projections were made that by 1987 a 12 MB floppy disk drive, a 300 MB fixed disk drive, and a 120 MB cartridge would be available; by 1987, board density would by 8MB, by 1988 32 MB, and by 1990, 128 MB.

Chris Taylor then described some of the software utilities available in the library.

Attendance at the meeting was about 80.

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32-bit co-processor boards:

Company	Processor	Maximum RAM	Operating System
Sritek	68000	4 megabytes	System V Unix
Sritek	32016	4	Berkeley 4.1 Unix
Defincon	32032	2	own or System V
Opus	32016	2	System V
Hallock	68000	1	OS-9 or CP/M68K

From a first glance at prices and specifications the Defincon looks like the most interesting of these creatures. There were a pair of articles on it in the July and August '85 Byte. Sritek were, I think, the first company with a product of this type. Their 68000 product was the basis of a Byte article a year or two back.

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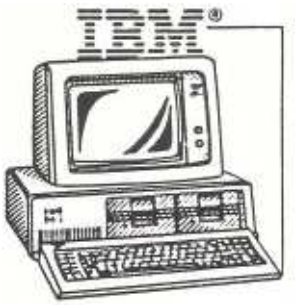

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Parameter Passing Using a RAM Drive H. Gross, Generic Transforms

One of the defects in Microsoft BASIC is the problem of passing parameters from the main program to a subroutine. All parameters must be given the same names as those used in the subroutine. In a short program, this is only a minor nuisance. In a longer one, it can be a major source of error and confusion.

If a RAM drive is available, it can be used to pass a list of parameters merely by writing them to RAM using their names in the main program and reading them under local names in a subroutine. Similarly, the subroutine may write its results to the RAM drive to be read back by the main part of the program.

A simple convention can be adopted to differentiate between variables in the main part of the program and those used in subroutines, such as using the form X.XXXXX, that is inserting a period in the name. Then by holding to the convention of a single entrance and a single exit point in a subroutine, the subroutine can be completely isolated from the main program. There will be no need to change variable names to use a routine that may be called from many places in a program with different inputs each time.

With these conditions, a program can be assembled from a library of routines and there will be no problems with conflicting variable names and no need to rename variables.

The 8086 Family Tree Sandy Harris

The IBM PC and the various compatibles, clones and competitors use processors of Intel's "8086 family", or perhaps their cousins from NEC (Nippon Electric Company). This paper explains the family tree.

Note that there is much important stuff not covered here. I won't talk about other processor families -- only the Intel and NEC chips. I will not enter the lively debate over whether the 8086 family's use of segements and offsets for memory addressing is a bug or a feature since, whichever it is, it is common to all chips in the family and not relevant to a comparison. Nor will I cover any of the factors influencing machine speed other than choice of central processor, although it is obvious that factors such as disk access speed, size of available memory and software efficiency are much more important in typical applications.

THE BASIC CHIPS:

```
8086     the basic chip, used in some compatibles
         16-bit registers        (scratchpad storage inside the processor)
         16-bit data bus         (processor-to-memory communication)
         1 megabyte memory limit
8088     8-bit bus version, used in IBM PC, XT and most compatibles
         16-bit registers        (same as 8086)
         8-bit data bus          (restricted compared to 8086)
         1 megabyte memory limit
```

Each chip is split into two parts -- an execution unit which does the actual computing and a bus interface unit which handles reading from and writing to memory or input/output ports. There is a little queue in between so the bus unit can be fetching instructions and filling the queue while the execution unit is using things already in the queue; this simple trick makes the chips considerably faster than a comparable one-unit design would be. It also lets Intel build two chips with guaranteed compatibility. The 8088 and 8086 have identical execution units; the differences are in the bus interface units and in queue length.

The 8086 is no faster on internal operations (which don't use the bus), or on single-byte reads and writes (which use only half of it) such as screen updates or text-processing operations, but it is twice as fast at reading and writing 16-bit items. The 8088's 8-bit bus allowed it to use peripheral chips already on the market for earlier processors, a significant advantage at the time when the PC was designed and probably the reason IBM chose it.

```
8087     can be added to PC and most compatibles
         specialised arithmetic processor
         stack machine with 8 80-bit registers and hardware floating point
              operations on numbers in those registers
```

8089 not used in any PC I know of
specialised input/output processor
two independent channels doing fast block transfers of data

These two "co-processors" were designed and introduced at around the same time as the 8086 and 8088. Both do their specialised tasks well and can improve the overall performance of a system greatly by relieving the main processor of some work for which it is not optimised. Both need a main processor to tell them what to do and are quite useless for anything outside their specialty.

Note that the 8087 sets up its memory interface to match the processor in use so it will work faster in a 16-bit 8086 system than with the 8-bit 8088.

LATER Intel GENERATIONS:

The 8086 family has grown considerably from the original 8086/87/88/89 line. New central processor chips include:

80188	8-bit data bus	used in some speed-up boards
80186	16-bit data bus	used in some speed-up boards also in machines like TRS-80/2000 and Icon

These chips are similar to the 8086 and 8088 in some ways:
-execute all 8086/8088 machine-language instructions (with a few caveats)
- have the same one-megabyte limit on memory capacity
- can use the 8087 math chip

tend different in others:
- execute additional instructions not found on 8086/8088
- completely different packaging and hardware interface

They are faster for several reasons:
- the bus interface unit has its own arithmetic hardware so it does not have to request assistance from the execution unit for address calculations; this speeds both parts up
- something very much like an 8089 input/output processor is built in
- the new machine-language instructions save time on some tasks
(e.g. a single microcoded instruction pushes or pops the whole set of CPU registers, useful in function calls or task-switching)

They also have a lot of other goodies built in to do things that in 8086/8088 systems require separate chips. This should mean that 80186/80188 systems can be built much more cheaply than equivalent 8086/8088 systems.
Then there is the next step up:

80286	used in IBM AT, various	compatibles and various speed-up boards
	16-bit registers	(same as all the others)
	16-bit memory bus	(same as 8086, 80186)
	16 megabyte memory	(NOT the same)

80287 can be added to AT and most other 80286 products
       specialised math processor, an upgraded 8087
       80-bit registers (same as 8087)
       16 megabyte memory (to match the 80286)

The 80286 has two modes:
- in "real mode" it behaves much like an 80186
  - executes all 80186 instructions (again, with caveats)
  - uses only one megabyte of memory
- in "protected mode" you have additional features
  - access to 16 megabytes of memory
  - memory protection features
    (to keep buggy programs or antisocial users in bounds)
  - additional instructions

Almost any software from the earlier chips can be moved to the 286 and run in real mode but this does not exploit the full power of the processor. DOS on the AT is an example -- it can use memory above the one-megabyte line only as a RAMdisk. Unix-based products for the AT, e.g. Xenix and Venix, do use protected mode. QNX offers a choice -- both real and protected versions.

The '286 does have all the '186 extensions to the instruction set, plus its own extensions for protected mode, but it doesn't have the other extras found in the '186 such as the 8089-like I/0 channels, on-chip interrupt controller, and so on. It needs lots of external support chips, just like the 8086/8.

The 80386 with 32-bit registers and a whole lot of additional features is now available in sample quantities only. Production quantities are supposed to be available later this year. If that goes as scheduled, we can expect machines that run PC software at several times AT speeds by '87. One important feature is a mode that lets the 386 run 8086/8 software with protection. The '286 has expanded protected memory OR compatibility, never both at once.

MORE CO-PROCESSORS:

Upgraded CPU chips are by no means the only new Intel products. There are also new co-processor chips. An 80387 math chip coming and . . .

The 87130 and 87150 are a pair of "operating system co-processors" for 8086/8 or 80186/8 systems. Each contains some ROM, interrupt-control logic and I'm not sure what else, but the net effect is to take much of the housekeeping load an operating system puts on the main processor away. Unfortunately, the two operating systems they have implemented this way are CP/M-86 and Intel's own iRMX. Now if they'd only do Unix, or even DOS . . .

I've forgotten the part numbers, but Intel have a pair of chips which together provide most of the required hardware for the Ethernet local area network, a 10 megabit per second net developed by Xerox and embraced by a number of vendors including most of the makers of upmarket personal machines such as Unix-based computer-aided design workstations and LISP machines for research users.

A more recent introduction is the 82588, a single chip which provides similar functions for lower speed LANs. This chip is the basis of both AT&T's 1 Mbit/s LAN using existing office wiring and IBM's announced 2 Mb/s product.

The normal IBM color and monochrome video boards, and the compatible boards, and the upgrade boards such as the Hercules products, all use Motorola's 6845 video controller chip. This chip was designed originally as a peripheral for the 6800 (same generation as the 8080, before the Apple's 6502 or the Z-80 used in the original TRS-80) and falls far short of the current state of the art. Some products using more powerful video control chips are already available and more can be expected.

The 82720 is a graphics co-processor built by Intel under license from NEC. It is equivalent to NEC's 7220. Several of the jazzier graphics boards for PCs, such as Revolution's products, use it to provide more colors, more speed, and more resolution than the standard IBM color board. I do not know what the IBM extended graphics adapter uses. Sometime soon we might expect to start seeing even more powerful boards using other chips -- Hitachi for example have a new video chip in or above the 7220 class. National have a multi-chip set with one overall controller and a slave for each bit plane that might turn up in AT products, though it needs a 16-bit bus and is unlikely to be used in PCs.

The Intel catalog also shows an 82730 text co-processor. The chip supports multiple fonts, real proportional spacing on the screen, and a linked-list method of finding displayable text in system memory that, from the documentation, looks as if it ought to be very fast and flexible. I've yet to hear of a product using this chip, though.

Unfortunately, 82720/7220 boards are all quite expensive and the ones that display their entire graphic image (perhaps one or two thousand lines of resolution in each direction) require expensive monitors too. The others just give you a screen-sized window into a larger space. Also unfortunately, no-one yet makes a 7220 and/or 802730 board for really high grade text and graphics on the monochrome display. Or if they do, I haven't heard about it and would much appreciate being told.

UPGRADING PC's:

Semiconductor companies often take out licenses to build each other's chips. This gives the chip-originating company extra revenue, saves the "second source" development costs, and makes customers less vulnerable to supply fluctations and monopoly pricing. Everyone's happy.

Intel and NEC (Nippon Electric Company) have several deals of this sort. For example the Intel 82720 graphics processor is just their equivalent of NEC's 7220. NEC also build Intel-based chips such as

NEC V20	an 8088 equivalent
NEC V30	an 8086 equivalent

These are drop-in replacements for the Intel parts but noticeably faster. They run 8086/8088 assembly language and have exactly the same "pinout" or hardware interface so you can just remove an 8088 and plug a V20 into a typical PC.

The extra speed is achieved simply; in the 8086 or 8088 the bus interface part of the chip borrows resources from the processor part to calculate the addresses it needs. NEC just add some simple arithmetic capabilty to the bus interface unit and both parts become faster. Intel use the same technique, plus others, to make the 80186/8 faster than the 8086/8.

The newsletter article where I found out about the V20 estimated the speed-up at 20 to 25%. NEC's advertising says 50%. Running Peter Norton's processor speed test on various machines, including some with speed-up boards, gives the following results:

Machine:	Clock (Mhz)	Processor	Norton Speed factor	
PC or XT	4.77	8088	1.0	
ACS	4.77	8088	1.0	
ACS	4.77	V20	1.7	
ACS	8.0	8088	1.7	
ACS	8.0	V20	2.9	(3.0on some trials)
PC + Speed Demon	10.0	8086	1.9	
PC + Speed Demon	8.0	V30	3.1	(no l0MHz V30 available)
AT	6.0	80286	5.7	(standard speed)
AT	8.0	80286	7.7	(changed crystal, some problems occur)
Compaq	8.0	80286	9.1	(their standard)

I suspect that the actual gain for an 8088-to-V20 upgrade is less than the 70% shown here, that the Norton test happens to make heavy use of instructions the V20 is good at and so gives an inflated reading. Still, the V20 is an excellent buy. Adds in US magazines offer these at around $25 US; I got mine at $50 Cdn. for the 8MHz version from Blue Chip on Bayswater, 729 - 6909. I have it in their ACS board and have yet to hit a problem with it running DOS, QNX or Venix at 8 MHz. My guess is I have double the XT's speed overall since I also have a relatively fast disk.

The V20 also has a mode in which it emulates the Zilog Z-80 and can therefore run CP/M software. I have yet to lay hands on the software necessary to switch mine into this mode and give my PC a CP/M BIOS. I'd like to hear from people who have actually tried such software.

There are also some complications in the Intel/NEC relationship. Although NEC licensed the 8086 and 8088 from Intel, they have announced their intention to go their own way on upgrades. The V20 and V30 are only the first in a series. So far they have announced plans for an assortment of upgrade chips numbered from V40 up to V70, all compatible with the 8086/8088, but all incompatible with later Intel products. Meanwhile, Intel are suing them for copyright violation in the V20/V30 design.

IBM PC Users' Group Newsletter
1984/85 Author/Subject Index