Lecture 9. The Computer Hobby Movement

Introduction

In the last lecture we looked at the world-wide activities aiming at designing inexpensive microprocessor-based computers for personal use and ownership. The companies such as the Canadian MCM, French R2E, and American Scelbi were among the first firms to announce and manufacture such computers.

While these early microcomputer manufacturers were able to attract small and medium-sized businesses, corporations, agencies, and educational institutions, they were unable to attract the general public to their products (to both, computers and software). The main three reasons for that failure were:

- early PCs were too expensive for an average individual (in 1974, the cost of an MCM/70 in basic configuration was approximately $4,000 which would suffice to buy a new Ford Mustang and a few other items);

- general public was not well educated about computers and their benefits; the early PC manufacturers were not interested in computer literacy programs; instead, some companies, such as MCM, insisted that their computers are "as easy to use as pocket calculators";

- none of the early PC companies could offer a "killer" application that would make their computers a highly-desirable consumer electronic gadget (note that there was no computer gaming market!!).

The hobbyists

The historical mission of explaining computers to the general public, of stimulating the development of the personal computer industry, and of helping to introduce computers to homes was fulfilled by a movement initiated in 1974 by the North-American electronic hobbyists interested in computers. This movement is referred to as *computer hobby movement*.

Fig. 1. Computer hobbyist Howard Franklin constructed his first computer in Toronto in 1974. Photograph by Z. Stachniak, 2004.

Who were the computer hobbyists? In short, these were enthusiasts of electronics interested in computers. Some of them were electronics professionals, others were high-school students interested in build-your-own-gadgets – most were just curious about electronics and what it had to offer. The hobbyists were flocking around popular electronics magazines, such as *Radio-Electronics* and *Popular Electronics* which were important catalysts in the formation of the microcomputer hobbyists' movement.

These magazines offered not only information about electronics novelties but also, and frequently, detailed construction projects such as: "build your own calculator", "build the first Low-cost ALL-SOLID-STATE TV Camera!" Of course, not everybody was interested in everything and only some embarked at these construction projects.

Neither the MCM/70, the Micral, nor the Scelbi computers made it into the hobbyists hands. The hobbyists would find their first computers not in computer stores (there were none!) but in electronics magazines presented as construction projects.

Fig. 2. "Build the first low-cost all-solid-state TV camera" project announced on the cover of *Radio-Electronics*, February 1975.

The Mark-8 computer

In July 1974, *Radio-Electronics* (RE) published a construction project unlike any other in the magazine's history: *Build The MARK-8 Your Personal Minicomputer*. Its author, Jonathan Titus, offered a small, microprocessor-based computer to the hobbyists.
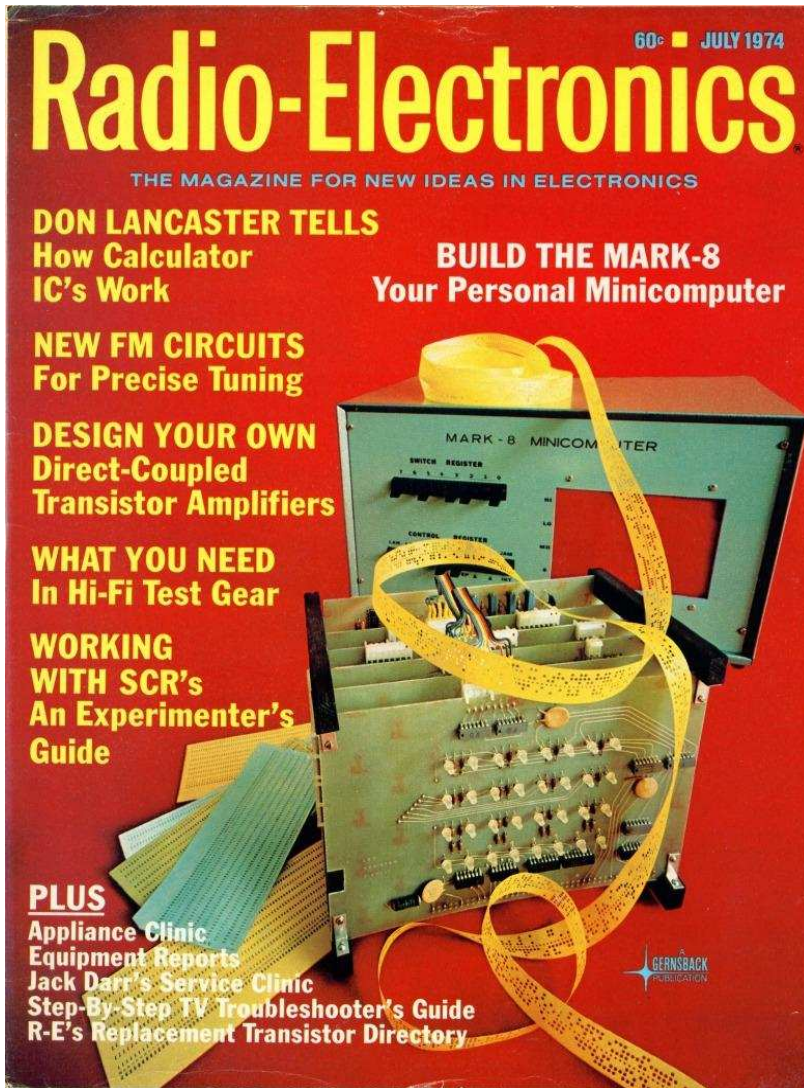

Fig. 3. The Mark-8 computer on the cover of the July 1974 issue of *Radio-Electronics*.

To Titus surprise, his microcomputer construction project resonated strongly with the REs readers who not only bought additional Mark-8 construction booklets and actually began to build the computer (RE sold over 5,000 Mark-8 construction booklets) but also started to organize dedicated Mark-8 clubs and groups. One of those groups, the Mark-8 User Group started by Hal Singer in September 1974 in Lompoc CA, published the *Mark-8 Newsletter –* a popular early publication devoted to hobby computing, and later renamed as the Micro-8 Newsletter.

The Mark-8 construction project was much more ambitious than what typically appeared in *Radio-Electronics*. It required much more than just skillful waving of a soldering iron during the marathon sessions of soldering; a would be home computer owner had to understand principles of computer architecture and programming.
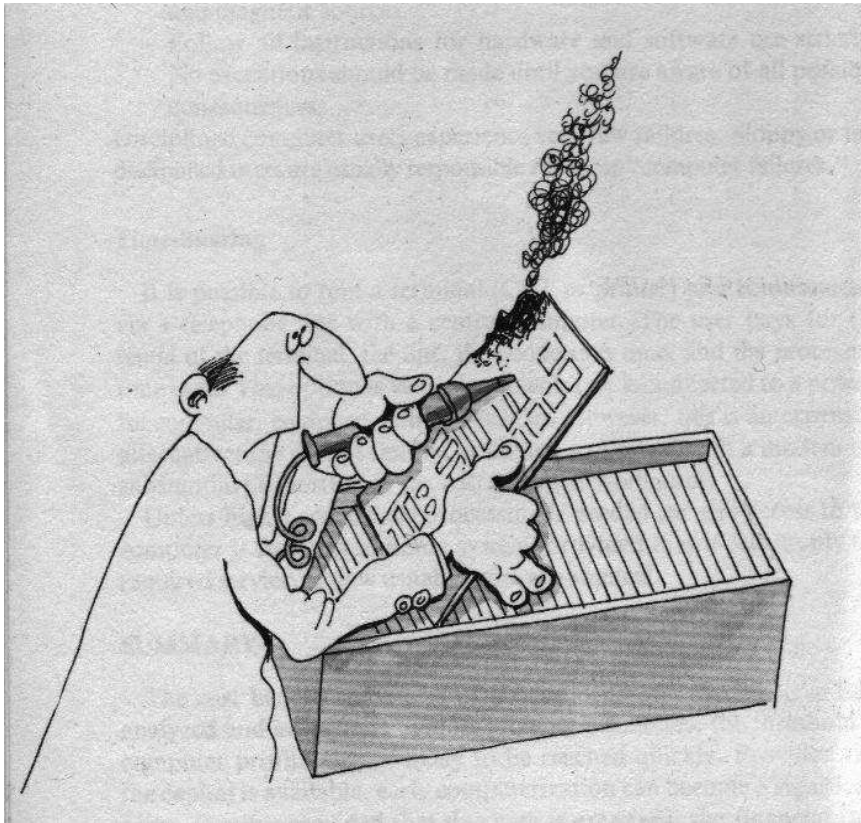

Fig. 4. A hobbyist working on his home computer. Artwork by Daniel Le Noury.

The Mark-8 was an educational project to allow electronics hobbyists to get first-hand experience with the fundamentals of digital computing. Build your personal minicomputer–invited Titus–build the Mark-8, a "computer system of your own." And many did exactly that and more.

The "Letters" column of *Radio-Electronics* was reporting on successful construction of Mark-8 computers, the readers requested a regular column dedicated to the computer. The Mark-8 user groups sprang up to provide support and exchange of information regarding programming and programming aids, hardware extensions and modifications, peripherals, and literature.

The ALTAIR 8800: the computer hobby icon

The Mark-8 project generated the first forceful wave of computer hobby activities. The computer project that would transform the hobby enthusiasm into a world-wide movement appeared in *Popular Electronics* (PE) a few months after the publication of the Mark-8. (PE which was among the world's largest selling electronics magazines of the mid 1970s.)

The cover of the January 1975 issue of the magazine, informed the readers about a new "Project Breakthrough! World's First Minicomputer Kit to Rival Commercial Models... "ALTAIR 8800". The article is arguably one of the most important publications to appear in a popular electronics magazine.

Fig. 4. The ALTAIR 8800 computer on the cover of the January 1975 issue of *Popular Electronics.*

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This time, the authors– Edward Roberts and William Yates of Micro Instru-mentation and Telemetry Systems (or MITS)–offered significantly more than a Mark-8-style construction project described in a booklet. For just $395, a hobbyist could get a real microcomputer in kit form designed around a new 8-bit microprocessor from Intel – the 8080. The Altair 8800 kit also included power supply and an impressive-looking blue-and-gray metal enclosure.

Fig. 5. The ALTAIR 8800 computer. Source: www.altairkit.com.

What happened next exceeded Roberts' even most optimistic predictions. Hoping to sell a few hundred computers to break even, MITS was swamped with a few thousand pre-payed orders for the Altair in the first year. The popularity of the Mark-8 and the Altair 8800 revealed how primed the hob-byist market was for an affordable personal computer, how large the personal computer market could become.

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The Altair 8800 had a profound impact on the computer enthusiasts and quickly became their hardware icon. The computer's popularity helped to elevate the early computer hobby activities to a world-wide movement.

By the end of 1975, there were a number of microcomputer clubs all over the United States and some were also forming in Australia, Canada, and the U.K. Their activities were supported by good quality magazines (such as Byte or Peoples Computer Co.) and a growing number of microcomputer start-ups that were manufacturing products ranging from peripheral cards to fully assembled computers.

By 1976, microcomputing became the world's most exciting and fastest growing hobby. Electronics enthusiasts were buying, building, and experimenting with rudimentary low-cost microcomputers frequently offered to them in a kit, do-it-yourself form. It was a valuable and ground breaking activity that would help to ignite the personal and home computer "revolution".
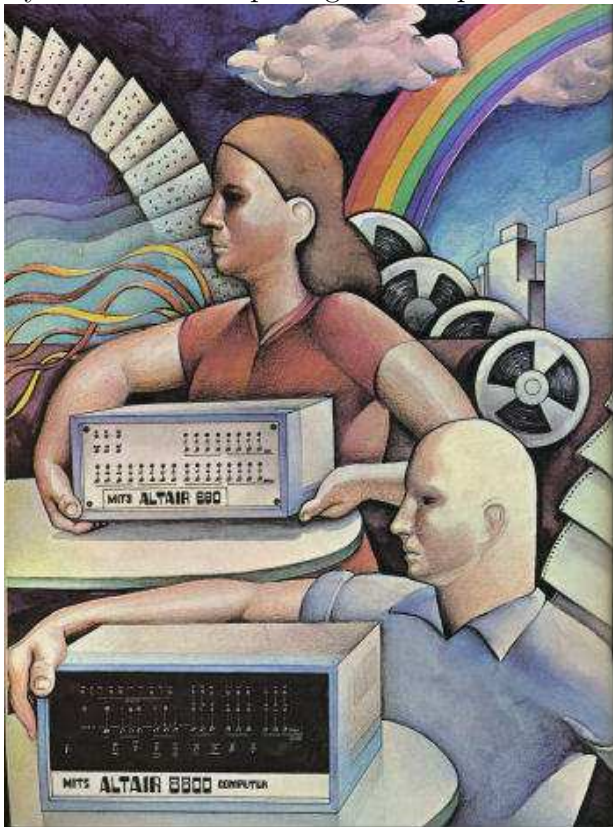

Fig. 4. An ALTAIR 680 ad on the back cover of the June 1976 issue of Popular Electronics.

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Computer Clubs

The initial challenge for the hobbyists was to educate themselves about the microprocessor technology and to use the knowledge to build fully operational computers rather than to find ways to compete with minicomputers or to define and explore application areas unique to microcomputers. To that end, they organized themselves into computer groups and clubs. The clubs provided support and exchange of information on programming and programming aids, hardware extensions and modifications, peripherals, and literature.

The Homebrew Computer Club (HCC) was one of the most influential early microcomputer clubs. Formed in San Francisco Bay Area in early March 1975, it quickly attracted a large number of computer enthusiasts. The early membership of HCC was diverse; it included computer novices as well as people with considerable hardware and software knowledge.

Most of HCC's members were interested in microcomputers, many in building them, some in experimenting with them. There were also club members who regarded microcomputers as tools for social change, and cultural and educational advancement. Some would start their own computer companies.

Fig. 6. HCC hobbyists. Source: *HCC Newsletter*, April 12, 1975.

Computer hobbyists in Canada

Possibly the earliest Canadian computer clubs was formed in in January 1976 in Mississauga, Ontario, by some employees of the Canadian Development Division of Control Data Corporation – one of the largest mainframe computer manufacturers–created its new R&D division in Canada. It was called the *Toronto Region Association of Computer Enthusiasts*, or *TRACE*.
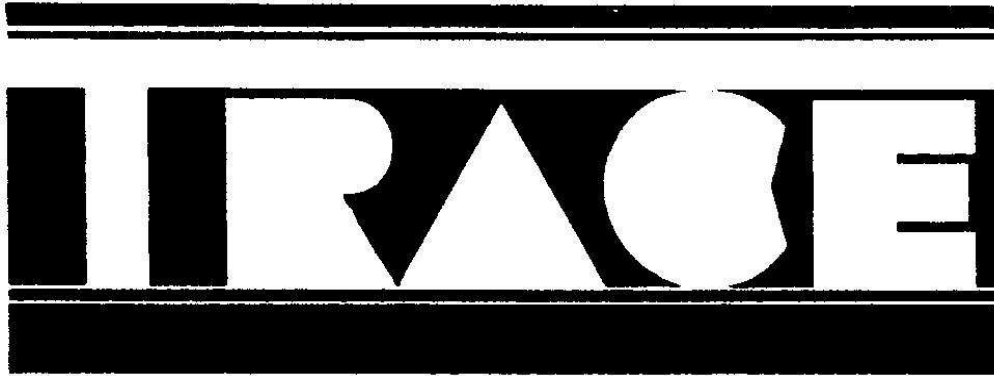

Fig. 7. TRACE logo.

Similarly to HCC, some people joined TRACE having already working microcomputers to their credit. For example, a young computer enthusiast and a high-school student, Howard Franklin, built his microcomputer in 1974 by studying microcomputer literature published by Intel (see Figure 1). His microcomputer is possibly the earliest hobby computer constructed in Canada and one of the elite few microcomputers designed in the early 1970s.

TRACE hobbyists regarded their club as part of the global North American microcomputer movement rather than a distinct Canadian organization. Since June 1977, TRACE had been a member of the Midwest Affiliation of Computer Clubs; it exchanged newsletters with several American computer clubs, and its members regularly attended microcomputer events in the United States.

Specific local factors would affect some of TRACE's defining characteristics and in the process distinguished it from other North American computer clubs.
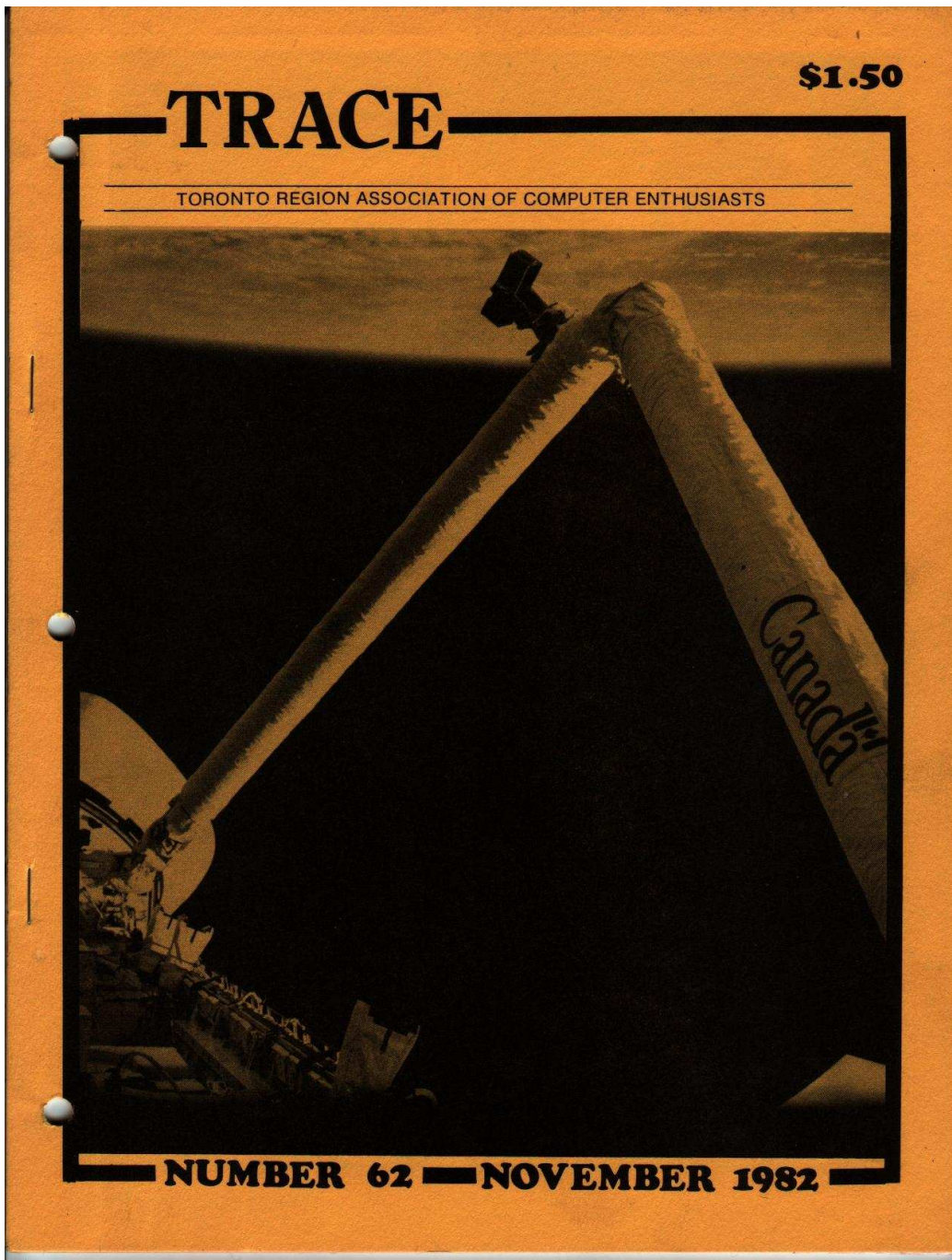
Fig. 8. November 1982 issue of *TRACE Newsletter*.

Educating the rest of us

In the 1970s, computer hobbyists saw their movement as the main channel by which the society would gain knowledge about computing and, eventually, accept microcomputers as useful personal tools.

Until the arrival of the first wave of commercial home and personal computers from large manufacturers such as Commodore, Atari, and Tandy in 1977 and 1978, that was indeed the case: hobby computings versatile infrastructure that included clubs and groups, microcomputer events and programs, dedicated microcomputer magazines and stores, offered comprehensive information about microcomputing to the general public.

Fig. 9. Children using computers. Source: *People's Computer Company*, November 1975.

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Publications:
Computer magazines and newsletters for the hobbyists existed even before the introduction of the first microprocessors, before the MCM/70, Mark-8, before the Altair 8800 (e.g. The Amateur Computer Society had been publishing its newsletter since the society's creation in 1966).

Almost every microcomputer club was publishing a newsletter. HCC started publishing its *Homebrew Computer Club Newsletter* in March 1975 and TRACE its *Trace Newsletter* a year later. Their role was to provide club members with up-to-date information about their club's activities, to share technical information, as well as to bring the latest microcomputer news from the outside.

Commercial computer magazines were soon to follow and by 1977 a large selection of them were available at newsstands: The first issue of *Byte: the small systems journal* appeared in September of 1975, *Dr. Dobb's Journal* premiered in January of 1976, and in January of 1977, *Personal Computing* and *Kilobaud* published their first issues.
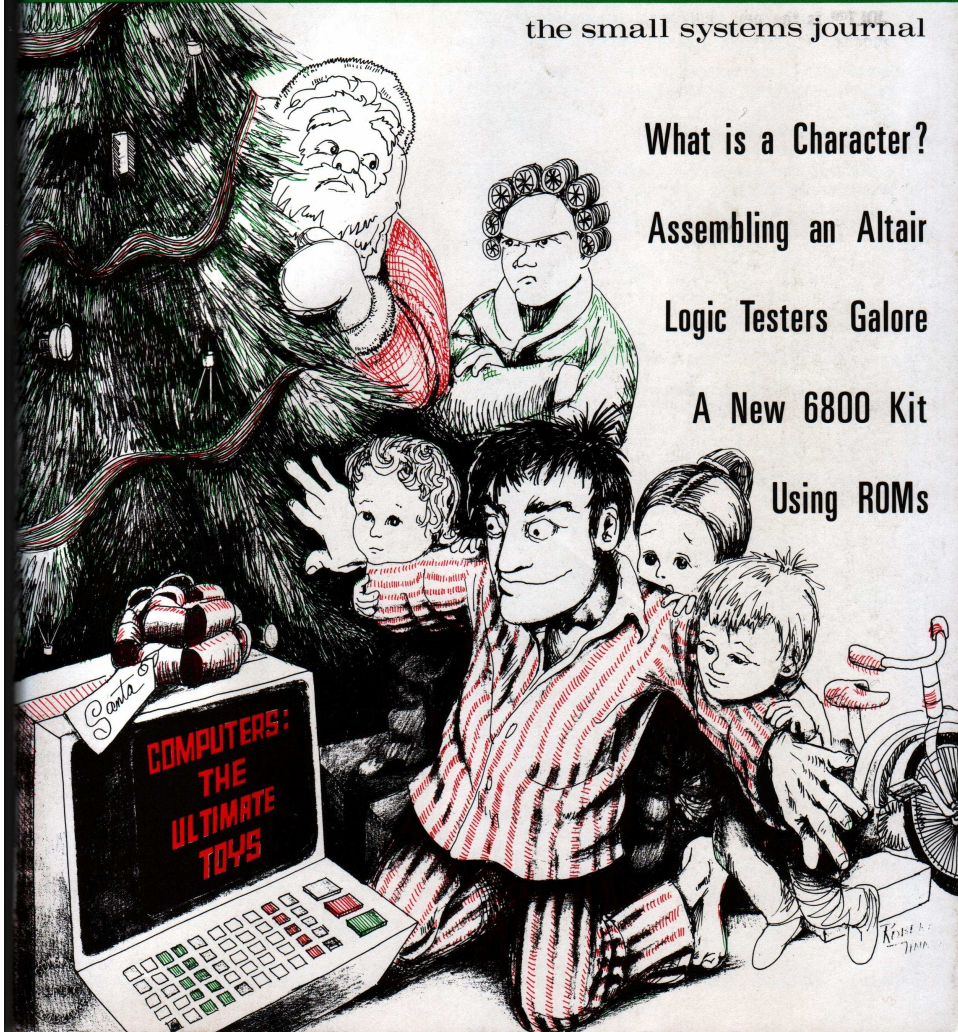
Fig. 10. *Byte Magazine*, one of the most popular microcomputer publications.

Computer Stores:

The first retail stores devoted exclusively to selling personal computers and computer books and magazines opened their doors in 1975 and 1976: The Computer Store in Santa Monica, California (opened in late 1975), and The Computer Mart in New York, DC (opened in the spring of 1976).

Fig. 11. The Computer Mart in New York, DC. Source: [1].

By 1977, there was a computer store in almost every major Canadian and American city.

In Canada, Computer Store Division of Hart's in Montreal, First Canadian Computer Store, Inc. in Toronto, The Computer Hobby Shop in Calgary, The Pacific Computer Store in Vancouver, SDS Technical Devices Ltd. in Winnipeg were serving hobbyists' needs. Some early computer stores were located in smaller towns such as Brandon, Manitoba, which was a home to Canadian Microcomputer Systems & Associates. They were selling microcomputer systems and products, serving both hobbyists and business needs. In addition to microcomputer hardware and software, such stores offered computer books, magazines and, of course, computer services.
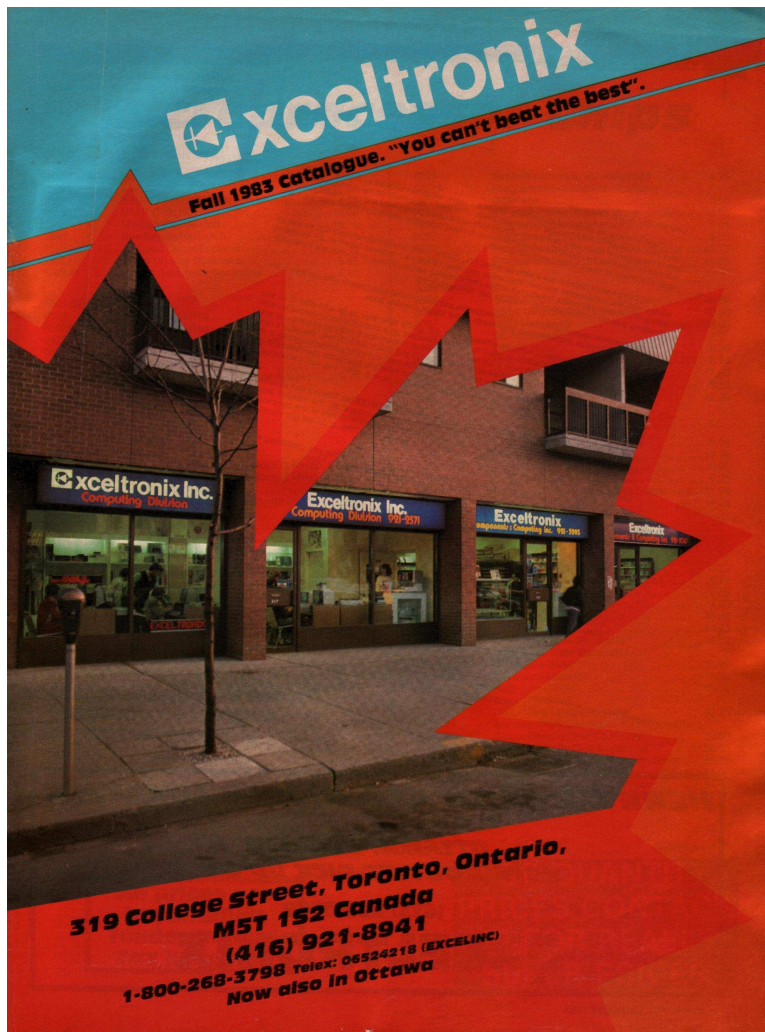

Fig. 12. Exceltronix: one of the most popular computer stores of the 1980s in Toronto.

Computer events:
Another example of information transfer from computer clubs to the general public were computer events: exhibits, shows, fests, conferences, and literacy programs.

Possibly the earliest event organized by a microcomputer manufacturer was the MITS Caravan Seminar. Until April 1976, a van loaded with Altair computers and software was travelling to cities across the U.S. delivering seminars about the Altair and microcomputing.

One of the first large scale hobby computer events was the First Annual World Altair Computer Convention, held in Albuquerque on March 26-28, 1976.

Fig. 13. Bill Gates delivering a lecture during the 1976 Altair Convention. Source: *Radio-Electronics*, July 1976.

By 1977, public microcomputer events were organized on regular basis. One of the largest early computer fests–The First West Coast Computer Fair– took place in San Francisco in April 1977. Over 12,500 people attended the computer show leaving many technology observers speechless.

In an interview with David Ahl, Mike Markkula, VP of Marketing at Apple Comp., said that he was very impressed with the numbers "but in terms of the reasons for their attendance, I'm not sure exactly why so many people are here." [2]

Fig. 14. The First West Coast Computer Fair, April 1977. Source: *Byte Magazine*, July 1977.

The high attendance at computer events clearly demonstrated the society's readiness to learn about computers as well as a vast consumer market for useful personal computers.

Judging by the high attendance numbers recorded during the Canadian Computer Show and Conference (CCSC) in the second half of the 1970s (approximately 13,000 in 1977; CCSC was a prime Canadian computer event organized since 1969), Canadians were ready to take a closer look at microcomputers as soon as those were brought out of the clubs and basements into the open.

The first public event organized by TRACE was an exhibit mounted at the Torontos Ontario Science Center on August 8-12, 1977. It was a unique opportunity for TRACE to showcase microcomputing to the general public (the exhibit presented a range of systems and their applications, from computer games to microcomputer-controlled model railroad controller).

Another large microcomputer exhibit took place during the 1977 CCSC in Mississauga, Ontario, in early November. Under the The First Canadian Personal Computing Showplace banner several Canadian computer clubs as well as local suppliers of microcomputer products showcased the age of microcomputer by exhibiting hobby, personal, and business computers.

Fig. 14. Computer Fest'87 took place at Toronto's Exhibition Place on September 19 and 20, 1987. Source: York University Computer Museum.

The hobby computing industry

The early hobby computers required a lot of creative work to expand them to even minimally usable systems. For instance, Altairs needed more memory, external storage, keyboards, printers, and other peripherals for their effective use. Altairs were practically useless without software.

But, solving difficult hardware and software problems was exactly what the microcomputer hobby was all about. Sharing innovations and ideas was a standard practice among the hobbyists. Soon innovations turned into commercial products and ideas into entrepreneurial ventures, into hardware and software manufacturing.

MITS' decision not to keep the Altair's designs a company secret allowed third party manufacturers to satisfy the demand for hardware and software products by furnishing the Altair with new or improved 'add-on' cards, peripherals, software and, finally, created competition.

By 1977, over 120 companies, well-established and startups, were involved in the production of personal and home computers, and roughly half of them were manufacturing personal computers. The microcomputer industry was well-founded and growing in strength.

Microsoft and Apple Computer

The software power house Microsoft owes its good start to MITS's need of a programming language for its computer. In the early 1975, Bill Gates and Paul Allen offered such a language–BASIC–to MITS on a paper tape.
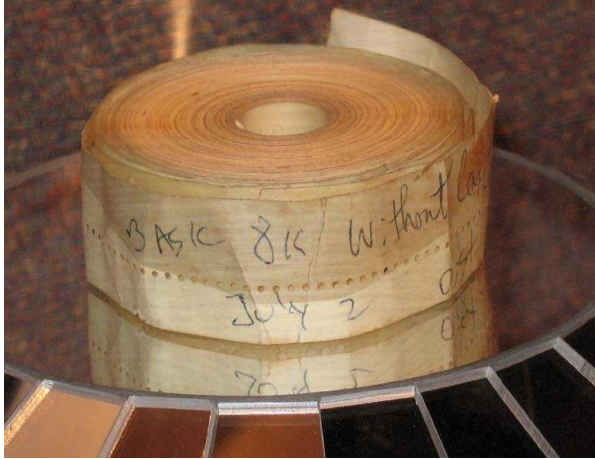

Fig. 15. Microsoft's BASIC on a paper tape. Source: http://en.wikipedia.org/wiki/Image:Altair_BASIC_Paper_Tape.jpg

Fig. 15. Bill Gates with an Altair 8800 running Microsoft's BASIC. Source: unknown.

The BASIC programming language was originally developed by John Kemeny and Thomas Kurtz at Dartmouth College in the early 1960s. MITS decision to advertise Gates and Allen's dialect of BASIC as the language for the Altai 8800 made Microsoft known across North America.

The origins of the Apple Computer can also be traced to the computer hobby movement. Steve Wozniak, one of the co-founders of Apple, learned about microprocessors while attending the first meeting of HCC.

By 1976, he had his first computer designed – the Apple 1. He sold his single-board computer (without case, keyboard, or peripherals) to the hobbyists.

By 1980, his improved Apple–the Apple II announced in 1977–propelled the Apple Computer to the position of the microcomputer industry leader.

Fig. 16. The Apple][computer (1977). Source: York University Computer Museum.

Canadian computer industry with hobby roots

Several Canadian companies benefited from connections to the hobbyists' movement as well.

While Matrox Electronic Systems' (of Montreal) first product (a specialized video-display device called Video RAM) had nothing to do with the hobbyists, the company's next line of products were specialized video graphics cards for some of the most popular hobby computers.

In 1974-75, the Canadian semiconductor giant Microsystems International Ltd. (MIL) offered its MOD8 and MOD80 microcomputers. Both computers were intended as tools for the development of applications that utilized MIL's microprocessors.
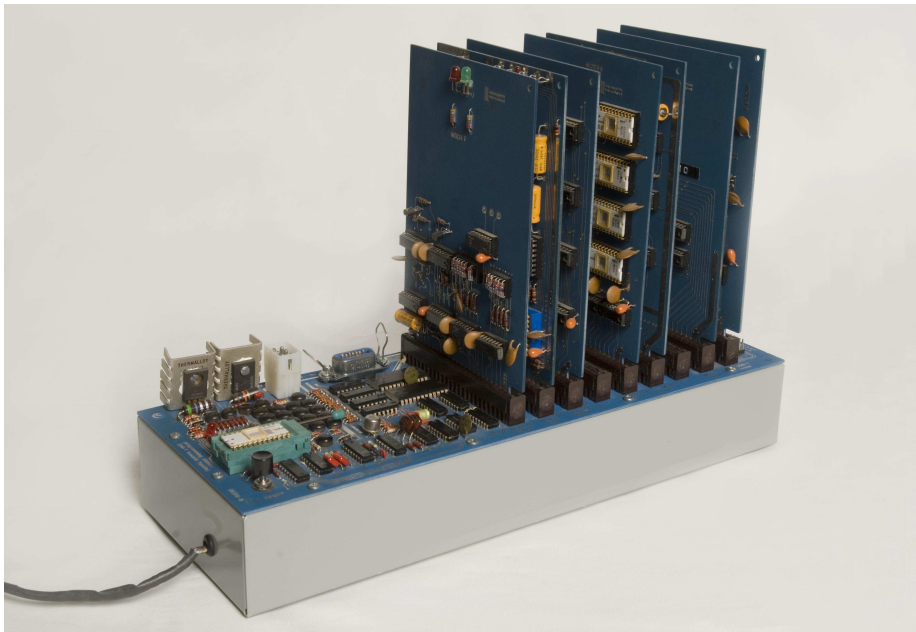

Fig. 17. The MIL MOD8 computer (1974). Source: York University Computer Museum.

The North American computer hobbyists were, in fact, the ones who made the MOD8 and MOD80 computers popular. The computers were bought and assembled by both the Canadian and the U.S. hobbyists. Despite MIL's closure in 1975, the popularity of the MOD8/80 hardware continued until 1977.

Possibly the most successful among Canadian computer hobbyists was Peter Jennings (a TRACE member). In 1976 he wrote Microchess – a chess playing program for one of the microcomputers. The computer game became one of the most successful entertainment programs written for early home computers and launched Jennings successful entrepreneurial career.

Fig. 18. Peter Jenings demonstrating his Microchess program during Vintage Computer Festival, 2003. Photograph by Z. Stachniak.

In their article *The Quest to Build a Thinking Machine: A History of Computer Chess* (cf. [3]), Dag Spicer and Kirsten Tashev mention that

> *Microchess sold several million copies and demonstrated that there was an audience for early computer games [for microcomputers]. Interestingly, some of the early profits from Microchess were used by the company Personal Software (which had purchased Microchess from Jennings), to help finance the marketing of one of the first spreadsheet programs, VisiCalc.*

VisiCalc, arguably the first killer application and one of the best selling software products in the early personal computer industry, was published in 1979. It was initially offered for the Apple][computer exclusively helping the young Apple Computer Inc., rooted in another hobby computer club, HCC, to establish itself as an early industry leader.

The fall of hobby microcomputing

Following its rapid expansion in the second half of the 1970s, when a large number of small- and medium-sized companies were involved in the manufacturing and sales of microcomputer hardware and software world-wide, the hobby industry started to decline under pressure from consumer electronics companies which offered a new consumer gadget–the home computer–and from the commercial manufacturers of desk-top microcomputers.

Furthermore, some of the suppliers of hardware and software for the hobbyists' market started to shift their attention away from the hobbyists and into small business market, or were purchased by the main stream electronics companies. In May of 1977, Micro Instrumentation Telemetry Systems–the Altair 8800 maker and the computer hobby movement's icon–was sold to Pertec, a company specializing in storage peripherals for mini and mainframe computers.

By the mid 1980s, the computer hobby culture would mostly diffuse in a rich and diverse computing environment, and its remnants would merge with new forms of microcomputer activities focused on a unique microcomputer or manufacturer, or on forming virtual communities around popular electronic bulletin boards (BBS systems).

The computer hobby ended but but not without passing its legacy onto a new generation of microcomputer users, and not without leaving a rich landscape of organized microcomputer activities: computer groups and clubs, shows and stores, computer publications, BBSs. The nerds and geeks of the 1970s would mostly retire from their hobby activities making space for loosely knit communities of highly skilled and knowledgeable wiz-kids and computer hackers.

Some of the hackers would venture into destructive activities ranging from writing and propagating computer viruses to unleashing potentially destructive cyber-attacks, crippling targeted computer systems or shutting them down completely. Computer crime would become one of the distinct features of the new computer-based culture.

Conclusions

Personal computer industry began to develop along two independent paths. The first path was initiated by the commercial microcomputer activities as represented by companies such as MCM or R2E. The second path was set by the computer hobby movement.

In the end, both paths merged to form one of the strongest high technology industries: personal computing.

The early microcomputer firms had a hard time to capture a sizable part of the global computer market. Although some of the early microprocessor-based computers were advertised as minicomputers' rivals, neither the MCM/70 nor the Altair 8800 could match the computing power and extensive software libraries of the state-of-the-art minicomputers from Computer Automation, Data General, Digital Equipment Corp., General Automation, Hewlett-Packard, Honeywell, IBM, Texas Instruments, and other manufacturers.

This is one of the reasons why the commercial computer users of the 1970s were only marginally interested in trading the information processing power provided by minicomputers for low hardware and maintenance costs, small size, and dedicated individual use offered by microcomputers. Indeed, through most of the 1970s, the computer industry viewed centralized large computer systems as the only means by which large organizations could meet their data processing needs.

It was the result of both the commercial and hobby microcomputer efforts to make it evident that small, dedicated microprocessor-based systems could deliver enough computing power to successfully run many applications at much lower per user costs rather that either mainframes or minicomputers. Under this new economics of computing, users began to migrate large number of applications from centralized systems to microcomputers.

The second half of the 1970s witnessed a growing interest in computers from the general public. The computer hobbyists played a significant role in generating social awareness and, eventually acceptance of personal computers. They played a significant role in shaping the direction of the personal computer industry.

Much has already been written on the subject of the American computer hobbyists movement of the 1970s in scholarly literature as well as in non-scientific publications. This is hardly a surprise as the computer hobby movement in the United States was the strongest, most versatile and had a significant influence on the early development of personal computing world-wide.

However, the computer hobby movement of the 1970s was neither restricted to the U.S. nor was it homogeneous. Computer hobbyists in Asia, Australia, and Europe were frequently building and experimenting with locally designed and manufactured computers. Their hobby computer activities had a considerable impact on domestic home and personal computer markets that were developing in unique ways and at unique pace, reflecting local conditions.

References

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3. D. Spicer and K. Tashev, The Quest to Build a Thinking Machine: A History of Computer Chess, *Core 5.1*, 2006.

4. Z. Stachniak, Z. Microcomputers. *Wiley Encyclopedia of Computer Science and Engineering*, Benjamin W. Wah, Editor, volume 5, Wiley (2009), pp. 1860-1868.

5. Z. Stachniak and S. Campbell. *Computing in Canada: Building a Digital Future.* Transactions, 17, Canada Science and Technology Museum, 2009.