

 CONTROL DATA CELEBRATING THE ANNIVERSARY OF ITS FOUNDING
A Legacy of Innovation

A Legacy of Innovation in Products and Services

50TH

1957 • 2007

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Recognize some of Control Data's technological and service innovations? Ask us about them!

Very early days - Innovate or perish

Innovation	Division ¹ , Entity	When ²	Team ³ , people	Importance at the time	Impact - CDC progress	Impact - markets	Impact - technical	21st Century usage
Innovate!	All	1950s 1960s	All, all the time	Survival of the toughest (the desperate?!))	Intense! It fed back on itself to become the standard	Innovation with applicability, practicality, frugality	The base of the ever-expanding pyramid	Every new tech wave must now do the same
Financing 60% annual growth	Finance	1950s -1960s	Finance team	Very high growth means serious negative cash flow; big \$\$\$ must oft be raised	Ongoing stock offerings did the trick, but, required extraordinary financial results	CDC stock soared; recruits, employees, customers, suppliers love a winner	Some employees could occasionally take a weekend off	Does any tech company now work a 40-hour week?
Staffing all that growth with highly qualified and motivated people	Administration	1950s 1960s	Berg team	An era when mothers told children to get a safe job with the electric company and CDC pay was modest	Risk takers that joined brought similar others along if only to reinforce their risky decisions	CDC unwittingly became that rarity of a Black Swan: outsiders came to expect excellence at all times	Employees seldom rested but remained enthusiastic and recruited likewise	Silicon Valley
Little Character, early software tools	Computer	1957	Cray, Kisch	Bootstrapped tools to make tools to make computers as the funds hourglass ran out	It took a tiny computer to design a mid computer to design the big computer; absolutely crucial	Indirect but critically essential for fast speed to market	Acorns that grew to oaks, fast! Foundation for more advanced design tools	Computer-aided design, manufacture, testing, research
Fast and reliable solid-state electronics for computers	Computer	1957	Cray team	Fast computers must have fast, reliable circuits, hard to do in those early days	Clever engineering and careful shopping did the job and kept costs low	Customers got 'more bang for the buck' and CDC made reasonable profits	Later CDC projects built on those dual principles that are used today	It's now 'part of the industry woodwork'
Choice of 48-bit word length for 1604 computer, a critical element in early computers; a key but risky decision	Computer	1960	Cray	Broader word width was better but more costly; 1604 used 48-bit words, up from 36-bit in the Univac 1103	Eased parts of hardware, software design but added hardware costs; these were offset by circuit wizardry	Compared to prior machines, for the money, 48-bit words made the 1604 faster, more precise, easier to program	Almost a word-width war ensued, which CDC led and maintained; topped out at 64-bits in 1970s supercomputers	PCs began 64-bit systems in the 1990s but software is not yet fully implemented

NOTES

1. In early years CDC was organized by Divisions in a classical pyramid. In later years CDC used several organizational methods suited to the mission
2. For products with a specific market life, the year stated is First Customer Ship. In ongoing series it will often be a range of dates
3. For a list of all 30 Control Data major computer systems and their major technical contributors, see separate Systems Table
4. "Computers are hard to use and it's not your fault!" Walter S. Mossberg, Wall Street Journal's technology guru. Refers to PC software, some PC hardware

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Early computers, software & peripherals - innovating at the bleeding edge while meeting the payroll

Innovation	Division ¹ , Entity	When ²	Team ³ , people	Importance at the time	Impact - CDC progress	Impact - markets	Impact - technical	21st Century usage
1604 large scientific computer system	Computer	1960	Cray team	Profitable, elegant high-performance computer priced below competitors	We were on our way! profitable; a Major Milestone	Competitors took notice but predicted early CDC financial demise	Elegant architecture that spawned variants; first commercial computer to use transistor logic	RISC computers, lean and mean
Open-source software	Palo Alto	1960s	CDC CoOp	CDC's expanding customer base shared their diverse tools and applications	CDC administered the program, freeing up software staff for other tools development	CDC gained quicker, broader, deeper access to its initial markets	moderate	The tradition continues in 'open source' software
924 control computer	Computer	1961	Casale team, Jim Guzy	A small but critical step on path to put a man on the moon before the Soviets	On time, on spec, on budget, an early CDC engineering principle	Showed competitors that while we were small we were reliable and skilled	Modest in itself, it had to be integrated into entire NASA launch and support effort	RISC computers, lean and mean, good for technical solutions
160, 160A minicomputers	Computer	1960	Malcolm team	World's first minicomputers; housed in office desks	Major OEM contract with NCR; gave CDC opportunity to do volume manufacturing	Not just big computers anymore!	Proved that it could be done and that customers would buy them	Minicomputers, personal computers
3600 very large general-purpose computer system	Computer	1963	Casale team; all of CDC	Very high-performance with mix-and-match architecture, modest business features	3600 a highly profitable cash-flow generator during 6600 delay	IBM now took CDC very seriously; international sales; Big\$ players; competitive shakeout	Modular architecture speeded manufacture, lowered costs, eased testing & maintenance	CISC computers, good for broader uses that are less speed dependent
Peripherals; early computers were called 'electronic brains,' but 'peripherals' are needed to put data in and get information out	Peripheral, Cedar Engineering, Rabinow, others	1950s	Perkins, Bulver, Thorndyke	Our world-class computers relied on outside peripherals; IBM bought out entire supply of a small key item; we had to make our own, now!	A huge, controversial bet on expansion into an allied field; without the huge investment in electromechanical technology CDC may have foundered	The very large 3600 system depended on high-quality tape drives while the Peripheral Division needed a steady volume customer; they boosted each other	An ongoing beehive of mechanical and electromechanical innovation led to smaller electromechanical companies joining CDC	The bulk of today's peripheral technology was built on innovations by CDC, IBM and a few others

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The 3000 series & 6600 supercomputer era - surviving the '60s industry shakeout

Innovation	Division ¹ , Entity	When ²	Team ³ , people	Importance at the time	Impact - CDC progress	Impact - markets	Impact - technical	21st Century usage
3000 series computer systems	Computer	1963-1970s	Several teams (See tech players table)	Few competitors had compatible ranges of computers	Smaller, larger, scientific, commercial - CDC was expanding its capabilities	Significantly broadened CDC's markets in face of severe competition, IBM's phantom computers	Varied with size of computer from modest to important	Along with other early CDC computers, many aspects used today
3200 medium-scale computer system	Computer	1963?	Malcolm team	Astute combination of business, technical features that anticipated IBM's System/360	Reaching beyond scientific markets to IBM's massive markets	Non-IBM competitors saw their margins shrink, many folded their hands	Moderate; CDC could not support two circuit types at that time, impacted sales	A superminicomputer ahead of its day
6600 computer: choice of 60-bit word width	Computer	1964	Cray	Next advance in a key architectural factor	Enabled many innovations that created others	Customers saw the huge benefits of what 60-bits did	This 'detail' launched a thousand ships	32- and 64-bit words now standard
6600: world's first supercomputer	Computer	1964	Cray team	CDC's most spectacular computer architecture and cooling system	CDC had earned the supercomputer franchise; a Major Milestone	IBM's invincibility took a hit: CDC was on THE map and magazine covers	Truly awesome, rivals work of superengineers I. K. Brunel and N. Tesla	Big memories, multiple cores, multiprocessing
6600 extended-core memory	Chippewa	1964	Cray team	Huge, blinding memory speed sped up everything	Extremely bold technical move that worked	Right speed at the right time: Winning the Cold War	More and faster memory became the new benchmark	Memory sticks, thumb drives, it's all memory now!
Chippewa Fortran	Chippewa Palo Alto	1960??		Early, very fast Fortran compiler; CDC computers run student jobs quickly	CDC able to get quick advantage in higher education market	In that era, what you learned on was what you later specified and bought	CDC was a leader in Fortran and other technical compilers	Fortran still a standard in intensive scientific, engineering models
6600 software innovations	Chippewa Palo Alto	1960s	Allard, Tiede	Internal speedup and faster program compilation	Part and parcel of the 6600 momentum	IBM couldn't close the gap, withdrew from Big Iron	Each was moderate but CDC technology kept piling on	Some still used, but others could be to great advantage
Master Operating System on lower 3000 series	Palo Alto	1966	Computer, Palo Alto	Multitasking and multi-programming let multiple processors work under same operating system	Variations on hardware architecture can wreak havoc on system software	Introduced at the time when IBM's System/360 was struggling to do the same task	Benefits of multitasking, multiprogramming obvious to customers, but not the technical virtuosity	Some retrogression: "Computers are hard to use and it's not your fault!" ⁴
Fortran code optimization for 6000 series	Palo Alto	1968	Tiede team	Unique use of critical-path, other methods to maximize multiple-processor use	Control Data solidifying position of excellence in scientific programming tools	A major competitive advantage in National Labs market: speed of solutions	CDC tradition of excellence in scientific software	Fortran still a standard in intensive scientific, engineering models

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External and internal services, intellectual property - leveraging internal needs for feedback, profits, growth

Innovation	Division ¹ , Entity	When ²	Team ³ , people	Importance at the time	Impact - CDC progress	Impact - markets	Impact - technical	21st Century usage
Data Centers using Control Data systems and software	Data Centers	1960s	Jim Harris	Independent, out-of-the-news testbed for CDC products, services; a source of market trends	If the new product or service could make it in data centers, it could make it most everywhere	For many, try before you buy; rent not own; experts do the apps; try it, you'll like it!	Strong feedback to producing divisions; centers were often our unsung heroes but had high corporate visibility	Data Centers started when USA was a manufacturing economy; now its service!
Quorum (Litigation Support Service); built on CDC tools used in its major suit against IBM	Services	1973-1991	Robert Arthur, Bob Jackson, Bruce Aho	Winning the suit with these computerized analytical and search tools was a first; others wanted to use them	The big \$\$\$ win and the tools showed that CDC was a confident, innovative toolmaker - and risktaker	Large litigation can't now be done well without such tools that enable better argument with less clerical work	Clearly established that computers can do far more than compute, and often do it better than prior technology	The data-organization and search tools were decades ahead of others
Control Data Institute starts Associates degree with Univ of Minnesota	Control Data Institute	1971	Michael Brucciani, Layton Kinney	Computer skills not taught in colleges then; benefited all parties	Source of motivated employees with known skills and knowledge	Program was well received, expanded to other states, and USA overseas military	Using the CDI plan, colleges could jump start their own academic curriculums	Two-year degree now a standard in many technical fields
Pricing, optimizing revenues, upping margins, market intelligence for sales was role of Product Management	Computer	1960s	Eastling Uchill teams	Adapted, enhanced a commercial-goods marketing tool, created financial modeling to accurately predict product life, optimize cash flows	Low-cost controversial early move to use Harvard MBAs to perform vital business functions	Primary source of market intelligence, promotion, sales aids, forecasting, market needs and sensitivities	Worked closely with developers on tradeoffs between time, market needs, competitive threats, costs	Sophisticated, accurate financial modeling done years ahead of others; now a common tool
Patents - crucial to keep others from inventing on top or around you; highly competitive, big\$	All technical operations	All periods	Individuals, teams who keep logbooks	Patents tell the world that you own the invention; if others want to use it, "Let's talk;" can become litigious	Technical innovators are highly competitive, patents spur them on; CDC has more that we can count	Positive selling point: we keep inventing to serve you better; lagging companies simply copy	One patent on a device seldom enough; you can surround you with a 'thicket of improvement patents'	Patents expire, some of the technology obsolete, but much of it carries forward
Secret manufacturing processes and other trade secrets; "Don't even think of asking what they are/do?"	Peripheral, other operations	All periods	Individuals, teams who act in secret	Patents are disclosed to the world and thus copyable; Trade secrets keep innovations from rivals	CDC quietly built up know-how that rivals never knew existed; Many are subtle, improve reliability, costs	Customers receive the benefits, word-of-mouth brings in new business but the inventors are unsung	Dozens of otherwise patentable innovations that CDC explored and added to on its own	Some still in use today, quantity and types unknown; they are trade secrets!

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Next-stage / Later-stage computers, software, peripherals - selected entries

Innovation	Division ¹ , Entity	When ²	Team ³ , people	Importance at the time	Impact - CDC progress	Impact - markets	Impact - technical	21st Century usage
High-risk 'dual-state' Cyber 180 series 30 years ahead of its time; programs written for different computers run with no penalty	Canadian, Computer,	1978-1980s	Slais team	A most difficult technical task; the ability to run past and future programs from different computers on one system	Developed after the peak in large-computer markets, but made capturing sales from incompatible computer systems easier	Lessened the challenges of CDC competing in both supercomputing and commercial markets	An astonishing advance in computer architecture, technology and programming; it took all three elements to succeed	30 years ahead of Apple running Microsoft Windows on a Mac!
Single code generators for common use in both Fortran and Cobol compilers	Palo Alto	Palo Alto	Allard, Tiede	Developed a powerful code generator to handle the two major customer languages	Internal efficiency and consistency; generated higher quality and more reliable code	Indirect but important; customers would have less hassle and smoother operations	Like many innovations, these tools solved hurdles of the times, leading to even better designs	Probably not used as they solved problems of an earlier era
SES (Software engineering System)	Palo Alto	Mid-1970s thru mid-1980s	Allard, Tiede	Tools for much more efficient and fast software development	Enabled many innovations that created others; no-longer computer dependent	Indirect but important; customers would have less hassle and smoother operations	Moderate	not so many different instruction sets today
STAR computer system	Computer	1974	Thornton team	Leading edge attempt for even greater speed than 6600; a large technical risk	Key in advancing CDC supercomputing after Cray's departure	Modest; Cray, in a new company, leapfrogged with a less complex variation	As with all advanced supercomputers, Star added many items to the field	Parallel processors, array processors, supercomputers
600 Series magnetic tape drives for all speeds, densities, widths and budgets; tape drives were the bulk storage of that era	Peripheral	1962	Bulver Larson Hennefert	The few independent digital tape drives were unreliable but IBM would sell theirs to us at list, an unacceptable solution	Once developed, CDC rapidly learned to manufacture in high volume	The 600 series built on breakthrough technology; its reliability and adaptability led to an impressive product line	The rapid success of the 600 series emboldened CDC to pursue other electromechanical technologies	Tapes largely a medium of the past but some underlying electromechanical innovations live on
Peripheral sales to other computer equipment manufacturers (OEMs)	Peripheral	1960s onward	Peripheral	CDC supplied peripherals in large to the non-IBM competitors, continually reducing CDC costs	OEM sales became large business enterprise while assuring the Computer Division of reliable gear	CDC became a one-stop supplier to system customers	Control Data became a magnet for small electro-mechanical entrepreneurs looking for stable growth	Seagate, others
800 Series disk drives, the next step in mass storage	Peripheral	1965 onward	Sullivan Perkins	Similar to 3600 need for tape drives, far faster 6600 needed disk drives; we also wanted OEM sales	Leading-edge electro-mechanical technology becoming a CDC primary business asset	Magnetic densities and speed were pace with electronics, a necessity for market growth	Breakthrough in managing large physical forces let disks position while also reading and writing	Today all disk drives do concurrent read-write and positioning

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Defense electronics - quiet by necessity, even now, some secrets cannot be told!

Innovation	Division ¹ , Entity	When ²	Team ³ , people	Importance at the time	Impact - CDC progress	Impact - markets	Impact - technical	21st Century usage
Small, light-weight, fast, rugged equipment via harsh-environment packaging	Defense Electronics	1960-...	Lillstrand, Sammis, Whalen-Bergdund teams	Many novel techniques in vibration, shock, thermal, EMI, ruggedizing, boards, connectors, hi-density ICs	Key to success in all CDC defense, space programs; ruggedized several peripherals for military	CDC became known for physically robust hardware in harsh environments	Many of the early packaging technology developments led the way for the personal electronics of today	Cell phones, PDAs, hand-held/worn electronics
Firmware computer emulation using novel architectures	Defense Electronics	1970-1980	Several teams; Malakowsky firmware team	Bit-Slice data structures, microprogrammed control structures, plug & play interfaces, IC predecessor	Key to CDC winning \$1.5B Navy AYK-14 airborne computer business over several years	We became the main US Navy airborne computer contractor – The industry gold standard!	Predecessor to the integrated microprocessor and basic to many consumer electronics today	AYK-14 is standard US Navy multi-platform airborne computer; now at General Dynamics
Flexible data-flow computer architecture using super-high-performance hardwired algorithms	Defense Electronics	1970-...	ISD & GSD teams	Innovated: FFT, FP, AFP, uAFP, PMSP, Cyber Plus, equipment; comprehensive built-in test schemes; micro-controlled data architecture	Led to several defense programs dealing with radar, sonar, IR, camera video, and 'other' DP business	We "locked-in" several well-funded defense customers as their preferred supplier!	Continued generation-after-generation of higher performance DP for tougher customer problems	
High Integrity computer systems through advanced reliability, integrity, dependability techniques	Defense Electronics	1960-1980	Several design teams	System redundancy, hardware & software checking & voting; encoding & decoding algorithms	Key to early space, other markets; early competitor; success on AMR safety-center program, follow-ons	We could usually compete on historical reliability and dependability of our products	Bleeding edge solutions for ultra-demanding applications	Many of our early techniques were adopted by industry
Deposited magnetic memory element/modules	Defense Electronics	1970-1980	Smay & Bonnie teams	Computer non-volatile memory: Reliable thin-film and plated-wire memory	Got CDC into the space and airborne computer markets as an early competitor	Several contracts where many competitors couldn't be credible	Was the only viable solution for many years until solid-state technologies took over	
Computer interface displays and highly advanced drive circuitry	Defense Electronics	1965-1975	Mayer-Johnson & Weigler teams	2D panel displays; flat plasma displays; use of low-cost TV CRTs as operator-console displays	Kept development costs very competitive in test & operator equipment on numerous projects	Kept us noticed and a top innovator among many of our competitors	Way ahead of commercial use of flat-panel displays; ongoing source of technical savvy for other projects	Check out the latest in computer displays and plasma TVs!
Custom complex circuit design using early MSI-LSI-VLSI techniques and tools	Defense Electronics	1970-1990	Several design teams	Early use of PGAs, tools, techniques for 1st-pass complex gate-array chip designs; pre-build simulation	Kept us on top of the curve on higher circuit integration in special purpose defense electronics and systems	Kept us ahead of many of our competitors in our existing markets	Another example of CDC leading-edge innovation	Key to development of the CAD/CAM tools industry and several present corporations

Glossary of acronyms and terms used in this innovation table	
2D Panel displays	Two Dimensional Panel Displays
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing
CDI	Control Data Institute
CE	Customer Engineer
CMOS	A common semiconductor technology
CPM	Critical Path scheduling Method
Cyber Plus	A parallel processing extension of the Cyber line
DP	Data Processing
EMI	Electromagnetic interference
FFT	Fast Fourier Transform; a mathematical engineering technique
FP	Flexible Processor; early parallel-processor developments
GD	General Dynamics
GSD	Government Systems Division
IR	Infrared

Glossary of acronyms and terms used in this innovation table	
ISD	Information Systems Division; part of Government Systems Group
IT	Information Technology
LSI	Large Scale Integrated Circuit
MOS	Master Operating System or Metal Oxide Semiconductor
MSI	Medium Scale Integrated Circuit
OEM	Other Equipment Manufacturer
PC	Personal Computer
PDA	Personal Digital Assistant; e.g. Palm Pilot
PED	Peripheral Equipment Division
PGA	Programmable gate array
PLATO	Programmed Learning for Automated Teaching Operations
PMSP	Programmable Modular Signal Processor
SES	Software Engineering System
uAFP	Micro Advanced Flexible Processor; a parallel-processor development
VLSI	Very Large Scale Integration: a very high-density semiconductor

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PLATO - a pioneering social experiment in machine-based learning that pushed the frontiers of technology

Innovation	Division ¹ , Entity	When ²	Team ³ , people	Importance at the time	Impact - CDC progress	Impact - markets	Impact - technical	21st Century usage
PLATO as a system, service, and a family of products	PLATO	1974	Entire division	Ability to sell complete systems to major clients and services to individuals	Allowed PLATO to be sold by the bite	Allowed PLATO market to include a broad range of customer types	Was only possible through advanced data-networking technologies	Internet-based virtual universities and e-learning services
Laser-based PLATO Communications	PLATO, Central Research Lab	1976 - 1977	Jock Hill	Proof of concept – PLATO link between HQ & the lab via laser beam	Prospective addition to the PLATO product line	It was early for the market	Very high-speed data communications without laying cables	Line-of-sight laser transceivers are widely used today
First high-resolution touch panel for PLATO terminals	PLATO, Terminal Systems, Microcircuits	1975		Feature of CDC's PLATO terminal	A major feature of PLATO	Computers, terminals, phones, ATMs, etc.	Improved human interface	Touch panels are in general use today
Microfiche projector prototype (no moving parts)	PLATO, CERL	1975	University of Illinois PhD student	Proof of concept; magnetic-rubber & stepper-motor technology	Prospective product enhancement	Leading-edge products do not always gain acceptance	Not productized, replaced by videodisc	Other technologies won the day
PLATO service via CATV in Irvine, California	PLATO	1977	Jock Hill and Mal Doelz	Proof of concept; mixing analog and digital signals was very early stage	Improved methods of PLATO service distribution	PLATO distribution enhancement	Allowed PLATO communications to coexist with TV programming	Internet, data services now commonly coexist on CATV networks
Joint venture with French to boost PLATO audiovisual capabilities	PLATO, Thompson CSF Research	1977	Jock Hill	Proof of concept done in 2 weeks during a video-standards war	If warring parties could agree, a good PLATO product enhancement	Markets delayed, the usual outcome of standards wars	Improved human interface, with interactive video and sound	Common in today's personal computers

Infrared wireless Keyboard for PLATO (prototype)	PLATO, Central Research Lab	1977	PLATO Network Team	Proof of concept	Prospective product enhancement	Wireless technologies incur lengthy regulatory review, frequent litigation	First wireless keyboard	Common, widely used product
LCD PLATO projector prototype	PLATO, Hughes Electronics	1977 - 1978	Jock Hill	PLATO as a presentation medium	Prospective addition to the PLATO product line	Very early for the market	First application of liquid crystal for projection display	Common use today; LCD projectors
Eight-layer circuit board for plasma display electronics	PLATO, Microcircuits	1976		Reduced plasma display drive electronics from 3,200 components to 88	Major reduction of cost and assembly time of plasma displays	Improved marketability of plasma display panels	Allowed use of advanced integrated hybrid circuits	Common, widely used
Doelz Network - first ATM virtual fast-packet network architecture	PLATO, Doelz Networks, Inc.	1976 - 1978	Mel Doelz Jock Hill Bob Morris	Dramatic improvement in cost/performance of PLATO communications	Removed communications cost as the barrier to PLATO marketability	Commonly used technology today but controversial at the time. AT&T wasn't ready	A revolution in communications-network design	Elements of this architecture are in the belly of the Internet
Expert system for diagnosis of PLATO network-performance problems	PLATO	1978	PLATO Network Team	Need to monitor a large international network and maintain uptime	Made it possible to offer a reliable service	Customer satisfaction!	Ease of maintaining a very large network	Common use in today's Internet and in software updates
Portable PLATO plasma terminal prototype	PLATO, Central Research Lab, Microcircuits	1976 - 1977	Entire division	Proof of concept and improved plasma drive electronics	A potential addition to the PLATO product line	Very early for the market	A precursor of today's laptop computers	Laptop computers
PLATO Acoustic Coupler, first to operate at 1200 baud	PLATO, Central Research Lab	1976 - 1977	PLATO Network Team	Allowed PLATO service customers to connect via a common phone line	Made it possible to provide a distributed PLATO service	A necessity for service distribution	Avoided difficulties of dedicated, conditioned line on aged Telco network	In common use
Multilingual human interface	PLATO, CERL		Entire division	Multiple loadable font sets allowed for multilingual presentation	Expanded PLATO sales internationally	Made PLATO viable in the international markets	First-ever loadable font sets	Common feature of today's personal computers
Extended Semiconductor Memory electronic packaging	PLATO, Central Research Lab, Microcircuits	1976 - 1977	Memory Systems	Necessary to improve and reduce cost of the extended memory system	Substantial reduction in memory system cost	One of the many things that made PLATO affordable	Major reduction in component costs and assembly time	Semiconductor memory is in common use today

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Control Data's 30 major computer systems - 1960 to 1990 - 30 years of tencical innovation

Year	System ¹	Product Success	Organization ³	Key Technical Players ⁴
1960	1604	Very Successful	501 Park Avenue, Minneapolis	Seymour Cray, Jim Thornton
1960	160	Limited	501 Park Avenue, Minneapolis	Seymour Cray
1961	924	Successful	501 Park Avenue, Minneapolis	Chuck Casale, Chuck Hawley, Ron Hintz
1961	160A	Very Successful	501 Park Avenue, Minneapolis	Marv Green, Maris Bergmanis
1963	3600	Very Successful	501 Park Avenue, Minneapolis	Chuck Hawley, Ron Hintz, Sam Slais, Don Pagelkopf
1963	3200	Very Successful	501 Park Avenue, Minneapolis	Don Malcolm, Marv Green, Maris Bergmanis
1964	3400	Successful	Computer Development Arden Hills	Don Pagelkopf
1964	6600	Very Successful	Chippewa Falls	Seymour Cray, Jim Thornton, Les Davis
1965	3300	Very Successful	Computer Development Arden Hills	Marv Green, Dick Day, Maris Bergmanis, Matt Kramer
1965	3800	Successful	Computer Development Arden Hills	Ron Hintz
1965	3100	Successful	Computer Development Arden Hills	Sam Slais, Dave Mitchel
1966	6400	Successful	Computer Development Arden Hills	Don Pagelkopf
1966	1700	Very Successful	Computer Development Arden Hills	Curtis Alexander
1966	6500	Successful	Computer Development Arden Hills	Don Pagelkopf
1967	6800	Successful	Computer Development Arden Hills	Don Pagelkopf
1967	3500	Very Successful	Computer Development Arden Hills	Marv Green, Matt Kramer, Maris Bergmanis, Dick Day
1969	7600	Very Successful	Chippewa Falls	Seymour Cray, Les Davis
1969	6700	Successful	Computer Development Arden Hills	Don Pagelkopf
1974	Cyber 173/174	Very Successful	Canadian Development Mississauga	Curtis Alexander, Ivan Tavchar, Wayne Specker, Robert C. Olson
1974	Star 100	Limited	Star Development, Arden Hills	Jim Thornton, Ray Kort, Neil Lincoln, Ron Hintz, Chuck Hawley
1977	Cyber 175/176	Very Successful	Computer Development Arden Hills	Ken Kiefer, Don Johnson
1978	Cyber 180-825/835 (P2) ¹	Very Successful	Canadian Development Mississauga	Ivan Tavchar, John Roberts
1979	Cyber 203	Successful	Star Development, Arden Hills	Neil Lincoln, Dale Handy, Ray Kort
1979	Cyber 170 Series 700	Successful	Computer Development Arden Hills	Clark Noto, Paul Higgins
1981	Cyber180-855 (P3) ¹	Very Successful	Computer Development Arden Hills	Sam Slais, Curtis Alexander, Dan Chambers, Ron Hintz, Wayne Specker
1981	Cyber 205	Very Successful	Star Development, Arden Hills	Neil Lincoln, Dale Handy, Ray Kort , Maurice Hudson
1982	Cyber180-810/820 (P1) ¹	Very Successful	Canadian Development Mississauga	Ivan Tavchar, John Roberts
1985	Cyber 180-990 (P4) ¹	Very Successful	Computer Development Arden Hills	Sam Slais, Jim Stockard, Ron Hintz
1987	ETA 10 ²	Very Successful ²	ETA Systems	Neil Lincoln, Ray Kort
1990	Cyber 2000V	Limited	Computer Development Arden Hills	Ron Hintz, Neil Lincoln

Notes 1. The P1, P2, P3, P4 systems were joint-venture systems with NCR

2. "The ETA 10 was a great technological success and won good acceptance in the marketplace. We simply ran out of time and money before we could realize its market potential." - Robert M. Price

3. In early years CDC was organized by Divisions in a classical pyramid. In later years CDC used several organizational methods suited to the mission

4. Key technical players exclude project leaders unless they significantly participated in the detail work