

Une petite histoire de l'informatique

1er siècle avant J.-C.

Datée d'avant 87 av. J.-C., la machine d'Anticythère est une calculatrice mécanique antique permettant de calculer des positions astronomiques. C'est le plus vieux mécanisme à engrenages connu.



1623

Wilhelm **Schickard** (1592-1635) invente pour Kepler une « horloge calculante » destinée à calculer les éphémérides.



1642-1644

Blaise **Pascal** (1623-1662) invente une machine à calculer (« la Pascaline ») capable d'additionner et de soustraire des nombres de huit chiffres.



1673

Le grand mathématicien et philosophe Gottfried Wilhelm von **Leibniz** s'inspire de la Pascaline et invente une machine capable de multiplier et diviser sans utiliser les additions successives. Elle ne sera construite qu'en 1694, faute de trouver un artisan assez habile.

Leibniz a aussi compris l'importance du système binaire pour les mathématiques et la logique. On trouve cependant des traces du système binaire bien avant, chez les Indiens et les Chinois.

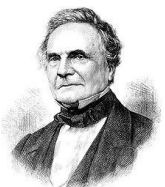
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1801

Joseph Marie **Jacquard** (1752-1834) invente des cartes pour commander le tissage de motifs sur les métiers à tisser.

On peut considérer cette invention comme le début de la programmation.



1823

Charles **Babbage** (1791-1871) commence à construire sa *machine à différences*, inspiré par le métier à tisser de Jacquard.

Babbage caresse l'idée de cette machine depuis 1812. Il s'adjoint l'aide d'une jeune femme, Ada **Lovelace** (1815-1852), brillante mathématicienne qui l'aide à concevoir les « diagrammes » pour faire fonctionner la machine. Il semblerait que c'est Lady Ada qui conçoit le premier langage informatique pour la machine à différences de Babbage (elle donnera d'ailleurs son nom au langage de programmation Ada), mais d'autres biographes pensent qu'elle a seulement corrigé une erreur de Babbage.



Dans une correspondance avec Sir Humphry Davy en 1822, Babbage y discute de certaines applications d'une telle machine, notamment pour le calcul et l'impression des tables mathématiques, et y discute aussi des principes d'une machine à calculer. En 1823 débute la construction de cette machine qui ne sera jamais complétée. En 1991, on a pu reconstruire à partir de ses plans une partie de cette machine, qui fonctionna parfaitement. On peut en voir une au *Science Museum* de Londres.



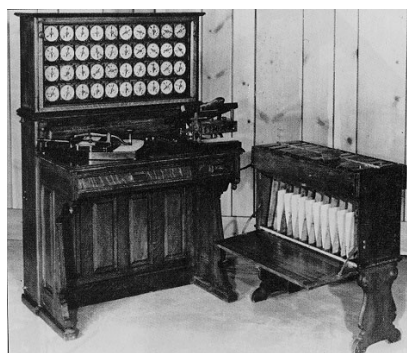
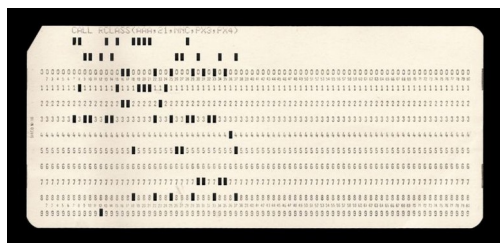
1854

George **Boole** (1815-1864) publie un article sur la logique binaire. Les travaux de Boole, s'ils sont théoriques, n'en trouveront pas moins des applications primordiales dans les systèmes informatiques.



1890

Herman **Hollerith** (1860-1929) utilise une machine à cartes perforées pour le dépouillement du recensement américain.



1936

Alan Mathison **Turing** (1912-1954) publie *On Computable Numbers with an Application to the Entscheidungsproblem*, ouvrage qui définit les limites théoriques de l'ordinateur. Il présente le modèle des machines de Turing et construit (mathématiquement) la première machine universelle. Il prouve également l'absence de méthodes algorithmiques (indécidabilité algorithmique) pour résoudre certains problèmes comme le problème de l'arrêt ou le problème de la décision.



Alan Turing se suicidera en 1954, en mangeant une pomme imbibée de cyanure. Une légende souvent rapportée dit que cet épisode est à l'origine du logo d'Apple.



1937

Le premier ordinateur, nommé **ABC** pour *Atanasoff-Berry Computer* est conçu par John Vincent **Atanasoff** (photo du haut, 1903-1995) avec son étudiant Clifford **Berry** (photo du bas, 1918-1963). Il a été testé avec succès en 1942.



Les idées d'Atanasoff (utilisation du binaire, utilisation d'une unité arithmétique et logique pour effectuer les calculs de base) furent reprises dans l'*ENIAC*, souvent considéré ainsi à tort comme le premier ordinateur. En effet, Eckert et Mauchly, concepteurs de l'*ENIAC*, brevettent leur invention comme le premier ordinateur (« first digital computer »), mais un procès dans les années 1970, juge qu'ils n'ont fait que reprendre les idées de l'ordinateur *ABC*, et consacre ainsi Atanasoff comme l'inventeur du premier ordinateur électronique.

1940

Pour décrypter les messages de l'armée Allemande, les Anglais mettent au point sur le site de *Bletchley Park* les calculateurs **Robinson** et **Colossus** sous la direction du mathématicien Alan **Turing**. Ce sont les premières machines qui intègrent les concepts d'arithmétique binaire, d'horloge interne, de mémoire tampon, de lecteurs de bande, d'opérateurs booléens, de sous-programmes et d'imprimantes. Tout ceci sera classé « Secret défense » jusqu'en 1975.



1941

Konrad **Zuse** (1910-1995) fait fonctionner le premier ordinateur du monde, le **Z3** (ou **Zuse 3**). Encore largement méconnu, il est l'un des pères de l'informatique en ayant développé le premier calculateur électromécanique Z1 en 1938. Le Z3 fut détruit en 1944 par les bombardements alliés et servait à produire des calculs pour une usine aéronautique allemande.

Il concevra aussi et réalisera entre 1942 et 1946 le premier langage de haut niveau nommé **Plankalkül**. Ce langage est extrêmement innovant, mais en dehors du courant principal du développement de l'informatique. Il demeure donc très largement méconnu.



1943

Création du *ASCC Mark I* (Automatic Sequence-Controlled Calculator Mark I) à Harvard par Howard **Aiken** (1920-1973) et son équipe, avec le soutien d'IBM. C'est un énorme calculateur électromécanique (3000 relais, 800 km de câbles) qui permet de faire 3 opérations sur 23 chiffres par seconde. Cette machine est très proche dans son principe de fonctionnement des plans de la machine analytique de Babbage. Le programme est lu depuis une bande de papier ; les données à traiter peuvent être lues depuis une autre bande de papier ou un lecteur de cartes.



1943

L'*ENIAC* (*Electronic Numerical Integrator And Computer*) est créé par John W. **Mauchly** (1907-1980) et John Presper **Eckert** (1919-1995). Il sera opérationnel en 1946. Son poids est de 30 tonnes pour des dimensions de 2,4 x 0,9 x 30,5 mètres occupant une surface de 67 mètres carrés. Il fut



utilisé pour des calculs ayant servi à mettre au point la bombe H. Son principal inconvénient était sa programmation : l'**ENIAC** était en effet uniquement programmable manuellement avec des commutateurs et des câbles à enficher.



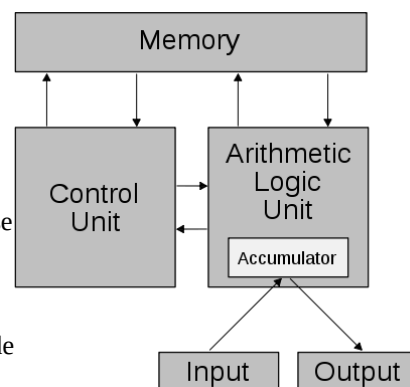
1944



John **Von Neumann** (né János **Neumann**, 1903-1957) a donné son nom à « l'architecture de von Neumann » utilisée dans la quasi-totalité des ordinateurs modernes. Cela est dû au fait qu'il est, en 1944, le rapporteur des travaux pionniers en la matière (*First Draft of a Report on the EDVAC*¹). Le modèle de calculateur à programme auquel son nom reste attaché, et qu'il attribuait lui-même à Alan **Turing**, possède une unique mémoire qui sert à conserver les logiciels et les données. Ce modèle, extrêmement innovant pour l'époque, est à la base de la conception de nombre d'ordinateurs.

L'architecture de von Neumann décompose l'ordinateur en 4 parties distinctes :

1. l'unité arithmétique et logique (UAL) ou unité de traitement, qui effectue les opérations de base ;
2. l'unité de contrôle, qui est chargée du séquençage des opérations ;
3. la mémoire, qui contient à la fois les données et le programme qui indique à l'unité de contrôle quels calculs faire sur ces données. La mémoire se divise en mémoire vive (programmes et données en cours de fonctionnement) et mémoire de masse (programmes et données de base de la machine) ;
4. les dispositifs d'entrée-sortie, qui permettent de communiquer avec le monde extérieur.



1945

Un papillon de nuit coincé dans les circuits bloque le fonctionnement du calculateur Mark II. La mathématicienne Grace **Murray Hopper** décide alors que tout ce qui arrête le bon fonctionnement d'un programme s'appellera « bug » (bestiole en anglais).



Il faut noter que le terme « bug » était déjà utilisé auparavant : Thomas **Edison** par exemple avait employé ce terme dans un courrier à propos d'une de ses inventions.

1 **EDVAC** (**E**lectronic **D**iscrete **V**ariable **A**utomatic **C**omputer) est l'un des tout premiers ordinateurs électroniques. Contrairement à l'**ENIAC**, il opère en mode binaire plutôt que décimal.



1951

Grace Murray **Hopper** (1906-1992) conçoit le premier compilateur, nommé *A-0 System*. À partir de 1957, elle travaille pour *IBM*, où elle défend l'idée qu'un programme devrait pouvoir être écrit dans un langage proche de l'anglais plutôt que d'être calqué sur le langage machine, comme l'assembleur. De cette idée naîtra le langage *COBOL* en 1959.

1954

Création du *Fortran*, premier langage de programmation à être implémenté sur un ordinateur.

1954

IBM (société fondée en 1911) lance sur le marché le modèle 650, premier calculateur, muni d'une mémoire à tambour et orienté calcul scientifique produit en grande série. Il coûtait un demi-million de dollars, occupait plusieurs mètres cubes et était doté d'une mémoire vive de 2 kilooctets.

1955

Le professeur Jacques **Perret** de la faculté des lettres de l'université de Paris, invente le mot « ordinateur » le 16 avril 1955, à la demande d'*IBM France*.

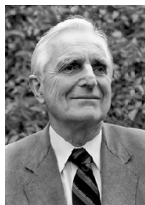


1958

En 1958, alors qu'il travaillait pour *Texas Instrument*, l'Américain Jack **Kilby** (1923-2005) invente le premier circuit intégré, jetant ainsi les bases du matériel informatique moderne. Cette découverte a valu à Kilby le prix Nobel de physique en 2000.

1962

Philippe **Dreyfus** invente le mot « informatique », mot-valise né de la contraction des mots « information » et « automatique ».



1963

Création de la souris par Douglas **Engelbart** (1925-2013) du *Stanford Research Institute*.



1967

Une équipe d'ingénieurs d'*IBM* dirigée par Alan **Shugart** (1930-2006) lance la disquette (dans sa version 8 pouces) pour stocker les microprogrammes des systèmes 370 et, accessoirement, envoyer pour un faible coût des mises à jour à leurs possesseurs. Cette première disquette pouvait stocker 80'000 caractères, soit environ une journée de frappe d'une opératrice de saisie. Pour cette raison, des matériels de saisie sur disquette commencèrent à remplacer les encombrantes et bruyantes perforatrices de cartes utilisées jusque-là.

À la fin des années 1990, les disques compacts et Internet commencent à remplacer certains usages des disquettes. Au courant des années 2000, les clés USB et les cartes mémoires remplacent progressivement les autres usages des disquettes sur les nouveaux ordinateurs personnels.

En mars 2011, Sony, cesse la fabrication de disquettes 3½ pouces. C'était le dernier format de disquettes encore existant, après les 8 pouces et les 5¼ pouces.



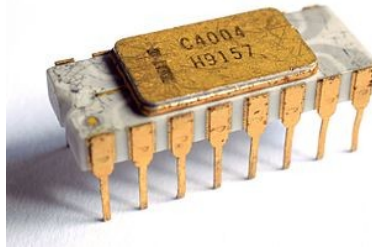
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Fin 1969

Début du réseau **Arpanet**, renommé plus tard **Internet**. Il compte 4 nœuds.

1971

Le microprocesseur 4004 d'**Intel** date de 1971. De la taille d'un timbre, il développe des performances équivalents à celle de l'**ENIAC** (1946), qui occupait toute une pièce.



1973

Commercialisation du **Micral**, le premier micro-ordinateur. Il a été développé de 1972 à 1973 par R2E, jeune société Française dirigée par André **Truong** (1936-2005), mais c'est François **Gernelle** (né en 1944) qui en est l'inventeur (photo ci-contre). Cet ordinateur ne possédait ni clavier ni écran et était commandé par des interrupteurs, comme l'**Altair**, deux ans plus tard.

1975

L'**Altair 8800** du constructeur américain MITS est un micro-ordinateur basé sur le microprocesseur Intel 8080A vendu en kit électronique à quelques milliers d'exemplaires pour les particuliers en 1975. Il est considéré par les Américains comme le premier micro-ordinateur.



1975

La société **Microsoft** est fondée en avril 1975 sous le nom original de *Micro-Soft*, par deux étudiants américains, Bill **Gates** (photo, né en 1955) et Paul **Allen** (1953-2018).



1976

Steve **Jobs** (1955-2011), Steve **Wozniak** (photo, né en 1950) et Ronald **Wayne** (né en 1934) fondent la société **Apple**.

1976

Apparition du premier supercalculateur : le *Cray I*.

1982

Au début des années 80, l'informatique commence doucement à investir les foyers. Cependant, le PC portable, tel qu'on le connaît aujourd'hui, n'existe pas vraiment. L'arrivée du **Grid Compass 1101**, en avril 1982, est une date importante, puisque c'est la première machine à proposer un concept d'écran « refermable ». Vendu la bagatelle de 8150 dollars, c'est un véritable monstre de puissance et se targue de proposer un écran de 6 pouces affichant une définition de 320 x 240 px. À l'intérieur, on y trouvait un processeur Intel 8086 cadencé à 8 MHz et 256 Ko de mémoire vive.



Le GRiD Compass 1101 a connu un succès d'estime, notamment auprès de l'armée américaine et de la NASA. C'est d'ailleurs le premier *laptop* à aller dans l'espace en 1985 à bord de la navette Discovery.

1985

Apparition du CD-ROM.



1989

Tim **Berners-Lee** (né en 1955) invente le **World Wide Web** (WWW) pour que les chercheurs puissent partager les informations au sein du CERN.



1994

Le site de vente en ligne **Amazon** est fondé par Jeff **Bezos** (né en 1964).

En 2017, la société emploie 541'900 personnes dans le monde et a établi, outre le site originel américain (ouvert en 1995), des sites spécifiques dans de nombreux pays.

1997

Deep Blue bat Gary Kasparov sur le score de 3,5 – 2,5.

Deep Blue est un superordinateur spécialisé dans le jeu d'échecs, développé par IBM. C'est la première fois qu'un ordinateur bat un champion du monde d'échecs.

1998

La société **Google, Inc.** est fondée le 27 septembre 1998 dans la Silicon Valley, en Californie, par Larry **Page** et Sergey **Brin**, créateurs du moteur de recherche *Google*.



2001

Wikipédia est une encyclopédie numérique ouverte, libre, multilingue, consultable gratuitement sur internet et en évolution permanente grâce à de très nombreux contributeurs bénévoles. Son succès est considérable et sa croissance exponentielle : créée en janvier 2001 par Jimmy **Wales** (né en 1966), elle est devenue un des 10 sites les plus consultés au monde.



2004

Mark **Zuckerberg** (né en 1984) fonde « The Facebook », le 4 février 2004. L'inscription était alors limitée aux étudiants de l'université Harvard.

En 2018, **Facebook** compte plus de 2.2 milliards d'utilisateurs.

2005

Youtube est créé par Steve **Chen**, Chad **Hurley** et Jawed **Karim**, trois anciens employés de **PayPal**. Il est racheté par **Google** en octobre 2006 pour la somme de 1.65 milliard de dollars.

2006

Twitter est créé le 21 mars 2006 par Jack **Dorsey**, Evan **Williams**, Biz **Stone** et Noah **Glass**, et lancé le 13 juillet de la même année. Le service est rapidement devenu populaire, jusqu'à réunir plus de 500 millions d'utilisateurs dans le monde fin février 2012. Au 5 mars 2017, Twitter compte 313 millions d'utilisateurs actifs par mois avec 500 millions de tweets envoyés par jour et est disponible en plus de 40 langues.

2007

Apple entre dans le marché des téléphones portables avec la commercialisation de l'**iPhone**.



2010

Le 3 avril 2010, Steve **Jobs** (1955-2011), président-directeur général d'**Apple**, présente sa dernière nouveauté : l'**iPad 1**. La tablette d'Apple est la plus vendue au monde.

L'écran tactile de la tablette remplace en quelque sorte la souris. Un logiciel interprète le contact et les déplacements des doigts sur l'écran. L'affichage à l'écran peut se faire en mode portrait et paysage en pivotant la tablette.

2010

Lancement du site **Pinterest** par Paul **Sciarra**, Evan **Sharp** et Ben **Silbermann**.

2010

Instagram est fondé et lancé par l'Américain Kevin **Systrom** et le Brésilien Michel Mike **Krieger** en octobre 2010. Le 10 avril 2012, **Facebook** annonce l'acquisition d'**Instagram** pour environ un milliard de dollars américains.

Instagram revendique plus d'un milliard d'utilisateurs à travers le monde, dont 75 % d'utilisateurs en dehors des États-Unis, selon les chiffres officiels fournis en juin 2018.

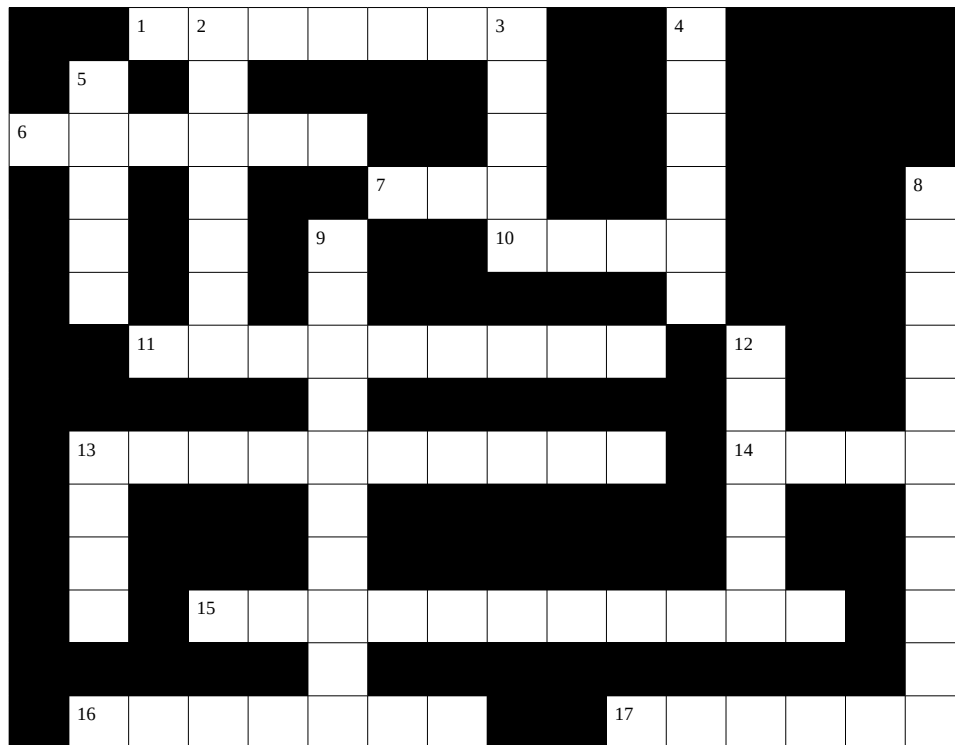
2017

En novembre, **IBM** déclare avoir développé un ordinateur quantique capable de gérer 50 bits quantiques, ou qubits. Les chercheurs ont pu préserver l'état quantique pendant 90 microsecondes. En dépit d'une période de temps extrêmement courte, il s'agit d'un nouveau record pour l'industrie.

2018

En mars 2018, **Google** a marqué les esprits en présentant **Bristlecone**, un processeur quantique avec 72 qubits. Personne n'a fait mieux à ce jour.

Mots croisés



Horizontalement

1. Concepteur de la "machine à différences"
6. Informaticienne américaine qui a conçu le premier compilateur
7. Prénom de la collaboratrice de Babbage et langage de programmation
10. Lieu où a été inventé le World Wide Web
11. Le "A" de l'ordinateur ABC
13. Créateur de Facebook
14. Nom du premier supercalculateur
15. Nom du premier langage de programmation de haut niveau
16. Inventeur de la première calculatrice capable de multiplier
17. Firme fondée par Larry Page et Sergey Brin

Verticalement

2. Ancêtre d'Internet
3. Electronic Numerical Integrator And Computer
4. A construit la première machine universelle
5. Inventeur de la logique binaire
8. Plus vieux mécanisme à engrenages connu
9. A donné son nom à l'architecture utilisée dans la quasi-totalité des ordinateurs modernes
12. Nom du premier micro-ordinateur
13. Informaticien allemand ayant fait fonctionner le premier ordinateur du monde

Publicités vintage



KAISER Jeep CORPORATION

"Why we chose the **NCR 315 Computer.**"

—Kaiser Jeep Corporation, Toledo, Ohio

"Early in 1963 we began an extensive analysis of computers and entered a wide, far-reaching search to evaluate the only system in the market. After our research was completed and we had tested the NCR 315 computer, we found it to be the one best suited to our particular needs. Specifically, our evaluation was based upon many factors. To name a few: technical equipment, processing speed, installation and the operation requirements, inherent ability to expand the system, etc. Today, we have daily working proof that our need is being met and profitable. Our EDP installation is costing us less each month in total charges than our previous system, yet the NCR 315 is automating the data processing on such applications much faster and more accurately than we previously realized."

NCR PROVIDES TOTAL SYSTEMS — FROM ORIGINAL ENTRY TO FINAL REPORT — THROUGH EDUCATION, SERVICE, AND SUPPORT. NCR 315 OFFERS IN 100 COUNTRIES, 70 PAGES OF PROGRAMS AVAILABLE.

NCR

NCR 315 – 1963



PDP-11
resource
timesharing
system
RSTS-11

the system...RSTS-11
the software...BASIC-PLUS

digital

PDP 11 - 1972



Introducing Apple II.

The home computer that's ready to work, play and grow with you.

Clear the kitchen table. Bring in the color TV. Plug in your new Apple II and connect any standard cassette recorder/player. Now you're ready for an evening of discovery in the new world of personal computers.

Only Apple II makes it that easy. It's a computer, ready to use tomorrow — at a bit. At \$1298, it includes features you won't find in other personal computers costing twice as much.

Start by playing PONG. Then invent your own games using the input keyboard, game paddles and built-in speaker. As you experiment you'll acquire new programming skills which will open up new ways to use your Apple II. You'll learn to "paint" dazzling color displays using the unique color graphics commands in Apple BASIC, and write programs to create beautiful kaleidoscopic designs. As you master Apple BASIC, you'll be able to organize, index and store data on household finances, income tax, recipes, and record collections. You can learn to chart your body rhythms, balance your checking account, even control your home environment. Apple II will go as far as your imagination can take it.

Best of all, Apple II is designed to grow with you. As your skill and experience with computing increase, you may want to add new Apple peripherals. For example, a refined, more sophisticated BASIC language is being developed for advanced scientific and mathematical applications. And in addition to the built-in audio, video and game interfaces, there's room for eight plug-in options such as a prototyping board for experimenting with interfaces to other equipment; a serial board for connecting telephones, printers and other terminals; a parallel interface for communicating with a printer or another computer; an EPROM board for storing programs permanently; and a modem operating system will be available at the end of 1977. And there are many more options to come, because Apple II was designed from the beginning to accommodate increased power and capability as your requirements change.

If you'd like to see for yourself how easy it is to use and enjoy Apple II, visit your local dealer for a demonstration and a copy of our

Apple II™ is a completely self-contained computer system with BASIC in ROM, color graphics, ASCII keyboard, light-weight, efficient switching power supply and modulated cassette. It is supplied with BASIC in ROM, up to 48K bytes of RAM, and with cassette tape, video and game I/O interfaces built in. Also included are two game paddles and a demonstration cassette.

SPECIFICATIONS

- **Microprocessor:** 6502 (1 MHz).
- **Video Display:** Memory mapped, 5 modes — all software selectable.
 - Text — 40 characters line, 24 lines upper case.
 - Color graphics — 400 x 480, 15 colors (1920 black, white, violet, green (16K RAM minimum required)).
 - Both graphics modes can be selected to include 4 lines of text at the bottom of the display area.
- Completely transparent memory access. All color generation done digitally.
- **Memory:** up to 48K bytes on-board RAM (16K supplied).
 - Users either 4K or new 16K dynamic memory chips.
 - Up to 128K ROM (16K supplied).
- **Software:**
 - Fast extended Integer BASIC in ROM with color graphics commands.
 - Extensive number in ROM.
- **I/O:**
 - 1500 baud cassette interface.
 - Apple game I/O connector.
 - ASCII keyboard port.
 - Speaker.
 - Composite video output.

Apple II is also available in board-only form for the do-it-yourself hobbyist. Has all of the features of the Apple II system, but does not include case, keyboard, power supply or game paddles. \$598.

PONG is a trademark of Atari Inc. *Apple II plug-ins are standard TV using an inexpensive modulator (not supplied).

detailed brochure. Or write Apple Computer Inc., 20500 Stevens Creek Blvd., Cupertino, California 95014.

apple computer inc.

Apple II - 1977

Introducing the extraordinary IBM 5110 Computing System



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There was a time when \$18,000 would have covered the monthly cost of a computer. But the new IBM 5110 Computing System shown above sells for \$18,000 in the configuration range from under \$10,000 to about \$18,000. And for any of these prices, you get a versatile IBM computer backed by IBM service and reliability.

The 5110 makes a major contribution to your business. For example, it can be programmed to do your accounts receivable, handle your payroll and prepare your general ledger, as well as provide a wide variety of timely management reports.

The 5110 can also be tailored to fit your particular needs. For instance, if you need quick access to data in an area like inventory, we'll recommend a diskette-based system. If the information you work with is more sequential, like payroll, a lower priced tape-based system might be best. Or perhaps, a combination of both.

You can also choose between a higher and lower speed printer and BASIC or APL programming languages, depending upon your particular operation.

The 5110 also offers a variety of main storage capacities as well as a familiar typewriter-like keyboard with a convenient 30-key numeric pad and a built-in display screen.

What's more, it's easy to use. In fact, your own people can learn to operate the 5110 in just a few days.

In short, the new IBM 5110 Computing System is a lot of computer for the money. And well like the opportunity to talk with you about it. Call your nearby IBM General Systems Division office and arrange for a personal demonstration. You'll find it a time well spent.

IBM

A small computer can make a big difference

IBM 5110 – 1978

"Get an Out-of-this-World Deal On My Favorite Color Computer!"

Save '100 With This Incredible Offer From Radio Shack!

"It's a fantastic deal on an exciting entertainer!" Take it from Isaac. Now you can save \$100 on any TRS-80 Color Computer. That means you can get our 16K Standard BASIC Color Computer regularly \$399.95, for only \$299.95! Add a pair of joystick for \$24.95 and you can play Super Bustout — our exciting action game that's also sale priced at just \$19.95 — a \$10.00 savings! You'll find the TRS-80 Color Computer to be an outstanding entertainer and educator for the whole family.

"It's also a very serious, hard working computer!" Just plug in a handy Program Pak™ and your Color Computer can assist you in everything from word processing to selling up a family budget — even to creating your own electronic filing system.

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"Hurry — this fantastic offer ends December 31, 1982!" Get the \$399.95 Standard BASIC Color Computer for just \$299.95 — and pay only \$19.95 for the \$29.95 Super Bustout Program Pak™! And save \$100 on any other TRS-80 Color Computer.

—Isaac Asimov
Renowned Science and Science Fiction Author



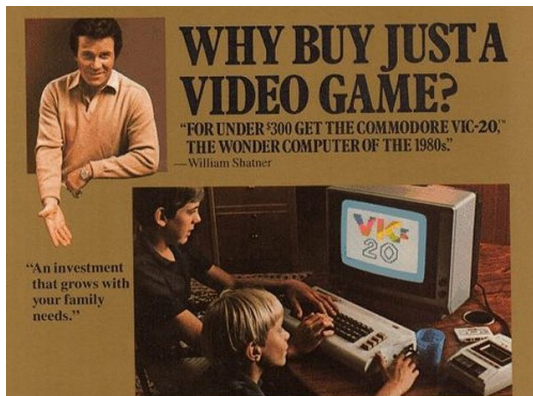
Radio Shack
The biggest name in little computers™
A DIVISION OF TANDY CORPORATION
Circle 387 on inquiry card.

TRS 80 – 1979 (avec Isaac Asimov)

WHY BUY JUST A VIDEO GAME?

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For about the cost of a video game, you can own the Commodore VIC-20™ — a full-fledged color computer that's so easy to use even a child can be computing in minutes. Since it plays the great games kids love, but the VIC-20 can also improve learning skills. In fact, it uses the same computer language taught in school on the Commodore PET™. So students learning on the PET, in class, can practice computing at home on the VIC.

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The wonder computer of the 1980s — VIC-20 from Commodore. Under \$300. At your Commodore dealer and selected stores.

VIC-20 VS. THE VIDEO GAMES

Product Features	VIC-20	Atari 2600	Intellivision
Under \$300	YES	YES	YES
Plays Cartridge Games	YES	YES	YES
A Real Computer	YES	NO	NO
Full-Size Computer Keyboard	YES	NO	NO
Basic Computing Language Built-In	YES	NO	NO
Expandable Memory Capability	YES	NO	NO
Self-Teaching Programming Manual	YES	NO	NO
Works With Printer	YES	NO	NO
Also Works With Disks and Cassettes	YES	NO	NO

VIC-20
Commodore
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Commodore VIC-20 – 1980

The first personal computer for under \$200.

The Sinclair ZX80.
A complete computer—
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Your course in computing.

The ZX80 comes complete with its own 128-page guide to computing. The manual is perfect for both novice and expert. For every chapter of theory, there's a chapter of practice. So you learn by doing—not just by reading. It makes learning easy, exciting and enjoyable.

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Sinclair's 4K integer BASIC has performance features you'd expect only on much larger and more expensive computers.

These include:

- Unique "one touch" entry. Key words (RUN, PRINT, LIST, etc.) have their own single-key entry and are stored as a single character to reduce typing and save memory space.

- Automatic error detection. A cursor identifies errors immediately to prevent



Price includes TV and cassette connectors, AC adapter, and 128-page manual. All you need to see your ZX80 is a standard TV (color or black and white). The ZX80 comes complete with connectors that only hook up to the screen, terminals of your TV. You also need a cassette for a portable cassette recorder, if you choose to store programs. (Please use ordinary blank cassettes.)

entering programs with faults.

- Powerful text editing facilities.
- Also programmable in machine code.
- Excellent string handling capability—up to 256 string variables of any length.
- Graphics, with 22 standard symbols.
- Built-in random number generator for games and simulations.

Sinclair's BASIC places no arbitrary restrictions on you—with many other enable features, such as variable names of any length.

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CPU	68000	80286	68000	68000
Speed/MHz	8.3	6.5	7.5	7.5
Standard RAM	128K	256K	128K	256K
Number of Keys	95	95	95	95
Mouse	Yes	No	No	Yes
Screen Resolution	640x320	640x320	640x320	640x320
Optional Monitor	640x320	640x320	640x320	640x320
Color Output	Yes	Optional	No	Yes
Number of Colors	312	16	No	4096
Disk Drive	3.5"	3.5"	3.5"	3.5"
Built-in Hard Disk	No	Yes	No	No
MIDI Interface	Yes	No	No	No
No. of Sound Voices	3	1	4	4

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Amiga – 1986

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