



**digital**

# INTEROFFICE MEMO

TO: Roy Gould

DATE: May 18, 1972

FROM: Peggy Dunn

SUBJ: MATERIAL FOR THE MUSEUM

I have several boxes of things that we might want to keep in the museum when we get it. There are some old modules, circuits and other doo-dads that might be of historical interest. I have them packed in boxes and they are stored on 11-3 in the Personnel Storeroom.

*K.O. property*

I also have quite a few plaques and pictures that we might want to use.\*

This is just for your information and for the record so that when we get a place for the museum we will remember to send them to you.

\* 8/74

*Pictures of mill etc  
collected & organized  
via Photo Lab w/copies  
for file — July 2-*

TO: ✓ Ken Olsen

DATE: May 19, 1972

FROM: R. L. Lane

DEPT: TP

MAY 23 1972

SUBJ: COMPUTER MUSEUM*DEC equipment*

On May 17, 1972, Rod Mooney called asking for some help in planning for the Computer Museum. I am not exactly sure what you have in mind but I provided him with the following suggestions for consideration. I also gave him the power requirements for each, and the physical size of each.

WORKING MACHINES

PDP-1/30 ✓  
 PDP-4 ✓  
 PDP-5 ✓  
 PDP-7/340 ✓  
 PDP-8 ✓  
 PDP-9, 9/L ✓  
 PDP-8/S ✓  
 PDP-8/IV ✓  
 PDP-8/L ✓  
 LINC-8 ✓

DISPLAY ONLY-NOT WORKING

LINC ✓  
 PDP-6/166/Display Tube  
 Whirlwind Components ✓  
 TX0 or TX1?  
 Module Display  
 Logic Lab  
 Computer Lab  
 555 Dual DECtape Transport  
 DF32

NOTE: I have only listed those which are currently Traditional and not any of today's machines. Your comments would be appreciated.

el

cc: Rod Mooney

*Roy Gull*

August 1972

253-41167

TXO from MIT for Museum

Contact: Prof. Zimmerman - ~~JIN4-6900~~<sup>253</sup>, ext. 2512

Their new building will be ready probably in April, ours in February.

We want to have the machine operational, so when they dismantle it the wires should be marked so that it can be reassembled.

We have offered our Field Service people to assist in the dismantling operation.

Searle Medidata, Inc. /

A SUBSIDIARY OF G.D. SEARLE & CO.

140 Fourth Avenue, Waltham, Massachusetts 02154  
TELEX—MEDIDATA Tel. (617) 890-6940

September 21, 1972

Mr. Robert Lane  
Traditional Products Dept.  
Digital Equipment Corp.  
Main St.  
Maynard, Mass.

*Museum*  
*Casino*

Dear Bob:

As you may have heard, we have been considering the question of what to do with our CASINO computer. The machine is nearing the end of its useful life. We have recently purchased a General Radio 1792 to supply the board testing function now being carried out on CASINO. I anticipate that within six to nine months we will have no further use for CASINO.

I would like to know whether Digital Equipment has any interest in the parts and components contained within the machine or whether you know of any other organization which might be interested. We are prepared to entertain any reasonable offer for disposition of the parts or of the machine as a whole.

The machine contains primarily 1000, 4000 and 6000 series systems units. Many of the 6000 series units have been modified or had selected transistors placed in them. In general, the modifications are minor. The units are, of course, largely in working order although unused portions of the units may have failed during the life of the machine without our noticing the failures. Most of the equipment racks are of the taper pin variety. However, in addition, there are perhaps twenty racks of the banana plug type. The relay racks are not standard DEC hardware; they were purchased from EMCOR.

In addition to the systems units and racks, the machine contains a couple of major components of DEC manufacture. One of these is a type 30 scope which may have been modified but probably not drastically. A second item is the basic 4K memory. This memory consists of two PDP-1 memories placed on top of one another to provide 38-bit words. The stacks and drivers could conceivably be quite useful to you. The entire stacked up memory array was manufactured by Digital Equipment in 1960. The bulk of the memory in the machine is a 16K Fabri-tek memory of 40-bit word length. I am presuming that this memory will be of no interest to DEC.

In addition to these items, there are several other peripherals which may or may not be of interest. These include three Potter tape transports, one of which has Potter electronics. The other two of these units contain SMI constructed read and write electronics. We have a couple of used but

still useful Friden Flexowriters, some paper tape equipment which I am sure is not of interest to DEC, and a Cal-Comp plotter. I would like to retain the latter except that I cannot for the life of me see how we will manage to use the thing without a big software program which I cannot afford.

If all of this sounds at all interesting to you, perhaps the best way to consider it would be to come and take a personal look at the hardware - seeing it as parts instead of as a machine. I would certainly be interested in your reactions to this suggestion.

Best regards,

*Ed.*

Edward B. Rawson

o

EBR/ceg

digital

November 28, 1972

Mr. Edward B. Rawson  
SEARLE MEDIDATA, INC.  
140 Fourth Avenue  
Waltham, Massachusetts 02154

Dear Mr. Rawson:

Your letter to Mr. Robert Lane has been referred to me for reply. Digital Equipment Corporation is planning to build a museum based on the history of the minicomputer at our new Parker Street facility in the very near future.

At the present time, we have not finalized our plans as to what will be displayed in this museum and how. Bob has mentioned to me perhaps some of the equipment that you mention in your letter to him may be of interest to us for use in this museum, however, being that we are in such early planning stages, I cannot make that decision yet. Therefore, when our plans do become more finalized, I would like to communicate with you again regarding the feasibility of using some of the equipment you mentioned.

Thank you for your kind offer and I will be in touch with you again soon regarding this.

Sincerely,

Roy G. Gould  
Exhibits Manager

RGG/jac

# TUREENS, OLD MONEY, WHISKY— BOOM IN COMPANY MUSEUMS

**More and more corporations are finding that a look backward can pay off—in prestige, in public attention, and even in sales and profits.**

American companies in growing numbers are dipping into their treasuries to help underwrite some specialized glimpses of the past.

They are doing this by setting up corporate museums, or by sponsoring traveling exhibits linked to their principal line of business. For example—

- The Campbell Museum in Camden, N.J., financed chiefly by the Campbell Soup Company, attracts some 1,500 visitors a month to its permanent collection of soup tureens assembled from all over the world. The collection of porcelain, silver and pewter tureens—many valued in the thousands of dollars each—is the only one of its kind in existence.

- Scheduled for a formal opening in May at Niagara Falls, N. Y., is the world's first museum devoted entirely to ceramics. Sponsored by the Carborundum Company, it will depict the history, technology and art of ceramics, ranging from priceless Chinese Ming pottery and ancient Greek vases to linings for the nozzles of today's rocket engines.

- The village of South Otselic, N. Y., was caught up in a one-day celebration last September when the Gladding Corporation, manufacturer of sporting goods, opened an International Sport Fishing Museum there. The village has been a center of the fishing-line industry since 1816, when pioneers from Rhode Island found the adjacent hills excellent for growing flax. The Gladding collection occupies a restored house that is itself a museum piece—a 142-year old eight-sided mansion.

- The Schwinn Bicycle Company in Chicago has been assembling hundreds of bicycles for eventual display in a private museum, says Frank V. Schwinn, president. The bicycle industry has been enjoying such a boom, Mr. Schwinn adds, that "we haven't had the time or the space to get started on a permanent home for our collection."

**Money to coffee pots.** Other well-known corporate names show up on the list of firms with their own museums or collections which are open to the public.

Chase Manhattan Bank in New York has a noted display of monies of the past and present. So does the National Bank of Detroit.

Wells Fargo Bank in San Francisco exhibits relics of its banking history going back to gold rush days. In Baltimore, the B&O Railroad maintains an elaborate museum of railroading.

The Winchester-Western division of Olin Corporation has a gun museum in New Haven. Taylor Wine Company shows early wine-making implements and glasses at its headquarters at Hammondsport, N. Y.

Proctor & Gamble, through its subsidiary, the Folger Coffee Company, has an expensive collection of antique English coffee pots spanning the eighteenth and early nineteenth centuries.

Many nationally known companies, such as International Harvester, Maytag, General Motors, IBM, Commonwealth Edison and United Air Lines, maintain permanent exhibits which are centered on their principal products or services at the Chicago Museum of Science and Industry.

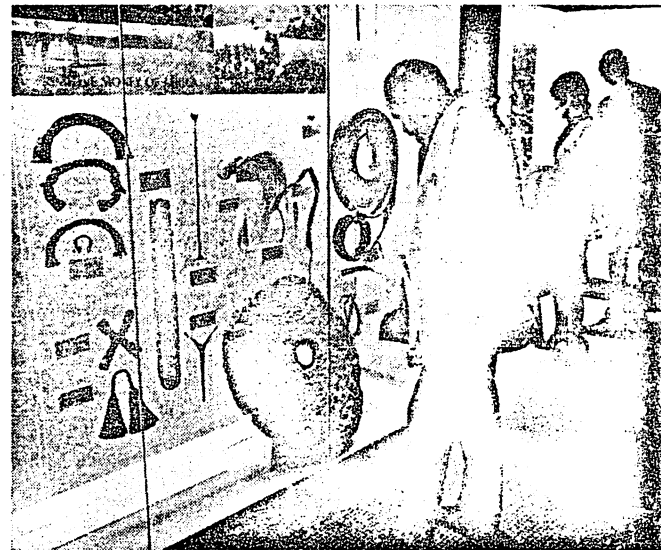
**Through the ages.** Perhaps the most widely known of all museums devoted to a single type of product is the Corning Museum of Glass in Corning, N. Y. There, a full-time staff of 18 watches over a comprehensive collection devoted to every aspect of glass from 1500 B. C. to the present.

Severe floods that accompanied Hurricane Agnes last June ruined some valuable items and severely damaged many others. "About 400 glass objects out of 13,000 in our collection were broken," says Dr. Robert Brill, the museum director. "We have a team of conservators at work now, and we hope we can restore all but perhaps 50 of the damaged pieces." Half of the museum's library of 7,000 volumes was waterlogged. The soaked volumes were put in freezers to forestall mildew. Gradually they are being thawed out and dried.

While Corning Glass Works originally financed the museum, it is operated

now by the Corning Glass Works Foundation, an autonomous, nonprofit educational institution.

**Firms provide funds.** A few other well-known museums, now independently operated, have a similar relationship to the companies that established them. For instance, Eastman Kodak Company contributed shares of its stock to a trust fund to help provide support for the International Museum of Photography at George Eastman House. The museum, set up in co-operation with the Uni-



Primitive money, too bulky to carry, is featured at the Chase Manhattan Bank's museum in New York.

versity of Rochester, is a repository for materials related to the history of photography and to motion pictures. The Kodak Company has donated samples of cameras, projectors and related equipment, and movie films of archival value.

The Hagley Museum in Wilmington, Del., devoted to the history of industry on the Brandywine River, was set up through an endowment by the Du Pont Company. It is part of the Eleutherian Mills-Hagley Foundation which occupies 185 acres along the Brandywine. The museum occupies an 1814 textile mill. Nearby are powder mills operated by Du Pont in the early 1800s. There is also a library of 80,000 volumes concentrating on American economic, industrial, business and technological history.

The John Deere Foundation maintains  
(continued on page 50)



## CORPORATE MUSEUMS

[continued from page 48]

buildings at the site of a blacksmith shop at Grand Detour, Ill., where John Deere built a self-scouring steel plow in 1837. The National Park Service has designated the site as a national historic landmark.

The Henry Ford Museum and Greenfield Village, at Dearborn, Mich., were originally set up with Ford-family funds, but are now independent of Ford Motor Company support.

**Variety of exhibits.** There's almost unlimited diversity in the fields covered by company museums.

Whisky has its day at the Barton Museum of Whisky History at Bardstown, Ky.

A collection of antique locks is on display at the Schlage Lock Company in San Francisco. Eli Lilly & Company, Indianapolis, in addition to a large exhibit center, maintains a duplicate of its founder's original laboratory.

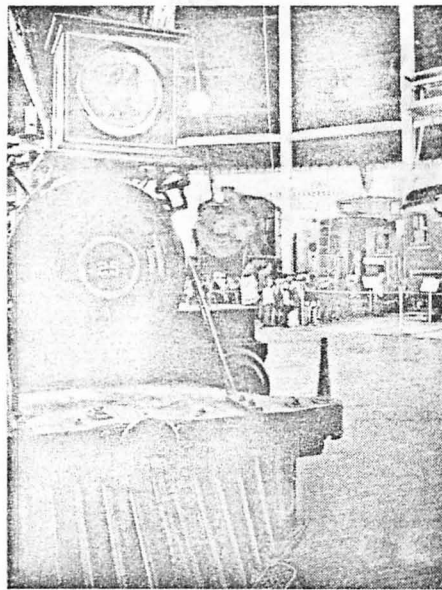
International Business Machines Corporation displays historic calculating machines at its Madison Avenue offices in New York City.

Many companies have turned over collections of historic products or rare individual items to public museums.

General Electric Company, as an example of this, presented some early types of electrical household appliances to the Smithsonian Institution in Washington.

**Prestige value.** Why the rising interest in museums and collections tied to specific companies and their products?

An obvious reason, corporate executives acknowledge, is the value of such collections in building a firm's prestige, keeping its name before the public and helping stimulate sales.



Old-time locomotives, cabooses enthrall youngsters at B&O Railroad Museum.

Officials of some companies say, too, that they feel an obligation to provide information about their industries' background and development to the public.

Museums of all kinds, privately and publicly supported, have become an important industry in themselves.

The American Association of Museums in Washington, D. C., publishes an annual directory of more than 1,000 pages listing all types of museums in the U. S. and Canada.

Scores of companies make a business of supplying exhibit cases, lighting equipment, display materials and storage supplies for the museum trade.

**Expensive venture.** Assembling a privately owned collection worthy of public display can be a painstaking and expensive venture.

Consider the case of the Campbell Museum, which was set up by the Campbell Soup Company in 1966 and

chartered by the State of New Jersey as a nonprofit educational institution. It moved into its own permanent building in Camden in 1970.

Campbell retained John M. Graham II, retired vice president of Colonial Williamsburg, as consultant and to help it acquire what Museum President William C. Parker describes as "symbols of elegant dining" from 24 countries. The acquisition process is still on.

Included among the nearly 200 showpieces listed in the Campbell Museum's latest catalogue are a silver soup ladle made by Paul Revere, porcelain tureens from France, faïence items from Holland, England, Ireland and Scotland, and a silver tureen made for Catherine the Great of Russia.

Mr. Parker notes that portions of the permanent collection have been exhibited by some of the country's best-known museums and have been seen by more than 1 million people. In recent weeks, part of the collection was shown at the Boston Museum of Fine Arts, and some items are on loan now to the Toledo Museum of Art. Exhibitions from the Campbell collection are scheduled for later this year at the Metropolitan Museum of Art in New York City and at the Victoria and Albert Museum in London.

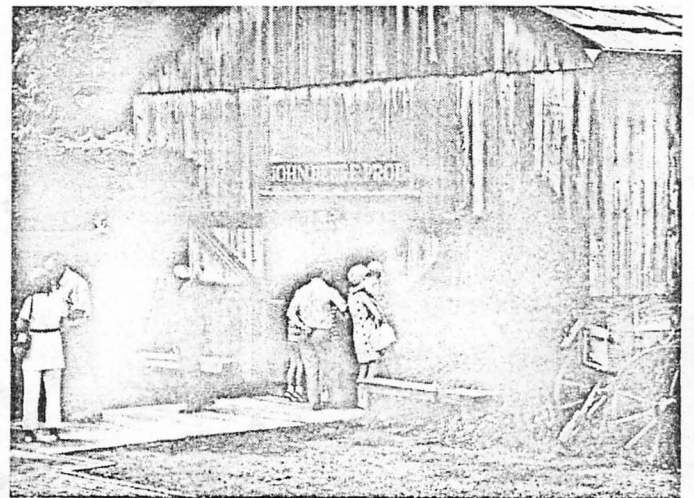
**Growing trend.** Some companies long have been important collectors of paintings and sculpture which often are available for public exhibit. Included are South Central Bell Telephone Company, Philip Morris, the J. C. Penney Company, Helena Rubenstein, Inc., Container Corporation, Chase Manhattan Bank, Gulf Oil Corporation, Atlantic Richfield Company and Distillers Corporation-Seagrams.

But the latest swing is toward items identified closely with a company's particular line of business. It's a trend that shows steady and vigorous growth.

Rare octagonal house in upstate New York is site of Glad- ding Corporation's International Sport Fishing Museum.



Blacksmith shop at Grand Detour, Ill., is the place where John Deere developed first successful steel plow in 1837.

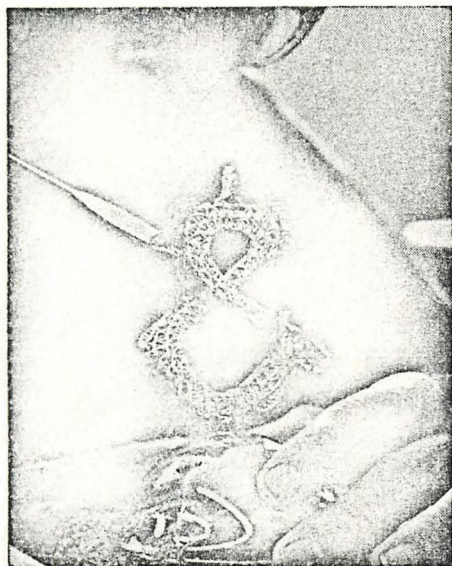




Relics of the stagecoach era and California's gold rush captivate visitors to the history room of Wells Fargo Bank in San Francisco.



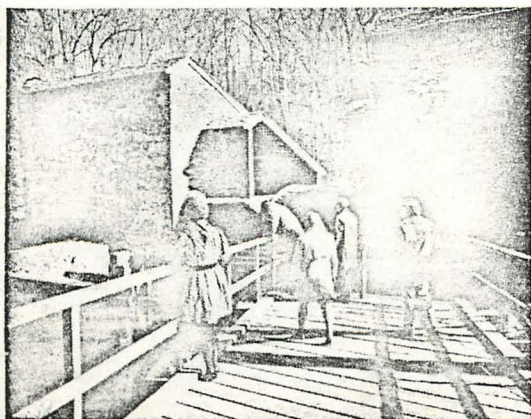
IBM display traces development of sophisticated computers from ancient calculating machines.



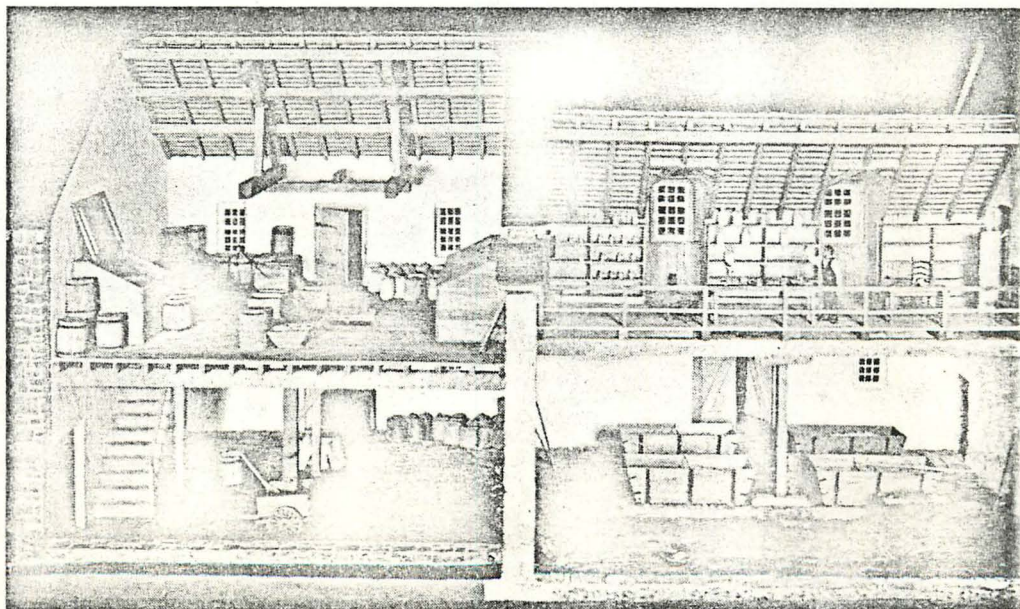
Craftsman at Corning Glass Museum restores a delicate piece of sixteenth-century Venetian glass damaged by floods from Hurricane Agnes in June, 1972.



Tureens, ladles, other symbols of elegant dining are on display at one of the country's newest private museums, opened by the Campbell Soup Company at Camden, N. J., in 1970. It has pieces dating from the sixth century B. C.



Powder mills once operated by the Du Pont Company are part of Hagley Museum, a restoration of early developments along Delaware's Brandywine River.



Model of nineteenth-century saltpeter refinery, a diorama in the Hagley Museum.

TO: Ray Gould ✓

DATE: 8/1/73

cc: Ed Kramer  
Gordon BellFROM: Dick Clayton *CC*

DEPT: Medium Scale Computers

SUBJ: Material for DEC Computer Museum

A friend at MIT, who currently has responsibility for ARC-I, has indicated it is now obsolete and they want to get rid of it. If we are interested we could have it for free. ARC-I was the first hard-wired Average Response Computer. It was built of parts used to test packaging and some circuit concepts for TX-2.

ARC-I was the forerunner of such machines as CAT (Computer Average Transients) and several devices built by the various nuclear instrumentation houses. It also lead to the signal Averging and Histogram packages originally developed by Bruce Delagi for the Lab-8 and its brothers and sisters.

I believe it is an appropriate device for the Museum. I have a warm spot in my heart for this particular one of a kind beast (having made it run for a few years) and would like to see us accept MIT's offer. Are you the King of the Museum, if so, what do I do next, if not, do you know who is?

Thanks.

RJC/ph

**digital** INTEROFFICE MEMORANDUM

TO: Ray Gould

DATE: 8/1/73

cc: Ed Kramer  
Gordon Bell ✓

FROM: Dick Clayton *DC*

DEPT: Medium Scale Computers

SUBJ: Material for DEC Computer Museum

AUG 02 1973  
F-15

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Thanks.

RJC/ph

*Ray I'd like a  
chunk (plug-in) if possible.  
Bell.*

**digital**

INTEROFFICE MEMORANDUM

TO: Dick Clayton  
Gordon Bell  
cc: Ken Olsen

DATE: August 7, 1973  
FROM: Roy Gould  
DEPT: Trade Shows 5-3  
EXT : 2302

SUBJ: Your Memo of August 1 - Material for DEC Computer Museum

I am currently the collector of items for the DEC Museum. You should have your friend at MIT get in touch with me and we can work out the arrangements to transport the machine to Maynard. One point of interest, however, is there may be legal complications such as the ones we are having with the TX0 machine at MIT. MIT being a government institution is having problems writing the TX0 off on their books to a private organization.

We are currently dealing with Professor Zimmerman at MIT regarding the TX0 and perhaps your friend should get in touch with him regarding the problems he has encountered.

Thank you for your interest in the Museum.

jac

TO: Rod Mooney  
CC: Pete Buckley  
Roy Gould  
Bob Pike  
Al Sidel

DATE: 8/17/73  
FROM: Frank Kalwell  
DEPT: Traffic/Office Services  
EXT : 2343

SUBJ: TRAILERS

This memo confirms an earlier note to George Beebe on the three 40' trailers in the PK-3 lot, loaded with computer parts for the museum.

I would like to shortly (60 days or less) find a home for these, possibly at the new facility in Marlboro where they can be neatly layed out prior to reassembling these units. An estimated 5,000 sq. ft. could be used on a temporary basis as these units cannot be stacked due to their delicate nature (vacuum tubes).

One move (hopefully) to the museum site is all I would recommend due to double handling problems.

mcw

TO: Roy Gould

DATE: August 20, 1973

FROM: Ken Olsen

DEPT: Administration

EXT : 2300

SUBJ: MUSEUM

If you are over at the RCA building sometime, take a look at the addition to the cafeteria which was never finished. It is the section added on nearest the Tower and it has a grand staircase and big, beautiful windows. If we sell the Tower, we have to sell that with it because it contains the utilities and is the cafeteria for the Tower. However, if we keep the Tower, I don't know what we would use this area for but it would make a beautiful museum. Will you get the floor plan and think about how you would use this for a museum. It sure would beat a blank room in the middle of an office building.

We had to collect all the Whirlwind equipment before it went to the dump and so Frank Kalwell picked out all the stuff I asked for, plus a lot of other things, and is storing them in a trailer. When we have a location for the museum and a work area we can start laying it out. With a little encouragement, I might also dictate some notes on the various parts that I hope we salvaged.

/d

To: Gordon Bell  
Ray Gould

Ken

SEP 7 1973

**AMERICAN USED COMPUTER CORPORATION**

15 SCHOOL STREET • BOSTON • MASSACHUSETTS 02108 • 617/227-8634  
TWX: 710-321-6388 • CABLE: USEDCCOMP

a  
BOSTON  
COMPUTER  
GROUP company

Museum

August 31, 1973

Bob I.  
I will watch Comp. World & Elec  
News for Sony's suggestions - pls  
advise on his offerings  
YJR 9/5/73

Mr. Robert Reed  
Digital Equipment Corporation  
PK-3, ML 25A  
146 Main Street  
Maynard, Massachusetts

Dear Bob:

It was nice hearing from you and I'm glad things are going well.

Among the equipment I think you should perhaps try to accumulate would be in the IBM area - IBM 604, 650, 701, 702, 705 and 704 -- there may be a 650 in one of the moving companies in Boston that's been sitting there for a while.

Also, I think that you ought to acquire a Philco 2000 as it is a beautiful representative of an old machine. ?

With respect to Univac, a Univac 1, 2 or 3. With respect to Burroughs a Datatron 205. There is some other equipment you should buy such as Monorobot 11 and many small semi-computers. ?

We have in our warehouse an RCA 301 CPU which is very interesting because of the mammoth size of it and you may have it free provided that you pay transportation. ✓

Also we have a stripped Honeywell 500 which is quite an enormous piece of equipment and you may also have it free. Looking forward to hearing from you. ✓

With best regards,

*Sony*  
Adolf F. Monosson  
President



**digital**

INTEROFFICE MEMORANDUM

TO: Ken Olsen

DATE: September 5, 1973

FROM: Roy Gould

DEPT: Trade Shows 6B-2

EXT : 2302

SUBJ: TXO Machine

I am still in touch with Professor Zimmerman and he is waiting for the Government to release the TXO. As soon as he gives me the word, we will pick it up.

jac

1026 7d2  
INTEROFFICE MEMORANDUM

TO: Roy Gould, Curator of the DEC  
Museum

DATE: September 17, 1973

CC: Bob Lane  
Ken Olsen  
Stan Olsen  
Bob Reed

FROM: Gordon Bell <sup>GB</sup>12-1

DEPT: Engineering

EXT : 2236

SUBJ: DEC MUSEUM

I would also like to keep in touch with our plans for a Museum/Display and be a part of it. Since I spent 6 years in a scholarly environment at CMU and worked on looking at the early machines, I think I can be useful. In many of the university and other laboratories I know people or am known. It seems to me that Ken's acquisition of Whirlwind was a stroke of genius, because it is one of the very early stored program computers (I give it #3 or 4) in time for being operational--we have an item for trading. As we all travel about, I would like us to begin getting parts from some of the more important machines and other peripheral parts.

Also, I would either like to acquire some early computer parts on a personal basis in parallel with DEC, or if DEC is not interested in particular items I would like to acquire some of the parts and loan them to the museum. (Some of the items I would like are rather large to store in a home that is reasonable sized.) There are a number of books which I have, or am considering which also fall into this category.

I would like also to meet with Monosson if useful and work on this problem, if it won't perturb things.

I think it is critical to decide what we want and to go after them quietly and slowly, rather than big dealing it.

My views as to what's important are pretty well expressed in the book by myself and Allen Newell, and numerous copies are around the company and the library; also there is an historical time chart on pages 43-46 of which gives the time relationship of various machines.

The following items are important, I believe--perhaps more so for the Smithsonian, but it gives a starting point. The starred items (\*) give high priority.

Classical Computers (by place)

U. of Illinois

ILLIAC\* I, II, III and IV--some representative parts. I-I is probably most famous. I-II might show some special independent logic. I-IV is now being operational, a real fiasco; Mel Pirth at NASA AMPS is the director of the lab. There are a number of ILLIAC I descendants; if we wait to flatter Illinois, we might try to get parts. I-I used Williams tubes.

BTL

Leprechan\*--first transistorized calculator. An early relay computer used at a distance to Dartmouth was first remote computing

Cambridge (Maurice V. Wilkes)

EDSAC I\*--first, stored program computer  
EDSAC II--claimed to be first microprogrammed computer

MIT (Whirlwind)\*

Core memory (first); diode time pulse distributor--first microprogrammed machine I believe, which gave Wilkes the idea. First displays; light gun; tape units Raytheon?)

Lincoln Labs

TX-0\* (forerunner of DEC circuits and PDP-1)  
LINC\* (DECTape forerunner)

Manchester (I know most of the people there--I probably should visit them).

I--there was a little known experimental machine which was truly the first machine. I doubt if they have parts of it. Also Williams Storage Tubes were first memories.

Mark I\*--first index registers (B tubes)--would like the tubes.

Atlas\*--paging, extra codes (idea behind UUC's)--the fast extra code store would be great to get--an early or first ROM.

Von Neuman--influenced machines

The Institute for Advanced Study machine (relatively late and unsuccessful)\*.  
RAND\*--Johniac (Smithsonian may have it all)

National Physics Laboratory

ACE\*(worked on by Turing and Wilkinson)--sentimental to me because I worked on DEUCE (an ACE descendant). A drum with moving heads and delay lines would be nice to get.

National Bureau of Standards

SEAC, DYSEAC (dynamic logic--never quite made it)

To: Roy Gould  
September 17, 1973  
DEC Museum

Gordon Bell  
-3-

U. of Penn. (Moore School)

ENIAC\*--first electronic computer  
EDVAC\*--the Eckhert/Mauchley stored program computer

Harvard\*

Hopefully we could get parts of various Marks.

U. of Toronto

First 12-bit computer. Forerunner? to minicomputer.

Rice University (virtual memory implementation)

IBM

650  
701, 704, 7090, 7094II (parts only)  
Printers 407  
CPC, 607, 604--all early non-computers  
1401  
Stretch?

CDC, Bendix

160\* (first commercial 12-bit computer)

RCA

Part of 601

UNIVAC (ERA)

Univac I\*--especially to get first tapes and drums  
ER1101, 1103

Burroughs

Datatron 205

Intel or Fairchild or?

First microprocessors and first integrated circuits.

ICL

Ferranti-Pegasus--first general register machine.

Zuse\* equipment

To: Roy Gould  
September 17, 1973  
DEC Museum

Gordon Bell  
-4-

## Technology to Show

### Terminals

Displays: Whirlwind, + Type 30, 5" precision, color, 338--all are firsts.

Typewriters: Flexourters; Teletypes\*--a number dating back would be interesting.

First alphanumeric?

First dot matrix printer?

Card reader/punch/keypunchers: something from IBM/Univac--here we want to have a chart to show how much data processing has been set back by punched cards.

Tape readers etc.

Analog-digital: old EPSCO unit + Whirlwind + new chip.

### Memory

Delay lines: Manchester, NPL

ROM:--Atlas

Storage tubes: MIT, earlier Manchester Williams Storage Tubes

Core: Whirlwind; old DEC; new DEC

Tape units: Whirlwind; possibly Honeywell Datamatic big drives

Disks: IBM, RAMAC, IBM 1311 (removable), DEC RS64 (not unique);  
IBM floppy

Drums: DEC swapper a la BBN or MIT; also NPL; also Whirlwind

### DEC PARTS

PDP-1 with display. It might also have swapping drum nearby--we can claim it used in first or early timesharing. This should be kept operational and used for playing space war.

A GT40 with moonlander would also be a nice interactive display.

Terminals to RSTS or a PDP-10 might also show terminals and timesharing.

Computers--rest of PDP's should be on display, but need not be operational.

Modules--A demo with the first building blocks! Also, we might show the evolution through various computers on a larger, time-line display. Also, 30 Mhz, RTM's. Our first receiver and transmitter modules for Teletype--first UART (now fits on a chip). -- *Note we use first!*

Packaging--vivid with the computers. Shows a mess + wirewrap technology including our own machines for this.

To: Roy Gould  
September 17, 1973  
DEC Museum

Gordon Bell  
-5-

Power Supplies--reduction in weight and size with time

Terminals-- VT05, RA30, Teletypes (especially 28 on PDP-4). Also type 30 display + 338 + color.

Drums--from PDP-1 including a large one from PDP-6) and RS series.

Disks--RK05

Memories--evolution from "1K PDP-1" through PDP-11 16K.

Tapes--DECTape + TMI0 (maybe some old Potter 906's), cassettes.

Books (for historical use)

Bell and Newell' Goldstine--The Computer from Pascal to Von Neumann (princeton); Bowden--Faster Than Thought (Pitman)

Software

Here we need something. Perhaps a library of reference manuals would be significant.

Pre-stored Program Computer

I'd like to see things like the Jacquard Loom (punched card control), Thomas Arithometer. I'll spend a day with the British Museum in the next year or so.

GB:mjk

DEC Archives

DEC manuals  
" machines

Historical books

non-DEC machines  
" manuals

PDP-3?

Indian 8, 11.  
Cuban

DEC  
Hungarian

Sue  
Sprague  
ITT

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100



# INTEROFFICE MEMORANDUM

TO: ✓ Roy Gould and Museum Group

DATE: October 1, 1973

FROM: Gordon Bell *GB*

DEPT: Engineering 12-1

EXT : 2236

SUBJ: DEC MUSEUM

I don't think we want an IBM 705. (I don't know what, if any, contribution it made to computing. In essence, I recall it is a 702 with core.)

Today, Prof. Murray Allen at the U. of N.S.W. in Australia, promised me some parts of the English Electric Deuce (Turing helped design) and an IBM 650. (I asked him to deliver it to the Sydney DEC office for shipment to us.) In return, he wandered through our surplus parts.

Let's get together to discuss my memo on list of parts.

GB:mjk



# INTEROFFICE MEMORANDUM

TO: Gordon Bell

DATE: October 8, 1973

cc: Ken Olsen

FROM: Roy Gould

DEPT: Trade Shows 6B-2

EXT : 2302

SUBJ: MUSEUM

Thank you for your recent memos regarding equipment for the DEC Museum. As you have probably realized, the location of the museum has not yet been decided.

We are currently holding parts of the Whirlwind Computer in storage and hopefully the TX0 from MIT will be turned over to us within the next four to six weeks. It is currently being held up due to government paperwork.

At your convenience, Gordon, I will be glad to get together with you and the rest of the museum group to discuss our progress to date.

jac



**digital**

INTEROFFICE MEMORANDUM

TO: Gordon Bell ✓

DATE: October 8, 1973

cc: Ken Olsen

FROM: Roy Gould

DEPT: Trade Shows 6B-2

EXT : 2302

OCT 09 1973  
10-9

SUBJ: MUSEUM

Thank you for your recent memos regarding equipment for the DEC Museum. As you have probably realized, the location of the museum has not yet been decided.

We are currently holding parts of the Whirlwind Computer in storage and hopefully the TX0 from MIT will be turned over to us within the next four to six weeks. It is currently being held up due to government paperwork.

At your convenience, Gordon, I will be glad to get together with you and the rest of the museum group to discuss our progress to date.

Ken + I +  
Good  
Come over

jac

6 Beacon St  
Burl. 620  
Boston Mass



# INTEROFFICE MEMORANDUM

TO: Gordon Bell  
Roy Gould

DATE: October 17, 1973

FROM: Ken Olsen

DEPT: Administration

EXT : 2300

SUBJ: WHIRLWIND COMPUTER

Last week Mr. Nixdorf of Nixdorf Computer came by and when I told him about our pieces of Whirlwind for our museum he indicated he would like to swap pieces for parts he has in his museum.

I expect we will be sending some people over to study what they are doing while we consider possible ways of cooperation and that time we might ask those people to look into what pieces of hardware we might want to swap.

/ma



INTEROFFICE MEMORANDUM

TO: Ken Olsen  
Gordon Bell  
Public Relations

DATE: 12/3/73

FROM: Dick Maliska

DEPT: Diagnostic Engineering

EXT: 3714 LOC: 3-5

*Dick  
Go Boy Gould  
about this  
Hawie*

SUBJ: PDP-4

About a year and a half or maybe two years ago, the Drafting Department phased out their use of PDP-4 #1. Because of this, some of our people were temporarily left without a machine to do preliminary software debugging for "AMT" programs.

Since Drafting had decided to scrap the machine, and no one else wanted it, we decided to take it into our area for our own use. Since that time, our use of the machine has been reduced to none. So there it sits, and what do we do with it?

On at least three occasions I have spoken to the Public Relations Department, inquiring as to whether or not the "computer museum" was still planned and if they wanted PDP-4 #1 - no reply. So I assume that they either are not planning a museum or they do not want this machine.

I spoke to the Traditional Product Line and they don't want it either. (It seems that there is not a big market for used PDP-4's)

It seems a shame to let that machine get into the merciless hands of the salvage area. I feel that the sentimental value is worth something, but I would like you to have that choice.

Sometime in January (?) I will be transferring to our Marlboro plant and I would appreciate having PDP-4 #1's fate decided by then. I really don't want to move it over there.

Please find a home for my orphan.

*cc Bob Lane*

*Should I grab this for the museum Bob*

*Ray*

CONFIGURATION LIST

PDP-4 #1

1 central processor  
8K memory  
1 line printer (Analex)  
2 card readers (Burroughs)  
4 tape units (Potter - I think)  
1 card punch interface (IBM)  
1 Dectape control  
2 555 Dectape transports  
1 KSR-27 teletype  
1 paper tape reader/punch

## The effervescent years: a retrospective

**Behind the Computer Revolution lay the vision and perseverance of a handful of pioneers committed to open information exchange**

The following alarm was sounded in 1950 by a prominent mathematician: "There is currently such a shortage of trained mathematicians required to operate the modern computing machine that these machines are not working full time. With the number of machines being built or projected it is probable that within ten years, two thousand persons will be required in this work. . . . this is a substantial fraction of all professional mathematicians in the country."<sup>1</sup> Eight years later, a RAND Corporation scientist told a computer conference that "Southern California is today generally regarded as a center of activity in high-speed computing, having perhaps the highest density of machines and active prominent people as any area in the world." In support of this claim, he displayed a map of digital computers installed and operating in Greater Los Angeles. It revealed a grand total of 32 machines!

These appraisals provide a good indication of how small the computer world looked during the 1950s. And yet only a few years were to pass before comput-

ers found their way into virtually every large factory and office in the United States, Europe, and Japan. The reasons for this surprise explosion are many and complex, involving a web of technological, architectural, conceptual, economic, and marketing decisions too complex to be tracked in an article such as this. One strand can be unravelled, however; it ties a small group of technical pioneers into the environment for computation that existed between the mid-1930s and the early 1950s, a period which has so far received relatively little attention from historians of science and technology.

The seeds of the computer revolution were sown between 1935 and 1950, by men of great vision whose primary interest lay not in accumulating patents and "shares of the market," but in disseminating their newfound knowledge to all who would listen. As I examine the computational environment between 1935 and 1950, I will be sketching the broad outlines of this process, necessarily omitting much that occurred in an effort to bring out what I consider to be the highlights (see Box, p. 78).

The 1930s and 1940s were decades when the word "computer" generally meant a person rather than a

---

Henry Tropp Humboldt State University



machine. Three hundred years of well-documented work by mathematical and inventive giants like Pascal, Leibniz, and Babbage had led to a great array of ingenious mechanical devices for tabulation and record-keeping. Furthermore, there was little interest in large scale, systematic computation in industry, even among those who might have been expected to be the most interested—the mathematicians. Such interest as there was existed among a handful of men working quite independently of one another on specific and complex research problems in such disparate fields as astronomy, weather forecasting, space charge physics, and network analysis. It was these men—principally George Stibitz, Howard Aiken, and John Mauchly—who built the first automatic digital computers in order to do their own particular research.

### The Stibitz and Bell Labs relay machines

George Stibitz was a young mathematician who had been intrigued with electrical gadgetry since his boyhood in Dayton, Ohio. (He remembers nearly setting his home on fire at the age of eight when he overloaded the living-room circuits running an electric motor his father had brought him.) Stibitz attended what for the World War I era was a very experimental and advanced high school—one that had been established in Dayton by Charles Kettering and some associates from Delco. The school was quite informal and the science program heavily oriented toward individual student projects.

When Stibitz went to college he concentrated on experimental physics and mathematics. He received his M.S. from Union College in 1927, and spent the following year making radio propagation measurements for the General Electric Co. This work was performed in an isolated farmhouse, and he and his partner rigged a voice-actuated electrical communication link that allowed them to operate their equip-

ment by remote control. They also used the link on winter mornings to open the damper on the fire in the coal stove before leaving their home.

After the year with GE, Stibitz went to Cornell for his Ph.D. in mathematical physics, which he received in 1930. That fall, he joined Bell Telephone Laboratories as a research mathematician and became involved with investigations into circuit theory that eventually led him into relay circuit problems. One evening, in 1937, he brought home a couple of relays, some flashlight batteries and bulbs, and wired up a simple binary adder that is referred to in the literature as the Model K (for Kitchen) Computer. This was a significant event because although Stibitz had been introduced to the notion of binary arithmetic in his high school math book, this was the first time we know of that anyone actually successfully adapted the concept to mechanical computation.

While Stibitz's colleagues were amused that relays could be used in this way, his computer didn't seem to arouse any serious interest. Stibitz's main assignment at this time at Bell Labs involved working on switching network problems that required dealing with complex numbers. These computations were so laborious that they had to be done by a group of about ten women using pencil and paper along with the crude mechanical calculators of the day. One day

[1] At the far left is one of the three operator stations for the first Bell Laboratories relay computer, which went into operation in January, 1940. The computer evolved out of the pioneering work of research mathematician George Stibitz, shown in the accompanying photo, which was taken in the early 1940s at Bell Labs.

[2] The first thoroughly automatic computing machine was the Automatic Sequence Controlled Calculator, or Mark I (below), which was built at Harvard between 1939 and 1944 by IBM engineers under the leadership of Howard Aiken, who is shown in the accompanying photo from that period. (Harvard Univ. Computation Lab photos).



a fellow employee suggested to Stibitz that the work might go faster if two or three calculators could somehow be hooked together. Stibitz knew nothing of earlier attempts to do automatic computation (he had never even heard of Babbage), but the suggestion interested him and he proceeded to design a circuit for an electromechanical calculator that could multiply and divide complex numbers. Stibitz's Complex Number Calculator was built by a team of Western Electric engineers headed by Sam Williams, and when it was completed in 1939 (with modifications so it could also add and subtract), it could perform these arithmetical operations three times faster than had heretofore been possible.

But the Complex Number Calculator had some unusual features that made it far more than just another special purpose calculator. First, it had an extremely high degree of reliability—one that would not be exceeded in the electronic automatic computers for many years. Second, because Stibitz felt so strongly about the need to prevent the machine from making arithmetic errors, he built in a checking code so that if a relay failed, it would be impossible to get a wrong answer. This Excess-3 code, as it is now known, also allowed a defective relay to be readily identified.

Another notable feature of Stibitz's machine was that it could be operated from a remote teletypewriter terminal. The demonstration of this to a meeting at Dartmouth College in the summer of 1940 marked the first public display of remote data processing.

It is quite conceivable that Stibitz's contribution to the future of computers could have ended with the construction of the Complex Number Calculator. Shortly after it was finished, he approached the management at Bell Labs with a request for approximately \$50,000 to take the next major step and build a large-scale computer, but he was turned down. Management evidently didn't share his feeling for the importance of automatic computation, at least to a telephone company. However, World War II changed all this, because now the need for computation became crucial, particularly in ballistics where research had been underway at the Aberdeen Proving Grounds since the early 1930s. As a result of his work, Stibitz and others at Bell Labs were asked to aid the Army, and a series of five relay computers were eventually built for the prime purpose of doing ballistics and other calculations important to the defense effort.

The Bell program was highly significant, for it demonstrated that relay calculators could perform essentially error-free calculations around the clock, seven days a week, with minimal down time due to malfunction. Thus, although it became apparent that the increase in speed would probably level off to roughly a factor of ten over manual computation, the reliability and ease of maintainability of these computers made people extremely reluctant to move into electronic computers until the 1950s, when new confidence in this technology began to emerge. Moreover, the Bell relay computers had special features which, though designed to meet specific wartime needs, found their way into the mainstream of the postwar computer art. For instance, the 1942 Model II relay computer had a tape program input and also utilized biquinary error detection\*; while floating, rather than fixed, decimal computation—which Stibitz conceived

in 1940—made its appearance in the Model V computer.

The achievements of George Stibitz have probably not received the public recognition they deserve. This is at least partly due to the fact that he is a rather shy, retiring man who to this day is reluctant to do much public talking about his achievements, with the result that one learns about them mostly from others.

In some respects Stibitz presents a marked contrast to Howard Aiken, another great technical visionary of the preelectronic computer period. While Aiken was not a publicity seeker, neither was he retiring. He was an extremely forceful personality whose perseverance and determination not only led to remarkable technical achievements, but made an indelible impact on all who encountered him.

### Aiken and the Mark I computer

Howard Aiken grew up in Indianapolis, Ind., and was forced to go to work after the eighth grade. His first job was as a switchboard operator twelve hours a night, 30 nights a month, with the Indianapolis Light and Heat Company. During the day Aiken attended Arsenal Technical High School, which was another first-class secondary school of its time. The superintendent of schools in Indianapolis took a personal interest in Aiken and arranged a series of examinations so that the boy could graduate early and thereby ease his work-load somewhat. This same superintendent then encouraged Aiken to attend the University of Wisconsin by assisting him to get a similar job with the gas company in Madison. In 1923, Aiken received his B.S. degree and, overnight, a promotion to chief engineer of the gas company.

Aiken had been a power engineer for more than ten years when he decided in 1935 to go back to school and enroll first at the University of Chicago and then Harvard as a graduate student in physics. His doctoral research on the laws of space charge involved him in laborious hand calculations of nonlinear differential equations which, in turn, led him to investigate the possibility of high-speed, automatic calculation.

Harvard in those days was an extremely unlikely place in which to find support for this kind of research project. It was a center of "pure" research, and Aiken was forced to persevere in the face of considerable skepticism and, in fact, very strong opposition. For instance, some people claimed that a machine to do what Aiken proposed would require so many parts that, based upon elementary probability theory, some parts would just never work. (A similar argument was later advanced in opposition to Eckert's and Mauchly's ENIAC project.) Others held that even if Aiken were lucky enough to get his machine working, it would only be a short time before it would have performed all the work it could possibly be required to do, thereby ending up as a museum piece, which was something a university should not produce! Thus, although Aiken received important encouragement from the astronomer Harlow Shapley and Business School Professor Ted Brown, his was essentially a lonely battle, won only by his great determination to reach a very specific and carefully thought out goal.

\* A scheme wherein each decimal place is represented by seven relays arranged in groups of two and five.

This goal was to build a thoroughly automatic computing machine controlled by a coded sequence of instructions and capable of producing a punched card or typewritten output. Aiken wrote his proposal for such a machine in 1937 and this document was published in *Spectrum*, August 1964. The reader of the document will be impressed by two things. First, of course, is the tremendous technical vision it reveals. But even more striking is its similarity to the actual machine that was dedicated at Harvard seven years later, in 1944—the Mark I. It is quite clear that what Aiken did was first to analyze carefully, the procedure for solving mathematical problems by hand and then to specify a procedure for performing the same operations mechanically.

One of Aiken's first attempts to build his machine was made with the Monroe Calculating Machine Company. He went to Monroe's chief engineer, G. C. Chase, who has described how "Aiken outlined to me the components of a machine which would solve his problems. His plans provided automatic computation and the four rules of arithmetic, preestablished sequence controls, storage and memory of installed values, sequence control which could automatically respond to computer results or symbols, together with a printed record of all that transpires within the machine, and a recording of all the computed results." Chase was convinced Aiken's machine would be important to Monroe's future business and did his best to get his management to agree. But they decided it was too impractical and turned him down. Chase then urged Aiken to approach IBM and suggested that Professor Brown of the Harvard Business School would be a good initial contact. It was through Brown that Aiken met Thomas Watson, Sr., and in 1939 a contract was signed whereby IBM, with financial support from the U.S. Navy, would build the Mark I.

The Mark I is sometimes called a Babbage-type machine, but although Aiken readily admitted to "learning more about computation from Babbage than any other individual," it would not be fair simply to infer, as some have, that Aiken built Babbage's machine. Without trying to detract from the fantastic accomplishments of Charles Babbage, I would point out that he and Aiken differed in a very important way. Babbage evolved a series of technical concepts, first for building a difference engine and later for building the analytical engine, which he conceived in 1833 (this was the first design for a universal automatic calculator). However, in every case, before any significant portion of his machine was physically completed, Babbage would go off into new and better conceptions. One has the image of wandering with this quirky British genius through an infinite series of rooms, each representing some new and yet unfinished level of machine development.

With Aiken, however, his Mark I was conceived at some point in the mid-1930s, articulated very carefully and precisely, and built almost to specifications with, moreover, materials already on hand. There is no technology in the Harvard Mark I that was not available in the 1930s.

The development of the Mark II, III, and IV at Harvard is characterized by much the same methods, with each model designed to take advantage of a specific level of technology. It is clear from my interviews

with Dr. Aiken and his colleagues that at some point he would say, "at this stage, new ideas stop and we build. Any new ideas that come afterwards will be saved for the next machine." His first electronic machine, the Mark III, was only built at a time (the late 1940s) when he felt the technology was sufficiently reliable. Many people have interpreted the late arrival of Mark III as a reluctance on Aiken's part to admit that electronics "was the way to go." This was not true. He merely waited until the reliability of the components reached his exacting standards.

## Computers in Iowa

The unfriendly environment in which Aiken worked contrasts with the supportive one that existed at Iowa State College in Ames. While all but a few of the most enlightened universities were ignoring computation during the 1930s, Iowa had become an important center for mathematical statistics as a result of the interest of Henry Wallace. Wallace (later President Roosevelt's Secretary of Agriculture as well as Vice President) introduced IBM tabulating equipment at Iowa during the 1920s when he demonstrated its use for statistical analysis in agriculture and weather forecasting.

The following letter, which Wallace wrote to Cuthbert C. Hurd, Feb. 21, 1965, provides a nice feeling for what it was like in those days:

*In the late winter [February and March] of 1923 I taught a course in machine calculation of correlation coefficients at Iowa State, using a cheap driven machine. In the concluding session of ten lessons I decided to demonstrate how the IBM machine could be adapted to correlation work. For this purpose I used a truck from the farm to enable me to haul an IBM machine from Des Moines to Ames. I never used an IBM machine as an aid to breeding work but I did try to use it for some time in trying to predict weather. While this work was a flop, I think that Larry Page, the man who conducted it for me had something to do with starting [Jerome] Nemias of the Weather Bureau on his long-range weather forecasting.*

*For purposes of assembling yield test data in form to study, the Pioneer Hi-Bred Corn Co. of Des Moines has long used punched cards and the IBM machine so as to assemble the facts so they may be studied. The company now owns a machine and keeps it busy assembling data on yield test with both corn and chickens.*

An extensive program in computation evolved from this start and, by the mid-1930s, a computer project was begun by John V. Atanasoff, a professor of physics and mathematics. In a letter to the college research council in March 1939, Prof. Atanasoff explained that as early as 1933 he had begun thinking about mechanizing the otherwise "extremely arduous" solution of systems of linear simultaneous equations having many unknowns. Continued Atanasoff:

*About two years ago I came to a realization that computing machines can be much simplified by changing from the use of numbers to the base 10 to the use of numbers to the base 2. Further study has reinforced this point of view and it now seems possible to build into a small machine of perhaps the size and intricacy of a Monroe a computational ca-*



**digital**

INTEROFFICE - MEMORANDUM

TO: Gene Smith

DATE: January 2, 1974

FROM: Roy Gould

DEPT: Trade Shows

EXT: 2302    LOC: 6B-2

SUBJ: Museum and Dick Maliska's memo of 12/3/73

Gene, I am on top of this and I have made arrangements to pick up the PDP-4 #1 which Dick is referring to in his memo.

As far as the status of the museum is concerned, there is still going to be one; however, where is the question. I have talked with Ken about it and when he finds some time we are going to get together along with Gordon Bell and get the ball rolling.

jac

**digital**

INTEROFFICE MEMORANDUM

*this page only.*

TO: *Jack Skidls*  
Ken Olsen  
Gordon Bell  
~~Public Relations~~ *where*  
~~John Trobendis~~  
~~Roy Gould.~~

DATE: 12/3/73  
FROM: Dick Maliska  
DEPT: Diagnostic Engineering  
EXT: 3714 LOC: 3-5

SUBJ: PDP-4

DEC 05 1973

About a year and a half or maybe two years ago, the Drafting Department phased out their use of PDP-4 #1. Because of this, some of our people were temporarily left without a machine to do preliminary software debugging for "AMT" programs.

Since Drafting had decided to scrap the machine, and no one else wanted it, we decided to take it into our area for our own use. Since that time, our use of the machine has been reduced to none. So there it sits, and what do we do with it?

On at least three occasions I have spoken to the Public Relations Department, inquiring as to whether or not the "computer museum" was still planned and if they wanted PDP-4 #1 - no reply. So I assume that they either are not planning a museum or they do not want this machine.

I spoke to the Traditional Product Line and they don't want it either. (It seems that there is not a big market for used PDP-4's).

It seems a shame to let that machine get into the merciless hands of the salvage area. I feel that the sentimental value is worth something, but I would like you to have that choice.

Sometime in January (?) I will be transferring to our Marlboro plant and I would appreciate having PDP-4 #1's fate decided by then. I really don't want to move it over there.

Please find a home for my orphan.

*I say put all but tape units, card reader, and card punch into a ~~stock room~~ warehouse to hold for eventual DEC Museum!  
Scrap Tape Units, Card stuff unless Field Service or TPL want it.*

*Do you FS or TPL.  
Roy Gould where are the things to be stored? gBell.*

CONFIGURATION LIST

PDP-4 #1

- 1 central processor
- 8K memory
- 1 line printer (Analex)
- 2 card readers (Burroughs)
- ~~4 tape units (Potter - I think)~~
- ~~1 card punch interface (IBM)~~
- 1 Dectape control
- 2 555 Dectape transports
- 1 KSR-27 teletype
- 1 paper tape reader/punch



January 4, 1974

Professor Henry J. Zimmerman  
Director of Research  
Electrical Engineering Department  
Building 26 Room 231  
77 Massachusetts Avenue  
Cambridge, Massachusetts 02139

Dear Professor Zimmerman:

The purpose of this letter is to restate Digital Equipment Corporation's interest in regard to the TXO computer at MIT.

As you know we are planning a museum on the history of computers and we feel, as you do, that the TXO computer would be a very important part of this museum. If we are fortunate enough to obtain the TXO, our plans are to keep it in an operating state in the museum.

The museum at present is planned for our Marlboro, Mass. facility and would be open to the public.

Please feel free to contact me if I or Digital can be of any assistance to you on this matter.

Sincerely,

A handwritten signature in dark ink that reads "Roy G. Gould". The signature is written in a cursive style with a large, looping initial "R".

Roy G. Gould  
Exhibits Manager

RGG/jac

cc: Ken Olsen

*Roy Gould*

digital

January 15, 1974

Mr. Tom Scanlon  
I.B.M. Corporation  
1 Gateway Center Newton Corner  
Newton, Mass 02158

Dear Tom:

We are trying to establish a computer museum. Can you suggest whom we might contact at IBM to aid us in locating some earlier IBM equipment? We would be willing to trade, purchase, or barter for parts, sub-systems or whole machines. Would appreciate any assistance you can offer.

Sincerely,

*Henry*

HENRY CROUSE  
Corporate Manager of Purchases

/cp



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VOLUME 3  
Third Year

Number 6

16 Pages

The Free Enterprise

Wednesday, February 13, 1974

PUBLISHED WEEKLY BY THE ENTERPRISE-SUN  
250 MAPLE ST., MARLBORO, MASS.

Office building will  
become showplace

## Digital to house computer museum

by EMDON D. MacKAY  
(Of the Enterprise-Sun Staff)

MARLBORO — "We'll have one of the best, if not the best, museum in the world" in the Marlboro division of Digital Corp., according to Kenneth H. Olsen, president of the firm that is known as the largest manufacturer of minicomputers in the world.

Olsen, who spoke at the meeting of the Rotary Thursday noon at Marlboro Country Club, said the former Marlboro RCA complex is ideally suited for the computer museum to house Digital equipment beginning with the first whirlwind models.

He added that Digital has been looking for space for a museum for several years, but "every time we found floor space, we decided it would be more economical to use the area for building or testing new computers."

Olsen, who introduced John Leng as plant manager of the Marlboro Digital complex, said that, although Digital is known as a manufacturer of minicomputers, the ones built in Marlboro will be the "king-size" DEC system-10, the largest made by the firm.

Of the 1,000 Digital employees expected to be employed in the Marlboro plant by mid-1974, many will be local residents, Olsen said. "We could conceivably have more local people, but it is not our policy to rob employees from other industries," he added.

Olsen said the Marlboro plant will bring the company to a total of 3.5 million square feet of floor space occupied by Digital plants worldwide.

Besides the headquarters in Maynard, "where it all started in 1957," Olsen said, other plants in the Bay State are located in Westminster and Westfield. Digital also has plants in Puerto Rico and in Ireland.

### Grow Carefully

"Why did it take us a year to make up our minds to move to Marlboro?" Olsen answered his own question by reminding the audience that it always has been the policy of Digital to "grow carefully and with caution."

Besides, he said, "many people didn't want to leave the old mill." Olsen noted — in tracing the history of Digital — that the former American Woolen Mills building where the first Digital computers were designed was taken over floor by floor in keeping with the company policy of caution in growth.

In fact, Olsen said that when Digital was developing, "growth wasn't important . . . we just wanted to a job we could be proud of."

He said that when Digital started, they didn't want government money, and, in addition, unlike most other companies, were determined to be a profit-making industry.

The \$70,000 that Digital borrowed to get started, was taken with the promise "that we'd make money," Olsen said. In answer to a question, Olsen noted that the \$70,000 loan has never been repaid, but those who lent the money now own 80 per cent of Digital stock.

### Founded in 1957

Founded by Olsen in 1957, Digital occupied 8,500 square feet of floor space in the Maynard mill, and there were three employees. Olsen noted that one of his chores, in addition to designing the early computers, was to fill in as janitor.

Today, the company has more than 13,000 employees worldwide, with more than 7,500 of these in its Massachusetts plants. Digital ranks second to IBM in the number of computers installed worldwide, but is the world's leader in the minicomputer field.

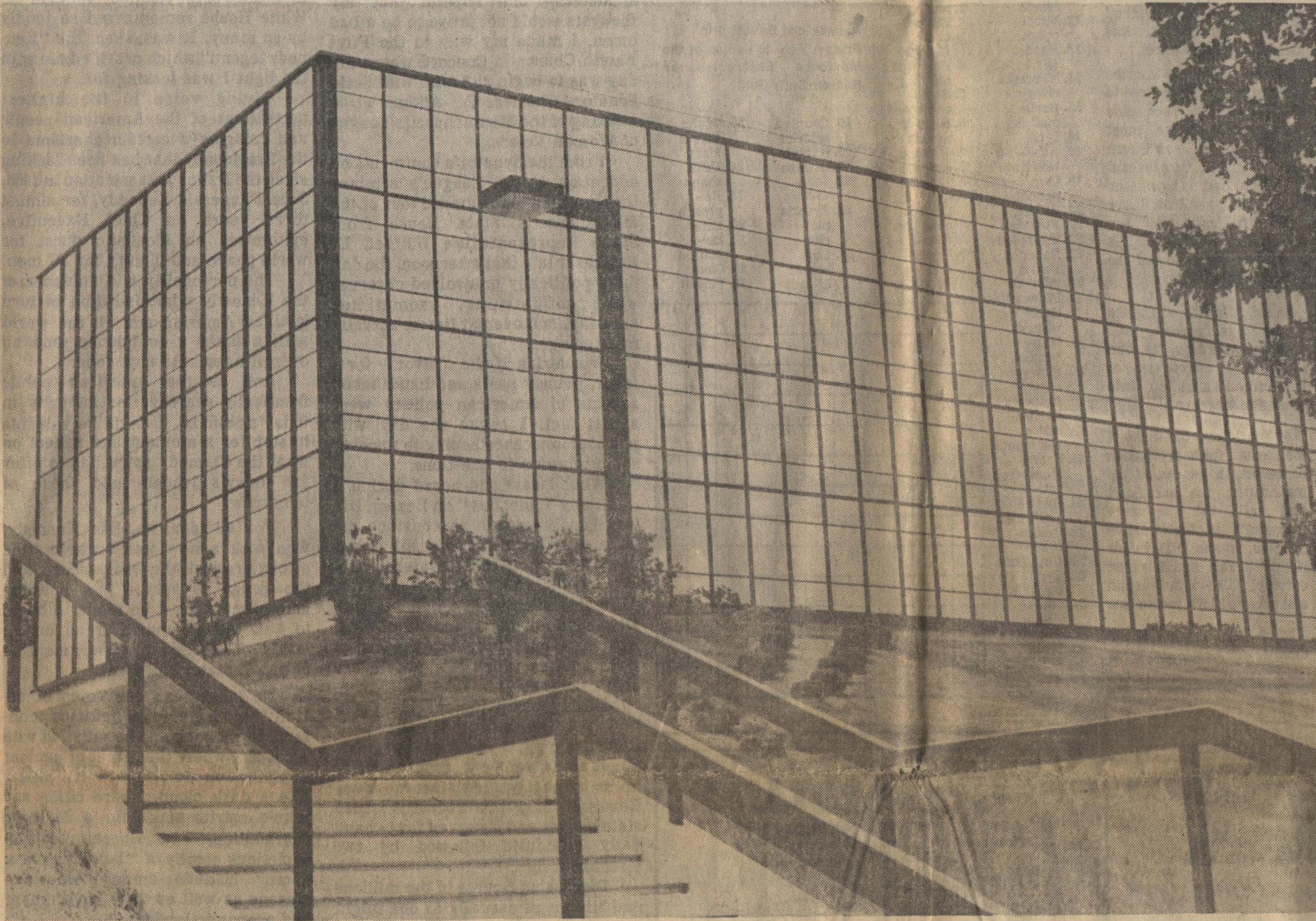
It manufactures more minicomputers than all other computer companies combined.

Olsen noted that the first true minicomputer was the PDP-5, introduced by Digital in 1963. This handmade machine, costing \$27,000, created a market that industry analysts estimate will top the \$1 billion mark by 1975.

By contrast, the DECsystem-10, the computer to be manufactured in Marlboro, will cost up to \$2 million, depending on the use it will be put to. It is a time-sharing computer, which can be used by several customers.

Olsen cautioned the Rotarians that he cannot guarantee that Digital will not go the way of RCA (which dropped the computer business and closed its Marlboro operations about two years ago) but "we intend to keep designing and making computers as if we were going to be there forever."

He added that the move to Marlboro was made, "because we needed the space . . . and I feel we're wanted here."



Staff photo  
by Art Phaneuf

**THIS BUILDING** will house a new computer museum planned by Digital officials for Marlboro. Kenneth Olsen, president of the Digital Equipment Corporation, told members of the Marlboro Rotary Club yesterday that he has been looking for space for the museum for some time and the Marlboro branch of the company is ideally suited for his purpose.

2/21/74

Sally Burch Lymberg  
779-6601  
Bolton

Telephone Notes on her background:

Librarian for Architects Collaborative  
Established the library.

Completed design courses in electrical, mechanical, civil engineering  
around 1958 at U. of Arkansas--they would not let a woman go in the  
field so she did not get her degree.

Geo Physics Corporation of America?  
Established library right after Sputnik--had to do with documentation  
of government secrets on a computer.

Reflectron Electronics, Conn.  
Simulation for B-52, worked with Director of Research and Engineering  
in setting up and coordinating all information necessary for  
simulation. Did navigation programming on the computer for the  
Japan "C".

Sperry Rand, Norwalk  
International Section of Business machines.  
Worked for Marshall Truex, VP of patents. They decided to coordinate and  
collect all information on Sperry Rand and go back to first computers.  
The place where the action was, was not where the interest was, so the  
project died. They did decide to go ahead with the business machines--  
forgetting the computers. She was in charge, started it up, and  
completed this museum, which I guess is a big success.

She has worked with Chuck Stevens, MIT, Lin. Lab (1717 K St., N.W.,  
Wash. 20036.

On call at Simmons to talk to the class on systems analysis.

Worked at Inteltek

Working/charter member of every society involved with computers.  
Has these contacts, many of whom would be willing to publisize and  
help procure things for the sake of history.

Worked with IFIPS collecting a listing of international programs on  
computers to be shared with the Europeans.

Doing work now on a consulting basis for Lin. Lab trying to standardize  
the information for catalogues and requests for information between  
university programs on a computer.

*3/18/74 visit*

*has contacts, finally,*

2/21/74

*Starten*

Gordon,

A friend of Sally Lymberg told her about  
our museum article in the Marlboro paper.

She is extremely interested, has been for  
several years, in the idea of a computer  
museum. She wanted to know if it was going  
to be international not just DEC.

She seemed to be a very energetic, enthusiastic  
woman, with great credentials for this project.

I made an appointment for March 18 and have  
already set up Ken, and Roy Gould, Bob Reid.  
With her programming background I thought  
Portner would be interested too?

The attached is only a smattering of what she  
said--I couldn't get it all down.

mj

digital

INTEROFFICE MEMORANDUM

TO: Gordon Bell

DATE: March 15, 1974

FROM: Jim Bell *Jim*

DEPT: R & D Group

EXT: 2764 LOC: 3-4

MAR 20 1974

#2

SUBJ: Dr. Sumner

Attached is a copy of the telex arising from your request via Ira Potell. Apparently, Dr. Sumner in return wants a copy of your Atlas 1 manual if possible. You should work through Peter Burton of our Manchester office on this matter.

JRB:cw

Attachment

*who he I don't have one*

*and significant*

*To: Peter Barton  
cc: Roy Gould*

*We're in the process of collecting manuals, photos, and a parts from ~~set~~ early computers for the a ~~possible~~ DEC museum. I would very much like these for MU 1, 2, 3, 4, and 5.*

F/04/11  
from G. Bell  
4/11/74

SUBJ: DEC MUSEUM IN MARLBORO COUNTRY

Note: This is a draft--Ken, please read before I send out, Roy and I should co-author this,

Roy, please review. *any comments?*  
*mj*

-----  
We have a great opportunity to establish a computer museum in the Marlboro building, in what would otherwise be totally useless space. Several of us have the interest to embark on this project; once set up, the incremental personnel operating expenses will be constrained to about 2 people,

We believe it may turn out to be financially rewarding, although it is difficult to justify, its uses include:

1. Being used to exhibit computers to the local and computer community.
2. Establishing us as an intellectually serious vendor via its embedded lecture hall for multiple functions.
3. Showing our working computers and products.
4. Showing our own past and present technology.
5. Using it as a liaison to various U.S. and European laboratories and universities who were also computer midwives.
6. It would be a possible place for technological and business historians to visit by placing our own literature there plus company archival data.
7. It being a place to collect books, manuals, computers, and technology outside of DEC.

The 20,000 sq. ft. museum could be utilized in the following ways:

1. Historical time line (family tree) evolution of minicomputers utilizing our NCC exhibit. This would show EDSAC (we have to get a part from Cambridge), Whirlwind (a bay and some peripherals), TX-0, PDP-1, PDP-4, and on to various 8 and 11's. Here we could show off-shoots like the Indian 8, 11; Cuban 8, DCC, Hungarian, Sue, Sprague modules, and ITT's copies.
2. As a really nice conference/seminar hall for a museum lecture series, press conferences, PDP-10 lectures, IEEE and ACM meetings, some of our own meetings. This would be reserved 1/2 time for these activities. It should hold about 50 to 100 people.
3. Working DEC computers: PDP-1 and NSA super console PDP-4 with space war, ...PDP-11 with moonlander, terminals to various machines. People could visit this just to look at and use our various consoles.
4. Technology displays. We have many exhibits that can be set up from time to time. Eg., history of displays from



SUBJ: DEC MUSEUM IN MARLBORO COUNTRY

(1026)

11/6/74  
4/16/74

TO: Operations Committee  
Product Line Managers

From: Gordon Bell  
Roy Gould

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3. Showing our working computers and products.
4. Showing our own past, and present technology.
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4. Technology displays. We have many exhibits that can be

set up from time to time. Eg., history of displays from Whirlwind and includes our first color and first precision displays. Also, we had first UART in 62--show the package evolution to UART on a chip with chips and microphotographs. In general, this would cover computers, computer parts, and technology (eg., logic, displays, printers, tapes, power-supplies).

5. Computers from universities, research labs and other vendors.
6. A place for machine and programming manuals for us and for the above technologies.
7. DEC archival information on computers and business.
8. A place to debug trade-show booths.
9. Historical computer books.

#### MODUS OPERANDI:

The museum will report to Roy Gould, who will hire a curator to live there for day-to-day operations, collect, guide and buy various internal services. A board of directors, consisting of Roy, the curator, myself, Ken, and 2 other people, will guide them, review plans, and establish priorities. The operating budget will be presented to the F&A Committee.

#### ACCOMPLISHMENTS SO FAR:

Already, Ken has established the basis for our having the most significant operation because we have Whirlwind (first mini, core, microprogramming, display, tape, and A/D). Also a great trading basis. We have the TX-0 (first transistorized machine) which will be operational! All our prototype machines are available and work. I've collected parts from ACE (UK-Nat. Phys. Lab), a 650, a 704, MIT Dif. Analyzer.

GB:mjk

~~Attachment - Museum Budget~~

Copies: Gordon Bell  
Ray Gould ✓

APR 29 1974



CORPORATE HEADQUARTERS  
DANIEL WEBSTER HIGHWAY, SOUTH  
NASHUA, NEW HAMPSHIRE 03060  
PHONE: (603) 885-5182

In reply refer to:  
0-1160-74-65  
25 April 1974

Mr. Kenneth H. Olsen, President  
Digital Equipment Corporation  
146 Main Street  
Maynard, Massachusetts 01754

Dear Mr. Olsen:

The last time I talked with you, about a year ago, was at the Finance Executives Institute where you were the guest speaker. At that time, I indicated that Sanders Associates, Inc. had an operative PDP-1 and inquired as to the number still in use. You were not certain of the exact figure but indicated there were relatively few and also indicated that you were not aware that Sanders had this computing system.

It has served well our purposes here and still is in excellent operating condition. We recently have concluded that the usage of this computing system is so marginal now that we would like to dispose of it. Recognizing that the market for used computing systems is unstable, I should like to inquire whether DEC would be interested in acquiring this system from Sanders, in view of its age and excellent operating condition. It might be that you people would want to display it somewhere or perhaps cannibalize it to maintain similar PDP-1 systems.

I would be appreciative if you could let me know, or if you would forward this inquiry to the appropriate executive at DEC. To help in assessment of your interest, attached is a configuration of our PDP-1 computing system.

I will appreciate any interest on your part.

Cordially yours,

SANDERS ASSOCIATES, INC.

A handwritten signature in cursive script that reads "E. B. Matthews".

E. B. Matthews, Director  
Corporate Computer Sciences

EBM/ilb

Attachment

cc: E. Gettel

**digital**

*Museum*

June 11, 1974

Miss Jane Pughe  
Asst. Keeper, Computing Section  
Science Museum  
Exhibition Road  
London, SW7, England

Dear Miss Pughe:

It was a pleasure talking with you on Friday, June 7, regarding possible interaction with you and the Science Museum. Professors Wilkes and Randall have spoken enthusiastically of your efforts and exhibits at the Museum.

I'm interested in some means of cooperating with you in the establishment of our own DEC museum in Massachusetts. DEC is a manufacturer of mini (and larger) computers with sales of about \$400M (about 1/3 of which is in Europe). It was founded in 1957, and its antecedent machines include MIT's Whirlwind and the Lincoln Laboratories TX-0 and TX-2. A booklet of DEC is attached. Our own museum will include parts of Whirlwind, the TX-0 (operational), other machines (operational) and various technological parts.

The cooperation we might explore:

1. Exchange of computers or computer parts with the Science Museum. We have nearly all of Whirlwind. Also, we have parts or complete machines of our early DEC machines. I (and Prof. Wilkes) feel that Whirlwind should be represented in your museum. Similarly, I believe it might be interesting to have a working U.S. machine (minicomputer) exhibit, too.
2. Your acting as a purchasing agent for early British and European, computing instruments for me. Here, I would like to personally buy machine parts which could be loaned to our museum; I have no intention of having our corporation buy parts which would not have wide appeal to the general American public. Since you have knowledge of this field, I would like to prevail upon you to consider such an arrangement. (I will wait until I hear from you before I contact Sotheby's 1 Bond St. W1). This arrangement would have to be cleared through the Science Museum.
3. Since we (I and others directly involved in our own museum) are considering a museum, we would like to have benefit of your counsel from time to time.
4. As a student of computing machinery, I would like to establish contact, because I may write other books about computing. Enclosed is a book

To: Miss Pughe  
June 11, 1974

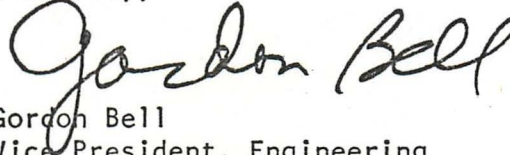
From: Gordon Bell  
-2-

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written by myself and Allen Newell of post Von Neuman computing;  
and this may eventually go into another edition.

Please consider the above possibilities, and I look forward to hearing  
from you, and eventually visiting with you.

Sincerely,



Gordon Bell  
Vice President, Engineering  
Professor, Computer Science  
Carnegie-Mellon University (on leave)

GB:mjk

cc: Ken Olsen  
Geoff Shingles  
✓ Roy Gould  
Sally Lymberg



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Bio-Medical Library  
Diehl Hall  
Minneapolis, Minnesota 55455

July 15, 1974

Ms. Sally Birch Lymberg  
Museum Consultant  
Digital Equipment Corporation  
146 Main Street  
Maynard, Massachusetts 01754

Dear Ms. Lymberg:

Audrey is no longer directly associated with the mini-computer project at Bio-Medical Library, so I am taking the liberty of responding to your letter. We hope your tape deck was recovered, but suspect that it wasn't.

We do have a mailing list, and I have added both you and Mimi Cummings to it. We will send copies of earlier reports that may be of interest, and will include you in the future dissemination of this information. Our next progress report will be in late August or September.

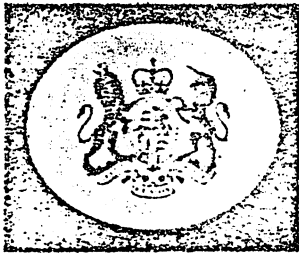
There is no connection between our project and the University of Illinois. Glenn Brudvig, Gene Lourey, and Audrey presented papers at a meeting held there in May of this year.

About the project -- as you probably know, we are building a comprehensive integrated library operations system to include acquisitions, serials management, cataloging, reference services, and circulation. Patron services will be added in the future. The system is being written in assembly language (MACRO-11) for the PDP-11/40. We are writing all of the software including the operating system. Sorry we can't say we are using DEC software, but sales can take heart from the number of libraries that want to install the completed system, and the fact that it will only run on a PDP-11.

Thanks for your interest in our project, and if you are out this way, please come visit us.

Sincerely,

Bob Denney, Co-Director  
Mini-computer Project



To: Roy Gould + Sally + Hold

SCIENCE MUSEUM

South Kensington London SW7 2DD

Telephone 01-589 6371 ext

JUL 30 1974  
7-32

Professor Gordon Bell  
Vice-President, Engineering  
Digital Equipment Corporation  
146 Main Street  
MASSACHUSETTS 01754  
U S A

Your reference GB:mjk  
Our reference 100/123/13  
Date 24 July 1974

Dear Professor Bell

First of all please let me apologise for the delay in replying to your letter of June 11th. This has been due to circumstances quite beyond my control, and I assure you it does not at all reflect a lack of interest on my part to the content of your letter.

I will answer the points raised in the same order. Concerning exchanges of objects, this can be a possibility, depending on the items involved. If you could give me a better idea of exactly what sort of artifacts you are looking for, I hope we will be able to come to a mutually satisfactory agreement. I am certainly very keen to have some parts of a Whirlwind, for instance.

I have been advised that I may be able to act as a purchasing agent for you, provided that this did not conflict with my Museum work and interests. It is not clear whether you are interested in just computers or also early calculating machines and mathematical instruments. Again I would be grateful for details of what you think this would involve, as it will have to be considered by senior officers here.

As to the other points, I shall be most pleased to give you any help and advice that I can for your new Museum etc. I was delighted to receive your book, thank you very much indeed. We had not seen a copy before, and it has already proved most helpful in the preparation of one part of our forthcoming exhibition.

I look forward to hearing from you.

Yours sincerely

*E Bechler*

PP Jane Pugh  
Assistant Keeper  
Department of Astronomy  
Mathematics & Earth Sciences

What  
can  
we  
do  
here?

Also a kit of  
DEC stuff  
Let's start by an offer



# INTEROFFICE MEMORANDUM

TO: Ed Schwartz

DATE: July 30, 1974

cc: Ken Olsen  
Gordon Bell

FROM: Roy Gould

DEPT: Trade Shows

EXT: 2302      LOC: PK3-2

SUBJ: Museum - Non-Profit Organization

Would you please check into the possibility of setting the Digital Computer Museum up as a non-profit trust, foundation, or corporation whichever is appropriate. This would aid us in donations of displays as no one will donate to a profit organization. This is part of the problem we are having with MIT turning the TX-Ø over to us.

I have enclosed a study done by Harvey H. Lippincott, Corporate Archivist for United Aircraft, for your information.

jac  
enclosure





Computers have changed our lives — they solve our little problems and our big ones, like directing air traffic.

# The computer revolution

By Isaac Asimov

Calculating devices of one sort or another are as old as arithmetic. As soon as primitive man got the notion of numbers, he used his 10 fingers as a device for keeping track, and for adding and subtracting.

Then came the abacus, which used pebbles or counters in rows of 10, like many sets of fingers. One row kept track of the units, the next of the tens, the next of the hundreds and so on. Centuries later came the move to mechanize the process — to make as little of it as possible the result of human manipulation, and as much of it as possible automatic.

In 1642, the French mathematician Blaise Pascal invented an adding machine consisting of a set of wheels connected by gears. Each wheel was marked with the digits from one through nine, plus a final zero. By turning the wheels backward and forward the proper amounts, numbers could be added and subtracted and the results read off the device. In 1674, the German

mathematician Gottfried von Leibnitz arranged wheels and gears in such a way that multiplication and division also could be done.

These machines were curiosities and didn't come into wide use. But in 1850, an American inventor, D. D. Parmalee, patented a machine in which the wheels weren't moved by hand, but by pushing down marked keys. That was the "cash register" which was *the* calculating machine of 1900 and for a number of years afterward.

Even the most advanced calculating machine in general use in 1900 was scarcely any advance at all over counting on your fingers. It did only the simplest arithmetical computations and it had to be supervised at every step.

However, there were signs of

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*This is another in a series of articles telling the story of the extraordinary scientific and technological developments of the 20th century.*

something more than that. If one had a simple and repetitive task to do, could one "instruct" the machine once and for all and have the machine do it without further human supervision?

In 1900, something of this sort was only three years old. It was the pianola or "player piano," which reached the peak of its popularity in the 1920s. A roll of stiff paper was perforated in a careful pattern and that pattern was the instruction. By the action of foot pedals, air could be blown through those perforations to activate piano keys.

Such punch-card techniques were invented in 1804, by a French weaver Joseph Marie Jacquard. The presence or absence of holes in this place or that on a rectangular piece of cardboard depressed or raised the threads and created automatic designs in silk-weaving.

In 1822, English mathematician Charles Babbage thought of using punch cards to guide a calculating machine. By using

*continued*

## The computer revolution *continued*

a proper combination of holes, a sufficiently complex machine could be instructed (or “programmed”) to do every kind of mathematical operation known to man. Babbage spent years trying to build a machine that was sufficiently complex for the purpose but failed. His theory was perfect but the mechanical techniques of the 19th century were insufficiently sophisticated.

Simpler punch-card calculating machines were working by 1900, though, and they were improved over Babbage’s attempt by using electricity to move the gears rather than mechanical pushes and pulls.

As the decades of the 20th century passed, there was a constant and growing need for mechanical devices that could do calculations of a more and more complex kind in less and less time. With advances in science, complicated equations of all kinds had to be solved; and as social life grew more complex, more and more statistics had to be analyzed.

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### First computer was a giant — but it wasn’t fast enough

---

In 1925, American electrical engineer Vannevar Bush constructed a machine capable of solving complicated “differential equations.” It was a successful version of what Babbage had tried to do a century before, but it still worked with mechanical switches and wasn’t fast enough.

In 1937, Howard H. Aiken, who was working at Harvard for his Ph.D., produced plans for a complicated device that would solve differential equations by using electrical rather than mechanical switches. The device was completed in 1944 and was called “Mark I.”

It was the first large-scale automatic calculating device — the first machine we could call a “computer.” It weighed five tons, had more than 3,000 electrical relays and 500 miles of wiring. It could add and subtract

23-digit numbers in three-tenths of a second and multiply them in six seconds.

Yet that still wasn’t fast enough. Even as Mark I was being constructed, World War II was raging and the need for faster computations was growing.

In place of the electric switch, there came the electronic switch. Instead of closing a contact by an electromagnetic pull, there came the much faster stopping and starting of a flow of electrons in a vacuum tube.

By 1946, a vacuum-tube device was completed under the direction of John P. Eckert and John W. Mauchly at the University of Pennsylvania. It was called “Electronic Numerical Integrator and Computer”; in abbreviated form, ENIAC. It was the first *electronic* computer. It contained 19,000 vacuum tubes and was much faster than Mark I, but it weighed 30 tons.

Hungarian-American mathematician John von Neumann suggested methods whereby the computer could store not only the data fed into it and the results it obtained, but even the operating instructions. It was then unnecessary to start from scratch each time you wanted the computer to do some work: If you already had the general instructions stored in the machine, you merely introduced the necessary modifications.

Once the transistor became practical in the early 1950s (see “The Electronic Revolution,” *Modern Maturity*, June-July 1974), it became possible to replace the comparatively bulky vacuum tubes by the much tinier and much more rugged transistors. The result was that computers became much smaller without becoming less complicated.

Punch cards vanished, too, for it was found that data and operations could be stored on magnetic tapes far more concisely, so that even a moderate-size computer can have an enormous memory. As time went on, various “computer languages” were devised, each closer and closer to ordinary English. Now it is almost as

though you can talk to a computer and have it talk back to you.

Computers worked so rapidly that almost any reasonable problem could be answered in a matter of millionths of a second. Even if many problems were fed into it at the same time, the computer could solve one after the other and even the last person in line would not be aware of having had to wait.

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### Don’t blame the machine when you find an error

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In 1965, therefore, the concept of “time-sharing” was introduced. Many different people could have a typewriter connected to the computer, some at considerable distances. Each could use the computer freely, taking his turn, without ever being aware of delay.

As early as 1948, two years after ENIAC, small electronic computers were being produced in quantity; within five years, 2,000 were in use; by 1961, the number was 10,000; by 1970, the number had passed the 100,000 mark — and it is still going up rapidly.

Computers have become essential for keeping government statistics in order in these days of income tax, Social Security and welfare. Scientists have used them in solving problems in every field. Businesses use them to keep track of a thousand matters from warehouse items to orders to billings. Computer memories are serving everyone now, even when they are scarcely aware of it.

And what of the future? Will computers ever take over? So far, there’s no question of that. They are still loyal servants of mankind, doing what they’re told, and when they make a mistake, it is never the computer that errs, but the man who has given it its instructions.

And the annoyance with mistakes is completely overwhelmed by the convenience of what computers make possible for us at every moment.

Box 315  
Bolton, Massachusetts 01740  
August 5, 1974

Computer History Project  
Smithsonian National Museum of  
History and Technology  
Room 4601  
Washington, D.C. 20560

Dear Sir:

The IEEE Spectrum of February 1974 had an article by Henry Tropp, former investigator for the Smithsonian History Project. Do you have any bibliographies or descriptive material of the contents of your project that are available at this time?

I am very interested in tracing certain points in the history of computers for a research project. Is it necessary to visit the Smithsonian and your Computer History Project in order to use the material?

Sincerely,

Sally Birch Lymberg  
Research Librarian

SBL/jac

no answer !!

**digital**

INTEROFFICE MEMORANDUM

TO: Roy Gould

DATE: 12 August 1974

cc: Marietta Ethier

FROM: Ed Schwartz

DEPT: LEGAL

EXT: 5500 LOC: Maynard PK-3/2

SUBJ: MUSEUM

X-4288

I have asked Marietta Ethier of my department to look into the pros and cons of establishing the museum as a non-profit corporation.

In addition, we want to check out the various tax laws to be sure that even if we can establish it as a non-profit corporation that it would have the benefit of tax free status so to take advantage of contributions, as you indicated.

I trust that Marietta will be in touch with you shortly.

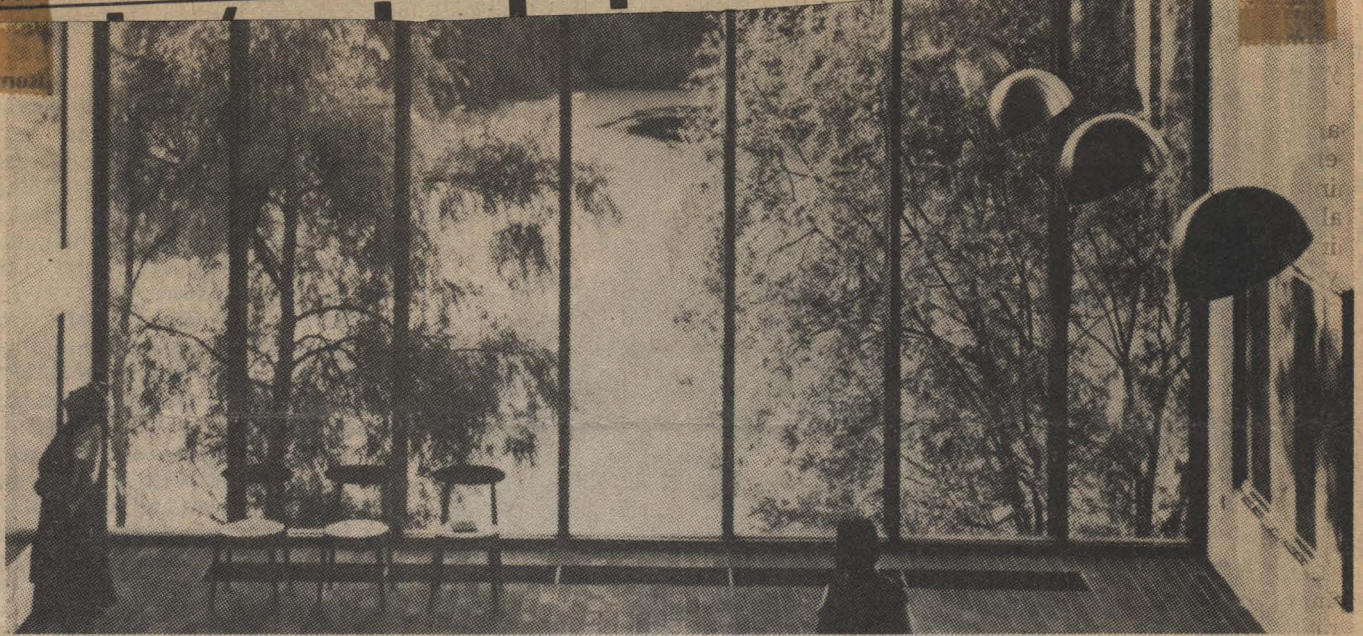
lml



Monday, August 12, 1974

R

814



Danish National Tourist Office

Art and nature blend at Louisiana Museum in Danish countryside

## Denmark's indoor-outdoor museum

Three million people have visited rural 'cultural milieu' since 1958

By Diana Loercher

### Humblebaek, Denmark

If you visit Denmark, don't pass up its most popular, and most unusual, museum. Traditional museums tend to be gray stone monoliths, cold storehouses of culture which intimidate the visitor with their vast

### Art

treasures. Moreover, the urban location of most major museums enhances this atmosphere of institutional formality.

The Louisiana Museum of Modern Art, a few miles outside Copenhagen bears little resemblance to its predecessors. Designed in 1958 by Jorgen Bo and Vilhelm Wohlert and completed in 1958, the one-story building is made of whitewashed brick, red clinker, teak, and pine, and has a light, airy, informal quality that reminds one more of a ranch house than a museum. Moreover, it sprawls, twists and winds in an irregular fashion that obviates the monotony on the traditional museum design and introduces an element of perpetual surprise to the visitor's wanderings. The rooms also tend to be spacious

and light, and the atmosphere lacks of oppressiveness. One almost feels as if one were outside while inside, and impression which owes much to the fact that windows are everywhere, facing out onto the sea, the sculpture garden and into the woods. One of the most striking instances of the harmony between art and nature is the square high-ceilinged room filled with Giacometti's slender, spare figures which look like reflections of the trees and reeds outside the huge window which fills an entire wall of the room.

### Dynamic director

Louisiana's dynamic director is Knud Jensen who sold his cheese business nearly 20 years ago to open a museum of modern Danish art. He deliberately selected a nonurban location, in Humlebaek, North Zealand, on the property of a nobleman who called his estate Louisiana after his three wives, all named Louise. Since it opened, the museum has attracted 3 million people, an astonishing figure when one considers that the museum not only is outside the city but deals with modern art, which exerts increasingly little popular appeal. But the combination of Louisiana's scenic location, intensive program of chang-

ing exhibitions, and gradual shift in emphasis from the Danish to the international scene has apparently proved irresistible to the average person.

Moreover, Louisiana has become a major influence on the Danish art scene. One of its most important exhibitions held in conjunction with the Moderna Museet in Stockholm, "American Art 1950-1970," introduced pop art to Scandinavia. As Gunnar Jespersen, an art critic for one of Copenhagen's major newspapers, said of Mr. Jensen, "without him it would be rather boring to be an art critic in Denmark."

It is clearly the implementation of Mr. Jensen's museum philosophy that accounts for its unusual success. In a recent interview Mr. Jensen explained: "I hate the word education but in presenting a wide variety of material you do stimulate people's joy in looking at things. I guess you might describe my approach as 'art without tears.' There is a long tradition maintained by idealistic bourgeois people that people go to museums not for fun but because it's an obligation, a visit to the temple of culture. Then too there's the complexity of modern art which they have to deal with."

Denmarks indoors-outdoor  
museums

The result, Mr. Jensen feels, is that people often feel alienated, even diminished by museums, and part of his purpose in creating Louisiana was to "avoid the loneliness and unhappiness that the visitor often feels." To this end he endeavored to bring art down to human scale by integrating functional architecture, abstract art, and modern design even of the furniture with each other and with nature. His theory is that the unification of these various elements is conducive to a feeling of comfort and relaxation in which the art experience becomes a pleasure rather than an affliction.

In keeping with this view Mr. Jensen hopes to turn Louisiana into a "cultural milieu," similar to the Museum of Modern Art in New York and the Stedelijk Museum in Amsterdam, where films, concerts, and theatrical performances also are held. Art, according to Mr. Jensen's view, should be a "a social event" and the museum a place to experience "togetherness" not only between the various people and between the various arts but between art and life.

By

Tl  
w  
vi

August 19, 1974

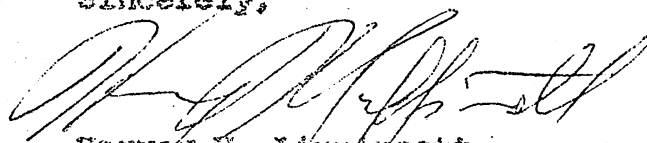
Mr. Roy G. Gould  
Exhibits Manager  
Digital Equipment Corporation  
146 Main Street  
Maynard, Massachusetts 01754

Dear Roy:

In a conversation with Sally Lynberg this week, she said you were interested to learn some of the legal advantages and disadvantages of setting up a company museum as a company owned museum and a non-profit organization. I am happy to pass on to you my findings as a result of my company museum study. The findings, of course, reflect Connecticut law and may be different in Massachusetts law.

It certainly was a pleasure to meet with you and Sally last week, and I wish you every success in your endeavors to establish your company museum.

Sincerely,



Harvey H. Lippincott  
Corporate Archivist

HHL:dc

enc.

cc: Mrs. Lynberg ✓

## Factors in Establishing and Maintaining a Company Oriented Museum

Federal and State Income Taxes. Company contributions to a Connecticut membership corporation to form or maintain a museum could be arranged to be either a charitable deduction or an "ordinary and necessary" business expense.

A contribution by a corporate foundation to a museum would, of course, be a valid contribution if the museum had an exempt ruling under section 501(c) (3) of the I.R.C. A museum open to the public which displayed past products of a company and provided historical and educational material probably could get a Federal exemption. It would be a "private foundation" unless its receipts (contributions or admission fees) from the public were at least one-third of its total receipts, but the primary disadvantage would only be a 4% tax on any investment income, which probably would be negligible. Contributions could be cash or the fair market value of any property given to it.

Property Taxes. A Museum holding a Federal exemption as a charity probably would not be subject to the Real Estate Property Taxes, under Section 12-81(7) of the Connecticut Property Tax Law. Section 12-89 of that Law provides that town Assessors shall determine the exemption status of such organizations. It would seem likely that an agreement on this point could be reached.

### Form of Organization

The most serious legal problems are the tax considerations. However, no particular form of organization is required to obtain tax exempt status under the Internal Revenue Code. Generally, a non-profit organization such as a museum would take one of two legal forms: a membership or non-stock corporation, or a trust. Some states have enacted statutes which provide for the establishment of non-stock corporations with minimum expense and effort. The charitable trust is a creature of the common law. Either could be used to establish the museum. The corporation would be required to file annual reports with the Secretary of State, but these are brief and not a serious problem. Often the choice between the corporate form or the trust form is made on the basis of a comparison of the powers and liabilities of directors and trustees. Trustees' powers are more



limited and the extent of their liabilities is less certain than is the case with directors.

### Advantages and Disadvantages of the Forms of Organization

As previously mentioned the museum organization can be handled two ways, depending upon the use to which the company wishes to use it.

It could be:

1. A wholly owned company facility
2. A non-profit, tax exempt corporation, foundation or trust supported by the company.

In usage and in cost advantages, neither way is entirely advantageous for the company.

If the museum were wholly company owned, advantages would be:

1. Full company control of the museum and its presentation, thus insuring that the presentation is fully satisfying to the company and correctly reflects its image.
2. Full, unrestricted use of the museum for any purpose, including sales promotion, engineering studies, technical presentation, public relations and the like.
3. A likelihood that the cost of the museum, at least its annual operating expense, as a valid public relations and business expense can be included in general overhead and administrative costs used in price negotiations would be acceptable to the government. Such would not be acceptable if the museum were a separate non-profit corporation or foundation.

Disadvantages would be:

1. Loss of town or city property tax exemption for the museum.
2. Possible over-balance of company control and dictation could adversely affect the museum's mission, presentation effectiveness, and quality.

If the museum was owned by a non-profit, tax exempt corporation, trust or foundation, supported by a company, advantages would be:

1. A higher degree of permanency should company control, policy or direction change. While obviously affected, the fortunes of the museum would not be directly tied to that of the company. The museum might possibly be able to refinance and continue to function independently of a company. It would be harder for an unsympathetic company management to arbitrarily shutdown the museum and disperse the exhibits.
2. More autonomy for the museum to establish its own operating and exhibition policy without outside distraction which would possibly result in greater operating stability for the museum and ensure a continued high quality professionalism.
3. Availability of town or city property tax exemption.
4. Availability of state sales and other tax exemptions.
5. Exhibits would be the property of the museum and not subject to possible disruptive requirements or removal for other company interests.

Disadvantages would be:

1. Outside of customer tours of the museum the company would be unable to utilize the museum for business purposes, such as sales and technical presentations, meetings and promotional usages. Such usage would prevent the museum to hold a federal tax exemption. Without such an exemption, a non-profit museum depending upon donative and charitable support cannot survive.

However, it may be possible to get around this problem by renting facilities and selling services to the company. However, these services would have to be available to anyone or any organization at the same rates with all funds so earned used solely in the museum operation and improvement.

In summation:

1. From an overall write-off standpoint it will make little difference whether the company writes off the museum building construction and annual operating expense as a public relations business expense or as an outright grant for donative write-off to a non-profit organization. There is little advantage one way or the other. The bill is the same.

The probability of expensing the museum cost in general overhead and administrative expenses in product price may balance out the loss of town or city property tax.

2. To maintain an acceptable company image and presentation, a very liberal amount of support from a company would be necessary if the museum were a non-profit corporation, trust or foundation. Under these circumstances, it would be very difficult to raise outside funding to support a company oriented museum.

#### Control of the Organization

A company would wish to be sure that any organization created would continue to carry out the purposes for which it was established.

In the case of a non-stock corporation this would be accomplished by providing in the certificate of incorporation that there would be no voting members and that at least a majority of the Board of Directors would be current employees or officers of the company. The trust agreement would require that trustees receive the approval of the company.

#### Liability of Directors or Trustees

The law places heavy responsibilities on both trustees and directors of charitable corporations. The organization documents should be drafted to limit their liability and to provide for indemnification to the extent possible. As indicated above this is somewhat easier to achieve in the case of the non-stock corporation.

#### Name

If the museum is created as a non-stock corporation under Connecticut law, it must include "Corporation", "Incorporated", "Corp." or "Inc." in its name. If it is established as a trust, this is not necessary. However, if incorporated, it can reserve the name and prevent others from using it.

Right to Property upon Dissolution

Since a company would either be constructing a building for the museum or providing the funds so that the museum can construct the building and exhibit it would naturally wish to protect its investment by insuring that in the event the museum ceases for any reason to continue to operate, the title would return to the company. Accomplishing this does raise tax problems in that it could affect the museum's tax exempt status.

Corporate Archives  
United Aircraft Corporation  
August 19, 1974



# INTEROFFICE MEMORANDUM

TO: Roy

DATE: August 21, 1974

FROM: Sally

DEPT:

EXT:                      LOC:

SUBJ: Future Conference on Museums.

Ned Pearce, Boston Museum of Science, has given me the following conferences which might be of interest to Digital:

- 1) American Association of Museums, New England Conference  
Augusta, Maine  
State of Maine Museum  
September 27-30

- X 2) Seminar on Operations of Small Foundations (with part emphasis on usefulness to company sponsored museums, exhibits, etc.)  
Conducted by American Bar Association  
Winston-Salem, North Carolina  
November (dates will be furnished if we are interested)

Agendas for both meetings are available upon request.

The first meeting is supposed to discuss changing trends in museum operations based on actual expenses. The second meeting is more for function and legal methods rather than operational procedures.

X Get info please

**digital**

INTEROFFICE MEMORANDUM

TO: Gordon Bell

DATE: August 26, 1974

FROM: Jim Bell *Jim*

DEPT: R & D

EXT: 2764 LOC: 3-4

AUG 27 1974

SUBJ: Attached letter

What information on the Computer Museum do you have that  
I can forward to Bert Raphael?

JB:cw

Attachment



STANFORD RESEARCH INSTITUTE  
MENLO PARK, CALIFORNIA 94025  
(415) 326-6200

RECEIVED

AUG 20 1974

August 13, 1974

Dr. James R. Bell  
Manager  
Research and Development Group  
Digital Equipment Corporation  
146 Main Street  
Maynard, Massachusetts 01754

Dear Jim:

Charlie passed your recent note on to me. Please send us more information about the proposed Computer Museum. It is certainly one of the possibilities we shall consider as a final resting place for Shakey (although I would miss having him around-- he makes a nice quiet office mate now).

It is a pleasure to be back to the comforts and conveniences of SRI and the USA. Perhaps we can get together before too long.

Best regards,

Bertram Raphael  
Director  
Artificial Intelligence Center

BR:dt

digital

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FROM: Jim Bell

DEPT: R & D

EXT: 2764 LOC: 3-4

AUG 27 1974



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RECEIVED

AUG 20 1974

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*cc Sally*

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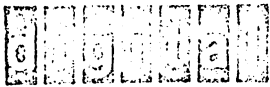
Best regards,

*Bert*

Bertram Raphael  
Director  
Artificial Intelligence Center

BR:dt





INTEROFFICE MEMORANDUM

TO: Roy Gould

DATE: August 26, 1974

FROM: Marietta Ethier

DEPT: Legal

EXT: 4428 LOC: PK3-2

*Marietta*

SUBJ: Digital Computer Museum

1. Ed Schwartz asked me to respond to your memo inquiring into the possibilities of making the proposed Digital Computer Museum a non-profit entity. It is certainly possible. At the moment, I think a corporation, chartered under Chapter 180 of the Massachusetts General Laws (popularly known as the charitable corporation statute) might be the most flexible form of organization. However, leaving that consideration aside the question becomes whether a non-profit entity is the desirable operating vehicle for the proposed museum.
2. I have set forth below a comparison of the company-owned concept and the separate non-profit approach with reference to several important features.

Independent Non-Profit

Company Owned

Taxes:

Other things being equal, Larry Ricci informs me that there is no distinct advantage either way. If company controlled contributions to the museum, in whatever form, could probably be labeled as advertising for the most part, and, therefore, an ordinary and necessary

Roy Gould  
Page 2  
August 26, 1974

Independent Non-Profit

Company Owned

Taxes:

(Cont.d)

business expense. Contributions to a legitimate non-profit entity would be a charitable deduction. (There is a maximum level but Larry thinks we probably would never reach it). However, in order for the contributions to be classified as charitable and, therefore, deductible, the non-profit entity would have to qualify under the Internal Revenue Code as a tax-exempt organization and would have to conduct its affairs so as to maintain this status.

Control:

All control rests in the managing body - A Board of Directors elected by members in the case of a corporation and the trustee or trustees for charitable trusts.

(Note if in the corporation charter or by-laws, we attempt to severely

Total unrestricted control.

Independent Non-Profit

Company Owned

Control:

(Cont'd)

limit membership to DEC officials or employees or at a minimum attempt to assure that a majority of members would be DEC affiliated, or if the Trustees have to be approved by DEC, this might mean denial of a tax-exempt status initially; or possibly loss of it eventually.

- I don't think the Trustees of a charitable trust could be DEC officials).

Use for Promotional Purposes:

Almost any use of the museum for advertising or promotional purposes by DEC would probably result in loss of tax-exempt status.

As with other company-owned divisions the facilities can be used for any legitimate purpose.

Independent Non-Profit

Company Owned

Use of Museum  
Facilities:

DEC would probably have to pay for use of museum facilities and services. Again, unrestricted free use might result in loss of tax-exempt status. Also, technically, competitors might also be entitled to use of the facilities on the same basis as DEC.

Free unrestricted use.

Availability of  
Donations:

Clearly, this is the biggest advantage. The museum's tax-exempt status would allow corporations and individuals to deduct the actual cash value of their gifts to the museum and the non-profit, separate identity status would provide justification to

DEC might have to rely on loans, if they can be arranged, or resort to outright purchases.

	<u>Independent Non-Profit</u>	<u>Company Owned</u>
<u>Availability of Donations:</u> (Cont'd)	other entities, such as universities, in making such gifts, not opening them to the charge of giving away university assets to a profit making <u>corp.</u>	

<u>Irreversibility:</u>	<u>A gift is a gift, is a gift!</u> Property <sup>given</sup> to the museum would probably be forever loss to DEC, Loans could be arranged, but then DEC would lose at least some tax benefits.	
-------------------------	---	--

3. There are, of course, other valid and important social considerations which are well outlined in Mr. Lippincott's memo entitled: "Survey of Company owned, sponsored and supported museum." (See especially page 2).
4. Briefly, in order to achieve and maintain tax-exempt status so as to attract donors, the museum would have to operate somewhat autonomously. Does DEC want to relinquish that amount of control?

Roy Could  
Page 6  
August 26, 1974

5. The pros and cons should be weighed carefully, thoroughly discussed and considered. At least during the organizational stage, I would recommend that the museum be kept within the corporate structure. In the long run, my feeling would be to maintain it as an integral part of the corporation until such time as it becomes evident that the museum's success will be greatly compromised by its' inability to attract badly needed gifts. We can always convert it to a non-profit entity, but we can't easily reverse the process.

ME/dt



# INTEROFFICE MEMORANDUM

TO: R. Gould ✓  
L. Ricci  
  
cc: Ken Olsen  
Gordon Bell

DATE: 27 August 1974

FROM: John Fisher

DEPT: Administration

EXT: 4515      LOC: 12-1

SUBJ: Museum

I believe that the changes to the tax law eliminated the benefit of giving inventory to charity but continued the benefit for depreciable assets. Accordingly, there may be a significant tax benefit in setting up the DEC Museum as a charitable institution and donating depreciable and rotation property to be used for the exhibits. It could be that the tax benefit from doing this would more than pay for the out-of-pocket cost of getting the museum started.

nkp

X 2237 Gordon Bell

Gould X2302

SUBJ: CAPTAIN HOPPER

PAGE 1  
DATE: 08-27-74  
FROM: GORDON BELL

\* \* \* \* \*  
\*\*PLEASE\*\*SEND TO: BOB LANE PK3-1  
\* \* \* \* \*

SUBJ: (HONORARIUM) GIFT TO CAPTAIN HOPPER

To: Distribution

CC: Ken Olsen

We need to give Capt. Hopper something besides the expenses. I don't think a financial honorarium is appropriate.

Intel gave her a set of MOS processor chips, which she uses in her talks.

As soon as we get mini-CO30L on a PDP-8, would it be appropriate to send a CLASSIC-8? An 8/A board set might also be appropriate.

We really need a first rate exhibit which would be suitable for an office wall or desk. Also, we still have to trade a large exhibit of this type with UK's Science Museum.

Any ideas?

GBimJK

Distribution

- 
- Roy Gould
- Bob Lane *Geo Chamberlain*
- Sally Lyberg
- Mike O'Connell

*Roy Gould*  
*Can I assume you are following on this?*

*Yes, I've talked to Gordon & Bob recently about it. TPL. Q*



THE MITRE CORPORATION

BEDFORD, MASSACHUSETTS

5 September 1974  
B33-L65

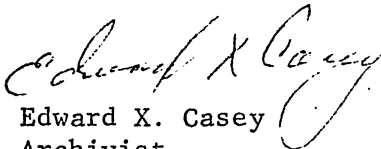
Ms. Sally Birch Lymberg  
Digital Equipment Corporation  
Parker Street  
Maynard, Mass. 01754

Dear Sally:

Under separate cover, copies of AC-6 Whirlwind I  
Computer (MIT Project 6345), AC-23 Memory Test Computer,  
and AC-31 Lincoln TX-0 and TX-2 Computer were sent to  
you.

These copies are for your retention.

Cordially,

  
Edward X. Casey  
Archivist

EXC/ecc



# INTEROFFICE MEMORANDUM

TO: Gordon Bell ✓  
 Ken Olsen  
 cc: Roy Gould

DATE: September 13, 1974  
 FROM: Sally Lyberg  
 DEPT: Museum  
 EXT: 2302 LOC: PK3-2

SUBJ: Museum Collection

I am making a list of objects that are available for a display in the museum. By this I mean pre-DEC material or artifacts from all companies. May I have your assistance in compiling an inventory? To avoid duplication, I have come up with the following list of the in-house collection:

- 1) Whirlwind et al  
 Ken ↔ Roy

Parts from ACE (UK-NPL) (Gordon's references)

650 & 704 (Gordon's references)

MIT Differential Analyzer (Gordon's references)

Have there been any offers from outside sources for items such as manuals, old items, or old machines not listed above?

- 2) The following are from the Museum file (Roy's)

- PDP-1
- Early Manuals
- ARC
- CASINO
- Museum Material
- TXO
- Nixdorf Computer
- IBM - request for purchase of early objects

- 3) DEC - Early Prototype Machines  
 (Roy has list and will coordinate)

Upon receipt of this list, I can then begin to fill in any reference sources for documentation of outside equipment if it is needed. For Whirlwind, TXO et al, I look to Ken for suggestions on documentation or commentary. Lincoln Labs, MIT, MITRE, Boston Public, will all cooperate as well as ONR, Boston, as soon as we know our needs for manuals, reports, or documents.

Enclosure: Digital Museum Project

## DIGITAL MUSEUM PROJECT

As a result of the research for the Digital Museum project, a resource file has been created. It consists of the following parts:

- 1) Historical File - alphabetical and chronological  
(3 x 5 cards)
- 2) Backup file for source material and information for the above
- 3) Bibliography of primary and secondary sources
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Bibliography of references used with list of current literature as reviewed to establish two points:

- 1) What has been done already in computer museums, science museums, or exhibits in any related field.
- 2) What has been written about the same subjects together with trends for the future. This information covers subjects relevant to company sponsored museums, computer exhibits, history of computers, computation, mathematics, etc.

With this background research accomplished, I began to collect appropriate historical data without duplication of an exhibit already established as well as an awareness of what was already in planning stages in our fields of interest.

LIST OF MUSEUMS AND SCIENCE CENTERS VISITED:

Massachusetts

Boston Museum of Science  
Boston, Massachusetts

Children's Museum  
Boston, Massachusetts

Toronto

Royal Ontario Museum  
Toronto, Ontario, Canada

Ontario Science Center  
Toronto, Ontario, Canada

Ontario Place (Civic Center)  
Ontario, Canada

McMicheal Canadian Historical Museum  
Kleinberg, Ontario, Canada

Pall Mall of Rothman Ltd.  
Toronto, Canada

New York

Corning Glass Museum  
Corning Glass Center  
Corning, New York

Connecticut

United Aircraft Company  
East Hartford, Connecticut

MUSEUMS VISITED BY OTHERS AT MY REQUEST:

New York

IBM  
New York, New York

Germany

Munich Museum  
Munich, Germany

MUSEUMS CONTACTED OVER PHONE FOR ATTENDANCE RECORDS:

Fruitlands Museum  
Harvard, Massachusetts

DeCordova Museum  
Lincoln, Mass.

Mass Dept of Education  
Boston, Mass.

ASSOCIATIONS AND INSTITUTIONS

American Association of Museums

Association of Science Technical Centers

Association of Computing Machinery

Computer History Project  
Smithsonian Institute  
Washington, D.C.

Federal Archives & Record Center  
New England Archivists  
Special Libraries Association

Codasyl

PERIODICALS

Museum News

"PEOPLE IN THE KNOW"

Last, but not least, I have collected a valuable source list of individuals, companies, librarians, and others who have already supplied source information for both Roy's and my use for the "Digital Museum Project".

Mimi Cummings in the DEC Corporate library has been a valuable asset in this research both inside and outside company history. At present, potential museum source material is being kept in the library.

All names, addresses, notes on meetings, reprints of articles, and references are available.

## BIBLIOGRAPHY

### BOOKS

Bell and Newell; Computer Structures

Goldstein; The Computer from Pascal to Von Neumann

John Von Neumann; The Computer and the Brain

Nigel Hawkes; The Computer Revolution

Bowden; Faster Than Thought

Eames; A Computer Perspective  
(IBM Exhibit)

Brian Randall; The Origins of Digital Computers

Pamphlets on "Computer History Project"  
Smithsonian Institute  
Washington, D.C.

Encyclopedias, Computer Surveys, Technical Reports, Abstracts, etc.

### PERIODICALS

Museum News: 1974 January, February, March, April  
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November, December  
1972 January, February, April, May, September,  
November  
1971 September

American Education: June 1974, Push a Button Turn a Crank by  
Victor Danilov, Director of Chicago Museum  
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Guide to Massachusetts Museums, Historic Houses, and Points of Interest  
by Jerome and Cynthia Rubin

**digital**

INTEROFFICE MEMORANDUM

TO: Gordon Bell ✓  
Ken Olsen  
cc: Roy Gould

DATE: September 13, 1974  
FROM: Sally Lymberg  
DEPT: Museum  
EXT: 2302 LOC: PK3-2

*go over with Ned*

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New York	Corning Glass Museum Corning Glass Center Corning, New York
Connecticut	United Aircraft Company East Hartford, Connecticut

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*info.?  
on these*

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Museum News

*where*

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by Jerome and Cynthia Rubin

9/16/74

ROUGH DRAFT - MUSEUM PHILOSOPHY

In reviewing all the pages and pages of "historical stuff" about "history of", I find a definite pattern in my notes --- it's not original, it's the result of this recording. There are two basic ways:

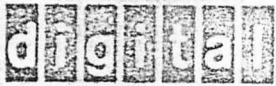
- 1) By concentrating on the equipment and the technology
- 2) On the ideas and the people who conceived them.

I have chosen arbitrarily to give ideas and people first place -- I think it is the more interesting approach for PEOPLE.

This is important to me because I think it tells also a story about DEC -- which is People.

In ~~all~~ <sup>most of the</sup> books prior to the last two years -- 72/73, the approach for "history of computation" was based on first premise -- equipment/hardware.

In order to "translate" into the people position, I am accumulating a lot of information which has been ignored in favor of technology. I believe part of my job is to tell "how I see it" and why "it's that way" -- from basis of data reviewed. I also believe this is an important change in general and should be recommended as a difference in presenting material or information as a basis for display of facts.



# INTEROFFICE MEMORANDUM

TO: Mike Rasdkin

DATE: 26 September 1974

cc: Larry Ricci  
Roy Gould ✓  
Gordon Bell  
Ken Olsen

FROM: John Fisher

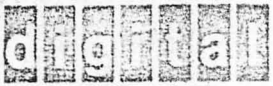
DEPT: Administration

EXT: 4515      LOC: 12-1

SUBJ: DEC Museum

I didnot make myself clear on the subject of donating property to a charitable foundation to start up the 'DEC Museum'. I don't think it is a question of selling versus donating property but rather it is a question of valuing unique and perhaps antique equipment. Certainly, this equipment has a limited value as a substitution for modern fourth generation computers. On the other hand, as unique, last of a kind 'a la Smithsonian' it might be possible to get a sizable outside appraisal that would hold up for tax purposes. If you find there is any merit to this approach let's get together to discuss it and make a conclusion.

nkp



# INTEROFFICE MEMORANDUM

TO: Roy Gould ✓  
Cc: John Trebendis

DATE: September 27, 1974

FROM: Ken Olsen

DEPT: Administration

EXT: 2300      LOC: ML12/A50

SUBJ: SURPLUS FLEXWRITERS

In the surplus junk room there are one or two old flexwriters. You probably should put them aside and try to make them look in decent order for our museum, because they are the machines that we originally used in the PDP-1, and close to the original flexwriters in the old World War I movie.

/ma

John,

Let me know if they are safe there. If not I will pick them up & put them in storage with my other stuff.

Olay



*Roy Gould* OCT. 74(?)  
*President & Operations Committee*

BUILDING

Cafeteria area for the tower, 12,000 square feet, within the building. 3,000 square feet mezzanine and 9,000 square feet on lower floor.

ACCESS

Easily accessible from Routes 495, 290, 20, and 85. However, no walk-in traffic; i.e., accessible only by car, no public transportation available.

PARKING

Foresee no problems with parking. Lots are more than adequate.

FOOD SERVICE

The cafeteria could be utilized with extra security so as visitors would not be able to enter the plant.

COST OF FITTING UP

Cost of fitting up to ready the area would consist of:

- 1) Sprinklers
- 2) Electrical
- 3) Air Conditioning
- 4) Tile in some areas
- 5) Construct an entrance easily accessible from parking lot and create a walk to the door
- 6) Labor
- 7) Provide toilet facilities in museum area
- 8) Some lighting

Total cost: 95K

SPACE RENT

\$14,400 per quarter  
\$57,600 per year

EXPANSION

Another 4,000 square feet available if Direct Mail is moved.

SUMMARY

The building in Marlboro is new and modern, however, it is referred to as the "old RCA building" and in Digital's family is just over a year old.

TENTATIVE  
MUSEUM OPERATION PLAN

1) WHAT WILL MUSEUM SHOW?

The museum will show the history of the computer. This will begin by depicting how man first learned how to count, the first counting machines, important steps in technology, hands-on demos will be used, up to our present day computers. All this will be done with graphics, copy, parts of machines, and actual machines.

2) PROPOSED MUSEUM HOURS

Sunday	11:00 AM to 4:00 PM
Monday	-Closed-
Tuesday	9:00 AM to 4:00 PM
Wednesday	9:00 AM to 4:00 PM
Thursday	9:00 AM to 4:00 PM
Friday	9:00 AM to 4:00 PM
Saturday	10:00 AM to 4:00 PM

Hours are designed so as not to have any affect on already existing peak traffic hours.

3) ATTENDANCE

a) I estimate that approximately 2,000 people will tour the museum per week. This figure should be greater during the summer months.

b) Attendance would be from DEC employees, DEC visitors, the general public, school and group tours, and general tourism.

c) I estimate that 1,000 will be on Saturday and Sunday; for example, the Fruitlands Museum in Harvard averages 600 on a Sunday during the summer months.

d) Weather, of course, is a definite factor on attendance.

4) SCHOOL TOURS

My figure of 2,000 should be average each week of the year do to the fact that when the heavy summer tourism season has ended, I anticipate a large turnout of schools during the winter months. Due to the scope of the museum, tours would be for fifth grade on up.

5) PUBLICITY

The Digital Computer Museum plans an extensive publicity campaign.

6) CENTENNIAL CELEBRATION

We anticipate heavy traffic at the museum, regardless of location, during these periods. Perhaps as much as 75-100% greater, especially on weekends.

7) ADMISSION

At the present time, there will be no charge for admission.

8) STAFF

Staff would consist of myself as cost center manager, an operations manager, an assistant, and a clerk for the gift shop. I see no reason for a curator in the true sense of the word. Future acquisitions and displays would be done by the Board of Directors of the museum.

In addition to the full time personnel, part-time students would be employed for the peak summer months as guides. Also, guard and custodian service would have to be contracted for through the Corporation.

9) GIFT SHOP

A gift shop would be incorporated into the museum selling such items as computer books, post cards, film and accessories, jewelry items made from IC's, paperweights, computer aided designs, photographs and drawings, etc., marked Digital Computer Museum.

The monies received here would compensate someone to work in the shop and anything above that would go into the operation of the museum.

10) MUSEUM AS A NON-PROFIT TRUST

At the present, our Legal Department is researching the pro's and con's of whether this is wise.



# INTEROFFICE MEMORANDUM

TO: Bob Francisco

DATE: October 11, 1974

FROM: Sally Lymberg

DEPT: Museum

EXT: LOC:

SUBJ: Resources for DEC Museum

As per telcon and your check list, I understand you already have the following material:

## PERIODICAL REPRINTS

### Man & Computer

New York Times 1972

### Denmark's Indoor/Outdoor Museum

Christian Science Monitor August 1974

### Those Overlooked Business Machines

Hartford Times June 16, 1974

### Port Gamble "A Logging Museum"

Christian Science Monitor July 1974

In addition to the above, I am providing you today with:

- 1) Tureens, Old Money, Whiskey -- Boom in Company Museums
- 2) The Computer Revolution
- 3) Rethinking Corporate Charity
- 4) How to Avoid Taxes
- 5) Cobol
- 6) The Effervescent years: a retrospective
- 7) The Whirlwind I Computer
- 8) Historical section from Computer Structures
- 9) Five Generations of Computers
- 10) Teaching With Computers
- 11) The Honeywell Computer Exhibit at the Boston Museum of Science

To supplement reprints and those listed above, the legal reference referred to in our last meeting is also attached.

Interoffice Memo dated August 26, 1974

In addition to the above, the following books are for your use:

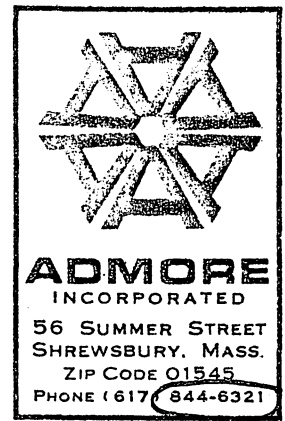
- 1) Charles Babbage and his Calculating Engines Lincoln Labs  
by Charles Babbage & Others
- 2) The Analytical Engines: Lincoln Labs  
Computers -- Past, Present and Future  
by Jeremy Bernstein
- 3) The Computer Revolution Museum of Science  
by Nigel Hawkes
- 4) The Computer and the Brain Museum of Science  
by John von Neumann
- 5) The Computer from Pascal to von Neumann DEC Library  
by Herman H. Goldstine
- 6) A Computer Perspective DEC Library  
by Charles & Ray Eames

At a later date, there will be several general reference books available for you to read.

The film, "Making Electrons Count" is being shown today.

jac  
Attachments

October 17, 1974



Mr. Roy Gould  
DIGITAL EQUIPMENT CORPORATION  
Maynard, Massachusetts 01754

Dear Roy:

Let this serve as a re-cap of our meetings with yourself, Mr. Olsen, Mr. Bell and Mrs. Lymberg in an attempt to define the purpose and direction for what will be called (for the time being) the DEC Computer Museum. The following:

I. PUBLIC RELATIONS

A. Level One

1. To soften the image of the computer in general, to allay the general public's fear of computers and computer related things, to lessen the sense of mystery surrounding computer sciences, to present computers as a servant of man as opposed to a threat.

M. O. for Accomplishment:

1. Educate the public as to the basics of how a computer functions.
2. Educate the public as to the myriad uses of computers. The elements in our daily lives that would not have been possible without the computer.

B. Level Two

1. Establish Digital Equipment Corporation as a public conscious people-oriented company, stable and with as much tradition as one can have in such a new field.

Mr. Roy Gould  
DIGITAL EQUIPMENT CORP.

-2-

October 17, 1974

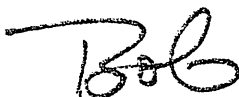
M. O. for Accomplishment:

1. Name of museum should reflect D. E. C. name in some way.
2. History area should reflect D. E. C.'s contributions.
3. D. E. C. equipment will be used as basis for all interactive computer exhibits.

## II. ARCHIVES

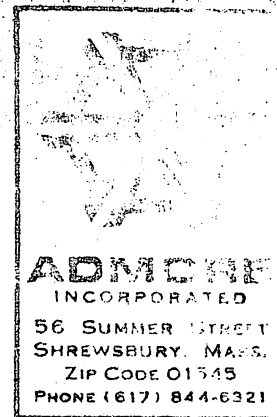
- A. To preserve historically significant artifacts such as the Whirlwind computer and place it in context with the development of computer technology. To present the people behind the advent and history of the computer. To reflect on the influence of the computer upon our society. To reflect on the possible future direction of computers.

Cordially,



Robert J. Francisco  
Executive Vice President

RJF/s



October 21, 1974

Mr. Roy Gould  
DIGITAL EQUIPMENT CORPORATION  
Maynard, Massachusetts 01754

Dear Roy:

Here is a brief recap of our meeting with Jim Lowe at I. B. M. gallery in New York on October 18th.

Gallery covers 8000 sq. feet - Jim's estimate to get entire thing up - about one million and a half dollars.

Three I. B. M. people on floor at all times. This I feel is due to the incomprehensibility of the copy and general message of the exhibits. Jim agreed with this observation. The hardware is beautifully detailed and makes very elegant "furniture." Age level is supposedly Jr. High School. To understand most of what is there would take a considerable pre-knowledge of the subjects and a great deal of reading time. The exhibit is very "teachy" and essentially a beautifully packaged text book.

Jim agreed that it generally reinforces the incomprehensibility of computers and I. B. M. and the stupidity and unworthiness of the general public.

They handle about two school groups per day. They use a film theatre with several Eames I. B. M. films. They do not solicit elementary school groups. The gallery is open 4 days per week.

No admission charge. Gallery is not a separate non-profit organization.

Gallery does not present subjects directly related to computers. Most exhibits are science oriented and travel after spending average of one year in gallery.

Staff consists of 10 people - 2 managers and 8 "floor" people - 3 on floor at a time for one hour duration. Staff consists of I. B. M. people from all different disciplines who are assigned to gallery usually for duration of 2 years on their way through the ranks.



Mr. Roy Gould  
DIGITAL EQUIPMENT CORP.

-2-

October 21, 1974

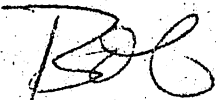
Yearly exhibit maintenance is contracted to an outside exhibit company - budgeted at about \$15,000 per year for totally static graphic panels.

Jim's ideas on planning:

Most important - set criteria and objectives first. They didn't do this and Jim says they tend to rationalize things after they are done. This makes the direction of the gallery very weak. Eames, the designer, tends not to listen to the gallery people and functions on his own.

Starting next month, the gallery is going to be closed indefinitely and used as a window exhibit (seen from sidewalk). Jim would not disclose why, nor would he give me his annual budget.

Cordially,



Robert Francisco  
Executive Vice President

RF/s



# INTEROFFICE MEMORANDUM

TO: George Chamberlain

DATE: October 24, 1974

FROM: Roy Gould *Ray*

DEPT: Museum

EXT: 2302 - LOC: PK3/M36

SUBJ: Chicago Museum of Science & Industry

I recently visited the subject museum and met with Mr. MacMaster, President, and Victor Danilov, Director, and discussed DEC's possible help with their project "America's Inventive Genius" for the Bicentennial.

We discussed how a Digital mini could be used in their Phase II part of the program where the computer would have twelve terminals (video) each one being an audience participant program where the individual asks questions about one of twelve subjects which America has played a large or leading part such as industry, aerospace, farming, etc. We, of course, would be given substantial recognition in the exhibit.

This exhibit would be in place for 2½ years and it is estimated that 10 million people will view it. I talked about the possibility of loaning them the equipment for this length of time rather than giving it to them. They seem to accept that idea. Maintenance, of course, would be a main concern. It is my recommendation that we do something for them. If we do not come up with the equipment, they made it clear they would take any money we can give them!

Shall we meet to discuss?

*12/21/74*

*George*

jac

*Danilov is inquiring if we are going to do anything for him, are we?*

*Ray*

digital

October 25, 1974

Mr. Robert Nolan  
Department of Education  
State Agency for Surplus Property  
Boston, Massachusetts 02111

Dear Mr. Nolan:

Thank you for the time you spent with me during our recent telecon.

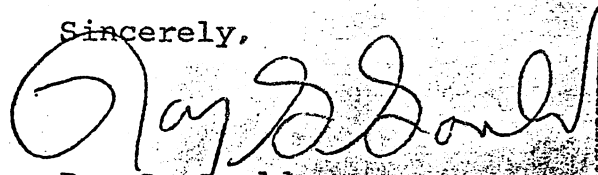
This letter is to reinstate the interest the Digital Computer Museum has in obtaining the MIT TX-0 Computer for a permanent working display in our Museum.

The Digital Computer Museum is scheduled to open in May of 1975 and will be located at our Marlboro, Massachusetts facility. We are now in the process of making the Museum a separate non-profit corporation under the laws of Massachusetts. The Museum will be open year round to the general public, school groups, civic groups, etc. There will be no admission charge.

The Museum will show early computers up to present day computers. It will teach how computers work, what they can do, and what they are doing in many fields such as medicine, science, and industry.

The TX-0 was an important step in the technology to develop today's modern mini-computers. Our plans are to keep the machine in a running condition in the Museum. The computer industry is only 25 years young, yet a lot of significant machines, papers, and films have already been lost forever. We see the Museum playing an important role in preventing this in the future. Any help you can give us, Mr. Nolan, in seeing that the TX-0 is not lost forever would be appreciated.

Sincerely,



Roy G. Gould

Museum Director

DIGITAL EQUIPMENT CORPORATION, 146 MAIN STREET, MAYNARD, MASSACHUSETTS 01754

(617)897-5111 TWX: 710-347-0212 TELEX: 94-8457

digital

INTEROFFICE MEMORANDUM

TO: Ken Olsen  
Gordon Bell

DATE: October 25, 1974

FROM: Roy Gould

DEPT: Museum

EXT: 2302 LOC: PK3/M36

SUBJ: TX-O

Attached is a copy of a letter I have sent to Mr. Nolan of the Department of Education - State Agency for Surplus Property.

He has told me we are not eligible to receive the machine, but we could bid on it if someone in education doesn't grab it!

Can you offer any assistance?

jac  
Attachment

File Museum + to Gould + Lyman



INTEROFFICE MEMORANDUM

TO: Gordon Bell  
CC: Charlie Spector

DATE: November 11, 1974  
FROM: Sally Bower *SRB*  
DEPT: Education Products  
EXT: 3084 LOC: 5-5

*Right on JB*

SUBJ: Minicomputer Museum

NOV 13 1974

It occurred to me during a recent instructional computing conference that the museum effort might benefit from the ideas and experience of educators and museum directors. I'd like to recommend that the group in charge of the museum project consider sponsoring a seminar to generate ideas for the implementation of the museum - effective board of experts might include:

Thomas Dwyer - Project SOLO, University of Pittsburgh

Bob Albrecht - PCC, Menlo Park, California

Marion Ball -- Temple University Medical School  
(Author of What is A Computer,  
Houghton Mifflin 1972)

Peg Pulliam - Lexington P.S. (Elementary Education  
Computing Program)

Bill Mayhew - Children's Museum, Boston

\_\_\_\_\_ - Boston Museum of Science

Etc.

Perhaps you can pass the idea onto the appropriate people?

SRB:jls

BIT REGISTRATION  
AND MEMBERSHIP FORM

NAME \_\_\_\_\_

STREET ADDRESS \_\_\_\_\_

TOWN \_\_\_\_\_

STATE \_\_\_\_\_ ZIP CODE \_\_\_\_\_

Registration only  
(\$1.00 contribution)

74-75 dues already paid  
(\$3.00/year)

74-75 dues attached  
(\$3.00/year)

B I T

FALL MEETING: Friday, November 22, 1974 7:30 p.m.

PLACE: Belmont Hill School, 350 Prospect Street, Belmont, Mass. 02178

DIRECTIONS: Rte 128 to Rte 2. Head east towards Boston. Take Park Ave., exit. At end of exit ramp turn right at lights. Belmont Hill is 1/4 mile ahead at rotary.

PROGRAM

7:00-7:30 Registration and coffee

7:30 Guest Speaker: Kenneth H. Olsen  
President, Digital Equipment Corp.

\*\*\*\*\* A unique opportunity to hear about history from a man who made it, and to contemplate the future with a man who will help shape it.

8:30 Coffee

9:00 Special Interest Sections

Section 1: Investigating Means, Sequences, and Series  
Rodgers Close, Medford High School

Section 2: How to Provide More Computing Service for Less Cost  
Ned Canty, Babson College

Section 3: How You Can Make Use of Calculators  
Kermit Schroeder, Wang Laboratories  
Dom Gualtieri, Wang Laboratories

10:00 END

BIT is a computer users group designed to provide information about the many uses of the computer and calculator in the educational environment and to promote interest in the use of these tools in many disciplines.

MEMBERSHIP dues for the year 1974-75 are \$3.00 and may be sent along with your name and address to Walter Koetke, Lexington High School, Lexington, Mass. 02173.

WE'RE planning a meeting for the winter oriented towards the application of the computer in the sciences. If you know of a teacher in your school who would be willing to participate in the program, please let us know.

Directors for the year 1974-75 are:

Buddy Bates  
Belmont Hill School

Walter Koetke *Walter Koetke*  
Lexington H. S.

Jean Stritter *Concord*  
Middlesex School

Ned Canty  
Babson College

Dick Rader  
St. Mark's School

Ann Waterhouse  
South Portland H.S.

Joe Hannigan  
Framingham North H.S.

Ted Sage  
Middlesex School

Bob Haven  
Project Local  
*meet. wood*

Paul Shapiro  
Newton Public Schools

*484-4410*



# INTEROFFICE MEMORANDUM

TO: Irving Berg  
Jim Gracie  
cc: Ken Olsen  
Gordon Bell

DATE: December 6, 1974  
FROM: Roy Gould  
DEPT: Museum  
EXT: 2302 LOC: PK3/M36

SUBJ: Museum

This will confirm our recent telephone conversation that the construction of the museum is in a "temporary hold". This means that no funds would be available for outfitting the area in Marlboro (MB-1) that the museum is slated to go to. This does not mean that the area is released as the site for the museum. You may continue to use the area as a storage area, but it should not be assigned to anyone else.

I would like to also reinstate our interest in the area currently being used by Software Services in the Mezzanine be earmarked for the museum for its theatre if and when Software Services relinquishes that area.

Thank you, Irving and Jim, for your help in the past and I look forward to working with you in the future when the project is started again.

jac



MUSEUM OF SCIENCE AND INDUSTRY

FOUNDED BY JULIUS ROSENWALD

57TH STREET AND LAKE SHORE DRIVE

JACKSON PARK

TELEPHONE MUSEUM 4-1414

CHICAGO, ILLINOIS 60637

December 13, 1974

Mr. Roy G. Gould  
Exhibits Manager  
Digital Equipment Corporation  
146 Main Street  
Maynard, Massachusetts 01754

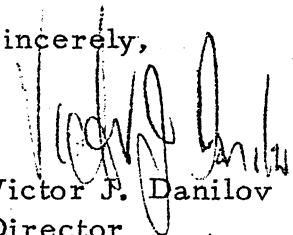
Dear Mr. Gould:

I am writing to check on whether a decision has been made to provide computer terminals for the Museum's Bicentennial exhibit on "America's Inventive Genius."

We are opening the first phase of the exhibit on January 15 and already are involved in the design of the section opening this summer that would involve the use of the terminals.

Incidentally, I hope you will be able to attend the opening of the Bicentennial program in January. It should be a sparkling affair.

Sincerely,

  
Victor J. Danilov  
Director

# The conjurer was a rabbit

The Magic of Lewis Carroll, edited by John Fisher. New York: Simon & Schuster. \$9.95. London: Thomas Nelson. £3.

By Robert Nye

Lewis Carroll used to relax by playing his musical boxes backward. Alternatively, he would doodle away, making apt anagrams of the names of eminent Victorians — Florence Nightingale soon became "Flit on, cheering angel."

He was in private life, as Charles Lutwidge Dodgson, don, mathematician, clergyman, a curious dissolving mixture of his own White Knight and his own White Rabbit. Like the White Knight, he had blue eyes, shaggy hair, gentleness and a trick of seeing the world upside down. Like the White Rabbit, he was more than a bit of an amateur magician.

When you think of that image of the White Rabbit in "Alice in Wonderland" — with his watch, his gloves, and his top hat — you are only one step away from the Victorian drawing room and a children's party where a conjurer has been called in to entertain. Only instead of a rabbit produced from a hat, you are confronted with a rabbit in charge of the conjurer's properties.

The change is characteristically Carroll in its looking-glass magic, its inversion of the expected, its pleasure in topsy-turvydom. Dodgson, a mediocre man while he took himself seriously, became a profound one when he started to joke. He stepped through the looking-glass of logic himself, and found some of the problems of modern physics.

The implications of that have already been well discussed, along with cabbages and kings, in Martin Gardner's "The Annotated Alice." This new book by John Fisher is not so substantial, but it is very nice. It performs a function which Carroll himself intended to achieve but never did — namely, the collecting of all his games and puzzles and conundrums.

Carroll would have called his own collection "Alice's Puzzle-Book," according to an entry in his diary dated March 1875. Mr. Fisher cannot quite so presume, but he has done his homework admirably and what we have here is as complete and anthology as anyone could desire. Remembering the experiences of Marghanita Laski when she tried out one of Carroll's games on her children and ended up playing it herself out of a sense of duty, perhaps "The Magic of Lewis Carroll" is more than anyone could desire. . . . I must admit I skipped the pages full of complicated mathematical exercises.

Carroll's idea of magic was sometimes no more than a complex plan for baffling the commonsense of little girls. This plethora of puzzles will certainly do that, but it would be sentimental and untrue to claim that much in it extends the imagination in any worthwhile way. Perhaps we should remember that Carroll was an insomniac, and forgive him a number of substitute dreams in the form of acrostics?

It would be safe to say that this book is full of fun and headaches, and that pedantic children and conscience-

stricken nuclear physicists will adore it at 3 a.m.

All the same, it is startling to see how modern some of his ideas are. (Could it be that the twentieth century is only the mirror-image of the nineteenth? And that we are all left-handed Victorians?)

Thus, you will discover that amongst his inventions was a prototype of the miniature traveling chess set, a primitive kind of double-sided adhesive tape, a game uncommonly like "Scrabble," a plan for controlling the London traffic at Covent Garden, and a novel new scheme for Proportional Representation in voting.

Similarly, you will find several of his word-games anticipating more solemn tricks by such as James Joyce, Borges, and Nabokov. It was Carroll who first drew attention to the fact that if you spell the word LIVE backwards you get another word which might be taken to represent the activity of living backwards. He left it to James Joyce to draw attention to the word DOG. And to Vladimir Nabokov to draw attention to the word REPAID.

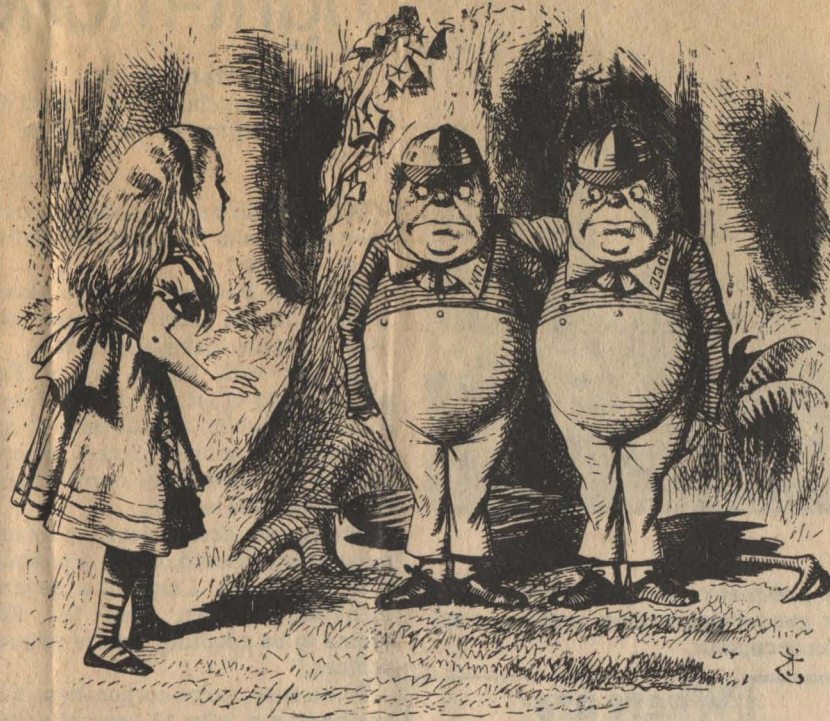
There is a special and rather precious category of literary criticism: that department which parodies its own seriousness by spending it upon a trivial object, quite consciously and in some cases condescendingly. Alice's critics fall down this particular rabbit-hole fairly frequently, offering stuff about sex and mathematics and photography, and nonsense about the poor girl being the first acid-head in children's fiction.

She has been analyzed and eulogized and made into a structure for adult fantasy. Last year there was even a book called "Aspects of Alice," edited by Robert Phillips, which added the anima and the Oxford Movement to the usual round of puns, chess, and philosophy. It was a book with few pictures and fewer conversations, and it was a book in which Alice's Wonderland was marked strictly Adults Only.

Mr. Fisher's is not so exclusive. I can imagine an intelligent older child having fun with its elaborate verbal gambits. Its main interest, however, is in providing literary commentators with the background of playful mystification from which the Alice books grew. And beyond that purpose ("curiouser and curiouser," said Alice) one may note the paradox that when Lewis Carroll wrote "straight" mathematics and logic he was essentially second-rate, but when he started fooling around he won through to what Mr. Fisher calls "the spiritual company of mathematicians as distinguished as Leibnitz and Newton, Abel and Pascal, obsessed with probability and methods of scoring, paradox and ciphers, new games and newer versions of old ones."

Nobody reads Dodgson's "Symbolic Logic." But Russell and Whitehead and Wittgenstein would all have been at home in "Alice" — in fact, come to think of it, perhaps they appear round about that famous tea-table under different names?

Robert Nye, a young poet, is poetry critic for the Times (London).



An engraving of John Tenniel's famous illustration.

# COMPUTER GENERATIONS

There's never been anything like the computer in the history of civilization. Historians will eventually have a field day. Computers have changed more in five years than the automobile since its invention. In the twenty-five years of computing, many performance and cost indices have improved by factors of 100,000. Every two years nearly twice as much computing power is available for the same money; or conversely, every two years computers halve in price.

Although computing goes back to the Chinese Abacus—or the Japanese version, the Soroban—the roots of modern computers are found in punch card equipment, particularly its ancestor, the Jacquard loom, which may have operated in the DEC mill at one point. Calculators were built by mathematicians Pascal and Leibetz, but modern mathematicians have given up computer design—leaving computers to the engineers. Though calculators are historically and technologically interesting, they're really dull in comparison to the modern stored-program computer, which gets its power by variable programs, with the ability to calculate rapidly, hold lots of information and even learn.

We mark computer generations by the logic technology they're built from. We're currently in the fourth generation, called large-scale integrated circuit technology. The first generation began in 1945 with vacuum tubes and ran until about 1958. The single

transistor package started then and lasted until about 1966. At that time, multiple transistors were put in a package to form a single functional array. In 1972 the fourth generation began, at which time a whole processor was put on a single substrate.

The first modern stored-program computer was probably the Manchester University prototype and we have a valve (tube, to us) from it—so Prof. Sumner, who sent it to us, said (it's clearly not from his TV set). The first useful stored-program computer was EDSAC of Cambridge University, built by Maurice Wilkes' group; Wilkes also invented the micro-programming concept. Wilkes was at the University of Pennsylvania where Eckhart, Mauchly and von Neumann worked to conceive the stored-program computer, which we now also call the von Neumann computer.

We now, overzealously I suspect, attribute Charles Babbage as being the father of modern computing. He had the notion of the stored-program calculator in the mid-1800's, but never got one of his computers to run, because each time he got a better idea for a new computer before the old one worked. In fact, he established other traditions carried into modern computing, including working with unbuildable technology. This caused him to solve a number of peripheral problems, such as making gears better than they had ever been made before. He also was about the first person to receive a government grant—for calculating nautical tables. These research projects were late and had cost overruns.

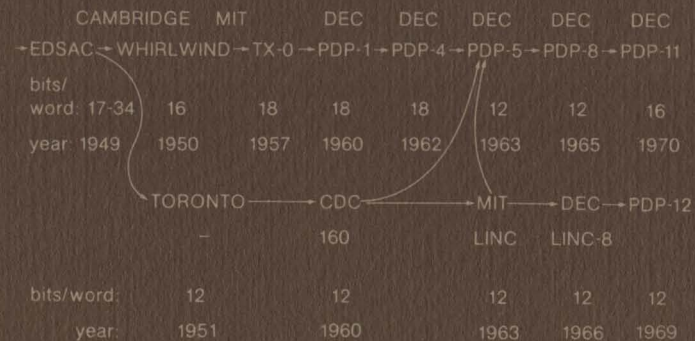
If Charles was the father of computing, then Lady Loveless, his benefactress, co-worker, and friend, was at least a midwife. But more importantly, she was probably the first programmer. Another tradition established there was that she complained that the machine specification was always changing.

If we look at the ancestry of the minicomputer, it is clearly MIT's Whirlwind. These machines and people had a profound effect on DEC. Ken Olsen, Dick Best, George Gerelds and several others of DEC are Whirlwind alumni, and I even wrote a program for it once. The PDP-1 was very much like Lincoln Lab's TX-0 (one of the earliest transistorized machines), and TX-0 like Whirlwind. Beginning with Whirlwind, we can see four generations of minicomputers. It was operational in 1950 and was packaged in a two-story building. The second, our own PDP-1,

#### FOUR GENERATIONS OF MINICOMPUTERS

	MIT WHIRLWIND	DEC PDP-1	DEC PDP-8/I	DEC LSI-11
GENERATION	first (1950)	second (1960)	third (1968)	fourth (1975)
PRICE	?	\$120,000	\$10,000	\$650
PACKAGE	Building	4 Cabinets	Box	Board
SIZE	50'x50'x20'	8'x2.5'x6'	2'x2'x2'	8.5'x10"x.5"
POWER (Watts)	150,000	2,500	250	50
SPEED (Mem- ory accesses/ second)	80,000	200,000	600,000	833,000

#### (PART OF) EARLY COMPUTER HISTORY INFLUENCING MINICOMPUTERS







MIT Whirlwind (very early first generation)



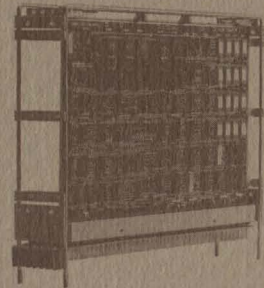
PDP-1 (early second generation)



PDP-8 (late second generation)



PDP-8/L (8/I derivative; mid third generation)



LSI-11 (early fourth generation)

was packaged in only four six-foot cabinets. The third generation PDP-8/I occupied about eight cubic feet and now, in the fourth generation, we have the single-board LSI-11, which is  $\frac{1}{2}$ " x 8" x 10", but it also has over ten-times the calculating power of Whirlwind. Most important, the price has come down by a factor of nearly 200 these last 15 years, which amounts to about 41% compounded per year; that is, every two years the price has halved. This permits new uses of the computer that are in the scale of the application.

The size too has changed, going from a building to a single board. The input power has decreased by a factor of 3,000 from Whirlwind. Whirlwind required 150,000 watts and when it ran, the lights in Cambridge dimmed. A Whirlwind flip flop, which stores a single binary-digit (bit) occupied a volume of about eight cubic feet. In the LSI-11, the same function takes an area of silicon that is only about one hundredth by one hundredth of an inch. Whirlwind had the five conventional computer elements: input, output, control, arithmetic, and storage. Control was an area of the room that one walked through. The storage tube invented at Manchester University was initially used. The arithmetic element gives us the notion of word length. Whirlwind word length was thirty-two feet and a bit slice took up about two feet. We could walk along the bits and the various registers were piled on top of one another. The console was also a place one walked around to look at lights and flip switches. Here we've not made similar strides in console design because there haven't been advances in miniaturizing people.

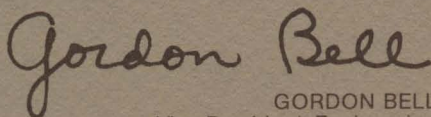
Whirlwind made important contributions to computing including the cathode ray tubes and light pen input which most computers still don't have, but eventually will if they communicate with people. But Whirlwind is probably most remembered for its innovative magnetic core memory, which is still in use over three generations.

The University of Illinois was particularly prolific. They used the storage tube (invented at Manchester University) in ILLIAC I, a direct descendent from the Princeton Institute for Advanced Studies' machine. A number of the ILLIACs were made and distributed around the world. Illinois built ILLIAC II, and ILLIAC III, second generation machines, but their most recent machine, ILLIAC IV, built with Burroughs, is still to be fully operational.

Industry began building computers in the early 1950's. English Electric built a machine called the Deuce which came out of the English National Physics Laboratory. Contrast this with modules from the IBM 650, and the 704. Probably one of the most easily produced second-generation packaging technologies was that of IBM for the 7090. Burroughs had an interesting package called Cordwood.

DEC's own modules came at the beginning of the second generation. The first modules allowed experimenters to easily build digital systems together. The systems modules allowed permanent digital systems to be made, but more important, they provided the basis for building digital computers. These were the modules from which the PDP-1, -4, -5, and -6 were made.

The flip-chip modules were built for the PDP-7 and -8 so that modules could be made more easily and the back panels could be wrapped automatically. Subsequently, this style of module packaging has been used to include more components and has lasted us through the third generation with the integrated circuits and on into the fourth generation, where it is used for the LSI-11. And there's really no reason to change unless the fifth generation is a big surprise, but that's a few years away, if past generations are any indication.



GORDON BELL  
Vice President, Engineering

DIGITAL EQUIPMENT CORPORATION  
MUSEUM PROJECT-1975

**digital**

digital equipment corporation

maynard, massachusetts 01754

SUBJ: MUSEUM PROTOTYPE IN MILL

DATE:  
FROM:

PAGE 1  
01-22-79  
GORDON BELL

\* \* \* \* \*  
\*\*PLEASE\*\*SEND TO: ROY GOULD PK3-2  
\* \* \* \* \*

SUBJ: MUSEUM POLICY AND MUSEUM PROTOTYPE IN MILL

To: Roy Gould  
cc: Ken Olsen, Jim Bell

Since we are not going to do the museum for a while, I would like to take a section, since you are still continuing the funding on it, and put on various temporary exhibits in the lobbies of the mill and possibly in Parker Street.

Parker Street might even be more urgent because the people there don't know about computers. This would be a warm up for the full museum and it would test the output of the group that we have been funding.

I visited Bell Labs last week and they have a PDP-11/45 running there on their own operating system--UNIX, to manage all the displays in the front lobby, which is in fact about 25. The displays are the usual junk that one sees and would expect at a museum where a spectator pushes a button and sees some lights blink, or hear some talking.

If the museum is non profit, I think we can get a copy of their operating system and the various types of programs to do this. This is a really impressive system because it allows you to go in and program any kind of behavior quickly. I would like to urge that as a matter of principle, nothing in our museum be built that isn't computer controlled.

GB:mjk

cc: Jim Bell  
Ken Olsen  
Harold Trenouth



DIGITAL EQUIPMENT CORPORATION

February 3, 1975

Jane M. Pugh  
Assistant Keeper  
Science Museum  
South Kensington  
London SW7 2DD  
England

Dear Miss Pugh:

Ken Olsen just handed me your letter of January 8, regarding MIT's Whirlwind. We have it in storage now, and Ken is keeping it for the Smithsonian. The MITRE Corporation is also trying to get it back. Hence, it is somewhat in limbo. We cannot promise a core memory or core memory plane to you just now, but we could make some other parts available--such as a switch register or a flip-flop from its accumulator. Ken would like to keep one of the cores systems in tact, and give it to the Smithsonian, and dismantle the other stack so that planes could be made available to various museums. But until this matter is cleared up with MITRE and the Smithsonian, we can't really move. Therefore, we will try to get a loan of a part of the the memory core system, but we could get you other parts and photographs if you are interested.

As for your letter of 24 July to me, I have certainly been late in responding. We have been in the mode of cutting back our museum program, because we have increased pressure for capital and people in the current unsettled economic climate. Nevertheless, we are still proceeding, and in fact, since our museum group really had little noticeable output for their expenditure of time, capital, etc., it is just as well that we are doing little. It has been really difficult to get the museum going.

I had asked Roy Gould to prepare a kit of parts that had to do with the minicomputer part of technology for you and others, but he has not made progress along these lines. I hope he will take this opportunity to assemble some materials and forward them if you're interested. I am starting to get some material from other places (e.g. the University of Illinois, Manchester,) and would like to get these parts put into perspective and will get them into displays around our facilities to build up interest in the historical section. Our museum will consist of 2 parts: the collection of old parts, and the working part that explains machines with demonstrations. As a Corporate Office, I'm pushing for the later, because of the general need, but I'm personally interested in the archival section (which will be small).

I would like you to give me an idea of some of the machine parts that you could obtain. I will buy these most likely for my personal collection, which I will loan to our museum; DEC and/or Ken Olsen may also buy some of the parts.

I am interested in all types of historical parts: mechanical

calculators, early data processing and storage equipment and conventional 1st and 2nd generation computers.

I think it is important to get some functional mechanical equipment, and I personally want a Thomas Arithometer.

I would hope that some parts of early English machines are still around in various junk stores (e.g. STC, ICT, Ferranti). In this regard, I have some pieces of the DEUCE, but would like to get some of ACE, and PEGASUS, together with other machines that were commercial versions of the Manchester machines. STC made a copy of our PDP-1, and I would like part of it, but we probably should go after it through ITT. In fact, if you have names of people within the UK computer industry, I would correspond directly.

As for the mechanics of purchasing, please let me have an idea of the parts and the money involved, and I'll send a check for the account. We should try a few purchases, and see if it is all right with both you and I. I'm sure we can get lawyers (solicitors) involved, but if we keep it simple, that pain can be avoided. Your commission should be whatever you think is fair--I have no knowledge of these matters. The equipment can be delivered to our DEC office in London (and to Reading) for transshipment. It might be useful to talk with our manager, Mr. Geoff Shingles of the U.K. office, because I've talked with him about this from time to time--hopefully he'll call you first at 01.589.6371, but the UK office number that he's at is: 58 35 55.

I hope we can get started with the collection.

Sincerely,

Gordon Bell  
Vice President, Office of Development

cc: Geoff Shingles, U.K. Office  
Roy Gould  
Ken Olsen  
✓Mimi Cummings

DIGITAL EQUIPMENT CORPORATION  
146 Main Street  
Maynard, Massachusetts 01754



# INTEROFFICE MEMORANDUM

TO: John Clarke PDP-8 DATE: February 4, 1975  
 Jeff Blundell FS  
 Pat McCormick PE FROM: Mary Jane Keeney  
 ✓ Mimi Cummings Library DEPT: 00D  
 Harold Trenouth PE  
 Willie McCleary Receptionist EXT: 2237 LOC: ML12/A51

SUBJ: LOBBY EXHIBIT--CAN WE DO IT BY APRIL 20?

Gordon has some antique computer parts in his office which will eventually find their way into our DEC museum. As a warm up to this museum, Gordon would like to set up displays in our various lobbies.

John Clarke is putting together an -8 for the New England Conservatory to do a music synthesis demo. We would like to use this display to start the lobby exhibits.

Do you think we could do the following?

Completed by	Responsible	Responsible for
3/20	Pat	John Clarke can tell you the size of the equipment for the demo. Jeff can tell you what he is planning for the demo--maybe some can be used for the lobby. Sketch a simple layout for the Main Street Lobby. Mimi will give you an idea as to the size needed for a display case--if we don't have anything we can use in house, please give a plan for this also to Harold.
4/10	Harold	Complete the display cases, special wiring (if needed), and exhibit area.
3/1 <i>2/25</i>	Mimi	Give Pat some idea as to the space needed for the enclosed display.
4/10 <i>2/25</i>		Please document, write a short description, put in order, the antique computer parts in Gordon's office.
4/15	Mimi	Mount in display cabinets.
4/20	Jeff	Please return the -8 to the Main Street Lobby and check Willie out on its operation.

What do you think? Can we do it? Please let me know if you see any hitches. Thanks.

mj

*Mimi, ask Pat to do this.*

*Yes*

27 } IBM 650  
31 } late 1st gen.

20 DEC - 1st gen on ceramic substrates

29 } toys QB  
28 }  
32 }

24 IBM 7090  
25 1st autom. wire wrap

~~30~~ } toys  
~~23~~ }

21 Univac military missile launch comp. c. 1960

~~31~~  
~~10~~  
~~11~~  
~~12~~

unwire transistorized

17 } West. Elec. ceramic substrates  
18 } check files for ? thru  
14 }

26 (get better) 1st DEC module for autom. wire wrap

~~15~~ } 5 3  
~~22~~ } 13  
~~16~~ } 10  
4 }  
5 }

whole series progression of modules diff. sizes shapes Dick Buel late 2nd gen.

14 mid 2nd gen. DEC POP 6 functional packaging bit slice pkg - accumulator 4 registers multiplier quotient memory buffer

33 part of fixed floor of adlar comp. indicator REGISTER

all with br - a diad

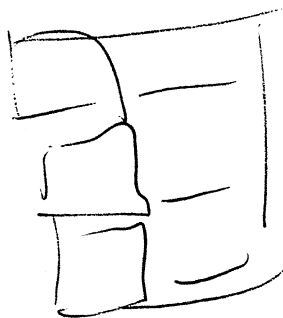
3. Early value from 2<sup>nd</sup> gen DEC system module  
manchester marc II

4. parts from DEC / some of arithmetic logic mid

3. mercury Delay line - 32 bit - Eng. Electric DEUCE  
commercial version of  
Tearing designed DEC  
operated a a megabyte  
bit rate  
+ amplifier

2. Harvard MARC IV (?)  
early shift register  
"inductive" " "  
Bob Tracchi's  
father in law  
gave it to him

1. A digit from whirlwind accumulator  
(4B get other digits?)  
Slack would → a digit



= 14 of 14

Early

H.L. -

D&C LA30 print head

need cold wood  
from Burroughs  
(Field Service had)

what's happened  
to the teletype  
module — to a dip  
1/11 — 75 —

95  
to 95

	<u>Order</u>
<del>28</del>	
	32
	29
	20
	10
	22
	23
	30
	12
	13
	16
	15
	5

They want  
help

John Trshawler  
Bob Reed - Trad. Prod.

June - Eng. Associates

1964 -

SUBJ: LOBBY EXHIBITS

DATE:  
FROM:

PAGE 1  
02-17-75  
GORDON BELL

\* \* \* \* \*  
\*\*PLEASE\*\*SEND TO: MIMI CUMMINGS ML5-4  
\* \* \* \* \*

SUBJ: EXHIBITS IN OUR FACILITIES (PRELUDE TO THE MUSEUM)

To: Roy Gould

I am intending to put together various exhibits on computer technology which might be put in various DEC buildings (for the time being, I would like to do one, and see what it looks like).

The exhibit would include the parts I currently have in my office, plus those which other people are sending me.

In order to make a really effective exhibit, I want to include Whirlwind! Would you please get me a list of the parts so that I can select some? or if possible, I would like:

1. One each of the registers: AR, AC, BR, IOR, PC to show the digit slice approach. We'll hang them together from the ceiling as they were in WW.
2. A plane and photo of core memory.
3. An electrostatic storage tube (if there were any).
4. Diode matrix for time pulse distributor (for changing control easily).
5. I/O--what can we have? a CRT, light pen/gun would be nice?, a flexometer.
6. A console register.
7. Part of marginal check/maintenance console.
8. Drum and/or tape.
9. Some interconnection cable.



SUBJ: LOBBY EXHIBITS

DATE:  
FROM:

PAGE 2  
02-17-75  
GORDON BELL

The emphasis will be to show WW as:

1. The first (early mini) 16 bits, in contrast to other long word machines.
2. The memory: core, disk, tape.
3. Unique I/O--CRT and camera (just now in use).
4. The flexo as an I/O device (used in late 2nd).
5. Marginal checking to increase reliability (used until 3rd gen.).
6. Bit slices (still used).
7. Design for reliability.
8. Forerunner of microprogramming.

WHEN:

GB:MJK

cc: MIMI Cummings, Mary Jane Keeney, Ken Olsen, Bob Reed,  
John Trebendis

DATE:  
FROM:

02-17-75  
GORDON BELL

\* \* \* \* \*  
\*\*PLEASE\*\*SEND TO: MIMI CUMMINGS  
\* \* \* \* \* ML5-4  
\* \* \* \* \*

2/19

Sally -

Consultant pay      3 mo. — \$4000  
                                 6 mo.      \$000

parttime only

now on cal. project - I suggested \$6-P/hr.  
4 hr. a day  
for 2 wk.  
- Tues. 2/25

I'll supervise her

Museum form  
# for parts

1. Item # / Name

2. Name: Technical

cataloguing info.

3. Overall physical dimensions

Physical Description

4. Description or sketch

5. Method or manner of display

6. Date catalogued

7. Present location

put at end

for use in cataloguing

Name of comp  
use of computer -

" mfg.

" country

" year

" generation

Source of info. \_\_\_\_\_  
for cataloguing \_\_\_\_\_  
\_\_\_\_\_

Other: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Commercial / gov't / ?  
~~Central Region~~

(1)

Item #

Name: Tree.

Date cat.

Present Location

Cataloging info →

Physical Description / dimensions

desc. or sketch

suggested method of

display

(2)

Hist. (3) imp.

Name of

comp. (system)  
imp. or originating group

designer

country

year

generation

Sources of info. →

# digital INTEROFFICE MEMORANDUM

TO: Sally LyMBERG

DATE: 2/24/75

FROM: Mimi Cummings

cc: Gordon Bell  
Dick Best  
Mark Abbett

DEPT: Library

EXT: 6465      LOC: M15-4

SUBJ: Consulting Job with reference to Digital Museum

This will serve as a written confirmation of the arrangements we have made concerning your work here at Digital as Museum Consultant. It also will clarify, I hope, for all of us what you can expect from us and vice-versa.

You are currently engaged on the following two projects,

1. Cataloging the antique computer parts in Gordon Bell's office. This work began around February 17 and will be completed by February 28. You will be compensated at the rate of \$7 for this work. I will help you with this project and supervise your procedures, as necessary.
2. Submitting a written report which will cover your work here at Digital as Museum Consultant over the past 6 months. This is considered the logical extension of that work and therefore you will not be compensated additionally for this report. This report should be due to Gordon Bell on March 14.

I hope that this report will contain the following:

- A. Your charter as you understood it.
- B. Broad outline of the steps you undertook to carry out this charter.
- C. Breakdown of what you did physically, e.g.
  - People you contacted
  - Museums you visited - your reactions to these as well as information on what worked well, what they would do differently etc.
- D. Material available for the Museum including what we already have at DEC, what we have been offered, what we might trade etc. Include location of any of these items you know about.
- E. Archives and Documentation you know of, either in-house or available on the outside, which will be necessary or desirable as a back-up to the actual collection of materials
- F. Resources you collected including books in the Library's collection, slides, movies etc. Annotate these resources if you can and indicate where they are currently located.

- G. Personal Recommendations: This part is perhaps the most important one for us of all. I would like to know what you see as being the possible philosophies behind a corporate museum. How do you interpret DEC's desires with reference to the possible choices? How do you feel personally?

We are eager to have any suggestions you have to make to us with reference to actual exhibits, audiences to be aware of, etc.

- H. Lastly, can you visualize what remains to be done prior to the actual decision to go ahead (and the attendant funding) - or what might you do for us within the present economic constraints?

I hope that these ideas will clarify your two projects and not impede your progress. I am sure I speak for all of us in saying that we are looking forward to your report with great enthusiasm.

Once we have examined your report and considered where the entire projects stands at the present time, I promise that we will be back in touch with you. At that time you can expect us to tell you what opportunities there are for future use of your consulting services.

Mimi

**digital**

# INTEROFFICE MEMORANDUM

TO: Sally Lymberg

DATE: 2/24/75

FROM: Mimi Cummings

cc: Gordon Bell  
Dick Best  
Mark Abbett

DEPT: Library

EXT: 6465      LOC: M15-4

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Mark,

Here is a draft for Mimi.

mj

Mary Jane -  
Sounds great -  
Mark

Sally Lyberg

Dear Sally:

as to

This is to summarize our verbal discussion ~~and outline~~ what we would like you to accomplish in the next 3 weeks:

1. Catalogue antique computer parts in Gordon Bell's office. This started February 17 and will be completed by February 28. You will be compensated at the rate of \$7 per hour for hours worked.
2. Submit a report covering the 6 month period you were on contract here. This is to tie up your work and is considered part of that work for which you have already been paid. This report should include:
  - A. People you contacted.
  - B. Parts/archives made available.
  - C. Location of parts for possible acquisition.
  - D. Trip reports to museums--what worked, what didn't work, what they would suggest doing differently.
  - E. Your suggestions on how to set up the DEC museum
  - F.
  - G.
  - H.

This report will be due March 14 to Gordon Bell.

We are looking forward to your report and are sure it will be a great help and guide as we go forward with the DEC museum. At the completion of the lobby exhibit and an examination of your report, we will let you know what opportunities there will be in the future for your consulting services.



Sally Birch Lymberg  
Consultant  
Box 315, Bolton, Ma. 01740

To: Digital Equipment Corporation  
146 Main Street  
Maynard, Massachusetts 01754

---

For: Consulting Services, DEC Museum Display  
Feb. 12 - Feb. 27 68 Hours @ \$7.00 per hour  
\$475.00

Sally Birch Lymberg  
Consultant  
Box 315, Bolton, Ma. 01740

To: Digital Equipment Corporation  
146 Main Street  
Maynard, Massachusetts 01754

---

For: Consulting Services, DEC Museum Display  
Feb. 12 - Feb. 27 68 Hours @ \$7.00 per hour  
\$475.00


*A.K. Wray  
2/27/79*



ROUTE SLIP

**digital**

TELEPHONE MEMO

TO  Mimi Cumming

DATE 3-20-75 5-4  
location / mail stop

MESSAGE

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PLEASE RETURN CALL

WILL CALL AGAIN

WANTS TO SEE YOU

PLEASE RUSH

FROM

DATE

TAKEN BY:

**PURCHASING**  
**ML5/P66**

location / mail stop

*Use on all inter-office mail with the exception of confidential bulky items. Staple to one corner.*







+ File  
Good

Nice use  
of machine.

## Bursting at the museums

Boston's Children's Museum offers computer fun and education to thousands. Online services may soon extend beyond the museum's buildings.

For most adults, computers are physically and conceptually inaccessible; they are objects of suspicion, saddled by their critics with the mistakes and even personalities of their operators. When bills are wrong or credit records mixed up, the computer can be blamed, and often is. And the public swallows that blame whole. As Ted Nelson has pointed out in our pages, cybercrud goes down easy. Isn't anyone doing anything about this?

Yes. Bill Mayhew is.

Mayhew is the computer center coordinator at Boston's Children's Museum. He thinks that people will accept the computer for whatever it is, given half a chance. He also believes that people will get to know the computer for what it isn't.

Computers, or at least an understanding of what they are, must be brought into the world at large, the world outside business offices, labs and classrooms. "They must," says Mayhew, "be made accessible to the public." So Mayhew views it as natural that the 60-year-old Children's Museum should possess a multi-terminal timesharing system. The museum is private, nonprofit and independent of the other Boston area museums.

### Three years before, reshaped

The museum's Visitor Center, one of its three major divisions, began computer activity three years ago under the leadership of Richard Gardner. At that time Mayhew was a part-time "associate developer." Mayhew had studied computer science and urban planning at MIT, and was dividing his time between the museum and his own firm, Elcheapo Industries, which he characterized as "dedicated to low-cost, human-oriented uses of technology."

Now 22, Mayhew coordinates computer group functions with other museum activities, directing his pro-

gram principally toward "children old enough to begin developing an understanding of computers but not too old to ask questions without embarrassment."

At various times during its three years of existence, the computer component of the museum has used a variety of resources, including a PDP-8/I mini and a Teletype donated by Digital Equipment Corp., dial-up service on Dartmouth College's *Basic* timesharing system, the *Logo* system run by Bolt, Beranek and Newman, Inc., of Cambridge, the *Mimic* minicomputer simulation system developed by Applied Data Research and operated by First Data Corp., and a four-user Wang mini system.

The Children's Museum found the PDP-8/I *Basic* system most effective. Although it was a single-user interactive system, more than 550,000 people used it between 1971 and early 1974, when it was retired. They played number games and computer checkers with it, and they ran a "turtle," a primitive robot that responds to simple computer commands.

### Grants to 'em

The value of the interactive computer exhibit was apparent from the start. "We felt we had demonstrated the success of our approach," Mayhew recalls, "and in 1972 we had already begun to investigate enlarging the resident system."

The arduous search for funds delayed the upgrade until last spring when, with aid from a Charles Hayden Foundation grant and Digital Equipment, the museum exchanged its PDP-8/I for its present PDP-11/40 system. Equipped with 48k words of memory, two disk pack drives, a line printer and a paper tape reader, the system supports eight interactive terminals. The museum uses three crts, four DECwriter hard-copy terminals, and a Teletype. The operating system is *UNIX*, a multilanguage timesharing system developed by Bell

just  
own

Laboratories which is partially modeled after the MIT-originated *Multics* system, now Honeywell's largest interactive system offering.

The system introduces visitors to interactive computing almost as soon as they arrive, since it asks for their names, birth date and residences. The system can then cough up tabulations of the data it has gathered. This catalog has become a popular souvenir. The ages and residences of visitors are also added to a disk file that provides museum personnel with a measure of computer appeal, while names are discarded in the interest of privacy.

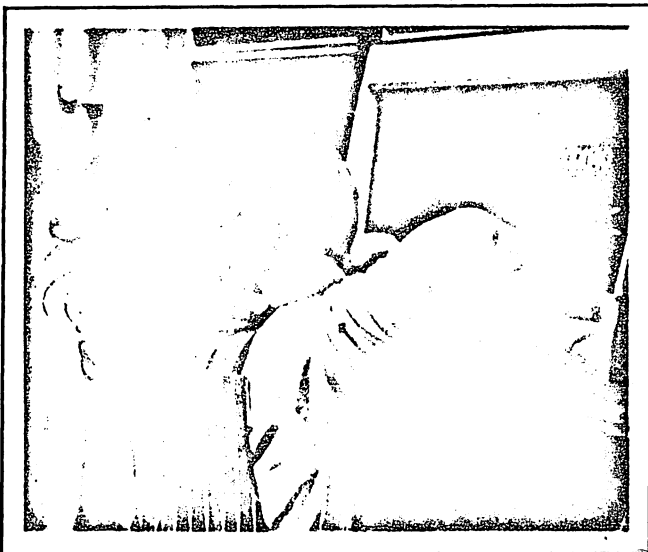
#### Cursor—foiled again

Upstairs, in the area set aside for computers and computer visitors only, terminals open a dialogue with an outline of games that may be played: number games, word guessing games (e.g., Hangman), graph games, tic-tac-toe and others. Each user is limited to a three-minute dialogue, after which the computer politely asks him to let the next visitor have a turn.

The system has been altered to give it resiliency. "We painted the carriage return keys green to make them easy to find," explains Mayhew. "We also disabled the cursor controls on the video terminals to prevent wanted text from being wiped out, inserted a check routine to prevent the carriage return from working on empty lines, and made certain that programs could accommodate a full buffer of characters to avoid overload crashes. And, of course, we have tried to make the programs as immune as possible from the entry of garbage."

#### Diversity people

Mayhew now spends about four-fifths of his time keeping the system alive and growing. The museum shifted work formerly done outside to its mini—such necessities as accounting, fund-raising support, mailing list maintenance—offsetting most of the system maintenance costs. In whatever time he has left, Mayhew chats with visitors and watches their activity, with an eye toward improving of the museum's program. One



addition has been instruction. The museum holds an hour and a half class in computer languages and programming once a week for interested school-children.

It's very tempting to undertake more and more of this kind of activity, observes Mayhew, "because of our success with it. But except for occasional workshops, we don't contemplate enlarging the teaching function. Our primary effort has been and will continue to be to provide an environment for discovery."

Mayhew and the Children's Museum staff have worked out future projects to lead participants through progressive steps of man-computer interaction, beginning with simple switch-activated and theremin-generated commands to control lights, audio synthesizers, and electric trains, moving eventually into simple computer programming. They would like to develop a robot that could perform various actions under computer control as visitors build up their skills. The museum is also trying to raise \$4,000 for an online voice synthesizer; full software for the synthesizer has already been developed by Bell Labs.

The last phase of the envisioned expansion of computer activities is the Portaputer project. A small computer with a Teletype and a grab bag of modules would be circulated to schools and neighborhood centers through the museum's Resource Center loan department.

Firmer than some of these plans which await funding are activities involving other institutions that serve the public. The Children's Museum is completing arrangements with the Metropolitan Cultural Alliance, an association of area institutions including the Museum of Fine Arts, the Boston Symphony Orchestra, the Institute of Contemporary Arts and others. They plan to place a remote terminal in the MCA headquarters which will be used to process business data for the alliance and its members.

#### Access to grind

The museum's computer staff has proposed a public information system for the 1975-76 Boston Bicentennial Celebration which would sprinkle terminals around the city so that people could get up-to-the-minute schedules of cultural events as well as information on landmarks, tours and accommodations.

Yet another possibility is a permanent public information access system. The model for the Children's Museum efforts is San Francisco's Resource One, which placed terminals in stores, libraries and other convenient sites. The terminals may be used to access everything from programs to poetry and constitute an electronic bulletin board of sorts. If several such setups were established in different cities, they might eventually be interconnected, yielding a system for nationwide public computer access.

Whether the computer will be the town crier of tomorrow or the weekend amusement of today, Mayhew's plans for it "revolve about one central purpose: to provide a realistic and nonhostile view of computers for large and diverse groups of people. We can do it by making computers work for them, by making the process an experience of pleasurable discovery.

"What else are computers for, if not to work for people?" □

*The Filter  
I want  
as  
(LDP)  
to offer*

digital

March 17, 1975

Management Information Corporation  
140 Barclay Center  
Cherry Hill, New Jersey 08034

Gentlemen:

In the centerfold of one of your Data Entry Awareness Reports there is a tree showing an historical route system, a time line with dates and a tree showing the various computer families. For the past several months I have been doing research in behalf of a computer museum. I have used the National Science Foundation tree of computers with their generations marked.

Since this is a different type of tree, I wonder if you could give me more information about its background, its author, or an original of the tree in a larger size. I am interested in using this as a reference resource in my work because of the graphic character of the information. I would be happy to hear from you and would appreciate any assistance that you can give me.

Sincerely,

  
Sally Birch Lymberg  
Museum Consultant

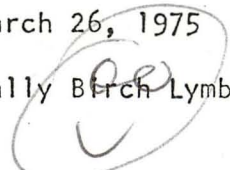
SBL/mrg

cc to Mimi



# INTEROFFICE MEMORANDUM

TO: Gordon Bell  
 Mimi Cummings  
 Roy Gould  
 Ken Olsen

DATE: March 26, 1975  
 FROM: Sally Birch Lymburg  
 DEPT:   
 EXT: LOC:

SUBJ: Museum Project

This Progress Report for the DEC Museum Project gives a quick, general overview of company museums, and computer exhibits in larger museums. It is in two sections. There is only one copy of Section II, Photographs of Science Centers and Museums; it is being attached to Gordon Bell's report.

There is so much to learn and so much to see that it's hard to tell it all. I've tried to hit the high spots -- which are my own, based on the information and guidelines given to me at the beginning of the project.

I'm sure there must be much left untold in my notes and references that could be of more value, if applied to a specific program.

I would be very happy to participate in any way possible toward the completion of this museum project.

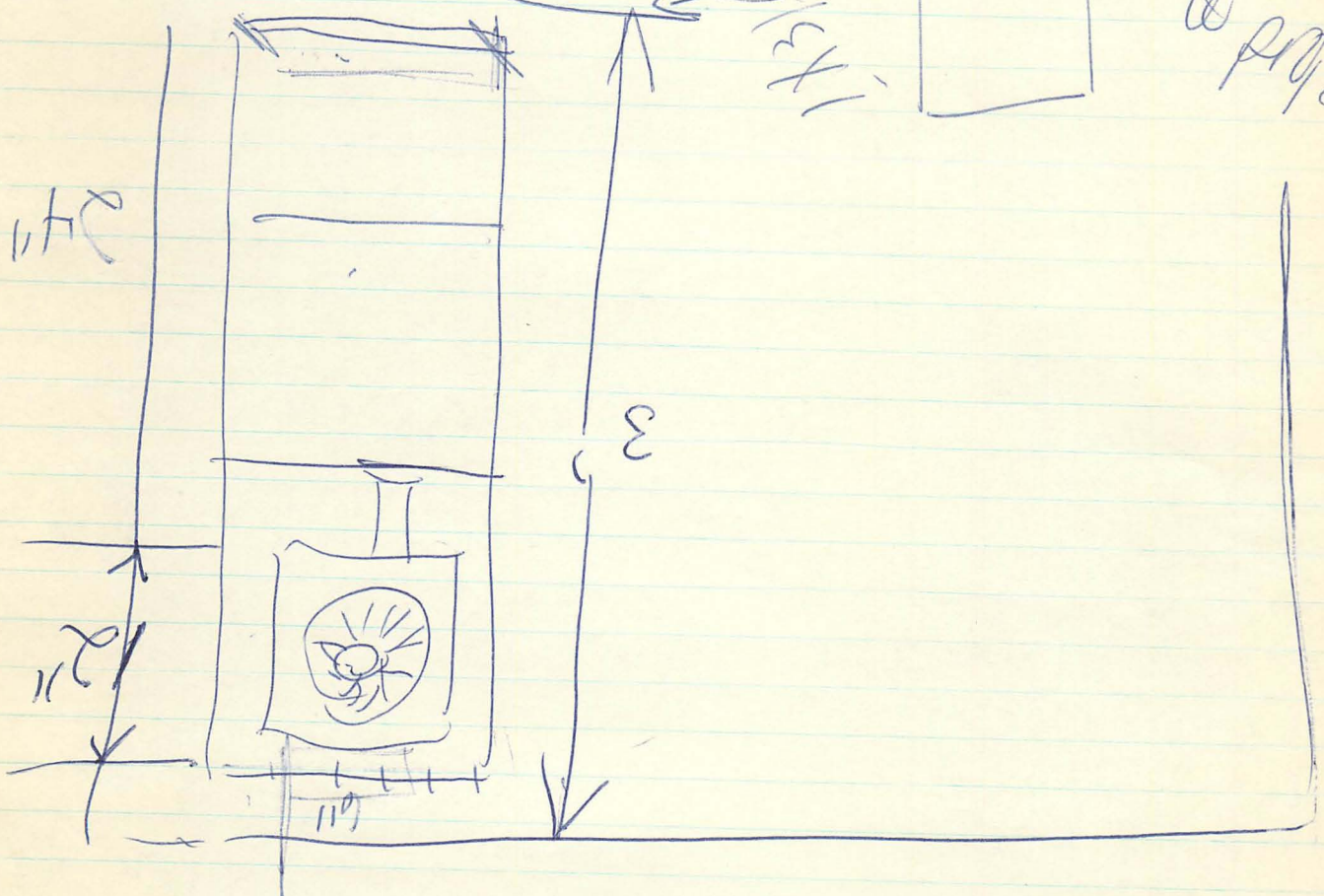
If a discussion of the report would be helpful, I am ready when you are.

- # 1 all whitewind photos, slides, archives collection books (as noted on attached) color prints are with Peggy Deum. 12-1 (includes negatives)
- # 2. all Antiquare Computer Parts identification with m.j. (she plans to make copies for you. Keener (12-1))

/mrg

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SUBJ: DEC MUSEUM IN MARLBORO COUNTRY

(1026)

4/16/74

TO: Operations Committee  
Product Line Managers

From: Gordon Bell  
Roy Gould

We have a great opportunity to establish a computer museum in the Marlboro building, in what would otherwise be totally useless space. Several of us have the interest to embark on this project; once set up, the incremental personnel operating expenses will be constrained to about 2 people.

We believe it may turn out to be financially rewarding, although it is difficult to justify. Its uses include:

1. Being used to exhibit computers to the local and computer community.
2. Establishing us as an intellectually serious vendor via its embedded lecture hall for multiple functions.
3. Showing our working computers and products.
4. Showing our own past, and present technology.
5. Using it as a liaison to various U.S. and European laboratories and universities who were also computer midwives.
6. It would be a possible place for technological and business historians to visit by placing our own literature there plus company archival data.
7. It being a place to collect books, manuals, computers, and technology outside of DEC.

The 20,000 sq. ft. museum could be utilized in the following ways:

1. Historical time line (family tree) evolution of minicomputers utilizing a computer exhibit. This would show EDSAC (we have to get a part from Cambridge), Whirlwind (a bay and some peripherals), TX-0, PDP-1, PDP-4, and on to various 8 and 11's. Here we could show off-shoots like the Indian 8, 11; Cuban 8, DCC, Hungarian, Sue, Sprague modules, and IIT's copies.
2. As a really nice conference/seminar hall for: a museum lecture series, press conferences, PDP-10 lectures, IEEE and ACM meetings, some of our own meetings. This would be reserved 1/2 time for these activities. It should hold about 50 to 100 people.
3. Working DEC computers: PDP-1 and NSA super console PDP-4 with space war, ...PDP-11 with moonlander, terminals to various machines. People could visit this just to look at and use our various consoles.
4. Technology displays. We have many exhibits that can be

set up from time to time. Eg., history of displays from Whirlwind and includes our first color and first precision displays. Also, we had first UART in 62--show the package evolution to UART on a chip with chips and microphotographs. In general, this would cover computers, computer parts, and technology (eg., logic, displays, printers, tapes, power-supplies).

5. Computers from universities, research labs and other vendors.
6. A place for machine and programming manuals for us and for the above technologies.
7. DEC archival information on computers and business.
8. A place to debug trade-show booths.
9. Historical computer books.

#### MODUS OPERANDI:

The museum will report to Roy Gould, who will hire a curator to live there for day-to-day operations, collect, guide and buy various internal services. A board of directors, consisting of Roy, the curator, myself, Ken, and 2 other people, will guide them, review plans, and establish priorities. The operating budget will be presented to the F&A Committee.

#### ACCOMPLISHMENTS SO FAR:

Already, Ken has established the basis for our having the most significant operation because we have Whirlwind (first mini, core, microprogramming, display, tape, and A/D). Also a great trading basis. We have the TX-0 (first transisterized machine) which will be operational! All our prototype machines are available and work. I've collected parts from ACE (UK-Nat. Phys. Lab), a 650, a 704, MIT Dif. Analyzer.

GB:mjk

~~Attachment: Museum Budget~~

~~Draft~~ - not sent

June 19, 1974

Professor Henry Tropp  
Humboldt State University  
Arcata, California

Dear Professor Tropp:

Your article in the IEEE Spectrum February 1974, (with references to the Smithsonian History Project) appeared at just the right time for me. I enjoyed it very much. Have you any other similar publications?

From the earliest days of Digital Equipment Corporation, there has been a strong and continuing desire by our President, Kenneth Olsen, and others, to establish a computer museum with a documented historical and archival base. Many times in the growth of the Company space has been allocated, but in each instance production needs claimed the space before the museum could take actual form.

In early February of this year a decision was made. To paraphrase Lewis Carroll;

"The time has come, the Walrus said, to talk of many things .....of cabbages and kings!"

'Of Ace to Zuse, abacus, Babbage, Deuce, ENIAC and Whirlwind I.'"

In short, the museum is now in its planning stage.

I am researching background, history and other computer oriented museums or displays from the viewpoint of historical and archival



content. It is not the desire of the Company to duplicate any work or information already successfully documented. We are fortunate to have Gordon Bell as our Vice President of Engineering. Mr. Bell was formerly professor of Computer Science and Electrical Engineering at Carnegie-Mellon University. He is also author of Computer Structures: Readings & Examples, C. Gordon Bell.

In reviewing as much of the revelant literature as I have been able to locate, I cannot find any record of a complete source for a history of computers all in one place. Perhaps it is "pie in the sky", but I would like very much for Digital Equipment Corporation to begin what would be a never ending process, namely, a start for a museum of the history of computers as a research tool available to the computer world. In addition, there would be artifacts, antique parts, manuals, on-line computer operated displays, games, etc.

Can I "talk" about this to you for a few sentences? IBM has its Eames book, the ACM has its 25th Anniversary edition, and the Smithsonian has its Computer History Project. Since so much has already been accomplished, no time should be spent in duplicating this work. However, as a researcher, myself, in the field of information processing, I feel there should be some place where these questions could be asked or answered; with a high priority on feedback; from a documented data base;

- 1) What is it?
- 2) Who did it?
- 3) When was it done?
- 4) Where is it?
- 5) Who has it?
- 6) Could we use it? Look at it?
- 7) What is its importance?

Since DEC's prime product is computers, a good beginning could be made with a data base of references, people (whether living or not),

publications, proceedings, books, artifacts, and displays. I envision even the opportunity to borrow or loan historical objects such as parts of Whirlwind, Mark I, and early abacus, or even a facsimile of a punch card from the Jacquard Loom.

I have not had the opportunity to visit the Smithsonian, but I understand that much still needs to be cataloged or processed for actual use by the public. Boston seems to be a logical place and a central location for the beginning of a resource center, because of the many historical events occurring at, in, or near; Harvard, MIT, Lincoln Lab, MITRE, etc., to say nothing of the evolution of the mini-computers in Maynard at the old American Woolen Mill site in 1957.

If your schedule is not too heavy, I would love to hear from you with any comments, critique, or suggestions that you may have.

MEMORANDUM

*file*  
To: DOD Survey Respondents

Case:

Date: July 15, 1975

Page:

Subject: Survey results

Carol Johnson of AFCRL has completed the survey requested of attendees at our April meeting at Hanscom Field.

I am attaching a copy of the resulting report she sent to Mr. Sauter at DDC. These reports are being sent to the contact person for the Route 128 Special Librarians Group in each participating organization. If a different person in your company was also involved, I would appreciate it if you could see that they receive copies as well.

Thanks are due to those who took their time to help the DDC and, in turn, all of us, in responding to this survey. I also appreciate the fine job Carol Johnson did in taking on this project.

*Jeanne Bracken*

From: Jeanne Bracken, Research Library  
15 Acorn Park, Cambridge, Ma. 02140

Bldg./Room: 15L/304 Ext. 864-5770 X3015

DEPARTMENT OF THE AIR FORCE  
AIR FORCE CAMBRIDGE RESEARCH LABORATORIES (AFSC)  
LAURENCE G. HANSCOM FIELD, BEDFORD, MASSACHUSETTS 01730




REPLY TO: SUOL/Carol Johnson  
ATTN OF: Coordinator of Route 128 Libraries Survey

25 June 75

SUBJECT: Utilization of DDC Services:  
Report on a Survey of Route 128 Libraries

TO: Hubert Sauter, Administrator,  
Defense Documentation Center

1. Copies of Especially DDC were distributed to 48 organizations in the Boston area during April, 1975.
2. Recipients were requested to review, comment and evaluate the report, as well as to make additional observations or recommendations to be considered by DDC.
3. Responses were received from 25 organizations, including 7 branches of Raytheon (see attachment 1). It is believed that these respondents represent the major DDC user population in the Boston geographic area.
4. Responses have been consolidated and are reported in attachment 3.
5. The Route 128 Librarians' Group looks forward to a continuing dialog with DDC to facilitate transfer of DOD generated information through channels to the ultimate user.

  
CAROL A. JOHNSON  
Director  
AFCRL Research Library

Attachments

Organizations Responding from the Route 128 Librarians' Group (Boston)

1. Air Force Cambridge Research Laboratories
2. Analytical Systems Engineering Corp.
3. Army Materials and Mechanics Research Center
4. Army Natick Laboratories
5. Arthur D. Little
6. AVCO Systems Division
7. Digital Equipment Corp.
8. Charles Stark Draper Laboratory, Inc.
9. Dynamics Research Corp.
10. General Telephone & Electronics Lab., Waltham Research Center
11. GTE Sylvania/Eastern Operations
12. Honeywell Information Systems
13. Itek
14. Kennecott Copper Corp.
15. M.I.T. Lincoln Laboratory
16. MITRE Corp.
17. Raytheon Corporate Headquarters
18. Raytheon Co., Equipment Div. (Sudbury & Wayland)
19. Raytheon Co., Missile Systems Div. (Andover & Bedford)
20. Raytheon Service Co.
21. Raytheon Co., Microwave & Power Tube Div.
22. Raytheon Co., Research Div.
23. Raytheon Co., Submarine Signal Div.
24. Sanders Associates, Inc.
25. Softech, Inc.

Summary of Responses: Route 128 Librarians' Group (Boston)

1. Everyone responding felt that the Washington, D.C. committee had performed a great service by conducting such a thorough review of the DOD Information Transfer Process.
2. There was general agreement with observations and recommendations presented by the Committee on Information Hang-ups in Especially DDC.
3. Users were enthusiastic about the interest of DDC in soliciting user reactions to their services.
4. There was overwhelming agreement that DDC provides an essential focal point for DOD generated reports and that the overall efficiency and scope of DDC is to be commended.
5. In general, the greatest problems are in the areas of communications and lack of coverage of considerable DOD sponsored work.
6. Below are listed some specific areas of concern, as well as some suggestions for services and directions for development. Most of these have been mentioned in Especially DDC but they are reiterated here as being of special concern to the Rt. 128 Librarians' Group.

a. Users are poorly informed about DDC services and products.

(1) Publish a User Manual for all DDC services explaining services in greater detail than the November 1974 Users' Guide. It would also be helpful if phone inquiries made to the phone numbers listed in the guide could be routed directly to a knowledgeable person capable of answering the specific questions.

(2) Publish some sort of reference directory on how to obtain types of DOD documentation not handled by DDC, or staff an office capable of answering telephone inquiries about same.

(3) Conduct "User Training Seminars" on various services such as preparation of report bibliographies.

b. There is unanimous dissatisfaction with the incompleteness of reporting work unit information summaries. Erratic input causes users to lose confidence in the system.

(1) Establish some sort of enforcement mechanism for reporting of DOD sponsored reports and current and projected research projects.

(2) DOD should be made aware of this situation and requested to study the problem to determine where the 1498s go astray.

c. Access to limited documents continues to be a problem, although there was a concensus that some improvements were made when DDC streamlined the requesting procedures and revised Form 55.

(1) Investigate ways of improving access to DOD generated information. Particular problems are overclassification, overly restrictive distribution statements, and the problems associated with unclassified limited reports.

(2) Publish a cumulated index to changes in "limited" as well as downgraded or declassified documents.

d. Overlaps/gaps in indexing and coverage between DDC and other government agencies is a problem which causes uncertainty and frustrations in retrospective bibliographic searching.

(1) Investigate relationship of DDC with the non-DOD sponsored information clearinghouses (AEC, NASA, NTIS). Explore possibility of networking and using common access procedures for each other's data bases.

(2) Explore possibility of accessing the DOD sponsored Information Analysis Centers through a DDC-IAC network.

e. Expansion of DDC services and products are considered a necessity by all respondents.

(1) Publish a DOD acronym listing.

(2) Publish cumulative indexes to TAB (1953-60), (1960-69).

(3) Introduce capability to access documents by project names.

(4) Provide a link between WUIS/Report numbers.

f. Installation of Defense RDT&E on-line system in the downtown Boston area was considered to be impractical and inaccessible by Rt. 128 Librarians.

(1) Plan to provide centralized access by contractor/government organizations in a suburban location.

(2) Coordinate part-time use required by most of the respondents.

g. Miscellaneous Comments:

(1) It has become necessary for most organizations to curtail their purchase of documents due to increased charges.

(2) Respondents were pleased to notice that an investigation of mail delivery is being conducted to trace problems of delayed document delivery.

(3) Five organizations indicated that their users definitely preferred full-size hard copy reports to microfiche. The volume of reports ordered dropped significantly when fiche is the primary format made available to users.

(4) One respondee objected to the inconsistency in terminology used to retrieve documents. Key words used by authors do not match those found in the DRIT.

(5) When reports are ordered from DDC using a Form 1, bills are received from NTIS for charges against deposit accounts. These bills do not provide the individual requestor's name, which makes bookkeeping an impossible task for the librarian.

(6) At least one user felt that the policy of distributing classified materials directly from DDC to the field site of request, rather than to a local D.C. address of that organization, inhibited their ability to expedite a "rush" request.

(7) Strong opposition was expressed by a couple of respondents to the idea of reinstating field offices. Service provided by field representatives in the past had not been uniformly rendered.

(8) It was expressed by one user that the AD numbers were too long, making the possibility for error too great when ordering documents.

(9) One respondent with on-line access to DDC indicated that the system was "down" 50% of the time they tried to use it.



digital

Whyland

# INTEROFFICE MEMORANDUM

TO: Peggy Dunn  
cc: Ken Olsen  
Dick Best  
Mimi Cummings ✓

LOC/MAIL STOP  
ML12-1/A50

DATE: July 18, 1975  
FROM: Carolyn Sweeney  
DEPT: Library  
EXT: x6465  
LOC/MAIL STOP: ML5-4/A20

SUBJ. Response to your request for a memo and thesis on character generation, with emphasis on author and affiliation.

Mimi and I searched the Digital historical files for a memo (M series) or an engineering note (E series) containing information or reference to character generation, but could not locate such. Through our interlibrary loan cooperation with M.I.T./L.L. we asked them to search their archives for an Olsen memo on character generation. They found only two K. Olsen memos from 1952, neither dealing with character generation. Unfortunately, neither M.I.T./L.L. nor Digital has a subject index to these files, so they could only be checked by date, author, and title.

The thesis which Sidney Bradspies completed at M.I.T. was entitled "A magnetic-core memory with external selection," 1955, 169 pages, Master's in Electrical Engineering. Dick Best agrees with me that this title does not appear to be relevant to the topic of character generation. However, if you care to see the thesis it is available for viewing at the M.I.T. Archives, or the M.I.T. Barker Engineering Library, and it can also be purchased.

In an attempt to locate other references which might lead to the particular item you'd like to see, I searched the abstracting and indexing services of the Digital library's reference collection. Perhaps bibliographies from some of these citations will yield the information you seek:

- Jones, E.D., "A versatile character generator with digital input," WESCON Convention Record of IRE, 1959, vol. 4, pp. 16 ff. (cited in W.W. Youden, Computer Literature Bibliography, 1946-1963, U.S. Dept. of Commerce, N.B.S.)
- Redman, J., "Advanced display techniques through the Charactron Shaped tube," Proceedings, 1st National Symposium, Society for Information Display, Santa Monica, Calif., March, 1964, pp. 31-46. (cited in S. Sherr, Fundamentals of display system design, c. 1970)
- Peterson, R.M. and R.C. Ritchart, "Recent developments in shaped beam display and recording techniques," IRE Convention Record, 3, pt. 3, (1958), pp. 21-30. (cited in Sherr)
- \* Loewe, R.T., et al., "Computer generated displays," IRE Proceedings, v. 49, #1, January, 1961, pp. 188-190.
- Gilbert, Barrie (Tektronix, 1970), "Monolithic analog READ-ONLY memory for character generation," IEEE Jour. of Solid State Circuits, Feb., 1971, pp. 45ff.
- \_\_\_\_\_, "Printicon: a new character generating monoscope for use in visual display systems," IEEE, Trans., Electron Devices, 1971, Feb., pp. 118 ff.

\* The bibliography from this article is attached.

12(a) lists several possible alternatives for direct viewing by individuals or small groups. Some systems use magnetic storage for one frame of data. Any of the various symbol generation techniques may then be used with a CRT for display. Instead of magnetic storage for image regeneration, image storage after digital-to-image conversion may be performed using hard copy or display storage tubes (see Fig. 1).

Where large audiences must be accommodated, a projection technique may be used, as is illustrated in Fig. 12(b). The image may be projected directly from a CRT or oil film or it may be projected from one of many types of image storage media.

For any set of requirements for computer-generated displays, there may be a number of feasible functional flows and a number of techniques for each function. Careful analysis of the many possible combinations should lead to a very effective computer-generated display within the present state-of-the-art.

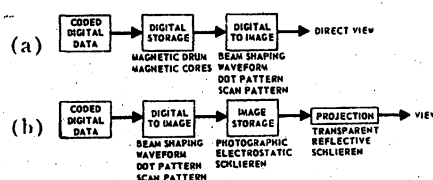


Fig. 12—Several typical functional flows and implementations.

#### ACKNOWLEDGMENT

The authors are indebted to representatives of many firms for supplying information, and are grateful to the many associates at Aeronutronic, including Dr. H. Weiss, Dr. R. H. Meier, P. Rosenblum, R. L. Kuehn, and J. Deutsch, who contributed information and assisted in various ways.

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- [5] L. S. Allard, "Electronic devices employing CR beams," *Brit. Commun. and Electronics*, vol. 4, pp. 620-625; October, 1957.
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- [9] "Reading the high speed printers," *Datamation*, pp. 18-20; August, 1958.
- [10] "Printers," *Office Automation*, suppl. 33, p. 179b.
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# INTEROFFICE MEMORANDUM

TO: Ed Schwartz

DATE: July 30, 1974

cc: Ken Olsen  
Gordon Bell

FROM: Roy Gould

DEPT: Trade Shows

EXT: 2302      LOC: PK3-2

SUBJ: Museum - Non-Profit Organization

Would you please check into the possibility of setting the Digital Computer Museum up as a non-profit trust, foundation, or corporation whichever is appropriate. This would aid us in donations of displays as no one will donate to a profit organization. This is part of the problem we are having with MIT turning the TX-Ø over to us.

I have enclosed a study done by Harvey H. Lippincott, Corporate Archivist for United Aircraft, for your information.

jac  
enclosure

Box 315  
Bolton, Massachusetts 01740  
August 5, 1974

Computer History Project  
Smithsonian National Museum of  
History and Technology  
Room 4601  
Washington, D.C. 20560

Dear Sir:

The IEEE Spectrum of February 1974 had an article by Henry Tropp, former investigator for the Smithsonian History Project. Do you have any bibliographies or descriptive material of the contents of your project that are available at this time?

I am very interested in tracing certain points in the history of computers for a research project. Is it necessary to visit the Smithsonian and your Computer History Project in order to use the material?

Sincerely,

Sally Birch LyMBERG  
Research Librarian

SBL/jac

100-100-100

# INTEROFFICE MEMORANDUM

TO: Roy Gould

DATE: 12 August 1974

cc: Marietta Ethier

FROM: Ed Schwartz

DEPT: LEGAL

EXT: 5500 LOC: Maynard PK-3/2

SUBJ: MUSEUM

X -4288-

I have asked Marietta Ethier of my department to look into the pros and cons of establishing the museum as a non-profit corporation.

In addition, we want to check out the various tax laws to be sure that even if we can establish it as a non-profit corporation that it would have the benefit of tax free status so to take advantage of contributions, as you indicated.

I trust that Marietta will be in touch with you shortly.

lml

