



# INTEROFFICE MEMORANDUM

TO: Gordon Bell  
Mimi Cummings  
Roy Gould  
Ken Olsen

DATE: March 26, 1975  
FROM: Sally Birch Lymberg

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.

/mrg

*Progress Report for*

*DEC Museum*

*Project*

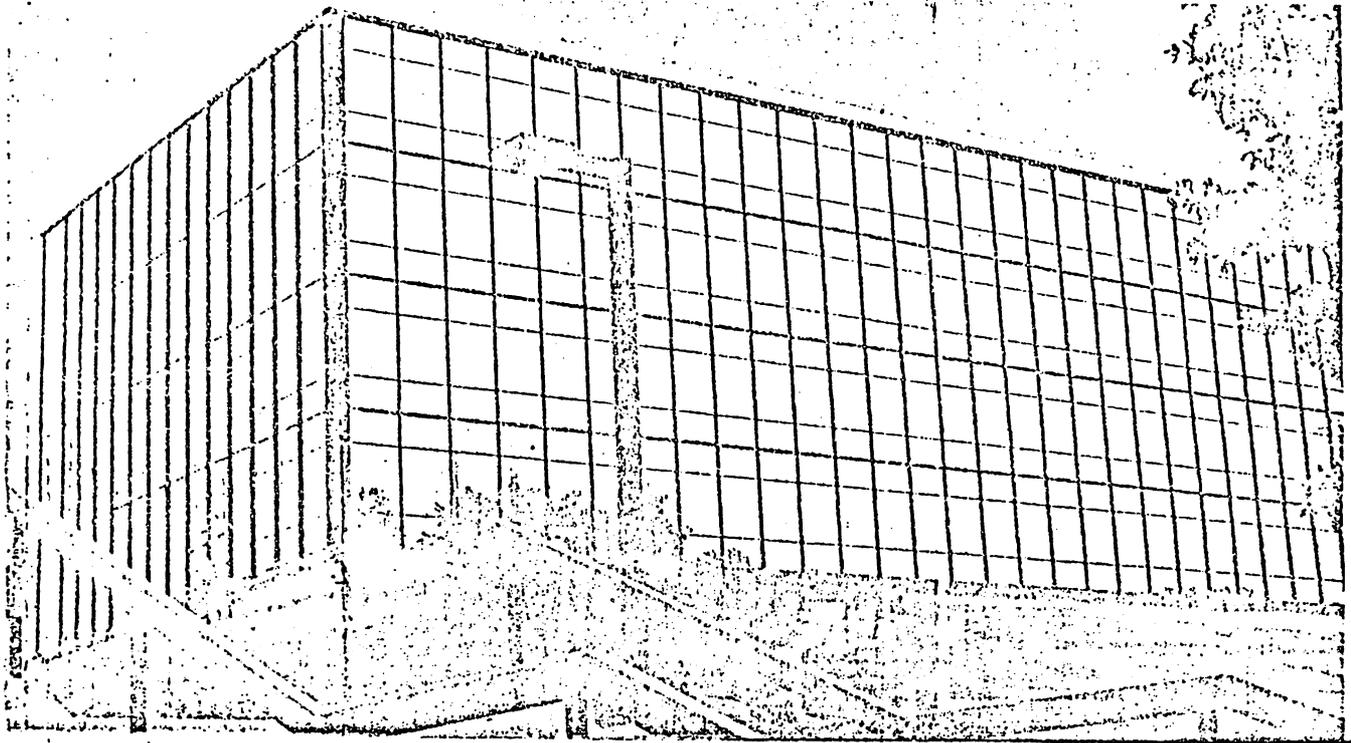
*Period Covered*

*May 20, 1974 to November 20, 1974*

*Submitted March 21, 1975*

*Sally Birch Lyberg  
Museum Consultant*

# Digital 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."

My interest in the DEC Museum project really began with this newspaper release. I began to think, and wonder if all the interest that I had found while planning for a Univac museum at Sperry-Rand several years ago still existed. A few notes and conversations with former associates convinced me that there was still an on-going enthusiasm, with an exciting quality. I believed that this same enthusiasm if properly "harnessed", had no proprietary bounds. In other words, many companies had many displays of their own history or product. But, no one in the computer world had developed a continuity of historical landmarks

The Free Enterprise

Wednesday, February 13, 1974

covering all companies, hardware or software, at a professional level.

In other words, the DEC Museum is valuable as an idea for the whole industry, for the state of the art, and as a central source of information. Unless someone begins to think the "year 2000" today -- there will be nothing to preserve, because the pace is so swift that historical records fall by the wayside. The computer industry is probably the only one in which men and women today are outliving their own contributions to the world of technology.

My association with DEC began May 20, 1974. I find no formal guidelines or outline for duties in my notes taken at that time. I reported to Roy Gould as a cost center, with support services, telephone and secretarial assistance furnished by his department. He made his complete file on the museum and museum related subjects, (dating back to May 15, 1972) available as references. There was a short meeting with Roy and Gordon Bell on May 23, 1974, to discuss ideas. As a result of this, I began to search in historical records for a "computer museum."

- . to cover all the steps in the design of "computers" from year unknown, to 1957 when DEC was formed.
- . to span the period between the Whirlwind-- and TXO eras to PDP-1 with as much primary source information as possible.
- . to locate as much as possible within DEC, of "archives\*," of historic\*\* value, other than hardware itself.

The above three categories reflect what I think one of the memos from Gordon Bell, dated September 17, 1973, was saying about contents and priorities for a DEC Museum.

\*An organized body of records pertaining to an organization (DEC)

\*\*Historic is largely restricted to what is important in or contributes to history.  
(Not necessarily confined to DEC archives)

(American Heritage Dictionary)

The next benchmark I found was a memo dated April 16, 1974, which could be considered modus-operandi for discovering other museums, science centers, or company sponsored exhibits,

- what are they doing?
- why are they doing it?
- does it work?
- what would they do differently?
- how much does it cost?

If you combine the above questions with priority and "how to," it is essential to find out what has already been done in "computer museums," who did it, was it any good, and could "people use it."

As a start, I combined field trips with written inquiry, and local telephone requests for information. Beginning in our own backyard, Boston, I started with the Boston Museum of Science on May 29th, 1974.

*Field Trips -*

*Boston*

Boston Museum of Science

Roy Gould and I met with the following:

Pamela Cook, Director of Exhibits  
John Drabik, Director of Program  
Edward Pearce, Librarian/Archivist  
John Radloff, Designer

for a guided tour and then "questions and answers"--

There is a Honeywell donated, designed and maintained exhibit in this museum. It was installed on July 19, 1973. The display consists of six parts:

1) Panel 1 - INFORMATION PROCESSING IS AS OLD  
AS MAN

A series of light boxes are illuminated in chronological sequence when an actuator button is pressed.

2) Panel 2 - THE COMPUTER HAS A LANGUAGE OF  
ITS OWN

A large punched card shows how alphanumeric information is represented in punch form, and the visitor is challenged to interpret a 6-character word punched into the card, but not identified. A pushbutton-activated light box also displays the binary equivalents of several numeric and alphabetic characters.

3) Panel 3 - THE COMPUTER HAS FIVE BASIC ELEMENTS

The panel when activated by a pushbutton suggests the flow of information through the elements via sequentially lighted, pulsating arrows.

4) Panel 4 - COMPUTER COMPONENTS HAVE BEAUTY AS  
WELL AS FUNCTION

An array of typical computer components has been mounted on a panel in an esthetically pleasing arrangement to form a contemporary sculpture. The panel consists of two parts, each containing a duplicate array. On the left side, the parts appear in their natural colors. On the right, the parts have been sprayed the same color as the background and thus appear as interesting forms (no attempt is made to identify the various components and subassemblies).

5) Panel 5 - PROGRAMMING IS THE PREPARATION  
OF DETAILED CODED INSTRUCTIONS  
FOR THE COMPUTER

Displayed are a typical payroll flowchart, a handwritten coding form, and a source and object listings.

6) Panel 6 - THE COMPUTER IS HELPING TO IMPROVE  
THE QUALITY OF LIFE

A series of twenty computer applications is presented to the visitor in the form of lighted panels. The visitor selects from ten categories such as space, medicine, law, industry, business, and agriculture, and, by pressing the corresponding button, is presented with two brief descriptions of computer applications in that field.

After almost a year of operation, several patterns were recognized by the museum staff which were peculiar to this exhibit. Because of a desire to assist us, this review of the past year's problems became a pretty accurate account of "real-time" and not just a P.R. report. The following consensus of the opinions of the staff covered several points:

- a) Because of the density of users, (as many as 2500 school children in one day), downtime often affected the plans of groups who came primarily to see that exhibit and this often disrupted the programs. The computer alone was not enough to hold their interest.
- b) It was unanimous that this display did not "Cope" with the purpose that the Museum had had in mind for a computer display in a museum.
  - . it was too technical
  - . there were inadequate instructions for any hands-on user.
  - . identification of panels, content of labels, and style/design of labeling did not attract or hold interest of spectator.
  - . there are 11 games in all. Only 3, TicTacToe, Simple Simon and NIM, allow a contest between a person and the computer.

No imagination in selection, or the game was too difficult to comprehend. Leaves a trace of hostility between user and machine.

- to produce a more effective display for all it would have been better to use a designer who would receive input from both donor and recipient. Honeywell was not really happy, and neither was the Museum.
- recognize vandalism and its results in expense of maintenance as well as down-time. Protective devices and plexi shields are expensive, but in the end they were not as expensive as not doing anything about vandalism. Nothing is really safe!!

After this discussion, the group disbanded and I was briefed on visitor services, security, and school scheduling in the museum, as well as other museums/ science centers with similar displays worth seeing: Toronto Science Center, Royal Ontario Museum (science display), Ontario Place, Carborundum Museum (Niagara Falls), and Corning Glass Works. The latter two are company sponsored. Letters of introduction were offered to all of them from the Boston Museum of Science; this assistance was accepted. (It was recommended that a personal membership be taken out in the American Assn. of Museums, to serve as a "union-card" in contacting other museums. This was done in Roy's name, through the Library. I have used it very successfully).

## The Children's Museum

The Children's Museum was closed for part of the summer in order to install a new PDP Computer, and build the display area.

In October, the new computer display showing DEC PDP8 was opened. At the last minute, Dick Berube asked for help in coordinating their lobby display. He furnished the corporate highlights and I was able to make necessary arrangements with Houghton Mifflin to use their book, "What is a Computer?" for the copy to illustrate parts of a computer. Edu Systems cooperated in supplying "Computers are for Kids," and other presentation material. Sally Bowers also loaned several enlargements of children at Computers. Roy Gould supplied a memory core, with a plastic shield as well as a small vial of ferrite cores. The exhibit was ready on time!!

In comparison to the Boston Science Museum, you would almost think this display was held together with "baling wire." However, as part of a newer trend in museum displays, a lot of preparation is left out of "black boxes" to offset the "mystery" of "black boxes" -- since the age level at Children's Museum is probably ten or under, accompanied by parents, rather than large groups; it is a different type of presentation than any others visited.

I was impressed by lack of a lower age limit, since even small ones could use it by experimenting with "Mr. Turtle" designed by Bill Mayhue out of parts and pieces of an erector-type toy set. The ability to read, really is the governing factor for use of the terminals.

Field Trips -

Out-of-State

From Sunday, June 9 through Saturday, June 15, the following museums were visited: (These visits coincided with a special Library Assn. meeting at the same time):

Carborundum Museum, Niagara Falls, New York

Company sponsored, built by company but leased back to the museum. Excellent lighting, good displays, of uses of Carborundum and related subjects, fee charged but not adequate to cover expenses. Staff too small for adequate security measures to cope with overflow from Niagara Falls on cold days -- building almost overpowers mission of museum.

Toronto: Ontario Science Center (See photo in Section II)

Contacts: William Castledine  
Chief of Electronics  
(Design Dept. in his area)

John Fowles,  
Sr. Education Officer

One of the older IBM exhibits from a worlds fair had been "cannibalized" by them as a basis for a large computer display. In contrast to the Honeywell exhibit in Boston, this exhibit tries to show principles of operation in all computers. As an interesting part of the tour, Mr. Castledine said he had a surprise to show me as a finale. He took me to see the TicTacToe exhibit again, down a corridor, behind a screen to see what ran the game -- a PDP 8!!

John Fowles, Education Officer, had a complete package made up for us of "how to book a school visit," through final record keeping forms. It was most interesting that their vandalism rate was much less than Boston Museum, and as a result made a great difference in the type of their displays. I consider this a AAAA museum to be studied for their method of solving problems with the public. Their exhibits are excellent, in content and display. It is colorful, fun, with a warm welcome by their "hosts" in white coats. Since all of their displays lean toward a non technical approach, there is excitement in finding and discovering new items for each visitor. An "Ask Us" phone network really works for in depth questions.

**ask us**

is the Ontario Science Centre's scientific and technical information service. We answer questions about: 1 technical problems in the home and at work\* 2 hobbies 3 Science Centre exhibits 4 whatever interests you. Replies are given in writing, and if we can't answer your question, we will tell you who can. \*(we don't do entire school projects for students!)

I know, I tried it, and the answer arrived back at DEC before I did! This is undoubtedly the best example of "how to" for a museum with hands on participation from the time you enter the front door until you leave - open to the entire public - kindergarten through Sr. Citizens.

Since the Province of Ontario funds them each year, there are no budget problems. The staff invites further visits, will share ideas or answer questions and believe that a "For-Profit Company Sponsored" museum of the scope proposed is one of the most rewarding achievements for the museum world. I think their phrase was "heritage, festival, and horizons," which can translate "history - fun and games -- and future year 2000."

Ontario Place: (Civic Center)

Many little theaters, much color, very contemporary, non-technical.

Pall Mall of Rothman, Ltd. (Company sponsored)

Traveling art, graphics, print, displays as loan exhibits to non-profit museums, institutions (colleges, etc.) paid for and sponsored in full by Pall Mall as a Company Museum to enhance their image without saying "smoke our cigarettes." The Stratford Art Museum furnished a permanent home for this collection. If we had a museum that qualified, they would be happy to send their graphic or prints -- Michael Nye, Asst. Director had seen our display at the recent trade show, in U.S. (ANPA?).

McMichael Canadiana Historical Museum  
Klienburg, Ontario

I went to this out of curiosity to see how a building similar to the Mill in Maynard could be used. It was a delightful combination of old artifacts, with simple design, clear labels and dates, intermingled with historical copy - a very non-boring display.

In conjunction with the Library meeting, I met with the museum groups and science and technology sections to renew my entre into the archival and historical information sections of other computer companies.

Elizabeth Brown, IBM, Armonk, N.Y., is an old friend and welcomed the opportunity to be of assistance in any way possible. She, in fact, set up all our contacts with John Lowe, Exhibit Manager in N.Y.C. where the Eames Wall is, and she will cooperate in all possible ways in the future to put us in touch with the right thing.

While in Toronto, I also attended several meetings at Mimi Cumming's request to bring back names or papers from the meetings attended, since she had a conflict in schedule that prevented her attendance.

## United Aircraft Corporation

Upon my return from Toronto, I was referred to the United Aircraft Corporation for information concerning a "Survey of Company owned, sponsored and supported Museums." I understand copies of this have already been routed by Roy Gould; a list of 50 museums in this country and 16 in Europe. Harvey Lippincott made this survey in October of 1973 as a company confidential document. He is an Engineer - turned Corporate archivist, with a very comprehensive overview of the technology - oriented content of a museum similar to what we have discussed.

Roy and I made a one day field trip in August to discuss in detail, portions of his report which were better discussed in person than in writing, as it could merge on UAC company confidential figures or decisions. We were shown his collection of slides, and he discussed at length UAC's philisophy, legal aspects of museum in relation to company, and final cost of plan as it was presented for their museum.

Since the plan for the UAC Museum included a new building, a new location, an over-ambitious design planned by an architect, and finally ended in costs of a million and over, no action was taken by UAC. The cost did not include any aircraft or engine displays. I had the feeling that none would ever be taken, but this feeling was based on the plan as presented. The interest in collecting and preserving company history and old engines did not diminish. Their choice items will be used as company exhibits in various locations. Later Mr. Lippincott did supply a summary "factors in establishing and maintaining a company oriented Museum" for review by DEC's Legal Department, where Marietta Ethier did an excellent comparison between company-owned-sponsored museums and museums as a separate non profit entity.

## Corning Glass Center

Contacts: Robert B. Wake  
Operations Manager  
Francis J. Doherty, Jr.  
Mgr., Public Relations

These men met with Roy Gould, Bill Harrington (of E.T. Fahey, an exhibit house used for trade shows) and me for a one day tour and "how we do it" session. As explained by Frank Doherty, Corning was almost forced into some means of supplying "culture" to their management employees in order to keep them, when the decision was made to locate glass works in the "backwoods" of New York State, where there was an adequate labor market many years ago, for the glass factory. Social responsibility by Mr. Houghton (founder) and later members of his family was the basis for many contributions to the community in the form of buildings and financing of the arts.

In 1951, when the International Headquarters of this growing company was located in Corning; the Glass Center was built to do several things. It celebrated the 100th anniversary of Corning Glass Works, it helped establish an image of a growing company, desirous of improving the quality of life for its people. Later a large auditorium was added which has really become "the community center." So much for philosophy and paternalistic history. The make-up of this Center is really in three parts, each showing a different aspect of glass:

- . The Corning Museum of Glass

The entire history of glass is presented in chronological order with thousands of glass objects from earliest items to the present. This is truly a collection of historical value, from all over the world.

- . The Hall of Science and Industry

This section presents the manufacture and uses of glass in today's world. There are pushbutton exhibits as well as some slide shows.

- . The Steuben Crystal Gallery

A guided tour shows the factory where the Steuben glass is poured, engraved and polished.

This Museum is a good example of the drawing power of the Glass Center, since it is 50 miles from "nowhere," and yet has become a major tourist attraction for three quarters of a million people each year.

The method of funding/sponsored/profit/no profit status was a delicate balance handled legally by the Center as a separate independent Corporation. Funding came from several sources, the major one being Corning Glass Foundation (back to original Houghton family philosophies). It was my understanding that the Center as a whole did not pay its own way, but once integrated into the community, politically and socially, it became difficult to withdraw to any degree.

Dr. Jack Martin, Administrator for Corning Museum and John Peck, Corporate Attorney, Corning Glass, are two names given to use for future reference if DEC counterparts would like assistance or background information at their own professional level. They've been through it all, and would like to share their knowledge, to keep us from making some of the mistakes they made.

## IBM

Exhibit Center of International Business Machines Corp.  
57th and Madison, New York City

John Lowe, Exhibits Director

Since I have not visited this exhibit, I feel the best summary of many of my telephone conversations can be summarized in a trip report by another. I gave Mimi Cummings as much background as I could before she made a trip to N.Y.C. for another meeting. Because of her interest in this whole museum project, she offered to meet John Lowe and take a tour. I quote as excerpts from her trip report:

Visit with Exhibit Director, John Lowe 7/10/74  
by Mimi Cummings

Most important step is to determine

1. WHY you want a museum or exhibit?
2. WHAT you want in it?
3. For WHOM this will be - what audience?
4. HOW you will evaluate its success afterwards?

Originally IBM had its products only in this exhibit. This lasted for about 7 years. Then 3 years ago they changed over to this museum concept and have found it much more in line with their objectives than just exhibiting their "wares." The following are suggestions gleaned from my visit.

Be sure that your exhibit or museum does not duplicate any other exhibits in your geographical area. In other words, even in Maynard, it would not be wise to attempt to compete with the Museum of Science or the Childrens Museum.

There are definitely conservative and more liberal philosophies behind museums and their objectives. Determine what these are and be sure that your concepts behind your museum fit in with the philosophy of your company on other matters.

If your Why you want a museum is go educate people in general about computers - John Lowe says "forget it." The industry is changing so rapidly that no museum can say something to everyone. The very sophisticated person will not find what he wants, and it is very difficult to teach something about computers to someone who knows nothing to start with.

IBM's WHY is partly an attempt to show that a technology oriented company that makes cold hard things like computers can have a place that is physically attractive with real human beings in it that speak to you when you come in and attempt to help you relate to some of the hardware which is demonstrated there.

Therefore, IBM's objective is not to teach the general public, but to enhance IBM's image with the general public, and to show people that they can have some sort of relationship with a computer that is not negative. Then, hopefully, they may want to learn more about computers or at least think more highly of IBM.

The cost is much bigger than you will first estimate because the cost of staffing to keep the museum going and productive will keep growing, in order to make whatever sort of exhibits you have meaningful.

You must have good literature to take home because no one can take in what you are trying to tell them on a once-around the exhibits.

People mainly come to exhibits or museums to be quiet, or get warm, or be mildly entertained. Their desire to be educated is not usually their number one motivation.

Don't be parochial or pat your company on the back. Be more subtle.

If you are an exhibit, say so - don't pretend to be a museum.

If you have anything in the way of exhibits that people operate themselves, each must be constantly moderated by a staff member. Every machine must be duplicated to handle "down time" - it would never do for the company's own machines to be inoperable.

Don't try to say so much to the person that you put him on the defensive. If the museum says to him, I know more than you do, he will not leave with a feeling of satisfaction. Rather he will say, boy am I stupid, and will feel negatively about your company subconsciously.

Be prepared to make some changes in exhibits with the seasons.

Some further statistics for the same gallery:

- . covers 8000 square feet
- . two school groups handled per day (age level, Jr. High)
- . a short tour, then a film theatre with several Eames IBM films.
- . no admission charge
- . gallery is completely company controlled and sponsored.
- . size of staff varies up to 10 in all
- . 2/3 on floor at a time, for one hour duration
- . two managers and eight "floor people" in all
- . staff taken from many disciplines and assigned for one to two year duration. (This period can be flexible if a wrong selection is made for a "floor" person).
- . outside exhibit company provides annual maintenance at about \$15,000 per year for just panels and graphics.

There have been several different exhibits - Astronomy, Copernicus, plus a "green growing corner" in addition to Eames exhibits and IBM consoles. However, I understand that in November '74, the entire exhibit center was closed indefinitely, and what could be used as a window display would be so used.

In October, after a week of interviewing museum designers and planners, Roy Gould selected Admore, Inc., from Shrewsbury. For about six weeks I worked closely with them to provide orientation in the computer field, historical references, books, reprints, films, and as much background as I could. Field trips were arranged so that they might have first-hand experiences with children and computers at as many age levels as possible. These field trips are briefly summarized as follows:

IBM, N.Y.C. Bob Francesca and Fred Moore met with John Lowe, in N.Y.C. at the IBM Exhibit.

Chicago Science Center - Fred Moore of Admore accompanied Roy Gould to Chicago to visit their exhibits on October 1 and met with Victor Danilov who has written many articles for Science Center and museum publications. It was really a double purpose visit since Chicago Science Center was soliciting funds for their exhibits to celebrate the Bicentennial. Their theme was "American Inventive Genius" and they were looking to American industry to finance it. Roy advises that he went in reply to their request for funds and reports that none were donated.

Lexington School System - The following suggestions made from many sources within DEC for the best exposure for the Museum design firm seemed to be visits to schools with DEC installations. Peg Pulliam who is a math specialist in Lexington brought a group of five third or fourth graders to the Lexington High School Computer Center. Some of these students had not seen a computer since their classes a year before, but they picked it right up again.

Newton North High School - The Newton System was quite different. The head of the Dept. called in three students who actually used their own time after school to do some needed programming for school, to list all programs available, and they were paid an hourly rate. Their enthusiasm and creativity came through loud and clear as an example of "student and machine." All three students wanted a job in the museum!! Along the way somewhere we met a 16 yr. old who had been in an MIT summer session as a teacher for BASIC, on one of the computers down there.

Childrens' Museum - Here again was another age segment to look at, with the types of displays, ages, sizes and needs for a staff. Bill Mayhue was most cooperative in explaining their reasons for displays and programs. He felt that having the electrical connections from DEC Writers to Central Console so that children could trace it did no harm, because they all knew that there were

wires to and from their telephones, too. This is the most simplified of all the computer displays, and in many ways the most successful with the visiting public (October to March 1, over 80,000 visitors).

I accompanied the designers to the above three appointments.

*Other Reference Sources*

## Whirlwind

Late in August I received a request to research some background for Ken Olsen's talk. During this period we obtained a copy of NBC's "See it Now" series by Edward R. Murrow, with a 15/20 minute section on Whirlwind from their archives. In addition, a film "Making Electronics Count" was loaned by MITRE as well as some 45 to 50 black and white negatives, which were copied and which I have documented exactly as MITRE did. In addition, we have three volumes from their archives as listed below:

- AC-6 Whirlwind I Computer (MIT Project 6345)
- AC-23 Memory Test Computer
- AC-31 Lincoln TX-0 and TX-2

This is their inventory of what was sent to the Smithsonian Computer History Project. In establishing our need for these references previous to Ken's request, I found that many original documents from this historical period were being destroyed by both MIT and Lincoln Lab as they were microfilmed for permanent and legal records. I began to "collect" just to keep from destruction.

A number of the early report series on Whirlwind I were among those contributed from various sources. These reports were added to those already on file in the Library. Since this is not a complete collection, it would be most interesting to get as many of the historical reports as possible in their original form. I am working on this. Professor Hartley at MIT archives loaned us many needed references in this search.

The Engineering notebooks requested by Ken are available, but only from microfilms, "they say." I know the archives and Library group well, many were originally in either Div. 6, or one of the sections concerned with computers and some things are "squirreled away" as souvenirs. I feel sure that if we can take some sort of positive action prior to these individuals' retirement, we might have some more interesting items than just "copies" from a film. John A. Kessler, in the Director's Office of Lincoln Lab, has extended an open invitation to use his records; or ask for guidance in looking for what we need. I have tried not to abuse this privilege until I really have a bonafide list.

While researching the Whirlwind era I found several books in preparation:

MIT - Professor Karl Wylde is writing a history of servo-mechanisms and electrical engineering departments with Gordon Brown, in active support of the project. I have been invited to review his manuscript when typing is completed. WWI is included briefly.

Smithsonian - Manuscripts for two books, each started by principal investigators for the Computer History Project, never really were completed. Copies of these are with Ken McVickers at MITRE. They are also available for reference.

MITRE - Ken McVickers is working in a History of Whirlwind, showing some of the "Whirlwind Firsts." He gave me a short summary copy, which is included in the second section of this report.

Bell Labs - Several books are being written or edited in various parts of the country, that have references to items of interest for us.

WHIRLWIND "FIRSTS"

Although it is difficult to say who was "first" with the many innovations spawned by the fast growing computer field in the 1950's, WWI was the first high speed digital computer intended for real-time applications to run reliably. As a result, it provided a chance for a multitude of enthusiastic and inspired technicians and users to develop their ideas and realize their rewards in an operating system, an inspiring environment replete with exciting opportunity.

This same situation, the opportunity to "do something" and "see it happen" was to result in a spur to do something better rather than to publicize what was done. Although Whirlwind was perhaps the best documented computer in history, it was the most poorly publicized. In a book published in 1950 entitled "High-Speed Computing Devices," published by McGraw Hill, Whirlwind is not even listed in the chapter on Large

Scale Digital Computing Systems even though others, behind Whirlwind in development at the time, are described. Of the approximately 400 references cited in that book, only three were related to Whirlwind and all of those to electrostatic storage.

Among the firsts which should be credited to Whirlwind are:

1. development of high speed digital circuits operating at a clock rate of 2 megahertz and utilizing pulses  $.1\mu s$  in duration;
2. first computer to operate with a magnetic core memory;
3. first computer for which a "simplified" or "user oriented" language was created;

4. first computer with a family of utility programs for input conversion, program assembly, program trouble shooting;
5. first computer to use diagnostic programs to locate machine malfunctions;
6. first computer to run with diagnostic programs designed to locate defective components to plug-in-unit level, to component level;
7. first computer to incorporate a voltage variation sequence, imposed while the computer was running, to locate deteriorating components and anticipate failures. This technique called marginal checking permitted many potential

failures to be located before they happened and allowed the machine reliability to exceed statistical predictions;

8. first digital computer to drive a cathode ray tube with a display of the results of its computation;
9. first digital computer to incorporate a "light gun" which enabled an operator to designate to the computer a single display point out of a multiplicity of display points on the cathode ray tube face;
10. first computer to accept digital data transmitted over a phone line;
11. first machine to operate with a remotely located interactive terminal - (CHARM -

TTY at Logan connected by phone line  
to WWI);

12. first machine to operate with a multiplicity of input (keyboard, light gun, TTY, typewriter, digitized radar data)
13. first digital computer to operate in real time with on-line man-machine interaction;
14. first machine to operate with multiple on-line operators simultaneously; the first "time shared" computer;
15. first computer to perform track-while-scan on remoted digitized radar data;
16. first computer to conduct a live intercept of one aircraft by simultaneously

tracking both the pursued and the pursuit aircraft, making the necessary intercept calculations and providing vectoring instructions for the interceptor;

17. first machine to demonstrate a pattern-recognition capability in which an object could be placed on the detecting surface at any location with any orientation and be recognized by the computer;
18. first digital computer to be used for remote control of aircraft via a data link;
19. first machine to run a document retrieval capability.

## Smithsonian

Several years ago, the Computer History Project was established in the Natural Museum of History and Technology at the Smithsonian, Washington, D.C. The American Federation of Information Processing Societies (AFIPS) attempted to fund the project with necessary funds, since all that could be furnished at Smithsonian was space and limited manpower. This fund raising attempt was not successful as an on-going project. When an Exhibit is installed there, it is usually funded by the donor, since it becomes an item of historical value, by being accepted. A number of computer reference collections have been sent to the Smithsonian. The same list that MITRE sent has been given to us in three volumes, from their archives.

John Kessler in the Director's Office at Lincoln Lab has no copy of their master list as sent to the Computer Project; however, we have access to their complete collection, including archives. This is a valuable source for continuity in documenting Whirlwind.

My impression of holdings at Smithsonian is that one must walk in the door to use the collection. A very small part of it is available to the general public, the balance is either boxed, in storage and often even restricted in user access, as designated by original donors. I also understand that items are available for loan under right conditions.

*Conclusions*

*Part I - Actual Resources available to the  
DEC Museum Project*

*Part II - Modus Operandi*

*Part III- Personal Recommendations*

## Conclusions

The early history of computation, math, counting and calculating, etc. has been almost overdone. So a wealth of source material is readily available. Harvard, MIT and Boston Public Library resources and collections are all useful and available. MIT has stored a number of their engineering notebooks prior to 1940, with the Boston Public Library archives. We will have any access needed. MIT archives have already helped in many ways, with loans or copies; and Harvard is as cooperative.

Lincoln Lab collections, library, archives and documents control are so closely entwined with MITRE and their archives, that I am referring to them as though they are one. This open door policy includes John McKenzie, with all TXO documentation, (Cambridge), John Kessler, Lincoln Lab, Office of the Director, and the entire MITRE organization. Needless to say, this is possible because of Ken Olsen and the total background of the history of DEC. If it's still "alive and well" and not destroyed, we may use, borrow or copy!

DEC company archives are a different story. There is a huge gap in the continuity of historical records about the company that is almost frightening. Annual reports give a bare bones skeleton. "On-line" from the first issue are stored in Marlboro and give a better clue. But not any backup records. In the short time of my project, three or four file cabinets full of historical files have been filled and stored in the Library.

Included are several early scrapbooks, an incomplete collection of technical reports on Whirlwind. When the Mill was purchased, I became the coordinator to pull together a record of what had been floating around, and list the items. This includes copies of early photos, some enlargements, and some Maynard Historical society films, etc. All items will be stored in the Library where they can be documented. Non DEC archival material in the form of other computer manuals has been offered by a number of individuals. Mike O'Connell and Sal Crisafulli are two who have discussed their collection of "good junk" in detail. I gather their wives need more space in their attics!! Since there was a space problem, all I have at the present is just lists.

As a result of the research for the Digital Museum Project, a resource file on historical references and computers 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
- 4) Reports, correspondence and reprints file on computer displays as well as museums.
- 5) Access to authors' of books currently being written, not yet published.

From the contacts that are already established, I feel safe in saying there would be no difficulty of any kind in collecting information from archivists, from other companies with historical displays, or discussing loan or exchange of like items, either hardware or software, with DEC. The response has been consistent, "tell us when you are ready, tell us what you would like and we will help in any way we can" --- Obviously, this is from the basis of non-proprietary items or information.

## Conclusions: (Modus Operandi)

Records show that in at least 75 percent of the companies with museums one or two persons in executive authority collected artifacts, of a related nature, or even used personal collections or early company products as a nucleus for a museum. DEC is in line 100% with this premise. However, there are so many other factors, plus the changing face of museums, as well as the state of the art in Computers, that I would like to summarize a few factors that have been common to several museums:

1. The highest priority I give is to the consideration of cost of establishing a good museum, for the public. This comes from the many individuals who are already in a company museum and bluntly it has been "Can you afford it?" No specific costs were discussed but there are individuals who are willing to reveal some details of their own experience, should we go back with a firm charter, as guidelines. Not a single company museum visited was self supporting. There was always a subsidy somewhere in the background, i.e. Corning Glass Foundation for Glass Center; and as of late 1974 the IBM Exhibit closed, with just a sidewalk window display. Based on hearsay, and "guesstimated" figures, museum "startup" and operating costs in relation to company sales range from a small fraction of 1% to 5%.
2. Since many companies that are growing find they are expected to have also a growing awareness of social and political problems as they affect the general public, museums open to the public can be construed as a company effort in good citizenship. I am sure DEC has already gone over this route of thinking many times. It is image, public relations, as well as useful as a tool at times for customer relationship or better company morale.
3. Type of Museum - In planning a museum from scratch all roads led to "keep it as non-technical as possible." One museum manager even listed reasons people come to museums as, "to be quiet, get warm, sit down, or be mildly entertained." Perhaps this is farfetched, but it is a factor in planning. No one has seriously indicated that education was a high priority of the general public.

Participation at some level by all who visit is

a must. As Victor Danilov at Chicago has written "push a button, turn a crank" has no substitute today. Interested visitors are also less apt to be destructive. To have integrity, the exhibits must lead one to more curiosity, or even an "ask us" button. AV displays are increasingly being used as a means to orient the public or bring variety and change to programs.

- 4) Size of Museum - Contrary to "museum myths" size has nothing to do with the caliber of the museum, or its designation as a museum. Many company museums started (about 30%) with a choice collection used in conjunction with a company anniversary.

Successful company museums vary from 2000 square feet to 185 acres in size. Generally speaking, 75% of the museums surveyed have a floor area less than 10,000 square feet, as a starting point. Those exhibits which show quality, excellence, integrity of content, good documentation of archival material are accepted as being as professional as any in the museum category.

The fear of commercialism often associated with many company activities does not usually extend into company museums. Most companies want their museums to be museums in the highest cultural and artistic sense, even though they expect to reap benefits for the company.

## Personal Recommendations

My first reaction to the news that the museum project was going on the "back burner" was "it's a good thing." This could be an opportunity to consider "feedback" from all sources, plus an evaluation of what has already been researched. There is a better chance that what was an undefined charter in the beginning, can now be defined within bounds of achievement. Based on a memo concerning display of computer parts that we already have, as I wrote September, 1974, I feel we already have a good start toward the display of an antique collection. This has been an unchanging and ongoing desire of management as I have read the "signs," and I prepared background material accordingly.

I am told that the combination of individuals involved, Ken Olsen with his MIT background, the impact of DEC as a company in the computer technology, Gordon Bell as an author and designer, is a combination that invites cooperation at the highest level at this particular time in history. I have already found this to be a fact. PDP has been described as "PDP-eople" I believe this is part of the reason for the success and cooperation both within and without the company in collecting information.

The planning of a museum which will include the contributions of all other companies without proprietary emphasis as a museum collection is a most valuable asset. Much of the material available now should be collected in one location before it is forgotten so that it may be properly placed in a time line. I think it is important to establish the relationship between the early large systems as developed in the cooperative university environment and the later development of the mini computer from one of the same sources.

I feel that the guideline for a corporate company museum is already established which serves as a firm foundation for implementation. I see no attempt to depreciate a museum with company commercialism, lack of good taste, or lack of professionalism. There seems to be a DEC image with a line down the center, one side is "go-go"/the other is conservative "let's see."

I feel Corporate management still wants to get started on a museum. My enthusiasm and interest have increased as I have learned more. The budget seems to be the controlling factor today. I would like to disregard this item and make a few suggestions.

Let's assume that a DEC Museum can do certain things for a company:

- . enhance its business standing with its customers,
- . enhance the name and image in the Public's eye,
- . provide a broader base of understanding of of what a company does, for a company that has as many employees in many different capacities. Better employee relations. (Few departments know what the one next to it even does),
- . show that company technology is good, hence a good product result,
- . increase public good will, recognition of integrity as a people-oriented "anti-big," even if a big structure exists,
- . increase awareness toward company by other companies, and professional groups.
- . increase public understanding of the industry which can have economic, and political benefits,
- . for a company with non-consumer products, the museum can be a means of becoming better known to the public. (Help dispel fear of a "black box" or "Computers mess up my charge accounts" syndrome).

The next step is to determine how, when and where. I do not feel that it is necessary to tackle the total expenditure or commitment of a budget until a number of other planning facts are established, and perhaps even implemented and results evaluated. There are no figures available on how to measure quantitatively the effect on business, but most businesses are convinced that museum visitors do benefit in some way that could lead to referring a lead or buying a product.

I suggest tackling the museum as other DEC products have been produced; by modules or building blocks, which can add up to a complete system as an end product. Costs can be controlled, if experiments can be made, the unsuccessful can be replaced with a better solution. As an example, the present lobby exhibit, if planned correctly, could have certain portions produced in such a way that there could be multiple exhibits, for loan, or travel all over the world to DEC offices.

One office in Kanata, Ontario, has designed its own display of a combination of "history" and today's company products. Brian Coll has supplied pictures which are in the second section. It has been most successful. In a discussion with him he was unaware of the time sequence or relationship of WWI to DEC and would have omitted it completely for future additions in his display. It now stops with Babbage analytical engine diagram, but I gave him a copy of the WWI chapter from Bell and Newell and a time line chart, which made a big difference!! An initial exhibit with the "historical tree" can certainly set the stage for the second "DEC family tree." AV/or graphics designed for public consumption, in support of either the history line or the DEC family tree, would be a good company employee orientation device of great benefit here and abroad. From this as a starting point, some reaction can be expected for level of reception from the viewing public.

As a beginning, establish an "intent" or policy statement that can be implemented at this time to put a museum plan into operation.

Establish a central location for control of material already collected. This does not mean everything has to be in one place, but the helter-skelter of the past, resulting from the fast growth pattern of the company could be better controlled. What is collected should also be useful to everyone at DEC to end needless duplication in search of corporate history or background. Some communication should be attempted within a reasonable limit at this time to locate what has been done, or is being done with archival or historical type files, since there is already material similar to this in the Library. I suggest it be continued in the same location, with one person as a control point, as an I/O station.

If this is established, whether anyone is actually assigned to a museum staff, there will be an opportunity for forward motion outside the company to continue to supply information or resources, instead of destroying or "forgetting."

Establish the next step for a display to include WWI, perhaps using as a base some or all of the material as furnished by MITRE to the Smithsonian. Determine what other relevant outside computer "swaps" are desirable, then begin to trade WWI, or ask for reciprocal loans. With a "museum intent" statement, this is then in order. How and when we display it becomes incidental, as long as it's within a "museum framework."

Establish an "ad hoc Committee," whose function is to operate under guidance of Ken and Gordon with enough flexibility and authority to show achievement and progress. By tying together guidance, authority, research, plan for design, its implementation or functions, there could be continuity. Perhaps such a system could manage to ride with all other factors, on a demand basis, without having so many "startovers."

Now to displays of DEC equipment, I feel it should be for fun and participation; an interaction on the basis that a visitor assembles his own experience. Some type of proper orientation or familiarity, when the visitor is on an area unknown to him, can assist him to identify the beginning of an experience. Once he has this overview, he can select his own area of interest and needs. There are already enough people who know what is good in this field for me to comment on the extent of display or hardware used. Just keep it as non-technical in explanation as possible.