Kenneth H. Olsen
Memos Received - July, 1969

incomplete

TO:	FROM:	RE:	DATE:
Ken	George Arnold	Promoting computer interest in schools	7/1/69
Ken	Jack Shields	Letter From Detlef Bock	6/2/69
Ron Ginger cc: Ken	Rob Katz	DEC No.64025 - PDP-9 for Medical College of Ohio	7/14/69
Ken	G. Thayer	Profile: Murray Ruben	7/14/69
Ken	Ed Kramer	Dan Liebowitz - LV Computer Systems	7/14/69
Ken	Joe St. Amour	Sixteen-Bit Words on the Small Disk	7/14/69
Ken	Larry Portner	Attached Memo "IBM Competition"	7/28/69

digital INTEROFFICE MEMORANDUM

DATE: July 2, 1969

SUBJECT:

TO: Fred Gould
Bill Long

FROM: Ted Johnson

Do we have a common policy on the sale of our semi-automatic wire-wrap system? Since they could play a role in module services, I'd like to see a clear agreement.

mr

digital INTEROFFICE MEMORANDUM

DATE: July 2, 1969

SUBJECT: Public Telephones

TO: Ken Olsen

FROM: Nick LoRusso

cc: Stan Olsen
Pete Kaufmann

We can arrange the installation of additional Public Telephones by a guaranty to New England Telephone Company of $0.35 per day per phone. If the phones were not used at all, they would cost only $11.00 each per month.

The Telephone Company is rather slow in installing Public Telephones, but I will arrange for the installations once I know where the problem areas are.

Nick

lets do it.

digital INTEROFFICE MEMORANDUM

#5

DATE: July 2, 1969

SUBJECT: Westminster parcel

TO: Ken Olsen
cc: Ed Schwartz
Pete Kaufmann

FROM: Al Hanson

Attached you will find the survey information on the Westminster parcel.

Description of land of John Heimo, Jr., a certain parcel of land situated on the northeasterly side and the southwesterly side of Sargent Road and on the northerly and southerly side of Route 2 a non-access State Highway in the westerly part of said Westminster, Worcester County, Massachusetts, bounded and described as follows:

BEGINNING at the southeasterly corner thereof at a highway bound in the northerly line of Route 2, and land of Arvo W. and ~~Aaino~~ Aino M. Sipila; thence westerly by a curve to the left having a radius of 7750.00 feet by the northerly line of Route 2 a distance of 472 feet to the easterly line of Sargent Road; thence north 22° 7' 23", 80.43 feet to a corner; thence north 50° 41' 08" west, 46.10 feet to a corner; thence north 1° 17' 13" west 35.0 feet to a bound; thence north 1° 16' west, 220.31 feet to a corner; thence North 14° 35' west, 155.29 feet to a corner; thence north 36° 56' west, 1079.44 feet to a drill hole in a stone in a wall at the most southerly corner of land of Arthur Smith, et ux. The preceding 6 courses being by the easterly line of Sargent Road; thence north 28° 43' east by land of said Smith 389.37 feet to a drill hole in a stone in a wall; thence north 22° 16' west by a stone wall by land of said Smith and land of William C. Foster, et ux, 615.73 feet to an angle in said stone wall; thence north 42° 41' east by a stone wall by land of said Foster, et ux, 833.66 feet to a corner of walls; thence south 47° 22' 22" east partly by a stone wall by land now or formerly of Connecticut River Power Transmission Company, land now or formerly of Thomas J. Kymalainen, and land of Aarne W. Aho, et ux, 2545.0 feet to a corner; thence south 42° 37' 38" west by a stone wall by land of one Edison and land of Arvo W. and Aino M. Sipila 1858.0 feet to the northerly line of Route 2 and the place of beginning. Containing 88 acres more or less.

The above described parcel is conveyed subject to an easement, 25 feet in width granted to the Commonwealth of Massachusetts, lying northerly of the first described course and adjacent thereto. Also, a certain parcel of land situated

on the southwesterly and westerly side of Sargent Road and opposite the above described parcel, bounded and described as follows:

BEGINNING at the most southerly corner thereof at a stone bound in the northerly line of Route 2, and being the southwesterly corner of a southerly terminus of Sargent Road where it abuts Route 2; thence westerly by a curve to the left having a radius of 7750.00 feet by the said line of Route 2, 204.10 feet to a corner; thence north 8° 50' east by a stone wall by land of Kenneth E. Carpenter, et al, 48.0 feet to an angle in said wall; thence north 72° 44' west by a stone wall still by land of said Carpenter, et al, 205.2 feet to a corner; thence north 47° 13' 29" west by land of the Commonwealth of Massachusetts 62.51 feet to a bound; thence north 27° 32' 43" west 447.36 feet to a bound; thence north 50° 31' 02" west, 367.11 feet to a bound; thence north 39° 29' east, 300 feet to a corner; thence north 55° 07' 20" west, 668.70 feet to a corner, the preceding 5 courses being by land of the Commonwealth of Massachusetts; thence north 17° 25' east by land of William C. Foster, et ux, 222.0 feet to the southerly line of Sargent Road; thence ~~south 85°~~ South 84°40' East 10' east by a stone wall, by the said line of said road 25.0 feet to an angle in said road line; thence south 55° 49' East, 668.20 feet to an angle in said road line; thence south 36° 24' east 1057.90 feet to an angle in said road line; thence south 16° 24' East, 132 feet; thence south 1° 17' 13" EAST, 250 feet to a corner; thence south 38° 31' 07" west 39.05 feet to a corner; thence south 21° 28' 55" west 43.17 feet to the northerly line of Route 2 and the place of beginning, the preceding 7 courses being by the southerly, southwesterly and westerly line of Sargent Road. Containing 13.4 acres more or less.

Also, a certain parcel of land lying on the southerly side of said Route 2 and the westerly side of Sargent Road and being opposit the above first described parcel, bounded and described as follows:

BEGINNING at the northeasterly corner thereof at a bound in the southerly line of Route 2, at land of Ernest C. Wilson, et ux,; thence south 42° 37' 38" west by

a stone wall by land of said Wilson, 369.4 feet to the easterly line of Sargent Road; thence north 2° 33' 27" west by the said line of said road 381.11 feet to the southerly line of Route 2; thence easterly by a curve to the right having a radius of 7450.00 feet by the southerly line of Route 2, 288 feet to the place of beginning. Containing 1 acre more or less. Being a portion of the premises conveyed to me by deed of etc.

7-1-69

Nick

Ken:

I've just finished reading Fitchburg State's project RECES proposal. sent to Nick

The main problem for DEC in the educational market is getting older and "slower" math and science teachers interested in computers.

This project appears to zero in on this problem and could be most useful to DEC. I recommend that we support it. Specifically, we could pay them to write a text which we would publish, giving us an entry into many other teacher's colleges.

George Arnold

digital

July 9, 1969

Professeur F. Gremy
FACULTE DE MEDECINE DE PARIS
Centre Universitaire
Pitie-Salpetriere
Centre de Calcul et de Statisique
91, Boulevard de l'Hospital
Paris, France

Dear Professeur Gremy:

I trust you have received the information requested in your letter to Ken Olsen of May 9th.

If we at Digital can be of any further assistance, do not hesitate to let us know.

Yours very truly,

Steve Sobel
Assistant to the President

SS/bn

DIGITAL EQUIPMENT CORPORATION, 146 MAIN STREET, MAYNARD, MASSACHUSETTS 01754
(617)897-8821 TWX: 710-347-0212 TELEX: 94-8457

GREMY

Steve waiting for DEC to receive customer P.O.

ALSO
ALSO

MSG P 1458 JUNE 9 1969
TO STEVE SOBEL FROM PIERRE JAILLET

CC : ARNAUD PINAUD VALENCIENNE

RE : YOUR MSG 4543 -6--4-69

SUBJ : PROF GREMY LETTER

DO NOT MOVE FOR THE TIME BEING , A NEMO WITH EXPLANATION IS COMING TO YOU .
ACTION WE WANT TO DO ARE .

1) GET FIRM COMITTMENT OF TECHNICAL SPECS AND PRICE FOR DPO 1 C FROM SPECIAL SYST . US .

2) MAKE A FIRM OFFER TO CUSTOMER GIVING FIRM DEAD LINE TO PLACE HIS FIRM ORDER .

3) IT SHOULD BE NOTED THAT CUSTOMER IS REGRESTING A DELIVERY FOR A SYSTEM WHICH IS EVEN NOT GET ORDERED .

ALSO

Sobel 8/c

FACULTÉ DE MÉDECINE
DE PARIS

CENTRE UNIVERSITAIRE
PITIÉ-SALPETRIÈRE

CENTRE DE CALCUL
ET DE STATISTIQUE

91, Boulevard de l'Hôpital, PARIS-XIIIe

Téléphone : 707 67-79

P. 328

Paris le 9 Mai 1969

Mr Ken. OLSON
DIGITAL EQUIPMENT
146 Main Street
MAYNARD
Mass 01754
U.S.A.

RECEIVED
MAY 16 1969
KENNETH H. OLSEN

Dear Mr Olson,

We enjoyed very much your visit, my friend Pierre Jutier and I, and it was a great pity for me not to be able to stay any longer with you. As I hope you understood that we intended to have a large configuration. It can be, I think, of great importance for the success of your Company in France and in Europe. As we mentioned we need some very quick and accurate information about the DPO 1C.

You promised us to take care personally of this problem. I send you the precise questions raised by the engineers of my laboratory.

Yours very sincerely,

Professeur F. GREMY

We intend to connect in a near future (6 months) our PDP 10 to two remoted similar computers PDP 8 ; one will be 2 miles far, the other 150 miles far. The data transmission technique will be synchronous at the rate of 4 800 bauds.

16 teletypes (maximum) will be connected to the remoted computer.

The procedures of transmission will be a polling procedure, with the PDP 10 as master station.

PDP 10

EOT	XX	I	ENQ	if interrogation
EOT	XX	S	ENQ	if selection

REMOTED COMPUTER

Interrogation

	XX	NAK		if no information is available
SOH	XX	STX	(TEXT)	ETB BCC
		STX	( )	ETX BCC

PDP 10 ANSWERS

XX ACK if OK
or XX NAK if not OK

The procedure is symmetrical for the selection sequence.

So, we are interested to have informations on the following points :

- Do you have a data communication controller for full duplex operation for such transmission system ? This controller should be able to detect special character (EOT).
  We would like to see the following points emphasized :
- Do you have a Software able to handle such transmission procedures ?
- Do you have a Software to activate a task from a remoted teletype ? (like it is done now in the Time Sharing System).

If the answer at these questions is not positive, do you know if any DEC's customer is using such system ?

J.C. HIREL

digital INTEROFFICE MEMORANDUM

DATE: 14 July 1969

SUBJECT: Sixteen-Bit Words on the Small Disk

TO: Ken Olsen
cc: Grant Saviers

FROM: Joe St. Amour

Up until the past week, the PDP-11 people have had significant problems in trying to put sixteen-bit words on this disk. During this past week, I understand they have borrowed the peak detector circuitry which we are developing as a possible solution to the present big disk problem or as a technique for the next generation disk and found that it works very well. This seems to be the reason for their optimism, but I am sure that there are a significant number of problems that have been overlooked.

I have asked Grant Saviers to spend some time with these people and come back with a better definition of the situation. We would like to work with these people as time permits, and we have a tentative schedule that would show a redo on this disk complete by 1 May, 1970. A prototype would be built by January and debugged by 1 March. Previous indications are that this will fit with the PDP-11 schedule.

I feel certain that we can put sixteen-bit words on the small disk but that some solid engineering has to go into this project to make it happen. I will get back to you with more information sometime during the week of 21 July.

/gp

digital INTEROFFICE MEMORANDUM

DATE: July 14, 1969

SUBJECT: CMD Mono Disk

TO: Ken Olsen
Win Hindle
Don Zereski

FROM: Richard Clayton RC

CC: Bill Long
Jim Milton
Bob Lane
Lorrin Gale
Ed Kramer
Ray Lindsay
George Thissell

Below is a statement of the CMD Mono Disk situation as seen from the PDP-12 Product Line.

1) It should be an 8/12 Product Line Option.

2) Jim Milton has been assigned full time to the PDP-8 Group to be Project Engineer. The project will include at various times another engineer, a technician, and up to two diagnostic programmers.

3) Jim is presently firming up a set of tentative system specs with the PDP-8 and PDP-12 Groups.

4) This will yield the formal project plan.

5) CMD Disks have been ordered.

6) These will be evaluated by Jim's group using the old interface initially and then the prototype production interface.

7) After these two steps, a formal decision on when, how, and how much, will be made for the purpose of release to sales.

8) The PDP-12 Group sees no real forced requirement to accept orders or published specs prior to the above evaluations assuming these are done by late October.

9) The Disk will not initially be supported by PDP-12 System Software. The future details of software are yet to be worked out between Marketing and Programming.

10) We would expect to deliver units within three months of announcement, if not sooner.

RJC/reb

digital INTEROFFICE MEMORANDUM

DATE: July 14, 1969

SUBJECT: Dan Liebowitz - LV Computer Systems

TO: Ken Olsen

FROM: Ed Kramer EHK

Here is some background information on Dan Liebowitz, President of LV Computer Systems, and his company.

They presently have thirty PDP-12's on order (50K each) and are anticipating ordering more systems this year. I thought it would be a good idea for you to meet him and speak with him for a few moments.

bam

Encs.

digital INTEROFFICE MEMORANDUM

DATE: July 14, 1969

SUBJECT: Profile: Murray Ruben

TO: K. Olsen

FROM: G. Thayer

CC: R. Collings
Personnel File

Attached, per your request, is a summary of Bob Collings' and my comments on Murray Ruben.

Bob and I would like to discuss this with you at your convenience, and reach some final decisions.

GAT/lw

CONFIDENTIAL

CONFIDENTIAL

Profile: Murray Ruben
(Based on interviews/comments - R. Collings and G. Thayer)

A. Personal Factors:

Strengths

a) Highly competent analog/digital systems and circuit designer

b) Adept in systems programming.

c) Consciencious (on those tasks he has interest in) and hard working.

d) Works long hours/extra days.

e) Cost conscious.

f) Creative.

g) Sensitive to customer requirements for reliable hardware.

Weaknesses

a) Lacks interest in production engineering and manufacturing interface aspects of Project Engineer's role.

b) Poor administrator - dislikes paper work, scheduling, meetings. etc.

c) Independent - does not conform to or have concern for customary work habits - maintains irregular hours, fails to keep appointments on time, sometimes not at all.

d) Attitude is somewhat negative. Feels he has insufficient recognition for what he has achieved.

B. Job Factors:

Accomplishments

a) Systems design of KV Graphics System.

b) EDGRIN Software System

c) Logic design KV Graphics System.

d) Systems design Multi-Terminal KVGS

e) Logic design Multi-Terminal KVGS

f) Designed majority diagnostic programs KVGS/Multi-Terminal KVGS.

Failures

Insufficient carry through in release. to production phase/associated documentation.

b) Weak communications with service groups.

c) Lack of scheduling/policing of service groups.

d) Ineffective as Project Engineer (team leader)

CONFIDENTIAL

C. Conclusions:

Murray likes to work in a small controlled environment as a technical contributor doing systems engineering; systems architecture, and product development (prototype). He asserts that such a role was clearly agreed to in his pre-employment interviews with Nick Mazzarese, yet finds himself frustrated by the fact that he has been "shoe-horned" into the role of a Project Engineer. His ambitions and interests with Digital are in "research engineering and advanced development", yet he is uncertain if it will work out.

He is a powerful engineer capable of creative low cost solutions (both the hardware and software aspects) to systems problems. Ideally this is the role he is best suited for and prefers. However, if his talents can be utilized primarily in design, and support provided to him via a production engineer or project technician, he can perform effectively as a Project Engineer. (Bob has been utilizing this approach) If he is required to personally perform the production engineering and administrative tasks involved, he will fail as a Project Engineer, and probably should leave the Company.

Murray is very concerned about his situation and what people think of him. He knows his idiosyncrasies, yet has intense professional pride in terms of his design ability/reputation. He has requested a leave of absence for 6-8 weeks in August to go to Alaska, primarily because he wants to "unwind" from the mental strain/pressure he feels he has been under.

digital INTEROFFICE MEMORANDUM

DATE: July 14, 1969

SUBJECT: DEC No. 64025 - PDP-9 for Medical College of Ohio

TO: Ron Ginger

FROM: Rob Katz

cc: Ken Olsen
John Jones
Mort Ruderman
Bob McInnis
Don Zereski

On July 10 Dr. Yanoff, the Medical College of Ohio, called Ken Olsen with questions and complaints about his PDP-9 system which was delivered last month.

His complaints seem to boil down to questions which any Field Service man who knows about the PDP-9 can solve (i.e. missing documentation, and diagnostic routines which do not apparently work). It seems, though, that the Field Service Engineer who was assigned to install the machine, and the EAE, really had no idea as to how a PDP-9 works! Dr. Yanoffs problems are that the EAE does not work and that he is missing documentation for the EAE and API. He is also missing some kind of logic that you were preparing for him to hook up to a skinner box.

The solution to the above problems can probably be solved by you and Gill Slaw (Regional Field Service Manager) going out to pay Dr. Yanoff a call.

As far as Dr. Yanoff's questions go:

1. There is no money for the LT19B and C, Mort Ruderman is about to issue a unusual order form to lend them to Medical College on consignment. They will be shipped in August. Note he will get documentation on the LT19C with the hardware.

2. Computer Administration is trying to ship the extra DECtapes we are loaning Dr. Yanoff this month.

3. Background/Foreground in its preliminary form will be sent as soon as it is verified that the PDP-9 has certain ECO's in it.

4. Computer Administration cannot order a line printer without a firm Purchase order. Therefore, the normal six month ARO applies. At this time he has submitted only a letter of intent.

5. The Hewlett Packard Card Reader has been ordered, but they are quoting idefinite delivery, no date is available at this time.

RK:dl

digital INTEROFFICE MEMORANDUM

DATE: July 15, 1969

SUBJECT: Ten Key Positions to be Filled - Professional Personnel

TO: Operations Committee

FROM: Pete Koch

CONFIDENTIAL

CC: R. Lassen
G. Thayer

Listed below are the ten positions which we show as the key jobs to be filled, based on inputs received from the various managers and Operations Committee members.

B. Kopp Group	
EDP	Senior Analyst Programmer
T. Johnson Group	
Central - Ann Arbor	District Manager
N. Mazzarese Group	
PDP-11	Product Line Manager
PDP-8	Engineering Manager
PDP-11	Applications Manager
PDP-11	Product Support Manager
S. Olsen Group	
Plant Engineering	Plant Maintenance Manager
W. Hindle Group	
Personnel	Management Development Manager
PDP-10	Memory Design Engineer
P. Kaufmann Group	
Special Projects	Design Engineers - Peripherals

PTK/lw

digital INTEROFFICE MEMORANDUM

DATE: July 17, 1969

SUBJECT: Batch Processing

TO: Ken Olsen

FROM: Bob Savell

cc: Win Hindle
Dave Cotton

Yes, it is true that the PDP-10 batch is not as good at present as the Sigma 7. If anyone wants a system for batch processing only, they will undoubtedly not buy the PDP-10 today. The Sigma 7 was designed as a batch processing system and does beat us in that market.

We have been aware of this weakness for some time and have laid out a program to redesign our batch processing system to eliminate this weakness. The project is scheduled to start August 1st. Present estimates are that it will take longer than I would like to see it take to complete, finishing sometime between July 1970 and January of 1971.

We are feeling the budget pinch most severely in the programming area and Larry Portner, Hartley LaDuke and myself have been working very hard over the past three weeks to see whether we could squeeze all the work that we feel must be done to fit the budgeted number of people. At this point I do not feel that its possible and that we must either shift budget dollars from some other area or exceed the budget by a fairly small amount in the programming area to get the work done.

This month is market plan month for PDP-10; our goal is to have the entire market plan completed by the end of this month with all projects scheduled not only for the makreting people but for hardware and software groups.

RES:ll

PRELIMINARY

Tony

digital INTEROFFICE MEMORANDUM

DATE: June 17, 1969

SUBJECT: New Multiprogrammed Batch

TO: Steering Committee

FROM: Tony Lauck
AL

This memo discusses design goals for a new multiprogrammed batch and outlines a general structure meeting these goals. We recommend that detailed design work begin as soon as possible on this product.

Members who were involved in this report were: Tony Lauck, Ed Nemeth, and Nick Pappas. Other members who have made contributions are: Bob Clements, Tom Eggers, and Tom Hastings.

TL:lp

Goals for New Batch

Oriented toward a disk system with at least 1,000,000 words of storage.

Efficient operation simultaneously with time-sharing.

Stacking of input onto disk from local or remote card reader in an automatic fashion. Jobs also submitted from a time-sharing (or Batch) job.

Queuing of output on disk and subsequent printing on local or remote single or multiple printers. Automatic operation.

Ability to multiprogram a variable number of jobs (up to reasonable limit, say 7 or 15). Number depends on size of batch jobs, swapping load, CPU usage, peripherals (mag tapes and private disk packs) required, and administrative priority of jobs.

Flexibility priority structure to assis system administrators and operators to maximize throughput, turn around time, or time-sharing response. Operators can control priority of jobs, but an automatic system supplies standard priority and is modular so each installation can adopt it to their peculiar requirements.

Job control language nearly indentical to what a user would type on a teletype. Only changes to include formatting commands with a prefix to specify, uniquely, monitor mode or user mode, and a simple conditional branching structure based on program errors to let user recover from errors appropriately (dump routines, etc.).

Use of system file structure in stacking of input or output. Seperation of job control statements, source code, program data, etc. is performed when job is submitted to system. User specifies files by name. Consequently, a batch job can operate in the same way as a time-sharing job. No filtering of data need be done when the job runs, nor must there be any recopying of the files. Each batch job can have a unique name space or can run in users disk area, as desired. The ability to reference permanent files is important, and essential on a remote batch system.

Operator communications commands to 1) inform operator of job state and 2) request specific service (mount private tape, disk pack, etc.). To simplify user command language and operator procedures, the same method should be used for batch and time-sharing jobs to request operator service.

Operator monitoring cabability for all jobs running in system and all work queued on disk. Ability of operator to alter priority structure of input or output queues, change the scheduling algorithm that initiates new batch jobs, and suspend, continue, requeue or abort any batch job. This operator system should operate on a teletype or VT03 display, but should probably be optimized for the display.

Ability of operator to intervene conveniently in the case of failures of card readers or printers. Error control should be handled by the spooling programs and result in a suitable message to the operator. Operator action should include restarting input or output of a job, or reprinting several blocks back on output to recover effeciently from printer lossage. The operator should be able to dump output (or input) on mag tape and restore it selectively. These operators are useful when the system is being taken down, or when work queues take up too much disk space. Operator action should be the exception, not the rule. I.e., if the card reader has been idle, the operator should be able to resume reading cards by merely putting a deck in the hopper and turning the reader on.

General Description of System

Operation of the batch system falls into three major phases: 1) Input of job to disk, 2) Processing of jobs, and 3) Listing of output files on line printers.

Phase I - Job Input

The job is identified by a job card which includes user number, priority level requested, and resources required to process the job. A password card follows. The rest of the job's input follows in the form of files of data proceeded by file name specification. A special card terminates input.

Each file is given a unique name, specified by the user. The first file contains the job control statements. Because a user might submit several independent batch runs with identical program names, a separate name space is provided for each job (UFD). A means of using the two demensional project, programmer file system allows reference to permanent files. Should a user want, his job can be stored in his normal time-sharing area. This required the user to specify unique file names for each batch job submitted.

When the user submits files from an already operating job he specifies disk files to be used as input for a new batch job and the file names used by that job as part of a command string to the stacking CUSP.

Once all input has been read on disk, an entry is made in a queue file of batch jobs requiring initiation. This entry includes user identification, specification of disk name space and job control file name. It also includes parameters from the job card to assist the batch initiation scheduler select job from the queue. (Time, core, peripherals.)

Phase II - Job Processing

Jobs must be selected from the input queue and initiated. Since the system will multiprogram a variable number of these jobs, a scheduling algorithm is used to determine when to initiate a new job, and which job to choose.

There are several inputs to this scheduling algorithm. The operator controls the rules by specifying basic parameters. These could include the maximum number of jobs ever multiprogrammed, the number of jobs at each priority level allowed simultaneously, the maximum core used by the batch jobs, maximum allowable core swapping, and available peripheral devices such as magnetic tape drives and disk drives. System inputs include current free peripherals, core in use by running batch jobs, and swapping load. Inputs from the job queue include administrative priority, running time estimate, core requirements, and special peripherals for each job waiting to run. A job can also specify what time of the day it would like to run.

The operator can exercise further control over the scheduling algorithm should he desire. He can change the priority of a job in the input queue. As a final control, should a job be selected which the operator doesn't want, he can requeue the job to the input queue, normally giving it a very low priority.

Once a job is selected, it is set up to run under control of the job control file specified in the input queue entry. An output file, (job log) is also opened. This file will contain the equivalent to teletype output under time-sharing. Lengthy output will go straight to disk (maps, listings, output, etc.) from the user program or CUSP.

Should the job require operator service, it issues a (new) monitor command. Commands exist to simply warn the operator of impending events. Other commands request specific action and require a response, e.g. assigning a specific tape drive and maintaning a tape. These are the same commands a remote time-sharing user needs to request service from the operator.

The user can specify command branching in case of errors. This enables a dump routine to be called, or different output queued for printing. This facility need not be complex to be highly useful.

Normally at the end of a job the user issues a command to the PRINT CUSP. Selected files are entered into a queue for printing by Phase III. This CUSP is also used by time-sharing users who need to use the line printer. The length of these files may be limited by the system administrator. Should the user desire, the job log file is also enterend in the queue for printing. This will normally be done. When a job finished, scratch files and input files are deleted accounting information stored, and the batch initiator scheduler activated to see if a new job should be selected from the input queue.

Time limits, core limits, or other restrictions specified by the user are enforced by the control portion of the batch system to prevent heating and getting artificially high priority. Many of these restrictions are also required on many time-sharing systems, so are properly part of the monitor, not specifically the batch system.

Phase III - Job Output

When a printer finished a job's output, the output program scans the output queue for a job to print. Jobs are selected based on length of output, adminstrative priority, and operator parameters. If a suitable file is found it is printed. If not, the program sleeps and periodically scans the queues.

In the case of remote batch, or systems with several local printers with different character sets, it is important that files be printed on the correct device. Information required to accomplish this is stored in the output queue file.

In addition to selecting priority levels of jobs to be printed, the operator can control the printing of a job. He can repeat a job in case of difficulties, abort a job prematurely, backspace several disk blocks and proceed with output, or requeue a job, allowing it to be completed later. The system will run automatically should it be desired. Thus the program will recover from "hung" devices, etc. Operator control is a facility, not a requirement.

If disk space is getting tight, the operator can elect to dump the output queue onto mag tape. He can later restore the queue, possibly selectively.

Files to be printed can reside in the user's area. This is most applicable to time-sharing usage, or permanent batch files. The user is charged for file storage. When printing is completed, the files are not deleted.

The user can also store output files in a special system area. They are entered there by a RENAME operation. The user is not

may be dependent on disk service

charged for file storage, since it is not his problem if many other users have created output delaying his printing. To prevent free storage, the files would be read protected while being stored for printing. When printing is completed, the files are deleted.

digital INTEROFFICE MEMORANDUM

DATE: 18th July, 1969.

SUBJECT: IBM 1130 Market Comments

TO: Ken Olsen

FROM: Ron Smart

cc: Nick Mazzarese
Ted Johnson
Steve Sobel

Bob Reid (Australian one in Brad Vachon's Department) was an 1130 user for a time, and provided the data for the following.

1. Accounting Orientation of 1130 Market

Most 1130 customers use their systems for accounting (small scale) even if its primary purpose is scientific or engineering calculations. They have appropriate software (see below) and salesmen qualified to sell with this orientation.

2. Off Line Orientation of the 1130 Market

Very few 1130 systems are used "on line", this area being handled by their 1800 which is pretty much program compatible (we do compete with the 1800).

3. Marketing Features of 1130 Relative to DEC at Present

As a stand alone computer, the 1130 is "different" in terms of instruction set (processor architecture), peripherals and program library. These are the things we would need to tackle, to pick up some of their market. Some re-orientation of salesmen would be necessary too.

(a) Instruction Set etc. Features of 1130

Double precision arithmetic instructions
Mult/Div instruction built in (not like EAE)
5 level priority interrupt
3 true index registers
No PDP-8 type paging problem

The PDP-11 may take care of this lot.

Ken Olsen. 18th July, 1969.

(b) Peripherals

i) Disk Pack (removable), half million words. Approximately DECtape reel capacity, but relatively random access.

ii) Line Printer, 120 column, about 80 lines per minute, inexpensive wide carriage printer (ex #407 tabulator mechanicals).

iii) Card Read/Punch Unit, relatively slow end-wise feed.

Basic system, 8K (words) core, paper tape I/O, console typewriter, rents for about $700-800 per month (Australian prices).

Expanded system, 8K core, card reader/punch, 120 column line printer, single disk drive, rents for $1,850 per month (Australian prices).

(The purchase price is approximately 40 times monthly rental.)

This indicates the job we would have to do on peripherals and their pricing.

(c) Software (some of it)

i) Systems:
- Assembler (not macro however)
- Fortran (easily intermixed with Assembly language coding)
- Algol
- Cobol (EDP)
- Report Program Generator (EDP)
- Sorting Routines (EDP)
- Batch Handling Monitor

ii) Applications:
- Critical Path Method
- COGO - Co-ordinate Geometry (e.g. for surveying closes
- Frame Analysis (Civil Engineering)
- Simulation Routine
- Matrix Manipulation

We are trying to collect more programming information, however the systems programs and the peripherals appear to be the first problems to look at. Of these, the wide carriage printer and card read/punch have never been properly dealt with in our Product Lines at a reasonable price. DECtape plus disk if the price is right, can go a considerable way towards competing with the disk pack, given proper software. Systems software properly related to our peripherals and configuration to handle general scientific engineering and small scale accounting work is the major challenge.

jr

digital INTEROFFICE MEMORANDUM

DATE: July 22, 1969

SUBJECT: CORPORATE IDENTITY

TO: Ken Olsen

FROM: Gabe d'Annunzio

Digital Equipment Corporation, Digital, DEC, D.E.C., the PDP-company; these are some of the more popular ways in which the Company is referred to either verbally or in print. From an advertising and sales promotion point of view, this variety of names is unwieldy and unmanageable. From a corporate image point of view, our many names and identities are a serious handicap on our attempt to develop a unified and universally accepted identity for the Company. Unfortunately, I have not been able to come up with an all-encompassing solution to this problem. Here is an outline of the various bits and pieces that make up our identity problem and a proposal on how to solve the problem.

I. The Cocktail Party Syndrome

One possible attribute of having a variety of names and identities is that a fellow party goer's reaction to the statement, "I work for Digital Equipment Corporation" will usually give you a fairly good fix on how much he knows about the Company. Here's what I mean:

Me: I work for Digital Equipment Corporation.
They: That's nice, I didn't know you were in the glove business.
This person obviously has no awareness of the Company or its products.

Me: I work for Digital Equipment Corporation.
They: You make PDP something or others, don't you?
This person has a fair awareness, usually developed through reading trade magazines where the product identity is closely related to our "PDP" prefix for all computer models.

Me: I work for Digital Equipment Corporation.
They: Oh, Digital, out in Maynard. I liked those "teddy bear" ads.
This person identifies with our logo and has developed his awareness primarily from our ad campaigns.

Me: I work for Digital Equipment Corporation.
They: Oh, I didn't know you work for DEC, I thought you worked for Computola.
This person invariably is a user of one of our computers.

2. The Inverted Pyramid Rule

Writers in various areas of the Company (Advertising & Sales Promotion included) have developed a variety of rules for consensing the hand-cramping "Digital Equipment Corporation" into more briefly written forms. The typical rule calls for starting with the formal Digital Equipment Corporation the first time the Company is named, then switching to the more convenient Digital with a capital D and following up with a sprinkling of the ever popular DEC for an occasional change of pace.

3. Formal vs. Informal

Current usage indicates that reference to the Company as "DEC" is usually informal, such as in a conversation, while reference to us as Digital is formal, as in ad copy or a press release.

4. Us vs. Them

While we attempt to cope with assigning some logical order to the usage of our various names, the trade press seems to have cut the problem down to size by referring to us as DEC with increasing regularity. This is especially noticeable in tabulated data. Comparing a table of computer specs from a magazine that appeared, in say, 1967 with one printed within the last six months will usually show references to "Digital" in the '67 issue, and "DEC" in the '69 issue.

5. Our Friend the Logo

Use of the Digital logo often creates as many problems as it solves. While it provides a means of visual identity when placed on our products and incorporated in our printed materials it also fights the use of DEC as an abbreviated Company name. In other words, when a full-page ad has the logo displayed prominently at the bottom, we find that a reference to DEC in the body copy or headline is potentially confusing since our corporate symbol says "Digital" not DEC and our official signature says "Digital Equipment Corporation." So, we use Digital in the copy and hope that the editorial matter in the magazine the ad is running in does not talk about DEC.

I propose that we consider the following three-phase program to unify our corporate identity.

Phase I (Transition)

Establish a formal preference for the abbreviation "DEC" over the word "Digital" in all printed and verbal communications. This will create some confusion in promotional materials where the Digital logo appears but if we are consistent in our use of DEC, we can

live with this situation. The complete name, Digital Equipment Corporation, should be reserved for formal correspondence and in situations where the DEC abbreviation would be misinterpreted as a logotype if used alone.

Phase 2 (Unification)

Officially change the Company logo from Digital to a symbol incorporating the letters DEC. This would allow all printed references to the Company to relate directly to the Corporate symbol.

Phase 3 (Consolidation)

Phase out the use of the PDP prefix for model identification thereby linking model number designations more directly with the Company's written and symbolic identity—DEC. Thus, PDP-15 would be referred to as the DEC Model 15 or the DEC-15. The elimination of all alternative identifiers other than the basic DEC would consolidate product and corporate identification into one common unit.

GD:meb

July 23, 1969

SEMIAUTOMATIC WIRE-WRAP SYSTEM

Ted Johnson
CC: Fred Gould

Bill Long

We have made an arrangement with a small new company in Burlington called Microsystems Technology to supply them with existing documentation on our semiautomatic wire-wrap system. In return, Microsystems has agreed to purchase a minimum of 10 PDP-8 computers for this purpose.

The agreement is a nonexclusive one and does not commit us to providing engineering or programming services, nor are we responsible for the accuracy or the completeness of the documentation provided. In other words, we have given them the prints and invited them to make use of them in building a system around the PDP-8. We can do the same for anybody else who comes along, and there is nothing to prevent us from going into the business ourselves should we see fit.

WHL:pc

Re: Memo from KHO, 6 Oct.

CC: Stan Olsen
Nick Mazzarese

digital INTEROFFICE MEMORANDUM

DATE: July 28, 1969

SUBJECT: Wall for Westfield

TO: Ken Olsen

FROM: Al Hanson

We poured three sample walls of the kicker for the Westfield plant and I went out to look at them. Striations or any textured wall is not going to be seen unless you are about 20 feet from it. The additional ¼" of plywood will cause some delay because they have to get special foam cases, which take three weeks to get. The additional cost is not warrented in doing any kind of textured wall.

I recommend a plain concrete wall with no hand rubbing.

I need a decision on this matter today.

OK.

digital INTEROFFICE MEMORANDUM

DATE: July 28, 1969

SUBJECT: Attached Memo "IBM Competition"

TO: Ken Olsen FROM: Larry Portner

I suspect the following reasons are responsible for 1130 success.

1. They lease.

2. The hard sell from an applications/systems standpoint. (See attached release.)

3. Extensive applications software, documented and supported to the teeth.

4. Suitable peripherals thoroughly integrated into the system. (See attached memo from Chuck Conley.)

5. A software system aimed at the hard core scientific "data processors", featuring an integrated batch processing/Fortran system.

On the subject of using the IBM software, they apparently are copyrighting their software so that we could look at it but not use it directly, as would otherwise be possible, since it is probably in Fortran. A major difference between DEC and IBM software marketing is that IBM seems to define their systems based on a reasonable or extravagant hardware configuration, while we go for the absolute minimum system price (lease vs. sell?), thereby limiting the scope of our software.

gm
attachments

digital INTEROFFICE MEMORANDUM

DATE: July 9, 1969

SUBJECT: IBM Competition

TO: Larry Portner FROM: Chuck Conley

In my opinion there are three reasons why the PDP-8 does not, in general, compete with the IBM-1130:

1. The 1130 is a much slower and more expensive machine. Its structure is such that it lends itself easily to doing scientific calculations in a batch processing environment. On the other hand, the PDP-8 and PDP-9 software is oriented toward real-time applications.

2. The 1130 software is aimed at the educational market. It includes an outstanding batch processor, an outstanding FORTRAN system, for the size of the computer, a reasonably powerful macro-assembler, which is well integrated into the system, an outstanding relocating linking loader, with overlay and chaining capability, and an outstanding scientific subroutine package. The key here is not just good software, it is outstanding software which uses the full capabilities of the various hardware configurations.

3. The 1130 hardware options include extremely convenient removable disk packs, an inexpensive card reader/punch, and an inexpensive line printer, all of which are fully integrated into the 1130 system software.

The IBM-1130 is an expensive computer, for its size, but it has large computer software and software support. Many customers seem willing to pay for this.

In order to compete effectively in this market, I believe we would have to give top priority to developing an inexpensive card reader and line printer, a powerful FORTRAN, and an effective batch processor.

Chuck

digital INTEROFFICE MEMORANDUM

DATE: July 29, 1969

SUBJECT: Salvage Materials

TO: Ken Olsen

FROM: David Knight, Ext. 2240

About four weeks ago I talked to John Trebendis about the possibility of obtaining scrap material (modules, etc.) for my personal use (my hobby is electronics experimentation). He informed me that the scrap was proprietary material, and, of necessity, must be destroyed before being discarded. He then stated that it would be necessary to obtain permission from either Pete Kaufmann or yourself before he could release any material to me. Pete Kaufmann was contacted through Larry Portner and permission was refused on the grounds of being company policy.

I am willing to agree to any reasonable terms for obtaining some of this scrap material, including if necessary, paying for it at standard electronic salvage rates (ten to twenty cents a pound, I believe). None of this material, if made available, would be used for anything other than my personal experimental purposes.

Ken said - what as long as Pete Kaufmann had said no already, he would not contradict his decision.

mld

digital INTEROFFICE MEMORANDUM

DATE: July 30, 1969

SUBJECT: NEW YORK TIMES ARTICLE

TO: Ken Olsen
Brewster Kopp
Edward Schartz
Gabe d'Annunzio

FROM: Mark Nigberg

On July 29th I received word from Brewster Kopp of the possibility of Digital Equipment Corporation becoming involved in an SEC filing. The following morning I was made aware of the fact that the New York Times was planning to print a feature article on Kenneth Olsen and the Company. The article had been researched and Ken had been interviewed in mid-June. As soon as Ken was aware that the article would be appearing this Sunday, he asked me to obtain the opinion of our legal counsel to determine what action, if any, we should take. I received word this morning that we should contact the New York Times and request that they postpone printing the article until sometime in the future. I was informed by counsel that justification for this was based on the fact that Digital was anticipating a possible SEC filing. At approximately 3:30 P.M. on July 30th I conveyed that message to Mr. William Smith of the New York Times.

The purpose of this memo is to document the time, date, and person I spoke to at the New York Times.

jh

digital INTEROFFICE MEMORANDUM

DATE: August 1, 1969

SUBJECT: ELECTRONIC NEWS ARTICLE

TO: Ken Olsen
Nick Mazzarese
Edward Schwartz
Brewster Kopp
Gabe d'Annunzio

FROM: Mark Nigberg

On July 31 I was informed by David Gardner of ELECTRONIC NEWS that he was planning to publish an article expressing Nick Mazzarese's points of view about the small computer market sometime during the next several weeks. Because of the opinion we received from our legal counsel in regard to the NEW YORK TIMES article, I, at approximately 2:30 on July 31, 1969, informed Mr. Gardner that Digital was anticipating a possible SEC filing and we therefore would appreciate it if ELECTRONICS NEWS would postpone printing the article until sometime in the future.

The purpose of this memo is to document the time, date, and person I spoke to at the ELECTRONIC NEWS.

jh

K. H. OLSEN

F[redacted] Dave Cotton:

Bob Robichaud, Effective Analysis, Inc., N.Y.C. We received a purchase order in mid-October for $900,000 worth of PDP-10.

They have no money, but have made a deal, Dave thinks, with Applied Devices to back him in a business. The first PDP-10 would go to Austin, Texas, and provide time to the Univ. of Texas Business School. Dean Kozmetsky owns a large piece of Applied Devices. Robichaud claims he'll buy 6 PDP-10's over the next 3 years, with backing from Applied Devices; however, we don't think AD's credit is good. In 1967, we had to use legal means of collecting for modules they had purchased.

Elsa

DIGITAL EQUIPMENT CORPORATION

digital INTEROFFICE MEMORANDUM

DATE: August 4, 1969

SUBJECT: APPLIED DEVICES CORPORATION

TO: Win Hindle

FROM: Ken Olsen

cc: Bob Savell
Dave Cotton

I had breakfast last Thursday, July 31st, with Dr. Kozmetsky, Dean of the University of Texas, College of Business Administration, Austin, Texas. He is an exceedingly creative and influential man. Even though some of his ideas may be a little way out, he has, apparently, influenced many people. There are 5,000 people in the College of Business Administration; therefore, it is probably one of the largest.

They have 10% interest in a company in College Point, New York, called Applied Devices Corporation. They would like Applied Devices to get a PDP-10 to be used in a research organization, called University Research. The idea is that University Research will do a little research off campus for organizations which schools do not want to do research for. They would like to get a PDP-10, but don't want to pay rent for it for three months. They feel that if they can skip rent payments for three months, they can then be in the black in the first year.

I told them that when Applied Devices approaches us, our people would know what the problem is and be able to give comment.

They would also like a free, or discount, PDP-8/L for the School.

Ken

ecc

D. B. Learner, Pres.
112-03 14th Ave.
College Point, N.Y. 11356

digital INTEROFFICE MEMORANDUM

DATE: August 5, 1969

SUBJECT: PDP-11

TO: Ken Olsen
R. Cady

FROM: W. Vaillancourt

Listed below are the final assemblies required for the PDP-11. The limited release column (#1) indicates the dates when construction information is due from Engineering. Column # 2 indicates when the material (100 units - first 3 months of production) is due. Column # 3 indicates when the material has been assembled and tested; in lots of 10 units - 30 units - 60 units. (First 10 units are indicated).

ASSY	# 1 LIM. REL. DATE	# 2 SCHED. COMPLETION DATE FOR MATERIAL	# 3 SCHED. COMPLETION DATE FOR ASSY. TEST
Cabinet	July	Sept. 1	Sept. 15
Power Supply (1 module)	Sept. 1	Nov. 3	Dec. 1
C.P. Panel(2)	Oct. 8	Dec. 3	Dec. 17
Mem. Panel	Aug. 11	Oct. 1	Oct. 15
IO Panel	Sept. 15	Nov. 17	Dec. 1
Console	Sept. 1	Oct. 27	Nov. 17
Fan Ass'y.	Aug. 11	Oct. 13	Oct. 20
Cable Harness AC & DC	Sept. 1	Nov. 3	Dec. 1
IO Cables (Int)	Sept. 1	Nov. 3	Dec. 1
IO Cables (Ext)	Sept. 1	Nov. 3	Dec. 1
C.P. Modules (7 Modules)	Nov. 15	Jan. 12	Jan. 12
MEM Modules (8 types/ 14 modules)	Sept. 1	Oct. 27	Oct. 27
IO Modules (3 modules-basic)	Oct. 1	Nov. 24	Nov. 24

ASSY	# 1 LIM. REL. DATE	# 2 SCHED. COMPLETION DATE FOR MATERIAL	# 3 SCHED. COMPLETION DATE FOR ASSY. TEST
Stacks	July	Oct. 20	OCT. 27
Memories		Oct. 27	Nov. 24
Central Processors		Jan. 12	Feb. 6
Basic Machines			Feb. 6

mjm

cc: R. Puffer
P. Kaufmann
D. Mazzarese

digital INTEROFFICE MEMORANDUM

DATE: August 5, 1969

SUBJECT: DEAD STORAGE STOCK ROOMS

TO: Henry Crouse

FROM: Ken Olsen

I have been wandering through our dead storage stock rooms lately, and have the feeling that, again, people aren't showing due responsibility for them. Will you send me a list of all the stock rooms in which you have things stored, and then, during the next week or so, I'd like to walk through them with you.

Ken

ecc

This same memo sent to:

Jack Smith
Al Hanson
John Jones
Bob Savell
Al Devault
Bob Lane
Bob Collings
Joe St. Amour
Bob Dill

digital INTEROFFICE MEMORANDUM

DATE: August 5, 1969

SUBJECT: STATUS OF PROFESSOR GREMY (Faculte de Medecine de Paris) DP01C ORDER

TO: Ken Olsen FROM: Steve Sobel

Attached is a memo from Paul Dimouro (Special Systems) indicating current status of order. 10 Product Line is awaiting further information before making decision to have CSS build unit on apparently an LOI. Also attached is letter (July 2nd) from Professor Gremy to Pierre Jaillet (in French plus rough translation) and Master Order Sheet from Paris office.

Steve

bn

Attachments

digital INTEROFFICE MEMORANDUM

DATE: July 31, 1969

SUBJECT: PROFESSOR GREMY'S ORDER (DP01-C)

TO: Steve Sobel

FROM: Paul Dimouro
Special Systems

Attached is the L.O.I. received for the above order. Since Special Systems cannot build on a L.O.I., I have contacted Dick Dobbie, PDP-10 Marketing, and notified him that L.O.I. has been received by Special Systems. I suggested assigning an unusual order form number to the order so that we could process the order and start building it in Special Systems. Dick agrees and will get together with Bob Savell on this. I will stay on top of this and notify you on any further action.

/jb

FACULTÉ DE MÉDECINE
DE PARIS

CENTRE UNIVERSITAIRE
PITIÉ-SALPETRIÈRE

CENTRE DE CALCUL
ET DE STATISTIQUE

91, Boulevard de l'Hôpital, PARIS-XIIIe

Téléphone : 707 67-79

P. 328

Le 2 Juillet 1969

L.O.I. 5

Monsieur JAILLET
Directeur de la Société
DIGITAL
233, rue de Charenton
PARIS XIIème

Cher Monsieur,

Suite à la conversation que vous avez eue avec M. JUTIER, je vous confirme que le marché N° SA/172/F concernant la régularisation du DC 10 A, d'un télétype et la commande du coupleur DP 01 C vous sera notifié d'ici une quinzaine de jours.

Je prends bonne note du fait d'une part que le prix du DP 01 C a été révisé en hausse et d'autre part qu'il conviendra de définir la liaison avec le modem fourni par la Maison SAT. C'est seulement quand cette liaison aura été définie et que vous serez à même d'en chiffrer le prix qu'il nous sera alors possible de vous passer commande pour le complément.

Les liaisons humaines entre la maison SAT (Paris) et la Maison Digital apparaissant très difficiles, nous avons proposé à la maison SAT d'envoyer un ingénieur à Maynard pour régler définitivement la question.

Après ce déplacement, le prix supplémentaire de la liaison pourra être chiffré. En attendant, nous vous serions reconnaissants de passer commande du matériel à Maynard sans plus attendre.

Veuillez croire, cher Monsieur, à l'expression de mes sentiments distingués.

Pr. GREMY

July 2, 1969

Dear Sir,

Pursuant to the conversation that you have had with Mr. Jutier, I am confirming the sale of No. SA/172/F regarding the regularization of the DC 10 A, for a teletype and a (commande du coupleur) (Order for a Data Phone???) DP 01 C, you will be advised within two weeks.

I am well aware of the fact that on one hand the price of the DP 01 C has been revised upwards and on the other hand that it be necessary to define the interface with the modem furnished by the Maison SAT. It is only after this interface has been defined and you are able to quote the price that we will be able to place the order for the remainder of the materials.

The human relations between the Maison SAT and Digital seem very strained; we have suggested that the Maison SAT send an engineer to Maynard to clarify and settle definitely the question.

After this proposed trip, the extra cost of the interface will be set. In the meantime, we would be grateful to order the equipment from Maynard without further delay.

Sincerely yours,
Professor Gremy

L.O.I. 5

digital

MASTER ORDER SHEET

⇨ ⇨ ⇨ SEND TO: COMPUTER ADMINISTRATION VIA CENTRAL ORDER DESK

MASTER ORDER COVER SHEET
(attach customer purchase order)

DATE 16 July 69

EQUIPEMENT DIGITAL

SOLD TO
233, Rue de Charenton
PARIS - 12°
Tél. : 344-76-07.
Pitie Salpetriere Prof Gremy

SHIP TO (Same as "Sold To" Unless Otherwise Stated)
SHIP TO
DO NOT TRANSPORT
GARE DE FRET
ORLY AIR PORT
FRANCE

CUSTOMER ORDER NUMBER: DISCOUNT AGREEMENT YES ____ NO. ✓	PARTIAL SHIPMENT ALLOWED: YES ____ NO ✓	SHIP VIA: AIR
IF ADD-ON: YES SYSTEM MODEL NO. ____ SYSTEM SERIAL NO. 19	DESIRED DELIVERY DATE: JAN '70	F.O.B. MAYNARD (STANDARD) ____ OTHER: ____ IF OTHER, WHO AUTHORIZED:
(U.S. ONLY) TAXABLE: YES ____ NO ____ TAX EXEMPTION CERTIFICATE NO. ____ (must be on file in Maynard)	(U.S. ONLY) RENEGOTIABLE (1) ____ NON-RENEG. (2) ____ PRIORITY RATING: ____ GOVERNMENT SOURCE INSPECTION REQUIRED: YES ____ NO ____	TRANSPORTATION TERMS: 1) PREPAY 3) PPD. AND ADD (2) COLLECT 4) FRT. ALLOWED 5) ____

PURCHASING REFERENCE: ____

ENGINEERING REFERENCE: JUTTIER

SOFTWARE LIBRARIAN: LORINO

(include addresses if different from "ship to")
Pitié Salpetrière 91 Bd de l'Hopital PARIS 13e

SPECIAL NEGOTIATIONS WITH MAYNARD? YES

MAYNARD CONTACT: BRAD YACHON

WHEN CONTACTED: JUNE 10 - 1969 MSG 1490

REASON: Prices and Modem Specifications
THE modem specifications

SALES ENGINEER: R. RINEAU - VALENCIENNE

BRANCH OFFICE: PARIS DATE: 16 July 69
(where order is logged)

APPROVED BY: ____
(District Manager)

APPLICATION CODES:
(check one)

- ☑ B) Biomedical
- ☐ P) Physics
- ☐ A) Analytical Chemistry
- ☐ G) Geophysics/Marine
- ☐ E) Educational
- ☐ S) Other Applied Science
- ☐ T) Typesetting
- ☐ N) Numerical Control
- ☐ I) Industrial Control
- ☐ K) Other Industrial
- ☐ F) Computation Facility
- ☐ H) Hybrid Simulation
- ☐ D) Display Research
- ☐ C) Communications
- ☐ M) Miscellaneous

(check one)

- ☐ 1) O.E.M
- ☐ 2) End User
- ☐ 3) Special Systems House

Reservation No. #764
Date Received 7-24-69
MFR Month
Select Delivery
Date Required By

DOMBIE 2185

SUBSIDIARY ORDER FORM (continued)

Item No.	Quantity	Equipment	Unit Price (U.S. dollars)	Amount
1	1	GP 10 M	2,000	2,000
2	1	DP 01-C	8,000	8,000

Note

① That DC 10 A and ASR 33 shown on customer order have been delivered already

② Modem specifications asked by Boad VECHON will be give to Raynard Special System by the OEM Engineer in charge of that modem. This Engineer is planning a trip to Raynard for that purpose.

digital INTEROFFICE MEMORANDUM

DATE: August 6, 1969

SUBJECT: DEAD STORAGE STOCK ROOMS

TO: John Jones

FROM: Ken Olsen

I have been wandering through our dead storage stock rooms lately, and have the feeling that, again, people aren't showing due responsibility for them. Will you send me a list of all the stock rooms in which you have things stored, and then, during the next week or so, I'd like to walk through them with you.

Ken

bn

Ken
I have none.
J.

digital INTEROFFICE MEMORANDUM

DATE: August 6, 1969

SUBJECT: DEAD STORAGE STOCK ROOMS

TO: Bob Collings FROM: Ken Olsen

I have been wandering through our dead storage stock rooms lately, and have the feeling that, again, people aren't showing due responsibility for them. Will you send me a list of all the stock rooms in which you have things stored, and then, during the next week or so, I'd like to walk through them with you.

Ken

bn

about the only thing the Display Groups has in the dead storage stock room that I know of is 21 high voltage transformers for the 338 display. the old memory test group has 24 of the 790A current drivers in stockroom #10 but other than these two items I'm not aware of anything else.

Bob

digital INTEROFFICE MEMORANDUM

DATE: August 7, 1969

SUBJECT: I.S.C. Sales Literature

TO: Ken Olsen
cc: Win Hindle
Bob Savell
Cliff Pitz

FROM: Peter Melvin

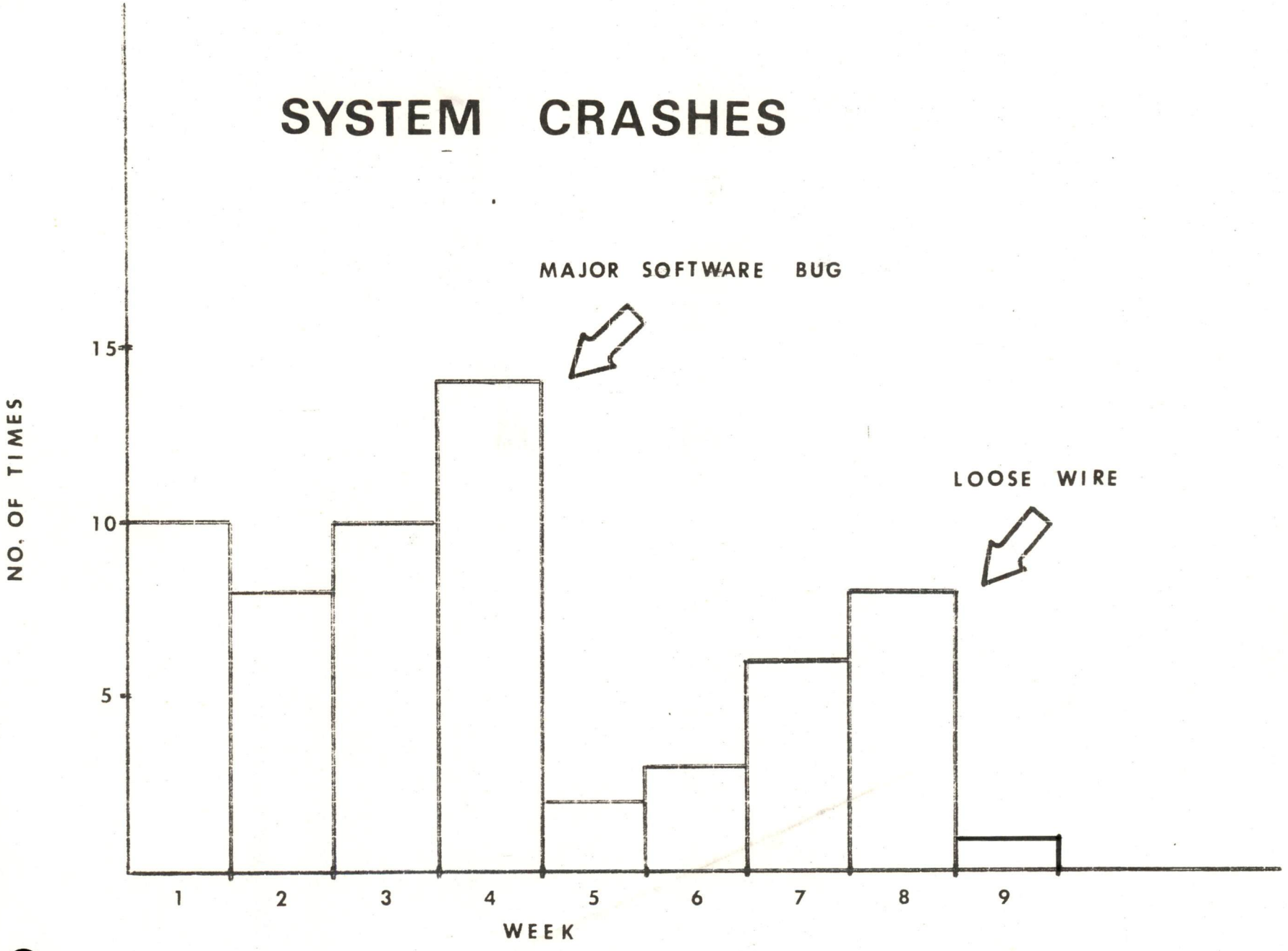
Tom Nourse, General Manager, I.S.C., asked me to pass this piece of I.S.C. sales literature along to you.

As you can see, the first page shows the number of crashes each week in a nine-week period.

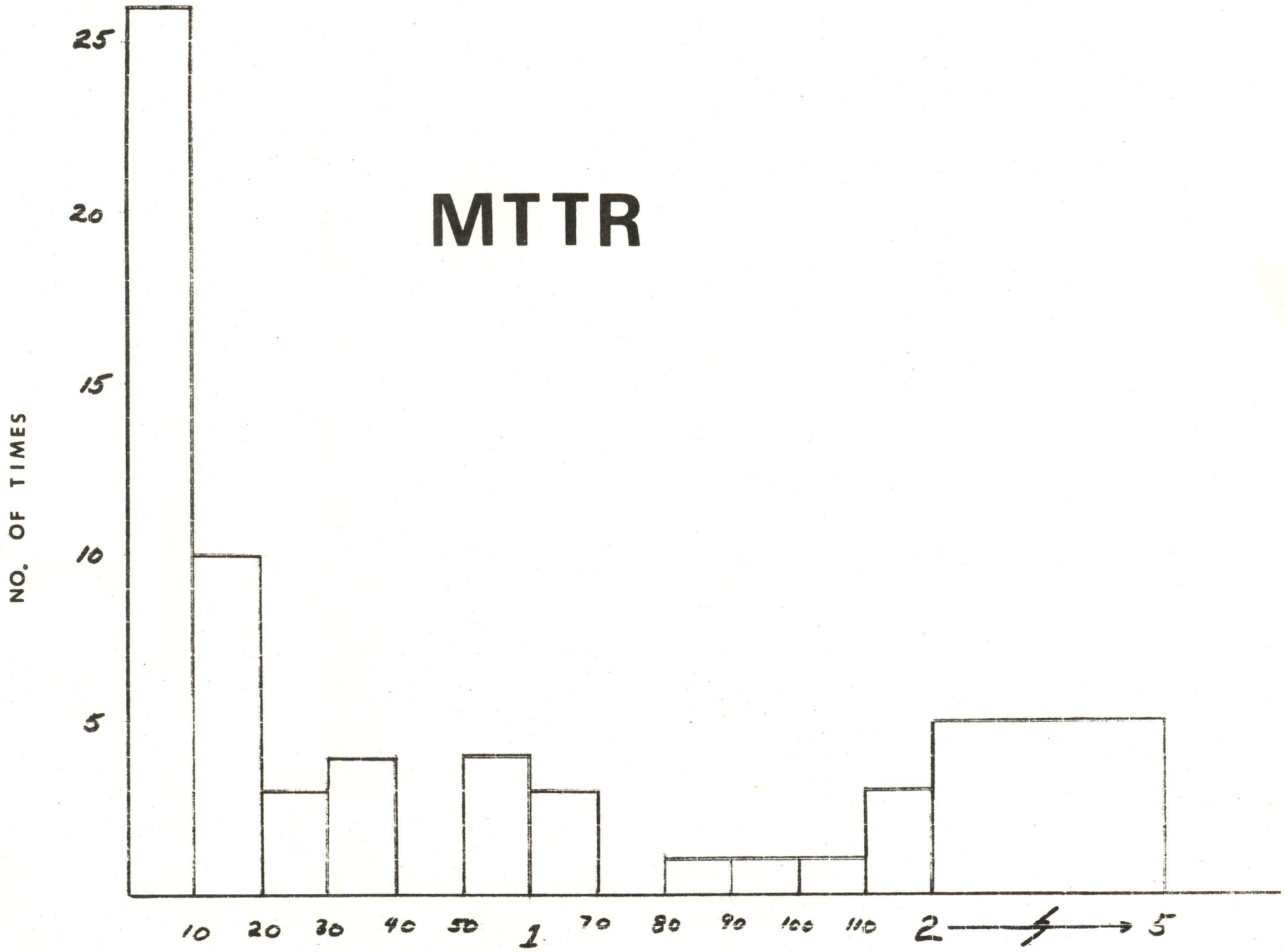
The second page shows the duration of failure. According to Tom, this record compares quite favorably with competitive timesharing houses.

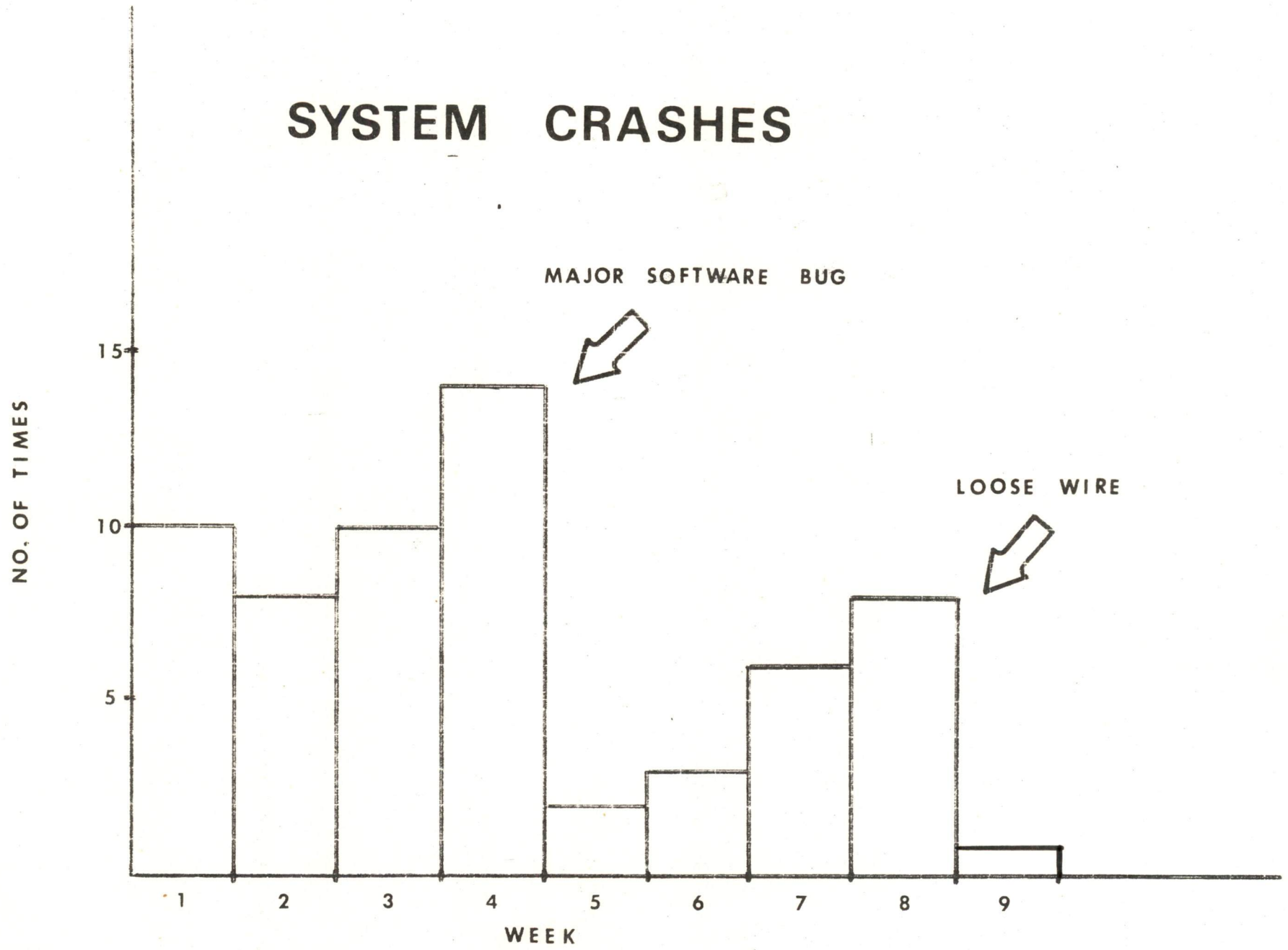
emf

SYSTEM CRASHES

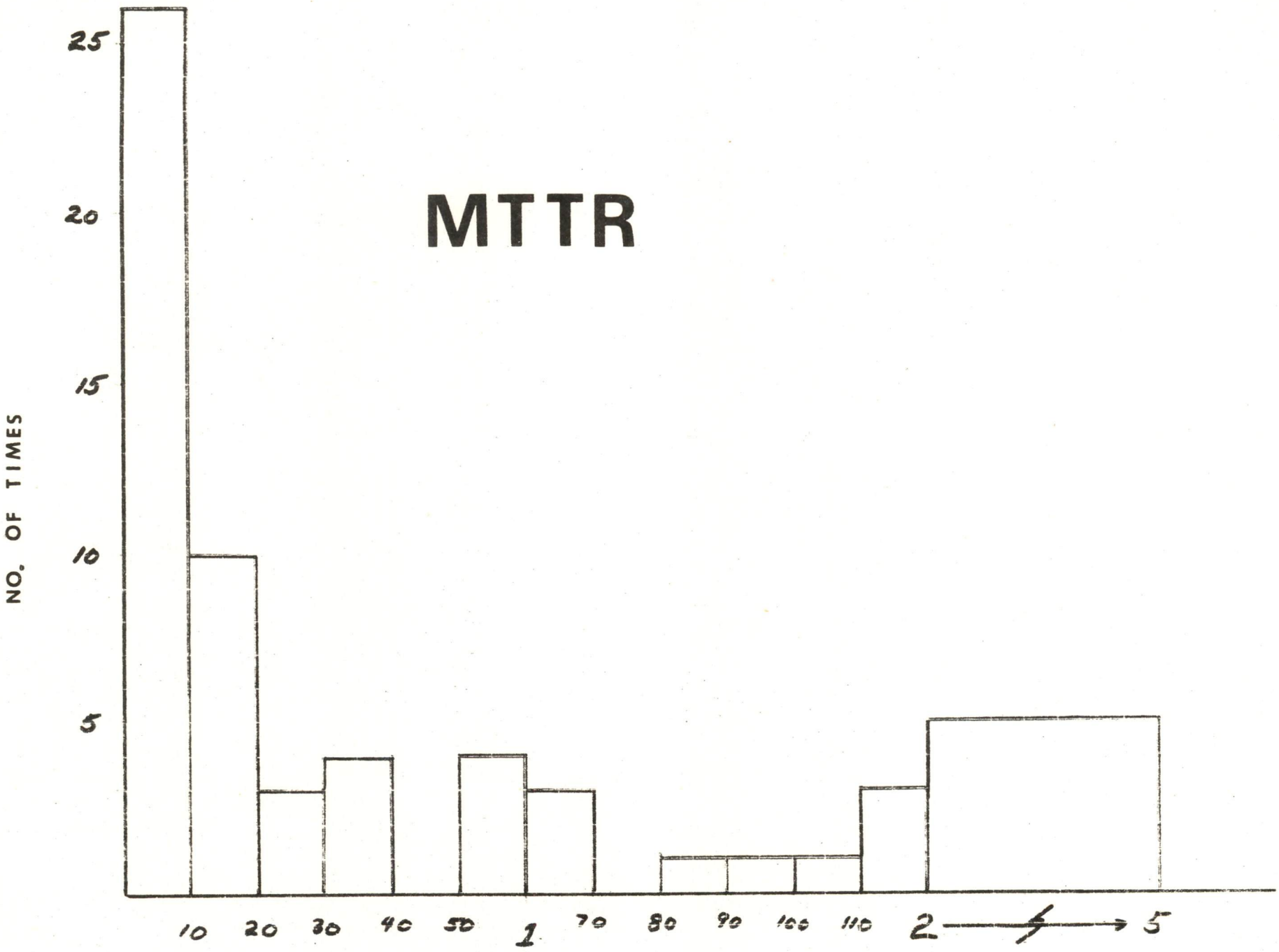


MTTR


25
20
15
10
5
NO. OF TIMES
10
20
30
40
50
1
70
80
90
100
110
2
5
DURATION OF FAILURE


SYSTEM CRASHES
MAJOR SOFTWARE BUG
LOOSE WIRE
NO. OF TIMES
15
10
5
1
2
3
4
5
6
7
8
9
WEEK

MTTR


25
20
15
10
5
NO. OF TIMES
10
20
30
40
50
1
70
80
90
100
110
2
5
DURATION OF FAILURE

digital INTEROFFICE MEMORANDUM

DATE: August 7, 1969

SUBJECT: Faculte de Medecine

TO: Ken Olsen

FROM: Dave Cotton

Faculte de Medecine (Prof. Gremy) has been quoted a DP01C synchronous dataphone adapter by Computer Special Systems Group. It apparently meets his requirements since we have received Letter of Intent and are told to expect order this month.

DBC:ll

digital INTEROFFICE MEMORANDUM

DATE: August 12, 1969

SUBJECT: Dead Storage

TO: Ken Olsen

FROM: R. F. Dill

The only area in which accounting has material stored is GC-2. I shall be on vacation from August 11th through September 1st, but if you would like to inspect the accounting stockroom before I return, Richard Barrett will be available in my absence. He is familiar with the organization of the accounting files stores there and with the plans that we have for improving the filing of stored records.

egs

digital INTEROFFICE MEMORANDUM

DATE: August 12, 1969

SUBJECT: Frictional Polymer

TO: Ken Olsen
Joe St. Amour
Bill Owens
Ed Corell

FROM: Grant Saviers

COMPANY CONFIDENTIAL

For your information I have attached the most important papers about frictional polymer and the report from Massachusetts Material Research in regards to what they found in their analysis of our plating and contamination.

Previous consultation with Arnold Green Testing Labs indicated that the contamination in the disk was primarily organic. These labs performed an emission spectrograph of contamination that I supplied them. Spectroscopy is difficult to perform with organic materials because of the masking of the spectral lines of the metals that may be present. AGTL found very faint traces of copper and iron. "Very faint trace" indicates less than $10^{-3}\%$ mass concentration. Several other consultants were asked about their ability to determine the content of the organic material. The replies were generally negative, since the amount of testing and instrumentation required to find the organic constituents is difficult and time consuming (and not clearly worthwhile).

Since talking with Massachusetts Material Research and Arnold Green Labs I have discussed frictional polymer with Saul Chaikin whose article is attached, and with T.F. Egan at the Bell Telephone Laboratories in Holmdel. Egan and Hermance were the discoverers of frictional polymer in reed relays. Chaikin has since followed Egan's work and attempts to describe the mechanism of frictional polymer formation. Unfortunately Chaikin (who has had some experience with disks and their frictional polymer problems) is unavailable at this time for consultation. He did indicate however, that we probably have frictional polymer in a rhodium plated disk. He has had experience with Contact Recording frictional polymer problems. (Probably Data Disc or video applications.)

In my discussion with Egan he disclosed that it is possible that static electricity could be part of the polymerization problem.

He said that the polymer is such a mess you just cannot possibly find out what it is. It is difficult to trace contamination, but qualitative analysis of outgassing of different materials can be performed. He recommended materials such as mylar, kel-F, or teflon as being desirable because of their low outgassing properties.

I have performed several experiments with a sealed system in an attempt to determine what materials will cause frictional polymer. These experiments are confusing and in contradiction with some of the literature. The experiments involved cleaning with methanol or water and providing high concentrations of organic vapors in the disk space.

In all cases a final rinse with water in the cleaning process seems to eliminate or strongly reduce a possibility of formation of frictional polymer. The reason for this is not understood. Mr. Egan was also very surprised to hear such a statement.

Several experiments run with methanol cleaning only usually resulted in heavy concentrations of frictional polymer on the surface of the disk. However, there seems to be some variables. It is possible that items such as wash bottles or storage of methanol may contaminate or initiate reactions in the methanol. One disk was cleaned with fresh methanol from a glass container. It showed less frictional polymer than that which was dispensed from a polyethylene squeeze bottle. It seems perfectly reasonable that contamination from polyethylene gets into the methanol and is deposited on the disk to accelerate the frictional polymer accumulation. Gas chromotography could indicate if the methanol is contaminated.

Additional experiments were run with organic vapors being supplied by evaporating methanol and outgassing from silicone rubber. The room temperature vulcanizing "RTV" silicone rubbers outgas acetic acid during their cure and were placed in the disk in order to provide a saturated atmosphere of more complex organic vapors. Very high concentrations of frictional polymer were found. Less frictional polymer was formed when saturated methanol atmosphere was provided. When the disk was washed with methanol followed by a water rinse no frictional polymer was found, in either case.

The general conclusion is that once the frictional polymer process is started it continues with extreme rapidity if material is available to support the reaction. The key to success is preventing any frictional polymer from starting in the first place. Thus the purging system which provides low concentrations of organic vapors and the water rinse seem to be reasonable solution to the frictional polymer problem. My supposition as to why the water rinse works is that it removes any residual material that is absorbed or chemisorbed into the surface of the rhodium. Static charges on any organic film probably greatly accelerates the frictional polymer formation. Although we have true flying heads, it is not clear that the average separation between the head and disk (100 micro inches) is enough to rule out the production of static electricity during normal file operation. Minimizing the possibility of forming the thin organic film may eliminate the process over long term. Disks that have been in operation for five months in an uncontrolled environment have indicated that very little frictional polymer forms. The material is medium grey in color rather than the dark brown that is found in the short (24 hours) experiments. It is not clear if the grey material is frictional polymer or just contamination picked up from the atmosphere. A lot of air passes over the head in five months.

It seems that we really do have the substance called frictional polymer. Our mechanism of formation is probably more influenced by static electricity than by deformation of the metallic surface, and the concentration of organic vapors present have little effect if the surface is clean to start with. Note that Chaikin and Hermance and Egan claim that methanol cannot form frictional polymer.

Because of the active surface chemistry of rhodium it seems perfectly reasonable that it would be desirable for us to put something we would like on the surface rather than something that happens to be there. It is impossible to actually devise a clean metallic surface under atmospheric pressure. According to the literature the only known way to provide a true metallic surface is to evacuate to 10^{-12} torr and then produce an internal metallic surface by cleavage. If we could displace whatever contamination we have on the surface with a poisoning cum lubricating agent that would adversely affect the formation of frictional polymer we would be way ahead. The materials outlined by Chaikin in his patents are rather exotic, dangerous, and difficult to use. It has been generally observed that organic contamination left from methanol or minor frictional polymer formation on disks in operation for awhile seem to help

reduce start/stop scratching. Apparently the surface chemistry of rhodium is such that enough residual long chain organic material is around to lubricate the head when it comes in contact with the disk surface. I strongly suspect that people have chosen rhodium for contact start/stop and in contact recording memory systems because of its active surface chemistry and not because of its hardness or corrosion resistance. However, it is a rather narrow walkway between having frictional polymer in abundance and having a clean surface that provides no lubrication.

ADDENDUM

Since beginning this memo I have talked with H.W. Hermance who is now retired from B.T.L.

He has agreed to examine some of our suspected frictional polymer residues and report his opinion as to whether it is really frictional polymer or not. If it appears to be frictional polymer he may be available for consultation.

An answer from him will be available by August 25, 1969.

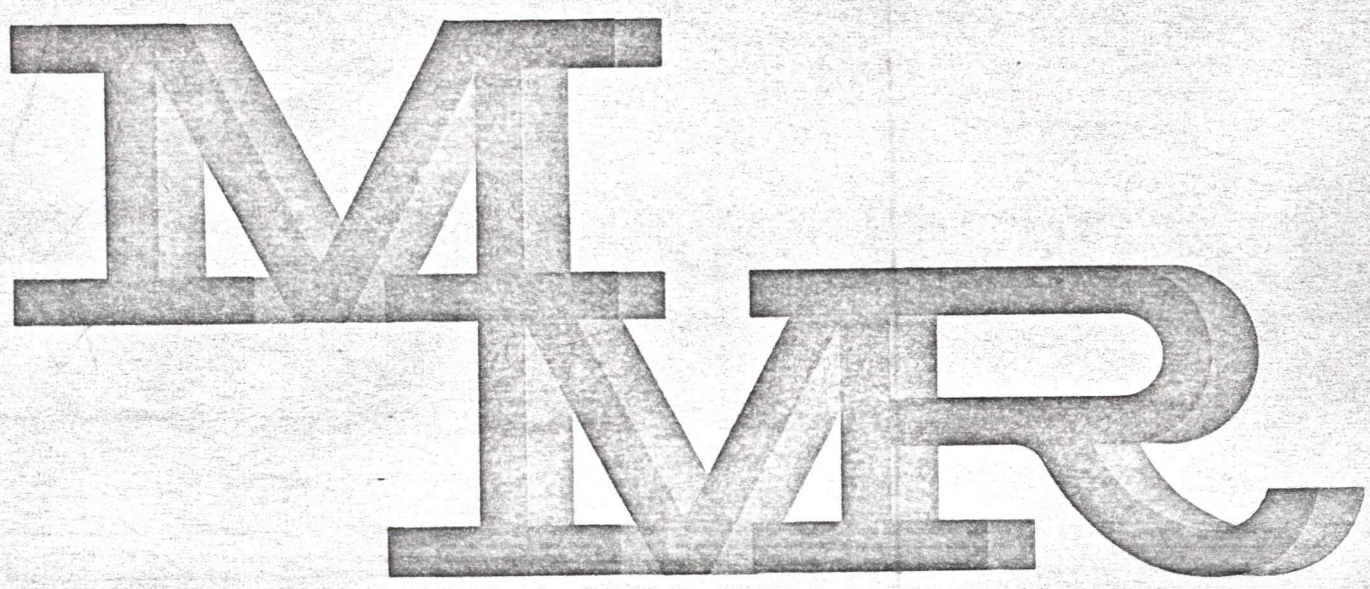
Applied Magnetics is out of the disk system business because of frictional polymer. Tech Met is aware that we rinse disks in distilled water as part of the cleaning process. They are not aware that the real reason is to inhibit frictional polymer. Tech Met sells disks to Applied Magnetics.

It is hoped that in the consultation with the giants of surface chemistry that we will be able to generate alternatives to the water rinse.

REFERENCES:

Osipow, Surface Chemistry
Burns & Bradley, Protective Coatings for Metals
LaQue & Thompson, Corrosion Resistance of Metals & Alloys
Chaikin, U.S. Patents 3,222,489
3,238,342
On Frictional Polymer, Wear, 10 (1967)
Hermance & Egan, BSTJ, 37(1958)739
Massachusetts Materials Research Report on Job 552

/bca



MASSACHUSETTS
MATERIALS
RESEARCH, INC.

WORCESTER, MASSACHUSETTS 01606

MASSACHUSETTS MATERIALS RESEARCH, INC.

55 MILLBROOK STREET • WORCESTER, MASSACHUSETTS 01606 • TEL. 617-752-7501

August 6, 1969
Job 552

Digital Equipment Corporation
146 Main Street
Maynard, Massachusetts 01754

Attention: Mr. Pierre Schneebeli

Re: Purchase Order No. 14081

Gentlemen:

This letter report describes our investigation of residues found on ceramic sliders and our evaluation of electroplated coatings on an aluminum memory disc.

THE PROBLEM

To determine the nature of the residues on the sliders and to determine the source of corrosion within the plating on an aluminum memory disc.

THE ANSWER

The "fuzz" in the slots in front of two ferrite cores consisted mostly of aluminum with some zinc and a small amount of copper. Several specks of contaminant from the back of the aluminum oxide slider contained traces of iron, aluminum, copper, and silver. The residue from the white outriggers on the sides of the aluminum oxide sliders contained considerable cobalt and nickel; smaller amounts of silver, zinc, and copper; and very minute traces of aluminum and iron.

No gold and no rhodium were found on the sliders and outriggers. The absence of these elements and the presence of significant quantities of silver on the sliders indicates the possibility of a plating error.

Zinc + aluminum = chromate

silver - photoresist

The thickness of the copper plate is 2800 microinches instead of the required 100-500 microinches. The total thickness of the three other plating layers ranges from 7 to 12 microinches instead of the expected 21 microinches. This again suggests the possibility of a deficiency in the electroplating process.

Electron microscopy revealed that the tiny pits in the surface of the memory disc started on the outside surface. Accordingly, the pits probably resulted from contact corrosion between the sliders and memory disc.

DISCUSSION

The analyses of the residues on the sliders were performed by optical microemission spectrography. Various micromanipulation techniques, performed under a microscope, were used to isolate the residue samples. Six samples were analyzed.

First, a piece of ferrite core was analyzed to determine if abrasion of the ferrite was responsible for any of the contamination. The principal constituent of the core was iron, but there were also significant amounts of zinc, cobalt, nickel, copper, aluminum, and traces of several other elements.

The second samples was a portion of the bonding agent used to hold the ferrite cores to the aluminum oxide sliders. The bonding agent, in addition to organic matter, contained significant aluminum and traces of iron and copper.

The "fuzz" in two slots in front of the ferrite cores contained considerable aluminum, moderate zinc, and a small amount of copper but no iron.

Other samples, as noted above, were removed from several positions on the aluminum oxide sliders. The significant cobalt and nickel contents on the outriggers indicates that this residue came from the memory disc. It is difficult to believe that the cobalt and nickel from the ferrite cores could be transferred to the rear portions of the sliders. Thus, these elements must have come from the third layer (counting from the surface) of the aluminum memory discs.

We would have expected to find gold and rhodium on the outriggers along with nickel and cobalt. The absence of these metals, which were supposed to have been in the outer two electroplated layers, indicates that they were not present on the memory disc at all.

The presence of zinc on the outriggers suggests that there was considerable heat between the ferrite cores and the memory disc. Being volatile under the influence of heat, the zinc apparently migrated to the surface of the ferrite cores; and then it was mechanically transferred from the ferrite core to the memory disc during sliding. Thus, heating and subsequent transfer probably resulted from direct contact between the sliders and the memory disc.

In a separate phase of the work, the electroplated layers on the memory disc were examined by optical and electron microscopy. Figures 1-4 illustrate our observations.

Figure 1 shows a pit penetrating the copper plating. The plating measures 2800 microinches instead of the expected 100-500 microinches. Figures 2 and 3 show the same view at 1000X and 4500X magnifications, respectively. The outer three platings were not present around the pit.

Figure 4 shows an electron micrograph of the outer three platings at 64,200X magnification. The individual platings could not be resolved but their total thickness could be. This thickness was 7-12 microinches, a value significantly less than the required total thickness of 21 microinches.

Please do not hesitate to contact us if there are questions concerning this report or the test techniques used to develop our information.

Thanking you for this opportunity to be of service, we are

Very truly yours,

MASSACHUSETTS MATERIALS RESEARCH, INC.

David Krashes

David Krashes
President

DK:hd

Enclosure

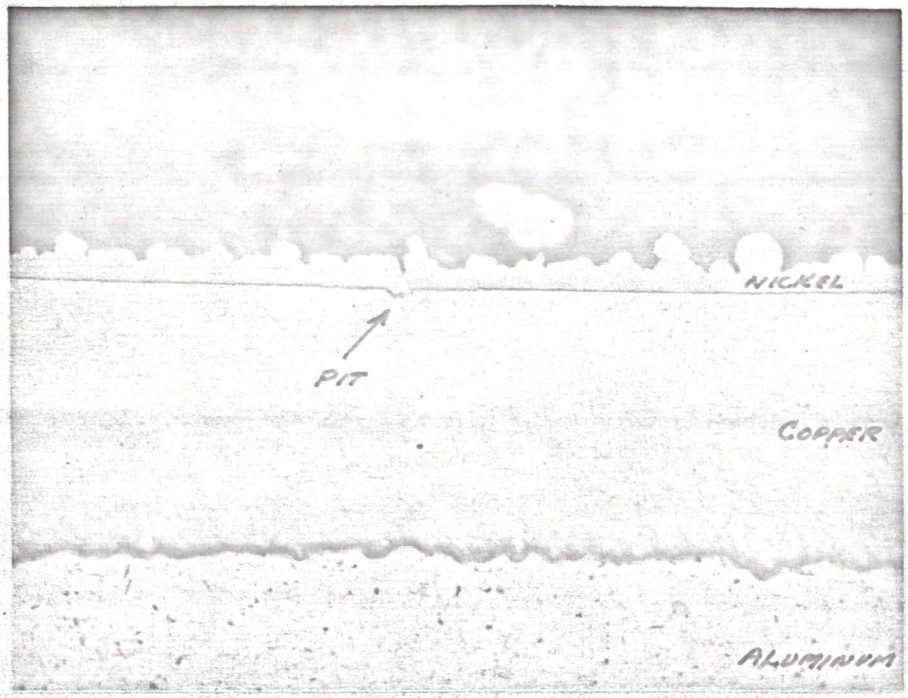


Figure 1. Transverse cross section of the several platings. The electroless nickel plate was applied by MMR to preserve the surface features. A pit that penetrates into the copper is present.
Neg. No. 2656
As-Polished Mag: 500X

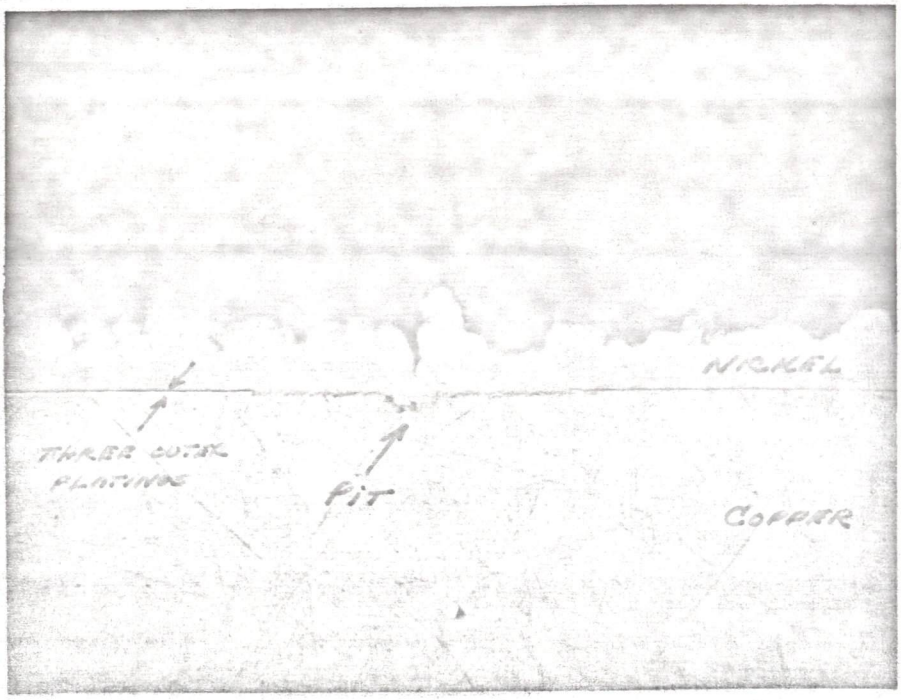


Figure 2. Same as Figure 1 except at a higher magnification. The three outer platings are barely visible. Neg. No. 2657
As-Polished Mag: 1000X

Figure 3. Enlargement of Figure 4. The outer platings are missing around the pit. Neg. No. 2657
As-Polished Mag: 4,500X

Figure 4. Electron micrograph of the outer platings (between arrows). The individual platings are not resolvable. Their total thickness measures 7-12 microinches. E.M. No. 552
Carbon Replica Mag: 64,200X

digital INTEROFFICE MEMORANDUM

DATE: August 12, 1969

SUBJECT: INFORMATION on PDP-8/I typesetting system at McGraw-Hill, a new memory device and IBM's System 3.

TO: Ken Olsen

FROM: Dennis Goss
P.R. Dept.

cc: Nick Mazzarese
Mark Nigberg
Gabe d'Annunzio

Last Friday, I was in New York City and met with Louis Young, editor-in-chief of BUSINESS WEEK Magazine, to discuss their dual PDP-8/I typesetting system. Mr. Young had very high praise for DEC, describing the system as a complete success. He said that it is responsible for them making their weekly mailing date, a task that would otherwise be impossible.

He continued by saying that the system has been so successful that McGraw-Hill has begun putting other magazines on it. Currently it is used in the production of BUSINESS WEEK, TEXTILE WORLD and INDUSTRIAL MANAGEMENT. Before too long, it will be used in the production of all their magazines, and they are one of the world's largest magazine publishers.

I feel that as important as the compliments on the system were, those given Marv Cothran and Richard Falt are just as worthy of note. Mr. Young praised both men and said that they were a credit to their company. He added that they contributed a significant amount to the success of the system.

After my interview with Mr. Young, I spent about a half hour with Ted Merrill, BUSINESS WEEK's computer editor. He has been around computers for a long time and was formerly employed by IBM. He raved about a new disk-like memory device developed at Bell Labs in Murray Hill, N.J. He said it should permit thousands of words to be stored in a device not much larger than a man's fist. I have enclosed the article he did on it.

Since he said that this was probably the most exciting computer development he had ever seen, I thought it might be worth a closer look.

Also, he mentioned that he thought the programming for IBM's new System 3 cost the company about $80 million. He said he recalled that it was probably the outgrowth of a package they had developed when he was there. They developed this package, a very large undertaking, and then did not know what to do with it. He said IBM would not confirm this.

DCG

ndf

Data bits by the million can be stored as tiny magnetic "bubbles" or "domains" in new solid-state devices developed by top Bell Labs researchers A. H. Bobeck (seated), J. P. Remeika (left), L. G. Van Uitert, A. A. Thiele, and P. C. Michaelis.

Computers

Magnetic tug toward the future

Bell Labs' work on memory devices using magnetic crystals may lead computers far beyond the transistor generation

Top electronic and computer designers from across the U. S. have been trekking to Murray Hill, N. J., lately to see a 10-minute, silent film at Bell Telephone Laboratories. Unprepossessingly titled Basic Orthoferrite Domains, the film documents new developments in the application of magnetic technology that could lead to yet another generation of computers and allied devices.

Bell Labs' invention of the transistor made large computers possible and resulted in a whole new electronics components industry. Its new work in magnetic devices may have an almost equal impact.

Like the transistor, the lab's magnetic devices depend on basic solid-state physical phenomena. But while transistors use the electrical characteristics of semiconductor crystals of, say, silicon or germanium to amplify and switch signals, the new technology takes advantage of the magnetic alignment properties of crystals grown from mixtures of iron or lead oxides and rare-earth metals.

Thin slices of such magnetizable crystals can store as many as a million bits of information per square inch. Stacks of slices might hold millions of words and numbers in a volume not much larger than a few cigarette packages. Nowadays, storing that much information in a way that makes it immediately accessible to computers takes units the size of clothes closets, packed with precision machinery.

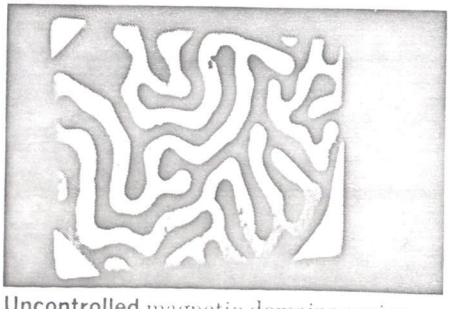
Compactness is only one of the advantages Bell Labs researchers have found in devices made from their magnetic materials. The devices have no moving parts to wear out, generate little heat, operate on very low power, and need very little wiring to interconnect them. Once the crystals are grown, manufacture will be much simpler than making semiconductor devices. The potential is a vast reduction in the cost of storing and handling data.

Bubbles. So far, the Bell Labs researchers have not tagged their new magnetic components with a formal name like transistor. They have been nicknamed "bubble" devices, because the technology is based on generating tiny magnetized areas known as magnetic domains in the thin crystalline slices. The domains—a fraction of a thousandth of an inch in diameter—move across the slices under the influence of electrical currents in printed conductors on the surface, or in response to changes in the magnetic fields surrounding the unit. Under polarized light, the domains are visible, and under a microscope look like tiny bubbles.

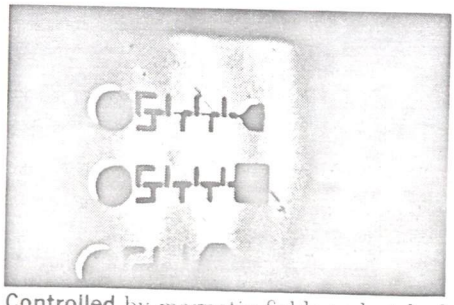
If the circuits are operated very slowly, it is possible to watch the bits of data move through the storage and logic patterns that are printed on the surface of the crystal to guide them. The bubbles blend into a blur as the speed of data transfer increases toward the present maximum of 3-million bits per second.

No surprises. Like many other technological developments from Bell Labs and other large research organizations, magnetic bubble technology is a product of a long-term effort by many researchers from a variety of disciplines. No one yelled "Eureka!" when the first lab models started working, since Bell's scientists knew perfectly well how the devices should behave according to the known properties of the crystals.

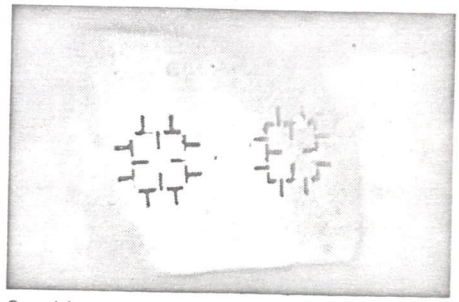
William B. Shockley, one of the transistor's inventors, was also one of the men who suggested investigating magnetic domain phenomena for use in computer



Uncontrolled magnetic domains squirm across crystal slice in Bell Labs' test.



Controlled by magnetic fields and etched patterns, domains are data-bearing dots.



Sped by rotating magnetic field, data bits race in patterns at 20,000 in. per second.

memory devices. Bell's previous work in plated wire memories provided much of the background. And the project marked a continuation of Bell's long-term strategy of directing research towards reducing the number of parts and connections in electronic systems.

Andrew H. Bobeck, who heads the exploratory development group working on the devices, is pleased and surprised at the sudden interest in the project. "We gave technical papers on a lot of our work as much as two years ago," he says. Apparently, though, few people associated these reports with a possible revolution in data processing and storage.

"It's almost impossible to tell exactly where the contributions came from," says Alfred A. Thiele of the fundamental memory device staff. "We wander around here pretty informally. The mathematics department may help on a problem, the materials lab will grow special crystals, the components people come up with ideas, and so on."

Production. The Bell researchers think it is still a bit early to estimate when their new magnetic devices may go into production. Bobeck admits there is a lot of difficult work ahead—particularly in the technology of growing large crystals. Since his group is now concentrating on large-capacity memories to meet some of the specific requirements of the Bell System's electronic switching systems, the need for large crystals is vital.

It is likely that some of the first production devices using the domain bubble techniques may come from companies outside the Bell System, operating under licensing agreements. Bobeck and others think the devices may be of great interest to the military. For one thing, they ought to be resistant to radiation effects.

Bobeck and his group see a neat match between the new magnetic devices and recent advances in semiconductor circuitry. With integrated semiconductor circuitry in the high-speed units and magnetic circuitry in the storage and slower input and output units of computers, there should be a lot of room for design innovation from now on.

Black book. One research scientist at Bell Labs, musing on the future of the magnetic circuits, envisions a little black box that could replace the little black address book: "You might have a pocket-sized gadget with the capacity to store all the information you normally use. You could keep names and addresses, phone numbers, appointments, personal and business accounts, or whatever."

But of more immediate importance to the computer industry is whether—and how quickly—such products as disk files and other computer peripherals will go the way of the vacuum tube, nudged out by less costly and more efficient devices from the world of solid state physics. Bell Labs' short movie may turn out to be a billion-dollar story. End

lead carpet treatment hushes shipboard noise

A new concept to accomplish noise reduction in power boats has been introduced by Soundcoat Company. Particularly applicable in those classes of boat where the engine compartment is totally enclosed beneath a flat deck, this soundproofing technique employs a resilient sandwich of lead and polyurethane foam. The sound deadening sandwich is installed as easily as carpet.

Sound pollution — the introduction of annoying, distracting noise into our immediate atmosphere — has become a critical design consideration. Design engineers must be aware of the effectiveness of sound control devices and how to install them. Lead, used exclusively or in combination with other design materials in a variety of shapes, forms and sizes is helping to answer these design problems in a range of architectural and industrial situations.

If you have a noise problem, it will pay you to look into the possibilities of using lead. Metallic sheet, leaded plastics, bulk damping compounds, and other lead-loaded products could provide the answer. For more information on the many uses of lead in sound attenuation, write Lead Industries Association, Inc., Dept. P-8, 292 Madison Avenue, New York, N.Y. 10017.

Ken

digital INTEROFFICE MEMORANDUM

DATE: August 13, 1969

SUBJECT: EMPLOYEE APPEARANCE AND WORK HABITS

TO: Paul Chambers
John Murphy
Joe Gaffney
Pete Koch
Bob Falin
Graydon Thayer

FROM: Bob Lassen

cc: Ken Olsen
Win Hindle
Stan Olsen
Brewster Kopp
Pete Kaufmann
Nick Mazzarese
Ted Johnson

We are very much concerned about the increasing number of employees who are using extremely poor judgement in their choice of working attire and their appearance in general.

A number of employees are coming to work indecently attired and many of them appear to be unclean and sloppy.

I think our first step is for each of you to pass the word along to supervisors and managers that they have the authority to send people home who, in their judgement, are not using good sense with respect to their appearance and personal grooming and cleanliness.

Some supervisors have suggested that we publish standards; however, I find this difficult to do. In my opinion, mature supervisors and managers are perfectly capable of identifying those who are not using good common sense in their personal habits and the way they dress when they come to work. (In most cases it is quite obvious.)

We should make it clear to the supervisors that we don't want these people in the plant. Because many of these employees are young, we owe it to them to teach them the proper way to dress for work.

In addition, we are concerned about the work habits of the younger employee. In many cases they are working for the first time; and if we as managers and supervisors don't teach them good working habits, they may never learn to become responsible people.

I would like you to impress the issues as outlined in this memo (both personal appearance and work habits) on all of our managers and supervisors every time you have the opportunity (meetings, individual discussions, etc.)

Further steps may be necessary, but let's begin now to solve the problem and pass the word along to others in the department who are in a position to meet with supervisors and managers on a fairly regular basis.

I welcome any further suggestions you have to help solve these problems.

Bob

jfr

digital INTEROFFICE MEMORANDUM

DATE: August 18, 1969

SUBJECT: Guest Services Program

TO: Pat Greene
Ken Olsen ✓
Gabe d'Annunzio
Ted Johnson

FROM: Roy Gould

PROPOSAL

The following is a detailed plan for arranging a Guest Services Program within the Trade Show Group.

PURPOSE

The purpose will be for ease of coordinating customers, with and without salesmen, and to accompany their visits to Maynard. This would consist of the following:

(1) When a salesman is sending a customer or coming with a customer to the plant, he notifies the Guest Services Group at least two weeks ahead of time so that motel reservations can be made. He also notifies us of tentative or firm flight plans.

(2) Also, at this same time he notifies us of what and who he wants to see. We, in turn, immediately arrange a meeting with the people involved so if there are any problems we can immediately notify him of such. We will be coordinating plant tours and such through Pat Greene's in-house sales organization.

(3) Upon arrival at Logan Airport, the customer is met by a Guest Service representative. He is then escorted to a waiting station wagon which has "Digital Guest Service" painted on its doors. He (they) are driven to their motel or to the plant. Upon arrival at the plant, the salesman is started off on his planned itinerary which had been mailed to him a few days before his arrival. If it is a first visit by a customer, he is guided around on his itinerary by a member of the Guest Services Group.

(4) Upon completion of the day's activities, he (they) are driven back to their motel or to the airport by Guest Services.

(5) As you can see, this system is designed for one or two day trips to the plant. If the trip is for a longer period of time, it is suggested that a car be rented by the salesman.

GOALS

This service will give the customer a long lasting impression of Digital. A courteous, neat-looking individual will meet him at the airport, drive him to his motel and to the plant where he is efficiently guided about, and will return him to his motel or back to the airport.

Salesmen will not have to worry about arrangements as they will have all been confirmed to him.

NEEDS

To perform this service effectively, we will require one more secretary who will handle reservations, arrangements of meetings, etc. I have a fellow now who sets up and repairs our exhibits who could be the individual who makes the trips to the airport. We will also require one new station wagon.

Basically, there is myself and two other coordinators who work with me on Trade Shows. However, now that the Trade Show Schedule is down to a workable program they will be able to help on this new Guest Service Program.

Your comments are invited.

jac

digital INTEROFFICE MEMORANDUM

DATE: August 18, 1969

SUBJECT: Dead Storage Stock Rooms

TO: K. Olsen FROM: J. Smith

Below is a listing of dead storage stock rooms that are my responsibility:

1. Dead Storage (One caged room near old Production D Area)

2. Software and Z Stock (Building One, Floor One, next to Shipping)

3. Z Stock (Next to Raw Material Stock Room) (Building Three, Floor Five)

4. Logics (Stored with W. Hanson's kit stock room)

Jack

sm

CONFIDENTIAL

digital INTEROFFICE MEMORANDUM

DATE: 19th August, 1969.

SUBJECT: PDP-10 Customer Survey

TO: Ken Olsen

FROM: Ron Smart

cc: Ted Johnson
Win Hindle

The attached summary results are a quick cut from a significant sample of the U.S.A. and Canadian customers. The detailed reports of individual customers are still in the process of being commented on by field people as a quality control measure, and will be included in the final report.

Enclosures are:

* Percentage distribution of customers rating our performance in the different categories of "well", "marginal", "poor".

* Ranking of comments in reply to the survey questions, by frequency of occurrence of the comments.

jr
encl.

PDP-10 CUSTOMER SURVEY FORM

Ron Smart, 7/15/69.

Customer ..... Equipment .....

Application ..... RESULTS IN PERCENTAGES ON HOW CUSTOMERS ANSWERED QUESTIONS.

1. Are you satisfied the PDP-10 system is well suited to the job it was selected and purchased for?

87% Yes .....

7% No .....

No answer - 6%

2. How well have we fulfilled our obligations to date, in terms of the supply of equipment, software and services?

Well	Marginal	Poor		
55%	25%	15%	(a) Hardware	No answer - 5%
37%	20%	10%	(b) Software	No answer - 33%
50%	12%	2%	(c) Services	No answer - 36%

Do you have dates for the clearing up of outstanding problems? ☐ Yes ☐ No

3. In particular, how well did we handle the following functions?

Well	Marginal	Poor	N.A.		Any Specific Problem
30%		15%	50%	(a) Sales presentation of product and services	No answer - 5%
50%	10%	10%	25%	(b) Contract details	No answer - 5%
55%	9%	11%	9%	(c) Delivery	No answer - 16%
60%	5%	10%	5%	Installation	No answer - 20%
35%	25%	2%	25%	(d) Maintenance service (response and effectiveness)	No answer - 13%
40%	10%	12%	20%	(e) Software Support	No answer - 18%
55%	9%		12%	(f) General handling of your account	No answer - 24%
				(g) Other factors	

4. How well would you rate our hardware reliability and performance?

Good	Marginal	Poor	Main problem area if any
60%	20%	10%	No answer - 10%

5. How would you rate our software reliability, performance and completeness?

Good	Marginal	Poor	Main problem area if any
75%	18%	2%	No answer - 5%

6. Who do you recognise as your: Account representative (Salesman) .....

Software support man .....

Field service representative .....

7. Would you care to comment on any other aspects of our PDP-10 system, relating to the way we promote it, handle our sales or service, or the way in which you would like to see the hardware or software developed?

E.g. New software needed:

Not Applicable

New hardware needed:

New applications:

Other:

PDP-10 CUSTOMER SURVEY FORM

(Ranking of comments, and frequency of their occurrence.)

1. Are you satisfied the PDP-10 system is well suited to the job it was selected and purchased for?

	Rank		Actual Number Making Comment
FAVORABLE:	1.	Cost/performance	4
	2.	Will buy another system	2
	3.	Plans to buy two more	1
	4.	Good instruction set	1
	5.	Well designed	1
	6.	Does very good job	1
	7.	Well pleased	1
	8.	Very satisfied	1
	9.	Best buy available	1
	10.	Chose because of Monitor	1
	11.	Performed better than anticipated	1
	12.	Very happy	1
UNFAVORABLE:	1.	Unreliable	1
	2.	Bad service (one week to fix)	1

2. How well have we fulfilled our obligations to date, in terms of the supply of equipment, software and services?

	Rank		Actual Number Making Comment
FAVORABLE:	1.	Good sales support	1
UNFAVORABLE:	1.	System wasn't checked out well in Maynard	2
	2.	Promised Fortran re-entrant code	1
	3.	Inadequate software support	1
	4.	Minimum service charge too high	1
	5.	Press too hard for payment without putting effort into getting their installation problems solved	1
	6.	Slow to respond to trouble call	1
	7.	Spare parts on order for ages	1
	8.	No interfacing help	1
	9.	Couldn't purchase module without service call (MIT)	1

3. In particular, how well did we handle the following functions?

(a) Sales Presentation of Product and Services

	Rank		Actual Number Making Comment
FAVORABLE:	1.	Good sales brochure	
	2.	Good sales support	
UNFAVORABLE:	1.	Salesman ineffective against competition	2
	2.	Completely undersold	2
	3.	Poor presentation	

(b) Contract Details

No comments.

(c) Delivery and Installation

UNFAVORABLE:	1.	Disk pak late delivery	4
	2.	Slow 6801 delivery	
	3.	Poor delivery of mass storage	
	4.	Late delivery of card punch	
	5.	TU20 delivered instead of TU79	
	6.	DM10 late delivery	

(d) Maintenance service (response and effectiveness)

UNFAVORABLE:	1.	Parts not stocked by Field Service
	2.	Too few maintenance people
	3.	MA10 memory problem for six months

(e) Software Support

UNFAVORABLE:	1.	Too few software support people	4

(f) General handling of your Account

UNFAVORABLE:	1.	Press to hard for payment without putting effort into getting their installation problems solved

4. How well would you rate our hardware reliability and performance?

	Rank		Actual Number Making Comment
Main problem area:	1.	Memory	7
	2.	Console switches	2
	3.	Console design	1
	4.	Magnetic tape	1
	5.	DECtape	1
	6.	Line Printer	

5. How would you rate our software reliability, performance and completeness?

	Rank		Actual Number Making Comment
Main Problem Area:	1.	Documentation	6
	2.	Fortran is poor	3
	3.	Software not user oriented	1
	4.	Manuals not simple enough	1

7. Would you care to comment on any other aspects of our PDP-10 system, relating to the way we promote it, handle our sales or service, or the way in which you would like to see the hardware or software developed?

	Rank		Actual Number Making Comment
Software needed:	1.	Improve Fortran	4
	2.	Improve Monitor	2
	3.	Improve Batch	2
	4.	Develop - Cobol, APL, PL1, Sort/Merge, RPG, Snobol, COGO	2
	5.	Multi-Processor software	1
	6.	Means of communicating between jobs	1
	7.	Expand Basic, Algol and Cobol	1
	8.	Translator to convert 360 programs	1
	9.	Improve "Convert"	1
	10.	Re-entrant Algol	1
	11.	Snobol, Lisp, load and go Fortran	1
	12.	Bio-medical statistical package	
	13.	Lisp system	

7. Cont'd.

	Rank		Actual Number Making Comment
Hardware needed:	1.	Paging	3
	2.	Remote batch terminal	3
	3.	8 or 16 port memory interface	2
	4.	Faster CPU	2
	5.	Better data communication device	2
	6.	Cheaper card punch	
	7.	Higher speed tape standard product	
	8.	Cheap line printer	
	9.	Better swapping facilities	
	10.	Cheaper graphics	
	11.	Slower and cheaper memory	
	12.	Remote plotter	
	13.	Remote high speed displays	
	14.	Cheap bulk storage	
	15.	Need magnetic tape that is program supported	
	16.	Bigger drum - addressable other than sector	

* * *

digital INTEROFFICE MEMORANDUM

DATE: August 21, 1969

SUBJECT: The Values of Getting Good Publicity in the Business Press

TO: Ken Olsen

FROM: Mark Nigberg

We recently received a memo from one of our Vice Presidents which indicated that we seemed to be very concerned with our business and financial publics, perhaps at the expense of our customer publics.

We certainly would not accept the notion that the financial community is more important than our customers, but often, building a good image in the business and financial press can directly affect sales.

A case in point was our recent mini-computer article in the WALL STREET JOURNAL. During the past week, this article has generated a number of sales leads directly traced to it. The Ann Arbor office, for example, received about a dozen calls from people who had read the article and were interested in buying systems; either ours or those of one of our OEMs who were mentioned.

Scott Schmedel, the WSJ reporter who worked with our Dennis Goss on the story, received a number of telephone calls and letters requesting more information about us and the applications discussed.

In a telephone conversation with Ken Stevens of the Atlanta office, he said that the story has created considerable interest at the Hyatt House Hotel chain. He said we are trying to sell them a system for their reservations. This is a prospect Ed Kramer is most excited about, since it involves the sale of several PDP-12's.

Last week, we received a call from Northeast Sales asking for the telephone number of one of the customers mentioned in the article. The number was to be given to a prospect who was interested in buying one of the systems described.

/rdb

digital INTEROFFICE MEMORANDUM #36

DATE: August 22, 1969

SUBJECT: Stockrooms (11-3)

TO: Ken Olsen
cc: Nick Lorusso
Stan Olsen

FROM: Al Hanson

In reference to your memo regarding housekeeping in the stockrooms in Building 11-3, I have relinquished all space in 11-3 (Dead Storage), because I have adequate storage room in my new stockroom in Building 3-1.

9/5
Copy to Tom Stockbrand

digital INTEROFFICE MEMORANDUM

DATE: August 22, 1969

SUBJECT: UNDERWRITERS' LABORATORIES, INC.

TO: Ken Olsen

FROM: Phil Markell

As you aware, the local regulations in the City of Portland, Oregon, require that any electrical equipment be first certified or listed by an approved testing laboratory as meeting the minimum safety standards contained or adopted by such local regulation before it can be leased, sold, rented or offered for sale in the City of Portland and before it is installed, operated or energized with electricity.

As a result of this local ordinance and the specific intervention of the Assistant Chief Electrical Inspector of the City of Portland, the PDP-10 group has had the PDP-10 inspected by Underwriters' Laboratories, Inc.

As a result of the inspection, Alan Kent received a letter from Underwriters' Laboratories, Inc. dated July 18th, which set forth various criteria which would have to be met before the PDP-10 would be considered acceptable for listing.

I believe that this matter has been brought to the attention of the Engineering Committee.

Subsequent to the problem with the PDP-10 in Portland, Oregon, a customer of a typesetting system in Los Angeles has informed us that the local authorities there have told him that he must get UL approval for his typesetting system.

I have enclosed to Dick Best, with a copy of this memorandum, a report of a January 14-15 meeting held by the electrical counsel of Underwriters' Laboratories, Inc. and manufacturers of listed electronic data processing equipment. At this meeting, representatives of Burroughs Control Data, Honeywell, Univac, IBM, among other, were present.

My recommendation would be that the entire question of UL approval be given immediate attention. From my brief conversation with Alan Kent it is not altogether clear to me whether any computer company

will be able to comply with the new code, what computer companies have complied with the old code, what the computer companies are doing in regard to obtaining UL approval under either the old or the new code.

More and more the feeling is that requests by purchasers of our equipment for UL approval, and possibly direct requests from cities with the type of local regulations as Portland and Los Angeles, will become more rather than less prevalent. We should at least know what other computer companies are doing so that we may respond to these requests.

I have also received a copy of the Los Angeles Electrical Code which I have sent along to Dick Best. Fred Barla, an Anaheim salesman, has discussed with the local Los Angeles authorities the non-compliance of the typesetting system in Los Angeles with the electrical code. They indicated to him that our equipment does not even have an identification tag indicating current wattage, etc. for each piece of equipment.

I would also recommend that an analysis should be made of various electrical codes throughout the country, with a view to determining the types of regulations which DEC equipment does not comply with but could without the necessity of obtaining Underwriters' Laboratories' listing. As an example, marking equipment with an identification tag.

PM:lml

digital INTEROFFICE MEMORANDUM

DATE: 26 August 1969

SUBJECT: Computer Access Systems' Tape Cassette

TO: Joe St. Amour

FROM: Arnold Sherman

cc: Ken Olsen
Roger Cady
Jim Milton

I have met with Mr. Donald Iams of Computer Access Systems and looked at their Model 2000 Keyboard Recorder. This keyboard recorder contains a keyboard entry for data which is then recorded on a low-cost cassette transport of their own design and manufacture.

Of the cassettes which I have seen, this one appears to offer the best combination of low cost and reliability which I have seen to date. The transport design includes two reel motors, a reel servo and a prerecorded timing track on one track of the cassette. The tape is driven directly through one of the reel motors by using prerecorded timing track as part of the servo loop to achieve constant tape speed. Mechanically, this is quite simple; and electrically, the servo is not terribly expensive.

Data is recorded on the second track of the cassette in a bit serial fashion; however, the character is recorded three times on the tape along with a parity bit. The logic is designed to use the first of the three redundant characters in which parity checks. They have data which indicates data errors of about one bit in ten to the seventh.

Mr. Iams has indicated a sales price of approximately $500 for a cassette system which includes the tape transport, the reel motors and the servo electronics.

The unit does appear to meet the requirements for a low-cost tape system. Roger Cady is in contact with this Company to investigate the possibility of obtaining a unit for evaluation. I am keeping abreast of this in order to furnish any possible assistance.

/gp

9.16 Let's let this slide for now. Ken Olsen

digital INTEROFFICE MEMORANDUM

DATE: August 29, 1969

SUBJECT: Three Block Assembly by Adhesives

TO: Ken Olsen

FROM: Loren Prentice

cc: Stan Olsen
Joe St. Amour

Approximately the middle of June this year we contacted both Cinch Mfg. Co. and Sylvania in regard to producing this item. We have recently received a quote from Cinch Mfg. for assembling three of their connectors. Their quotation is $3.50 each; holding fixture, a quantity of 10, $1,000.00; glue setup, $500.00; foam packing for shipping, $1,600.00. Sylvania has not quoted.

We received some material from Emerson & Cummings and ran a test here on two units that we cemented together with angle pieces on the end to support the three blocks. After they had cured the required time we suspended them and hung a weight of 50 pounds in the center of the unit and left them for 48 hours. One unit failed completely because of incomplete filling of the glue joint; the other unit distorted approximately 1/16" under the load but returned to normal when the load was removed at the end of the time.

The first tests we ran here indicate that there is a good possibility of mounting with adhesives with the required strength. There is some indication from the tests that we ran that there might be difficulty in insuring a completely filled joint. This might be overcome by vacuum filling or some other method. The fixturing to maintain the correct dimensions so that the part can be wire wrapped is a necessity that can be done.

Note that Cinch's price is considerably higher than the die casting for mounting, the die casting now believed to be around $.85 or $.86 each.

Will you please indicate if you have further interests in this method of mounting.

Loren

Kenneth H. Olsen

Memos Received, September, 1969

TO:	FROM:	RE:	DATE:
Ken	Joe St. Amour	large disk status	9/4/69
Ken	Brad Vachon	Stanford Research Institute	9/4/69
Ken	Bob McInnis	" " "	9/8/69
Ken	Ed Reilly	phone call from Drexel	9/11/69
Howie Painter/Bill Long	Richard May	desirability of DEC offering basic as part of our educational package	9/17/69
Ted Johnson	Richard May	your memo dated 9/10/69	9/17/69
Ken	Joe St. Amour	DEC standards for block schematics	9/18/69
Ken	programming dept.	thanks/outing	9/19/69
Ken	Rick Merrill	projects/processing	9/22/69
Mark Nigberg	Dennis Goss	results of small computer story in the wall street journal	9/26/69
Ken	Richard Clayton	views of production from a product line mgr/end of successful month	9/29/69

Copy to Pete Kaufmann
From Ken Olsen 10-8-69

digital INTEROFFICE MEMORANDUM

DATE: September 29, 1969

SUBJECT: Views of Production from a Product Line Manager at the end of a successful month.

TO: Ken Olsen

FROM: Richard Clayton R.C.

CC: Win Hindle

While I certainly think we have much to do in improving our corporate methods and effectiveness in Production, I thought it appropriate to outline what I consider some of the accomplishments of Production over the past few months. It has been really fun watching the PDP-12 develop from a loosely organized production group, with little influence and effectiveness, into the present situation of substantial respect and confidence. An effective organization is developing, in spite of the daily pressures of substantial production increases each month.

It appears to me that one of the reasons for Production's ability to meet its rapid expansion requirements is due to its management strength. A substantial number of key people have come on board who are capable of directing and developing some of the good people we have whose job temporarily outgrew them. This seems to be bringing some order out of the trouble that developed from too many people trying to be heroes and not realizing that their jobs had grown to the point where one person could no longer be expected to handle it.

The strength and sense of corporate objectives of some of the people like Jack Smith, Bob Puffer, Bill Hansen and Harold Trenouth, is truly what will make us grow. The ability of these people to select and develop their supervisors seems to me impressive and leaves one with a feeling of confidence. They seem capable of both solving the short term problems and getting their organizations straightened out, preventing the repetition of problems. Of course, our rapid growth makes these problems even more complex.

To be sure, I would like more from Production and we will do our best to help things along that direction, but when I think things are bad; I can vividly remember starting the LINC-8 group with a group of six technicians with an average of eight weeks PDP-8 experience and two production supervisors, Steve Mikulski and Frank Fortin, who had never experienced this before, yes, things are improving, but there is still plenty to do!

RJC/reb

digital INTEROFFICE MEMORANDUM

DATE: September 26, 1969

SUBJECT: RESULTS OF SMALL COMPUTER STORY IN THE WALL STREET JOURNAL

TO: Mark Nigberg

FROM: Dennis Goss

cc: K. Olsen
T. Johnson
N. Mazzarese
W. Long
H. Painter
G. d'Annunzio

In the August 11th issue of The Wall Street Journal there appeared on page one a story on the small computer. It was almost entirely about DEC and its PDP-8 family. Since we had never received this type of publicity before and since the value of publicity in the general or business press has been questioned, we decided to conduct a survey to see what kind of interest this article might have created.

First, we sent inquiries to all sales offices asking them to inform us of inquiries received. Twenty-seven offices responded. Of these 27 responses, five were from European offices. None reported any inquiries and seemed to be in general agreement that The Wall Street Journal has very little readership in Europe. However, Geoff Finch of the London office did mention that the story created some interest in that city.

The 22 United States sales offices that replied reported that they had received 167 inquiries. We asked that they include in their reply some idea of the type of inquiry. Of the 167, 115 were interested in the small computer for business or commercial data processing. The second greatest area of interest was industrial applications.

By area, it is interesting to note that 50 inquiries were received by the Orlando office, 35 in the business data processing area. Of the 20 received by the Washington, D.C. office, 12 were in the business data processing area. The Huntsville office received five inquiries, all for information on data processing. Ten of 10 received by the Denver office were data processing, as were all of the 15 received by the Ann Arbor office.

- more -

Going one step further, we talked to some of the customers mentioned in the article and to the article's author. Scott Schmedel, the author, reported that he had received several telephone calls and about 10 letters on the applications mentioned, some from as far away as California. In each case, he referred them to the proper party. Dr. Joseph Edelman, a Louisiana neurosurgeon whose PDP-8/I-based system for automating patient records was mentioned, said that he received more than 50 inquiries from the article. Victor Rosenberg, the man in charge of the data processing center at Chesapeake Life Insurance, said that he had received more than a dozen inquiries. One of these was a visit to his office in Baltimore by a man from New Jersey. The bulk were from people in the insurance industry.

By way of comparison, it is interesting to note that 81 grade A inquiries were generated by our participation in Spring Joint. It is estimated that of the inquiries generated at WESCON, only about 50 can be considered grade A. It would seem that those generated by The Wall Street Journal article must fall into the grade A category, since the inquirer took the time to write an unsolicited letter or make a telephone call.

ndf DCG

cc: Nick Mazzarese 11-10-69

digital INTEROFFICE MEMORANDUM

DATE: September 22, 1969

SUBJECT:

TO: Ken Olsen

FROM: Rick Merrill

These are the projects (short and long) that I am currently processing. I have estimated the time to completion as if each were the only item and with no overtime.

Many of the smaller items (questions, FOCAL functions) could be taken care of by an assistant programmer. They are not yet within the scope of the software specialists. Also, Mr. Pyle has refused to consider any FOCAL systems (consequently, we have had to turn down a request from project LOCAL to do a disk bootstrap feature to 7-user FOCAL).

Rick Merrill

P.S.

People at Lawrence Radiation Lab and others at Foxboro Co. have indicated they are, or want to be, committed to FOCAL. Are we?

vlb

- (1) One talk at Northeastern on Sept 29 ✓ prepared - day

a Vanal (Bill Bowen wants a copy) for GITO FOCAL-S'71 - 1 week

b H.S. I/O for QUAD - 1 week

c DDT-11 Use Manual ✓ 8-ypr - 12 weeks more

d FOCAL-11 (Super FOCAL) - 12 weeks

e FOCAL-10 - 8 weeks

f Swing functions for Gorlo Bell - 1 week

g (2) PDP-8 at FJCC (use 8L or 8SL on ~~Friday~~ ✓ Dick ~~May~~ ~~Dec~~ May)

h FOCAL post processor functions for E.I.A RS 244 numerical control machine for Paul Pawlosh - 2 days

i Discussed on FFT for Peter Hupe ✓ - 1 day done

j Answer miscellaneous phone calls and custom visits - 1 day per week

k Instruction dummy card for PDP-11 - 1 week ✓

l FOCAL-8, 1971 corrections for language ~~work~~ need to be tested

m (3) EDN questionaire ✓ - Joe Colizzolo ~~make by Oct 15 → Nov 15~~ done Paris?

n ~~Focal application~~ demos - Bell Mills for tech specs?

o FOCAL, 1969 Errata Sheet for Tech Specs!

p VC languages with Russ Doane (Friday) ✓ got the order! (Jan-Feb)

q (5) functions for the A.E.C.

R (Company info for proposals, letters, manuals for PDP-8 PDP-11 (Joe Billatore Stan Cotkin Gene Arnold)

S FOCAL functions for custom & Rich One (E.I. Dupont or Bill Rowe ✓)

digital INTEROFFICE MEMORANDUM

DATE: September 19, 1969

SUBJECT:

TO: Ken Olsen

FROM: The Programming Department

THANKS FOR THE GREAT TIME AT CANOBIE LAKE -

Ron Gleinman
Ken Stone
Clarke T. Weyer
Keith F. Nelson
Mary LaCourse
Nancy Fitch
George Trissell
Gloria Macdonald
Hadley La Dude
Margaret Hancock
Susan Hadas
Glenda Mary
Ed Steinberger and the children from St Ann's Home in Methuen
Elaine M. Gravelle
Pat White
Karen Kolling
Jim Bell
Dr Blackington
Tony Wicks

Linda Mason
Jon Lund
Cecil Brooks
Joe 2 Fries
Sharon Metivier
Edward C Nelson
Ray Bernier
Bob Underwood
John R. Kinchloff
Earl Haight
Bob Christoph
Ken Chapman
Carl J. Alsing
Earl Bouse
Mary Lamir
Chris Peters
Margaret Symonds
Monica Krysiak
JoAnne Maslanka
Sheila Ford

(OVER)

Sandy Dickinson
Gaile Burke
Linda J. Harris
John O'Rourke
Susan Poradek
Jack O'Connor
Ralph Gillmeister & family
Cindy Morse
R. Baylor
John Rodenhiser
John Hilliard
D Gosselle
Max Dietrich
Bob Jeans
Don Bennett
Gladys Parnell + children
Glenn Prinkey & Family
George Arnold

digital INTEROFFICE MEMORANDUM

DATE: 18 September 1969

SUBJECT: DEC Standards for Block Schematics

TO: Dick Best
Gerry Butler
Dave Chertkow
Fred Wilhelm

FROM: Joe St. Amour

cc: ✓Ken Olsen

Welcome to the Drafting Standards Committee. Our first meeting on Wednesday, 24 September 1969 at 1:00 P.M. has already been confirmed with your Secretary. The purpose of this meeting is to see if we can reach agreement regarding a set of pictures that everybody reads the same way. DEC Standard 054 identifies a method, and I would like to reach agreement on this as a starting point. If we can agree on this, I would like to propose that all changes occur through ECO Procedure and only when they are for implementation across all Product Lines.

Confusion exists because various Product Lines want different symbols, etc. It seems easy to reach agreement on what Automated Drafting System can do but not on what DEC Standards should be. Our agreement should be that Automated Drafting System must only do what is specified in DEC Standards.

There are several other topics that I would like to cover while we exist as a Committee (however, at later dates). Problems currently exist with microfilm growing in many different areas within the Company. I feel the focal point for this should be in Drafting. I'm also concerned about security and fire files. Perhaps you can think of other topics.

/gp

digital INTEROFFICE MEMORANDUM

DATE: September 17,1969

SUBJECT: Your memo dated September 10,1969

TO: ~~Ted Johnson~~ Rick Merl FROM: REM Richard May

cc: R. Eisenhauer
W. Long
K. Olsen
H. Painter

The following will summarize the series of events which resulted in the loss of a sale at Concord Carlisle Regional High School.

In February 1969 I began working with Charlie Johnson and Mannie Lakis of Concord. On occasion Mr. Lakis came in late in the evening to work with FOCAL; he was sold on the use of the computer at the Junior High as well as High School level. He and Mr. Johnson, at that time, could not persuade the superintendent, Sayer Uhler, to purchase an 8/S; the lease plan was not available at this time. Concord-Carlisle decided to continue timesharing from Call-A-Computer.

During the summer of 1968 I met Mr. Scott Apgar at a Summer Institute at the University of Massachusetts. He became very enthusiastic about the 8/S and FOCAL. In September 1968 he came to Concord Carlisle in the Physics Department as Concord-Carlisle's computer expert. I was making progress on a two user 8/L or 8/I with Mr. Apgar. He saw no problem in changing from BASIC to FOCAL. I continued working with Mr. Apgar and Mr. Charlie Johnson during the school year of 1968.

In May of 1969 Mr. Apgar resigned his position at Concord Carlisle and during the summer of 1969 Mr. John Eten came to Concord Carlisle as the computer expert. He was very pro-BASIC and was completely opposed to changing languages. He was also very much interested in Hewlett Packard's card oriented BASIC system and would only consider DEC equipment if we offered BASIC and a Mark Sense Card Reader capability. As late as mid-August 1969 we would not commit ourselves to supplying BASIC or a Mark Sense Card Reader. At this time, he leased a Hewlett Packard "2114 Educational System". This was not a purchase.

I feel the door is still open at Concord Carlisle for the sale of an 8/I if and when we commit ourselves to a Mark Sense Card oriented BASIC.

In addition to the loss of the sale at Concord Carlisle, we also lost sales to Hewlett Packard's 2114 Educational System at Milton Academy; and the Middlesex School in Concord. The loss of these three systems amounted to a loss of over $60K to DEC. I attribute this loss directly to our inability to supply a good version of BASIC on the PDP-8.

Before I left Northeast Sales, I documented the possible loss of sales to Hewlett Packard's 2114 Educational System at Phillips Academy, Andover; Mt. Herman School, Mt. Herman, Massachusetts; and the Brooks School, North Andover. The loss of total sales to these six (6) schools amounts to over $120K. In addition to our loss of sales, Hewlett Packard has established themselves in this market and should we lose sales at Mt. Herman, the Brooks School and Phillips Academy, they will have gained three (3) very prestigious accounts.

The basis for lease of Hewlett Packard systems at each of the schools which are currently committed to Hewlett Packard was the BASIC language. These people have many man-hours invested in developing materials in BASIC and are very unwilling to change. Phillips Academy, The Brooks School and Mt. Herman also are committed to BASIC and are unwilling to change; therefore, I expect to lose these sales unless we can offer a good version of BASIC in the very near future.

d

digital INTEROFFICE MEMORANDUM

DATE: September 17,1969

SUBJECT: Desirability of DEC Offering BASIC as Part of our Educational Package

RFM

TO: ~~Howie Painter/Bill Long~~ FROM: Richard May

cc: N. Mazzarese
K. Olsen RFM/mcm

HISTORY

My experience in Northeast Sales has made me very much aware that many potential customers in the New England sales district are BASIC oriented; i.e., currently subscribing to a BASIC time-sharing service. I felt these people were my most immediate customers because I could save them money by offering FOCAL on an 8/I or 8/L. I felt it would be easy to convert these potentials from BASIC to FOCAL because of the similarities between the two languages. This was, however, not the case.

I was, except for two cases, unable to convert BASIC time-sharing customers to DEC customers even though I could show them a 2 1/2 year pay out period on their investment. In addition to short term pay-out, FOCAL on the 8/L offers them most of the capabilities they currently have on their time-sharing terminals plus much more flexibility; i.e., they have the availability of multiple languages. I became unsure whether their commitment to BASIC was emotional or if there was a hesitancy to invest a rather large sum of money. At this point I made a study and found that with few exceptions the purchase price of the machines that we had sold to the educational market was less than $15,000. The sales to the educational market with a purchase price greater than $15K (approximately $25K) were to two independent schools--St. Marks and The Hill School. In neither case was there a commitment to BASIC. I concluded at this point that there was a rather small number of schools which could afford an expenditure of greater than $10 to $15K.

In roughly April of 1969 Hewlett Packard announced their card oriented BASIC system. By August, I had lost three (3) sales to Hewlett Packard. These three sales amounted to a loss of many man-weeks of sales effort on my part as well as $60K to DEC. After talking with these customers, I determined their basis for going with Hewlett Packard was the availability of BASIC which is in their words "a standard language". They would have preferred to have an 8/I, "because of its expansion capabilities and DEC's reputation"; however, they were not willing to use a "non-standard language". My sales pitch was that "many independent schools are currently using DEC equipment and have been satisfied with the FOCAL language. We also have an educational sub-group in our DECUS organization; all the schools using DEC computers meet twice a year and discuss their accomplishments. Our users feel that FOCAL is adequate and desirable for their application. In addition to the independent schools, the Project Local people and several other public schools have found FOCAL to be ideal for their use. We feel we can offer you four (4) FOCAL terminals for the price of one BASIC terminal at equivalent cost". Even with this sales pitch, the potential customers were completely unconvinced.

NEW CONSIDERATIONS

Dartmouth and G.E. have done much to promote BASIC as a standard language. BASIC has been recognized as a standard language, (as attested to by the implementation of BASIC on most large computers). FOCAL on the other hand is a comparatively unknown language and available only from DEC. Therefore, we are at a competitive disadvantage in an emotional buying situation. This is attested to, I believe, by the loss of sales to Concord-Carlisle Regional High School, the Middlesex School, and Milton Academy.

We currently have a version of BASIC going into DECUS from Brooklyn Polytech. It has something to be desired; however, we are now in the position to advertise an operational dialect of BASIC. I feel that it would be to DEC's advantage to support this version of BASIC as a standard software.

CONCLUSIONS

Chuck Conley feels that with one half man-year of effort we could implement a Mark Sense Card Reader BASIC on the Family of Eight. In addition to this version of BASIC, I would like

approval to explore the possibility of disguising FOCAL commands as BASIC commands so that we can offer a "time-sharing BASIC on the Family of Eight". The customer would then have four (4) terminals operating in a limited dialect of BASIC. With the addition of a DF-32, he would have a single terminal operating in a powerful dialect of BASIC. This would allow us to maintain a competitive position in this market and offer the customer a choice of costs and capabilities.

By offering only FOCAL we will lose a number of sales to BASIC. By offering BASIC and FOCAL, I feel we can capitalize on very nearly 100% of the sales potential in this market. If we do not offer BASIC, I feel we will lose a significant number of sales to our competitors over the next two years.

RECOMMENDATIONS

DEC offer BASIC on the Family of Eight with Mark Sense Card Reader and in our advertisements acknowledge both FOCAL and BASIC and leave the choice to the customer.

d

digital INTEROFFICE MEMORANDUM

DATE: September 11, 1969

SUBJECT:

TO: K. Olsen
CC: D. Zereski
K. Senior
D. Clayton

FROM: Ed Reilly Ed

In regards to the telephone call received from Drexel concerning the reliability of their Linc-8, the following facts should be related.

1) The call was made by a Mr. Rosen who is a technician that has been with them for two weeks.

2) He did not contact the Philadelphia office prior to calling Maynard nor do our records show a call being requested nor made during the last 15 months.

3) Field Service has contacted the appropriate customer representatives at Drexel and received a verbal apology for the call made.

ED,
ER/nam

digital INTEROFFICE MEMORANDUM

DATE: September 8, 1969

SUBJECT: STANFORD RESEARCH INSTITUTE

TO: Ken Olsen

FROM: Bob McInnis

cc: Stan Olsen
John Jones
Dave Cotton
Brad Vachon
Don Berman

We have been in touch with Stanford Research to find a solution that will allow them to tie a PDP-15 to a PDP-10 shortly after delivery of their PDP-15 (December).

The application is graphic display research and requires high speed data transfer. At present two alternatives are being considered:

use of a DF10 where they design their own interface to the PDP-15 (Dave Brown suggested volunteering some of your time to help with the logic design), or

tie the graphics directly to the PDP-10.

They will make a decision within the next two weeks.

The situation there is better. They now realize that we didn't drop the ball. No pieces of paper were lost nor was delivery misstated. The time required to deliver the interprocessor buffer is a funtion of its complexity, six to eight racks of logic and being the first-of-a-kind.

I think they are satisfied that we are doing everything possible to help solve their problem.

Bob

jl

digital INTEROFFICE MEMORANDUM

DATE: September 4, 1969

SUBJECT: STANFORD RESEARCH INSTITUTE
(Your Memo of September 2 to Bob McInnis)

TO: Ken Olsen
cc: Bob McInnis
Stan Olsen
John Jones
Dave Cotton
Don Berman

FROM: Brad Vachon

Brad

There seems to be some misunderstanding here, or perhaps a power play to get a better delivery.

There was no "piece of paper" lost in Special Systems. I think they were referring to the unusual order form which was placed in July. The unusual order form was processed and a construction requisition approved by Computer Administration in July. At that time, we set a delivery date of April, 1970, carefully considering the fact that we would need two months of time with the PDP-15 to check out the special interface and also considering our current backlog. The PDP-15 is currently scheduled for December, and I frankly have very little confidence in seeing this machine before the end of January. I feel it is very important to set realistic delivery dates when the order is received and not keep postponing the customer a few weeks before he is expecting the system. We sometimes have to do this anyway when we encounter unforeseen technical problems with a system at the last minute. Scheduling a project so that this happens in the beginning is just asking for trouble.

Another question which seems to have come up concerns an increase in price. This increase in price resulted from the customer change from a PDP-9 to a PDP-15.

I will stay in touch with Bob McInnis and the salesman in this regard.

/ee

digital INTEROFFICE MEMORANDUM

DATE: 4 September 1969

SUBJECT: Large Disk (RS-08) Status

Ken Olsen

TO: Central Planning

FROM: Joe St. Amour

cc: Operations Committee
Marketing Committee

Production and shipment of disks will resume during the week of 2 September. A number of significant problems have been solved, but the corrosion resistance of the unit is still uncertain. Units shipped must operate within a restricted environment. Meanwhile, work continues to create a surface that will meet existing environmental specification.

Surfaces to be used for initial shipments will consist of approximately fifteen with fourteen micro-inches of rhodium (produced late July, early August), approximately ten from previously rejected December-through-February disk production and up to two-hundred with fourteen micro-inches of rhodium as produced under a controlled process instituted 29 August 1969. Tech Met will continue producing with the above controlled process until demonstrated improvements are ready for implementation (approximately eight to twelve weeks away).

Evaluation of "controlled process" disks will take place during the weeks of 2 September and 9 September. It is expected that they will be superior to all previous items except possibly the December-through-February production. Since they are untried, this performance estimate is based on surface evaluations with an electron beam microscope.

A tentative plan outlining Nashua Corporation's (parent Company of Tech Met) development program will be available within one week. Their initial efforts will be aimed at the aluminum and copper substrate finishing, cleaning and plating where most of our problems seem to occur. Samples will also be available with the addition of an electro polishing operation which seems to offer the potential for superior characteristics.

Present thinking calls for Tech Met to become strictly a production operation, running with now existing specifications. All technical development will be done through the Nashua Corporation. Information on the overall plan will include Nashua personnel assignments at the Tech Met Operation.

The attached sheets indicate developments which have occurred during the past five weeks of effort.

Weekly reports will be issued regarding status until such time as we are fully under control.

The DF-32 disk surface has also gone through significant changes since the first of the year, and its corrosion resistance is not what it was previously (still superior to RS-08).

Since Tech Met cannot identify all the changes, and since the production process has been relatively stable since early June and the DF-32 continues to work, we have decided to make no changes until we are certain what must be done to produce positive results. Disk surfaces are still our number one priority and will continue to be so until a proven solution is in hand.

/gp

SUMMARY

DISK EFFORT

25 July thru 2 September 1969

1. Corrosion

Increased from eight to fourteen micro-inches of rhodium.

Identified contamination buildup under head as varnish (not frictional polymer).

Possibility that head glues to disk at stop, peels rhodium at start to allow corrosion identified by head print.

Changed cleaning procedures to eliminate contamination buildup. Early tests indicate success. Need added tests to be sure.

Air-conditioned environment shows less corrosion than non-air-conditioned environment.

Corrosion is now random throughout disk, not identifiable by head position.

Some corrosion occurs in shipment; similar surfaces in their plant do not corrode. Changed packing to use sulphur-free paper inside plastic bag. Was in cardboard carton; felt differences in air pressure could cause sulphur, etc. contamination.

Corrosion less with circumferential polish than with cross polish. This possibly is the reason the DF-32 surface has better corrosion resistance.

Changed to circumferential polish (evaluated samples and have proven that it works).

Will evaluate electro polish which eliminates burnishing which traps contaminates and leaves rounded surface defects (versus peaks) for better plating.

Corrosion, and with it magnetic defects, seem to occur due to faulty copper plating. This could start at aluminum substrate and/or contaminated plating bath. The copper builds up with a number of small holes (.0001 to .0005 in diameter). In addition cleaning after polishing is not adequate.

2. Glitches and Switch Drop-ins

These drop-ins were thought to be caused by improper surfaces. Cause was traced to heads. Head ferrites are being grounded and wires to coils are being redressed to eliminate this defect.

3. Adaptive Timing Track Writer

Have developed concept whereby we can use a surface with over one-hundred small errors. Will pursue as insurance policy and for possible future use. About six to eight weeks of logic design are required.

4. Second Sources

a. Disks - Burton Magnekote doesn't have total capability to do what is required. After two weeks into program, we dropped them and concentrated entire effort on Tech Met. We will have to become our own second source; urgency will depend on Nashua Corporation program and response.

b. Heads - Have heads from two other vendors in house to evaluate in complete units. Have set lower priority on this pending completion of present programs.

5. General

Closed loop purging system needs more time. System evaluated showed heavy contamination buildup and corrosion.

Gold-plated disks are not an improvement. Will need head work and closer quality control to make heads fly consistently.

Super-smooth surface improves corrosion resistance but will not consistently fly heads.

Gold under rhodium contributes nothing to corrosion resistance. It has been dropped at this time. ("Old" disks had no gold.)

Built, debugged and installed surface tester at Tech Met's Plant. Second unit of improved design is now being debugged.

digital INTEROFFICE MEMORANDUM

DATE: August 26, 1969

SUBJECT: Progress Report

TO: Grant Saviers

FROM: Cary Levine

cc: Joe St. Amour ✓

1. Went over existing RF/RSØ8 Maintenance Manual and associated circuits and made technical corrections in the manual so that the September 23, 1969 publication date will be met. Saw to it that the flow of signals was correct, or made the necessary changes for it to be correct. Also, made corrections in "language" so that there will be no doubt in one's mind as to the meaning.

2. Ran tests on various T.M.I. disks to determine what the effect of different thicknesses of Rhodium have. Found that a thicker Rh plating has little effect, if any, on the baseline noise level, but on the other hand, the signal itself decreased in amplitude as the Rh thickness increased. The shape of the pulse remained quite consistent. The tests were run on disks that had from 8μ" to 20μ" of Rh with the Co-Ni being 12μ". Flying height was as specified for usual conditions.

   Also revamped writing and reading logic of the tester so that only one revolution would be written or read at a time, rather than many revolutions as was the previous case. This was to facilitate finding a bad location on the disk, if any exist, since under previous conditions, this could not be done. Proceeded to look for "glitches" that were present at one time, but are very hard to reproduce.

3. Conferred with Bev Young on preliminary goals of the Peak Detector. Quite a bit of work remains to be done on this.

/bca

digital INTEROFFICE MEMORANDUM

DATE: August 28, 1969

SUBJECT: Monthly Progress Report

FROM: Charles Youse

TO: Bill Owens
Grant Saviers
Ed Corell
√Joe St. Amour

In my third month at Digital, the pace has quickened to a dead run. The month has been given primarily to the study of the problems with the RF/RSØ8.

1. Study of several 16" discs, using Don Vonada's disc surface tester, showed two kinds of "Drop In."
   A. "Pinhole"
      1. Locked to a certain location.
      2. Fixed Amplitude
      3. Reverses sense when direction of magnetization reverses
      4. Seen in read only mode
   B. "Glitch"
      1. Stays within 1 micro second of a certain location on the disc
      2. Amplitude different on each pass. May disappear for several minutes
      3. Does not reverse sense
      4. Seen only in Write-Read mode
2. A working RSØ8 requires a perfect recording surface. If this is beyond the state of the platers art, or causes too great burden of cost, the system must adapt to plating imperfections. This can be done with a more sophisticated track writer, which would include a surface evaluator, and allow us to live with "Pinholes". I am currently designing such a track writer.
3. An experiment which charged the recording heads to 15v DC produced synthetic "Glitches". Naturally occurring "Glitches" should be eliminated by grounding the heads. (Ferrites)
4. The grounding within the RSØ8 will be improved, though no specific trouble can be traced to the grounding when all the connections are made.

5. I looked at two printers during the month. One, the Clevite 4800 Electrostatic, I have reported on. It is very fast, expensive, and inflexible. The other is the offering of the Data Printer Corp of Cambridge. This is a conventional line printer with one magnetically actuated hammer per column. It should be seen as an example of how to squeeze cost out of a mechnical printer. Unfortunately, Data Printer Corp lacks any production facilities to meet our needs.
6. I have been working on the logic for a small matrix printer, short of the process electronics which would tie us to a particular printing process. A read-only memory for the character font is an area of major interest. MOS holds promise of lowest cost, but for now, a diode matrix looks like the most practical arrangement.

/cg

digital INTEROFFICE MEMORANDUM

DATE: August 27, 1969

SUBJECT: RSØ8 Support - Progress Report

TO: Grant Saviers
Ed Corell
Joe St. Amour ✓

FROM: Bill Owens

Evaluation of Failures

RSØ8 and DF32 recording surface failures have been examined and primary conclusions are:

1. Contamination at the Cu/NiCo interface provides seeds for corrosion. Some of this contamination causes magnetic deterioration of the surface during shipment to us, so that flaws are visible when the package is opened. Other contamination remains buried but shows up later after prolonged exposure to moisture.

2. Polishing of the RSØ8 surface is inferior to that of the DF32 resulting in poor corrosion protection. Plating of the Rh and NiCo may also be porous adding to the problem.

My feeling is that until this contaminant problem is solved at the vendor, we will be able to ship units only if extreme care is exercised in keeping moisture away from the disk surface. I will try to determine a safe humidity level for prolonged operation.

Head/Disk Interaction

The heads we buy from Data Magnetics have major problems. The first is ferrite pole piece alignment. This alignment is at times very poor and generally very inconsistent. The average head does not come close to meeting our spec. This poor alignment causes severe scratching of the disk surface and reduces the signal amplitude. This poor alignment is related to poor ferrite/alumina bonding technique.

The second major problem envolves the relatively large holes or pores in the ferrite and alumina pieces. The holes are gathering places for various kinds of debris; the most troublesome being water and head cleaner. These chemicals are transferred to the disk surface on contact stopping and provide the solvent needed to form electrolytes with the salts contaminating the plating. Until we solve the plating problem the only

solutions seem to be to thoroughly degas heads before use; or clean heads in a cleaner which will not cause corrosion or polymer problems; or use head materials having substantially lower pore volume.

Sample heads from Ferroxcube and Applied Magnetics show gross improvements in all areas over the Data Magnetics heads. Heads adhere to disks because of the capillary action of a liquid at the head/disk interface. We are pretty sure the liquid starts out as head cleaner which probably absorbs water from the atmosphere; may get polymerized too.

Disk Surface Tester

Surface tester mechanics will be completely assembled and aligned by Thursday, August 29, 1969. This is nine working days from original conception of this mechanism. The electronics will be completed on Thursday also. Debugging can start August 30.

Production Fixture/Aids

A microscope stand to aid in head ferrite alignment inspection has been built and is in use.

A new disk handling tool is being built. Estimate one week to completion.

The need for more tools is being evaluated.

The major tool being worked on at present is the head load adjustment tool. Expect to have a prototype by September 8.

QC/PC

George Beckner is the major force working this evaluation. Detailed recommendations will be made on September 1, but initial feelings are that 1) material flow and job assignments within the clean room lack efficiency, 2) incoming inspection and handling of parts is inadequate in some cases, 3) certain new or changed assembly aids may be required, and 4) implementation of ECO's is lagging.

Disk Copper Surface Contaminants

A copper disk plated at Tech-Met has been sent to MMR for

an analysis of impurities on surface in an attempt to provide T.M.I. with clues to plating contaminant. Also plan to send them NiCo disk if first tests are meaningful. Contaminants on copper surface may be poorly preserved, while those buried under NiCo plating should be well preserved.

14μ inch Rh Ten Day Tests

Units were run for five days and stopped for five days. Three were in non A/C environment. Four were in A/C environment. Tests are really inconclusive because all units did not pass diagnostics perfectly before start. None in non A/C environment passed diagnostics after test.

Three of the A/C units passed diagnostics both before and after test. One was marginal.

The transient glitch apparently associated with head grounding clouded diagnostics.

Visual examination of the seven surfaces showed severe head imprints which could be wiped from the surface on all units. Corrosion in the non A/C units was well advanced in one case. The non A/C units all showed more severe corrosion than did the A/C units. Corrosion was at random places on disk surfaces. Even the A/C units however were developing pits but at a very slow pace.

12μ inch Gold Disks

One gold disk surface passed 145 contact start/stops with relatively little deterioration of the surface. Magnetic examination of that surface was inconclusive due to transient glitch or other intermittant tester problems.

Only carefully selected heads having superior ferrite pole piece alignment would fly on the gold. Heads having abnormal protrusions would drag on the relatively "sticky" gold surface and would not fly. The start/stop tests were run on carefully selected heads.

The gold discs showed all of the corrosion problems present in the normal disk only at a retarded rate. Plating imperfections were present.

/bca

digital INTEROFFICE MEMORANDUM

DATE: 22 September 1969

SUBJECT: Stockrooms

TO: Ken Olsen FROM: Joe St. Amour

Sometime back, you asked me for a list of all stockrooms in which we have things stored with the plan that sometime in the future we would both go through them. Part of the delay in answering your memo has been a "clean-up" program.

Presently, Loren Prentice has one stockroom, located on the third floor in Building 11, and shares fifty percent of the space with Tom Stockebrand. Roger Melanson has one half of Frank Kalwell's stockroom in Building 8-A, floor 3. The storage consists of all obsolete drawings, obsolete ECO's, marked-up prints and miscellaneous items relating to reproduction. Special Projects has not been in existence long enough to accumulate the type of material that would wind up in a stockroom.

/gp

Kenneth H. Olsen
Memos Received, October, 1969

TO:	FROM:	RE:	DATE:
Ken	Gene Cronin	educational market & TSS/8	10/30/69
Ken	Mark Nigberg	corporate contributions	10/2/69
Ken	Jack Shields	DEC Business eastern block countries	10/3/69
Ken	Bill Long	ICS	10/6/69
Ken	Richard Clayton	PDP-12 for MIT, Physics dept. (DEC 64515)	10/6/69
Ken	Julius Marcus	call to Mr. Ratz M.B. Electronics	10/8/69
Howie Painter	Richard May	PDP-8 marketing	10/17/69
Ken	Gabe d'Annunzio	H.P. Catalog	10/20/69
Ken	Bob Savell	Conrac's alphanumeric consoles	10/21/69

Copy to Stan Olsen 11-10-69
Win Hindle
Pete Kaufmann
Ed Johnson
From Ken Olsen

file

digital INTEROFFICE MEMORANDUM

DATE: October 30, 1969

SUBJECT: THE EDUCATIONAL MARKET AND TSS/8

TO: Ken Olsen
CC: Norm Doelling
Brewster Kopp
Nick Mazzarese

FROM: Gene Cronin

As requested, I looked into the educational market and talked with Norm Doelling about his plans.

Norm tells me that he is spending about 95% of his time on the Time-shared 8. As you know, the balance of our thrust toward the educational market is now being handled by Dick May. Norm's first quarter sales budget (approximately $500K) was met without the RS08. He predicts delivery problems in the second quarter and cannot, at this time, quote deliveries for the third and fourth quarters (problem: RS08). He expects to make sales and profit goals for the first half of this year. In the second half, however, much will depend on the customers, the sales force, and the deliveries which, in turn, depend on availability of the RS08.

Norm made the following points which he believes are significant in appraising where we are in education with the Timeshared 8.

1. We have a product which is measurable.

2. A market, small computer timesharing, has been identified which two years ago could only be dimly perceived.

3. Hewlett-Packard is now beating us in this market because:

   a. They can deliver.
   b. Their BASIC is far superior to ours and customer demand for their BASIC only system has been huge.

4. We are ahead of H-P in breadth of user software which Norm feels is giving us our market share. (Norm hopes we will sell $5 million this year. H-P will sell $15-20 million. There are only two companies in this business.)

5. We should make a 25% before tax profit on our $5 million sales.

The Educational Market and TSS/8 October 30, 1969

Norm is attempting to limit development work on the Timeshared 8. Specifically, we are:

1. Improving the BASIC language - which needs some work.

2. Maintaining and debugging of monitor - which is a continuing effort.

We are not now implementing but are considering implementing DIBOL. If it can be done at a reasonable price, Norm feels it will be worthwhile.

Other developments (outside of Timeshared 8):

1. Looking at a version of Timeshared 8 on the PDP-12.

2. Investigating the possibility of simplifying the current Timeshared 8 to make it run on the PDP-8/L instead of 8/I.

3. Investigating a small BASIC only timesharing system.

Norm is preparing for Nick a 6-month and 1-year plan of his objectives and strategy for selling Timeshared 8 and some other products to the educational market. He will include his plans for the use of promotional literature.

GC/ml

digital INTEROFFICE MEMORANDUM

DATE: October 21, 1969

SUBJECT: CONRAC'S ALPHANUMERIC CONSOLES

TO: Ken Olsen

FROM: Bob Savell

cc: Win Hindle

You asked me to let you know prior to October 24 why we cancelled the alphanumeric consoles. Mr. Putnam wanted to know if Conrac marketed them wrong or if they did something wrong technically.

The primary problems have been technical, but the overall terminal market has also changed, as described below. What follows are the same reasons that were passed on to the Conrac salesman, John Chislett, by Lon Beaupre (Purchasing Department) and Fred Wilhelm.

As I said, the decision to discontinue the Conrac display terminal was based upon one primary reason. The development of the terminal fell five months behind the original schedule for the project. In addition, there has been considerable market change during this extended development period in the display terminals market which, in our opinion, has resulted in the Conrac unit losing its competitive edge.

In regard to the development schedule, they agreed that the prototype unit was to be delivered on May 1, 1969. A unit was delivered on May 23, 1969, which was fairly close to schedule; however, there were a number of problems with the unit in the following areas; which, in total, caused the unit not to meet the specifications:

1. A number of electronic design bugs, including difficulty with the hard-copy option.

2. Keyboard functioned improperly.

3. Flimsy cabinet construction.

4. Unit contained breadboard circuits.

The prototype unit was returned to Conrac during the second week of June, together with our objections. The second prototype was delivered on July 24, 1969. Most of the previous keyboard and electronic design bugs had been fixed, but there were new problems in both areas. A design engineer from Conrac visited the plant during the last week of July to fix the logic problems with the unit, but it was not until August 22, 1969, that all of the logic problems, with the exception of the hard-copy option, were fixed. The unit was still in breadboard stage, and it was agreed that a new keyboard was required.

The prototype unit was shipped back to Conrac again to have the breadboard circuits replaced by printed circuit cards. The new keyboard was also to be installed. This unit was to be returned

to us on October 15, 1969. If the unit was received on this date, it would have taken over five months to progress from a breadboard version to a true prototype with printed circuit boards and an acceptable keyboard. Pilot production delivery originally scheduled for September 1, 1969, was rescheduled to January 1, 1970, which is 4 1/2 months late, if further delays were not encountered.

During this period, terms and conditions of purchase of competitive equipment in the market became available to us, which, in some areas, significantly cast doubt on the competitiveness of Conrac. We are not, however, committing to any other vendor at this time. We are reevaluating the market and suppliers.

In summary, slippage of the Conrac development schedule due to not meeting specifications, has already resulted in a five-month slippage. Further delay, and additional problems, could have resulted.

We have offered to negotiate a reasonable settlement price for the delivery of their prototype in a workable condition.

Bob Savell

bwf

Send to Org. Com. 11-7-69

digital INTEROFFICE MEMORANDUM

SUBJECT: H. P. CATALOG

DATE: October 20, 1969

TO: K. Olsen

FROM: Gabe d'Annunzio

LOCATION: 12-1

LOCATION: 5-2

Since most discussions about handbooks usually involve some reference to the Hewlett-Packard catalog as an example of what a good catalog is all about, I decided to find out what it costs to produce such a book. Though I realize we would never undertake a publishing effort on as grand a scale, I thought you might be interested in the price tag for the H. P. book as an indication of what everyone's favorite catalog really costs.

Cost to print 100,000 copies	$216,000
Cost to set type	60,000
Cost of freight and mailing	60,000
	$336,000

/meb

digital INTEROFFICE MEMORANDUM

DATE: October 17,1969

SUBJECT:

TO: Howie Painter

FROM: Richard May RCM

I think Harris Young's memo (attached) pretty well sums up the feeling of the sales force in general. My purpose in proposing my transfer to PDP-8 Marketing was to help the salesmen sell more effectively to this market.

Top priority on my list was to get a brochure to the sales force by late September. The brochure continues to be delayed because of commitments by Advertising to LAB-K,PDP-14, and now a budget problem. I understand from Gabe Del Rossi there is a good possibility the Education brochure will not be printed until January. If this happens, we will have lost another year in our effort to make significant sales into this market; this market is very cyclic because of budgeting problems. Our prime selling time is from September through January; February through August is essentially non-productive sales time because budgets are in and being approved. Budgets are approved in late April and early May, school recesses from late May to mid-June through August and then the cycles start over. Again, our prime selling time is from September through January.

I feel very strongly that every effort should be made to make the Education brochure available to the sales force by October 31.

I trust that every effort will be made to meet this deadline.

Copies:

K. Olsen ✓
T. Johnson
N. Mazzarese
W. Long
G. D'Annunzio
G. Del Rossi
J. Hill

digital INTEROFFICE MEMORANDUM

DATE: October 14, 1969

SUBJECT:

TO: Dick May - PDP-8 Marketing FROM: T. Harris Young

What would help me sell to the Education Market? A good non Technical Education Brochure!

Would like to see brief descriptions of FOCAL 4 and 7 Users Systems, and the TSS-8. For instance

Page

1. Introduction to Computers in Education
2. PDP-8I/L - Education Slant - BASIC
3. FOCAL - 4 User - Hardware & Software
4. FOCAL - 7 User - Hardware & Software
5. TSS-8 Hardware & Software

In the second section, brief descriptions of installations could be mentioned. Similar to Application Note 102. But you could up-date the applications and list both secondary schools and colleges.

We agree, its a big market, so how about a Sales Brochure for Education.

Regards,

T. Harris Young

T. Harris Young

THY/wc

digital INTEROFFICE MEMORANDUM

DATE: October 8, 1969

SUBJECT: CALL TO MR. RATZ - M.B. ELECTRONICS

TO: Ken Olsen

FROM: Julius Marcus

cc: J. Benson
R. Handy
N. Mazzarese
H. Painter

Spoke with Mr. Ratz on October 6, 1969. Mr. Ratz had sketchy information on the PDP-11 from a certain Yale summer student. I gave him a few minutes of description on the PDP-11 and told him deliveries were not yet firm but were expected to begin in the summer. Price was stated as being more than the PDP-8/L's they are currently buying.

Mr. Ratz claims to be at a decision point where he must decide to wait for the PDP-11 or move forward with 8/L's and then reprogram when the application outgrows the 8/L. Since he was talking DEC in anycase, I left him with the statement that John Benson would see that he received information on the PDP-11 as soon as it becomes generally available.

Roger Handy may want to press further on this one if Mr. Ratz's comments about 50 machines per year are a real possibility. A note of caution - there seems to be no problem selling him the PDP-11, but 8/L sales would be traded for the PDP-11 sales. I recommend delaying the PDP-11 entry in this case until there is more risk of the market being lost to a competitor.

digital INTEROFFICE MEMORANDUM

DATE: October 6, 1969

SUBJECT: PDP-12 for MIT, Physics Department (DEC #64515)

TO: Ken Olsen

FROM: Richard Clayton RC.

As you may remember, some of MIT's top Physicists put the heat on you last July to hustle a PDP-12 over there in time for their visiting dignitaries to measure the speed of light for the summer. As you might gather from my rather sarcastic tone, the Physics Department accomplished very little with the machine through the middle of September. This came as no surprise, in spite of the fact that they had great need for the machine it was apparently too far to come out to DEC to do their programming prior to actually using the machine.

It turns out that not all was lost though, there is another machine due in the Chemistry Department in early November and the people from that laboratory have been making use of that machine for programming purposes. A second use of the Physics Department machine came from a Ph.D candidate, who came here from Washington University in St. Louis and was living in Cambridge. He made good use of the machine for about three weeks in late August and early September.

Because this information comes from people presently "borrowing time" on the Physics Department machine, I suggest that there's nothing appropriate to be said to anyone at this time; it's one of those things that we can both tuck away for some future time when it might be appropriate.

On the lighter side, I see Gordon College has ordered a PDP-12. It is my understanding that they are actually buying the machine (at least from my point of view). Is there any special paper work I should be looking for on that machine.

Thanks.

Dick

RJC/reb

file

digital INTEROFFICE MEMORANDUM

DATE: October 6, 1969

SUBJECT: ICS

TO: Ken Olsen
CC: Nick Mazzarese
Brewster Kopp

FROM: Bill Long

Here is a brief summary of the situation at ICS:

- Current debt to us $211,000.

- They are looking for equity financing now through First of Michigan with the following deal: 23.5% of the company for $1.5M.

- Bill Congleton has been approached by First of Michigan as a possible investor. Bill tells me the terms of the deal as stated are absurd, and that there is little likelihood of them raising the cash on those terms.

- The National Bank of Detroit has a security interest in the entire ICS inventory to protect a $350,000 loan. We have recently taken a second security interest in this inventory, but it is questionable how much will be left.

- None of the Astrotype systems have been sold outright as yet. Seven are in the field on short-term rentals pending the completion of leasing arrangements between ICS and Delos.

- Of the four divisions of ICS, Astrotype is the only one which holds any interest for us. Their major investment has been in Astrotype while the bulk of the income is from the other divisions. In my opinion they have been profligate in the use of capital, and have accomplished very little for such a large investment.

- The Astrotype product itself is an interesting one, and would make a fine Computer Pack. I am not sure of all the details; but I think as it is marketed by ICS, it has only a small price advantage over the MTST system of IBM.

- To really succeed with this product, ICS is going head to head with IBM; in an application where IBM really knows how to sell.

- Putting all this together, I think the key to their failure is their inability to market this product without a significant price advantage.

- Since much of the hardware used by Astrotype is DEC built, I think we could offer this product cheaper than ICS. I also think there is a significant market for the product and that DEC is capable of reaching that market.

- My conclusion: The Astrotype product is not worth the price of acquisition of the entire ICS operation. Should ICS succeed with it, we will eventually get paid. Should ICS fail, we should grab the Astrotype software as part of our settlement. In fact, if we could trade the complete Astrotype package for the 200K debt, I think we would have ourselves a good deal.

WHL:pc

10-8-69
Copy sent to Warren House of National Academy of Sciences

digital INTEROFFICE MEMORANDUM

CONFIDENTIAL

DATE: October 3, 1969

SUBJECT: DEC BUSINESS, EASTERN BLOCK COUNTRIES

TO: Ken Olsen

FROM: Jack Shields

This memo is to keep you informed of my inputs and impressions of the technology, market, and service problems in the Eastern Block Countries. My information sources are primarily from customers and employees. I have no way of really completely verifying the information, however, a number of inputs from different areas do seem to agree and give some substance to what I have been told.

Many of our Scandinavian OEM's are interested in selling to the Eastern Block and some already do substantial business with other product lines. NOKIA, SAAB and ASEA are among these customers. Several of their systems, using our computers, have been demonstrated at trade shows.

SAAB has a customer in Moscow interested in a Spiral Reader System. SAAB would like to use the PDP-15 and have asked me my impressions of possible State Department liberalization of sales of this type computer to the Eastern Block. The Spiral Reader is, as you know, used in Physics Applications and SAAB had inputs from the Russians that the U. S. was going to allow a CDC 6600 to be sold to them for a physics application. SAAB felt that if this happened, the State Department could not then refuse a license for a PDP-15. They also implied that with a 6600, Russian computer technology would take a large leap forward and in addition they (Russians) would copy the machine. They also mentioned that the Russians now do have semi-conductor plants in operation. I couldn't get any comments as to the status of their integrated circuit technology.

Service

The biggest problems are:

(1) Travel Limitations. We just can't move as freely there as we would like to. This problem seems the same for either Scandinavians or Yugoslavians.

(2) Training. We would have about the same level of training problems with Finns or Yugoslavians. That is limited or virtually no trained manpower base.

(3) Apparently, prices and terms must be agreed to well in advance or there are tremendous difficulties getting payments.

(4) Currency exchange is a real problem. Finland can deal in Ruples, however, the other Scandinavian countries cannot.

General Information

IBM provides Eastern Block service from Yugoslavia, and my information is that the head of their operation is a former U. S. Agent who worked with Tito's partisan forces during the war. They presently have 180 people in Yugoslavia, but again currency exchange appears to be a problem.

European countries sold approximately 30 million dollars worth of computer equipment and services to the Eastern Block this past year. ICL is the largest supplier, with 90% of the business.

Sven Martin is to look into various problems concerning travel limitations, currency exchange and anything else he can find out related to service. I think we must charge a healthy uplift for any equipment we sell to the Eastern Block, otherwise we will never recover the money for services rendered later. Perhaps a limited warranty, customer training package and purchase of spares should be required with the purchase of a machine. This way we could get the money to fund our operation and limit our manpower requirements.

I still lean towards Yugoslavia as the way to go if we decide to do do anything.

smh

Pete
what do you think

digital INTEROFFICE MEMORANDUM

DATE: October 2, 1969

SUBJECT: CORPORATE CONTRIBUTIONS

TO: Ken Olsen

FROM: Mark Nigberg

We recommend that a special contributions committee be created to:

- help formulate policy concerning corporate contributions and community activities,
- make recommendations concerning the budgeting of funds for corporate contributions,
- evaluate requests for cash contributions and make recommendations directly to the Operations Committee,
- evaluate requests for equipment contributions (other than those which are sales related) and make recommendations directly to the Operations Committee.

I feel this system is warranted because:

a. There has been no formal mechanism for processing and evaluating requests for equipment contributions (other than those which are sales related).

b. There is a need for a group (which represents management and different parts of the organization) to help formulate and define policy concerning corporate contributions and community activities.

c. We are receiving an increasing number of requests for cash and equipment contributions.

d. With the addition of Westfield and Leominster, Digital's community now extends well beyond Maynard.

I recommend the committee include the following:

Pete Kaufmann or representative (Chairman)
Win Hindle or representative
Representative of Finance
Representative of Personnel (Bob Lassen)
Maynard Resident (Fred Gould)
Representative of Public Relations (Mark Nigberg)
Secretary/Coordinator (Dimitri Dimancesco)

Can you give me an answer on this or would you prefer that I submit a proposal to the Operations Committee?

/rdb

Kenneth H. Olsen
Memos Received, November 1969

TO:	FROM:	RE:	DATE:
Ed Correll	Joe St. Amour	Engineering Philosophy	11/6/69
Ken	Jim Bell	Special Projects Group	11/11/69
Joe St. Amour	Ed Corell	Nortec 200 LPM Printer	11/13/69
Ken	Henry Crouse	Atron	11/14/69
Ken	Jean-Claude Peterschmitt	Nixdorf	11/14/69
Ken	Ed Savage	Change in Budgeting Techniques	11/25/69
Ken	Bob Lane	Accounting - Europe	11/26/69

digital INTEROFFICE MEMORANDUM

SUBJECT: ACCOUNTING - EUROPE

DATE: November 26, 1969

TO: ~~Ken Olsen~~ Kopp

LOCATION:

FROM: R. L. Lane

LOCATION: , 5-3

It is most difficult to verify the Product Line financial report when we are unable to determine what items are invoiced to the customer and/or what expenses are contained in the monthly statement from the Subsidiaries. They do not break the charges down to a usable detail.

We can review what is shipped via the shipment detail, but the income from these items may take several months getting onto our statement.

Further, when we ship items to Europe on a PDP-6 and invoice Europe correctly, they arbitrarily or just plain unthinkingly changed the Product Line code to another Product Line.

For example, refer to DEC #42731 and invoices #11010 and #016488. In both cases the invoices stated Product Line 06 yet the income went to Product Line 10. The amount of time we spend looking for and checking the statements should be unncessary, but it isn't.

Ken:
I understand that they plan to furnish us with a copy of their ledger or sales register which will solve problem above.
Thanks,
Bob.

el

cc: Gene Cronin
Ed Savage
Phil Feeney

digital INTEROFFICE MEMORANDUM

DATE: November 25, 1969

SUBJECT: Change in Budgeting Techniques

TO: Ken Olsen

FROM: Ed Savage

The Operations Committee recently implemented a change in the corporate budgeting technique. In the past, corporate budgeting policy provided for quarterly revisions to the years' plan of action. This policy has been rescinded, effective immediately, and replaced with a technique called PCP (Program Change Proposal). A PCP can be submitted anytime.

This technique has been adopted to permit greater flexibility in planning on the part of DEC's managers as well as to provide a tool to make more profits. In a growth situation such as our company is experiencing it is essential that our planning techniques provide for the ability to change the plan quickly as conditions change. Managements' purpose is to encourage profit-improving changes in our program.

In presenting a PCP, the emphasis should be quantitative in substance not qualitative, indicating key benchmark dates and effects of changed plans. The format (for Product Lines) that should be followed is as follows:

1. Set of financial statements encompassing the impact on current budget year and the subsequent fiscal year (this information will be used as a vehicle to up-date the Company's long range forecasting).

Next, the presentation should include graphs pertaining to bookings, billings and backlog position for the following periods:

1. Last Fiscal Year (actual)
2. Current Fiscal Year; present budget and proposed budget
3. Next Fiscal Year

These graphs should include $ and number of systems by Quarter (the start-up period should be shown on a month-by-month basis).

4. Revised Manpower Budget (quarterized)
5. Revised Capital Equipment Budget including any economic justifications which may be required.
6. Revised input relative to service departments which may be affected on a quarterized basis.
7. A schedule indicating the impact of PCP on Inventory planning. Expressed in simpler terms: What is being ordered from production? What is being shipped? What is going to happen to the difference?

Important

Before submitting a PCP to the Budget Department, please be sure to negotiate and obtain the

approval of all cost center and service managers which may be affected by this change. This will ensure that your proposal will be processed on a timely basis.

The format for a cost center manager would consist of a historical review of his costs, his current plan, his revised plan including a quantitative justification for the change.

In addition, the following items should be included:

1. Manpower forecast (original and revised)
2. Capital Equipment budget (original and revised)

In all instances the following guidelines should be adhered to whenever possible.

1. The Budget Department requires adequate time for review purposes before it submits the PCP to the Operations Committee for review and subsequent approval.

2. The Budget Department should be consulted prior to embarking on the preparation of PCP to review the significance of the change and determine exactly what information will be required under the circumstances relating to the change.

(The Budget Department will aid you in preparation of the PCP in order to make this process as painless as possible).

ELS/ba

INTEROFFICE MEMORANDUM

SUBJECT N I X D O R F

DATE November 14th, 1969

TO Ken OLSEN
Ted JOHNSON
Win HINDLE

FROM Jean-Claude Peterschmitt

C O N F I D E N T I A L

NOTE ON VISIT WITH NIXDORF - NOVEMBER 5th, 1969

1) The initial contact with Nixdorf was established by Mr. Kreis, manager of AIV, one of the top German Software houses. Among other, AIV is writing German PDP-8 typesetting Software for Linotype (German subsidiary of Mergenthaler) and application software for a number of our customers. They also write software for Siemens and Nixdorf. Their reputation is very good.

2) Kreis indicated that he had discussed with Nixdorf the possibility of selling complete Time-Sharing systems where DEC would supply the central computer, Nixdorf the peripheral terminal computers and AIV the business oriented software packages. The total systems would be supplied either by Nixdorf who may put his name also on the PDP-10, or by a new company, joint venture between Nixdorf, AIV and possibly DEC.

3) Following the initial letter contact between the Cologne Office and Mr. Rausch, a Nixdorf Vice-President, Mr. Nixdorf got involved himself and expressed the desire to have himself a meeting with us.

4) I then visited Nixdorf. In the initial part of the meeting, he acted as if he was not really interested in any arrangement with us, as he has already more business with his small machines than he can handle, and has no desire to get involved with large machines either on the software or hardware side. I then indicated that on the

contrary our impression was that the initiative had come from him, that we had no desire to press ourselves upon him and that I had only come on an exploratory visit.

5) We then went into a discussion of DEC and Nixdorf areas of activity and capability, and Nixdorf expressed the viewpoint that after all there might be possibilities of areas of common interest where we could co-operate. However, he stressed the point that he would not want*to build up a F.S. organisation to take care of our machines. (This would be fine with us as long as somebody, like AIV, would take complete responsibility of the system and the applications software)

6) My impression is that Nixdorf and Kreis (AIV) both are still in a very exploratory stage, and that Nixdorf does not want to get into an arrangement tying him up with anybody or limiting his flexibility.

7) However, Kreis has a point when he claims that Nixdorf's competitive position may be less solid than Nixdorf himself realizes as IBM, Philips and others come out with business mini-computers, and that having the capability of offering complete business-oriented systems with the central computer, the peripheral computers and applications software could be a major asset in coming years.

8) In any case, Kreis, with whom I have talked since the Nixdorf meeting, is pushing to go ahead and is talking about setting up a company himself which would supply systems, taking complete systems responsibility, if Nixdorf does not move. He claims that, if not immediately,

*) to make any applications development on either our Hardware or our Software and would not want .. - 3 -

at least in the long term he will get Nixdorf interested to participate directly.

9) Interest for us:

9.1 It is interesting to note that both Kreis and Nixdorf mentioned the figure of 10 to 20 systems (i.e. 10 to 20 PDP-10's plus Nixdorf peripherals) could be sold a year.

9.2 Having systems initmately tied with Nixdorf equipment, who enjoys the image of a purely German organisation, would go a long way towards boosting our acceptance in Germany.

10) Other elements of interest:

10.1 Nixdorf has developed and is mass producing a very interesting contactless keyboard which we should investigate.

10.2 They are also working on a small console printer which, if successful, could be very interesting.

All Nixdorf equipment is oriented towards low cost and high reliability.

11) Comments on Nixdorf:

Total Nixdorf production, at end-users list price value, is about Dollars 70 million. All systems are built around one small processor, with a combination of read/write and read only memory, and limited programming capabilities.
Major applications area is small business and active terminals, but Siemens sells a process oriented system under the designation Siemens 101 (something between a PDP-14 and an 8/L), especially for numerical control.

-4-

digital

Nixdorf has around 8000 systems in the Field.

Their production methods are a combination of clever, advanced methods and pedestrian solutions (e.g.: no panel wiring, but audio type wire connections, no automatic component insertions).

Total employment is around 3500 people, with an output rate of $ 23'000 per employee (at enduser list price), which is almost twice as much as anybody else in the business in Europe.

Nixdorf himself is obviously dominating his company, and seems to be involved in everything. I am puzzled about the way he is organising his work: his secretary, far away from his office, does not even filter telephone calls which come directly to his desk from the switchboard (and therefore he is continuously interrupted).

However, initially planning to spend about 30 minutes with us, he actually spent one hour and a half. Morale in his organisations seems to be very high; a point to which he gives particular attention. He seems to make it a point to greet personally each new employee.

He strikes me as relying to an extreme degree on himself and his own judgement. I am not sure (although a plant tour is not sufficient to make a judgement) that he is building a sufficiently strong management structure.

I had also the feeling that he may be over-confident about his approach and his future (something like "I must be doing it better than everybody else since I am so successful"), although he is not of the unpleasantly conceited sort.

I believe that Kreis also feels the same way, and is

digital

preparing for the time when Nixdorf will recognize that a venture like the one with the PDP-10 can be a good way of broadening his market base and competitiveness.

JCP/es

Jan Clarke

cc Nick

digital INTEROFFICE MEMORANDUM

DATE: November 14, 1969

SUBJECT: ATRON

TO: Ken Olsen ✓
Pete Kaufmann

FROM: Henry Crouse

The following information was generated by Royce Fuller. He recently joined us from Univac.

In confirmation of our conversations, Mohawk Data Sciences is buying a small computer from Atron in St. Paul, Minnesota, which is mounted in the cabinet of their printer. It is described as being roughly equivalent to a PDP-14 Controller. It allows printing direct from magnetic tape.

They say they have been doing this in the past on a custom basis for customers, but the hook-up was permanent. The Atron Controller gives them a programmable computer with the additional ability to control other peripherals such as card equipment, etc., thus giving a free standing computer system. They don't have plans to announce this in the near future, but they do have customers and an order backlog. Deliveries will start in February.

I believe, but I'm not positive, that the computer has a 4K core memory. I know the logic uses TTL logic of the T. I. type.

Atron is a Univac spin-off, only one year old, with a new building south of St. Paul, and a large firm contract from Mohawk Data Sciences. I know many of the people there. They are privately financed at present.

ams

digital INTEROFFICE MEMORANDUM

DATE: November 13, 1969

SUBJECT: Nortec 200 Line Per Minute Printer

TO: J. St. Amour FROM: E.B. Corell EBC

This printer represents a novel approach to printers in many aspects. In particular, the hammer-actuator and the metallic belt. The hammer is flux coupled to the driver and mechanically reset. Dampening is also mechanical.

The unit has a metal belt for character font which is apparently butt welded.

The electronics are integrally packaged with the mechanism. The company's primary interest is marketing the total assembly. Present speed capability is 200 lines per minute.

The major questions regarding the printer mechanism is whether the company has succesfully solved the welding of the metal belts without inducing brittleness. They have no apparent interest in running faster than 200 lines per minute. Present production facilities are almost non-existent. Full production is scheduled for September, 1970. Significant tests on production units are not available since printers are of an engineering prototype nature.

/sm

FMO

digital INTEROFFICE MEMORANDUM

DATE: November 11, 1969

SUBJECT: SPECIAL PROJECTS GROUP

TO: KEN OLSEN
TED JOHNSON
STAN OLSEN
WIN HINDLE
PRODUCT LINE MANAGERS
PRODUCT LINE MARKETING MANAGERS
PROGRAMMING DEPARTMENT MANAGERS & SUPERVISORS
SOFTWARE SPECIALISTS

FROM: JIM BELL

The Special Projects Group is a new group within the Programming Department charged with investigating selected new techniques and technologies of potential value to DEC.

Since the group's authorization we have received numerous inquiries about the initial projects to be tackled. The attached descriptions should convey some feeling for what we are trying to do. The exact shapes of the projects will be affected by the men pursuing the projects.

As soon as the group's formation was approved, we began an agressive recruiting campaign to attract the best people available. We have hired one such person, Dr. Chuck Kaman, so the first project (microprogramming) is underway.

The emphasis in each project will be on applied research generating results of practical value to DEC. The first month of each project will be devoted to laying out a plan proposing goals for that project and methods of reaching them. These project plans will be submitted individually for approval so that tight control is kept on the resources available.

It will be difficult to obtain the specialized talents needed for the group. For this reason we have selected four initial projects. The three actually performed will be determined by the interests and skills of the three individuals involved.

The proposed initial projects are investigations of the following topics:

1) Systems Programming in Higher Level Languages

The scarcest of our resources is programming talent. The use of higher level languages for system programming is a possible way to stretch that talent by enabling the writing and debugging of programs faster and at lower cost. Furthermore, such programs would potentially be transferable between product lines in much the same way as FORTRAN applications programs.

The initial phase of the investigation would include an exploration of the relevant work by our competitors (notably Burroughs) and our customers (notably Carnegie). It is desirable that the project reach the point of actually coding some systems program in a higher level language. Only in this way can we evaluate the extent to which the theoretic promises of the approach are fulfilled in practice.

2) Microprogramming

Microprogramming is an important emerging technology. What does it imply for DEC? Will our programmers soon be writing assemblers and compilers for microcode? Writing them in microcode?

Where is the optimum tradeoff between steadily more expensive programmers and steadily less expensive circuitry? Does microprogramming provide a way to cut programming costs? Should we care whether microcode is read/write or read only? How does the architecture of a microprogrammable machine affect the programmer?

Answering these and related questions appears to be a fertile and vitally important area for investigation. The answers discovered will be of interest to many groups within the company.

3) Algorithms for Arithmetic and Basic Functions

We provide function evaluation software (for sine, log, etc.) for all our computers. On smallers computers even arithmetic is done mostly by programs. Yet we lack a systematic groundwork of knowledge for improving these programs on existing computers and providing them on new ones.

Since much of the work done by our customers is numeric, such programs are of vital concern to them. The running speed and accuracy are both areas which can be improved.

Furthermore, the numerical analyst who would undertake this project would provide a consulting expertise which our department needs but cannot yet justify on a full time basis. He might also evaluate the numeric implications of proposed hardware (including EAE's, optional floating point, etc.)

This project should provide a general systematic framework for understanding basic numeric algorithms. It should also provide a set of specific suggestions for each of our existing computers.

4) Modeling and Measuring System Performance

Too often, after its completion a complex software system is black box to us. We know whether it is executing satisfactorily

(i.e. few customer complaints). But we don't know why. In particular, we are unsure of the section at which application of additional effort would prove most fruitful. We have solved particular cases of this problem, e.g. for PDP-9 FORTRAN. But we have not developed a general mechanism for measuring software. Such a mechanism would facilitate improvement of every program produced by our department.

With modeling techniques it should be possible to carry this process even further. Software systems can be modeled in the planning stage. In this way trouble spots can be spotted and removed before programs are even written.

This project will develop modeling and measuring techniques and show how they can prove their value on our various computers.

sh

digital INTEROFFICE MEMORANDUM

DATE: 6 November 1969

SUBJECT: Engineering Philosophy

TO: Ed
Grant
Arnold

FROM: Joe St. Amour

Our recent work on development of a priority schedule produces an image in my mind that I don't like.

I get a picture of Engineering for engineering's sake, a feeling of a conservativeness that will allow no risk. We are spending too much time worrying about other problems (Production Engineering as an example) and not enough about our own problems.

During the next few days, and particularly during our individual meetings, I want to come up with some solid, written plans for action. I want high and low risk areas identified, and we will make judgements on what we should do.

My main concern, I guess, is balance. A year ago, we were way out of balance on the side of seat-of-the pants engineering and make it work. Today, I feel the pendulum is starting to swing past midpoint towards too much concern about need to know.

/gp

digital INTEROFFICE MEMORANDUM

DATE: 19 November 1969

SUBJECT: Staff Meeting Discussion on Engineering Philosophy

TO: Pete Kaufmann FROM: Joe St. Amour

Our recent Staff Meeting on this memo brought forth some comments which seem worthwhile for further exploration.

The Engineering picture has been getting more and more conservative because of pressures which are felt both from Marketing and from Production. There is concern that if a new product proves highly successful that the Design Engineer will get so tied up in designing volume production tooling that he will never again have the opportunity to go back and design new products. There is also concern that Marketing will pick up the most optimistic information in a proposal and base all of their programs on these statistics.

General conclusion is that Engineering, in order to be successful, must have tough goals. It is agreed that we will never reach an unset goal. Perhaps the way out of this dilemma is to base all new proposals on a conservative product that we are fairly certain of reaching and one which Marketing can sell. Our internal schedule will be based on an optimistic goal with the idea that we can back off and produce a product which will be successful. Under this method, it is also possible to start selling and getting feedback on the more conservative product while we take the opportunity to perform long-term quality assurance testing on the more optimistic product before we release it.

Another question which came up was about the role which the Marketing Committee plays. There was some concern that since the Marketing Committee consisted of Product Line Managers there was tremendous pressure on short-term profit along with the normal pressure for the introduction of new products. The feeling was expressed that the Marketing Committee would be an excellent source of pressure for new product introduction.

A third question which was asked was whether or not we are using existing Engineering talent wisely. It seems that certain areas of the Company, the PDP-10 Group in particular, have done an excellent job in using the computer as a tool for engineering design. Other areas of the Company have not been involved in this type of effort. I have suggested to Grant and Ed that they get together with Allan Kent and Alan Kotok of the PDP-10 Group and see if we can set up some sort of panel discussions at the Engineering Committee to try to stimulate more activity in this area.

We will continue to explore these topics and would appreciate your comments.

/gp

Kenneth H. Olsen
Memos Received, December 1969

TO:	FROM:	RE:	DATE:
Ken Olsen Operations Comm.	Jim Cudmore	Quality Problems in the Field	12/1/69
Henry Crouse	Bob Hamel	Trip to Cogar Corporation	12/5/69
Ken Olsen	Ralph Wilk	College Recruiting/ Turnover Analysis	12/9/69
Win Hindle Ken Olsen	Washington University	Dick Clayton	12/10/69
Ken Olsen	Andy Knowles	AC Power for the PDP-11 and other DEC computers	12/17/69
Ken Olsen	Roger Melanson	Computer Output Microfilm	12/22/69
Ken Olsen	Denny Doyle	University of Waterloo	1
Operations Committee	Ron Noonan	Analog Modules	12/31/69

digital INTEROFFICE MEMORANDUM

DATE: December 31, 1969

SUBJECT: Analog Modules
Ken Olsen's Memo of 12/29/69

TO: Operations Committee FROM: Ron Noonan

CC: A. Devault

Ken's subject memo asked for my opinion on how we should "fulfill our needs for analog modules for the Module Product Line".

There appears to be two diverse approaches to this question:

1. Do sufficient marketing and product planning homework to define the markets, products and returns that we want.

2. Buy an existing Product Line and resell on an OEM basis; and by direct experience from marketing, selling, applying and supporting these products, determine what markets and products we should concentrate on and what financial returns we should expect.

My opinion is that we should take approach (1). My thoughts on this (attached) are summarized in a memo I wrote to file last November when I had a chance to review the proposal from Bernie Gordon's group. Frankly, I have not given this situation much thought since then. Also, I do not feel qualified at this point, nor do others in my group, to set down a well defined list of product offerings until more market and business planning are done, i.e. the market and business risks, the nature of the applications and customers, the business and product strategies are not on the top of my head. In other words, neither we nor the product line have a good handle on this market. I would rather see DEC spend it's limited resources to determine a course of action that makes sense rather than gamble these resources on an apparent quick score.

A brief outline of my reservations on approach 2 are as follows:

1. Market uncertanties, i.e. if a major portion of the OEM market is other small computer manufacturers, will they do business with DEC, e.g. HP buys over 35% of Ratheon's output but would they sign with DEC; there are also some competition and profitability questions that need some answers.

2. Competitive prices based on buyouts with suitable markups.

3. Possible confusion on our customers part on our service, performance, support, etc. of these units when sold to DEC small computer users (this can be reduced with clear policies).

4. Lack of product control if we get locked into Analogics design and manufacturing techniques.

5. Are we trying to market to M-Series or K-Series type customers? There are considerably different technical requirements. Analogic's line is aimed primarily at M-Series customers.

6. Will the product line get up to speed fast enough in the areas of documentation, applications engineering, marketing, training and sales support to keep pace with an instant product line? There are as many holes in these support areas as there are in our current product offering.

On the other hand, there is little I or my group can do in the immediate future to actively spearhead approach (1) above. Clark's group,which acts primarily as an analog circuit design service group to the Module Product Line, is not funded this year for any new analog module development. Our group is concentrating on filling holes in our computer peripheral/ subsystem offerings in both analog and discrete I/O areas. Our current resources are fully committed to existing projects through quarter 1 of Fiscal 1971. If approach (1) were adopted, it would take 3 to 6 months for us to begin additional development. However, Clark and I could give part-time assistance to the Product Line in market and product planning.

Recommendation

1. Defer decision on going to outside vendor for complete product line.

2. Schedule personnel and resources primarily within the Module Product Line to do:

   a) Market research and survey

   b) Study products falling out from planned computer subsystem development in Clark's group

   c) Develop 2 year business and market plan

   d) Develop 2 year product engineering plan (including pieces on total line from vendor)

   d) Present integrated plan to Operating Committee sometime in 4th quarter of this year

My gut feel is that the above recommendation is a proper one. However, it is a much slower, greater effort, deferred market entry, less stimulating approach that may not be too exciting to the Product Line. Since they will have the responsibility for executing, then I feel the Operations Committee should give the greater weight to their feelings on this subject.

Time does not permit me to answer Part 2 of Ken's subject memo, "what are we not now doing that you think we should be?". This will be answered in a memo for the January 19th Operations Committee Meeting.

R. P. Noonan
November 14, 1969

Summary of thoughts -

Planning an approach via plan 3 and 4 seems forward thinking and agressive. Its basic benefits appears to be immediate entry on a larger scale into A/D modular business without much knowledge of the market or product requirements. If this approach is successful, then it gets DEC moving in this area about 1 year earlier. In plan 4, the eventual design and manufacture by DEC of high volume items appears to be a benefits assuming that those items can be handled within DEC's normal manufacturing practices.

However, I have some basic reservations about the nature of the market and whether we can successfully compete for it, e.g. many of the potential OEM's are the other 60 mini-computer manufacturers who would not like to do business with us, other things being equal. Our relatively high prices (modules assumes a 2.5 markup while B. Gordon's price comparison assumes 2.1) would not be industry breakthoughs. Also, I am concerned about out getting locked into Analogics product and manufacturing techniques removing some of our flexibility.

I am also concerned about confusion between our computer peripheral and modular products lines.

I believe a better approach is to delay an immediate plunge until the marketing plan and product planning is better thought out. DACS could provide Modular Products limited assistance in this area in the person of myself and C. Crocker. Based on those products currently available, under development, or feasible for development, a product requirement for an outside firm could be generated. This would include items needed now plus low volume items. Such an approach, I believe, would give us a more orderly and more profitable approach. Essentially, I recommend a compromise between Plans 2 and 4 which would require a product and market plan before making irrevocable committments.

1st PASS QUESTIONS ON ANALOG MODULE PROPOSAL

1. What markets will these products be sold to?

   a) Basic use?

      1) What % for use on DEC computers?

      2) What % for use on foreign computers?

      3) What % for use on non-computer systems?

   b) OEM user mix?

      1) Total OEM % of total sales?

      2) Computer manufacturing OEM % of total sales?

      3) User % of total sales?

   c) What industries will be sold?

      e.g. Automatic
      Aerospace
      Electronic
      Machine Tool
      Process Industries, etc.

   d) What applications will be markets within these industries?

      e.g. Q.C. Testing
      Computer based data acquisition
      Low level measurement

2. In what way, if any, does the potential market ~~for~~ DEC computers cases overlap with DACS computer peripheral sybsystem?

3. Is there a potential problem for customer confusion with two different offerings?

   e.g. 1) Different specs (system specs vs module specs)

      2) Software support

      3) Maintenance/Operating Manuals

4. Can we define what specific capabilities need to be added to current line?

a) Module vs sub-ystem philosophy

b) Binary vs BCD items

c) Price performance indexes.

5. Why do Analog Sales fall-off in Plan 1?

a) A significant portion of Analog Module sales are tied to computer systems

- Spares for peripheral units.
- Do it yourself interface kits and computer installations will be increasing.

b) The DACS Group will be developing several new and improved products over the five year period for computer subsystems with fallout benefits to the Module Products Group.

6. How will testing inspection and maintenance be performed on purchased subsystems?

a) Budgeted?

b) Skilled personnel available?

c) Warranty and field maintenance considerations?

7. How much application engineering, sales training and marketing will be necessary for plans 3 and 4?

cc: John Sharp

digital INTEROFFICE MEMORANDUM

DATE: December 22, 1969

SUBJECT: Computer Output Microfilm-COM

TO: Ken Olsen

FROM: Roger Melanson

In reply to your memorandum regarding Information International's Cathode Ray Tube 35mm plotter, the following comments are some of my thoughts on the use of Computer Output Microfilm.

The functions of our Automated Drafting System namely, input processing and output have been sadly imbalanced in their speed relationships to the computer itself. On the input side the basic medium of data after the sketch drawing has been encoded is paper tape. Direct terminal input is available but the successful use of this method is proportionate to the persons ability to visually encode the sketch drawing with precision. Experience has shown that this is not very practical. Accordingly, we are working on the input problem and I feel confident that we have found the solution.

On the output side electromechanical plotting on vellum as the hardcopy medium has been the principal method of getting the graphic information to the user. Conventional microfilm is used as a storage, retrieval and reproducible medium. In an effort to solve the turnaround problem and improve drawing quality we have been experimenting with a Calcomp 900 increment/second drum plotter. The increase in speed reduced the average plotting time from 45 minutes to 30 minutes per drawing. Hardly enough to make a substantial difference in turnaround. The improvement in drawing quality is barely noticeable and because of the speed at which the drum travels the ink does not dry fast enough. The result - ink spots appear on the more busy drawings. Although faster electromechanical drum or flatbed plotters can be employed to improve the output bottleneck, chances are that the capillary action of the plotting pen will be the governing factor of speed and of drawing quality.

In terms of marketing and selling an Automated Drafting System or output device thereto drawing speeds and quality are

important characteristics to have. So much so, that without good input/output capabilities costs saved by most Automated Drafting Systems become marginal when compared to what a draftsman could do manually. Because the finished drawing from electromechanical plotters are not acceptable to DOD (Department of Defense) and many commerical users, manufactures of phototypesetter equipment are making a big push with their high quality drawing output capability. The Computer Output Microfilmer, or COM recorder may just provide the solution to the problem of plotting drawings and perhaps even of storage, retrieval and dissemination of many other company data or documentation.

I see the COM system offering the following advantages over what we are presently doing:

1. Printing at computer tape speeds - solves the problem of ADS turnaround.

2. Improved drawing quality - eliminates the incremental shape of alphanumerics and graphics.

3. Forms design with data printed simultaneously.

4. Automated storage and retrieval of ADS engineering documentation and other company data.

5. Background updating of records.

6. Smaller record storage.

7. Substitute for certain microfilm equipment.

8. Improved security retention program.

9. Automated ECO program.

10. Less handling of documents.

11. Reduced costs of technical manuals.

12. Reduced costs of labor, material and supplies in microfilming and in configuration control.

Insofar as printed circuit artwork is concerned Daniel Forsyth and George Harmond of Information International have expressed some reservation that COM could do an acceptable job. Presumably, the feature of 8 line widths and 8 line densities provide the capability to do so given that the PC software exists. The sharpness and accuracy of the artwork after it has been enlarged from 35mm to the desired scale requires some careful study.

All of the above activities mentioned are undergoing or will undergo extensive change in the next two years. Although the biggest disadvantage of a COM system is price, it may prove to be more or just as economical and usable as the varied pieces of equipment Drafting and other departments would eventually end up purchasing. Justification of a COM system would be hard to determine unless a careful and comprehensive study was made.

Information International's FR80 COM recorder apparently has the speed, quality and versatility most manufactures of COM systems would like to have. It can provide film with higher resolution, more contrast and greater sensitivity all of which are necessary in any highly active microreproduction and information handling system. If DEC entered into a marketing agreement with Information International it could very well sell a large number of computers. At the end of 1968 about 300 COM recorders were in use. Of this number about 60 units were being operated by systems service companies. Forecasts of the COM field have it that by 1975 there will be between 6,000 to 12,000 recorders in operation. That's a lot of computer sales if the cost of Information International's COM system is competitively priced.

RM:tl
CC: J. Jones
J. St. Amour
T. Stockebrand

digital INTEROFFICE MEMORANDUM

SUBJECT: AC POWER FOR THE PDP-11 AND OTHER DEC COMPUTERS

DATE: December 17, 1969

TO: Ken Olsen

FROM: Andy Knowles

LOCATION:

LOCATION:

cc: Roger Cady
Nick Mazzarese

Your points on the subject of how we control and distribute AC among our systems are well taken. Although it may not be practical at this time to implement all of your suggestions, a program will be established to use the PDP-11 as a vehicle which will aid in establishing a consistent method for handling AC in our computers. Specifically, by January 12, 1970 we will present a plan which will definitely phase into the PDP-11 product line the following redesigns:

1. A different socket for 110 volts and 220 volts, including male plug changes where necessary

2. Circuit breakers instead of the fuses

3. "Cleaner, less messy" wiring

In addition, over the next three months we will embark on a program which will encompass the addition of:

1. Special, separate 110 and 220 AC power paks which incorporate sockets, circuit breakers, etc. Attention will be given to cross product usage of the device.

2. Addition of relays to the power pak or peripherals.

At the end of the three month period we will present it to the Engineering Committee for phase into the PDP-11 line and cross product line.

mg

digital INTEROFFICE MEMORANDUM

SUBJECT: LAP6 - DIAL AND WASHINGTON UNIVERSITY

DATE: December 10, 1969

TO: Win Hindle
Ken Olsen ✓

FROM: Richard Clayton RC

LOCATION:

CC: Ed Kramer
George Thissell
Marty Kay

I believe we have now reached complete agreement with Wes Clark on the name and details of handling DIAL (or LAP6 - DIAL). The exact details are contained in a letter I wrote to Wes on November 24, 1969. The significant points are:

1) The formal name is LAP6 - DIAL.

2) We will use the name DIAL freely, both internally and externally including advertising.

3. Formal literary references will be to the program LAP6 - DIAL.

4) This in no way binds us to future programs or names on this machine or others.

5) We really do want to be friends.

Wes and I have talked several times, both before and after my letter. The version of the write-up sent with Ed's letter did have some material from the LAP6 Handbook, which I believed had been removed. That error was corrected and Wes is happy with our version. He suggested several very minor changes by phone which are included. He promises to respond in writing to my letter and assure us that all is settled.

The circumstances that really precipitated the resolution of this issue with Wes appear to be the very firm stand of the University of Wisconsin (Dr. Phil Hicks). By comparison,

our requests were very mild. I am sure that the issue has caused some friction between Wes and Mary Allen but I believe Wes feels our requests are justified and business like. I personally feel we came out as relative "good-guys".

Dick

Sent copies to remaining Ops. Comm. members not listed.

CONFIDENTIAL

digital INTEROFFICE MEMORANDUM

DATE: December 9, 1969

SUBJECT: College Recruiting - Turnover Analysis of College Hires

TO: Ken Olsen

FROM: Ralph Wilk 7796

cc: Win Hindle
Bob Lassen
Graydon Thayer

I would like the opportunity to discuss the attached in more depth, at your convenience.

/mc

COLLEGE RECRUITING - TURNOVER STUDY OF COLLEGE HIRES

Statistical Summary

The question has been raised as to the advisability of continuing to hire new college graduates at Digital. This concern has apparently arisen because of mention that there has been high turnover among Digital's college-recruited employees. We have therefore prepared a summary of our 1966-67 and 1967-68 college hires to determine what the facts tell us. Please refer to exhibits as indicated.

EXHIBIT I

Our 1966-67 college recruiting effort produced a total of seven college hires. As of this date, two of these individuals have terminated their employment with Digital. These were Dan LaRoe, Branch Manager, Dallas, and John Holzer, PDP-14 Product Line Manager. Both of these individuals were in our employ for two years before terminating with the Company. Noting the five individuals who continue to be employed at Digital leads us to conclude that they were indeed excellent hires when measured against their contributions and current level of responsibility at DEC.

EXHIBIT II

Twenty-two hires resulted from our 1967-68 college recruiting program. Seven 1968 graduates have left the Company as of this date. Fifteen are currently retained by Digital. Again, attention is called to those remaining employees. Are we prepared to state that we were mistaken in hiring these individuals?

In summarizing the results of our efforts over this two year period we find that we have retained 70% of our college hires. In addition, almost half (four) of our nine terminations occurred after two years of employment with Digital.

EXHIBIT III

Although national data is sketchy, Northwestern's Frank Endicott has conducted a college turnover study which lends itself to careful scrutiny.

In supporting Endicott's findings, John Steele, of Harvard, recently stated that "there are no facts to substantiate high turnover among college graduates." He estimates that 70% of Harvard's MBA's have had no more than two job changes over a ten year period since their graduation. About 10% have experienced a significant number of job changes since they graduated. Unfortunately, it would seem that we too often think of this small minority when concern about turnover among college graduates is expressed.

Although our own experience compares closely with national findings, we will gain much more pertinent information if we review the reasons for these terminations.

Termination Analysis

Five of our nine college hires who terminated expressed explicit job discontent. This is exemplified by one individual's statement that "my job could have been done by a co-op." This frustration was the result of a mismatching of job responsibility with aptitudes and interests and lack of proper supervisory direction. Other reasons given were return to school, geographical relocation, and salary. It is significant to note that, without exception, all individuals were considered eligible for rehire by their supervisors.

Conclusion

Digital has been involved in college recruiting for only three years. Last year's program was our first full-scale campaign in this direction. Our relatively short exposure to this type of recruiting makes it difficult to judge its longer term advantages as measured by current turnover data.

The ultimate worth of hiring fresh college graduates depends upon our ability to better utilize the talents of these young men. In addition to a distinct cost-per-hire advantage, today's college graduate brings fresh ideas, training, and abilities which will be needed to fill the void for corporate talent and leadership in the next decade.

As you are aware, we were successful in hiring fifty-six college graduates last year which represents an unprecedented campaign. It would have been premature to include these individuals in this study (all of whom are still employed by DEC). In order to achieve expected productivity from these individuals and insure their long-term employment with Digital, Personnel is closely monitoring their first two years with the Company. This follow-up program is determining the concerns of the new college hire to which we must be sensitive and the extent to which job expectations have materialized. Managers will be made fully aware of their responsibilities in this task of career development for these individuals. With the proper conducting of this program it will become increasingly apparent that turnover can be alleviated before it becomes problematic and that Digital's continued success will, in part, rest with this youthful source of talent.

COLLEGE HIRE PROFILE

EXHIBIT I

-1966 - 1967 College Recruiting Hires-

NAME	SCHOOL	DEGREE	CURRENT POSITION	CURRENT SUPERVISOR	DATE OF HIRE	TERMINATION DATE
(Currently employed)						
R. Collings	Harvard	BSME MBA DBA	Display Mktg. Mgr.	N. Mazzarese	6/67	
W. MacKenzie	Dartmouth	BS Phys. MBA	Mktg.Supp. Spec.	D. Cotton	6/67	
N. Pappas	Harvard	BS Econ.	Soft. Dev. Supr.	L. Portner	6/67	
C. Alsing	U. of Mass.	BSEE	Programmer	L. Portner	6/67	
B. Dewey	U. of Chicago	BA Econ. MBA	GLC/8 Prod.Mgr.	W. Long	7/67	
(Terminated)						
D. LaRoe	Harvard	BSEE MBA	Branch Mgr.-Dallas	A. Liveris	5/67	5/2/69
J. Holzer	U. of Chicago	BSEE MBA	PDP-14 Prod.Line Manager	S. Olsen	9/67	9/12/69

EXHIBIT II

-1967 - 1968 College Recruiting Hires-

(Currently employed)

NAME	SHCOOL	DEGREE	CURRENT POSITION	CURRENT SUPERVISOR	DATE OF HIRE	TERMINATION DATE
C. Proteau	M.I.T.	BSEE	Syst. Programmer	L. Portner	2/68	
J. Eggert	Rensselaer	BSEE MSEE	Circuit Designer	R. Doane	2/68	
G. Saviers	Case Western	BS & MS Comp. Sci.	Disc Control Group Leader	J. St.Amour	5/68	
G. Cole	Case Western	BS Phys.	Appli.Programmer	B. Dewey	6/68	
P. Hurley	M.I.T.	BSEE	Appli.Programmer	A. Titcomb	6/68	
D. Symmes	Northeastern	BS Math	Tech. Writer	G. Arnold	6/68	
M. Manugian	M.I.T.	BS Math	Programmer	L. Portner	6/68	
R. DiDonato	Northeastern	BSEE	Sales Engineer	R. Handy	6/68	
H. McFarland	Carnegie Mellon	(no degree)	Engineer	A. Sherman	6/68	
L. Goldman	Boston U.	BSIE	Process Engineer	T. Stockebrand	7/68	
P. Maslowski	U. of Michigan	MSEE	Engineer	B. Vachon	7/68	
M. Dowling	Columbia	BSIE MA Acct'g	Financial Analyst	E. Savage	11/67	
A. Campbell	Worcester Poly.	MSME	Sales Engineer	R. Smart	12/67	
D. Rogers	Nichols College	BSBA	Admin. Ass't	B. Farnhum	2/68	
J. Green	Brooklyn Poly.	BSEE	Engineer	F. Wilhelm	7/68	

EXHIBIT II (Continued)

-1967 - 1968 College Recruiting Hires-

(Terminated)

NAME	SCHOOL	DEGREE	CURRENT POSITION	CURRENT SUPERVISOR	DATE OF HIRE	TERMINATION DATE
G. Chikwendu	U. of Mass.	MS Civ.Engr.	Programmer	R. Pyle	11/67	10/21/69
T. McGettigan	M.I.T.	BS Econ.	Programmer	L. Portner	2/68	3/28/69
B. Byer	Rensselaer	BSEE	Prod. Supp. Spec.	R. Lane	2/68	1/10/69
K. Burkhalter	U. of Michigan	BSEE BS Math MS Engr. Mgmt.	Appli. Engineer	B. Fronk	4/68	11/5/68
T. Patch	Harvard	(no degree)	Applic. Progrmr.	J. Cohen	11/67	9/12/69
F. Edelman	St.Louis U.	BSEE	Sales Engineer	R. Smart	12/67	7/3/69
P. Hoyt	U. of Mass.	MS Comp. Sci.	Appli. Engineer	G. Rice	2/68	4/3/69

EXHIBIT III

LOSS OF COLLEGE GRADUATES DURING THE FIRST THREE YEARS

The problem of turnover among newly hired college graduates concerns many companies. It is difficult to get reliable figures showing how great the loss actually is. Therefore, respondents were asked to report the number of men hired from 1965 classes who left the company during each of the first three years. A total of 148 companies supplied information. Results are summarized below:

	Eng'g.	Acc't.	Sales	Bus. Adm.	Lib. Arts
Number of companies reporting	86	60	42	84	48
Total number of men hired 3 years ago (1965 classes)	3239	1652	1072	3537	1228
Number who left the company during the first year	262	162	198	436	214
Percent lost during first year	8%	10%	18%	12%	18%
Number who left the company during the second year	437	187	193	516	170
Percent loss during second year	14%	11%	18%	15%	14%
Number who left the company during the third year	251	188	89	318	92
Percent loss during third year	8%	11%	8%	9%	7%
Total number of men who left the company during the first three years	950	537	480	1270	476
Percent loss during first three years	30%	32%	45%	36%	39%

Note: Men who left to enter military service and who can be expected to return to the company were not included.

In previous surveys, companies were asked to report the percentage of college graduates who leave during the first few years and the results were somewhat similar. In 1959, for example, a total of 171 companies reported estimates of losses after three years. The average, for all fields, was 32%. This corresponds to an average loss of 35% in all fields shown by the above tabulation. Statements indicating that "over half of the college graduates leave their jobs during the first year or two" are not substantiated by these findings.

EXHIBIT III (Continued)

REASONS FOR LEAVING THE COMPANY

A total of 168 companies indicated reasons why college graduates left during the first few years. Reasons reported by five or more companies are summarized below:

	Number of Companies
Better salary - More Money - Higher pay	116
More chance for advancement - Progress too slow	98
More challenging work - Wanted greater responsibility	62
Preferred a different location	55
Preferred a different type of business	35
Wanted a different type of work - Job not suited to interests	32
Entered graduate school	15
Unhappy with training program - Wanted broader exposure	10
Hours too long - Objected to overtime	8
Wanted less travel	5
Personal problems - Personality clash	5

WAYS TO REDUCE TURNOVER

The most effective ways to reduce turnover among newly hired college graduates were reported by 162 companies. Those indicated by five or more companies can be summarized as follows:

	Number of Companies
Provide more challenging work - Meaningful job assignments	85
Give responsibility early - Rapid promotion - Recognize achievement	72
Close personal supervision - Regular progress review	50
Pay adequate salaries - Reward good performance promptly	45
Improve training program - Shorter training period - Training program tailored to each individual - Broader company exposure	42
Real interest by management - Regular contact with executives	28
Better selection when hired - Hire only those best qualified	18
Develop real opportunity for advancement - Have real jobs before hiring	10
Careful geographic placement	6
Improved benefit program - Tuition refund for continued study	5

PDP-11

DATE: December 5, 1969

SUBJECT: Trip to Cogar Corporation - Technology Division

TO: K. Crouce
D. Heaton
J. Jones
B. Long
T. Stockeyhand
N. Mazzarese
A. Knowles
B. Savell
K. Olsen
D. Chertkow
F. Wilhelm
J. Butler

FROM: B. Hamel

On Wednesday, December 3, Dick Best, Pete Durant, Pat Sullivan and myself took a trip to the Technology Division of Cogar Corporation. The Technology Division is located in Wappingers Wall, N.Y. and specializes in the development and manufacture of solid state memory systems.

They are in the business to sell "standard" solid state memory systems. They will not do any custom development work at the storage level but plan to standardize on a basic drive system and memory cell. They will sell the complete memory system and the user will supply the logic interface. The following system cost and performance specifications are for systems that are now being offered in their standard product line. These are but a few configurations and the organization is flexible enough to meet any of D.E.C.'s main memory requirements.

TYPE	ACCESS/CYCLE NANOSECONDS	LOGIC INTERFACE	CAPACITY WORDS X BITS	DENSITY BIT/in 2	POWER WATTS	1970$
R/W	40/80	E.C.L.	256x18	130	25	1850.00
R/W	40/80		512x18	150	45	2760.00
R/W	40/80		128x18	100	15	1030.00
R/W	45/80		2048x36	150	360	24,300.00
R/O	40/60		256x32	640	7	820.00
R/O	40/60		512x32	820	11	1220.00

R/W	125/150	TTL	512x18	250	25	1100.00
R/W	125/150		1024x18	310	45	1660.00
R/W	125/150		4096x36	310	360	16,700.00
R/O	125/150		512x32	1300	9	910.00
R/O	125/150		1024x32	1600	11	1310.00
R/W	250/300	TTL	4096x18	2000	32	available
R/W	250/300		8192x18	2500	56	
R/W	250/300		32Kx18	2500	224	on
R/O	250/300		2048x32	5100	8	
R/O	250/300		4096x32	6600	13	request

One important thing to note is that thus far that have no working memory system. They expect to have the high performance and medium performance products available April 1970. The Cost performance MOS memories will be available mid 1970. Normally this would discourage our interest in Cogar until they truly produced, but the technical personnel have built similar working memories at IBM. Today they are gearing up with the latest Technology in process control as well as testing. They gave us a tour of their facility which is in the process of being debugged. They have been in business for a very short length of time and have made significant progress. If continued, their April commitments will be met with no trouble.

The following are the areas where some of the significant technological advancements could enhance the production and reliability capabilities of their product.

Epitaxial and Diffusion Area:

Today within the industry there are a couple types of reactors for the epitaxial process. The two most common are a horizontal and vertical reactor which have basic problems when trying to process a large quantity of wafers. They have designed their own "barrel" reactor which takes advantage of both previous reactors and increases the production capability of their process.

The processed wafer is 2¼ inches in diameter. This is the largest wafer size used in this type of industry. They are using a closed tube or sealed system when diffusing the inpurity elements and have a capability of processing up to 250 - 300 wafers per lot. (Present systems process about 10 wafers per lot.) They use an open tube dynamic system to deposit phosphous glass to enhance the reliability of the end product.

Photo Resist, Metalization and Mask Fabrication:

They make their photo masks using an IBM-1130 computer with a C.R.T. input device. The magnification is 10 x regular size. Normally

the turn around time to get a new mask is 6 to 8 weeks. They have such a sophistacted system that the turn around time is "one" day. The program is complicated enough for a designer to make etch changes in his circuit and determine the effect it will have on the overall memory system.

They use chrome masks and etch the lines using argon "ions." The resolution is so good that the printed circuit is as good as the mask. They said the line widths could be as small as .0002 inch with no major problems. (The chemical etching from our printed circuit facility can produce line widths in the area of .020 inch.)

Instead of using "Bell Jars" they have designed their own vacuum box. This box has standard fixtures and a large enough area to enhance volume production. The volume of each vacuum box is over a cubic yard and the pumping equipment can depressurize the area in a matter of minutes.

They dice the wafer with a diamond saw rather than a diamond scribe. This gives a better wafer edge definition which they feel will enhance the reliability.

Chip Joining:

They receive the substitute and screen on a metalized pattern using .006 inch line.

They have a machine which they claim automatically inserts 24 to 36 pins on each substrate in 250 milliseconds.

After the substrate is tinned it is alligned to the chips under the microscope. The substrate is then placed in a furnace where the substrate and chips are automatically bonded.

Cards:

They use multilayer circuit boards with .010 inch lines and .009 inch spacing. The cost of the boards constitute 30% of the system cost.

Testing:

They have an extensive testing program which evaluates the product at the wafer, chip, module and card levels. They use much of the data to insure a reliable product.

Reliability:

The product will be constantly evaluated for various failure modes. They have built maximum reliability into their manufacturing process and are confident enough to give a 5 year warranty against defective parts.

digital INTEROFFICE MEMORANDUM

SUBJECT: QUALITY PROBLEMS IN THE FIELD

DATE: DECEMBER 1, 1969

TO: KEN OLSEN
OPERATIONS COMMITTEE
LOCATION:

FROM: JIM CUDMORE

LOCATION: Q.C. 5-4

CC: JACK SHIELDS
JACK SMITH

STATUS

OUR ONLY CONSISTENT SOURCE OF QUALITY INFORMATION IS THE FIELD SERVICE INSTALLATION REPORT SUMMARY. THIS REPORT INDICATES THAT THE LEVEL OF PROBLEMS ENCOUNTERED AT INSTALLATION, WHILE STILL WAY TOO HIGH, HAS ACTUALLY DECLINED STEADILY FOR THE MONTHS OF JUNE THROUGH AUGUST; WITH AUGUST SHOWING THE GREATEST IMPROVEMENT YET. THE SEPTEMBER RESULTS, WHILE NOT YET COMPLETE (IT TAKES TWO MONTHS FROM THE END OF THE SHIPMENT MONTH TO OBTAIN A REASONABLE SAMPLE), INDICATES A SLIGHT INCREASE IN PROBLEMS.

QUALITY IMPROVEMENT ACTIVITY

THERE HAS BEEN A SIGNIFICANT AMOUNT OF ACTIVITY IN THE LAST SIX MONTHS DEVOTED SPECIFICALLY TO SOLVING INSTALLATION PROBLEMS. I WILL ATTEMPT TO LIST ONLY THE "HIGHLIGHTS".

1. PRODUCTION CHECKOUT PEOPLE GOING TO THE FIELD. WE HAVE SENT SOME OF JACK'S MORE EXPERIENCED CHECKOUT PEOPLE INTO THE FIELD TO WITNESS INSTALLATIONS. THIS HAS BEEN DONE ON 8/I'S, 8/L'S AND 10'S. THIS ACTIVITY HAS GONE ON FOR APPROXIMATELY THREE MONTHS. THE CREDIBILITY GAP HAS BEEN REDUCED SIGNIFICANTLY AND A SERIES OF "FUNNY" PROBLEMS HAVE BEEN IDENTIFIED.

2. REGULAR MEETINGS BETWEEN QUALITY CONTROL, FIELD SERVICE AND THE PRODUCTION LINES ARE BEING HELD ON THE "8" AND "10" FAMILY PRODUCTS. AT THESE MEETINGS, SPECIFIC PROBLEMS ARE IDENTIFIED AND AN INDIVIDUAL IS ASSIGNED TO RESOLVE THEM. THE RESULTS THUSFAR HAVE BEEN VERY GOOD.

QUALITY IMPROVEMENT ACTIVITY (CONT'D)

3. SHIPMENT CONTAINER - REDESIGN: THE PACKAGING ENGINEER HAS CONTRIBUTED SIGNIFICANTLY TO RESOLVING SOME OF THE PACKAGING DAMAGE PROBLEMS THAT CHRONICALLY APPEAR; SUCH AS, BROKEN LEGS, DAMAGED TELETYPES, ETC.

4. SHIPMENT TEST SIMULATIONS HAVE TAKEN PLACE ON 8/L'S. A SERIES OF SHIPMENT TESTS ON ACCEPTED 8/L'S TO LOGAN AIRPORT AND BACK HAVE BEEN PERFORMED AND UNCOVERED MANY PROBLEMS, SOME AS FUNDAMENTAL AS SHEET METAL OUT OF TOLERANCE, SCREWS LOOSE -- ALLOWING WIRES TO BREAK, CONSOLE PANELS SHIFTING -- BINDING KEYS AND INDICATOR LAMPS FAILING.

5. MISSING SOFTWARE/ACCESSORIES: JACK SMITH HAS AN INDIVIDUAL ASSIGNED TO SOLVING THE MISSING SOFTWARE/ACCESSORIES PROBLEM. IT ISN'T SIMPLE. HE HAS A PLAN THAT INVOLVES GENERATING ALL THE DOCUMENTATION NECESSARY TO DESCRIBE THE SOFTWARE/ACCESSORIES AND A STOCKROOM TO CONTROL IT. THIS IS A LONG RANGE PLAN, BUT WILL WORK.

LONG RANGE QUALITY IMPROVEMENT ACTIVITY

THERE ARE SOME LONG RANGE ACTIVITIES GOING ON THAT WILL PAY OFF PRIMARILY WITH NEW PRODUCTS. THE MOST OBVIOUS ONE IS THE PRODUCT EVALUATION GROUP. THE PRODUCT EVALUATION GROUP HAS BEEN IN EXISTANCE ABOUT EIGHT MONTHS AND HAS CONTRIBUTED SIGNIFICANTLY, I FEEL, TO FINDING PROBLEMS OF BOTH DESIGN, MANUFACTURING AND PACKAGING. I SUSPECT THE RESULTS OF THEIR CONTRIBUTION WILL NEVER BE KNOWN, SINCE HOPEFULLY, THE PROBLEMS WILL NEVER GET TO THE FIELD. OTHER LONG RANGE ACTIVITIES INCLUDE IMPROVEMENT OF PURCHASE SPECIFICATIONS, CLOSING THE LOOP ON INCOMING INSPECTION OF MAJOR PERIPHERALS, ADDING SOME QUALITY CONTROL ENGINEERS IN THE LOOP TO DO NOTHING BUT BASIC PROBLEM SOLVING AND MAKING SURE THERE IS AN AWARENESS BY PRODUCTION ORGANIZATIONS OF THE DEGREE OF THE QUALITY PROBLEMS WE HAVE IN THE FIELD.

-CONT'D-

CABLES -- QUALITY/QUANTITY

MY INTERPRETATION OF THE OCTOBER SALES REPORT IS THAT MOST OF THE PROBLEMS ON CABLES WERE QUANTITY NOT QUALITY. HOWEVER, WE HAVE HAD SERIOUS QUALITY PROBLEMS WITH CABLES. CABLES HAVE RECEIVED RATHER INTENSIVE ATTENTION FOR THE BETTER PART OF THE LAST SIX MONTHS. SPECIFICALLY, WE NOW TEST AND INSPECT CABLES 100%. WE HAVE DESIGNED AND BUILT SEVEN (7) SETS OF ELECTRICAL TEST EQUIPMENT FOR ALL OUR VENDORS AND OUR OTHER SUB-ASSEMBLY PLANTS. WE HAVE WRITTEN A CABLE ASSEMBLY DRAWING STANDARD, NOT YET IN USE, TO ATTEMPT TO MINIMIZE THE PROBLEMS CREATED BY VENDORS TRYING TO BUILD FROM PRINTS WHICH NO ONE CAN UNDERSTAND. WE HAVE ESTABLISHED A CABLE REPAIR GROUP TO FIX DEFECTIVE CABLES FOUND IN CHECKOUT SO THAT THE TECHNICIAN IS NOT TEMPTED TO FIX THEM HIMSELF AND SHIP THEM WITH THE SYSTEM. I REALLY FEEL THAT THE CABLE PROBLEMS HAVE BEEN PRETTY MUCH RESOLVED AND I WOULD BE VERY SURPRISED IF IN THE NEXT THREE MONTHS, WE HAD SIGNIFICANT QUALITY PROBLEMS IN THE FIELD.

JGC/TAB