criteria? Why do we want another language in the field to sell? Do we make money now on languages?

In this case you have a well-defined alternative (i.e. BLISS) against which you're comparing a well-defined name PASCAL together with lots of ambiguous additions. When you get through, is it possible that your PASCAL language will bear the same relationship to worth as the RSTS language has to BASIC? In making these changes to have it be an IL is it possible you come nearly full circle to re-invent BLISS? Is it PASCAL+?

I really felt cheated in not being able to understand your decision. While we're only mid-way in the 11VAX design, we spend much effort in formulating goals and constraints and then measuring alternatives against these to select a particular design. Only the goals and constraints have been published, but I can show you some of the backup. But you should get some idea in looking at it as to why we're where we are.

What I really feel has to be done now to make our implementers feel comfortable is to put down a fairly complete list of criteria (say 10 groups with 10 items/group) that an implementation language must do (e.g. sense and set i/o words). I really don't understand the needs here of an IL and in comparing PASCAL and BLISS, I would rather program in PASCAL, but I don't write any systems programs, nor care about size, runtime, or data structures. With the error predicates for routines, could you eliminate so much of the type checking that PASCAL has (size and run time)? Hence, does one care that PASCAL checks? Don't you want it not to in production? It's hard for me to imagine that a language designed for gp student use has much relationship to a production, machine-oriented IL? Could you be more specific in quantifying the algorithms types that IL's deal with so as to get a better handle on the needs? As the developer of a set of modules (RTM's alias PDP-16), which were ideal for teaching and prototype building, they turned out to be unused in production environment (cost and speed were the issues...not design time). All your positive quotes from academicians in support of PASCAL tended to scare me about PASCAL as an IL. Don't you think there is a risk here?

Very often these languages (and machines) are hard to quantify and what usually clenches matters are benchmarks. Since we have so much BLISS code, I'd like to see some PASCAL code for comparison. What does it look like? How do you express a certain type of activity. Can you select, say 6, typical benchmarks and compare them? E.g., can it handle our

11VAX page table structures where bits are packed in every which way with pointers, etc.? Will Dave Cutler use it for the Operating System?

By stating your goals and constraints, it gets you really deep into the extensions of PASCAL. You (I or anybody) can then place our own weightings on these criteria and the others (e.g. $, time, training) such that its obvious why you chose PASCAL. Right now as a pure, simple, manager, my weightings tend to be on $ and short-term; thus BLISS might have been my choice, given only the data in your recommendation. When can I see some benchmarks, IL criteria, and weightings?

GB:mjk

Distribution

Ed Fauvre
Bill Slack

cc:

VAXA	Rick Grove	Bill Schauweker
Jim Bell	Glenn Lupton	Mike Spier
Bert Bruce	Jim Mills	Larry Wade
Dick Clayton	George Poonen	Peter Christy
Bill Demmer	Larry Portner	Dave Cutler

D I G I T A L INTEROFFICE MEMORANDUM

01564

SUBJ: PDP-11 USE

DATE: 06-03-75
FROM: GORDON BELL
EX: 2236
MS: ML12-1/A51

TO: FILE

To: Distribution

With increased emphasis on future 11 development oriented toward the types of activities we do in engineering, i.e. computation, text processing, laboratory automation, data processing, I believe we (engineering) should make significantly more use of the PDP-11. Currently we use 10's for most of these activities. It appears this falls in your area(s).

Can you get together and propose how this might be done? Who's to do it?

Some of the questions I have about such an organization:

1. How will you network it, so that we can still access 10's for large jobs, and the specialized languages (e.g. ALGOL, APL, COBOL, some simulation languages, statistical packages)?

2. Should we use large ones centralized, or should we use 40-class and distribute them physically along the lines HP is advocating?

3. What would they do? Clearly all text processing, small engineering computation, some DBM, COBOL, all 11 programming development (they do now).

4. What operating system(s) will be useable?--RSX-11/D-IAS, MIAS (RSX-11/M version), RSTS, MUMPS, RT-11 for laboratory-type.

GB:mjk

Distribution

Leo Bennett
Don Crowther
Arnie Goldfein
Ron Rutledge
Phil Tays

cc: OOD, MC, John Leng

DIGITAL INTEROFFICE MEMORANDUM C1565

SUBJ: SPACE PLANNING REQUESTS

DATE: 06-03-75
FROM: GORDON BELL
EX: 2236
MS: ML12-1/A51

TO: FILE

To: Dick Clayton
Larry Portner

cc: OOD, Ed Wright

I've been holding up space planning requests by Ed Wright for 1 larger computer room + 1 large building for programming until you come up with the "systems" plan. While I don't know what you'll decide, I've developed some biasses (especially since my VAXA group is largely from programming):

1. programmers are bright, and have a lot to offer the traditional hardware developers who only worry about processors and low level controllers. The system manager will be responsible for support of devices up to a standard, internal operating system interface--diagnostics and handler. Thus, these programmers should cohabit the space with hardware engineers.

2. Delagi has suggested (and started to demonstrate) that combining total systems development together is quite effective. His "team" is really Gourd, Hughes, a marketer, plus an architect. They have produced the best system results I've seen at DEC to date.

3. Ed has proposed a single, central computer room. I'd prefer to have several large rooms: 1-1 (for DA 10's), 3-5 and 5-5 which are located for open use and jam packed with machines. These would be associated with certain systems groups and there might be one for central groups e.g. languages (why can't the programmers have quiet, low power video terminals (VT52) with copier in their offices?) The purpose would be to make use convenient, close and quiet. Where possible, since power is decreasing, let's put small machines in offices (e.g. LSI-11).

4. The groups that might be co-located (note--no organizational changes):

   A. LSI-11 + RT + diagnostics for Q-bus.

SUBJ: SPACE PLANNING REQUESTS DATE: 06-03-75
FROM: GORDON BELL

B. 11VAX high end + diagnostics + operating system design.

C. PDQ/11/70 would include RSX's.

D. 11/04; B05 would only include diagnostics and any other support to get them to run existing Operating Systems for their markets..largely iron.

E. PDP-8 would be fully integrated.

F. Communications + peripherals (tape, disk, printer) would be responsible for device level driver interface + diagnostics. This is mandatory as we evolve toward much smarter peripherals with programs in them.

G. Terminals (LA + VT) must have software help!

H. All applications would live with their respective PL's.

I. Manufacturing programming would be with their counter-part.

J. RSTS and languages would be central (Bldg. 3?).

K. Planning and general management would locate on 12-3.

L. Tools, plus common techniques, research, Bldg. 3.

What youse think? When or should we get at this?

GB:mjk

01567

digital

June 3, 1975

Bill Broadley
Computer Science Department
Carnegie-Mellon University
Pittsburgh, Pennsylvania 15213

Dear Bill:

I've been talking with Prof. Siewiorek regarding your manufacturing of the CMU-DEC microstore for the 11/40. NRL would like to obtain several of these, and since I feel their work is so important, it is imperative that the microstore be available to them.

At this time we, DEC, have no plans for the manufacture of this unit. Therefore, I would like to encourage you to manufacture the microstore and offer it for sale to NRL. In the future, if we become interested in the manufacture of the microstore, I would like to get the documentation so that it could be built here. But, in general, this would not preclude your continued manufacture of the unit.

If there's anything I can do to help, please let me know. I hope NRL can get the unit as soon as possible.

Sincerely,

Gordon Bell

Gordon Bell
Vice President
Office of Development

GB:mjk

cc: John Mucci--DEC
Roy Van Duesen--DEC
Charles Eichenlaub--DEC
Dr. Y. S. Wu--NRL Code 5490, Navy Research Lab, Wash. DC 20375
John Holman--DEC

DIGITAL EQUIPMENT CORPORATION, 146 MAIN STREET, MAYNARD, MASSACHUSETTS 01754
(617)897-5111 TWX: 710-347-0212 TELEX: 94-8457

digital

June 3, 1975

Robert A. Stratton
President
Stratton Associates
4234 Matilija Avenue
Sherman Oaks, California

Dear Bob:

Thanks for the interest in Brian Warner. Some of our people talked to him and didn't find a match. I'm sorry I didn't meet him since you regard him so highly.

If other people, who may be somewhat controversial, come here, I'd appreciate meeting them.

Sincerely,

Gordon Bell
Vice President
Office of Development

GB:mjk

DIGITAL EQUIPMENT CORPORATION, 146 MAIN STREET, MAYNARD, MASSACHUSETTS 01754
(617)897-5111 TWX: 710-347-0212 TELEX: 94-8457

C1569

digital

June 3, 1975

Susan Huhn
Election Process Consultants
38 Ridgewood Avenue
Groton, Massachusetts 01450

Dear Ms. Huhn:

As a product developer, your product sounds interesting, unique and important. However, I'm not really involved with products that are so "end-user" oriented, as I'm just involved with the building of our basic computers.

Since we really aren't segmented yet into a market structure which includes government, per se, it's not clear who would be responsible for working with you. I'm sending your material to Mr. Bill Long, who is in charge of our Original Equipment Manufacturer (OEM) product lines. I would believe you should base your product around one of our computers. If you're interested in pursuing this, let me urge you to contact Bill.

Sincerely,

Gordon Bell
Vice President
Office of Development

GB:mjk

cc: Bill Long
Stan Olsen

D I G I T A L INTEROFFICE MEMORANDUM C1570

PAGE 1

SUBJ: SERIAL TYPEWRITER DATE: 06-02-75
FROM: GORDON BELL
EX: 2236
MS: ML12/A51

* *
TO: FILE
* *

SUBJ: HIGH QUALITY TYPEWRITER FOR WORD PROCESSING SYSTEM SHOULD BE SERIAL

To: Distribution

I would hope you make a cursory examination of using a serial interface instead of the parallel one to pDP-8 by getting the design operating! I believe it gets you many advantages and with probably less cost. It would use the existing MPS modules (an Intel 8008); hence, there would be NO hardware to develop since the series already has parallel interfaces, COMM I/O, etc.

The advantages, as I see them:

1. Quicker development time. Mark & Roy, could you help here to show that it can be done in less than a week?

2. The terminal could go on other computers...we currently buy a fair number for internal use, and I'm sure our customers wouldn't mind being offered a higher quality printer someday.

3. It can do self test...a real benefit since the thing is probably going to break a lot.

4. Easier to have redundant and multiple ones.

5. Easy to remote.

6. I believe it provides a better system design by functionally partitioning the system.

7. It lightens load on 8A--although this may not be important.

8. Can use it off-line at same time data system 310 is doing something else.

9. We'll end up doing it anyway eventually, so let's do it right the first time.

GB:mjk

SUBJ: SERIAL TYPEWRITER

DATE: 06-02-75
FROM: GORDON BELL

Distribution

Ed Corell Jack Gilmore Dick Kalin
Roy Moffa Mark Sebern

cc: Bob Puffer

01572

D I G I T A L INTEROFFICE MEMORANDUM

PAGE 1

SUBJ: PMS STRUCTURE POLICY

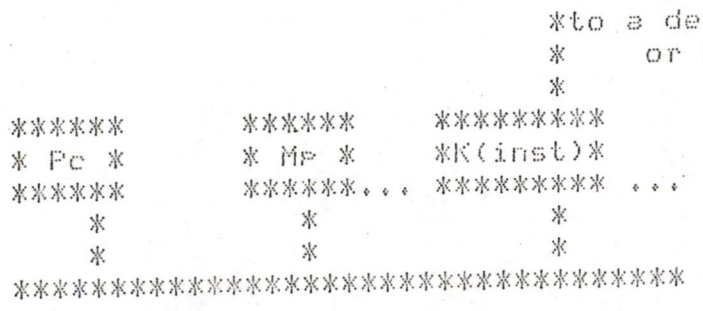
DATE: 06-02-75
FROM: GORDON BELL
EX: 2236
MS: ML12/A51

TO: DISTRIBUTION--VAXB XXX

SUBJ: INTER-PMS COMPONENT TRANSFERS ON DEC COMPUTERS:
RATIONALE, EVOLUTION AND RECOMMENDATION FOR A POLICY

This memo describes the philosophy that has been used for controlling the transmission of data among the various components within a computer (and especially at DEC). The method has remained relatively constant for about 15 years. As technology has changed recently to offer low cost, fast read only memories, it is time to update the position. We are to the point where nearly all controllers for larger devices can include their own computer which can interpret a program and have the capability of at least current device drivers. This memo will describe the past philosophy and posit, what I believe is, the right way to do in future systems. Recommendations will be given first, followed by the problem, and the alternatives that determine the solution framework.

Given the current, 1 central processor UNIBUS system with primary memory modules, and simple controllers, K's for devices; a controller K, may directly transfer data to Mp or it may interrupt Pc. Pc can communicate with K for data and/or control information.



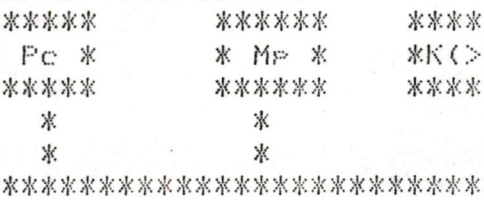
Recommendations (the solution)

0. Define an IO process level interface which is at least as capable as current I/O drivers. Current hardware engineering would be responsible for developing systems and diagnostics to this level. Implementation would be by any of the techniques listed below ranging from totally programmed as with our current systems to separated IO computers with

SUBJ: PMS STRUCTURE POLICY DATE: 06-02-75
FROM: GORDON BELL

their own microcode programs.

1. Adequate instruction bufferins in K. We must add sufficient command bufferins in each K, such that a device can operate at its full speed (subject to poor payoff from a cost/performance viewpoint).



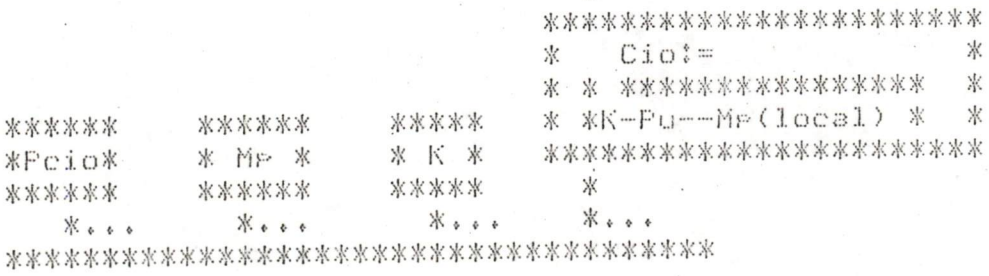
2. 1 instruction interrupt in Pc plus better I/O instructions--Pcio. We can, by a small change to current interrupt vectors, permit a single block-oriented data transfer instruction to be executed at interrupt time. The additional instructions we need are:

   A. Block I/O, Byte/Word, IO-device-address, Word-count and transfer-address. Input/Output a byte/word according to a control word which has a word-count and transfer address. At termination of block, cause a conventional interrupt.

   B. Decrement a word in memory and interrupt IO.

   C. Block I/O with character translation. The communications soup should specify the operation.r

3. Add a fully programmed microprocessor Pu with its local primary memory, Mp (local), which forms a small, fast stored program, computer, Cio. Cio is connected to a control, K, or is part of a control K. With this scheme, IO processes will correspond to at least the current IO device driver level. In essence, Cio will operate on a data structure specifying a Job(s) to be done. The program in Cio is fixed. We are currently building controllers of this type for communications.



4. Examine the feasibility of using the small, Cio's, i.e. Demons, on the UNIBUS generally for specific control purposes (e.g. disk management, communications).

5. A multiple processor structure to increase reliability and performance.

Notice, the complexity is bounded; we have come full circle, once a Cio is formed. A Cio is precisely a second computer just like the starting point of the most primitive computer (i.e. K simple-Pc), but it is split apart for the sole purpose of I/O task management.

The Overall Problem

A computer consists of a number of PMS components and the design task is to interconnect them in a "cost/effective" way. This implies:

1. there is a physical structure that permits information to be transmitted among them. The UNIBUS is the most general way.

2. A process (program) in the computer system has to tell the various components that the transfer must take place... i.e. control.

3. According to good engineering principles, the system should be cost-effective:

   A. the cost of the transfer, in terms of the resources it uses, must be small.

   B. The overall system cost must be small. This can best be accomplished by leaving out components.

4. The overall throughput must be high, which in the case of I/O means greatest concurrency (parallelism).

5. The devices must operate at their own speed unless this cost does not increase the cost/effectiveness.

6. In some applications, it is important to have a minimal time between when an event is signalled until when a response is given by the program. (This also gives high throughput.) This, in effect, minimizes the interrupt response time.

Controls (K), Processors (P), and Computers (C)

A control (K) is the simplest form of finite state machine. It is given an input (1 or more instructions), it executes them and stops. In our systems, a control is given 1 instruction at a time by a processor (Pc), it executes the instruction (e.g. move a disk arm, print a character, transfer a block of data on Ms.disk to Mp).

A processor (Pc) picks up its own instructions from a list in a primary (program) memory (Mp). It has a program counter, which points to the instruction it is executing (or going to execute). The act of fetching and executing instructions is program interpretation. Thus to give a task to a processor to execute, requires giving it a program...i.e. specifying "how to do it."

A computer (C) is a Pc-Mp pair with a program(s). In the case of Cio, specifying a task requires giving Cio tabular information (data-structure) about the task...i.e. specifying "what to do", not "how to do it." The assumption is that a program in Cio "knows" about the data structure and knows how with not being told.

Pio and Cio are analogous to a procedure-oriented and a report generator-type program language (e.g. COBOL and RPG). In the former, tasks are specified by lists of instructions to carry out the task. The later accepts a template of the result (report) and then proceeds to achieve the goal by extracting the appropriate information from the data.

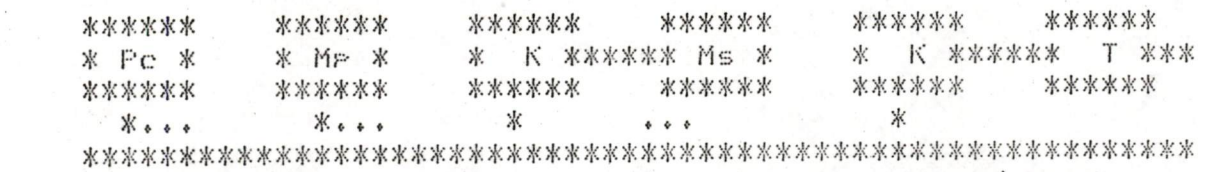
The Physical Structure Problem

The UNIBUS is the most general interconnection scheme to interconnect PMS components because it permits any device to communicate with any other. It is an obvious solution once the problem is formulated in its most general form.

The general structure is:

SUBJ: PMS STRUCTURE POLICY

DATE: 06-02-75
FROM: GORDON BELL



There are several kinds of traffic which the UNIBUS (or any other bus structure) carries:

1. Central processors (Pc) to primary (program) memory (Mp)-- in a stored program as the processes are being executed, each processor must access its program and data.

2. Primary memory (Mp) to secondary memory (ms), e.g. disk, via controller (K). In nearly all computers even beginning with Whirlwind, programs exceeded Mp size that Pc could execute from. It is necessary to move programs and/or data between secondary (backing) memory, Ms, and primary memory (Mp).

3. Non-memory transducers (T), e.g. typewriters, communicate with a program.

4. General control to cause transfers (2 and 3) and generally synchronize with them.

Historical Solutions to the Physical Structure and Control Problem in Terms of Processors

There has been an evolution in structure and in the way initiation and synchronization have taken place with Pc. This has been governed by technology, and has followed this path:

1. Very simple controllers (K's). With the processor stopping to help control each transfer. This also simplifies programming because everything is sequential.

2. Adding interrupts, and more complexity to each control (K) so that it could proceed in parallel with competitive interrupts were "invented" to synchronize completion with the processor without requiring Pc to wait or poll.

3. direct memory transmission (DMA-NPR) of information between Mp and Ms (or other device which require very high data rate transfers.

SUBJ: PMS STRUCTURE POLICY

DATE: 06-02-75
FROM: GORDON BELL

4. The addition of an io processor, Pio (IBMese=channel) which executes a stored program. Pio has instructions to initiate the controllers, and nominally spends its time passing data from the controller it initiates to Mp. at the completion of data block transmission, it fetches another instruction from its own program. I've been traditionally against this approach because:

A. It is most costly. (The initial channels on the IBM 7090 were really bad, because they were non-multiplexed; hence only 1 device (e.g. a 150 lin/min) printer could run at a time. The 360 selector channels are just as bad.

B. They add logical and physical complexity without much payoff. The controller is doing the real work, because of device idiosyncrasies, and all Pio does is buffer and pass data from a control to the memory...something that a buffer and wire will also do reliably and cheaply.

C. As a somewhat (not terribly) intelligent device, they require more communication because they are somewhat smarter than a dumb controller (notice the nice analogy with people). They must be told how to do a job.

D. Since a Pio has the same complexity as the central processor, one might as well use just the central processor. The central processor is the cheapest device in the system because it is already there, and the only time that Pc is expensive to use is when its at full load (i.e. there is no spare capacity).

However, when this happens, the nicest alternative is to merely add a second central processor to do the IO task (and any other tasks). Note the cost is no worse than in the case where we required both an arithmetic and IO processor.

E. There is system cost to have another component type which has to be stocked, diagnosed and programmed. The central processor has to have a program waiting for the IO processor, or has to compile one, or insert one in the Pio's table structure.

Note that when all the work has been done by the central processor, the only remaining work is actually handing the commands to the traditional, low level controller.

One should ask, why have a complex middle-man to which you hand commands, that merely hands commands off to someone else. Why not have Pc just hand commands to K when they're generated? It's clear to me since each small set of commands (a channel program) generates an interrupt back to the CPU, nothing has been gained since the Pc does the same (or slightly more work)...

5. The IO computer Cio. This has been used effectively by CDC in the 6600-7600 series, and we have done this to a certain extent in the PDP-10 and in large PDP-11's where a certain high level function is being performed by a totally separate program and complete process. The control activity is in Cio's memory, and it is told what to do--i.e. transfer a block, not how to do it (e.g. move arm + search + transfer + check).

6. Single instruction execution interrupt level. Improved instructions in Pc to handle IO transmission. This was done in the PDP-10 and in PDP-8 for communications I/O, such that instead of executing a program at interrupt time, a single instruction is executed. This slipped by in the initial implementation of the 11 and should be included at this time. Themost conventional use is to interrupt, and then execute a single Block Transfer In/Out instruction. The instruction transfers one word under control of a word count, and location pointer in memory. It has been used extensively byour competitors--the most notable has been Interdata, who added instructions to input characters from communications lines and perform translation, and store them in memory.

7. Specialized processors which interpret programs for a particular task. The GT40 is a good example of this. Because the instruction-rate is high, a complete processor is required. A typical instruction draws a character or line, or manipulates a list data structure defining the picture.

Evolution of Controllers (K)

While the above section discussed the evolution of the concept, and location of control, device controllers have varied considerably. Controller complexity has been influenced by technology, thus "control" can be distributed among hardware in a processor, a processor and a program, a specialized processor, or completely in an autonomous controller.

SUBJ: PMS STRUCTURE POLICY DATE: 06-02-75
FROM: GORDON BELL

Our controllers have evolved to the execution of single instruction (e.g. find a disk block, transfer a block from disk to a block in memory, output a character on a given LA36). I believe that controllers have and will evolve along the following lines:

1. K(simple). Simplest control where the CPU or a program handles most of the device control. In essence, all that K has are buffers to staticize information and convert signal levels according to the device's needs. Input converters sense the device's output and read them into another part of C.

2. K(instruction) Current controllers can execute a complete instruction on a data type that is known to the device being controlled (a character on the LA36, a line on a line printer, or a block on a disk or tape).

3. K(>-1 instruction) Current controllers but with sufficient command buffering (>1 instruction) such that the devices will operate continuously. We may have been minimizing controllers to the extent that system performance is degraded. For example, since a disk is usually the limiting component, and we use alternate blocks, the transfer rate is limited to be 1/2 the maximum, or conversely, the throughput is down by a factor of 2.

4. K's formed as K-Pu-Mp(local). This corresponds to at least the device driver level task. In this case, a special IO computer, is formed by a microprogrammed processor, Pu, which has a local primary read-only memory. In having a program, there are several possible uses of the increased complexity:

   A. The control program formerly in Pc-Mp or Pio-Mp can be located in Mp (local).

   B. K is told what to do, not hw to do it--it knows by interpretting its own program in Mp(local).

   C. The control program can diagnose the device.

   D. The control program can fetch a data structure (task) from Mp (global), and manage buffers, do error control, etc.

   E. More optimization of device control (e.g. disk transfers based on min. latency via a queue of jobs).

SUBJ: PMS STRUCTURE POLICY

DATE: 06-02-75
FROM: GORDON BELL

The dimensions of control choices evolves alons these lines for a controller (K) and the corresponding control in the processor (P).

*	K simple	*	* Pc (with embedded K)
*	K (instruction)	*	+ * Pc (interrupts + I/O programs)
*	K (>1 instruc)	*	* Pcio (1 instruction at interrupt)
*	K-Pu-Mp(local)	*	* Multi-Pcio
	(note equivalent		* Pio (e.s. channels0
	to K simple +		* P special
	Cio)		* Cio (separated computer with local Mp for I/O process control

GB:mJk [6/2/75]

01581

digital

INTEROFFICE MEMORANDUM

LOC/MAIL STOP

TO: Jim Bell
OOD
Finance Committee

DATE: July 14, 1975
FROM: Gordon Bell
DEPT: OOD
EXT: 2236
LOC/MAIL STOP: ML12/A51

CC: John Fisher, Ken Olsen

SUBJ: HONORARIA--ATTACHED POLICY

The OOD is in the process of approving the following policy having to do with honoraria for talks. I just got a note from Ed Schwartz requesting officers and employees to list boards they're on, which presumably is covered in a policy somewhere.

Last year, I billed CMU for visiting and consulting CMU at $2,000 for joint DEC-CMU, CMU, and some profession-related projects. This year I made four trips and spent a total of approximately one hundred hours (2% of my professional time), much of which was on the phone and computer via the network. My intent was to turn this money over to DEC.

The problem: is my CMU affiliation like honoraria or a board fee? Are board fees turned over to the company?

There are clear cases where DEC doesn't get reimbursed, e.g., teaching classes after hours. Can F&A establish guidelines for everybody and rule on this by issuing the attached policy on some revised, appropriate form?

GB:mjk

Attachment

01582

digital JUL 11 1975

INTEROFFICE MEMORANDUM

TO: Gordon Bell LOC/MAIL STOP ML12/A51

DATE: July 9, 1975
FROM: Jim Bell
DEPT: R & D Group
EXT: 2764
LOC/MAIL STOP: ML3-4/E41

SUBJ: Honoraria

Attached is the revised draft of the policy on Honoraria. Since there are still some open issues I will wait until I hear from you before proceeding further.

As we discussed on the phone the key open issues are:

1) should honoraria disbursements be centralized for better record keeping and control?

2) should incoming honoraria always be accepted, even from non-profit institutions, thereby serving

   a) as a control on the number of invitations,

   b) as a small source of income for the company, and

   c) as a counter balance to outgoing honoraria?

3) how do we distinguish between talks which DEC people give on their own (evenings, weekends, vacation days) and those talks given by DEC people as representatives of DEC.

JB/cw

C1583

digital

INTEROFFICE MEMORANDUM

TO: Hardware Engineering Managers
Software Engineering Managers
LOC/MAIL STOP

DATE: June 27, 1975
FROM: Jim Bell/Gordon Bell
DEPT. R & D Group
EXT: 2764
LOC/MAIL STOP: ML3-4/E41

SUBJ: Policy--Honoraria for Invited Speakers to Engineering Seminars

Background: The academic community has the custom of providing honoraria for invited talks when faculty members speak at other institutions.

DEC employees are offered honoraria for giving talks and participating in conferences at non-profit institutions, the government, and other companies.

Purpose: To establish a uniform policy within DEC with regard to giving and accepting honoraria.

Policy:

1) When a university faculty member is invited to give a seminar at DEC, it shall be customary to provide an honorarium in addition to expenses. The size of the standard honorarium shall be set by the Vice-President of Engineering; it is currently set at a maximum of $150.00, the exact amount to be based on the time and effort involved, and set by the person who issues the invitation.

2) When a DEC employee is offered an honorarium, the employee shall (a) decline it when offered by a university or other non-profit institution and (b) accept it on behalf of DEC otherwise.

3) The responsibility for enforcing this policy, providing outgoing honoraria, and accepting incoming honoraria shall rest with each cost center manager.

JB/GB/cw

C1584

0062 1302 30-JUL 36124 1300 30-JUL
MP30 LPTR RDGB
ZCZC
RD

MSG NO NA14

TO GEOFF SHINGLES READING ENGLAND

FOLLOWING IS A COPY OF THE LETTER I SENT TO PROFESSOR SHACKEL

"THANK YOU FOR YOUR LETTER REQUESTING FUNDING OF THE
NATO ADVANCED STUDY INSTITUTE. WE BELIEVE THIS IS IMPORTANT
BUT DO NOT HAVE FUNDS TO SUPPORT IT NOW.

IT IS POSSIBLE THAT DEC UK MIGHT HAVE SUPPORT FUNDS, AND I WOULD
ENCOURAGE YOU TO CONTACT THEM THROUGH YOUR LOCAL DEC CUSTOMER
SALE ENGINEER. BUT IN VIEW OF THE LATE DATE, I WOULD BE
CONCERNED THAT THEY TO ARE IN A FINANCIAL BIND.

REGARDS
CC GEOFF SHINGLES"

DEB

FROM GORDON BELL MAYNARD
NNNNN

D I G I T A L INTEROFFICE MEMORANDUM C1585

SUBJ: VAX ARCHITECTURE (HRDWR/SOFTWR)

DATE: 07-28-75
FROM: GORDON BELL
EX: 2236
MS: ML12/A51

* *
TO: FILE
* *

We have produced much documentation on the hardware architecture. Enough so that implementers can start to work so that we can interact with them. The software architecture is marked with great gobs of milling inactivity. The hardware architecture is described in terms of surrounding goals, constraints, and the technology environment for the 1975-1985 time scale. Most of the instruction set is completed and encoded, and the virtual addressing use and mechanism, though designed, is about 2 weeks away from description for review. We held our first corporate-wide (35 people for 3/4 day) design review (hearing).

So far, we appear to get a 1/3 reduction in code size and running time as compared with a comparable PDP-10 and 40% to 50% reduction over a PDP-11 for FORTRAN, while giving the user 29-bits of memory address space. While these measures are relatively spectacular for an Instruction-set, note that if we didn't build the machine, and used a PDP-10 instead, technology evolution would give us the same gain 2 years delayed.

As an architect, I'm helping provide the best 11 follow-on machine that is similar to an 11 so that a user recognizes it as such.

As a business person, I'm terrified at the amount we'll spend in getting a 3rd machine to support beyond 10 and 11--also the risk is enormous. The 11 software support is thin and this will further stress it.

As a user, I doubt if I'll turn in my PDP-10 account # for a a number of years. ALGOL, APL, BASIC+, COBOL, DBMS,...SIMULA plus lots of applications are most important to me and I don't see 8-bits versus 9-bits, or any OP-code at all except a language's. We're dead if I'm anywhere near a typical user who just wants to get work done and not bit hack.

As head of development, I see 4 years of sheer hell ahead for us all, and I expect super-human support.

GB:mjk

D I G I T A L INTEROFFICE MEMORANDUM

C1586

SUBJ: DG IN BUSINESS

DATE: 07-30-75
FROM: GORDON BELL
EX: 2236
MS: ML12-1/A51

TO: FILE

To: Irwin Jacobs, Larry Portner

CC: MC, OOD, John Fisher

We're getting strong signals that DG is:

1. Becoming aggressive in business market place--they have RPG.

2. Working on a full COBOL.

3. Working on a PL/1.

4. Working on a database language.

Do we have right strategy vis a vis our home brew languages: DIBOL, BASIC, and minimal COBOL?

GB:mjk

7/28/75

COMMENTARY ON YELLOW BOOK

C1589

From: G. Bell

In order to make the Yellow Book more meaningful, I would like to emphasize the quarterly ones with EVERYONE reportings. In readings the report, I've commented on various pages, and if you have comments to me or ideas, please feed them back to the author.

BUDGET: We were only .6% ($172k) over budget. Good work in spending control.

PROJECT SCHEDULES: The budget control and poor time estimates, caused poor performance in meeting schedules. However, more major products are going into production this year than ever before, coming up from last year's low. The performance of projects reported on the calender and sections 6 and 7:

MONTHS LATE
(CUM %)

Project Group	?	-1	0	1	2	3	4-6	7-9	10-12	>12
Calender	2	1 (3)	6 (24)	3 (34)	3 (44)	4 (58)	2 (65)	4 (79)	1 (84)	5 (100)
Sect. 6 (Hrdw.)	103	2 (7)	11 (45)	1 (48)	6 (69)	5 (86)	4 (100)			
Sect. 7 (Sftw.)	40		18 (46)	1 (49)	8 (69)	3 (77)	6 (92)	2 (97)	1 (100)	

Note, the disparity of reportings in the 3 areas (unless the calender is atypical). While I am happy that we are getting the products done, the fact that half of them are about a quarter late, with some going beyond a year, sure must cause product and product line managers a lot of grief.

Section 6 and 7 charts designed to glean summary information are really awful (with a few exceptions). We started out with a form for everybody that would allow others (including me) to find out what the status of the project and budgets were. The budget numbers are continually revised upwards to reflect the newly required funds to complete, and the completion dates are mostly non existent. The most important goal: cost is missing in nearly all cases! On the next quarterly Yellow Book, I would like to get this straightened out so all can see what's going on in a project against its initial commitments.

In general, our culture is really forgiving of project slippage and budget overrun...given that we get the product and it is a good product. It even ignores cost goal misses. A late, uncompetitive product is unacceptable. I don't want to change the way we schedule, because it is optimistic, but I do want us to understand and track it.

I don't know who's responsible here, but the pink book manufacturing costs are generally abysmal. There is negative learning in some areas (e.g., RS04) and only 5% in others. We really should flush many of these products. Hopefully, this is due to recession and not working at full capacity (and full urgency). Core is especially serious; and its demise is hastened. Especially since innovation as in 32K is so long in coming.

We have, however, moved into higher volumes for terminals (LA and VT) with 90% and a committed 85% (how's it actually?) learning. Now, if we can work the pricing, we might make some money.

Some projects are of concern to me:

1. RK06--I believe we're all available to help here. What is needed? This is a serious problem as it is pivotal to all systems. The controller cost, maintainability, and MASSBUS interface problem should be cranked into plans.

2. Serial bus versus LSI-11 bus--Wouldn't we be better off using this instead of going to another computer bus for all our low speed peripherals.

3. VAX--SEE Delasi/Bell reports.

4. Use of both special MOS computers (INTEL 8080, Motorola 6800, etc.) and support of microprogrammed controllers. Lorrin Gale to focus direction.

5. General architecture of more intelligent controllers--who to focus (see also 4)?

6. Terminals--a plethora of really difficult problems--smart versus dumb; multidrop and block mode of what flavor; how do we support in software--especially smarter (non-programmable) kind?

7. LSI-11--BUS, phase-in to standard systems, use in packaged systems, and unacceptable ROI. Since we feel it is a good product this should be easy to solve. Also note we really learned much about semiconductors (probably more than we wanted to).

8. Worcester--Now that it got into our budget, can we get a plan?

9. CAD/IDEA/pc Layout--I'm frightened enough to totally trust the developers. All I hear about our service areas are the bad stories. Better measures are needed. The groups being served are so intimidated (their service could get worse) they won't talk.

10. VT5X-6X. Much misunderstanding about market with my colleagues (and PL's). Hopefully the sales take off and we won't have to know why.

11. Multitude of Operating Systems--With VAX, thin support will get thinner.

digital

24 July 1975

Drs. Samuel H. Fuller & Daniel P. Siewiorek
Department of Computer Science
Carnegie-Mellon University
Pittsburgh, PA 15213

Dear Drs. Fuller and Siewiorek:

The decision to continue DEC support of the Multi-Micro-Computer Project to its second stage (30 module configuration) will depend on a joint review of the project by CMU and DEC following the demonstration of the 10 module configuration. At that time, a new letter of agreement will specify how CMU and DEC will cooperate, although there is an understanding that if the 10 module configuration works well, both CMU and DEC are interested in developing the 30 module configuration. Details of the actual configuration will depend on a joint CMU/DEC evaluation of the initial 10 module system.

Because of the long development time, high cost and risk, discussions involving the support of the final stage of this project (100 module system) will not be started at this time.

Gordon Bell

Steve Teicher

DIGITAL EQUIPMENT CORPORATION, 146 MAIN STREET, MAYNARD, MASSACHUSETTS 01754
(617)897-5111 TWX: 710-347-0212 TELEX: 94-8457

01592

digital

July 24, 1975

Mr. N. B. Hannay, Vice President
Research and Patents
Bell Telephone Laboratories
600 Mountain Avenue
Murray Hill, New Jersey 07974

Dear Mr. Hannay:

As you may know, Bell Telephone Laboratories has installed numerous Digital Equipment Corporation (DEC) computers at its various facilities. These machines are used in research within Research and Patents, area 10. Also, we have machines in other parts of the laboratory, particularly those which eventually end up in the operating companies.

DEC's Laboratory Data Products group is responsible for developing and supporting those computer hardware and software products that are most particular to research. Recently, we have increased our personnel assigned to the laboratories to include a Laboratory Data Products (LDP) sales representative.

In order to better serve your researchers, and to aid in determining the kinds of products they need, the LDP group would like to conduct a series of seminars dealing with computer applications. Edward Kramer, Product Line Manager for the LDP group, Jack Kay, LDP sales representative, and I would like to meet briefly with you and your divisional directors (individually or as a group) in order to discuss the possible interaction.

Although I'm not as involved in products development or use as I'd like to be, I have enjoyed interaction with BTL researchers, (especially H. S. MacDonald), and I particularly value this interaction to guide our product direction. The Digital Filter is entering this area of possible application now, and I would like some interaction about possible applications as a means of pushing us harder.

DIGITAL EQUIPMENT CORPORATION, 146 MAIN STREET, MAYNARD, MASSACHUSETTS 01754
(617)897-5111 TWX: 710-347-0212 TELEX: 94-8457

To: Mr. Hannay
-2-

From: Gordon Bell
July 24, 1975

If you believe this is worthwhile, please let me know and we can set up a meeting at Murray Hill.

Sincerely yours,

DIGITAL EQUIPMENT CORPORATION

Gordon Bell

C. Gordon Bell
Vice President
Office of Development

CGB:mjk

cc: S. J. Buchsbaum
A. M. Clogston
D. Gillette
R. C. Prim
W. P. Slichter
V. M. Wolontis

Jack Kay
Ed Kramer

01594

digital

July 23, 1975

David M. Taylor
939 Washington Street
Holliston, Mass. 01746

Dear Mr. Taylor:

I got your resume. The "objectives" will be more helpful to us.

Do you have anything written which represents your skills as an analytical engineer--such as a standard, or a task force report, etc., in which you are the principal author?

Sincerely,

Gordon Bell
Vice President
Office of Development

GB:mjk

DIGITAL EQUIPMENT CORPORATION, 146 MAIN STREET, MAYNARD, MASSACHUSETTS 01754
(617)897-5111 TWX: 710-347-0212 TELEX: 94-8457

01595

D I G I T A L INTEROFFICE MEMORANDUM

SUBJ: CORPORATE AUDITORIUM

DATE: Ø7-23-75
FROM: GORDON BELL
EX: 2236
MS: ML12-1/A51

* *
TO: FILE
* *

TO: OWNER OF CORPORATE AUDITORIUM (CLASSROOM)

The tiny blackboard and screen share the same physical space, hence, can't be simultaneously used. The room is poor for televising.

There are no tables when coffee arrives (or for sales meetings coffee and doughnuts).

There is no overhead projector built in (why not?) and the audio visual group has no projectors for use, nor do the people come to work early enough to check them out for an 8:15 or 8:30 meeting. Sales Training saved us.

There is a high intensity noise source near it (cafeteria) that occasionally runs, inhibiting hearing in rear... although for us the acoustics are not too bad.

The parking facilities are good for 8:15 and 8:30 meetings since the PK3 people aren't using them; it does not help engineering morale to visit PK-3.

The tables and chairs are nice, especially the chair bottoms.. which is what we usually concentrate on.

We need a large, good conference room/auditorium in the mill.

GB:mjk

cc: Ted Johnson
John Jones
Ken Olsen
Harold Trenouth
Craig Zamzow

digital

INTEROFFICE MEMORANDUM

TO: Distribution

LOC/MAIL STOP

DATE: July 21, 1975
FROM: Gordon Bell
DEPT: 00D
EXT: 2236
LOC/MAIL STOP: ML12/A51

01596

SUBJ: PORTABLE BLISS

Now that we are building a BASIC PLUS on the 10 and 11, what's the chance of writing it in portable BLISS? I assume the 11 will be written this way, and the 10 is already written this way? Clearly, some is different (such as the run time and the system interaces), but much is the same: editor, parser, common user documentation, etc.

GB:mjk

Distribution
Norma Abel
Ron Ham
Irwin Jacobs
John Leng
Jim Mills
George Plowman
Larry Portner
Jon Singer

digital

July 21, 1975

Michael W. Rohrbach
International Marketing Services
38 Garden Road
Wellesley, Massachusetts 02181

Dear Mr. Rohrbach:

I really appreciate the effort you spent in writing down and focusing on interface problems with DEC and our various product deficiencies. I'm distributing the letter now to solicit responses in some of the problem areas you mentioned.

For the particular questions:

1. Please contact Bill Kiesewetter regarding the DEC System 10.

2. Since I too don't understand the precise structure of the Commercial Group (it's being reorganized), I suggest you start with Stan Olsen, who is Group Vice President in charge of Commercial, Communications and Typesetting Product Lines.

It's unclear specifically how we might interface better, but it probably has to be through the sales or a marketing group. For now, I believe you might contact Mort Ruderman as a next step. Again, thanks for your input.

Sincerely,

Gordon Bell

Gordon Bell
Vice President
Office of Development

GB:mjk

cc: Bill Kiesewetter
Stan Olsen
Mort Ruderman

To: Jacobs, Marcus, Portner, Schroeder, Johnson, Ruderman, Long, Long

+ Marketing
Coutter + OOD
Fisher (for KO)
Kieswater

INTERNATIONAL MARKETING SERVICES
38 GARDEN ROAD
WELLESLEY, MASSACHUSETTS 02181

01598

JUL 18 1975

7-22

July 16, 1975

This guy came to see me by mistake. Some probs are mine, but bulk seems to be Marketing/sales etc

Dr. Gordon Bell
Vice President of Engineering
Digital Equipment Corporation
146 Main St.
Maynard, MA 01754

Subject: Review of meeting with Dr. Gordon Bell and Larry Portner on July 2, 1975

Purpose:

To review observations of an outsider on how DEC looks and to relate the challenge that DEC presents in dealing with its organization. To present specific first hand and second hand information as to the difficulty of obtaining a cohesive picture of DEC's posture in the business systems area as it relates to systems above the DIBOL business system. To review in brief the position of the competition on how they are marketing and how they are addressing the same market segment.

Bus Products

Database: For the past several months, I have attempted to determine whether there is an established position on the question of database. To my frustration I have not found out if there is a position, who has made that position known, and if the position is known, how the forces are going about evaluating databases. I am aware that there are several vendors attempting to convince DEC that theirs is the best, but I have not gotten a definitive statement, such as was given in our meeting, that DEC will wait for several companies to come up with DBM's that run on the PDP 11 and let them market these along with DEC.

Cent. Eng.

Although I have little doubt that DEC can build their own DBM package, I am not at all convinced that you can afford to frustrate companies who are sincerely trying to gain your interest in their offering. You let them grind through the mill and then do not give them either an answer, opinion or a feeling as to what decisions you are making. I also feel that when companies such as Computer Corporation of America (whom I presented to DEC for their Model 204 database package and user language) spend six years developing their system before aggressively taking it to market, there might be good reason to buy a database design. This is particularly the case when such a supplier has been a long standing DEC OEM, supplies lots of software to the ARPA network, and is under contract to work in the DECOM product line development. DEC may in fact be sincerely interested. The point is that after lots of searching, I have not been led to the right person. Others with less tenacity have understandably given up.

DECom

HELP

I owe him a letter can you help? I believe he sincerely ~~likes~~ wants to work with us.

COBOL under DOS: This was the first of the projects which was to materialize into a potential market for my company. This is the activity through which I met Al Brown and Computer Power Ltd. For several months I was feeding information both ways trying to get underway a final agreement that would permit the marketing of COBOL under DOS by an independent company without the support of DEC. We were simply looking to provide COBOL to the existing DOS or one foreground, one background partition DEC processor. We even got to the point where DEC made an internal market study to make sure that DEC did not want to market that product themselves. It was our intention to resurrect the DOS/COBOL version in existence in Australia and market it in such a way that it would indeed be a subset to the RSX COBOL. The clients could later upgrade to DEC's own RSC COBOL. After working at this for over six months, the entire subject was suddenly closed off. Worse than that, Roger Allen left the States under the impression that everything had been cleared. He wrote me from Australia that all signals were go. It was only because I checked again with Al Brown that I found out that DEC Australia had turned the whole thing off. It was truly an education. Unfortunately a great deal of time and energy was spent for nothing.

As for the subject matter involved here, I believe that nothing could have been more perfect for DEC than to have an alternative to DEC's own COBOL available in the market. Since all the competition has COBOL running on systems much smaller than the minimum which will be required under RSX, I believe that there were opportunities that will now fall to competing hardware. We might also have seen systems houses who are building PDP 11 systems as RJE stations, target systems under DOS that would have later been moved up to RSX.

Operating systems versus languages: From the view presented by DEC to the general or special systems house in the commercial market, one is always left with some rather difficult alternatives. BASIC is an excellent language for use in interactive commercial systems. The problem to date is that in order to have BASIC, there has to be RSTS. However, there isn't an RSTS small enough to compete with a system programmed in BASIC on a number of competing minimainframes. COBOL is the next alternative, but there is no DOS COBOL that could be sold as a minimal system. Under RSX 11D COBOL is large enough to support at least ISAM files (if not a query language) and database. DEC's smaller system coming in at the lower end of the market using DIBOL requires a re-education of the prospect. The systems house working with DEC's DIBOL cannot compete (nor even survive) against a month-to-month rental RPG system that has the same application already bundled into the monthly rent. Therefore, a systems house has to have a very versatile set of personnel merely to cover the offering DEC has in the product line.

From a DEC corporate point of view, each marketing group has its own axe to grind and, therefore, little unification can be anticipated. I found this reflected in the attitude that headquarter people working with RSTS care little about COBOL and those in "business systems" are not at all sympathetic to things like BASIC for the commercial client.

Sales

Worse yet, the potential client is faced with different sales people covering different interests. When the systems house takes along a DEC sales person, it is never certain what will finally come out of the conversation. You might pick the salesman you think is the right one and find that in the middle of the conversation, he will say something like "COBOL is for universities".

M.C

Competition by DEC: A specific situation was brought to my attention in the retail trade. A systems organization has developed and has installed a number of DEC PDP 11's in this market segment. In calling on one major account, they now find that DEC is competing with them. The group competing against them is the DECOM group which is trying to show that they are able to do the whole thing including the retail application. The systems house has both the communication and the application all worked out and their system has been in operation for three years.

Maybe worse than that was the fact that DEC came to this same systems house to look at some special software and hardware interfaces that were built to handle asynchronous signals on synchronous channels. After the visit, DEC never came back with so much as an answer as to what they thought or what the interest was.

In a local case, a systems house had gotten to the point of defining a working system which the client considered acceptable. This system was to be written in BASIC. The client asked the systems house to call in a number of hardware vendors to make a bid on the hardware. Instruction had been given to the hardware vendor as to what system had been specified. DEC responded by bringing in another system house with a proposal for DIBOL. Admittedly they were not given much of a chance to present their case, since they were way off base. It did destroy the opportunity to have DEC as a vendor with this client.

Larry Tobe

Sell "FUTURES": There is not a question in my mind that DEC had a great deal more to offer to the commercial market than its major competitor. By merely advertising more and giving lip service to INFOS, for instance, DG has placed itself out front in getting leads from the systems houses. Technical people are turned on by it. Whatever the reason, the lack of a

Are we in more trouble than we think?

stated position with regard to a complete system in the mid-range between DIBOL and the DEC 10 is hurting DEC. Thus, DEC may not get a chance to retrain these system organizations later on to recommend DEC, even when the direction DEC wishes to take is finally made public.

Application package: In a specific case there is a COBOL based application package for the Life Insurance field. The supplier of the application would like to work with DEC on making the conversion to DEC. A client has been located who does not have a machine at the present time. IBM is making a recommendation to go to an in-house 370/135. By combining the client and the software there is reason to think that the client can be won over. Where does one start working through the DEC organization to get something like this started?

Government request for bid: An opportunity exists for DEC to help write a spec for a complete system to be installed in a government facility. The person writing the spec is not an ally of IBM and is intrigued by the possibility of a large PDP 11 or small DEC 10 being specified. How would one go about securing the right person in DEC to start on that project?

Data dictionary vs. Database: Several weeks ago, I had an opportunity to present a new slant on database to DEC. The case I presented was that of offering a data dictionary facility first, so that DEC might buy time to work on resolving the question of database. Admittedly this would not only be a delaying tactic, but would make DEC unique in offering the most logical approach to database. Despite the fact that I took two months to set up a presentation, I asked myself why I had bothered. I presented a product and many reasons why we have had such success with it. I believe it was a compelling story as did a member of your Corporate Information Systems staff. Unfortunately it got nowhere. As it turns out, even Corporate Information Systems would like to have this facility for in-house use, and even they don't know how to get the project started.

And yet, when all is said and done, the "IRON" is shipping out and that does help pay for all of this. It is gratifying to hear from long-time DEC users that the "IRON" works well. It works so well that in a recent system bidding, we proposed an 8A and suggested to the client not to buy the maintenance contract. We suggested taking a couple of extra boards instead. Although this is less possible in the electromechanical units, it does demonstrate how well things do work out there. Your ability to provide service in almost as many places as IBM certainly is a major factor in why larger and stronger systems houses do prefer to go with DEC.

What I have highlighted in these notes may just point out to you that

your policies are indeed being carried out. If that is not the case, I would like to have the opportunity to review some of these items with Mr. Olson or others you may suggest so that they may have more complete background information. I would be most intrigued with the idea of working with DEC on some of these items in either a consulting role or as a contractor with the support of DEC. Since I spend most of my time selling software and systems to the commercial marketplace occupied by IBM, there are a number of strong opportunities into which I would like to draw DEC. I would, however, like to know that I can count on complete support before embarking on any of these projects.

Please let me know how I should proceed. For your information, I have also enclosed a brief write-up on the activities of my company should that be necessary as introductory material to those whom I might meet.

Very truly yours,

Michael W. Rohrbach

MWR:sj
Encl

01603

digital

July 21, 1975

Mr. Eric Marshall
Marshall Design International Ltd.
Haughdell House
Park Road
Banstead, Surrey, SM7 3EL
England

Dear Mr. Marshall:

Mr. Olsen asked me to respond to your request to visit DEC. You're welcome to talk with our people directly regarding possible consultation. However, we buy very little or no outside consulting in this area, and currently no consultation in the U.K., although we manufacture in Ireland. Our European design and engineering effort is special systems and programming.

I've given your letter to Dick Schneider and Dave Nevela, who have much of the design responsibility for our products.

Sincerely,

Gordon Bell

Gordon Bell
Vice President
Office of Development

GB:mjk

cc: Dave Nevela
Ken Olsen
Dick Schneider

letter ~~out~~ to
Dick Schneider ~~who~~ ~~or~~ and Dave Nevela who
~~when you for any del~~
have much of the design responsibility for our products.

Emily cc Ken, Nevela, Schneider

JUL 11 1975

C1604

JUL 18 1975
K-177

Marshall Design International Ltd. *Haughdell House, Park Rd, Banstead, Surrey, SM7 3EL Tel Burgh Heath 58091*

Kenneth H. Olsen, Esq.,
Chief Executive,
Digital Equipment Corporation,
146 Main Street,
Maynard,
Maryland, 01754, U.S.A.

1st July, 1975.

~~Also~~, and currently no consultation in the U.K. although we manufacture in Ireland.

Do you want to respond — No → G. Bell

Our European design and engineering effort is special systems and programming

Dear Mr. Marshall — Yours welcome to talk with our people, directly, regarding possible

Dear Mr. Olsen,

I would like to introduce to you my Company - Marshall Design International Limited - one of Europe's largest and most successful design organisations.

We specialise in the styling of consumer and industrial products and we have earned our reputation by designing for such major Companies as I. T. T., Hoover, Philips, Black & Decker, Plessey, Shellmex & B. P., Thorn Electrical Industries and Citroen.

Some people may argue against new designs or new products during the present business recession. We disagree totally - now is the time to plan new products, redesign existing lines - be ready to increase your profits, expand your market share as soon as the economy picks up - as it will.

I shall be touring the U.S. during the next few months and would welcome a meeting with you.

Yours sincerely,

Eric Marshall

ERIC MARSHALL

Mr. Olsen asked me to respond to your request to ~~invitation to~~ visit DEC.

C1605

digital

July 21, 1975

Dr. Michael J. McKeown
Chairman, Computer Development Committee
North Bend Medical Center, Inc.
1920 McPherson Avenue
North Bend, Oregon 97459

Dear Dr. McKeown:

I'm not in charge of this area of the company, which develops and markets products into the medical profession.

Since it is unclear to me just which group would develop and/or market such a system, I have turned the material over to Mr. William Thompson, Secretary of the Marketing Committee. Our Marketing Committee consists of four senior vice presidents, responsible for the development and marketing of special applications; and they can decide the next step.

The proposal looks interesting, and I'm glad you're considering DEC.

Sincerely,

Gordon Bell

Gordon Bell
Vice President
Office of Development

GB:mjk

cc: Bill Thompson (+ material)
MC

DIGITAL EQUIPMENT CORPORATION, 146 MAIN STREET, MAYNARD, MASSACHUSETTS 01754
(617)897-5111 TWX: 710-347-0212 TELEX: 94-8457

North Bend Medical Center, Inc.

General Medicine
CARL U. ALBERTSON, M.D.
ROBERT CHIAPUZIO, M.D. P.C.
WILLIAM W. COX, M.D. P.C.
ENNIS KEIZER, M.D.
CHARLES M. LINDSAY, M.D.
ELMO W. PETERSON, M.D.
GAYLE R. WILSON, M.D.

Surgery
PHILIP J. KEIZER, M.D.
WILLIAM H. MASSEY, M.D.

Physicians and Surgeons
1920 McPHERSON AVENUE
NORTH BEND, OREGON 97459
(503) 756-4171

Internal Medicine
RICHARD L. WEST, M.D.
DAVID R. WHITE, M.D.
DAVID E. OELKE, M.D.
PHYLLIS J. BROWN, M.D.

Pediatrics
WILLIAM P. KEAN, M.D.
JAMES F. MEANS, M.D.

Obstetrics and Gynecology
MICHAEL J. McKEOWN, M.D. P.C.
RALPH E. WHITING, M.D.

Administrative Manager
GARY L. MILLER

JUL 18 1975
7-19

July 14, 1975

Gordon Bell, Ph.D.
Vice President, Office of Development
Digital Equipment Corporation
146 Main Street
Maynard, Massachusetts 01754

Dear Doctor Bell:

We are asking you to consider a proposal for an automated business management system for medical clinics. The increasing complexity of this business will soon require such tools to run efficiently. Dr. George Wied of the University of Chicago has reviewed this proposal and suggested we write to you.

We have developed these specifications after considerable study. The current version utilized the resources of Boeing Computer Systems for publication.

We believe there are three unique management tools in this system which will give it increasing usefulness in the medical clinic business.

First, it enables the patient to have an accurate, up to the minute bill and statement of account at the end of any patient encounter/visit. Our experience with a manual approach to this concept supports our belief that this significantly increases immediate collection percentage and decreases age of accounts receivable. A group our size can thereby realize a significant improvement in cash position. Automation of this concept makes it even more cost effective.

Second, the detailed management information available facilitates timely management decisions. Negotiations with third party payers can be much more productive for the medical clinic if its management has the supporting statistics that our proposed system produces about billing and receipts on accounts. Effective negotiations in this area are becoming a matter of economic survival for medical clinics.

Third, the payment allocation system allows a unique distribution of income such that individual doctor income is clearly

identifiable. This allows a cooperative corporation approach to the business with individual doctors utilizing professional corporations, HR 10 plans, etc. This conglomeration of individual retirement plans and not one unified plan with all employees covered has significant tax and estate planning advantages which are of increasing interest to more sophisticated group medical practices.

We realize that some details of this specification are unique to North Bend Medical Center, Inc., but we would consider more generally applicable procedures if the costs of development were to be shared.

Thank you for considering this proposal. We would hope that cooperative development of a business system would be possible.

Cordially,

M. J. McKeown, M.D.

Michael J. McKeown, M.D.
Chairman, Computer Development Committee

MJM mks
encl

C1606

CURRICULUM VITAE

Michael J. McKeown, M.D.

SOCIAL SECURITY NO.:	544-40-6953
DATE OF BIRTH:	December 13, 1935
PLACE OF BIRTH:	Portland, Oregon
CITIZENSHIP:	American
EARLY SCHOOLING:	Coos Bay, Oregon, Marshfield Senior High School, 1950-1954
COLLEGES AND DEGREES:	Dartmouth College, 1958 - B.A. Harvard Medical School, 1961 - M.D. Diplomate American Board of Obstetrics & Gynecology, 1969

PRESENT POSITIONS:

Assistant Clinical Professor of Obstetrics and Gynecology, University of Oregon Medical School.

Clinical Professor of Biomedical Technology, Southwestern Oregon Community College.

PREVIOUS POSITIONS:

Intern, The University of Chicago Clinics and Hospitals, 1961-1962.

United States Navy Medical Corps, 1962-1964.

Resident, the Chicago Lying-in Hospital, 1964-1967.

Teaching Assistant in Mathematical Biology, 320, 321, The University of Chicago, October, 1966.

Chief Resident and Instructor, Department of Obstetrics and Gynecology, The University of Chicago School of Medicine, 1967-1968.

Instructor in the Department of Obstetrics and Gynecology of the Pritzker School of Medicine of The University of Chicago, July 1, 1968 to April 1, 1970.

Consultant, Obstetrics & Gynecology, Chicago Board of Health, 1970-1972.

Assistant Professor in the Department of Obstetrics and Gynecology of the Pritzker School of Medicine of The University of Chicago, April 1, 1970 to July 1, 1972.

SOCIETIES:

Fellow of the American College of Obstetrics and Gynecology

Fellow of the American College of Surgeons

American Fertility Society

American Public Health Association

The Institute of Electrical and Electronics Engineers, Inc.

Association for Computing Machines, Inc.

American Statistical Association

Association for the Advancement of Medical Instrumentation

American Institute for Ultrasound in Medicine

Society for Computers in Medicine

American Association for the Advancement of Science

New York Academy of Sciences

American Federation for Clinical Research

International Scientific Society

Association for Health Records

Fellow of the Royal Society of Health

Royal Society of Medicine

National Association for State Information Systems

American Academy of Political and Social Sciences

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2. McKeown, M. J., Burks, J. L.: MESENTERIC CYSTS: A Diagnostic Conundrum. Northwest Medicine 65:748, 1966.

3. Davis, M. E., McKeown, M. J.: The Management of Fetal Distress. Obst. and Gynec. Survey 22:549, 1967.

4. McKeown, M. J., Hesseltine, H. C.: VULVAL CARCINOMA: Philosophy of Treatment. Postgrad Med. 41:204, 1967.

5. McKeown, M. J., Bush, R., and Domizi, D.: A Computer System for the Monitoring of Intensive Care Obstetric Patients. Lying-in J. Reprod. Med. 1.275, 1968.

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7. Burks, J. L., Bush, R., and McKeown, M. J.: A Computer Based Obstetric Information System. Lying-in J. Reprod. Med., August, 1969.

BOOKS:

1. Hamilton, Jr., L.A., McKeown, M. J.: Biochemical and Electronic Monitoring of the Fetus. Obstetrics and Gynecology Annual, 1973, Appleton Century Crofts, pp. 105-166.

PROCEEDINGS:

1. Bush, R., Domizi, D., Lee, R., and McKeown, M. J.: THE PDP-8/I AS A SATELLITE COMPUTER FOR BIO-MEDICAL APPLICATIONS (Systems Software). DECUS Fall Symposium, 1968.

2. McKeown, M. J., Domizi, D. B.: Computer Enhancement of Obstetric Intensive Care. San Diego, California, San Diego Biomedical Symposium, April, 1970.

3. McKeown, M. J., Domizi, D.: The Intelligent Obstetric Monitoring System. Society for Gynecologic Investigation, March, 1972.

4. Kneler, E., McKeown, M. J.: Experience with Computerized Predictive Scoring of High Risk Obstetric Patients. Society for Gynecologic Investigation, March, 1972.

5. McKeown, M. J., Schorum, S.: A Revolutionary Technique for Ultrasound Imaging. Society for Gynecologic Investigation, March, 1972.

6. McKeown, M.J.: A New Technique of Ultrasound Imaging. American Federation for Clinical Research, May, 1972.

F/V

01609

digital

INTEROFFICE MEMORANDUM

LOC/MAIL STOP

TO: Dave Nelson
Grant Saviers

DATE: July 21, 1975
FROM: Gordon Bell
DEPT: 00D
EXT: 2236
LOC/MAIL STOP: ML12/A51

SUBJ: I/O

You guys were going to meet and discuss I/O channels, I/O processors and I/O computers. What's happening? Dave, you were going to propose a uniform message-oriented interface for VAX.

Our disk controllers are sadly lacking in technology/capability/ etc. Please send me a simple (understandable) version of RK06 controller for comment and starting point.

GB:mjk

C1610

digital

INTEROFFICE MEMORANDUM

TO: Ron Brender LOC/MAIL STOP

DATE: July 21, 1975
FROM: Gordon Bell
DEPT: 00D
EXT: 2236
LOC/MAIL STOP: ML12/A51

SUBJ:

Why isn't the WCS assembler written in BLISS? Don't you have many of utilities, interfaces, etc. from FORTRAN?

01611

digital

INTEROFFICE MEMORANDUM

LOC/MAIL STOP

TO: Dave Cutler
Ed Fauvre
Roger Gourd

CC: Larry Portner

DATE: July 21, 1975
FROM: Gordon Bell
DEPT: OOD
EXT: 2236
LOC/MAIL STOP: ML12/A51

SUBJ: MACRO-VAX

Do I correctly assume that the new MACRO-VAX will be written in BLISS?

```
SMERGE(#447);
        EXECUTE(XTEQLOP     ,SYS156,USR131,USR222);
        EXECUTE(XTEQLOP     ,SYS212,USR131,USR223);
        EXECUTE(XTOROP      ,SYS144,SYS156,SYS212);
BRANCH(SYS144,PLIT(#450,#453));
SETLABEL(#453);
        EXECUTE(XTCALLOP    ,USR173,USR173,NIL);
        EXECUTE(XTMOVEOP    ,USR040,USR104,NIL);
        EXECUTE(XTCALLOP    ,USR142,USR142,NIL);
        EXECUTE(XTMOVEOP    ,USR105,USR041,NIL);
DIVERGE(PLIT(#463,#464,#465,#466));
SETLABEL(#463);
        EXECUTE(XTMOVEOP    ,USR023,USR165,NIL);
JOIN(#462);
SETLABEL(#464);
        EXECUTE(XTMOVEOP    ,USR031,USR165,NIL);
JOIN(#462);
SETLABEL(#465);
        EXECUTE(XTCALLOP    ,USR175,USR175,NIL);
JOIN(#462);
SETLABEL(#466);
        EXECUTE(XTCALLOP    ,USR202,USR202,NIL);
PMERGE(#462);
SMERGE(#450);
        EXECUTE(XTNOOP      ,USR221,NIL,NIL);
JOIN(#363);
SMERGE(#467);
        EXECUTE(XTEQLOP     ,SYS156,USR131,USR225);
        EXECUTE(XTEQLOP     ,SYS212,USR131,USR226);
        EXECUTE(XTOROP      ,SYS144,SYS156,SYS212);
BRANCH(SYS144,PLIT(#470,#473));
SETLABEL(#473);
        EXECUTE(XTCALLOP    ,USR173,USR173,NIL);
        EXECUTE(XTMOVEOP    ,USR040,USR104,NIL);
        EXECUTE(XTCALLOP    ,USR142,USR142,NIL);
        EXECUTE(XTADDOP     ,USR105,USR041,USR023);
        EXECUTE(XTANDOP     ,SYS144,USR106,USR157);
        EXECUTE(XTRSHFT00P  ,SYS144,SYS144,USR160);
BRANCH(SYS144,PLIT(#505,#517));
SETLABEL(#505);
DIVERGE(PLIT(#507,#513));
SETLABEL(#507);
        EXECUTE(XTANDOP     ,SYS144,USR105,USR201);
        EXECUTE(XTEQLOP     ,SYS156,SYS144,USR165);
        EXECUTE(XTEQLOP     ,SYS212,USR023,USR154);
        EXECUTE(XTANDOP     ,SYS144,SYS156,SYS212);
BRANCH(SYS144,PLIT(#511,#512));
SETLABEL(#511);
        EXECUTE(XTMOVEOP    ,USR023,USR154,NIL);
JOIN(#510);
SETLABEL(#512);
        EXECUTE(XTMOVEOP    ,USR023,USR165,NIL);
SMERGE(#510);
JOIN(#506);
SETLABEL(#513);
        EXECUTE(XTANDOP     ,SYS144,USR105,USR201);
        EXECUTE(XTEQLOP     ,SYS156,SYS144,USR157);
        EXECUTE(XTEQLOP     ,SYS212,USR023,USR154);
        EXECUTE(XTANDOP     ,SYS144,SYS156,SYS212);
BRANCH(SYS144,PLIT(#515,#516));
SETLABEL(#515);
        EXECUTE(XTMOVEOP    ,USR031,USR165,NIL);
JOIN(#514);
```

Copy to: Don, Mimi, Andy re our discussion & file

19 July 1975

01612

gB.

Museum Exhibits

Probably ~~first~~ priority for Marlboro

2. ~~I~~. Human interface i/o - non-putty light pens, guns, mouse, tablet, 3 d scopes, etc. Whirlwind display, TX-0, Type 30, 338, VT 05/50 GT 40 and friends, colour displays (including first colour on PDP-1). also lights and switches from Whirlwind.

1. ~~Typewriters~~ or Human (paper) driven i/o. Typewriters coming from a marriage of telegrah and typewriters: Telegraphy key plus old Teletypes (Model 14,28, and 35 and 40) Flexowriter of Whirlwind, IBM-Soroban modified for PDP-1, IA 30, 36 and 37. Also some old typewriters such as my Underwood and Pasarellows

3. Memory: ~~I~~ primary type or Williams tube from ILLIAC I; Whirlwind core; Ferro from Atlas; Delay line from Deuce; Core stack from PDP-1? or so showing stack, and the planar core. the ~~1K~~ and 4k chips and ~~or~~ microphotsos of these.

1K — can do now.

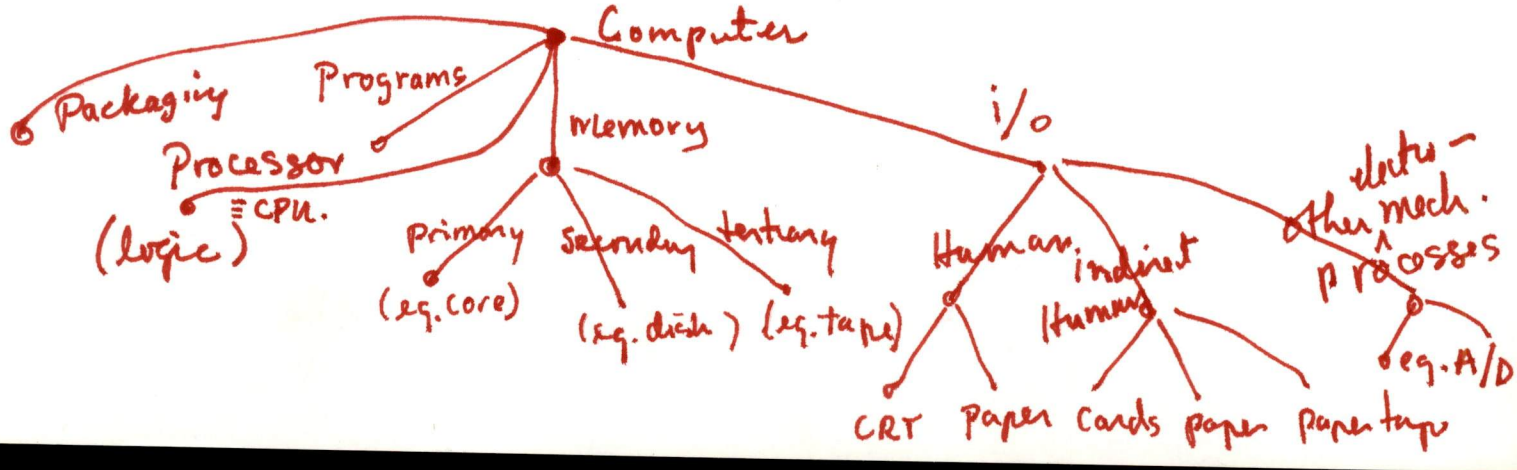
4. Indirect i/o (ie humand to something to computer). Cards, paper tape, and ~~I~~ line printers, and plotters.

5. Secondary memories: Whirlwind drum and tape. others and our later ones.

6. Logic---I have all of this now. in Mill exhibit, but enough for a Marlboro one. Shows 4 generations

7, Computers-- it is stored in mill now. PDP-1, 4, etc. ...LSI-11

8. Any i/o to other processes: eg. note DEC had first UART to telegraph line, A/D/A converters, shaft position encoders, solenoids,



01613

digital

INTEROFFICE MEMORANDUM

LOC/MAIL STOP

TO: Larry Portner

CC: Irwin Jacobs
John Leng

DATE: July 21, 1975
FROM: Gordon Bell
DEPT: 00D
EXT: 2236
LOC/MAIL STOP: ML12/A51

SUBJ: DBMS ON THE 11

Since you are the Product Manager, Manager, and I don't know who to write to let me pass this suggestion along from Jake: let's just move DBMS over from the 10. The neat thing: the specifications, manual, etc., are already given, along with some knowledge about the implementation, which should save us a year or two of timesharing.

Note also, the part that is done in BLISS may even be transportable. We would have compatible products, and a really nifty system which would permit the DBMS part to reside in a single 11, given a network.

GB:mjk

C1614

D I G I T A L INTEROFFICE MEMORANDUM

SUBJ: PDP-11 REFERENCE MANUAL

DATE: 07-17-75
FROM: GORDON BELL
EX: 2236
MS: ML12-1/A51

* *

TO: FILE

* *

SUBJ: AVAILABILITY OF BILL ENGLISH (AUTHOR OF 10 REFERENCE AND MAINTENANCE MANUALS AND DG MANUALS)

To: Distribution

How about a really good PDP-11 Reference Manual? Don't we really need one? He's currently working for Savell on some IPG stuff.

Anyone want to talk with him?

He performs well to schedules and with fixed price (assuming there is a penalty clause).

GB:mjk

Distribution

Janice Carnes
Dick Clayton
Bruce Delagi
Bill Demmer
Steve Teicher
Mike Tomasic

cc: Bob Savell

01615

digital

INTEROFFICE MEMORANDUM

LOC/MAIL STOP

TO: Distribution

DATE: July 14, 1975
FROM: Gordon Bell GB
DEPT: OOD
EXT: 2236
LOC/MAIL STOP: ML12/A51

SUBJ: HODGE & TAYLOR--CONSULTANTS

These guys keep calling me about consulting for us. They used to work at GA. They have the attached ECL design which they'll describe for 2K and give design documents for $10K to evaluate for manufacturing. (Rights are ?$.)

They have sold rights to this design--which they say can be manufactured for $200, CA and/or GA and Interdata. They say that Interdata is impressed that it can do the 7/16 in the same time.

They've consulted widely throughout the mini industry with everyone except DG and HP, thus I don't want to educate them. Also they say they're behind the Fortran speed-ups of Varian.

The interesting thing, they claim the ECL microprocessor can be built in one chip.

GB:mjk

Distribution
Bob Armstrong
Dick Clayton
Bill Demmer
Chuck Kaman
Steve Rothman
Steve Teicher

What do you think? Should someone drop by to talk with them?

Copy to Demmer, Delagi, Teicher, Tomlinson, Roman, Clayton,

Winston W. Hodge, Lawrence E. Taylor, & Associates

CONSULTANTS TO MANAGEMENT C1616

Minicomputer & Microprocessor Design
Computer & Communication Systems Design
Program Management
Market Analysis & Planning
High Technology Business Planning

Winston W. Hodge
2603 Hillcrest Avenue
Orange, California 92667

Lawrence E. Taylor
18612 Minuet Lane
Anaheim, California 92807

April 1, 1975

APR 04 1975

Shall we invite in OK, OK — for review? Sure, why not?

Gordon

Chuck

It's worth a day. (I hope!)

APR 11 1975

To: Gordon Bell
Vice President, Engineering
Digital Equipment Corporation
146 Main
Maynard, Massachusetts 01754

From: Win Hodge (714) 637-6556

Subject: Follow-up On 56 I.C. Emulator With No LSI

Reference: March 12, 1975 Correspondence

Dear Gordon:

Attached is a brief product summary of our emulator, as described in our referenced correspondence to you.

We are experiencing interest on this coast from two mini-computer houses, as evidenced by the fact that we are under contract to make preliminary disclosure and do a partial micro-coding of two target processors.

We have, however, retained the ownership of our emulator so that we may present it elsewhere, maintaining only applications micro-code and special interfaces as confidential and proprietary to these customers.

If your interest continues, we would still be most anxious to have a June-July-August technical summer engagement with you.

Sincerely,

Win Hodge

W. Hodge

Attachment

HODGE, TAYLOR, & ASSOCIATES LOW COST EMULATOR

Summary of Features:

General Registers - Dual-ported. 64 registers, expandable to 256

Register Addressing Modes - Implicit, explicit, stack

Control Store - 64 words by 24 bits, expandable to 16K X 24

Micro-instruction Cycle Time - 60 ns.

Simultaneous Control Functions Per Micro-instruction - 1 to 20

Number of I. C.'s - 56

Estimated Shop Cost - Under $250

CPU's That Can Be Emulated:

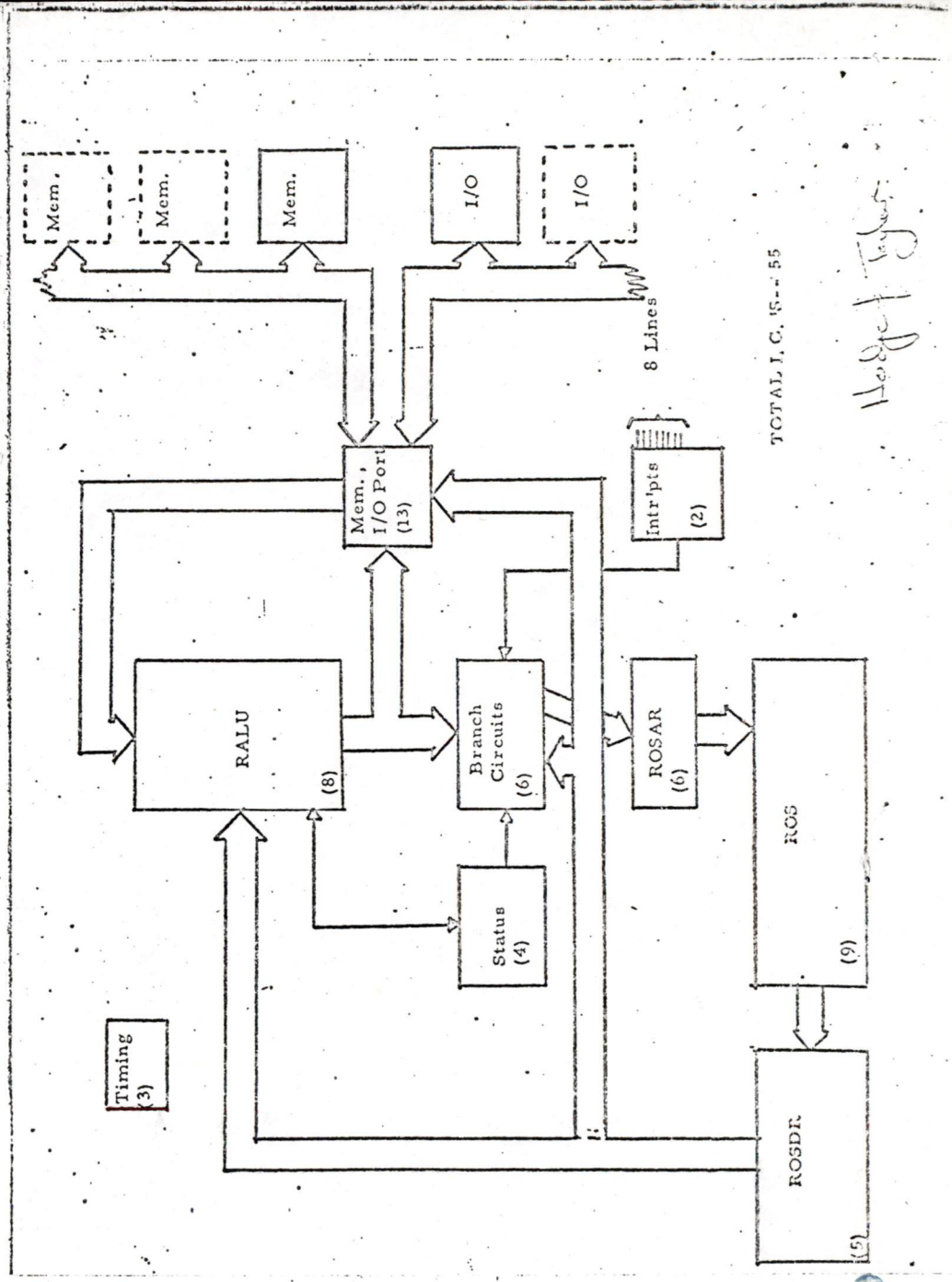
DEC	PDP-11	MICRODATA	800/1600
DEC	PDP-8	HP	2100
GA	SPC-16	IBM	System/3
INTERDATA	7/16	IBM	System/32
DG	Nova 2	IBM	System 360's (low end)
VDM	620-i	IBM	System 370's (low end)

Peripheral Controllers That Can Be Emulated:

Magnetic Tape
Fixed Head Disks
Moving Head Disks
Floppy Disks
Plotters
Card Readers and Punches
Tape Readers and Punches
High Speed Line Printers
CRT Terminals
Communications Controllers and Multiplexor

Computer Interfaces:

Most Popular Mini-computers
IBM 360/370 Channels



01618

digital

INTEROFFICE MEMORANDUM

LOC/MAIL STOP

TO: Jim Bell
OOD
Finance Committee

CC: John Fisher, Ken Olsen

DATE: July 14, 1975
FROM: Gordon Bell
DEPT: OOD
EXT: 2236
LOC/MAIL STOP: ML12/A51

SUBJ: HONORARIA--ATTACHED POLICY

The OOD is in the process of approving the following policy having to do with honoraria for talks. I just got a note from Ed Schwartz requesting officers and employees to list boards they're on, which presumably is covered in a policy somewhere.

Last year, I billed CMU for visiting and consulting CMU at $2,000 for joint DEC-CMU, CMU, and some profession-related projects. This year I made four trips and spent a total of approximately one hundred hours (2% of my professional time), much of which was on the phone and computer via the network. My intent was to turn this money over to DEC.

The problem: is my CMU affiliation like honoraria or a board fee? Are board fees turned over to the company?

There are clear cases where DEC doesn't get reimbursed, e.g., teaching classes after hours. Can F&A establish guidelines for everybody and rule on this by issuing the attached policy on some revised, appropriate form?

GB:mjk

Attachment

digital JUL 1 1975 INTEROFFICE MEMORANDUM

TO. Gordon Bell LOC/MAIL STOP ML12/A51

DATE. July 9, 1975
FROM. Jim Bell
DEPT. R & D Group
EXT. 2764
LOC/MAIL STOP. ML3-4/E41

SUBJ. Honoraria

Attached is the revised draft of the policy on Honoraria. Since there are still some open issues I will wait until I hear from you before proceeding further.

As we discussed on the phone the key open issues are:

1) should honoraria disbursements be centralized for better record keeping and control?

2) should incoming honoraria always be accepted, even from non-profit institutions, thereby serving

   a) as a control on the number of invitations,

   b) as a small source of income for the company, and

   c) as a counter balance to outgoing honoraria?

3) how do we distinguish between talks which DEC people give on their own (evenings, weekends, vacation days) and those talks given by DEC people as representatives of DEC.

JB/cw

digital INTEROFFICE MEMORANDUM

TO. Hardware Engineering Managers LOC/MAIL STOP
Software Engineering Managers

DATE. June 27, 1975
FROM. Jim Bell/Gordon Bell
DEPT. R & D Group
EXT. 2764
LOC/MAIL STOP. ML3-4/E41

SUBJ. Policy--Honoraria for Invited Speakers to Engineering Seminars

Background: The academic community has the custom of providing honoraria for invited talks when faculty members speak at other institutions.

DEC employees are offered honoraria for giving talks and participating in conferences at non-profit institutions, the government, and other companies.

Purpose: To establish a uniform policy within DEC with regard to giving and accepting honoraria.

Policy:

1) When a university faculty member is invited to give a seminar at DEC, it shall be customary to provide an honorarium in addition to expenses. The size of the standard honorarium shall be set by the Vice-President of Engineering; it is currently set at a maximum of $150.00, the exact amount to be based on the time and effort involved, and set by the person who issues the invitation.

2) When a DEC employee is offered an honorarium, the employee shall (a) decline it when offered by a university or other non-profit institution and (b) accept it on behalf of DEC otherwise.

3) The responsibility for enforcing this policy, providing outgoing honoraria, and accepting incoming honoraria shall rest with each cost center manager.

JB/GB/cw

READY FOR INPUT
MMC1 RDGB

01620

TO: GEOFF FINCH SALES SUPPORT DEPT READING ENGLAND

FROM: GORDON BELL ML12-1 A51

1. YES - THOUGH NOT STRICTLY AN ARRAY PROCESSOR, BUT A MULTIPROCESSOR.

2. YES, PROF. WULF, 412-612-2600, CMU, COMPUTER SCIENCE DEPT.,
   PITTSBURGH, PA. 15213.

MESSAGE ACCEPTED 00526 0959 01-JUL
MMC1 RDGB

READY FOR INPUT

TIMEOUD

01621

0016 1141 27-JUN 35410 1111 27-JUN
RDGB MR11

JUN 30 1975

JUN 27 11 44 AM '75

27TH JUNE 1975 REA/MB 7MAY
TWX NO 0071

127

TO: GORDON BELL ~~MARLBORO~~ A.51
FM: GEOFF FINCH SALES SUPPORT DEPT – Reading-Eng.

FRANK BOOTY OF 'COMPUTER WEEKLY' IS WRITING AN ARTICLE ON ASSOCIATIVE OR ARRAY PROCESSING. HE HAS THE FOLLOWING QUESTIONS:-

1. DOES CARNIGEY MELLON UNIVERSITY, ARRAY PROCESSING PROJECT USE PDP11'S?

2. IF SO, (AND IT WOULD BE IN DEC'S INTEREST) CAN HE HAVE NAME AND ADDRESS AND PHONE NUMBER OF CONTACT THERE?

To:

1. Yes – though not strictly an array processor, but a multiprocessor

2 yes, 1 Prof. Wulf, 412-621-2600, CMU, Comp. Sci Dept. Pittsburgh, PA 15213

Geoff Finch

0016 1141 27-JUN 3SA10 1111 27-JUN
RDGB MR11

27TH JUNE 1975 REA/MB TMAY
TWX NO 0071

TO: GORDON BELL MARLBORO A.SI
FM: GEOFF FINCH SALES SUPPORT DEPT

FRANK BOOTY OF 'COMPUTER WEEKLY' IS WRITING AN ARTICLE ON ASSOCIATIVE OR ARRAY PROCESSING. HE HAS THE FOLLOWING QUESTIONS:-

1. DOES CARNIGEY MELLON UNIVERSITY, ARRAY PROCESSING PROJECT USE PDP11'S?

2. IF SO, (AND IT WOULD BE IN DEC'S INTEREST) CAN HE HAVE NAME AND ADDRESS AND PHONE NUMBER OF CONTACT THERE?

READY FOR INPUT
MMC1 FORN

01622

TO: JEAN DANIEL M/NICAUD
LABORATOIRE DE CALCULATRICES DIGITALES
16, CH. DE BELLERIVE
CH-1007 LAUSANNE
TELEX 24478

FROM: GORDON BELL MAYNARD ML12-1 A51

WOULD PREFER YOU NOT CONSULT ON DISPLAY CONTROL. CONTRACT IN PROCESS.

MESSAGE ACCEPTED 06027 0900 07-JUL
MMC1 FORN

READY FOR INPUT

TIMEOY

V

CRASTRE 24478F
188 1715 ⊕
22593X DEC CH

01623

PPQR POPQ 07-JUL 06027 0900 07-JUL

MMC1 FORN

TO: JEAN DANIEL M/NICAUD
LABORATOIRE DE CALCULATRICES DIGITALES
16, CH. DE BELLERIVE
CH-1007 LAUSANNE
TELEX 24478

FROM: GORDON BELL MAYNARD ML12-1 A51

WOULD PREFER YOU NOT CONSULT ON DISPLAY CONTROL. CONTRACT IN PROCESS
.

NNNN

⊕

CRASTRE 24478F

Jul 7 12 23 PM '75

I would appreciate if you could send me more information on the Educational Centre (such things as the type of courses currently being offered, if any software development is done at the centre, etc.) and provide an indication whether or not such an UN-supported visit would be possible from DEC's standpoint.

Betty and I certainly enjoyed our evening with you when you were in Irvine in March and hope that we get to see you again soon.
All the best to Gwynn and the kids.

Sincerely,

Peter

Peter Freeman,
UN Visiting Expert,
and
Asst. Prof., University of California, Irvine

P.S. We just learned that our recommendation to the UN in New York that they buy an 11/70 for the center here was approved! So, this fellowship would be very valuable!

TO: Gordon Bell.

AUG 11 1975

01646

Copy to Brad Vachon + return

JUL 3 1975

Brad discussed this with me and unfortunately we do not feel that we can arrange for this fellow to work in IPG at this point in time; mainly because we do not have in place the personnel to help him and get him familiarized with our equipment and systems. This was a great opportunity that we have to pass.

Bernie Lacroute
08/08/75

International
Computer
Education
Centre

United
Nations
Development
Programme

Office of the Project Manager

AUG 04 1975

Brad
Could you house such an individual for 6 months + lead him in this? What about working in Power Monitor Group to do applications? GB

Call + find out!

Mr. C. Gordon Bell,
Vice President of Engineering
Digital Equipment Corporation,
146 Main Street,
Maynard,
Massachusetts 01754,
U.S.A.

25th June, 1975

Dear Gordon,

My stay here in Budapest is turning out to be quite interesting and productive. I am primarily helping with the design of a small time-sharing system, but am also working with people here at the Centre on a number of topics.

One of the things that the UN project does is to send staff members from the Centre abroad for study, ranging from a few weeks up to six months. I am writing to you to find out if it is possible to arrange a fellowship for one of the staff members here with the DEC Education Centre.

The particular person interested in this type of fellowship with DEC wants to learn more about DEC equipment and systems from the standpoint of teaching about them. Further, he would like to participate in some sort of programming or development activity so that he could obtain some hands-on-experience on PDP 11's. (In particular, he is interested in process control.) While I realise such work may not be done directly at the Educational Centre, I thought perhaps some sort of arrangement with a DEC user in the vicinity of the Educational Centre could be worked out.

In short, if it still looks appropriate after learning more about the Education Centre, he would like to come there for six months, take some courses, perhaps help teach some, observe others, and do some programming. If some of the programming is on a process-control application, that would be ideal.

The individual involved has a good command of English and is an engineering graduate of the Technical University of Budapest. He has 4 or 5 years teaching experience here with the Centre and programming experience on a number of different machines. I can personally vouch for his competence.

At this stage we basically only need feasibility information. Since the UN would support the individual and pay for his travel and local expenses, what we need to know is a) whether such a "work-study" arrangement would be possible from DEC's point of view and b) whether the Education Centre would be the right place.

Bernie
How about the demo? Or some handlers etc.
?
Brad

I owe a letter.

1426 BUDAPEST XIV., TOROKOR UTCA 18 HUNGARY · TEL: 150-435 · TELEX: 22 44 93

I would appreciate if you could send me more information on the Educational Centre (such things as the type of courses currently being offered, if any software development is done at the centre, etc.) and provide an indication whether or not such an UN-supported visit would be possible from DEC's standpoint.

Betty and I certainly enjoyed our evening with you when you were in Irvine in March and hope that we get to see you again soon.
All the best to Gwynn and the kids.

Sincerely,

Peter

Peter Freeman,
UN Visiting Expert,
and
Asst. Prof., University of California, Irvine

P.S. We just learned that our recommendation to the UN in New York that they buy an 11/70 for the center here was approved! So, this fellowship would be very valuable!

Brad Vachon
ML5-2/M48

01648

digital

August 6, 1975

Mr. Sandler
Atomic Energy of Canada Ltd.
Chalk River, Ontario
Canada

Dear Mr. Sandler:

Regarding your question about why we did not put form feed in the basic LA36 design, we drew the line at features just above form feed and tabs. The design and cost goals were such that we wished to replace the Teletype Model 33 on our equipment and provide significantly greater reliability, at minimal cost. At this time, we are a ways off in the cost, but the reliability has turned out beyond design expectations (2000 hours MTBF). The reliability and increased speed really brings the cost down for the user.

We have put in these features in a kit which is now just being announced. The reasoning was that we should have the lowest cost for the greatest number of users in the basic package; the more cost/performance oriented users such as yourself, who truly understand that more performance and function improves productivity, will buy them. It is continually distressing to find that many users buy on cost alone (i.e. the purchasing agent mentality); hence, we must market to them. I continually argue for more functionality, but we have to be careful of being uncompetitive. I believe that over the next few years the cost of these options will decrease, and there won't be the hassle about their availability in the standard package.

Thank you for your input. As an LA30 user, I believe you'll be pleasantly surprised with the LA36 (with option package).

Sincerely,

Gordon Bell
Vice President, Office of Development

GB:mjk
Attachment
cc: Dave Whiteside
Ed Corell - Mgr., Printer Engineering
Andy Knowles - Vice President, Components

DIGITAL EQUIPMENT CORPORATION, 146 MAIN STREET, MAYNARD, MASSACHUSETTS 01754
(617)897-5111 TWX: 710-347-0212 TELEX: 94-8457

digital

August 6, 1975

Real L'Archevesque
Atomic Energy of Canada Ltd.
Chalk River, Ontario
Canada

Dear Mr. L'Archevesque:

It was thoroughly enjoyable to spend the day at Chalk River last Wednesday. Since it has been about a dozen years since visiting there, it is nice to see the activities that have been going on in the application of the computers you helped design.

The discussion of the network activities were especially vigorous, and I sincerely hope that we can interact with the laboratory in providing equipment, observing use and collaborating on the research. I think it would be worthwhile to begin to have some discussion with our network and communications people when you are further along in the decision process. Since I concur with your approach to use CATV, it would also be helpful to get this view exposed to our internal people. Also, I hope you'll get in contact with Eric Manning at Waterloo, who is also working in this area.

Again, thank you for the invitation to speak, visit, and I look forward to continued interaction over the years.

Sincerely,

Gordon Bell
Vice President, Office of Development

GB:mjk

cc: Jim Bell - DEC, Mgr. of Research and Development
Nat Teichholtz - DEC, Mgr. of Computer Network Development
Stu Wecker - Network Architect

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Computing
Services
Office
University of Illinois
at Urbana-Champaign
Urbana, Illinois 61801

August 8, 1975

Dr. Gordon Bell
Digital Equipment Corporation
146 Main Street
Maynard, Massachusetts 01754

Dear Dr. Bell:

This is just a note to inquire about the computer museum and whether or not the material arrived concerning Illiac I, II, III.

We have been out of contact with each other for a few months and I didn't know whether or not you needed other items.

Sincerely,

Clifford E. Carter
Assistant Director
of Engineering

CEC:dkw

Dear Dr Carter

Sorry, I didn't get around to ~~thanking you~~ informing you about the material. I believe we have everything you sent.

The ~~Eb~~ IlliacI storage ~~tube~~ Tubes and amplifiers, ILLIAC II Switch and Core, and ILLIAC III modules are displayed covers

in the DEC to mill lobby now. ~~We~~

~~Also~~
I also recorded a 3 min talk on computers
and we used photos of the parts in it.
The talk is going into service next
week.

Thanks for
the manuals and parts.

Emily.

01650

digital

August 18, 1975

Mr. Clifford E. Carter
Assistant Director of Engineering
Computing Services Office
University of Illinois
at Urbana-Champaign
Urbana, Illinois 61801

Dear Mr. Carter:

Sorry, I didn't get around to informing you about the material. I believe we have everything you sent.

The Illiac I storage tubes and amplifiers, Illiac II switch and core, and Illiac III modules are displayed in the DEC Mill Lobby now.

I also recorded a 9 minute talk on computers and we used photos of the parts in it. The talk is going into service next week.

Thank you for the manuals and parts.

Sincerely,

DIGITAL EQUIPMENT CORPORATION

Gordon Bell

Gordon Bell mjh
Vice-President
Research and Development

GB:as

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

01652

digital

August 18, 1975

Mr. Charles E. Letteer, Jr.
Manager, Computer Systems
Data Systems Department
Armstrong Cork Company
Lancaster, Pennsylvania 17604

Dear Mr. Letteer:

If you will send more information on the proposal, I'll send it around for internal review.

Thanks for your letter of August 7, 1975.

Sincerely,

DIGITAL EQUIPMENT CORPORATION

Gordon Bell

Gordon Bell mlh
Vice-President
Research and Development

GB:as

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01653

AUG 13 1975

Armstrong
CORK COMPANY

AREA CODE 717 | TELEPHONE 397-0611

LANCASTER, PA. 17604

August 7, 1975

Dear Then: If you send more information on the proposal, I'll send it around for internal review. Thanks for your letter of Aug. 7. Sincerely, 8-20

Dr. C. Gordon Bell
Vice-President, Research and Development
Digital Equipment Corporation
Parker Street
Maynard, MA 01784

Dear Dr. Bell:

I have been working with Dr. David Freeman for the past several months in defining a thesis topic for my Masters Degree in Computer and Information Science at the University of Pennsylvania. We have narrowed the search to a single proposed topic that includes a hardware/software design using a DECsystem-10 and a PDP-11 that are installed in Armstrong's Research and Development Center. Dr. Freeman asked that I write to you outlining my plans and request any comments that you feel are appropriate, including any similar work that you might be familiar with.

My topic would involve a detailed description of the hardware and software to be used in implementing a multitasking laboratory automation system using a shared memory DECsystem-10/PDP-11. This work differs from that done at other locations (i.e. CERN) in that various experiments would be multitasked on the PDP-11 rather than having the PDP-11 dedicated to a single type of experiment. Under the proposed system, experimenters would develop their programs on the DECsystem-10 using Fortran, thus taking advantage of the full range of 10 capabilities (i.e. text editor, optimizing compiler, etc.). Compiled programs would execute on the DECsystem-10, and, by use of all CALL statements fully control the experiments through the PDP-11. The DEC supplied DMA-10 hardware facility is an integral part of the system functions.

When operational, the system would relieve the experimenter from learning the intricacies of machine language or the necessity of finding a programmer who is knowledgeable and available. The person most familiar with the experiment would usually be the one to write the code. It will also be easier to add new experiments and change existing programs while minimizing the impact of such changes on other running experiments. The programmer will be able to handle functions, such as digital input and output, in a way that is similar to his control over other I/O type devices. Manipulation of the data will be in a high level language familiar to many of the people involved in experimental work at our facility.

I realize that this is a brief description of a somewhat complicated task. However, I wanted to get your initial reactions without boring you with too much of the wrong detail. I am willing to provide whatever additional detail or explanation that you would require.

I appreciate your taking time from a busy schedule to handle this request and look forward to your comments. Correspondence can be sent to me in care of the address shown at the top of this letter.

Sincerely yours,

Charles E. Letteer, Jr.
Manager, Computer Systems
Data Systems Department

MLG

D I G I T A L INTEROFFICE MEMORANDUM

AUG 22 1975 01655

PAGE 1

SUBJ: PHILIPPINES/INDONESIA DATE: 08-18-75
FROM: GWEN BELL
EX: 2237
MS: LINCOLN

* *
TO: FILE
* *

To: Ted Johnson
Ron Smart

Subj: DEC IN THE PHILIPPINES AND INDONESIA

As we discussed when you were at our house, I would try to explore appropriate contacts when I was on my UN missions.

INDONESIA

In early August, I was one of 5 UN consultants at an Indonesian meeting of Ministers--government officials, academics, and private consultants--discussing the spatial components of the next five year plan and toward their plan for 2000. As you may well know, the Indonesian oil company has an 11; it is also used by a firm of engineers--P.T. Widya Pertiwi Engineering, whose President, Ariono Abdulkadir, attended the meeting. Ariono (everyone goes by their first names in Indonesia) got his PhD in Mechanical Engineering from Kentucky several years ago, and started this firm last August. It now has 170 people. He cannot understand why DEC is not in Indonesia; he is very bright; teaches one day a week at the Bandung Institute of Technology--Indonesia's premier school; works extraordinarily hard; and is a super person as well as a true believer (in DEC).

Independently in Bandung, I met Harijono Djojodihardjo, who is Director, Computer Science Division and Computer Centre, Bandung Institute of Technology; and Head, Aerospace Technology Center, The Indonesian National Institute of Aeronautics and Space. He has a recent MsMe, and Sc.D. in Mech. Eng. from MIT. He works part time in addition for Ariono, (who I think is brighter and certainly more of an entrepreneur). Anyway, these are your two contacts in Indonesia. The Bandung Institute of Technology has an old 401 and needs a new machine. This is the place where all the bright young men go who stay in the country and don't go abroad; or this is where they come first for a technical undergraduate degree before going abroad.

Ariono is having one of the people in his firm write a paper which he will send to me, evaluating the computer market

SUBJ: PHILIPPINES/INDONESIA DATE: 08-18-75
FROM: GWEN BELL

in Indonesia. It is a very exciting place; full of resources; developing a cadre of bright young men who are returning; and clearly has potential.

I have said that someone from DEC would probably also be in contact with Ariono, and secondly with Harijono. The addresses are:

Ariono Abdukadir,
President P. T. Widya Pertiwi Engineering,
Romol Pos 3316, Jakarta, Indonesia

Harijono Djojodihardjo
Lapan
Jl. Pemuda Persil No. 1
Jakarta Timur Indonesia

Philippines

Jose Benitez, Senior vice President, Development Academy of the Philippines, was one of the other UN experts at the meeting. He has said that the Academy is considering an 11. He has direct access to President Marcos, and the Development Academy is more or less a supra-cabinet task force organization. He will be at the UN the first week of Sept, and will probably come to Boston on the 2nd or 3rd. I will let you know just barely before, and also hope you could come here and have dinner with him.

[Hopefully, someone will contact these people on a junket. Gordon]

AUG 22 1975

01657

TTTT
WUI NY TELUS 119 0827 08/18*
DIGITAL MAYN A
948457
DIGITAL EQUIPMENT CORPORATION
PARKER STREET
MAYNARD, MASS

LT

FERRANTI ASSOCIATES
16 HUNTER ST
SYDNEY NSW, AUSTRALIA 2000

ATTN: BARRY DE FERRANTI

CRAIG MUDGE, RON SMART, AND I WILL BE IN MAYNARD WHEN YOU ARRIVE IN THE UNITED STATES. PLEASE CONTACT CRAIG TO SCHEDULE A DAY. WE ARE ALL PRETTY BUSY BUT WOULD LIKE TO UNDERSTAND YOUR TALK.

FROM: GORDON BELL - DIGITAL MAYNARD

AUG 8 8 34 AM '75

END
*
WUI TELUS NYK

BARRY FERRANTI ASSOCIATES PTY. LIMITED

16 HUNTER STREET. SYDNEY. N.S.W.. AUSTRALIA. 2000. PHONES | 231-2026
P.O. BOX H101. AUSTRALIA SQUARE. SYDNEY. N.S.W.. 2000. | 960-2676

01658

AUG 15 1975

BFA/BZF

8 August, 1975.

Mr. Gordon Bell,
Chief Engineer,
Digital Equipment Corporation,
Maynard, Mass. 01754,
U.S.A.

Dear Gordon,

Overseas Visit - August, September, October 1975

I do hope it will be possible for us to meet during my forthcoming overseas visit. My objectives on this trip will be

a) To present my paper "Computer Education Needs and Resources - Implications for Employers" at the 2nd World Conference on Computer Education in Marseilles, September 1-5. (This discusses work done for the Australian Department of Education and Telecommunications Commission, just completed).

b) To study world developments in management, education and technology (especially computing).

c) To discuss problems of future planning, with employers of computing and technological staff.

d) Exchange views on consequences of these matters, in national and corporate planning (impact of technology on society).

e) Seek out new ways of exchanging significant information (for managers and technical decision makers).

f) Establish contacts and seek assignments of mutual benefit.

Barry Ferranti Associates is a consulting group specialising in management information and planning, modelling and project evaluation, for situations of rapid change. Since incorporating in 1971, we have carried out many assignments and research tasks for Government, industry and education, with particular emphasis on change brought about by the introduction of the computer. This has led us to other work, advising on and managing situations of drastic change, for clients in much wider contexts.

My itinerary is likely to be crowded, but I would welcome the opportunity of meeting with you at IFIP, if you will be there, or in your vicinity, if possible. I will therefore plan to telephone you en route to discuss topics of mutual interest.

At this stage I plan to be in Switzerland August 25-27; France August 28-September 12; then U.K. and on to the U.S. for 10 days.

It will be good to look up Ron Smart and other old friends: I will probably be visiting Maynard Sept 24 to 26. Could I get together with you, Bob Reed and Greg Mudge?

Yours sincerely,

Barry de Ferranti

Barry Z. de Ferranti

PS I think you will find the work we have done on technological futures quite interesting. I look forward to discussing old times [like GEORGE?]

B.

01660

digital

August 6, 1975

Robert H. Vonderohe
Project Manager
University of Chicago
Institute for Computer Research
5640 Ellis Avenue
Chicago, Illinois 60637

Dear Dr. Vonderohe:

Thank you for sending the Christopher proposal of June 11, 1975, on building a PL/1 for the PDP-11. We have been reviewing it extensively internally for the last 2 months.

We are not interested in proceeding with the compiler at this time. A combination of cost, administration, and language definition issues have gone into this decision.

Thank you for the proposal.

Sincerely,

Gordon Bell
Vice President
Office of Development

GB:mjk

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01624

digital

11 July 1975

Dan Brown
Ricketts House
Caltech
Pasadena, California 91126

Dear Mr. Brown,

I received your letter of 26 May, and sent it around internally for review. One of the people in our research group interested in multi-processing, Dick Eckhouse, made comments and I enclose his marked-up copy of your proposal.

In general, while I believe the work is interesting, I am not especially interested in pursuing this approach because it introduces assymetry in a system and unreliability through lack of redundancy even though there is lots of hardware. I would rather build systems with fewer component types. The 11 could be built to achieve more performance, but so far, when we build these systems to take the load off the big processor, usually all that happens is either we move the bottleneck, or we provide enormous power, and yet only get 5% more out of the system. This is the amount of time the system spent doing the function you propose, and the bottleneck is still the processor (or usually the secondary memory system). Also, a new operating system is born, and we have too many already.

In general, I suspect I would like the 32 processors you designed. Why not just make them all execute PDP-11 code and be done with it, and use an existing process-structured operating system such as RSX11-M or -D, with the capability to have various processes run on any of the processors. Once you add another physical system (more processors, e.g., front end) then move some processes to the other computer, and then use a passive connection between the two.

While I'm not especially sympathetic to your design approach, it might be worthwhile submitting it to the CACM, Computer, IEETC, or one of the Computer Architecture conferences. (It clearly is a lot better thought out and more carefully done than much of the work reported on.) Also, it's not clear that I'm right...Your design goals and problem statement might convince me that your solution is right.

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To: Dan Brown
-2-

From: Gordon Bell
11 July 1975

It is clear that you put a lot of work into this, and I'm sure there are lots of ideas in it that would be useful in future designs. I would be interested in seeing whether the implementation contains ideas that could be used in other designs.

Thank you for your interest in DEC.

Sincerely,

Gordon Bell
Vice President
Office of Development

GB:mam

Margaret - pls send as is

01631

Marny Rouleau and Phil

For the June Yellow Book let's goa about a top down audit of all the projects to put them in perspective for our readers. Then put marks on the projects that deviate good and bad from this norm.

The summary page would :

group projects into maybe 2/3 categories;

count the projects in the categories;

give an average size and standard deviation for the project sizes ... or per haps just give these in terms of a distribution;

give a distribution of what"s on time, and what's late;

give a distribution of what the spending is versus budget.

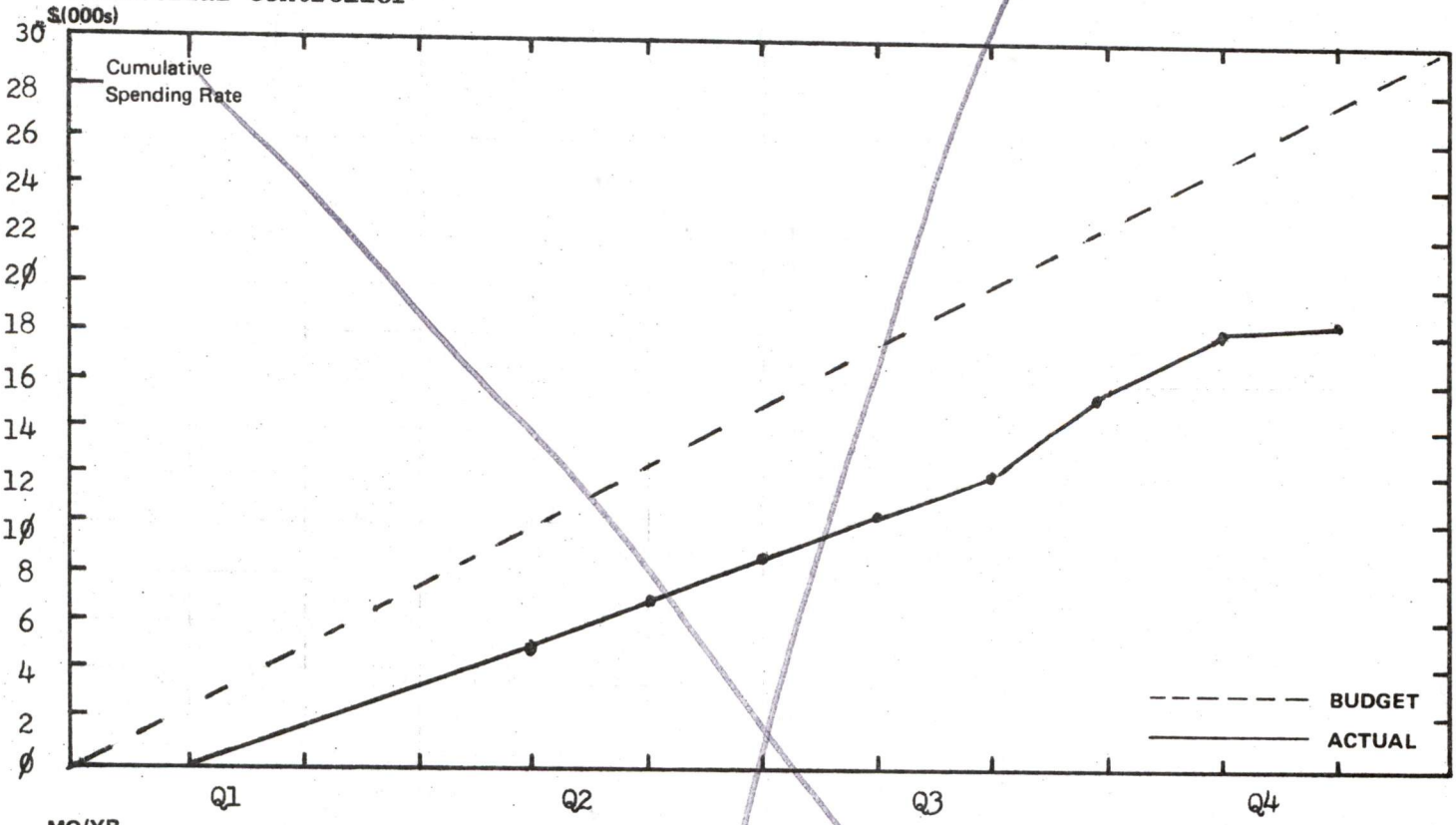
What youre think? What's the right format?

Gorden

Let's get report from Clayton, Pfeffer, Porter Lemair, Marcus this month and make a "complete" YB even if it means slipping Schedule... Get me to call people if you have trouble.

SOFTWARE DEVELOPMENT MONTHLY PROJECT REPORT

Proj. Name: ICS-8
Proj. No.: 46-Ø7767
Prod. No.:
Prod. Line: IDACS
C.C.: 3Ø1
Proj. Type: Scheduled
Period Ending: 4/29/75
Proj. Leader: Ken Wright
Supervisor: D. Deknis
C.C. Manager: Walt Manter
Proj. Description: Module System and Field Test Diagnostics for the PDP-8 Based Industrial Controller



MO/YR	6/74	7/74	8/74	9/74	10/74	11/74	12/74	1/75	2/75	3/75	4/75	5/75
MILESTONES	1 C	2 C	13 C	14 C			15 C	16 C	2Ø C	25 C	26	
		5 C						18 C	24-1	24 C		
		7 C										

COMMENTS:

System Test will be released next month. Field Test is coded and being debugged.

LEGEND:

1. CURSORY PROJ. PLAN
2. PROJECT PLAN
3. BUSINESS PLAN
4. PROD ANNOUNCEMENT
5. FUNCTIONAL SPECS
6. SUPPORT PLAN
7. DESIGN SPECS
8. IMPLEMENTATION PLAN
9. FIELD TEST PLAN
10. QA PLAN
11. DOCUMENTATION PLAN
12. INITIAL DOC
13. INITIAL CODE
14. INITIAL DEBUG
15. INITIAL INTEGRATION
16. INITIAL EVALUATION
17. PRICING APPROVAL
18. CODE FREEZE
19. FINAL INTEGRATION
20. INITIAL QA
21. START FIELD TEST
22. USER DOCUMENTATION
23. MAINT DOCUMENTATION
24. EVAL COMPLETE
25. ACCEPTANCE
26. RELEASE TO FIELD

NOTE: 1. Milestone suffixes of a, b . . . indicate 1st, 2nd etc. base level.
2. C = complete, + = months ahead of schedule, − = months behind schedule.

01632

digital

8 July 1975

Richard J. Kopro
1811 Leadburn Road
Towson, Maryland 21204

Dear Mr. Kopro,

I'm sorry to have misplaced your letter to Mr. Olsen. Thanks for sending me another copy.

I totally agree that there may be a potential use of a computer and CRT as a communications medium to the deaf. Right now we are not able to support doing research that might lead to a tool to help these people.

It is possible that a firm proposal might change this belief, but right now our research is devoted to building better basic computers (tools) for all applications.

We have machines (computers and displays) at Bell Labs, and I would think that you might talk directly with them since they're mainly concerned with communications. Also, I believe the best graphics and speech research is done there.

Again, please forgive me for not responding rapidly to your idea.

Sincerely,

Gordon Bell

Gordon Bell
Vice President
Office of Development

GB:mam

CC: Ken Olsen, President
Jim Bell, Manager of Research
Ed Kramer, Laboratory Data Products, Product Line Manager

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01633

digital

INTEROFFICE MEMORANDUM

TO: Tom Siekman
Ken Olsen

LOC/MAIL STOP

DATE: 1 July 1975
FROM: Gordon Bell GB
DEPT: Office of Development
EXT: 2236
LOC/MAIL STOP: ML 12-1/A51

SUBJ: A SWITCH FOR PIN-TYPE FLOURESCENT BULBS WITH NO INSTALLATION

This product was born out of my frustration that we spend too much on lighting the mill, but have been powerless to install conventional electric switches due to cost/time - even though the payoff is only a few months.

All this would change if anyone could install the switch. Therefore, it occurred to me that it had to be as easy to install as a light bulb itself. In examining the light and circuit, it was clear that all one had to do in a one or two circuit pin-type flourescent bulb (eg. 80 Watter) is break the circuit of a bulb as one connects the pin to the socket.

Furthermore, there are about three ways to do this:

1. Put a switch in the bulb - we want to patent this case. It applies to all lights...including conventional flourescents.

2. Put a conventional switch in series with the pin and socket. Since these bulbs have one inch of spring play, there's room to insert a 1/4-1/2 inch insulated male-female connector with conductors to the SPST switch.

3. The cheapest. Use the spring load action of bulb socket to help in switching action. The bulb, and socket are part of the switch.

There are at least two basic methods - rotary action like a conventional pull chain would be one. This could either be continuous pull or a single chain. A second method would be a pin-plunger-toggle to push the bulb away from the contact. This may not work if there are many socket types and/or socket life is decreased.

It is not clear what company would want to build and sell such a switch.

1. Bulb manufacturers? Eventually perhaps. Does it cut down on their sales?
2. Lavolier, Eagle - Does it cut down on their sales? Necessary if a type 2 switch is needed.
3. Honeywell, Rixon - Why give them any help at all?
4. Some random plastics manufacturer/distributor?
5. The socket manufacturer?
6. The fixture manufacturer? - Perhaps.

GB:mam

file C1634

digital

1 July 1975

Ursula Huws
1 Mentone Mansions
368 Fulman Road
London SW10 England

Dear Ursula:

I'm collecting artifacts for what I hope will eventually be a museum of computer technology. So far much of the collection is packages of computers since 1949...which is really when the computer first came into existence. I would like to obtain some earlier pre-1900 calculators, since they too are parts of computer ancestry. Specifically, I would like to get a Thomas Authometer. There are undoubtedly other parts, but I don't know what's available. Arithometer.

I correspond with Miss Jane Pughe, of the British Science Museum, and am sending parts for the museum. She can't, because of conflict-of-interest, consult and purchase parts for me. Still, you could contact her for ideas (01-589-6371).

Could you look around, and purchase parts for me on a commission basis? Apparently Southeby's (1 Bond Street W1) is a possible place to buy things like this. I'm also interested in an early teleprinter, and old English computer parts (probably available in electronic surplus stores) but the latter is more the form of junk.

Let me know what you decide, but it would be helpful if you could visit Southeby's and give me some idea of parts, availability, price, of some of this stuff.

Pat sends her regards, and would like to get her camera sent.

I look forward to seeing you, the next visit to London.

Sincerely,

Gordon Bell
Vice President
Office of Development

GB:mam

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01635

digital

INTEROFFICE MEMORANDUM

LOC/MAIL STOP

TO: Gordon Bell
Phil Laut
Henry Lemaire
Julius Marcus
Larry Portner
Bob Puffer

DATE: August 13, 1975
FROM: Dick Clayton
DEPT: Computer Systems Development
EXT: 3638
LOC/MAIL STOP: ML5/E71

SUBJ: OOD STAFF MEETING - AUGUST 21, 1975
GORDON BELL"S OFFICE

AGENDA

10:30 A.M.	Review of Minutes.	
10:35	Review this weeks Agenda.	Delagi et al
10:45	What is VAX Organization?	Delagi et al
11:05	What are VAX Goals and Products?	Delagi et al
11:35	VT61 Business plan review.	Puffer
12:05	Is DEC System 20 group doing the right thing by changing to MOS.	Lemaire/Leng
12:20	Should Printer Engineering spend more on budget in FY 76 (unspent 75 plan).	Puffer
12:40	End. Lunch.	

FUTURE TOPICS

8/28/75	Where does Vince find funding for SDLC in-house chip development? (15 min.)	Vince Bastiani/ Bob Savell
8/28/75	Is there an action plan that allows follow-up on a field oriented product safety problem?	Shields/OOD
8/28/75	Product Managers dinner meetings.	Portner
8/28/75	Assignment of Best & Noelcke.	Puffer/Clayton
8/28/75	What's our Military Computer strategy? (written report by 8/14)	Clayton
9/04/75	(30 min.) Product Managers Green Sheet and job classifications.	Puffer/Portner/ Clayton

9/04/75	Business Plan Review Procedure.	Laut
9/04/75	Review of the role of OOD Staff secretary (and rotation).	All
9/04/75	QCMS Defect Reporting System	Smith/Pecore
9/11/75	OOD-Marketing Committee interface.	Laut/All
9/18/75	What is the three year serial bus strategy (15 min.).	Clayton/Bastiani
9/18/75	Approval of OOD Space Guidelines (30 min.).	Laut
September	Report on in-house PDP-11 usage.	Computer Resources Committee
	Is there a Field Integration Plan yet?	Smith/Shields/ Clayton/Puffer
	Honararia Policy.	Bell

01637

digital

INTEROFFICE MEMORANDUM

TO: OOD

LOC/MAIL STOP

DATE: August 13, 1975
FROM: Dick Clayton
DEPT: OOD
EXT: 3638
LOC/MAIL STOP: ML5/E71

SUBJ: MINUTES OF MEETING DATED 8/07/75

Present: Mark Abbett, Gordon Bell, Dick Clayton, Phil Laut, Larry Portner, Bob Puffer.

I. Review of Minutes.

Bob Puffer reported that there now exists a preliminary business plan for the VT61. It shows the product line usage and associated software dependencies including funded and unfunded parts of the problem space.

II. Review of Business Plans.

The group generally agreed to Phil's proposal to collect, redistribute (limited basis), and schedule OOD Review for Product business plans. Phil will revise his proposal slightly and it will be accepted by OOD in the next several weeks.

III. Woods Meeting Lose Ends.

OOD wishes to charter a 4 week task force to report on the nature of the general problem referred to as "Reducing Support Costs". It is expected this group will help us focus on where there is a likelihood of high leverage action by OOD or others to reduce these costs.

Bob and Dick will identify an individual each to work at least half time for four weeks. Larry will also identify a person. Larrywill lead the group to identify several others (probably from F.S., manufacturing, software support, etc.), get them involved, and see they get a report issued by the end of September.

IV. Space.

Gordon has assigned the space task to Phil. By early September it is expected Phil will have a revised set of guidelines for space utilization including inter group interaction goals. Phil will also attempt to clarify the Mfg.-Eng. DMZ. Phil is expected to report in early September.

V. Financial Results.

Phil reviewed the FY75 results and FY76 budget. The group agreed that for FY77 DECUS must be out of Engineering. There were no surprises in the general budget numbers. Q1 is most likely tight, need July results to get a better picture.

VI. Capital Budgets.

Phil reported that there is a Corporate Capital Budget problem. "They" have decided the OOD capital budget should be $4,655K for FY76. This compares to FY75 actual of $2,909K and a current plan of $6,817K.

Phil took a first pass cut at where he thought the plan changes should come from. In as much as no one has yet worked the problem there was reluctance to agree on the change for the total group or especially the pieces.

Larry was particularly concerned that the software change was unrealistic and that CS2 is a major out of control problem.

Expected attendance at next four weeks OOD meeting.

	GB	LP	BP	DC	PL	MA	JM	HL
8/21		X	X	X			X	
8/28		X	X	X	X	X	X	X
9/04	X	X	X	X	X	X	X	X
9/11	X	X	X	X	X	X	X	X

01639

digital

INTEROFFICE MEMORANDUM

LOC/MAIL STOP

TO: Dick Clayton

CC: Ed Fauvre
Ed Kramer

DATE: August 18, 1975
FROM: Gordon Bell
DEPT: Office of Development
EXT: 2236
LOC/MAIL STOP: ML 12-1/A50

SUBJ: CDC MINI-COMPUTER DIVISION

According to Ed Kramer, CDC has a plan to enter the mini business. Ed believes we should spend a day figuring out what their position might be if they did.

What products do they have (e.g. CR 17 or military computers)?

Who are some people we could gather information from?

Could you have someone to pull the info together?

GB:as

01640

digital

August 6, 1975

Norman N. Axelrod Associates
445 East 86th Street
New York, New York 10028

Dear Mr. Axelrod:

Thank you for your letter of July 21, 1975. I circulated your resume to my staff, but we feel there are no openings at the present time that would take advantage of your qualifications. .. or your consult. Serv.

We thank you for considering DEC, and we wish you success you your future endeavors.

Sincerely,

Gordon Bell

Gordon Bell
Vice President
Office of Development

GB:mjk

DIGITAL EQUIPMENT CORPORATION, 146 MAIN STREET, MAYNARD, MASSACHUSETTS 01754
(617)897-5111 TWX: 710-347-0212 TELEX: 94-8457

Bob Poffenberger

JUL 25 1975
7-118

01641

JUL 24 1975
7-27

NORMAN N. AXELROD ASSOCIATES
445 EAST 86TH STREET
NEW YORK, N. Y. 10028

(212) 228-0900
(212) 369-2885

CABLE ADDRESS
GOLDESQ
NEW YORK

Any word for good ol' Norm?

July 21, 1975

Dear Mr. Thanks for your letter of July 21, 1975.

Sincerely,

Mr. C. Bell, VP
Digital Equipment Corp.
146 Main Street
Maynard, Massachusetts 01754

Dear Mr. Bell:

Correct decisions on optical systems can result in greater reliability per dollar, reduced operating costs, and more usable output.

This letter is to advise you of my services and experiences as a consulting optical specialist. I have:

applied lasers to remote detection, non-contact testing, dynamic materials characterization, pattern recognition, and dimensional measurement;

troubleshot on development of illumination system for electro-optic display in a digital watch; patent filed (assigned to Timex);

consulted on optical systems for on-line sensing/control, information processing, image projection, color discrimination, gauging, and on tolerances in opto-mechanical and opto-electronic systems;

designed simplified optical/electronic inspection system with minimized computer processing of scanned optical signals for defect detection in moving, complex patterns on paper, textiles, etc.; patent issued;

quantitatively determined technical and commercial feasibility of new systems;

designed compensated remote sensing system for diagnostics in a 500 million watt steam turbine; nulls the effects of instrumental vibration on the output signal; enhances detection reliability and sensitivity at reduced visibility; patent disclosures assigned to General Electric;

developed optical and electro-optical devices, techniques, and systems which resulted in patents filed in eighteen countries and which are described in over thirty papers;

reviewed technical programs of an industrial controls manufacturer; demonstrated that time saved in design and development over eight months equaled four times the total dollar cost to the company.

As you can see, I provide solutions to technical problems, function as a technical auditor, and formulate and control programs. I provide management support in areas that require both technical expertise and experience with different industries. I produce practical results that are clean and cost-effective. My clients make industrial controls, commercial products, consumer goods, and instrument systems.

In 1974-1975, my clients have included:

Babcock & Wilcox	Remington Arms
General Electric	Schering
Hanovia Lamp Division	Shigoto Industries Ltd.
MacBeth Color and Photometry Div.	Skan-a-matic
Recognition Equipment Inc.	Timex

I completed the Ph.D. at the Institute of Optics (University of Rochester) in Optics and Physics, and the A.B. at Cornell University; studied at the University of Paris; and spent post-doctoral years at the University of London and at NASA - Goddard Space Flight Center. I worked in R & D at Bell Laboratories, Murray Hill, New Jersey from 1965 to 1972.

I would be glad to explore and discuss how my services can be used to advantage. You may reach me at (212) 228-0900 or (212) 369-2885.

Sincerely,

Norman N. Axelrod

NNA:fk

01643

digital

August 14, 1975

Mr. Peter Freeman
International Computer Education Centre
United Nations Development Programme
1426 Budapest XIV
Torokor Utca 18 Hungary

Dear Peter:

Regarding your letter of 25th June, John Holman, head of our Computer Special Systems (CSS) products has agreed to host the faculty person, provided he can look at his vitae. Since you recommend him so highly, this should be no problem, but he would like to approve. Could you please send it? CSS builds hardware and software products for particular customers or classes of customers on a specialized basis. Thus, it is probably a most ideal place to be to get an overview of control applications.

When he comes, a precise schedule of courses (he might give or teach), and activities can be worked out.

Sorry I took so long, but I looked in wrong group to place him. This should be a really good opportunity. Please write directly to John in Maynard.

Sincerely,

Gordon Bell
Vice President
Office of Development

GB:as

cc: John Fisher
John Holman

DIGITAL EQUIPMENT CORPORATION, 146 MAIN STREET, MAYNARD, MASSACHUSETTS 01754
(617)897-5111 TWX: 710-347-0212 TELEX: 94-8457

MJ

Copy to Brad Vachon + return

JUL 3 1975

01644

AUG 04 1975

International Computer Education Centre

United Nations Development Programme

Office of the Project Manager

Brad

Could you house such an individual for 6 months +

Call + Aug b find out.

Mr. C. Gordon Bell,
Vice President of Engineering
Digital Equipment Corporation,
146 Main Street,
Maynard,
Massachusetts 01754
U.S.A.

25th June, 1975

Read him in this? What about work in Power Monitor Group to do applications? gB

Dear Gordon,

My stay here in Budapest is turning out to be quite interesting and productive. I am primarily helping with the design of a small time-sharing system, but am also working with people here at the Centre on a number of topics.

One of the things that the UN project does is to send staff members from the Centre abroad for study, ranging from a few weeks up to six months. I am writing to you to find out if it is possible to arrange a fellowship for one of the staff members here with the DEC Education Centre.

The particular person interested in this type of fellowship with DEC wants to learn more about DEC equipment and systems from the standpoint of teaching about them. Further, he would like to participate in some sort of programming or development activity so that he could obtain some hands-on-experience on PDP 11's. (In particular, he is interested in process control.) While I realise such work may not be done directly at the Educational Centre, I thought perhaps some sort of arrangement with a DEC user in the vicinity of the Educational Centre could be worked out.

In short, if it still looks appropriate after learning more about the Education Centre, he would like to come there for six months, take some courses, perhaps help teach some, observe others, and do some programming. If some of the programming is on a process-control application, that would be ideal.

The individual involved has a good command of English and is an engineering graduate of the Technical University of Budapest. He has 4 or 5 years teaching experience here with the Centre and programming experience on a number of different machines. I can personally vouch for his competence.

At this stage we basically only need feasibility information. Since the UN would support the individual and pay for his travel and local expenses, what we need to know is a) whether such a "work-study" arrangement would be possible from DEC's point of view and b) whether the Education Centre would be the right place.

MJ

Aug 5
Pls call
Brad.

I owe a letter.

1426 BUDAPEST XIV., TÖRÖKŐR UTCA 18. HUNGARY • TELEPHONE: 150-435 • TELEX: 22 44 98

D I G I T A L INTEROFFICE MEMORANDUM

SUBJ: VAXB MEETING AGENDA--8/12/75 DATE: 08-07-75
FROM: GORDON BELL
EX: 2236
MS: ML12-1/A51

* *
TO: MJ FORBES ML12-1/A51
* *

Place: ML3-4 CENTRAL MILL CONFERENCE ROOM
Time: 8:30

8:30-10	VA Mechanism	Hastings
10-10:30	Field/Bits	Rodgers
10:30-11:30	Call/Return	Hastings/Conklin
11:30-12	Status of 75 Design Review Problems	Rodgers

VAXA--DOCUMENTATION FOR VAXB (By 5:00, Aug. 8)

- Status of 75 Design Review Problems — Rodgers
- Call/Return, Field/Bits (handwritten) — Strecker
- VA Mechanism (whatever is ready by Friday evening) — Hastings

---

VAXA SCHEDULE WEEK OF 11 AUGUST

- Strecker - out
- Compatibility/subsetability Design — with Lipman, Stewart, Delagi, Gourd
- process structure/Interrupts/Traps Design — with Lipman/ Stewart

GB:mjk

01662

D I G I T A L INTEROFFICE MEMORANDUM

SUBJ: CHIEF ENGINEER

DATE: 08-07-75
FROM: GORDON BELL
EX: 2236
MS: ML12-1/A51

* *
TO: -BELOW
* *

SUBJ: CHIEF ENGINEER JOB DESCRIPTION THOUGHTS (STAFF POSITION)

To: Mark Abbett, Dick Best, Dick Clayton, Bob Puffer

Overall:

1. Has significant depth* in 2 areas:

   A. Device level (technology e.g., semiconductor, disk, core)
   B. Circuit level
   C. Logic level
   D. Architecture level including networks
   E. Programming
   F. Applications (1 area)

   (Recognized as "near the top" technically.)

2. Knowledge of entire field (breadth)

3. Understanding of business (breadth)

*"Recognized" contributions, talks, patents, papers.

Activities

1. Depth

   A. Solves problems, as needed--in depth 1/2 time
   B. Finds problems.
   C. Recommends strategy--related to "depth areas".
   D. Introduces new technology/techniques to DEC.

2. Breadth

   A. Helps formulate strategy.
   B. Helps with people development (determines/leads?)
   C. Outside spokesman

SUBJ: CHIEF ENGINEER

DATE: 08-07-75
FROM: GORDON BELL

- customer visits
- talks (internal/external)
- papers

D. Guides Engineering Committee

3. Fire Fighting

GB:mjk

01664

D I G I T A L INTEROFFICE MEMORANDUM

PAGE 1

SUBJ: TED STROLLO

DATE: 08-06-75
FROM: GORDON BELL
EX: 2236
MS: ML12-1/A51

* *

TO: FILE

* *

To: Distribution

Ted Strollo from BBN called again about coming to work here. Do we have anything yet? He's quite good, and oriented to development of both hardware and software. He knows much about COMM.

Mark, will you coordinate this and give his resume to any interested party?

GB:mjk

Distribution

Mark Abbett
Jim Bell
Dick Clayton
Bill Demmer
Alan Kotok
Julius Marcus
George Plowman
Larry Portner
Nat Teichholtz
Mike Tomasic
Fred Wilhelm

DIGITAL INTEROFFICE MEMORANDUM

SUBJ: OMSI APL

DATE: 08-06-75
FROM: GORDON BELL
EX: 2236
MS: ML12-1/A51

* *

TO: FILE

* *

To: Distribution

I'm ecstatic that we are getting the APL on the -11... particularly in view of the abortive behavior in the languages product management area...for what I hope will be the last time. APL is truly one of the triumphs in modern language design, and I believe it will be a significant product over the years. Classic 11 will certainly require it.

The deal bothers me somewhat, though not very much, because we can't lose that much, and we might even make something. The point is, maybe we could have made more. My initial intent was to let OMSI do the front work in development marketing and support, and that we could observe it as a marketing experiment. By placing options to buy at various times and various prices, we could later make APL as a tested product, when we had the right hardware (e.g. Classic 11), and when the market developed. Somehow, I don't see adding more software to our catalog, since we make no money on nearly all software, and this one could be high support. (Not many software support people speak APL.)

I yield to the marketing strategists here in that we have chosen correctly (I'm happy that we have the product), and I look forward to seeing the business plan, which George has agreed to provide.

I would believe this is a nice one for George and Larry (as Product Manager-Maynard) to present to the Marketing Committee on a formal basis as it begins to focus on issues of pricing nad support.

GB:mjk

Distribution:

Dave Brown
Bruno Durr
Jon Hardy
Ed Kramer
Bill Long

SUBJ: OMSI APL

DATE: 08-06-75
FROM: GORDON BELL

Larry Portner
Charlie Spector
George Thissell

cc: Marketing Committee, OOD

DIGITAL INTEROFFICE MEMORANDUM 01667

PAGE 1

SUBJ: REGARDING YOUR MEMO ON THE MUSEUM DATE: 08-06-75
FROM: GORDON BELL
EX: 2236
MS: ML12-1/A51

* *
TO: FILE
* *

To: Don Mallinson

I was really happy with your memo. It looks like a good workable plan to proceed with. My 9 minute logic talk and the ML12-1 exhibit is about a week from completion, and the deadline is for the Board of Directors meeting on 18 August--so we can try it out on them.

We'll go ahead and give you text and some photos with the written version of the talk so that a little leaflet can be made available.

The Whirlwind module has been delivered to you in Marlboro and can be taken to the WESCON show. It would be great to take the 1K core to WESCON. The PDP-8 (Mill lobby) with music programs and VT05 has also been delivered to Marlboro for you to try out.

Can another panel be started?

GB:mjk

cc: Mimi Cummings, Andy Knowles, Ken Olsen

01668

D I G I T A L INTEROFFICE MEMORANDUM

SUBJ: RELIABILITY/QC BROCHURE

DATE: 08-06-75
FROM: GORDON BELL
EX: 2236
MS: ML12-1/A51

TO: DISTRIBUTION

SUBJ: RELIABILITY AND QC BROCHURE--HOW MUCH TO DO A QUALITY JOB?

Distribution: Dick Clayton, Tom Coleman, Carl Noelcke

I read the draft because I was asked to give a talk on the reliability of our products at a customer site. They have perceived that the quality has fallen over the PDP-8, and I tried to assure them it hadn't. Has it? Can your brochure say? In preparing the talk, I first came at it from the things that have been happening the last year to improve quality, and then I read your brochure. Although I got some of the details to help the talk, I found it to be pretty superficial, and didn't learn very much.

The talk turned out to be acceptable to them as not many of the 250 or so walked out, even though it was the 2nd hour they listened to me; and I prepared it between 5 and 7:30 am on the plane to Ottawa. Anyway, the whole business is a multi-stage pipelined process shown in the sketch. Information and materials flow between the stages. You could really orient your paper this way, and then carry each chapter down to more detail (boxes). There are things (activities) that all groups engage in to make reliable products.

The basic theme I used was that we are producing more reliable products because we actually understand how the manufacturing system works, and how a design theoretically works. I gave some of the numbers on the RK05 improvement program, and that we really didn't react soon enough. Some of the things that make it work also include the Product Management function which is measured on the profitability through warranty, and include engineering changes for production. This really affects quality. Also, our plant managers are measured on both quantity and quality.

Bring the user in too--he should be demanding, and he should do the things we suggest to have reliability such as using redundant parts. He should demand that we tell him how well something will work before he buys. Your brochure doesn't help him understand or face this!

My impressions were on a very quick reading:

SUBJ: RELIABILITY/QC BROCHURE

DATE: 08-06-75
FROM: GORDON BELL

Impressions

1. Not a very good, top-down structured approach to presentation.

2. Page 16 few #'s, e.g., seventeen ball bearing fans. Lots? Little? Are sleave bearings better? What is the importance? Will it work with 16? How often does a fan kill you? The chart is unconvincing. Do we run IC's hotter?

3. Lots of little bullets (i.e. 1 liners) with no real depth.

4. Can you put in the DEC Standard which relates to Design Reviews?

5. There are numerous new standards and tests introduced this year to increase reliability. State them.

6. Why not put in a case study--RK05 or LA36 or VT50 with real #'s? Compare LA36 with well known alternative.

7. Theme should be--there is a "science" to making things reliable. It is based on knowledge (information). In all areas, we first design--based on principles, and then test to verify that the original design (hypothesis) is correct.

8. You didn't have micro positioning for disks.

9. Self testing on 11/04 and 11/34.

10. The best part is the one not there...our serial consoles get rid of the lights and switches plus offer possible use remotely.

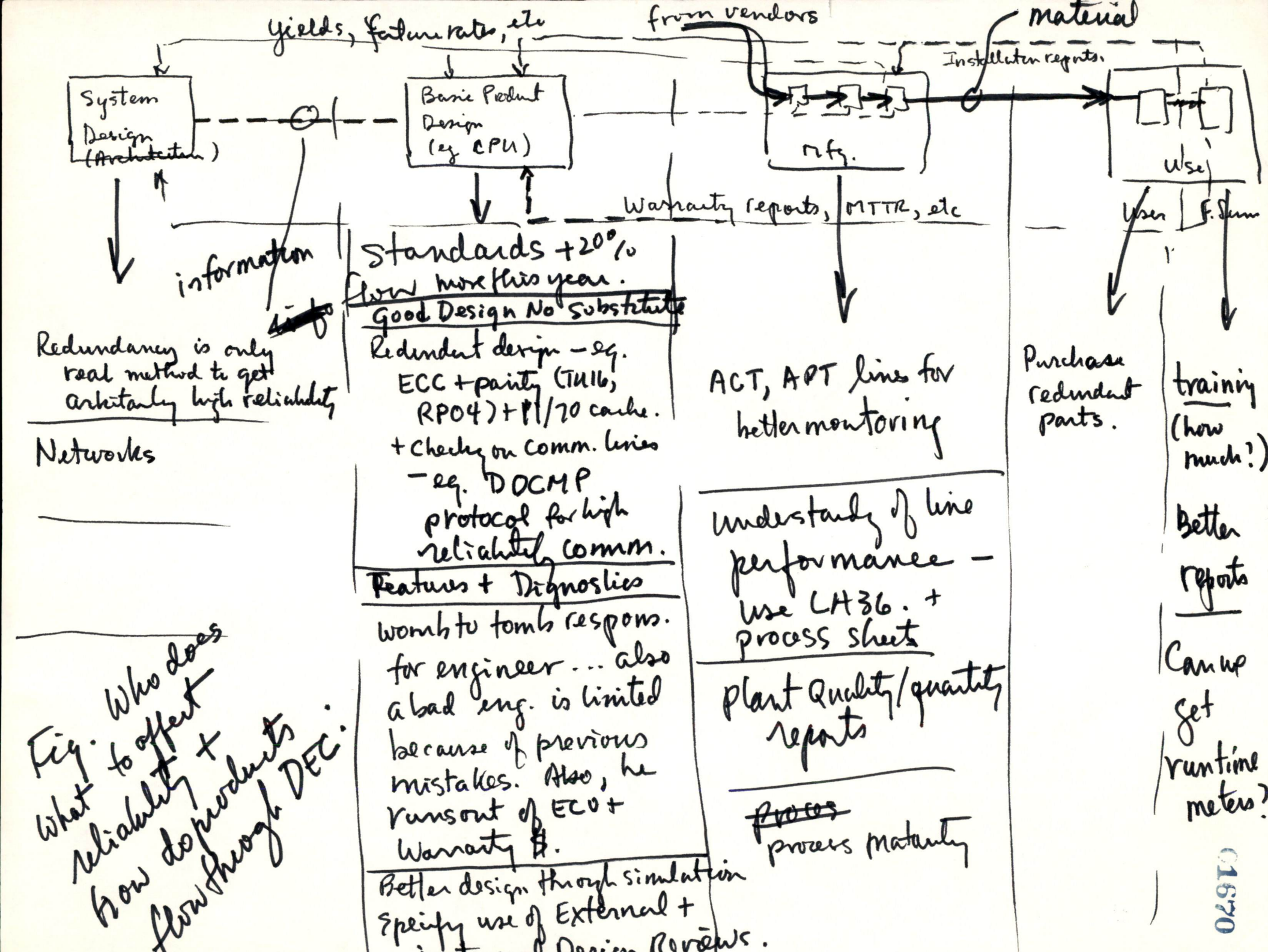
11. Simulation is used extensively on LSI-11: circuits, gate, register-transfer, and systems.

12. MTBF indicator will come from parts list to help understand design maturity + field data.

13. Our people are better vis a vis their engineering backgrounds to understand the process statistical issues--i.e., education is important too.

14. We use our own computers in the design, construction and test. If you know what we do relative to say some of the other test equipment, that might be worthwhile. We were first to have computer testor for modules and for memories!

GB:mjk


Yields, failure rates, etc
from vendors
material
Installation reports
System Design (Architecture)
Basic Product Design (eg CPU)
Mfg.
Use
Warranty reports, MTTR, etc
User
F. Serv
information
Standards +20% flow more this year.
Good Design No Substitute
Redundancy is only real method to get arbitrarily high reliability
Redundant design – eg. ECC + parity (TU16, RP04) + P1/20 cache. + Checks on comm. lines – eg. DOCMP protocol for high reliability comm.
ACT, APT lines for better monitoring
Purchase redundant parts.
training (how much?)
Better reports
Networks
Features + Diagnostics
womb to tomb respons. for engineer ... also a bad eng. is limited because of previous mistakes. Also, he runsout of ECO + Warranty $.
Understandg of line performance – use LA36. + process sheets
plant Quality/quantity reports
Process
process maturity
Can up set runtime meters?
Better design through simulation
Specify use of External + internal Design Reviews.
Fig. Who does what to effect reliability + how do products flowthrough DEC.

```
175   4    100   0  272   0        0 SETNCC
176   3      0   0    0   0        0 0,200
177   3      0   0    0   0        0 0,7
200   4    100   0  276   0        0 SETVCC
201   3      0   0    0   0        0 0,177777
202   4    100   0  310   0        0 SETZCC
203   4    100   0  322   0        0 SIGNEX
204   3      0   0    0   0        0 0,177400
205   4    100   0  332   0        0 BRANCH
206   4    100   0  360   0        0 EXEC
207   4    100   0  364   0        0 CLR.B
210   3      0   0    0   0        0 0,50
211   3      0   0    0   0        0 0,1050
212  10   1001   0    0   0        0 SYFLAG
213   4    100   0  400   0        0 COM.B
214   3      0   0    0   0        0 0,51
215   3      0   0    0   0        0 0,1051
216   4    100   0  424   0        0 INC.B
217   3      0   0    0   0        0 0,52
220   3      0   0    0   0        0 0,1052
221   4    100   0  447   0        0 TST.B
222   3      0   0    0   0        0 0,57
223   3      0   0    0   0        0 0,1057
224   4    100   0  467   0        0 ADC.B
225   3      0   0    0   0        0 0,55
226   3      0   0    0   0        0 0,1055
227   4    100   0  537   0        0 MOV.B
230   3      0   0    0   0        0 0,11
231   4    100   0  562   0        0 ADD
232   7   1001   0    0   0        0 SYTEMP
233   3      0   0    0   0        0 0,200000
234   3      0   0    0   0        0 0,20
235   4    100   0  613   0        0 CMP.B
236   3      0   0    0   0        0 0,12
237   3      0   0    0   0        0 0,400
240   4    100   0  651   0        0 ROR.B
241   3      0   0    0   0        0 0,600
242   3      0   0    0   0        0 0,10600
243   3      0   0    0   0        0 0,777
244   3      0   0    0   0        0 777777,777000
245   4    100   0  714   0        0 BPL
246   4    100   0  721   0        0 BLE
247   4    100   0  726   0        0 BNE
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