SUBJ: POTENTIAL TO SHIP MORE BY ACCELERATING ENGINEERING PROJECTS

TO: Operations Committee

0964

FROM: OOD

December 6, 1974

General

1. Work on all projects that require sales and marketing support:

   A. The TC/D project needs analysis and measurement. Also analysis of RSX 11D/M and Comtex will probably enhance sales because of increased product knowledge.

   B. Benchmarks and product comparisons. We really need to organize this activity with PL's to avoid duplication.

   C. MTBF book on PDP-11.

2. Better analysis of the critical projects and elsewhere using staff and development resources now will assure these products will make it with low ECO's. These activities include: Potter (11A/05 PS), Best + Noelcke (PDP 14 I/O Modules, 32K sense, 11/A05 + 8/A PS, floppy R-W); 1 on 1 logic design reviews by persons in research and elsewhere (floppy, TS, COMM options, microprocessor); LSI group--logical design; simulation to insure producibility--use on various high volume options (e.g. 11/A05).

3. Generally accelerate to the limit to manage: floppy, the small tape, large disk, 11/A, WD, and 11/OK

4. Networks. Real push and start selling components now for delivery prior to original June date.

5. IAS the timesharing system on 11/45 and 11/70. Will certainly compete with the HP3000.

6. Multiprogramming on RT using BASIC

7. Interprocessor High Speed Communications Link.

8. KL10. Can it use help?

9. VT50 copier.

10. A project that would get a quick writeable control store on 11/40. This would defuse the Microprogramming WCS on both the HP21MX and the DG Eclipse. We might not actually ship any until the OK, when all the smoke clears.

11. We should brainstorm to see if there is a trivial turnkey system which could be built to install immediately.

12. General expense reduction. Get a data base program to cut down on the tons of paper we distribute now throughout engineering!

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12. General expense reduction. Get a data base program to cut down on the tons of paper we distribute now throughout engineering!

13. Personnel and other support resources probably should be moved to liaison, support and communications roles.

OOBiMJK

0966

digital

December 6, 1974

R. J. Murray
Group Planning Manager
Valentine Holdings Limited
50-54 Clayton Road
Clayton North, Victoria 3168

Dear Mr. Murray:

We don't have a really good production system for ISP available. The CMU group is continuing to work on it however. Considerable design aids were made available for the PDP-16 modules for assembling hardware. These are not generally available now as the 16 isn't supported. They were written in BASIC, and converted blocks to a wire list.

Prof. Chu, at U. of Maryland, College Park, Maryland, has a system, CDL, which he might make available to you. You might contact him.

A copy of the Bell-Grason-Newell book is enclosed.

Sincerely,

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

GB:mjk

Enclosure

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

0967

VALENTINE HOLDINGS LIMITED

50-54 CLAYTON ROAD, CLAYTON NORTH, VICTORIA 3168.
TELEPHONE: 544 0333 · CABLES: "VALENCARD" MELBOURNE
TELEX A.A.32762 AUSTRALIA

PUBLISHING

PRINTING

COMPUTER
SERVICES

November 27, 1974.

Dr C Gordon Bell
c/- Digital Equipment Corporation
146 Main Street
MAYNARD. MASS. 01754. U.S.A.

Dear Dr. Bell:

We have a current project which is concerned with the design of some small special purpose computers, along the lines of the PDP-16 system.

Because you have originated techniques for the analysis of such designs using ISP, I would like to know from you whether it is possible for us to have access to ISP or some similar hardware modelling scheme you may be aware of. In particular, I would like to explore the possibility of having ISP made available to us locally.

As the only immediate alternative is develop our own modelling system, I would appreciate it if you would give me an answer as promptly as possible.

Yours faithfully,

R.J. MURRAY.
Group Planning Manager.

RJM/lc.

Dear

We don't have a really good production system for ISP available. The CMU group is continuing to work on it however. Considerable design aids were made available for the PDP-16 Modules for assemblying hardware. These are ~~are~~ not generally available now as the 16 isn't supported. They were written in BASIC, and converted ~~assembl~~ blocks to a wire list.

~~Prof.~~ Chu at U. of ~~Mand~~ Maryland, has a system, CDL which he might make available to you. You might contact him.

College Park, Maryland.

~~A copy of the~~

A copy of the Bell-Grason-Newell book is attached

digital INTEROFFICE MEMORANDUM

TO: Circulation

DATE: December 11, 1974

0968

FROM: Gordon Bell

DEPT: OOD

EXT: 2236 LOC: ML12/A51

SUBJ: ATTACHED NATIONAL SCIENCE FOUNDATION PROPOSAL

I was given this proposal to review by the National Science Foundation. Note, they hope to use the 11/WD-on-a-board.

The work is interesting, because it addresses the problem of applying the microcomputer to small systems, which would have been done with analog techniques. If they get the grant, I believe we should try to sell them for sure to use our machines--particularly since the support is with an 11/35. This would give a user an extremely unique and powerful capability to apply the computer to problems, and it goes well beyond the low level tools we usually supply (e.g. Operating Systems, BASIC, and FORTRAN).

The proposal is worth reading, and this type of program is one that I believe we'll be seeing more of with smaller machines.

Circulate, date, and return:

Date

Jim Bell
Andy Knowles
Richie Lary
Bob Savell
Mark Sebern
Steve Teicher
Brad Vachon
Rob Vannaarden
Pete Van Roekens
Mel Woolsey

digital INTEROFFICE MEMORANDUM

1086

TO: John Kulik

DATE: November 5, 1973

FROM: Gordon Bell GB

DEPT: Engineering 12-1

EXT : 2236

0969

SUBJ: MIKE DOREAU

Please arrange to give Mike Doreau a visitors-type badge which would allow him in the mill unescorted. He is a doctorate student from CMU and is writing his thesis on a subject here at DEC. Mike will be working with Lou Abel and will probably have some weekend work. He will be using the Thompson Street entrance.

Thank you.

GB:mjk

December 28, 1973

Please extend Mike Doreau's visitor's badge to the end of March.

Gordon Bell GBell mjk

5/30/74

John,

Please extend Mike Doreau's visitor badge until Dec. 31, 1974.

Gordon Bell Gordon Bell

12/13/74

John,

Please extend Mike Doreau's visitor badge until June 30, 1975.

Gordon Bell GBell

SUBJ: LA180

DATE: 12-16-74
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ: LA180 TO ENTER PRINTER BUSINESS

To: Ed Corell
Al Huefner
Andy Knowles

CC: Products Committee
Marketing Committee

Are we missing a tremendous opportunity by not pushing the LA180 faster and harder? Every competitive low end system I see has a Centronics on it (e.g. Singer, DEC, DG, etc.). Can we get this market away on the issues: of quality, reliability, price, service?

The interface to these systems is the same one we use? Is it an easy add-on or replacement business? All the printers out then are probably totally worn out now, and really costing the user or supplier vis a vis service.

What youse think? Can we get components and the product manager to make a proposal?

GB:mjk

SUBJ: MICROCOMPUTERS DATE: 12-16-74
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

COMPANY CONFIDENTIAL

Subj: MICROCOMPUTERS--DATA NEEDED TO USE THEM INTERNALLY

To: Distribution

Rick and Mike did an excellent job of designing and benchmarking two terminal designs (PTS and VT51). The results are attached (I distributed this before). We need more data from them on the WD and Motorola chips. Rick Merrill has stated that the chip count using the 11/WD is 3X that of an 8080 based system for PCS. I want to see the design!

We are entering a computer market period where designs will be benchmarked by: chip count, cost, number of ROM/RAM bits, speed, apparent ease of hardware design by simple interface chips, clocks, etc., compatibility, and software (languages, host machines, and subprograms--ease of software design). Second sourceness is an issue. We have the benchmarks for bits/time for some small subprograms. We need to fill out the matrix of cost for say the above system--since it is a relatively large system, and add the Motorola 6800, 6700 (to be announced), and WD 3 chip and 1 chip set. This will give us some feeling as to where we (can) stand, and the direction for improvement.

For our own systems, e.g. VT51, it seems clear to me that the chip count probably isn't the constant on its success.

Our internal criteria:

1. Total cost--probably dominated by RAM/ROM. Clearly will be when the microprocessor people start shooting it out in the price war and cost=0.

   In VT and LA's the package and mechanics dominate.

2. Programming support--we have to limit ourselves to a single design and evolve it or evolve with it. These smart devices,

SUBJ: MICROCOMPUTERS DATE: 12-16-74
FROM: GORDON BELL

e.g. VT51--appear to all be different in some way--a small programming problem.

Right now we're on a course to use WD externally, and we have chaos internally. We must have data to know why we can't use WD internally or what we have to do to use it? Can we better use their 1 chip processors, as it's bus compatible.

I've asked MOTOROLA to give us a real hard sell on microprocessors and their application. If they're really great, then we ought to turn on internally for various products. However, its clear to me they are our external competitor to boarded and boxed computers.

GB:mjk
Attachment

Distribution

Dick Clayton
Lorrin Gale
Andy Knowles
Mike Leis
Rick Merrill
Larry Portner
Bob Puffer
Tom Stockebrand
Steve Teicher
Rob VanNaarden

To: Clayton, Teicher, Eorell ✓

digital INTEROFFICE MEMORANDUM

TO: Gordon Bell
Tom Stockebrand
Ken Fine
John Buzynski
Chuck Kamann
Steve Teicher

DATE: December 5, 1974 0973

FROM: Mike Leis/Rick Merrill

DEPT: A/N Display

EXT: 3406 LOC: 5-3

DEC 09 1974

SUBJ: PRESENT SIZE AND CHIP COUNT OF THE VT51 AND THE PCS

Attached are simplified block diagrams showing the chip per function of the VT51 and PCS.

Totaling the microprocessor, clock, equal size memory, UART, video and interfaces for cassettes, printer, and keyboard, the VT51 has 159 chips and the PCS has 185 chips. The VT51 has several other functions which bring its chip count to 186, and the PCS is not completely minimized.

The VT51 P.C. boards presently have 828 square inches or 4.4 square inches per chip, while the PCS may have 135 square inch of PC boards or .7 square inches per chip.

A study will follow later attempting to quantize the costs associated with the radically different densities. Also, we must investigate the cost differences between the VT50/51 style boards and the DEC standard boards.

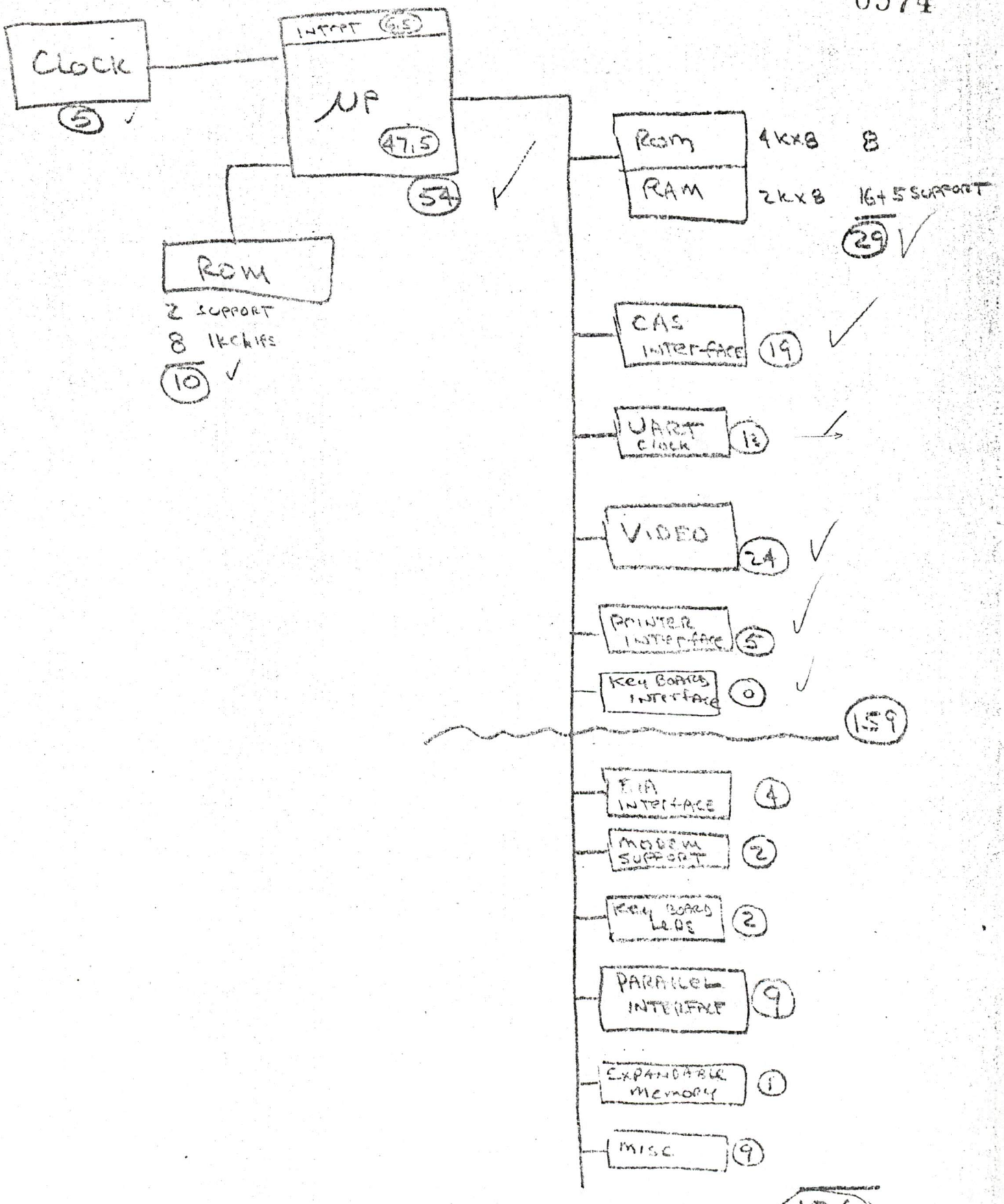
Rick What does the WD design look like, by comparison.

Also, the Motorola 6800 design?

GB

FM: Leis/Merrill

0974

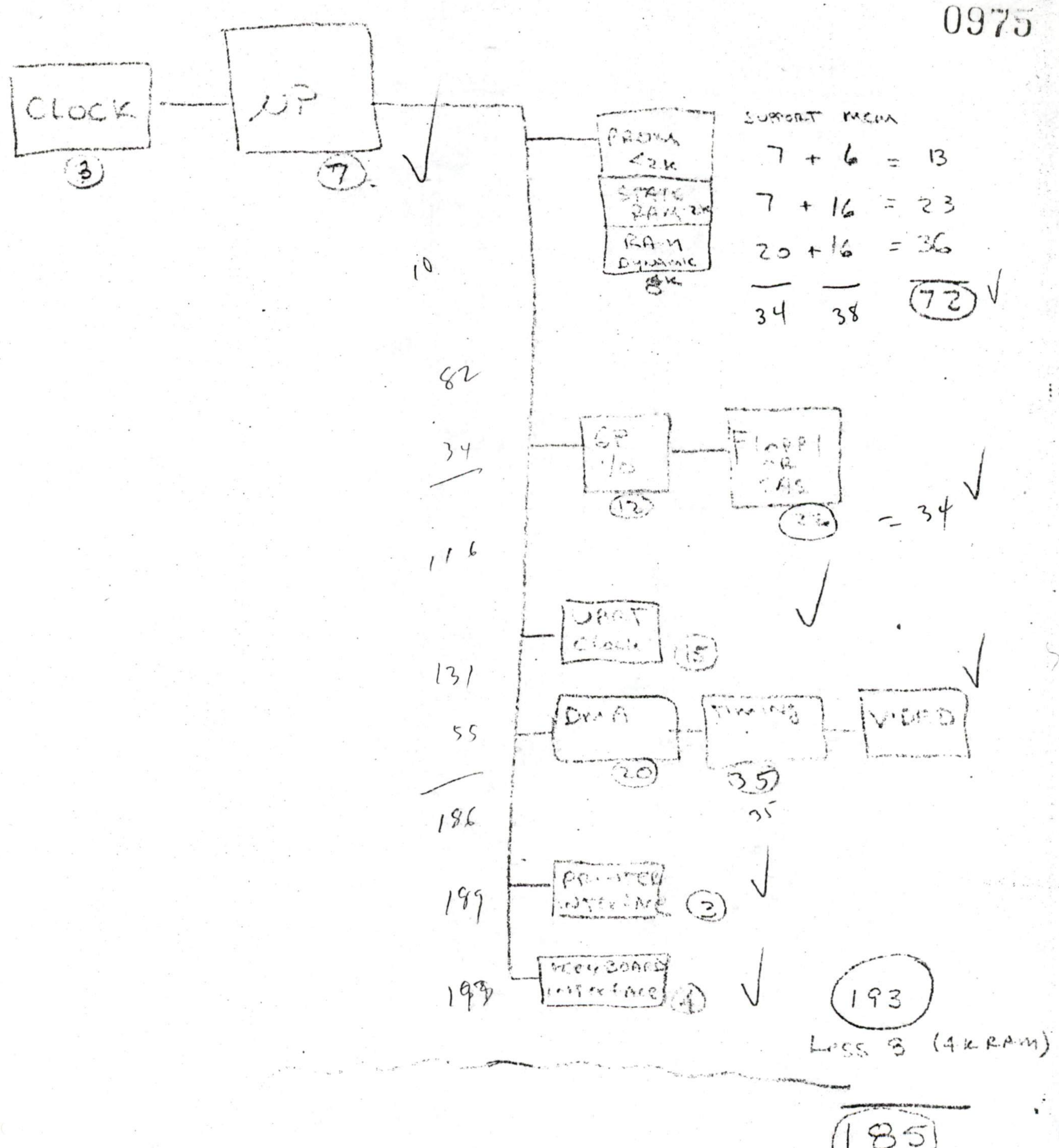


NOTE: ALL CHIPS CONSIDERED TO BE EQUAL SIZE.

VT51

Component	Prototype Computer System (8080)		VT51 0976 (Home-maid μP)	
clock and processor		10		59
Microprogram memory - rom			2+8 (1K)	10
The - processor		10		69
Static ram	7 + 16 (2K)	23	5+16(2K)	21
prom / rom	7 + 6 (2K)	13	8 (4K)	8
Dynamic ram.	20 + 16 (8K)	36		—
Total - P+Mp		82		98
Floppy or Cassette interface		34		19
UART to comm.		15		13
Video		55		24
Printer interface		3		5
Keyboard "		4		0
		193		159
Total.				
Less Dynamic ram		36		
Less display complexity		25		
adjusted Total.		132		159
EIA Interface				4
Modem Support				2
Keyboard LEDs				2
Parallel interface				9
Expandable Mem.				1
Misc				9
				186

GB
12/74


CLOCK
3
µP
7
PROM <2K
STATIC RAM 2K
RAM DYNAMIC 8K
SUPPORT MEM
7 + 6 = 13
7 + 16 = 23
20 + 16 = 36
34
38
72
10
82
34
116
GP I/O
12
FLOPPY OR CAS
= 34
UART Clock
15
131
55
186
DMA
20
TIMING
35
VIDEO
PRINTER INTERFACE
2
199
KEYBOARD INTERFACE
193
LESS 8 (4K RAM)
185

PCS

digital

December 17, 1974

W. Leighton Collins
Manager, Resident Fellow Program
American Society for Engineering Education
Suite 400
One Dupont Circle
Washington, D.C. 20036

Dear Mr. Collins:

I'm sorry, but we will not be able to participate this next year. Please try us the year after.

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

(202) 293-7080

American Society for Engineering Education suite 400
one dupont circle, washington, d.c. 20036

0978

DEC 13 1974

Dear Mr. ~~—~~
Sorry, we will not participate this year. Please ~~keep us~~ try us next year.
12-22

December 9, 1974

Mr. Gordon Bell
Vice President, Engineering
Digital Equipment Corporation
146 Main Street
Maynard, Massachusetts 01754

Dear Mr. Bell:

Your company is again invited to participate in the Resident Fellow Program of the American Society for Engineering Education. The Program is familiar to you but there are several changes this year that you should know about.

Most significant is the broadening of eligibility to give you a greater choice of the "kind of man" you want to employ. This has been accomplished by including faculties of engineering technology as well as of engineering, by removing the forty-year age limit and by eliminating the Ph.D. degree requirement. Major emphasis, of course, still is on giving the young faculty member an opportunity for experience in the decision making, problem solving and cost conscious world of the practice of the engineering profession--in industry, private practice or government. It also should be mentioned that the Program is now entirely self-supporting. According to plan, Ford Foundation funds are no longer available to defray any costs involved and the employer consequently pays ASEE $2,000 per Resident to defray administrative costs.

Participation in the Resident Fellow Program gives you an opportunity to employ a highly competent and motivated engineer, to improve college-industry relations, and to have an influence on the kind of education given to engineering students. The enclosed brochure gives the details. Please read it carefully and then inform me of your interests. Nominations are now being readied for screening and when the task is completed, I will send you, upon request, a brief resume of all candidates and a more detailed biographical sketch of those that seem particularly suited to your needs.

I hope you will respond favorably and I'll do my best to answer any questions you might have. If, perchance, you no longer are the individual to whom this letter should have been directed, please forward it and inform me of the individual's name and title.

Sincerely,

W. Leighton Collins

W. Leighton Collins
Manager, Resident Fellow Program

Enclosure

SUBJ: PDP-14 DATE: 12-17-74
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ: PDP-14 PERFORMANCE AND FUTURE DIRECTION

To: OC
Don Chace
Bob Savell
Brad Vachon

The ROI on the PDP-14 from 70 to 74, and also for 75 as we are projecting, is 11% and 19.5%. The ROI is much less than we are expecting and getting. Our standard products including systems with combined hardware/software systems are anywhere from 25% to several hundred % on disks and memories. We spent $2.5M on it for engineering--less than the amount for our RSX series operating systems, which IPG successfully markets and always needs more capabilities in! My guess, if you can get the Field Service factored in, the results will be really abysmal.

GB:mjk

Attachment

ROI - PRESENT VALUE TABLE

0980

QTR	FACTOR	EXPENSES ACTUAL	EXPENSES PR VAL	REVENUES ACTUAL	REVENUES PR VAL
70					
= 1	= 1.00000	= 1031.0	= 1031.0	= 0.0	= 0.0
= 2	= 0.95648	= 0.0	= 0.0	= 0.0	= 0.0
= 3	= 0.91486	= 0.0	= 0.0	= 629.0	= 575.5
= 4	= 0.87504	= 0.0	= 0.0	= 0.0	= 0.0
71					
= 1	= 0.83696	= 1385.0	= 1159.2	= 0.0	= 0.0
= 2	= 0.80054	= 0.0	= 0.0	= 0.0	= 0.0
= 3	= 0.76570	= 0.0	= 0.0	= 1120.0	= 857.6
= 4	= 0.73237	= 0.0	= 0.0	= 0.0	= 0.0
72					
= 1	= 0.70050	= 2167.0	= 1518.0	= 0.0	= 0.0
= 2	= 0.67002	= 0.0	= 0.0	= 0.0	= 0.0
= 3	= 0.64086	= 0.0	= 0.0	= 2571.0	= 1647.7
= 4	= 0.61297	= 0.0	= 0.0	= 0.0	= 0.0
73					
= 1	= 0.58629	= 2741.0	= 1607.0	= 0.0	= 0.0
= 2	= 0.56078	= 0.0	= 0.0	= 0.0	= 0.0
= 3	= 0.53637	= 0.0	= 0.0	= 3142.0	= 1685.3
= 4	= 0.51303	= 0.0	= 0.0	= 0.0	= 0.0
74					
= 1	= 0.49070	= 4127.0	= 2025.1	= 0.0	= 0.0
= 2	= 0.46935	= 0.0	= 0.0	= 0.0	= 0.0
= 3	= 0.44892	= 0.0	= 0.0	= 4865.0	= 2184.0
= 4	= 0.42938	= 0.0	= 0.0	= 0.0	= 0.0
75					
= 1	= 0.41070	= 6470.0	= 2657.2	= 0.0	= 0.0
= 2	= 0.39282	= 0.0	= 0.0	= 0.0	= 0.0
= 3	= 0.37573	= 0.0	= 0.0	= 8119.0	= 3050.5
= 4	= 0.35938	= 0.0	= 0.0	= 0.0	= 0.0
		= 17921.0	= 9985.9	= 20446.0	= 9985.9

RETURN ON INVESTMENT = 19.5%

John Hughes
12/17/74

*

ROI - PRESENT VALUE TABLE

QTR	FACTOR	EXPENSES ACTUAL	EXPENSES PR VAL	REVENUES ACTUAL	REVENUES PR VAL
70					
= 1	= 1.00000	= 1031.0	= 1031.0	= 0.0	= 0.0
= 2	= 0.97438	= 0.0	= 0.0	= 0.0	= 0.0
= 3	= 0.94941	= 0.0	= 0.0	= 629.0	= 597.2
= 4	= 0.92508	= 0.0	= 0.0	= 0.0	= 0.0
71					
= 1	= 0.90137	= 1385.0	= 1248.4	= 0.0	= 0.0
= 2	= 0.87827	= 0.0	= 0.0	= 0.0	= 0.0
= 3	= 0.85577	= 0.0	= 0.0	= 1120.0	= 958.5
= 4	= 0.83384	= 0.0	= 0.0	= 0.0	= 0.0
72					
= 1	= 0.81247	= 2167.0	= 1760.6	= 0.0	= 0.0
= 2	= 0.79165	= 0.0	= 0.0	= 0.0	= 0.0
= 3	= 0.77136	= 0.0	= 0.0	= 2571.0	= 1983.2
= 4	= 0.75160	= 0.0	= 0.0	= 0.0	= 0.0
73					
= 1	= 0.73234	= 2741.0	= 2007.3	= 0.0	= 0.0
= 2	= 0.71357	= 0.0	= 0.0	= 0.0	= 0.0
= 3	= 0.69528	= 0.0	= 0.0	= 3142.0	= 2184.6
= 4	= 0.67747	= 0.0	= 0.0	= 0.0	= 0.0
74					
= 1	= 0.66011	= 4127.0	= 2724.3	= 0.0	= 0.0
= 2	= 0.64319	= 0.0	= 0.0	= 0.0	= 0.0
= 3	= 0.62671	= 0.0	= 0.0	= 4865.0	= 3048.9
= 4	= 0.61065	= 0.0	= 0.0	= 0.0	= 0.0
		= 11451.0	= 8763.2	= 12327.0	= 8761.4

RETURN ON INVESTMENT = 11.0%

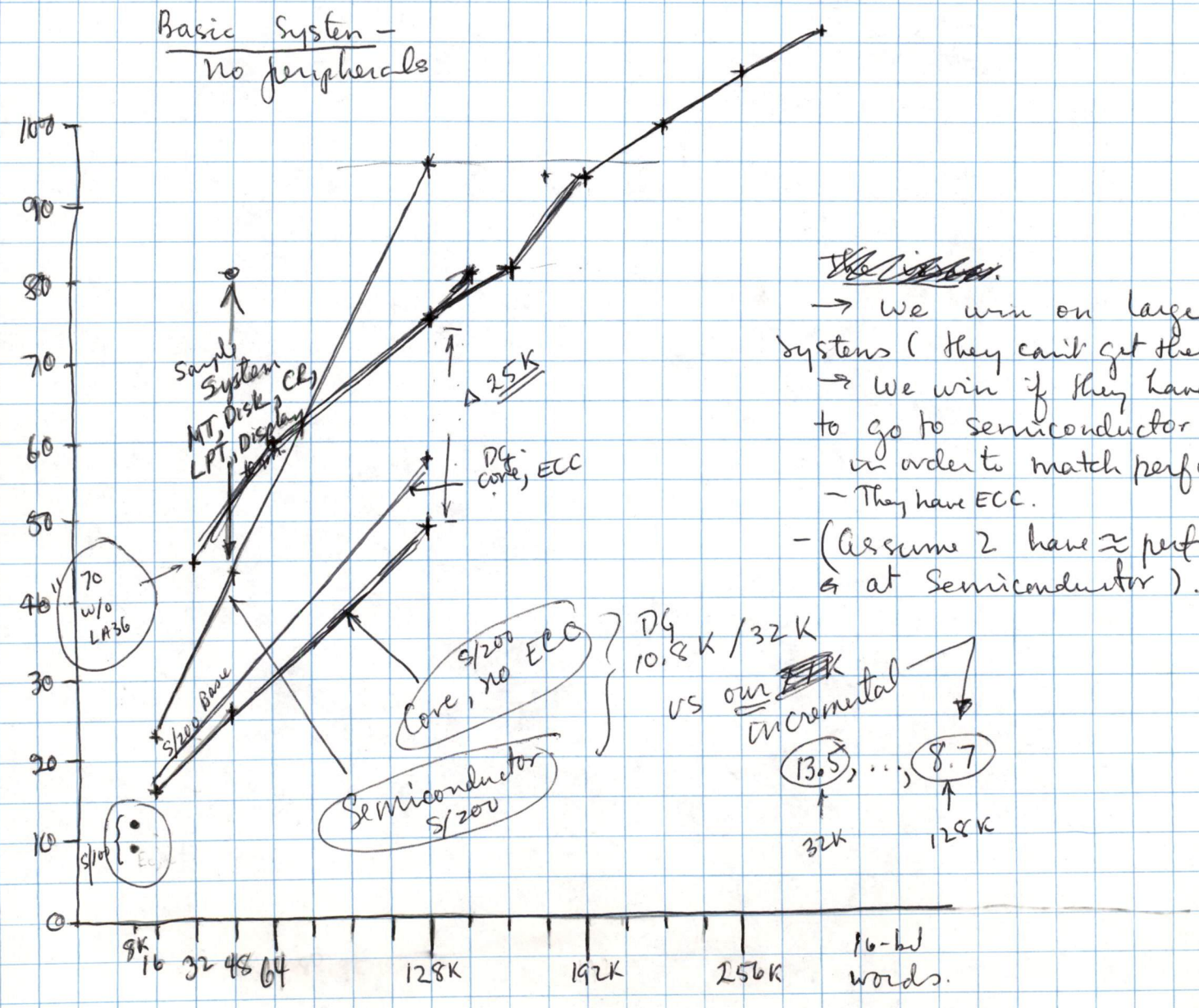
John Hughes
12/17/74

0982

Subject: Eclipse vs 11/70

TO: Remmer, Clayton, McBride, Carnes, Fisher, Lemaire, Misaleh
~~MKt~~ MKt. Committee, Marcus, Long, Jacobs, Vachon, Kramer.

FM GJBell, 12/14/75



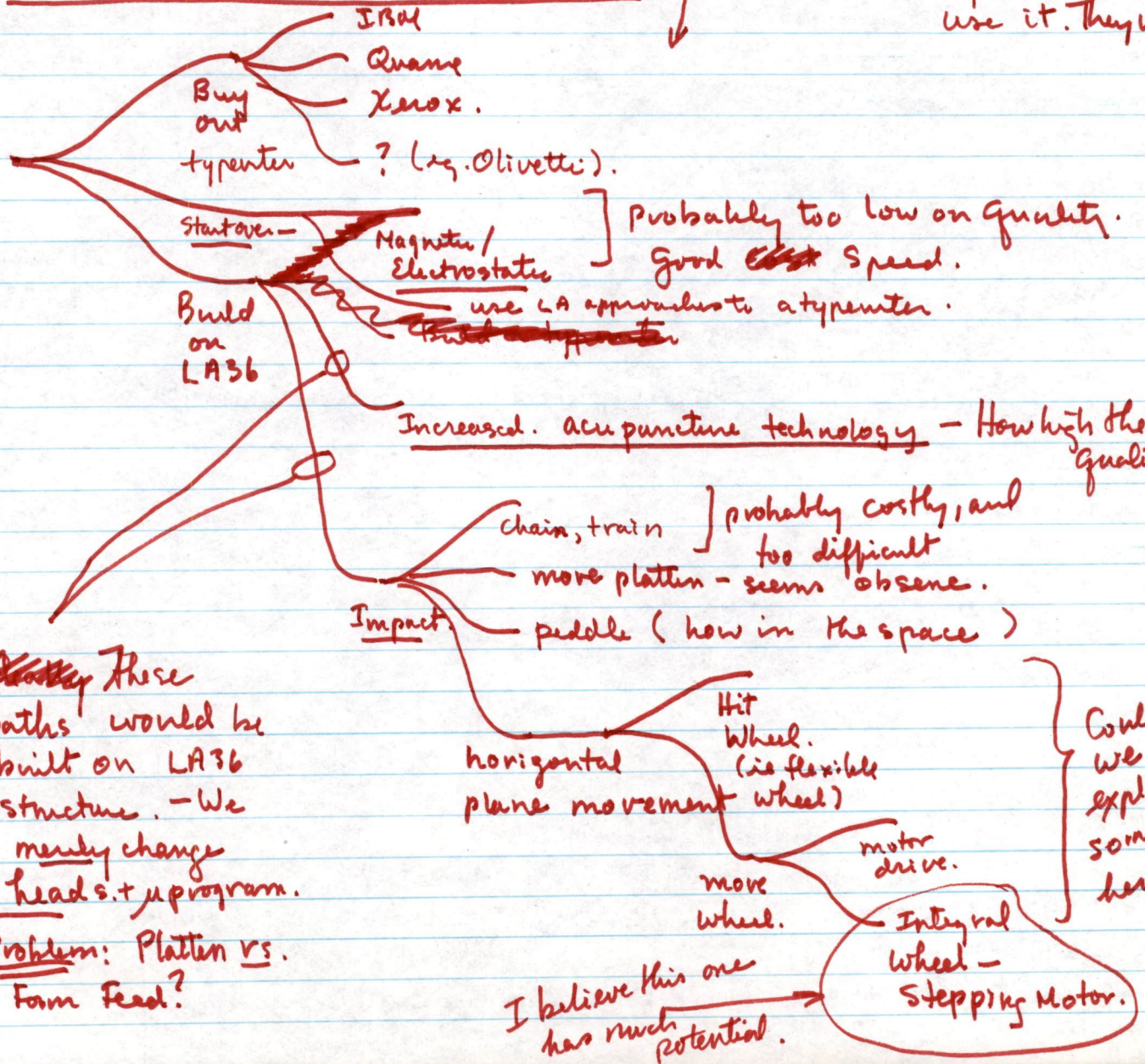
→ We win on large systems (they can't get there).
→ We win if they have to go to semiconductor — in order to match performance
- They have ECC.
- (Assume 2 have ≈ performance at Semiconductor).

Subject: High Quality Printing

To: Ed Cornell, Bob Putter, Al Hoffner. 15 Dec. 1974.
cc: K. Olsen, S Olsen, J. Gilmore Fm: g Bell.

Within the next 2 years, there will be increased emphasis on getting a very high quality printer (ie typewriter). Let's outline how we're going to have the basis to make this decision. Stan (Jack Gilmore) is really pushing at word processing, for example. We could just wait for a clever typewriter co. (eg. Olivetti) to build a great, low cost typewriter — and use it. They will.

I see the space of alternatives:



digital

December 17, 1974

Professor W. L. van der Poel
University of Technology of Delft,
Department of Mathematics
Julianalaan 132, Delft
The Netherlands

Dear Professor Van Der Poel:

I just received the letter of appointment for the editorship of the IFIPs Conference on Minicomputer Software. Please correct your files to read Dr. James R. Bell (DEC) and C. Gordon Bell (DEC and Carnegie-Mellon University)--coeditors. This is in accordance with my original agreement with Bill Wulf.

Jim will be attending the conference, and we will edit the proceedings together. It would be helpful if you could send ideas about what you expect of us as editors and deadlines. Also, I don't have a copy of the proceedings you edited, but would like a copy if you could send one, as it would be helpful as to standards (and I would like to read the material).

It would be helpful if you could put us in contact with the editor at the publisher, and indicate various dates, etc. I look forward to a successful conference and proceedings.

Sincerely,

Gordon Bell

Gordon Bell nsh
Vice President, Office of Development
Professor, Computer Science
Carnegie-Mellon University (on leave)

CGB:mjk

cc: Jim Bell
Bill Wulf
P. G. Hibbard

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

~~Copy to~~ MJ

TWX 23763

0985

Dr. P. G. Hibbard

DEPARTMENT OF COMPUTATIONAL AND STATISTICAL SCIENCE
VICTORIA BUILDING BROWNLOW HILL
P.O. BOX 147 LIVERPOOL L69 3BX

TEL: 051 – 709 - 6022 EXT.

The University of Liverpool

and resend letters

PGH/JOC

26th November 1974

Professor C. G. Bell,
Department of Computer Science,
Carnegie-Mellon University,
Schenley Park,
Pittsburgh 15213,
U.S.A.

~~Please correct~~
Received Letter of 26 NOV.
PLease correct
editorship to: ~~read:~~
Co-EDITORS: JAMES R. BELL AND Gordon Bell, DE Digital EQUIP Carnegie-Mellon U AND Digital EQUIP. Corp.

Dear Professor Bell,

On behalf of the Organising Committee of the Working Conference on Software for Minicomputers, may I thank you for accepting the editorship of the conference proceedings.

As you may know, the official IFIP publisher is North Holland, and I have written to Tom Steel, Chairman of IFIP Technical Committee 2, asking him to put you in touch with them. If you have any questions about this conference, please let me know, though questions specific to the editorship are best directed to Bill van der Poel, who edited the Trondheim Conference proceedings on Machine-Oriented Higher-Level Languages last year, and who is on the Organising Committee of this conference. His address is:

Professor W. L. van der Poel,
University of Technology of Delft,
Department of Mathematics,
Julianalaan 132,
Delft,
The Netherlands.

to Delft

I enclose the circular which has just been sent to the invitees. I will be writing to the members of the organising committee shortly, and I will send you a copy of that letter. I will also send you copies of all future communications between organising committee members.

Dear

Yours sincerely,

Peter Hibbard Digital EQUIP Corp

+over

A schedule would be helpful.

~~Please send another letter~~

JIM ~~JAMES~~ will be attending, I WON'T, AS I INDICATED TO W. WULF.

Dear Professor Van Der Poel

I just received the letter-~~accepting~~- of appointment for the editorship of the IFIPs Conference on Minicomputer Software. Please correct your fils files to read, Dr James R Bell (and C Gordon Bell HJ James R Bell (DEC) and C Gordong Bell (DEC and Carnegie Mellon U). co-editors. James Jim will be attending the conference, and we will edit the proceedigns together. It would be helpful if you could send ideas about what you expedct of us as editors and deadlines. I g It w seems like the Also, I don't have a copy of the proceedings y-u edited, but would like to Could you send a copy ? as it would be helpful as to standards (and I would like to read the materil).

~~Also, what do~~

~~Also, I would like~~

It would be helpful if you could ~~tell us who~~ ~~contact the publisher~~ put us in contact with the editor at the publisher, and indicate various, dates, etc. ~~I'l~~ I look forward to a successful ~~p~~ Conference and proceedings.

Gordon

C.C: Wulf,
James Bell.
Hibbard.

This is in accordance with my original agreement with Bill Wulf.

OT
ITT 12 17 1538*
DIGITAL MAYN A
851627095";
UNIVERSITY LPL
DIGITAL MAYN A

0986

0078 1410 17-DEC 18081 1219 17-DEC
MP30 FORN

ZCZC
23763
MSG NO NA10

TO: UNIVERSITY OF LIVERPOOL
ATTN: DR. P.G. HIBBARD
TELEX NO. 23763 LIVERPOOL ENGLAND

RECEIVED LETTER OF 26 NOVEMBER. PLEASE CORRECT EDITORSHIP
AND RESEND LETTERS TO:

CO-EDITORS

JAMES R BELL
DIGITAL EQUIPMENT CORPORATION

GORDON BELL
CARNAGIE MELLON UNIV AND DIGITAL EQUIPMENT CORPORATION.

JIM WILL BE ATTENDING. I WON'T AS I INDICATED TO BILL WOLF.
A SCHEDULE WOULD BE HELPFUL.

FROM: GORDON BELL - DIGITAL MAYNARD

REGARDS
JG
NNNN
*

UNIVERSITY LPL.....
12/17/74 1541EST 002.4

SUBJ: ARPA PROPOSAL DATE: 12-19-74

FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ: A SECOND REQUEST FROM ARPA FOR RESEARCH ON 3 TOPICS

To: OOD

I got a call today from Craig Fields of ARPA, relative to a research proposal. They didn't like our draft proposal on the terminals, because it wasn't aligned with what they wanted. They would like any/all of the following before Jan 15.

1. A really good, scan-graphic display to be used as the front end to their office automation/data-base systems. It must be better than a GT40. It would drive a standard monitor, and possibly go to 1000 lines or color. They would like a bit memory map plus various generators to get the vectors and arbitrary characters. I hope Len Hallo would put this proposal together (if interested), coordinating the various ideas and people (within Stocky's group and CSS). They would like to be able to get subsequent copies if we get anything interesting. They believe this would cost 100 to 110K.

2. Low cost PDP-10 with pager, and 1-megabit of memory and a swapper. They would pay about 250K for this research. This would be a single researcher's personal 10. Certainly double as a single breadboard.

3. High Speed IMP. They would like to get a commercial system similar to the one BBN developed for packet message switching. We would develop the hardware and software. Ideally, we would be able to get some assistance from BBN in the way of consulting etc.

I don't really know how this one should be handled. We have to have such a product eventually. Any ideas who would propose and run this?

The proposal format details can be answered by Gene Stubbs, ARPA business manager, who Tom Siekman should call to get the information on how to go about this and what the restrictions

are.

The proposal format:

1. 1 page work statement--what we will do.

2. Details of the project, what avenues we intend to explore, milestones, approach, etc.

3. Budget

Jim Bell should probably coordinate this effort to present a consistent message. Call us if interested.

GB:mjk

cc: Jim Bell
Bruce Delagi
Len Hallo
Julius Marcus
Rick Merrill
Mark Sebern
Tom Stockebrand
Nat Teichholtz

digital INTEROFFICE MEMORANDUM

TO: John Leng

CC: Julius Marcus
Larry Portner
Nat Teichholtz

DATE: December 20, 1974

FROM: Gordon Bell

DEPT: OOD

EXT: 2236 LOC: ML12/A51

SUBJ: COMMUNICATIONS/NETWORKS

Regarding the communications/network systems products dilemma. Can we explore how DAS-10 might take on central development in this area? You have the most capability for products. How can you supply these to the corporation too?

How do we explore?

GB:mjk

SUBJ: LSI SEMINAR

DATE: 12-20-74
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ:

To: Lorrin Gale
Tony Bryan
(and LSI GROUP)

cc: Dick Clayton
Bob Puffer

Since I'm habitually laudatory and supportive of your effort, let me take this special opportunity to state that I believe the LSI seminar came off really well. I hope the line users benefited from it as much as I did. The insights at all engineering levels into past, present, and future are essential to our future.

The book has much hard data and analytic methodology that I hope will filter into our standards and products. The model of what technology to use versus size, etc, for ROI is almost worth pushing to a standard program for engineering.

I hope you'll use the Engineering News to communicate some of the tidbits, and I look forward to book and quarterly updates.

GB:mjk

SUBJ: ARCHITECTURAL POSITION

DATE: 12-20-74
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ:

COMPANY CONFIDENTIAL

To: Distribution

I had great hopes for the staff architectural position in terms of being able to provide focus, leadership alternatives, and perspective in terms of:

0. Structures which are competitive--we are currently in the corner looking at our navel, MODCOMP, now DG, and HP are beating us and already beat our new machines.

1. The necessary enhancements for a VAX at high end;

2. The VAX at low end.

3. The I/O mapping and context switching problem. Everyone has reasonable solutions now here--HP 21MX, MODCOMP and DG.

4. The basis for a 32-bit 11 so it could be compared with a 10, any other internal better alternatives, and most important--the competition. The Rolls Royce benchmark certainly indicates a big hole in what we're doing. I want each one of us to understand why!

5. The ASCII console. All that's happened by having a standard, is that it licensed and suggested more ways to do things than a single engineering group would probably have done. The only 2 instances I know of Q and A both appear different to me.

Schedule of how we're going to get at some of the hard techincal competitors but failing that, get my expectations in line with what is happening or the advertising program to cover the deficiencies.

GB:mlk

SUBJ: ARCHITECTURAL POSITION

DATE: 12-20-74
FROM: GORDON BELL

Distribution

Jega Arulpragasam
Dick Clayton
Bruce Delagi
Bill Demmer
Robin Frith
Bill McBride
Dave Nelson
Bill Strecker
Steve Telcher

CC: Bob Armstrong (re 21MX)
Kaman and O'Loughlin (re DG + MODCOMP)

SUBJ: COMM CONTROLLER

DATE: 12-20-74
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ: THE COMM CONTROLLER ON-A-BOARD AND THE CHIP-SET FOR HIGH PERFORMANCE CONTROLLERS.

To: Distribution

Regarding our discussions this last week, I understood:

1. Vince agreed to have a common microprogrammed controller board(s) for 2 new options. Even going from 2 to 1, I believe this is significantly understaffed in terms of experienced people to design, assemble, simulate, document, and build testers. I.e., it seems to me to be headed for disaster. (This board is more complex than many of our processors, and the currently assigned individual seems like the wrong person to do this.)

2. I don't know what's happening vis a vis controllers on RK06, etc.

3. LSI engineering is trying to define chips which can, in principle do communications controllers and disk controllers. They won't be ready at this time, and since they don't have a real product to go into now, it may not be useful anywhere!

4. LSI engineering has resources which can solve 1 and 2 now.

Since there's a proposal coming from LSI engineering soon, I hope some of these concerns (fears) will be addressed...i.e. educate me and tell me how great things are going to be.

GB:mjk

Distribution

Vince Bastiani
Lorrin Gale
John Hughes

SUBJ: COMM CONTROLLER

DATE: 12-20-74
FROM: GORDON BELL

CC: Dick Clayton
Julius Marcus
Bob Puffer
Grant Saviers

SUBJ: MINUTES/AGENDA FOR OOD | DATE: 12-20-74
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ: OOD STAFF MEETING MINUTES--December 19, 1974

To: OOD
Brian Croxen
Julius Marcus
Henry Lemaire
Len Hallo
Win Hindle
Bill Thompson

ACTION ITEMS ARE ***'d!

1. We discussed the extra hour plan. Each VP will distribute to their own managers.

2. *Budgets--problems in RS03/4 area, 11/55. Vince and Tom to come back with plans.

Q2 data due beginning of second week in December. WIP will not be on Q2 results from plants. Thus the computer reports don't reflect the last month, but rather a float of one month.

*Dick is trying to get this budget on for the year. It's currently projected to be 300K over. Dick will work his test equipment issue for 11/70 with Phil.

Rules for testors: we are moving to have manufacturing pay for all testors beyond the prototype in peripherals as in CPU's and memories.

*Phil will reissue the policy, call attention, and there will be inconsistencies until next year.

*Memories will be 60K (MOS) and 130K (core) under for original budget, but over by 100K on new budget. Brian will come back with a plan for core.

SUBJ: MINUTES/AGENDA FOR OOD

DATE: 12-20-74
FROM: GORDON BELL

Current estimated overrun: 100K core, 100K DECUS, displays 300K, COMM 50K+ and 100K+ for computers. Printer is somewhat over.

3. Plans for next year as/Lander is constant next year.

WE MUST SELL OUR BUDGET PLANS BETTER!!

4. Otis Courtney came and described the EEO audits which are forthcoming.

5. *We discussed the Marketing Committee/Products Committee merger possibility with Bill Thompson. Bill and Larry are going to propose a system of planning, marketing, product integration. OOD will attend on 1.

6. *PSG's--Bill Thompson will attempt to get an audit of the Marketing Committee and PL Managers.

7. Graphics (Hallo, Ashton, Kramer, Hindle)--by centralization, we hope to improve the visibility of graphics and hence increase the use, beginning FY76. This would focus on proper allocation and sales, relative to other products. The graphics group would stay in LDP.
*The graphics group will come back with a proposal.

ARPA--

1. *Graphics--Hallo will propose.
2. PDP-10--Bruce and Dick will study
3. IMP's--Gordon and Julius will study problem

*Gordon (and subsequently Jim Bell) will collect the data.

December 26 meeting agenda:
12:00 to 1:30
---
0. Bob Puffer--please assume the chairmanship.

1. Memories will come back re 100K overrun. Croxon, Lemaire

2. COMM budget review; displays probably will not be back.

3. Clayton will discuss his alternatives for meeting budget.

GB:mjk

digital

December 28, 1974

Myron B. Gilbert
The Boylston, Apt. 8C
Prudential Center
Boston, Mass. 02199

Dear Mr. Gilbert:

I've sent your vitae to John Jones, who heads our Public Relations effort.

Sincerely,

Gordon Bell

Gordon Bell mjk
Vice President
Office of Development

GB:mjk

cc: John Jones

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

0999

digital

December 28, 1974

Mr. Wayne M. Roney, Jr.
c/o W. A. Swayze
4120 Auburn Drive
Royal Oak, Michigan 48072

Dear Mr. Roney:

Thanks for the interest in Digital; however, we aren't hiring at this time. Also, we in general are not searching for people with a highly theoretical and research background in physics.

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

UNIVERSIDADE DE SÃO PAULO
INSTITUTO DE FÍSICA
CIDADE UNIVERSITÁRIA - CX. POSTAL 20516 - FONE: 286-1503 - SP. - BRASIL

1000

November 29, 1974.

Gordon Bell
Digital Equipment Corp.
Maynard, MASS
U.S.A.

Dear Sir:

From information received from the Nuclear Physics division of the A.P.S. I understand that there is a possibility that you would be interested in hiring a physicist with training and abilities similar to mine. Enclosed are a copy of my resumé, a description of my current position and activities at U.S.P., and a list of professional references. My duties here will run until the end of Feb. 1975.

Should you wish to arrange an interview in March, Air Mail letters should be sent on or before Feb.1 if I need to respond to confirm a date in early March. In any event it has been the experience here that letters have a significant chance of not arriving in Brazil, and therefore it would be a good idea to send a copy of the letter to the address below.

I realize that at the moment the economic situation is rather uncertain and that you may not know what positions will be open 6 to 8 months from now, however if you would be interested in further contact, I can be reached at the address below after our return.

Sincerely,

Wayne M. Roney, Jr.

Wayne M. Roney, Jr.

U.S. address:

c/o W.A. Swayze
4120 Auburn Dr.
Royal Oak, Michigan
48072

R E S U M É

WAYNE MASON RONEY, JUNIOR
Born: May 27, 1943
Married, one child

Education

University of Oregon (1961-1965) B.A. (Physics)
University of Wisconsin (1965-1966) M.A.(Physics)
University of Wisconsin (1966-1971) Ph.D.(Physics)

Thesis Title: 'Magnetic Moments of Excited States of Odd-A Nuclei'

Jobs

Teaching Assistant for first year physics lab/ discussion sections at the Univ. of Wis. (1965-66)
Research Assistant at the Univ. of Wisconsin (1966-71)
B.N.D.E. Fellow at the Univ. de São Paulo(1971-75)

Publications

G-factors of Core Excited States Near A=100
W.M.Roney, H.W.Kugel, G.M. Heestand, R.R. Borchers and Rafael Kalish in Nuclear Reactions Induced by Heavy Ions. Ed. by R. Bock and W.R. Hering (North-Holland Publishing Company Amsterdam 1970) p.419

IMPAC Measurements on Levels of ^{125}Te,
W.M. Roney and R.R. Borchers, in Hyperfine Interactions in Excited Nuclei. Ed. by G.Goldring and R. Kalish (Gordon and Breach Science Publishers 1971) Vol. 4, p.1182.

Time Dependent Angular Correlation Measurements of the First 2^+ State of ^{150}Sm Recoiling into Vacuum, T. Polga, W.M. Roney, H.W. Kugel and R.R. Borchers, in Hyperfine Interactions in Nuclei, Ed. by G. Goldring and R. Kalish (Gordon and Breach Science Publishers 1971) Vol. 3, p.961.

Gyromagnetic Ratios of Excited States in $^{123,125}Te$. W.M. Roney, D.W. Gebbie and R.R. Borchers to be published in Nuclear Physics

Advanced Courses

Taught

'Hyperfine Interactions' A one semester graduate level course to give a general picture of the subject from the point of view of nuclear physics and with more emphasis on perturbed angular correlations.

'Statistical Methods for Physicists' A one semester course for seniors and graduate students. The main topics were Parameter Estimation ('Maximum Likely-hood' and 'Minimum Chi Squared'), Error Estimates including correlated parameters, and Prediction Analysis.

References

Robert R. Borchers (Major Adviser)
Physical Sciences Laboratory
P.O. Box 6
Stoughton, Wis. 53589

Oscar Sala
Instituto de Física
Universidade de São Paulo
C.P. 8219
São Paulo, S.P., Brazil

Trentino Polga
Instituto de Física
Universidade de São Paulo
C.P. 8219
São Paulo, S.P. Brazil

Position: I hold a fellowship sponsered by a governmental agency (Banco Nacional do Desenvolvimento Econômico) which requires that the recipients teach as well as do their research. However the Physics Institute treats my position as equal to their equivalent of assistant professor, and I am currently the major professor of one student.

Current Responsibilities: i) Chief of a group of 7 people working on general gamma-ray spectroscopy, and hyperfine interaction measured by perturbed gamma-ray angular correlations. (This item needs clarification since as far as I know my situation is rare. The Brazilian members of the group had never participated in the type of experiments that we are doing, and the other PhD in the group is overburdened with administration even by local standards. Thus I became responsible for nearly all phases of the experiments from making the vacuum in the chamber to analyzing the data) ii) Teaching a one semester course on hyperfine interactions, iii) Responsibility for the electronic modules of the accelerator and supervision of repairs of the beam transport system.

Previous Responsibilities and Projects (at the Univ. de São Paulo):

i) Initial testing of all the electronic modules for the laboratory, and some of the initial repairs due to a lack of personnel in the electronic shop at the time.

ii) Assistance for the National Electrostatic Corporation representatives during the initial installation and testing of the prototype Pelletron accelerator system. Primarily working with electrical and electronic components, but a reasonable share of the time spent on the preparation of the single stage injector (4U) and its ion source for the acceptance test.

iii) Implementation of computer programs for data analysis including: programs which I wrote for our specific needs, several general purpose programs for least square fits to linear and non-linear functions, and published programs e.g. the COULEX program of de Boer and Winther.

iv) Supervision and installation of the beam transport system between the NEC supplied equipment and the vacuum chamber of the angular correlation system. Design, and optical alignment of the detector supports.

Approximately 20 months after we had arrived I was asked to stay on at the institute. At that time the Pelletron had not passed the original acceptance test, however it seemed that the accelerator would function normally during the 2 years for which I agreed to stay on. This decision has not turned out well due to unforeseen problems which were aggravated by the level of Brazilian industrial development which is insufficient to support such an accelerator. In the 2 years since my decision, our group has had 4 useful days of machine time. Although we have succeeded in verifying the optical alignment of the system, it is doubtful that we can produce very much useful data in the short time remaining.

Note on Computer Programming Skills

Besides a thorough knowledge of Fortran G, I have had a course in assembly language programming (for the CDC 1600/3600 computers) which I presume would allow me to learn more easily how to program on small computers in lower level languages. In addition my knowledge of numerical analysis is approximately the level required in 1970 for a Masters degree in Computing at the University of Wisconsin.

digital

December 28, 1974

Thomas H. Dunigan, Jr.
Department of Computer Science
University of North Carolina at Chapel Hill
New West Hall
Chapel Hill, North Carolina 27514

Dear Mr. Dunigan:

Sorry, we don't have anything in this area. Rockwell, Bell Northern Research, and Fairchild have built such devices and are prototyping them on PDP-]]'s. I believe you'd be better off getting the possibilities from the literature and provide insight into how they should be organized.

Sincerely,

Gordon Bell

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

GB:mjk

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

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

Department of Computer Science

December 17, 1974

DEC 20 1974
12-30

Professor Bell:

On one of your visits here to UNC, I spoke briefly with you about my doctoral research in the area of electronic mass memory system design. You indicated that DEC had a prototype device in operation. I believe the underlying technology was magnetic bubbles. If such information is not proprietary, I would like to know the device characteristics of DEC's bubble device -- access time, data rate, capacity, logical and physical organization. Since the main thrust of my research is in system design, I would also appreciate any insight that DEC may have gained into the efficient utilization of such a device.

Thank you.

Sincerely,

Tom Dunigan

Thomas H. Dunigan, Jr.

Dear Sorry, we don't have anything in this area. Rockwell, Bell Northern Research and Fairchild have built such devices and are prototyping them on PDP-11's. I believe you'd be better off getting the possibilities from the literature and providing insight into how they should be organized. Sincerely

New West Hall, Chapel Hill, North Carolina 27514 Telephone 919-933-5698

digital INTEROFFICE MEMORANDUM

TO: Distribution

DATE: December 20, 1974

FROM: Gordon Bell/Al Bertocchi

DEPT:

EXT: LOC:

SUBJ: COMPUTATIONAL SERVICES FACILITY RELOCATION

We are relocating the Computational Services Facility (CS-2) to Parker Street to improve the operating environment and obtain the benefits of a consolidated facility with Corporate EDP. Ron Rutledge will manage the CS-2 facility during the move and subsequent to the relocation. He will now be directly reporting to Herb McCauley, Corporate Manager Information Services; however, he will continue to be responsible to Phil Tays for administration of the Engineering budget and Computational Services for the remainder of FY-75.

Jack Wuenschel will continue to manage the DEC Data Center, reporting to Herb.

mjk

digital INTEROFFICE MEMORANDUM

TO: Ed Corell
Phil Laut
Bob Puffer
Andy.

DATE: December 20, 1974

FROM: Gordon Bell

DEPT: OOD

EXT: 2236 LOC: ML12/A51

SUBJ: LA180

Please put together a "CRASH" plan on the LA180.

How much.

When.

How many?

with Andy, et al mems.

Ken would like to review ROI on it.

GB:mjk

P.S.

Just received Andy's memo.

INTEROFFICE MEMORANDUM **CONFIDENTIAL**

digital COMPONENTS GROUP

1010

TO: Gordon Bell
CC: Ed Corell
Al Huefner

DATE: December 18, 1974
FROM: Andy Knowles
DEPT: Components Group
EXT: 6777 LOC: MR2-2

cc Bob + Phil re memo.

SUBJ: LA180

Of course we are missing a tremendous opportunity by not pushing the LA180 harder and faster. Given the product at the projected cost and reliability, we could give Centronics a really bad time. They are ripe - every customer of theirs is unhappy, etc.

In our business model for FY76 we looked at the following possibilities:

	Shipments (Units) Q1	Q2	Q3	Q4	T	Total NOR	Bookings
Worst Case	0	0	0	0		0	0
Most Probable	0		150	530	680	1,156K	1,700
Optimistic			150	1000	1150	1,955K	2,720

Certainly we could push this up a quarter or two. In our #'s we assume no factory shipments prior to Q3 FY76. In FY77 we are forecasting 9000 units shipped with a resulting NOR of 13,500K$!

If one weighed, say, the TS03 vs the LA180 from any business standpoint, one would first spend his limited $ on the LA180.

P.S. Note these are COMPONENTS #'s. Given the product sooner the corporate projections could be:

	FY76 DCG	OTHER	TOTAL	FY77 DCG	OTHER	TOTAL
Units LA180	3500	1400	4900	9000	2000	11,000
NOR$	5,950K	3,220K	9170	13,500K	4,200	17,700
AVG PRICE	1,700	2,300	1870	1500	2100	1,610

We might project the market for LA180 like line printers to be 40,000+ in FY77. The way we are going we most likely will not come close to the FY76 or FY77 #'s unless someone takes this product seriously.

Circulate to Staff

digital INTEROFFICE MEMORANDUM

Please return F 1011

TO: John Fisher

DATE: July 18, 1974

FROM: Phil Laut

DEPT: Engineering

EXT: 4308 LOC: 12-1

LA180

SUBJ: Summary of Items Approved at the Products Committee July 9, 1974

Increase to Semi-conductor Memory Engineering Budget - Approved

Approval was granted to increase the Semi-Conductor Memory Engineering budget by $150,000 in FY75 from $512,000 to $662,000. The purpose of this increase was to allow purchase and testing of 4K memory chips from additional vendors. The $150,000 comes from the unallocated portion of the Central Engineering which was $448,000 and is $338,000 after this change.

LA180 Business Plan - Approved

The LA180 is a 180 character per second printer with:

First ship date: September, 1975
Manufacturing cost: $600
Development cost: $500,000

Sales of $49,000,000 (about 60% by the Components Group)

A copy of the business plan is attached.

/ale
att

digital INTEROFFICE MEMORANDUM

1012

TO: Product's Committee
Product Line Manager's Committee
Al Huefner
John Wolaver

DATE: September 4, 1974

FROM: Ed Corell

DEPT: Printer Engineering

EXT: 2991 LOC: 1-3

SUBJ: LA180 Money Problems

I feel a word of explanation is needed now to let everyone know what has taken place in the last two weeks on the development program for the LA180. For reference, we have obtained approval from the Product's Committee and showed a schedule that provided for first shipments from Westfield to Westminster in August 75.

My cost center has experienced budget overruns during July and August due to two reasons. First, we have some overspending occurring on the LA36 and second, drafting has provided us with 30% increase in rates since the beginning of the fiscal year. This is only significant, since that is where our project is at the present time.

I have stopped all drafting and layout work on the LA180 for the remainder of the first quarter. I expect this to result in a first shipment from Westfield date of November 75.

/sj

To: Gordon Bell cc Puffer Corell
This is dumb! dumb! dumb!
This is a top priority project. Something else should suffer below it in priority
How do we get at it. (Like I mean TUXY can suffer! etc)
Andy Knowles
9-12-74

SCHEDULE: LA180 Printer

BY Dan Belanger
DATE Oct. 17, 1974

SH. 1

	FY:75						FY76								
	Q3			Q4			Q1			Q2			Q3		
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M
LA180 Build							100	ϕ	200	200	350	500	400	500	800
Material Schedule				300				200	350	500	400	500	800	880	1080
Cumulative Build							100	100	300	500	850	1350	2150	2950	3950
Customer Ship													500	900	1200
Inventory (Build-Ship)							100	100	300	500	850	1350	1250	850	450
Module Schedule					50	75	125	200	375	525	500*	680*	1010*	1060*	1300*
Print Head Schedule						100	ϕ	200	200	350	500*	500*	680*	1040*	1000*

*Includes 20% field spares

1013

INTEROFFICE MEMORANDUM **CONFIDENTIAL** digital COMPONENTS GROUP

AK

TO Bill Chalmers

DATE December 16, 1974

FROM: John Wolaver

DEPT: Peripherals

1014

EXT: 6079 LOC: MR2-2

SUBJ: Report on DataPoint/ICC Milgo Trip to Test LA180 Market

I. Data Point

Data Point	Digital
Victor Poor - U.P. R+D	Ed Corell
John Walker - V.P. Eng.	Nick Notias
	John Wolaver

DataPoint presently is buying 1000 Centronics 101 165 cps line printers a year. They are yet another unsatisfied Centronics customer, claiming arrogance and unwillingness to correct deficiencies in printer. Datapoint keeps my record intact of never finding a satisfied Centronics customer.

DataPoint had hoped when they heard about our rumored printer, the LA36, that it was, in fact, a Centronics replacement. They would be interested in buying the LA180 if it were available today. The LA180 specifications meet their needs, and its projected pricing is acceptable.

A possible strategy to pursue with DataPoint would be to promote their idea of using the new and lower priced Centronics 500 Series on a limited basis for key accounts over the next 12 months. In the meantime, we keep them apprised of LA180 developments and get them an evaluation unit as soon as possible.

II. ICC Milgo

	Digital
Ted Scarpa - Marketing	John Wolaver
Judd Gilberts - Software	Charlie Wycoff

ICC Milgo is building a one-plus product to sell against Teletype's Model 40. They estimate their need for LA180's could go as high as 10,000 over the next 3 years. A total of a not insignificant 3000 seems more likely.

Competitors here are Teletype, G.E. and Okidata. G.E.'s pricing appears too high to be competitive. Teletype in the 80 column mechanism and associated electronics with Teletype defined interface

CONFIDENTIAL

1015

configuration is quite attractive:

Model 40 P101B	$1340 list
	1073 maximum discount
132 Column Option	250 - 350 extra

Okidata, a CRT copier, with their $700 quantity price looks like to most likely near term buy for ICC Milgo. Essentially the price is right to help ease their cash flow problems. As a product, all indications are it is a very low duty cycle printer (10 minutes continuous printing before the head gets too hot to print.)

Our strategy could be to encourage ICC Milgo to use Okidata as an interim product. Then come back with a highly reliable, full feature printer, the LA180.

JW/njo
xc: E. Corell
~~A. Knowles~~
A. Michels
N. Notias
C. Wycoff

1 - ANDY KNOWLES

digital INTEROFFICE MEMORANDUM

FYI.

TO: ED CORELL

cc: Bob Puffer
Howard Reed
Art Williams
Dan Belanger
LA180 Distribution
Ed Savage

DATE: December 9, 1974

1016

FROM: Paul McGaunn

DEPT: Peripheral Mfg.

EXT: 366 LOC: WF

SUBJ: LA180 MANUFACTURING RECOMMITMENT

Westfield Manufacturing based upon present economic conditions and the need to dedicate all efforts to insuring FY75 DEC success hereby notify you and all concerned that our LA180 schedule is extended 3 months.

This in effect changes initial build from July 75 to October 75. All other commitments move accordingly.

We will not hire the projected needs of twenty-two (22) additional people in FY75 for this project.

Comments.

Paul
PAUL

RECEIVED
DEC 13 1974
PRINTER ENGINEERING

TO: LA180 DISTRIBUTION

1017

Paul McGaunn - Westfield

Ed Corell - MA 1-3

Rene Jodoin - MA 5-1

Ed Czerwinski- Westfield

Vahram Erdekian- MA 1-3

Art Granfors - MA 1-4

Jim Koskinen - Westfield

Fred Cortazzo- MA 1-4

Al Huefner - MA 1-3

Art Williams - MA 1-3

Dan Belanger - Westfield

John Chernick - MA 1-3

W. Owens - Westfield

John Eyres - Ireland

Don Call - MA 1-4

Tony Mongillo MA PK 3-2

SUBJ: FUNDS FOR RESEARCH DATE: 01-07-75
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ: WHY I WOULD LIKE TO INCREASE OUR RESEARCH AND TO GET OUTSIDE FUNDS FOR RESEARCH--draft

To: Distribution

In the past we have been unable to establish a research program which yields products sufficiently in advance of the general market. In general, I believe we need to improve our ability to accumulate, filter, process, and utilize technology and techniques (ideas) in our products! The odds of scheduling a product which has significant innovation is extremely small. Similarly, our development is quite obvious, as development managers are reluctant to use more than 1 new idea/product and that by definition in our business is new circuits or higher magnetic recoding density.
Therefore, I want to know how the new ideas are going to be developed before we commit them to a scheduled product.

I am not unhappy with the research group, however; as they have been effective as: consultants, teachers, general problem solvers, product generators, recruiters; and about 25% of their time they work on research of the type I'd like to increase. Our problem-rich environment is terribly seductive to the very people we want to do research, because the development groups tend to operate behind schedule and sub-state-of-the art. There is intense pressure to move people from research into development as the development areas suffer (see appendix 1 for examples).

Summary

I want to go outside for research funding to:

Ø. indirectly build substantially better products;

1. increase the amount of spending in research;

SUBJ: FUNDS FOR RESEARCH DATE: 01-07-75
FROM: GORDON BELL

1. Achieve better systems concepts and integration and give researchers a broader view by not being confined to a single group.

2. Permit a variety of research to be carried out both central, decentral, and in various universities.

3. Provide better management, since a development group manages products and their production introduction.

Funding Research At Universities

In general, I'm for this, but it's an independent issue, except that it competes with getting more money for research internally. As we decide that a research area is important, we should look at it similar to the way we calculate ROI for products. If the cost, benefits, etc. are right, then we do the work in the appropriate place. My own bias is that unless the work is done jointly, the likelihood of impact is so small as to preclude our doing it outside.

Why Externally Funded Research?

Fundamentally, I don't believe we're spending enough money in this area, and I don't see how to extract more from our currently overcommitted development budget--the obvious answer to cut development back seems to be impractical for what we've sold to our PL customers.

In general, research is a business like product development; the product is knowledge written--communicated in reports and papers--but the most important product of the research is the knowledge in the researcher's head. This knowledge is the basis for subsequent development--and if the research is properly timed, starting over with a product in mind, should provide the best products. We can see how research so far has effected our own products--ARPA has the most (see below).

Therefore, the most valuable part of research is usually the training of people on a particular idea, such that the next time through the implementation will be "done right." We could take the view of simply recruiting people who have done a product outside; and when we build something, simply go locate them; but the DEC acclimatization (decompression) process may be so great as to make this infeasible--I can't think of any recent examples.

Since research is competitive, in going outside for funding

we can callibrate our own research in a competitive environment.

I believe we must do several things to widen our scope for products--as we get larger, it seems more difficult for us to assimilate new ideasquickly: networks, multiprocessors, microprogramming, microcontrollers, processor-on-a-chip, structured programming, high level language programming, etc. Therefore, the only solution is to get the ideas, and assimilate them in advance of the need.

Also, in entering this competition, it can tend to focus us along the direction that other research is going at the time. This is double edged: we're all blundering along together or by being separate, we may stumble onto something really unconventional (and with high payoff).

In being a member of the conventional research community, I believe our access to ideas, literature, and people will increase. We have been most successful recruiting at Carnegie-Mellon and U. of Mass.--in both cases we have joint research.

By taking on research projects per se, with the associated commitments, I believe we will carry our research much further and deeper, than we currently do. The pressure (including mine) on the research group is on solving short term problems: staff a position, make a measurement, etc.--and we want to keep much of this pressure. It is possible that we have swung too far.

Criteria for Research Projects

We probably have to get much more formal in our funding of our own research--i.e. we have to decide on a cost-benefit basis what to do.

Some criteria:

1. Cost. The proposer, size of project, likelihood of success, input dollars.

2. The payoff. How big is the market area? Does it affect all new systems, one market, all programming? Try to quantify.

3. Need--especially timing.

Why ARPA?

I've personally been associated with this community for some

time and believe it is involved in research which we eventually require in our products. I would like for others within DEC to be exposed more directly to this community. Either directly or indirectly they have provided us with: timesharing techniques; a modern timesharing system--TENEX, on which to base a new system; various programs and languages--e.g. ALGOL, APL, BLISS, LISP, MUMPS, SOS, TECO; several computer-aided-design programs; the basis for the KL10; knowledge about networks together with use to form our own more limited network strategy; ideas in building our own GT40-series graphics processors; a microprogrammed box for the 11/40; and multiprocessor research which I believe will influence subsequent products. By not having the right processors for the ARPA-net construction, we missed a great product opportunity for communications products. We'll eventually have to invent this.

Other ideas coming from this community include: the circuits which DEC initially used, DECtape, the LINC, and displays.

How Do We Justify the Research to ARPA (and to ourselves)?
(Or How Does ARPA Justify Research to a Corporation)

For ARPA, the justification of funding us is probably easier than for the National Science Foundation (NSF). NSF exists both as a body responsible for the education of scientists and for research, hence there is a conflict. ARPA (presumably) only cares about research, hence, the instrument is immaterial--be it a university (e.g. CMU, MIT, Stanford), non-profit research (e.g. RAND), research-for-hire, profit making (e.g. BBN, SRI or SDC) or research part of a corporation (e.g. IBM, Xerox, TI).
ARPA also cares about the transfer of technology from research into applications--i.e. they are rated on how their research is applied. Also, once successful, they want the products

to be available for other government users.
I'd like to justify the research on:

1. We are interested in research for the sake of ideas that will eventually impact the way we do computing--i.e. products. We want to transfer research to products quickly.

2. We have utilized much of the ARPA research in the past, would like to in the future, and believe the contractor relationship would enhance this.

3. We believe we have a unique collection of people, skills, facilities to do research--particularly in building.

hardware/software systems.

4. We have not had a strong research program, even though we have supported various ARPA ties (e.g. MIT, CMU) but would like to; and hence, need money. With this view, we never have enough money.

5. The techniques we would propose would benefit the public--e.g. better terminals, the 10, the network.

6. We are seeking support where there is a high research component, an education component, and which there is a relatively high risk. Otherwise a project would be in a development state.

7. The knowledge we obtain will be made public.

The Proprietary Nature of Research

Each outside source of funds has a different criteria for exposing the information gained in the research. In general, all sources require publication of the ideas and even working drawings, provided they are funded. In cases of patents, the government wants royalty-free access to the ideas if they are used in products purchased by the government.

Right now, I don't believe these requirements are unreasonable. The only problem might be the accounting and assignment of ideas to costs as a product goes from research to development.

MIGRATION OF PEOPLE (AND IDEAS) FOR RESEARCH TO MEET PRODUCT DEMANDS--APPENDIX 1

Historically people have left research to solve crisis development problems:

1. Brender--structured code, programming tools and implementation languages--FORTRAN compilers and FORTRAN-Plus.

2. Wecker--multiprocessors and networks--communications protocol, design and network architect.

3. Kaman--computer architecture and microprogramming--teaching of microprocessor design, computer design of 40, PDQ.

4. Levy--computer modules, microprogramming and small systems--manage timesharing system for PDP-11.

SUBJ: FUNDS FOR RESEARCH DATE: Ø1-Ø7-75
FROM: GORDON BELL

;onsulting is quite healthy if held to 1/2 time.

'here is pressure to solve day-to-day problems as an alternative ıethod to direct project funding.

.. Turner's work on programs to analyze performance has been viewed as line development. Even now, there is little work in the line development groups. Only recently have projects staffed this function.

2. Strecker has carried on performance analysis for cache, instruction streams, and architecture. A significant educational effort was involved in selling the cache concept.

3. Ken King is just formulating research in office automation. Certainly one alternative is to work on "word processing"--a development problem--the pressure will no doubt form.

Current Research

'he current projects could yield significant results if carried o completion.

1. Poonen--structured programming and compiler parse table generator. Hopefully, this will lead to easy generation of language front ends and be tested on a limited PL/1.

2. Eckhouse--operating systems. Hopefully this will lead to a multiprocessor system we sell. We're 1-2 years late in doing the work, because without it, we can never build the appropriate hardware.

3. Sebern--low cost terminals, system and interconnected computers.

4. Kaman--microprocessor design for peripherals was carried out, but has been abandoned for work on PDQ.

5. ?--small systems research. Interface to Teicher's group.

B:mjk

ttachment

Distribution

SUBJ: FUNDS FOR RESEARCH

DATE: 01-07-75
FROM: GORDON BELL

OD
Im Bell
en Olsen
om Siekman
teve Teicher

APPENDIX 2

Analogy Product Development Evaluation Criteria

Nearly every product we design is the most successful (e.g. profit, performance, reliability) the second time through--provided the same people do it! The first one is a prototype, the third one we usually goof because we get too sure and the people disappear. Alternatively, a product is successful if it utilizes advanced technology and the market is ready to understand and accept it. (5-8; 8/s-new; 8/I,L,8/E,F,M, 8/A 4, 7, 9, 15 new people each time; 6, KA10, KI10, KL10, KA was same performance as 6) however; each new processor was a significant new design effort requiring much invention; 11/20-11/40; 11/45--external technology; 11/05--not sure why it has been so successful--smallest member of 11 family?, good and reliable?--by these criteria the 11/04 should be really successful. The 11/PDQ should be all right because of third time through and new technology. The 11/WD will hopefully be a technology windfall similar to the 11/45 (let's hope).

For peripherals, the current papertape equipment is second time design. The LA30-36 seems better already; will the RK06 be significantly better than the 05? All our fixed head disks have trained new people, and have been relatively difficult--likewise the tapes. The VT50 should be a breakthrough over the VT05 because Russ Doane, and Stan Olsen were involved in the VT05. The TU55 was the most cost effective of the 555 and TU56. Another criterion determining a successful product is that it cannot appear to be an orphan--standing alone. The buyer wants to believe that it will be made forever and have program enhancements, service, parts, etc....always available.

digital

January 6, 1975

Charles H. Frye
Northwest Regional Educational Laboratory
Lindsay Building
710 S.W. Second Avenue
Portland, Oregon 97204

Dear Mr. Frye:

I was interested to read the status of PLANIT. I would like to go about getting a tape of PLANIT to run on some of our in-house DEC-system 10's, so that we can evaluate it. In order that we can get on with this, could you please send some more information so that we could look into how it could be made available to our customers. Who has such a copy?

There are three areas of interest:

1. The DECsystem 10 product line (sales to marketing of the -10)--Floyd Benson.

2. The Education product lines (currently sales are only minis)--Bob Trocchi.

3. As a general product for our minis as a language--Al Brown.

I'm circulating the documents you sent, but I would like more information as to the size, language definition, the conversion process, what the library is at this time, and your projection of PLANIT's use.

Sincerely,

Gordon Bell

Gordon Bell
Vice President
Office of Development

GB:mjk

cc: Floyd Benson
Al Brown
Bob Trocchi

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

MJ - Letter - over

1028

Northwest Regional Educational Laboratory

Lindsay Building · 710 S.W. Second Avenue
Portland, Oregon 97204 · Telephone (503) 224-3650

December 23, 1974

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

Dear Mr. Bell:

Enclosed is some information regarding PLANIT which I hope you will find useful.

Both the University of Indiana at Indianapolis and the University of Oregon at Eugene are very interested in making PLANIT run on the PDP-10. U of I has already invested some effort in that direction.

About four years ago I had some discussions with DEC people regarding the installation of PLANIT on the PDP-10 but nothing materialized at that time. The three included a vice president, a systems man, and a salesman. Of the three, I only remember the name of the salesman, Al Beal. If it is of interest, I think I can retrieve the names of the others--at least the vice president. The only conclusion at that time was that the installation of PLANIT on the PDP-10 would present no particular problem.

If I can be of further help, please let me know. A PLANIT Users Group exists with a newsletter (published quarterly) available from Dr. Lyle B. Smith, SLAC, P.O. Box 4349, Stanford, California 94305. The price is $6/year.

Sincerely,

Charles Frye

Charles H. Frye

Enc.

(over)

Dear

I was interested to read the status of Planit. ~~As the report indicates, I would be happ~~

I would like to go about getting a tape of Planit to run ~~on~~ on ~~our PDP-10 Development~~ some of our in house PDP-10's so that we can evaluate it. In order that we can get on with this, ~~I wou~~ could you please send some more information so that we could look into how it could be ~~used outside of DEC' and be~~ made availabel to our ~~users~~. customers

There are ~~these~~ three areas of interest:

2. The Education Product ~~Li~~ Lines (~~cu~~ currently sales are only minis):-Bob Trochii
2. The PDP-10 Product Line (sales to marketing of the 10)-Floyd Benson
3. As a general product for our minis- as a language-Al Brown.

I"m circulating the doucments you sent ~~to me~~, but I would like more information as to the size, ~~a wha what~~ ~~the~~ language ~~looks like vis a vis general purpose use~~, definition, ~~how~~ the process conversion ~~is carried out, and~~ what the library is at this time, and

Sincerely,

cc Benson, Brown, Trochi

Please ~~attach~~ a send copy of this letter to +

Circulate the brochure.

your projection of ~~as to~~ PLANIT's use, ~~eventual use~~

digital

January 8, 1975

John Whitney
600 Erskine Drive
Pacific Palisades
California 90272
Dear Mr. Whitney:

I received your letter of December 26. I've looked at the picture and the information you sent to Bob Trocchi.

I have no trouble at being intrigued, and I would like you to send any more ideas and the direction you are pursuing right now with computer graphics. I am certainly interested in this area and have used computer scopes for about the last 15 years. In fact, I probably made the first computer maps, which were used for displaying information about city densities and characteristics.

Unfortunately, I don't believe we have the money for patronage that IBM has, so all we can probably offer you is encouragement and if perhaps things look interesting some equipment or at least time on equipment.

I'm glad that you are in contact with Ivan Sutherland, and since he is at RAND now, he probably can get you access to equipment that would be useful in this effort. Since you also are based around Cal. Tech., it is probably worth calling another friend of mine, who has been active in computer graphics there, Ed Fredkin, who's a visiting professor there now.

Each year we think computer graphics is going to be important as a product, but so far the applications are quite limited. I'll be happy if you send more information, and I am sending the information I have received so far to Bill McBride, who is becoming the manager for our computer graphics area.

Sincerely,

Gordon Bell

Gordon Bell
Vice President
Office of Development

GB:mjk

cc: Bill McBride
Bob Trocchi

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

digital

January 8, 1975

Mel Peisakoff
Director of Computing
University of California
Office of the President--Administration
2200 University Avenue
Berkeley, California 94720

Dear Prof. Peisakoff:

Keith Miles informed me that you had been made aware of a memo I wrote during your visit to DEC in September, and it was the cause of some embarrassment to you. The essence of the problem seems to be that the memo I wrote as a result of your visit was circulated to another of your colleagues, and I was apparently misquoted in the memo as being unhappy that you visited. To the contrary, I believe we had a very enjoyable visit, and as a result of the visit, I wrote a memo in which I tried to outline your position, especially relative to our own product direction. It has been circulated widely within the development and marketing organization, and received favorable comment. It is not clear that I quoted you accurately, however, as there is always that ambiguity in exchanging ideas like this. But as a result of the visit, and the memo, we have made a very large number of changes in our own product funding and direction, which I attribute to that point in time surrounding your visit.

I'm extremely unhappy that the memo got outside the DEC product development and product marketing organizations, and much sorrier that it got outside of DEC. Not because I was particularly embarrassed of what I said in the memo relative to you, but that the memo relatively clearly outlined a view of product strategy and our deficiencies in position that I would just as soon not be made public. In order that you can verify this, I have asked Keith Miles to show you his copy of the memo. (I know not where he got it) and ask that you read it on a confidential basis.

I would like to get your comments on it as to how accurate you feel I quoted you. Keith Miles was also concerned about the tone of the memo as he is responsible for a large part of UC. He intends that we are able to keep the current position with respect to sales in your campuses. It is certainly his intent that he do everything that we are able to do necessary to keep this position. Certainly I am available to help in anyway that I can, because I also would like to keep the same position with respect to sales there.

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

Apparently there was also a misunderstanding about how strongly you felt about the position of the DECsystem 10 in the computing picture at UC. I think it would be helpful if you would read the memo and comment as to how accurate I was in stating this position, because I perhaps overstated your position, but in a way it is almost irrelevant because this kind of thing is purely a matter of opinion and degree, and only time will tell.

All in all I certainly appreciated our meeting and I look forward to further interchange when I visit UC/Irvine as Professor Feldman has assured me that you will be present at their Tenth Birthday party, at which I will be a visitor.

If you have any inputs that you think would be helpful to us about the future of computing, I am always available to exchange ideas. From my standpoint, you caused no trouble within our organization, and I'm sorry about the foul-ups at your end.

Sincerely,

Gordon Bell
Vice President
Office of Development

GB:mjk

cc: Keith Miles

digital INTEROFFICE MEMORANDUM

TO: Distribution

DATE: January 14, 1975

FROM: Gordon Bell

DEPT: OOD

EXT: 2236 LOC: ML12/A51

SUBJ: ARPA MEETING ON INTELLIGENT TERMINALS

We are invited to attend a meeting with an ARPA group which is investigating the use of AI programs on small machines, and in essence makes them more available.

The two topics are:

1. Reduction in program size.

2. What software systems are needed to support the programming.

They would like someone knowledgeable in our Operating Systems so that the users aren't tempted to reinvent, or discount available systems.

I believe it would be worthwhile for Pete Van Roekens or Larry Wade to go.

Please get back to me so I can call back!
What you think!

GB:mjk

Distribution

Jim Bell
Larry Portner
Pete Van Roekens
Larry Wade

digital INTEROFFICE MEMORANDUM

TO: OOD

CC: Mark Abbett
Jim Cudmore
Dick Best

DATE: January 14, 1975

FROM: Gordon Bell

DEPT: OOD

EXT: 2236 LOC: ML12/A51

SUBJ: OOD STAFF MEETING MINUTES--January 9, 1975

1. John Cronkite presented the Product Manager's school.

2. Best and Amann--we are asking Jim Cudmore to come back in 8 weeks with a DEC Safety Standard. Ron Minezzi is presenting a first pass at Engineering Committee.

3. Ken described the organization vis a vis the Woods Meetings. The implications for us:

   A. It may be appropriate to have an interface to P/L's similar to their interface with manufacturing, finance, personnel (sales has a similar problem).

   B. We are moving to systems versus computer components (e.g. disk) PSG's for P/L interface. Computer component level will exist intra central engineering.

4. We approved Nat's plan to establish a Communications Review Board inside the software standards framework.

5. Gordon will call Leng and Marcus relative to the problem of planning and building communications systems.

6. The production interface. The 2x2--Bob will work on it specifically with Howard Reed and Jim Cudmore (if appropriate). The issue certainly needs cleaning up and a plan. Bob should report back on this.

7. Stocky came to ask for $20K-40K for a 12", integrated, low cost terminal with TPS (20K for terminal, 20K for TPS). Stocky will deliver a 1 page proposal on the subject.

GB:mjk

Future Items:

1. Hardware/Software Systems Plan — Portner/Clayton

digital INTEROFFICE MEMORANDUM

TO: Nat Teichholtz

DATE: January 15, 1975

FROM: Gordon Bell

DEPT: OOD

EXT: 2236 LOC: 12-1

SUBJ: NETWORK FUNDING

Nat, I had a talk with John Holman about the possibility of obtaining the funding for networks. John is certainly building networks all the time in Special Systems and is in fact implementing the standard DEC DDCMP protocols such that the things he builds wi-l in rpinciple be able to eventually talk to other things that are built from a network standpoint. As such John said he is willing to fund some of the standards in software activities.

I think this is excellent, and I think in fact by doing it that way we will all spend less for development and end up with networks--products that talk with other products.

Will you follow this up please?

GB:mjk

SUBJ: DDCMP STANDARD DATE: 01-15-75
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ: THE MAKING OF DDCMP INTO A STANDARD OUTSIDE OF DEC

I received a letter the other day from Hazeltine requesting a DDCMP spec, presumably so they could implement it on some of their equipment. I read that a reputable company, whose name I forget, is also intending to make DDCMP available as a product.

As I read our policy now on DDCMP, it is fundamentally that in the long run we believe SDLC will prevade as the industry standard for communication among machines. But in having such a standard defined defacto, by IBM, we inherently will be at their mercy from the point of view of changes, and understanding and any products that can use it for say connection to IBM machines will probably be inherently in the range of 1 to 2 years behind any published standards. This is because their simultaneous announcement of a product and standard will give them an inherent edge of 2 years-while we go about the understanding, the application of the understanding and the market education. I think we must understand that the low level protocol continues to be just more of the tip of the iceburg.

In essence the protocol is to the ANSCII character set as a command language is to the protocol and in having a protocol one can at least physically send messages, but then you engage in a mere matter of programming at either end of the terminal to support the various higher level commands that are transmitted using the protocol--e.g. transmit a file. Therefore, our policy on DDCMP is that we are in fact actively using it to implement products, simply because we almost understand it, and it can operate on today's hardware (as opposed to SDLC which requires special hardware). We can begin to focus on the higher levels with respect to machine to machine communication which we have been calling networking. We can get on with the applications.

In a sense we may have a built in market in taking this fairly

SUBJ: DDCMP STANDARD DATE: 01-15-75
FROM: GORDON BELL

evolutionary step in respect to DDCMP. Since it can run on existing equipment, we may have provided the industry with a standard that has long been searching for outside the really terrible 2780 standard that exists. In addition, DDCMP has the capability of running on either a synchronous or asynchronous communications lines. Therefore, we offer the computing and communications industry a significant standard, that is the ability to intercommunicate with existing equipment efficiently and error free, and get the benefits that normally we would attribute to standard languages, that is the ability to communicate.

I didn't see the issue this way until today--i.e. I thought we were just going off on a relatively independent trip. The way SDLC and DDCMP work are sufficiently close at the network command language level that once one has the system intercommunicating, transmitting jobs and files and tasks and things of that form, the switching over to another hardware (SDLC) and device driver set, doesn't appear to be a significant task, although it will be a traumatic and more difficult than we think. But we do have an edge on the problem since we do understand that this will probably eventually happen. Therefore, what I think we want to do is to:

> Eventually obtain the ability to use the SDLC protocol but to make the DDCMP a standard. Actively go through it through the ANSCII and/or CBEMA committees and some the associated headaches to provide the world with a way of interconnecting already existing hardware in a clean way.

I initially had asked Stu Wecker to put DDCMP into the ANSCII standard committees, simply as a tongue in cheek proposal to foil IBM, because I really didn't like the way they played around with the standards committee with respect to the standard and SDLC. Now I believe that DDCMP does have a role as a standard. Not in lieu of SDLC, but in parallel with SDLC until the world switches over--probably 3 years from now. What do you think?

GB:mjk

Distribution

Tom Hastings
Allen Kent
Tony Lauck
Stu Wecker

SUBJ: DDCMP STANDARD

DATE: 01-15-75
FROM: GORDON BELL

cc:

Marketing Committee
OOD
Vince Bastiani
John Gilbert
Frank Hassett
John Holman
Bill Klein
John Leng
Julius Marcus
Dave Stackpole
Nat Teichholtz

SUBJ: NOISY EQUIPMENT

DATE: 01-15-75
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

To: Distribution

Dick reminded me the other day how noisy our equipment is. I had independently been reminded a few days before as I walked into one of the programming areas and talked to some of the programmers and looked at the problem of baffling some of the equipment.

We subject our programmers to incredible hell. Can we begin to solve some of the problems internally, because I think we have to worry about the productivity. Also, this is cheap front-end money. With the noise levels one has in programming with the machines, there is just no way they can stand being around the machines that long. Therefore, what I would like to ask, is how can we look at some of the areas where the sound is particularly bad--building 3 and building 5--and work on reducing the sound level to ones that are normally fit for human consumption. If we learn anything by it, we can apply it and make it available to some special customers who would like a reasonable environment.

I think we have come a long way on terminals. Stockebrand is to really be congratulated on not having a fan, the LA36 is almost tolerable, and I think will eventually be when they get the right fans in there (I hope it is before I start using one--but since the outside demand is so high I will wait until we have some spares).

How can we get this noise design criteria under control? Should we go out and push OSHA to be unreasonable so we can meet it?

GB:mjk

Distribution

John Clarke

SUBJ: NOISY EQUIPMENT

DATE: Ø1-15-75
FROM: GORDON BELL

Dick clayton
Larry Nye
Dave Nevala
Larry Portner
Bob Puffer

digital

January 15, 1975

Dr. Craig Fields
ARPA
1400 Wilson Boulevard
Arlington, Virginia 22209

Dear Dr. Fields:

Enclosed you will find an unsolicited proposal for a personal computer system capable of interpreting the PDP-10 instruction set.

I hope the proposal is in concert with your research program because we are quite excited about the possibility of such a personal computer. We believe that it is important to do as a research program because of its highly unorthodox nature...i.e. I feel that the feasibility of such a system will be very difficult to believe, and understand, without a prototype.

Also included is a research program on multiprocessor architectures for a modular communications system using our forthcoming large scale integrated circuit PDP-11.

I'm sorry we have not worked more closely with you in the exact definition of the project, but we certainly appreciated the interaction, guidance, and motivation you have given. We are quite receptive to changes. Please feel free to call me or Bruce Delagi, or Stuart Wecker at any time. My home phone is: 617-259-9144. We also are available to visit your office at any time.

Sincerely,

Gordon Bell

Gordon Bell
Vice President
Engineering

GB:mjk

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

digital INTEROFFICE MEMORANDUM

TO: Ed Corell

CC: Mark Sebern

DATE: January 15, 1975

FROM: Gordon Bell

DEPT: OOD

EXT: 2236 LOC: 12/1

SUBJ: LA36

Ed, is the LA36 for Mark on its way? I thought you were going to make one available to him. I want the front end work of terminals to proceed. This is extremely important to have this front end work done properly and the incremental price to pay here is peanuts. How are you going to get him one?

I make out the cost, if you steal one from Westfield, as $1000--- the incremental income that we would have made on the sale, and if he comes up with some product ideas, vis a vis enhancement, you've gained (particularly on the existing one) a whole product class of revenue. Thus, I look at it as a really cheap investment.

GB:mjk

1042

digital INTEROFFICE MEMORANDUM

TO: Mark Sebern

DATE: January 20, 1975

FROM: Gordon Bell

DEPT: OOD

EXT: 2236 LOC: ML12/A51

SUBJ:

Some of the articles I looked at are the Scan Conversion algorithms for cell organized raster display--March 74 from the ACM, and an article of February 1974 by Jordan. There is an article in ELECTRONICS, February 7, 1974, by Thornhill and Cheek; and an article by Noll in March 71 on scan displays/computer graphics. Of course, April 1974 Proceedings of the IEEE was on computer graphics.

GB:mjk

SUBJ: COMPUTER CORPORATION OF AMERICA DATE: Ø1-21-75
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ: THE COMPUTER CORPORATION OF AMERICA (CCA)
MESSAGE SWITCHING SYSTEM

To: Don Alusic

Dr. Tom Marrill, President of CCA, called about some possibilities of our marketing his software on our PDP-11's--as a system. It works. He intends to market a service; hence, we should be compatible.

Don Alusic agreed to set up this meeting and I'd like to go with as many of you (cc: list) as possible.

Tom wants a 2+ phase approach:

1. Come, look at the system, get a rough idea of what it is and how it works--discuss whether we might be interested in going to part 2.

2. They would give a full-blown presentation at DEC to a wide audience.

GB:mjk

cc: John Fisher
George Friend
Ken King
Julius Marcus
Stan Olsen

SUBJ: LSI-11 MODULES

DATE: 01-21-75
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ: THE LSI-11 MODULES AND STEVE'S CONFERENCE

To: Dick Clayton
cc: Steve Teicher

I'm quite concerned that Steve's decision theory techniques are only applicable to projects outside Steve's group. Having lost in getting Steve to a common size for a power supply that could go in either an 8 or small 11 box and/or getting a common box for the 2 products, I at least understand Steve's art of non-negotiable demands. I hope the PS wasn't in the critical path for the 11/04, because these 2 counter-intuitive (to me) decisions certainly could have been costly in terms of NOR.

I'm also somewhat disturbed that the learning exercise I went through on packaging--and tried to present widely to engineers and much of DEC--wasn't taken seriously.

The drawer is clearly the worst packaging method that can be selected; and taking cables from the module handles places constraints on the packaging such that I don't believe a very good package can be designed--assuming one assigns arbitrary weighted values to an objective function consisting, for example, of cooling, cost, servicability, reliability, ...cableability. What is worse, a hastily designed box is now a constraint--we can't move because of limited development funds (we are in a crunch), and we have to meet arbitrary specs.

Steve is in the position of designing a new bus and mechanical structure for a computer that, I hope, will last many years. As such, there should be an attempt to do it right; and I would have thought it propitious to get feedback from internal users (P/L engineers and engineering managers--Bastiani, Savell,...) as well as through 1 or 2 marketing people--unless of course, we expect all the output to be OEM, or we expect a redo for each group. The problem with a single market outlet is that their forecasts may be wrong by up to a factor of

SUBJ: LSI-11 MODULES

DATE: 01-21-75
FROM: GORDON BELL

4 to infinity (on downside). I didn't see the very wide bus the modules use, and I think it may lose much of what the WD bus gains.

The other problem, while we want the OEM market (although it does turn down quickly and starts up slowly) we really do want advanced end user products, e.g. a lab spectrum analyzer, graphics, remote concentrator, remote controller for IPG, etc., that this gives. Here we'll make more money by having advanced products!

The Marketing Committee's decision to use a package scheme that appears to be poorly conceived was, I believe, irresponsible--violating the principle: if it don't work, don't announce it, and will put much more heat on Steve's already hot organization. As a party to previous packaging, PS, and backplane deals which have been oversold internally--I say let's clean up a few pending issues before committing totally beyond our resources to build a new package, power supply, bus, etc.

Please send me the spec and plan for Q-set and package, and then let's talk about a few of these issues

GB:mjk

digital

January 20, 1975

Prof. Robert Ashenhurst
University of Chicago
Chicago, Illinois 60637

Dear Bob:

Thank you for the hospitality extended to me in Chicago last Thursday. It was good to see your network activity first hand after reading about it. I was disappointed that you haven't a large user base yet, but these things always take a large effort. I believe the development of a special monitor will significantly detract from the network. Please let me urge you to consider one of our RSX series monitors, or the Bell Labs UNIX monitor, which, I believe, will accomplish the task.

Ed Kramer, who heads our Laboratory Data Products (LDP) Marketing group, is responsible for products in your environment. If there's some cooperative arrangement you'd like to propose for product development, it should be through him.

I believe it would be worthwhile to interact with our product development, because I'd like to know how you regard it. Similarly, you might find parts of interest--particularly in the protocol area. Nathan Teichholtz is our networks program manager; Stuart Wecker is the architect, and George Thissel is working on networks within the LDP marketplace.

Nat can send information on our DDCMP protocol, plus information of a general nature on our networks plans. Specific manuals aren't available yet, and they aren't ready for public disclosure. Therefore, the best way of communicating will probably be verbally, either through George, Stuart or Nathan. Since they're quite busy implementing, it isn't clear they could visit now, but it would, no doubt, be worth calling them to see if further interchange is worthwhile.

Again, thanks for the hospitality.

Sincerely,

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

GB:mjk

cc: Ed Kramer, Nat Teichholtz, George Thissell
Stu Wecker, Tom Schendorf (Chicago)

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digital

January 21, 1975

Dr. Mel Schwartz
Electrical Engineering and
Computer Sciences
2145 Sheridan Road
Evanston, Illinois 60201

Dear Mel:

Thank you for the hospitality extended to me at Northwestern and at the ACM talk on Thursday evening. I enjoyed visiting with you during the day and seeing the facilities at Northwestern.

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

digital

January 23, 1975

Dr. Craig Fields
ARPA
]400 Wilson Boulevard
Arlington, Virginia 22209

Dear Dr. Fields:

In our rush to get the proposal to you, we didn't stamp "proprietary" on it. Please consider the document as proprietary and disseminate only as far as you feel is necessary.

We prefer the proposal and product not be discussed at the ARPA contractors meeting on terminals.

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

SUBJ: LA36ASR, VT51, AND DEC MICRO'S

DATE: 01-23-75
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

To: Ed Corell
Lorrin Gale
Tom Stockebrand

SUBJ: LA36ASR, VT51, AND DEC MICROPROCESSORS

I read with interest Jay Mackro's memo on ASR logic board: A STUDY OF SEVERAL METHODS OF IMPLEMENTATION OF 12/19/74.

Several conclusions*:

1. The cost for almost all the approaches are about the same except that the 11/WD is about 100-200 more, depending on the memory. (I wouldn't use 4K RAM--as the study showed.)

2. Special LSI in this area probably will only cost us by slowing a project down.

3. We probably have plenty of money if the 3 groups get together to pool their resources to produce 1 product. I.e., VT51, LA and LSI (2-3 people "studying").

4. From an ROI standpoint, using Teicher's stuff may get some products--whereas, there won't be money another way--hence, no ROI.

Can I ask Ed to take the leadership here in examining how we might produce the ASR and VT51 with 1 design within our current budget?

GB:mjk

cc: OOD
Al Huefner
John Hughes
Mike Leis
Jay Mackro

SUBJ: LA36ASR, VT51, AND DEC MICRO'S DATE: 01-23-75
FROM: GORDON BELL

Julius Marcus
Steve Teicher

*Aside from the fact that the memo should be an appendix to a table giving the results, and needs some conclusions, it seems to have the facts and indicates design understanding.

digital

January 20, 1975

Dr. George L. Wied
Dept. of Obstetrics and Gynecology
University of Chicago
Chicago, Illinois 60637

Dear Dr. Wied:

It was a pleasure meeting you and discussing how we might be able to interact with you in the future as the pattern recognition system reaches production status. I looked over the reprints you gave me, and read "Objective Cell Image Analysis"; I'm sorry we didn't have the time to see a demonstration of your system.

I will discuss your application of multiple LSI-11's for pattern recognition, and how we might get involved in your subsequent stage of development with various DEC groups. My guess is that we probably wouldn't want to get involved in the direct marketing of such a system, but would prefer to sell modules to another manufacturer more closely tied to the medical supply field, or even build a special system for some other manufacturer. Since this is a basic marketing question, I'll defer the problem to Win Hindle and Andy Knowles.

The various marketing groups who might be interested in this application generally report to Win Hindle, who you know; they include: Original Equipment Manufacturer (OEM--Bill Long), Laboratory Data Products (LDP--Ed Kramer), Computer Special Systems (CSS--John Holman). LDP is, no doubt, where the interaction should be with for now. In addition, the DEC Components Group (DCG), headed by Andy Knowles, first market the basic boards for the LSI-11. Allen Michels, who you also know, manages the DCG marketing.

The Product Manager, who is in the engineering organization responsible for the product, is Steve Teicher.

Some information on the LSI-11, and a definition of the modules, is enclosed. I certainly dislike the notion of not using DEC computers in your system, which I believe is so important, and hope we can respond better now that we have a product that appears to be more suited to your application.

I enjoyed talking with you, and look forward to continued interaction.

Sincerely,

Gordon Bell

Gordon Bell
Vice President, Office of Development

GB:mjk
cc: Win Hindle, Andy Knowles, Ed Kramer, Bill Long, John Holman, Steve Teicher
Tom Schendorf (Chicago)

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Enc.

digital

January 21, 1975

Prof. William Lennon
Electrical Engineering &
Computer Science
Northwestern University
2145 Sheridan Road
Evanston, Illinois 60201

Dear Bill:

Thank you for the hospitality extended to me at Northwestern and at the Chicago Chapter of the ACM during the talk on Thursday evening. I enjoyed talking with your students and seeing the laboratory network equipment. I'll be anxious to hear of the progress on the automated laboratory as it comes into existence.

I'm enclosing some articles and material on the LSI-11, which I hope will give you some idea of what it will be like. I would appreciate your keeping this material confidential until our announcement.

I hope that some of our people in the laboratory data products marketing group can visit you at some time, so as to compare notes about capabilities. Also, Nat Teichholtz is our head of network activities and is interested in these applications too. I would appreciate any written material you have on the network, including reports on protocols, equipment, bootstraps, user manuals, systems, etc.

I look forward to the photographs of the VT50 prototype in your lab and would appreciate any comments you have on it from users.

Again, thanks for the hospitality.

Sincerely,

Gordon Bell
Vice President
Office of Development

GB:mjk

cc: Nat Teichholtz
Ed Kramer

Enc.

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

digital

January 24, 1975

National Aeronautics
and Space Administration
John F. Kennedy Space Center
Florida 32899

Gentlemen:

After a very thorough review of your Request for Proposal 10-2-001-5 for Minicomputers and Peripherals for Checkout, Control and Monitor Subsystem of the Launch Processing System, Digital Equipment Corporation respectfully requests the opportunity to submit a late proposal in accordance with paragraph 7 on page 12 of your Request for Proposal.

The basis for this request is two-fold. First of all, an alternative technical solution is obviously possible since the benchmark data, in enclosure 1, that we are submitting with this letter indicates we more than satisfy the time constraints stated in your RFP, without the use of Writeable Control Store. Secondly, the specification is very explicit about the requirement for Writeable Control Store and Microprogrammable code features. Since you have placed such importance on these features and you would prefer "off-the-shelf" hardware, we request to submit an offering, in May 1975, based on a current new product development which both complies and exceeds the specifications, and satisfies the "off-the-shelf" desire.

Digital Equipment Corporation has consistently maintained a leadership role in the minicomputer field in both technology and total number of installations. We hope that our past successful performance coupled with our current new product developments will permit you to grant us a favorable decision on our request for a late proposal.

(continued)

DIGITAL EQUIPMENT CORPORATION 200 FOREST STREET MARLBORO, MASSACHUSETTS 01752

(617) 481-9511

If we can provide any further information, do not hesitate to contact me or Mr. James H. Kouarik and/or Mr. Daniel Murry of our Orlando Office, Telephone Number 305-851-4450. Thank you very much for your consideration.

Very truly yours,

Gordon Bell.

Gordon Bell
Vice-President
Office of Development

GB:sml

SUBJ: OOD STAFF MINUTES

DATE: 01-24-75
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ: OOD STAFF MEETING MINUTES--1/23/75

To: OOD
CC: Mark Abbett, Ed Corell, Tom Stockebrand

1. A. Ed Corell and Tom Stockebrand will get together to work on the terminal plan.

   B. We will get Tom a decision on his request for budget over-run to maintain the group by February 1.

2. Becky Hawes introduced us to the Corporate Salary Planning process for 1975.

3. Mark will get back with expense visibility on the recruiting mechanism. The cost center pays for recruiting.

4. A. We will go to OC to ask for a policy to add people to spend according to budget.

   B. Larry asked for 5 hires: 3 are approved as a replacement. We recommend the other 2 to OC--Larry is under budget.

5. Gordon will get George Plowman to take over the Engineering Committee. (Notes on Eng. Co. Charter attached.)

6. We currently believe we aren't effectively communicating with Field Service and Production. We will talk with them once/quarter (Shields/Cudmore--St. Amour).

7. Core and MOS now meet the budget. Components is paying for core on 11/WD!

   A. 32K--progress in understanding ringing, better operating point, redressed lines. Two systems running at margin and room temperature. Report at schedule review on Wednesday, Feb. 15, looks good.

   B. MOSTEK--failure rates up on early devices at 70deg. C.

GB:mjk

digital INTEROFFICE MEMORANDUM

TO: Distribution

DATE: January 30, 1975

FROM: Gordon Bell

DEPT: OOD

EXT: 2236 LOC: ML12/A51

SUBJ: INTELLIGENT TYPEWRITER FOR DUMB PEOPLE (I.E. VOICELESS) TO USE FOR COMMUNICATION

The attached device is entering a hobby stage for me. A friend, Constantine Doxiadis, a planner and my wife's employer, has MS. His voice is gone, and he still wants to communicate, write and confer. I may get into doing the programming--another example of a small system.

I'm proposing to use an 8V, 8/A with floppies, mounted in a carrying case together with a keyboard and video monitors.

GB:mjk

Attachment — filed under inventors. copy too light to film.

Distribution

Jim Bell
Ed Corell
John Clarke
Ed Kramer
Ken Olsen

digital INTEROFFICE MEMORANDUM

TO: Distribution

DATE: January 30, 1975

FROM: Gordon Bell gb

1058

DEPT: OOD

EXT: 2236 LOC: ML12/A51

SUBJ: RELATIVE COSTS ASSOCIATED WITH TERMINALS

	Cost/Yr (K$)	Cost ($)/Hr @ 2400 Hr.
Person	5, 10, 20, 40	2, 4, 8, 16
System	(12-25)/10=1.2~2.5	.5~1.
Terminal @ (4 yrs)	.25~.75	.1~.4
Service (assume 2400 MTBF)	.05	.02
Space	.050 - .100	.02 - .04
Power	.005~.01	.002~.004
Line charges	0~2.4	0~1.00
Paper	0~.1	0~.04

GB:mjk

Distribution
OOD
Ed Corell
Andy Knowles
Stan Olsen
Tom Stockebrand

cc: Ken Olsen

G. Bell
1/31/75

WHO'S DESIGNING/SELLING/USING PRODUCTS?

1059

P/L
- COMM
  - COMM
  - Telco
- PDP-10
  - Do?
  - DAS 10
- LDP-net
- IPG
- CSS
  - US
  - Europe--Germany

Central
- COMM Hdw
- COMM Soft.
- Net Soft.
- Net Prod. Mgmt.

} Software

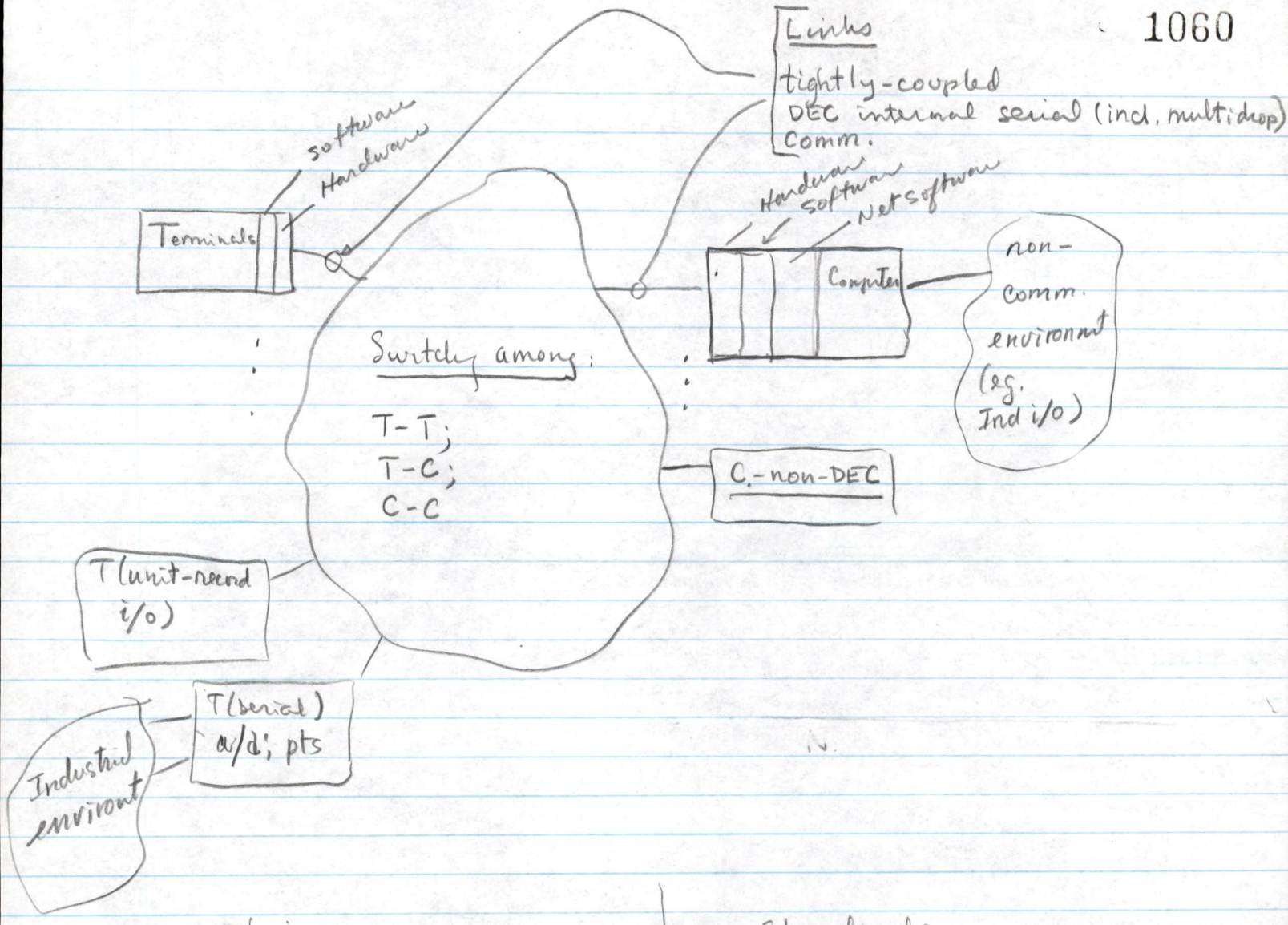
In house
- Eng.
  - CS/2
  - DA
- DECnet
- EDP--Maynard → FS; WM → WM

Concerns

1. Product goodness (competitive $/perf; perf; reliability)
2. Future: LSI-11, dist. process, higher perf.; better T's.
3. Resources are spent--do all, incremental!
4. Non standard! Need adequate ones--must adhere to them } LDP-DAS
5. Lack of products: s/f; c-to-c; multiple 10; concentrators.
6. High support.

The Communications - Termnls - Network Domain

1060



Thing	Standards
Hardware interfaces. to Links (from C.)	tightly coupled DEC-defined serial Comm.
Termnls	20ma | EIA | multidrop. Termnl converters
Software support	to Std. Op. Sys.
Sub systems (eg. concentrators, RJE T's, s/f switch)	DDCMP.
Networks	NCL Software utilities Inter-process.
Other	files command language. termnl modes. languages.

gb 1/31/75

Who's Designing / Selling / Using Products?

P/L
- Comm.
  - Comm
  - Telco
- PDP-10
  - DO ?
  - DAS 10
- LDP - net
- IPG
- CSS
  - US
  - Europe - Germany.

Central
- Comm. Hdw
- Comm soft. } Software.
- Net Soft } Software.
- Net Prod. Mgmt } Software.

In house
- Eng.
  - CS/2
  - DA
- DECnet
- EDP — Maynard → FS ; WM → WM.

Concerns
1. Product goodness (competitive $/part; perf; reliability)
2. Future: LSI-11, Dist. process, higher perf.; better T's.
3. Resources are spent — do all, incremental!
4. Non-standard! Need adequate ones — must adhere to them. (LDP-CSS)
5. Lack of products: s/f; C-to-C; multiple 10; Concentrators.
6. High support
7. Nee

SUBJ: ALPHANUMERIC GROUP

DATE: Ø2-Ø3-75
FROM: GORDON BELL

*
PLEASESEND TO: FILE
*

SUBJ: APPROVAL OF ALPHANUMERIC GROUP OVERRUN FOR 1 MONTH; REJECTION OF REQUESTS FOR LSI-11, LA 18Ø

To: Operations Committee

From: Gordon Bell
Chairman, Products Committee

The Products Committee voted to not recommend the requested overrun for the VT51-, LA 18Ø, LA36+, LSI-11, LSI-11 (core). Funding was approved for the next month for the alphanumeric group VT51 overrun to hold the group together. The Office of Development was requested to return to the Products Committee with a better recommendation.

The basis for the disapproval was:

1. The product lines are being held back next year and more products in this appear to only increase expense, not NOR.

2. The low end terminal strategy is certainly unclear as it relates to LA18Ø, LA36 options and specials of all types especially, including ASR's, and VT51's.

3. The rapid build up of production capacity is occurring in a single plant and there is credibility that this is possible, especially in light of a new disk system which will be entering the same plant in the same time frame.

4. There is some scepticism on the part of product and product line managers as to whether terminal build up can occur with the rapidity forecast...especially since much of this will have to be on a specialized (learned) basis.

5. The build up shifts the resources away from the current center of the business and we have not reforecast spending and future NOR.

SUBJ: ALPHANUMERIC GROUP DATE: 02-03-75
FROM: GORDON BELL

6. Examining the current product contribution and ROI for the LA180, VT50, and LA36, they are all below corporate average; hence, underpriced. The payoff is long, and in the case of VT50, the use of engineering resources is a factor of 3 too high. Future terminals are clearly going to suffer too.

For these reasons, we recommend that the overrun not be approved, except for the alphanumeric group and for the next month.

I believe a group composed of Puffer, Knowles, and Reed should look at the overall terminals plan in terms of the above considerations. Corell and Stockebrand have been working at the product part. Bell, Laut, and Frith will recompute the allocation of resources as a function of current and projected NOR. These forecasts (plans) are also needed before a plan occurs. (We would like the assistance of Curtis and Thompson.) Teicher and Tomasic have yet to establish a low end plan which is evolving rapidly, and appears to require much money, resources, etc.

GB:mik

cc: Products Committee
Ed Corell
Julius Marcus
Tom Stockebrand

SUBJ: DIALOGUE WITH JULIUS

DATE: 02-03-75
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ: DISCUSSION WITH JULIUS ON OUR PRODUCTS

To: OOD
CC: Julius Marcus

I've been pressing quite hard for improving terminals and COMM products.

Julius has several important inputs on products which are under our direct control, which I hope we all understand and can establish some objectives to remedy.

1. The packaging and cabling is terribl. COMM exascerbates this by having lots of cables and odd-sized modules. (My feeling that we must stop the works-in-a-drawer designs unless we want out of COMM and IPG markets.

2. Diagnostics is nil. For Telco 370/158--MTBF is 2 months, MTTR is 2 hours. For 11/40--MTBF is 10 months, MTTR is 10 hours.

3. The 04 was a bad product idea (except for parity). It is unforecastable (unscheduled). The B is a worse idea. Marketing Committee rammed it down the PL managers throats.

I still would welcome having Julius at our staff meetings, but we must all have more dialogue with him.

GB:mjk

digital

1065

February 4, 1975

D. B. Gillies
Professor of Computer Science
and Applied Mathematics
Computer Science Department
University of Illinois at Urbana-Champaign
Urbana, Illinois 61801

Dear Don:

Thanks for the documents on PASCAL I received in December. I was also anticipating more information on the later PASCAL and am curious as to how these tests are and when it will be available.

I had several people look at it, and although I think we may eventually be interested in it, I don't think we are right now. I would like to get your reaction as to what you think we might do with it as a product. Should we use it for implementing languages, operating systems, applications? Would users want it? When do you think there will be a standards effort?

George Poonan has been using PASCAL on the PDP-10 to write a language parse table generator, and he is looking at it for other applications. I still think we would like to get an object program somehow to fully evaluate. I still believe that if an object tape were available on some of our in house machines the interest might be increased. But without a way to look at it, there is not sufficient interest at this time.

I would like Al Brown to visit you in the future and discuss your views, and keep in touch as to how it might be useful. I believe it would be highly useful to our users community through DECUS. But since you are undoubtedly still interested in getting more support for it, then that avenue is probably out of the question. On the other hand, that would establish a need, and in the event that we wanted to make it a product, we would then work with you to establish a price.

I wish I could get more enthusiasm for the product internally, but I need your help somehow.

Sincerely,

Gordon Bell, Vice President
Office of Development

GB:mjk
cc: Al Brown, George Poonan

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

Copy to Brown + Poonan's memo + file → George

1066

DEPARTMENT OF COMPUTER SCIENCE
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN URBANA, ILLINOIS 61801, U.S.A.

November 27, 1974

Jim Bell

DEC 02 1974
12-5

Professor C. Gordon Bell
Vice President for Engineering
Digital Equipment Corporation
Maynard, Massachusetts 01754

Dear Gordon:

Enclosed please find two documents:

(1) a manual for the present (bootstrap) PASCAL-11,

(2) a sample of how it compiles code.

Since we are concerned only with clean code (not optimized) for such a provisional compiler, it should be read in that spirit. The final PASCAL (written in PASCAL) is coming up quite fast--we are going to test it on students next week and we expect to have it reasonably solid by December 20. I'll send a sample output as soon as possible. There will be some optimization at that time but much more in the first 10 weeks of 1975. Next semester it will be used for two courses--operating systems and compilers.

We don't use C ourselves so can't give you any first-hand information about it.

Sincerely,

Don

D. B. Gillies
Professor of Computer Science
and Applied Mathematics

DBG:jw

Encl.

digital INTEROFFICE MEMORANDUM

TO: Gordon Bell

CC: J. Bell
Al Brown

DATE: January 21, 1975

FROM: George Poonen

DEPT: R & D Group

EXT: 3537 LOC: 3-4

1067

MT get me Gillies letter & answer S.

JAN 21 1975

SUBJ: PASCAL

This memo is in response to the letter sent by Professor Gillies regarding PASCAL. I have not seen any proposal by Professor Gillies and I have only evaluated the language implementation based on the documents sent by him.

A. First, how can DEC benefit?

1. As a systems programming language-
(for operating system and compiler development)
NO- The current implementation is not sufficient to warrant this. It makes no attempt at producing optimizing code. Possibly better code is forthcoming. On the other hand, as a language PASCAL is probably the cleanest and least error prone language existing today. PASCAL is more than adequate for writing compilers; however, it lacks adequate facilities for constructing operating systems. (Both Tony Hoare and Hansen are currently involved in extending PASCAL for this purpose.)

2. As an applications language-
(for application where a high degree of optimization is not required)

MAYBE- provided some of the basic constructs such as POINTERS and SETS are implemented. The current implementation has neither.

On the other hand, the language is not suitable for business applications because of lack of adequate I/O and data management facilities.

3. As an educational language-
MAYBE- many major universities and schools have adopted PASCAL as their standard. In fact, PASCAL is now available on all major manufacturers'machines. Provided the implementation is complete it would be attractive to some universities. On the other hand, it is not clear how big this market is today. The majority still teach FORTRAN, BASIC, PL/1, and COBOL.

4. As a language available through DECUS-
YES- this appears to be the most suitable category under which DEC could acquire it. This has several advantages. Perhaps we could acquire their PASCAL when it is complete in exchange for some other piece of software.

B. The implementation of PASCAL by Professor Gillies-

1. The state of the compiler as documented in the recent letter (Dec. 1974) appears to be very similar to that existing about 6 months earlier when I visited him.

2. The implementation is reasonable; no attempt has been made to produce optimized code although the compiler does not produce really dumb code either. The paucity of examples shown preclude any real evaluation. (I can't understand why he cannot send us an object tape for an honest evaluation.) Optimization has been mentioned by Professor Gillies as not being an initial goal.

3. The implementation lacks the following basic constructs: POINTERS and SETS.

4. The run time system provided with the compiler appears to be fairly good. This is based on some of the facilities that I saw on my visit.

5. Dynamic records are not available since POINTERS are not available. This is a major weakness.

All in all it makes me very doubtful whether at this stage we should consider Gillies' PASCAL. As far as I can tell, there have been no substantial improvements since I saw it 6 months ago. (Documents for both are attached.) When a full implementation together with some optimization is available we should reevaluate this implementation. Hopefully he could send us a copy of the object code so that we can run it ourselves. Meanwhile, we may wish to consider concurrent PASCAL by Hansen which includes additional constructs for building operating systems. (However, this will not be available for at least another year.)

PASCAL as a language is about the cleanest language existing today. It embodies a number of innovations which make it less error prone than any other existing language. However, even PASCAL, simple as it is, may be too rich a language to introduce at DEC. A highly optimizable and, in fact, simplier subset of PASCAL could be considered as an alternative to assembly language for internal use but not as a product. Such a language will require about 6 months to implement. Until PASCAL becomes a standard (if it ever does) or attains the status of ALGOL, FORTRAN, etc., we should not consider it as a language for a product.

GP/bd

PASCAL/11 USER'S GUIDE

UNIVERSITY OF ILLINOIS, URBANA, ILLINOIS.

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LANGUAGE AS OF

VERSION 4

20-NOV-74

INTRODUCTION

PASCAL/11 VERSION 4 IS AN IMPLEMENTATION ON THE PDP-11 OF THE PROGRAMMING LANGUAGE PASCAL. IT IS WRITTEN IN MACRO-11, AND IS DESIGNED TO BE A BOOTSTRAP COMPILER FOR THE NEXT VERSION TO BE WRITTEN ENTIRELY IN ITSELF. IT IS ASSUMED THAT THE READER IS FAMILIAR WITH THE LANGUAGE PASCAL AS DESCRIBED IN THE REVISED REPORT ON THE PROGRAMMING LANGUAGE PASCAL BY NIKLAUS WIRTH. THIS DOCUMENT IS INTENDED TO DESCRIBE THE DIFFERENCES BETWEEN THE LANGUAGE SO DESCRIBED AND THE CURRENT IMPLEMENTATION, AND ALSO TO SPECIFY SOME OF THE CONCEPTS NOT COMPLETELY DEFINED IN THE REPORT. AS THIS IMPLEMENTATION IS MERELY A BOOTSTRAP, IT HAS NOT STRICTLY ADHERED TO THE SPECIFICATIONS MENTIONED ABOVE. THE NEXT VERSION, IS EXPECTED TO BE TOTALLY COMPATIBLE WITH OTHER IMPLEMENTATIONS OF THE LANGUAGE. FURTHER, THIS DOCUMENT DESCRIBES THE VOCABULARY USED BY THE IMPLEMENTATION, AND THE CHARACTER SEQUENCES USED TO REPRESENT VARIOUS PASCAL SYMBOLS. SINCE THE CHARACTER SET AT AN INSTALLATION IS INDEPENDENT OF THE PROGRAM, IT IS EXPECTED THAT THE CHARACTER CONVENTIONS WILL BE THE SAME IN FUTURE IMPLENTATIONS.

A ONE-PASS COMPILER WHICH PRODUCES AS ITS OUTPUT FILE A SET OF MACRO-CALLS, AND DEFINITIONS CONSTITUTES THE FIRST PHASE OF COMPILATION. THESE MACRO-CALLS, TOGETHER WITH A SET OF MACRO-DEFINITIONS, IS ASSEMBLED BY THE MACRO-11 ASSEMBLER TO PRODUCE AN OBJECT FILE. THE OBJECT FILE MAY BE LINKED TO A SET OF PASCAL RUN-TIME OBJECT FILES TO PRODUCE A STAND-ALONE PASCAL LOAD MODULE, OR IT MAY BE LINKED TO ITSELF TO PRODUCE A RE-ENTRANT, POSITION-INDEPENDENT MODULE (CALLED A CODE MODULE), WHICH CAN BE CALLED BY ANOTHER PASCAL PROGRAM. SINCE THE CODE MODULE IS A DOS FILE, THERE MUST EXIST A MECHANISM FOR BINDING THE NAME OF A PASCAL EXTERNAL PROCEDURE TO SUCH A FILE, AND THESE CONVENTIONS ARE DESCRIBED LATER.

IN ADDITION, THE FIRST PASS PRODUCES A LISTING OF THE SOURCE PROGRAM INCLUDING ERROR MESSAGES IF ANY. THE FIRST PASS ACCEPTS SPECIFICATIONS FOR INPUT AND OUTPUT DATASETS USING THE DOS COMMAND STRING INTERPRETER IN THE FOLLOWING FORM:

MACRO DATASET,LISTING DATASET<SOURCE DATASETS

COMPILER DIRECTIVES

COMMANDS TO THE COMPILER SUCH AS FORMAT CONTROL OR ERROR HANDLING DIRECTIVES, ARE NOT AN INTRINSIC PART OF THE LANGUAGE. THEY ARE SPECIFIED BY MEANS OF AN ESCAPE CHARACTER '$' OCCURRING AS THE FIRST CHARACTER ON A LINE. THIS CHARACTER IS NOT USED ANYWHERE ELSE IN A PASCAL PROGRAM (EXCEPT POSSIBLY INSIDE QUOTED STRINGS, WHICH MAY NOT CROSS LINE-BOUNDARIES) AND DENOTES THE START OF A COMPILER DIRECTIVE.

THE VALID $ COMMANDS AND THEIR MEANINGS ARE DESCRIBED BELOW:

$LIST	INCREMENT THE INTERNAL LIST COUNTER.
$NLIST	DECREMENT THE INTERNAL LIST COUNTER (UNLESS IT IS ZERO) IF THE COUNTER IS GREATER THAN 0 (IT IS INITIALLY 1) THEN THE SOURCE IS LISTED. IF A LINE OF SOURCE CONTAINS SYNTAX ERRORS, IT IS LISTED, REGARDLESS OF THE STATE OF THE LIST COUNTER. THESE OPTIONS PERMIT SELECTIVE SUPPRESSION OF THE LISTING.
$OCOMMENT	INCREMENT THE INTERNAL COUNTER OUTCOM.
$NCOMMENT	DECREMENT OUTCOM. IF OUTCOM (WHICH IS INITIALLY ZERO) BECOMES GREATER THAN ZERO, THE COMPILER PRODUCES DEBUG OUTPUT IN THE FORM OF COMMENTS CONTAINING THE SOURCE LINE PRECEDING THE CORRESPONDING MACRO-11 STATEMENTS GENERATED. THIS IS ESPECIALLY USEFUL FOR DE-BUGGING THE FIRST PASS.
$PAGE	CAUSE A FORM-FEED TO APPEAR IN THE LIST FILE (.LST) A NEW PAGE HEADER INCLUDING THE FIRST SIX CHARACTERS OF THE PROGRAM NAME, THE PAGE NUMBER AND VERSION NUMBER APPEAR AT THE TOP OF THE NEXT PAGE.
$IOLIM=<NUMBER>	SETS THE I/O LIMIT THIS IS A RUN-TIME PARAMETER DEFINING THE MAXIMUM NUMBER OF I/O REQUESTS THAT MAY BE MADE BY THE PROGRAM. NOTE THAT FOR A DISK FILE THIS NUMBER CORRESPONDS TO THE NUMBER OF BLOCKS IN THE FILE, WHILE FOR LP: IT CORRESPONDS TO THE NUMBER OF BUFFERS WRITTEN. THE DISK ACCESSES INVOLVED IN LOADING AN EXTERNAL PROCEDURE ARE COUNTED AS I/O REQUESTS. SETTING IT TO ZERO ($IOLIM=0) IS EQUIVALENT TO SETTING NO LIMIT.
$TIMELM=<NUMBER>	SETS THE TIME LIMIT IN SECONDS AS WITH $IOLIM, SETTING $TIMELM = 0 IMPLIES THERE IS NO LIMIT ON THE TIME THE PROGRAM MAY RUN.
$SYNTAX	INHIBITS CODE GENERATION AND EXECUTION, SO THAT ONLY THE SYNTAX OF A PROGRAM IS CHECKED. THIS REDUCES THE NUMBER OF DISK ACCESSES THE COMPILER NEEDS TO DO, AND THEREBY INCREASES THE COMPILE RATE. ONCE SET, THIS OPTION CANNOT BE TURNED OFF.
$ERRLIM=<NUMBER>	SETS THE INTERNAL COUNTER ERRLIM. IF THE NUMBER OF SYNTAX ERRORS FOUND EXCEEDS ERRLIM, FURTHER CODE GENERATION AND THE

EXECUTION STEP ARE SUPPRESSED.

$WARNLM=<NUMBER> SETS THE INTERNAL COUNTER WARNS.
IF AT ANY STAGE DURING THE FIRST PASS
THE NUMBER OF SYNTAX ERRORS FOUND EXCEEDS WARNS,
THEN THE COMPILER ABORTS COMPILATION IMMEDIATELY.

$STKSIZ=<NUMBER> DEFINES THE SIZE OF
THE RUN-TIME STACK. THE DEFAULT IS
1200. THIS IS THE AREA USED TO
ALLOCATE ALL NON-STRUCTURED
VARIABLES IN A PROGRAM.

COMPILER DIRECTIVES(CONTINUED)

$REMARK
.
.
.
$END

THIS IS USED TO ALLOW MULTI-LINE SEQUENCES OF DOCUMENTATION.
IT IS EQUIVALENT TO THE COMMENT CONVENTION DEFINED IN THE
REVISED REPORT, BUT IS RELATIVELY IMMUNE TO THE PROBLEM
OF MISSING COMMENT DELIMITERS.

$CODE
.
.
.
$END

THIS IS A MECHANISM TO PERMIT THE INSERTION
OF ASSEMBLY LANGUAGE STATEMENTS WITH A PASCAL PROGRAM.
ANY VARIABLE WHOSE SCOPE INCLUDES THE BLOCK
CONTAINING THE ASSEMBLY CODE MAY BE REFERENCED
WITHIN THAT ASSEMBLY CODE.
SINCE ALL VARIABLES IN PASCAL ARE
ADDRESSED OFF A REGISTER, (GLOBAL VARIABLES
OFF R5, LOCAL VARIABLES OFF R4), THE
PASCAL IDENTIFIER, IN ASSEMBLY LANGUAGE
ACTUALLY CORRESPONDS TO THE VALUE OF THE
OFFSET. THE COMPILER THUS GENERATES THE EQUATES
NECESSARY TO BE ABLE TO ACCESS THE
VARIABLES CORRECTLY.
THUS, THE FOLLOWING MAY BE TROUBLESOME:

```
PROGRAM DISPLAYR0;
        VAR R0:INT;
        PROC DISPLAY(VALUE:INT);
                BEGIN
$CODE
                MOV     VALUE(R4),R0
                HALT
$END
                END; "DISPLAY"
        BEGIN
        .
        .
        .
        END.
```

IN THE MOV INSTRUCTION SHOWN ABOVE, BOTH VALUE
AND R0 REPRESENT OFFSETS FROM THE RELEVANT DISPLAY
REGISTERS. FOR OBVIOUS REASONS, USE OF
$CODE BY ANYONE NOT FAMILIAR WITH PASCAL
INTERMEDIATE CODE IS TO BE DISCOURAGED.

THE FOLLOWING COMMANDS ARE USED TO DEFINE THE VARIABLES
NOST, NOSUB, NODIM.
THESE VARIABLES ARE USED FOR CONDITIONAL ASSEMBLY.

SEMANTICS:

NOST=0 MEANS THAT STATEMENT NUMBERS ARE MONITORED AT RUN-TIME.
NOST=1 MEANS THAT STATEMENT NUMBERS ARE NOT MONITORED.
THIS MAY BE USED TO SAVE CORE.

NOSUB=0 ENABLES RUNTIME SUBSCRIPT CHECKING.
NOSUB=1 DISABLES RUNTIME SUBSCRIPT CHECKING, THEREBY SAVING CORE AND TIME
NODIM=0 ENABLES DYNAMIC CHECKING OF ARRAY DIMENSIONS.
NODIM=1 DISABLES RUNTIME CHECKING OF ARRAY DIMENSIONS.
OF COURSE, FOR A SINGLE PROGRAM THIS CAN BE DONE AT COMPILE
TIME. IT IS ONLY USEFUL FOR EXTERNAL PROCS WITH ARRAY
ARGUMENTS.

$COMMANDS:

$NOST SETS NOST TO 1.
$YOST SETS NOST TO 0.
$NSUB SETS NOSUB TO 1.
$YSUB SETS NOSUB TO 0.
$NDIM SETS NODIM TO 1.
$YDIM SETS NODIM TO 0.

DEFAULTS:

NOST=0
NODIM=1
NOSUB=0

BASIC VOCABULARY

1. LOWER CASE LETTERS ARE TRANSFORMED TO THE CORRESPONDING UPPER CASE LETTERS, IN THIS VERSION.

2. THE FOLLOWING SPECIAL SYMBOLS HAVE THE DESIGNATED MEANINGS:

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!	SET UNION, LOGICAL OR.
&	SET INTERSECTION, LOGICAL AND.
\	NEGATION
\=	NOT EQUAL TO
<=	LESS THAN OR EQUAL TO
>=	GREATER THAN OR EQUAL TO
"	OPEN COMMENT
"	CLOSE COMMENT THERE IS NO AMBIGUITY ABOVE, SINCE A CLOSE COMMENT CAN OCCUR ONLY AFTER AN OPEN COMMENT
:=	ASSIGN
_	ASSIGN

3. THE CHARACTER SET IS ASCII, WITH THE ASCII COLLATING SEQUENCE.

4. ABBREVIATIONS:

INT	INTEGER
PROC	PROCEDURE
FUNC	FUNCTION

5. THE RANGE OF VALUES FOR A VARIABLE OF TYPE INTEGER IS -32768..32767.

DECLARATIONS

1. LABEL DECLARATIONS: ONLY LABELS THAT ARE USED IN TRANSFERS
OUT OF PROCEDURES NEED BE DECLARED EXPLICITLY. THE AMBIGUITY
CAUSED BY ENCOUNTERING A GOTO TO A LABEL WHICH HAS NOT YET BEEN
DEFINED IN THE BLOCK, BUT HAS BEEN DECLARED IN THE SURROUNDING
BLOCK (THAT IS, SHOULD THE GOTO BE INTERPRETED AS A BLOCK EXIT,
OR A TRANSFER TO AN AS YET UNDEFINED LABEL WITHIN THE SAME BLOCK)
IS HANDLED BY USING AN EXTRA RESERVED WORD, EXIT. THIS IS DESCRIBED
IN MORE DETAIL IN THE NEXT SECTION. IN THE REVISED REPORT, THE
AMBIGUITY IS HANDLED BY DECLARING ALL LABELS DEFINED IN A PROCEDURE,
AND THE NEXT VERSION SHOULD DO THE SAME.

2. CONSTANT DEFINITIONS:
THE FOLLOWING FORMS ARE ALLOWED.

```
CONST
        X=65;
        X=+65;
        X=-65;
        X='A';          (SAME AS X=65;)
        X=+'A';         (SAME AS ABOVE)
        X=-'A';         (SAME AS X=-65;);
        Y=X;
        Y=+X;
        Y=-X;
        Z='ABCDEF'      (AN ARRAY CONSTANT)
```

THE FOLLOWING ARE NOT ALLOWED:

```
        X=-'ABCDEF';
        X=+'ABCDEF';
        X='ABCDEF';  Y=+X; OR Y=-X;
```

THE PREDEFINED CONSTANTS ARE EOL=10 (LINE-FEED),
FALSE=0, TRUE=1, NIL=0, AND ALFALENG=2.
THESE ARE ALL RESERVED WORDS AND MAY NOT BE
REDEFINED.

TYPE DEFINITIONS:

1. INTEGER IS A RESERVED WORD AND IS EQUIVALENT TO -32768..32767
CHAR IS A TYPE THAT CAN FIT IN ONE 8-BIT BYTE.
BOOLEAN = (FALSE,TRUE); ANY SUCH SCALAR TYPE DECLARATION
IMPLIES THAT CONSECUTIVE INTEGRAL VALUES, STARTING FROM ZERO,
ARE ASSIGNED TO SUCCESSIVE ELEMENTS OF THE DECLARATION,
AND THE TYPE IS DEFINED TO BE EQUIVALENT TO A SUBRANGE
TYPE 0..LASTELEMENT; THUS THE DECLARATION FOR BOOLEAN
IS THE SAME AS:

```
CONST
     FALSE=0;
     TRUE=1;
TYPE
     BOOLEAN=0..TRUE;
```

REAL (THAT IS FLOATING POINT) OPERATIONS HAVE NOT
BEEN IMPLEMENTED AS THE HARDWARE FOR SUCH
INSTRUCTIONS DOES NOT EXIST ON OUR PDP-11.
INTEGER,CHAR,BOOLEAN,REAL ARE ALL RESERVED WORDS, AND MAY
NOT BE REDEFINED.

2. GENERAL SCALAR TYPE DECLARATIONS ARE ALLOWED, AND ARE INTERPRETED
AS WITH BOOLEAN. THUS, COLOR=(RED,ORANGE,YELLOW); IS THE SAME AS

```
CONST
     RED=0;
     ORANGE=1;
     YELLOW=2;
```

```
TYPE
     COLOR=0..YELLOW;
```

NONE OF THE ELEMENTS OF A SCALAR TYPE DEFINITIONS MAY BE USED ELSEWHERE IN THEIR BLOCK EXCEPT AS DEFINED CONSTANT IDENTIFIERS.

3. SUBRANGE TYPES ARE PERMITTED USING ANY TWO NON-ARRAY CONSTANTS. THUS THE FOLLOWING ARE PERMITTED:


```
CONST
     LO=0;
     HI='Z';
     MINUSZ=-HI;
     TENBASE8=8;
     GREEN=3;
TYPE
     T1=LO..HI;
     T2=MINUSZ..HI;
     T3=MINUSZ..-5;
     COLOR=(RED,ORANGE,YELLOW);
     T4=RED..TENBASE8;
     COLOR2=RED..GREEN;
```

IF THE RANGE OF VALUES DEFINED BY A SIMPLE TYPE DECLARATION CAN BE STORED IN 8 BITS, THEN ALL VARIABLES OF THAT TYPE ARE STORED IN 1 BYTE. THIS IS ONLY FOR STORAGE PURPOSES, AND ALL CALCULATIONS ARE PERFORMED ON THEIR 16-BIT EQUIVALENTS. FOR THE PRESENT NO RANGE CHECKING IS DONE AT RUN-TIME. FOR EXAMPLE, A BOOLEAN VARIABLE MAY TAKE ON THE VALUE 2.

4. NO STRUCTURED TYPE IS ALLOWED IN A TYPE DEFINITION. ALL VARIABLES OF STRUCTURED TYPES, MUST BE DECLARED EXPLICITLY IN THE VARIABLE DECLARATION.

```
TYPE
     X=ARRAY[0..1] OF INT;
VAR
     A:X;
```

MUST BE WRITTEN AS

```
VAR
     A:ARRAY[0..1] OF INT;
```

5. VARIABLE DECLARATIONS

VARIABLES MUST BE ONE OF THE FOLLOWING TYPES:

A. SIMPLE TYPE, (WHICH MAY BE DEFINED EARLIER USING A TYPE IDENTIFIER)

B. FILE OF CHAR. 3 OPTIONS ARE AVAILABLE WITH A FILE DEFINITION, AND ARE SPECIFIED IN SQUARE BRACKETS AS SHOWN:
FILE[OPTION1,OPTION2,OPTION3] OF CHAR;
THE FIRST OPTION SPECIFIES IN/OUT/EXT CORRESPONDING TO THE DOS OPENI, OPENO, OPENE OPTIONS.
THE SECOND OPTION SPECIFIES ASCII/BINARY CORRESPONDING TO ASCII OR BINARY FILES.
THE THIRD OPTION SPECIFIES A DEVICE NAME.
ANY OR ALL OPTIONS MAY BE ABSENT, IN WHICH CASE THE DEFAULTS ARE FILE[IN,ASCII,SY] OF CHAR; WHERE SY IS THE NAME OF THE SYSTEM DEVICE (LIKE DF0).
THE ACTUAL NAME OF THE FILE MAY BE OBTAINED BY
NAME=FIRST 6 CHARACTERS OF PROGRAM NAME.
EXTENSION=FIRST 3 CHARACTERS OF FILE NAME.

C. RECORDS CAN HAVE ELEMENTS OF ONLY A SIMPLE TYPE, AND VARIANTS ARE NOT ALLOWED. FURTHERMORE, IDENTICAL FIELD NAMES IN TWO DIFFERENT RECORDS WHICH ARE DECLARED IN THE SAME BLOCK ARE NOT ALLOWED, UNLESS THE RECORDS ARE BE DECLARED IN THE SAME VARIABLE LIST.

D. SET AND POINTER TYPES ARE NOT IMPLEMENTED.

E. ARRAYS OF ARBITRARILY MANY DIMENSIONS ARE ALLOWED. HOWEVER, THE ARRAY TYPE CAN BE ONLY SCALAR, OR OF TYPE RECORD. SINCE AN ARRAY OF ARRAYS IS THE SAME AS A SINGLE ARRAY OF ONE HIGHER DIMENSION, THE FORMER HAS NOT BEEN IMPLEMENTED. THUS

```
VAR
        X:ARRAY[0..10] OF ARRAY[0..10] OF CHAR;
```

IS NOT PERMITTED, WHILE THE EQUIVALENT REPRESENTATION USING MULTIPLE DIMENSIONS SHOWN BELOW IS ALLOWED:

```
VAR
        X:ARRAY[0..10,0..10] OF CHAR;
```

6. PROCEDURE/FUNCTION DECLARATIONS

WITHIN DECLARATIONS OF PARAMETERS FOR PROCEDURES OR FUNCTIONS, THE FOLLOWING RULES APPLY.

A. VAR SPECIFIES A CALL-BY-REFERENCE.

B. THE DEFAULT IS CALL-BY-VALUE FOR SIMPLE VARIABLES AND CALL-BY-REFERENCE FOR STRUCTURED VARIABLES.

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C. CALL-BY-VALUE FOR STRUCTURED VARIABLES HAS NOT BEEN IMPLEMENTED.

D. PROCEDURE AND FUNCTION PARAMETERS HAVE NOT BEEN IMPLEMENTED.

E. FOR ARRAY PARAMETERS, THE RANGE OF SUBSCRIPTS SPECIFIED BY THE FORMAL PARAMETER SPECIFICATION IS IGNORED, AND THE RANGE OF SUBSCRIPTS FOR THE CORRESPONDING ACTUAL PARAMETERS ARE USED. THUS, THE FORMAL DECLARATION SPECIFIES ONLY THE NUMBER OF SUBSCRIPTS OF THE ARRAY, AND ITS TYPE. IT IS THEREBY POSSIBLE, FOR EXAMPLE, TO WRITE PROCEDURES WHOSE PARAMETERS ARE STRINGS (=ARRAY OF CHAR) OF UNKNOWN LENGTH.

F. SIMIALRLY, THE OPTIONS SPECIFIED FOR AN ACTUAL FILE PARAMETER TAKE PRECEDENCE OVER THE OPTIONS SPECIFIED FOR THE CORRESPONDING FORMAL PARAMETER.

G. BOTH DECLARATIONS OF A FORWARD PROCEDURE/FUNCTION MUST HAVE AN IDENTICAL PARAMETER LIST.

THE FOLLOWING OPERATIONS ARE NOT YET IMPLEMENTED.

A. NEW( )
B. SET OPERATIONS
C. THE FLOATING POINT FUNCTIONS SUCH AS SIN( ) OR ROUND( )

THE FOLLOWING ARE EXTENSIONS/MODIFICATIONS:

A. TO DISTINGUISH BETWEEN JUMPS INSIDE A PROCEDURE AND EXITS TO OUTSIDE BLOCKS, A NEW STATEMENT 'EXIT <LABEL>' IS INTRODUCED.

B. CASE STATEMENTS CAN HAVE AN DEFAULT CLAUSE BY USING AN 'ELSE' WHERE A CASE LABEL SHOULD SYNTACTICALLY OCCUR.

C. FOR READ AND WRITE USING DECLARED FILES, THE SYNTAX IS 'READ <FILENAME> (LIST)' AND 'WRITE <FILENAME> (LIST)'.

D. WHILE WRITING A NUMBER TO A FILE OF CHAR, (A NUMBER MEANS AN EXPRESSION OF TYPE INTEGER, OR SUBRANGE THEREOF), A FIELD WIDTH MAY BE SPECIFIED BY PUTTING A ':<EXPRESSION OF SIMPLE TYPE>' AFTER THE EXPRESSION TO BE PRINTED. THE VALUE OF THE FIELD WIDTH SPECIFIER CAN BE USED TO CONTROL THE FOLLOWING:
   - LEADING ZEROS,
   - FIELD WIDTH SET TO MINIMUM POSSIBLE,
   - BASE 2,8,16 OR 10
   - TREAT THE NUMBER AS UNSIGNED.

   THE VALUES NEEDED TO SELECT ONE OR MORE OF THE ABOVE OPTIONS IS AVAILABLE IN EARLIER DOCUMENTATION.

F. MULTIPLE ASSIGNMENTS ARE ALLOWED IN AN EXPRESSION, AND ARE EVALUATED FROM RIGHT TO LEFT.

G. THE FOLLOWING FILE OPERATIONS ARE ALLOWED:
   - RESET (IN DOS CLOSE, OPEN FOR INPUT)
   - REWRITE (IN DOS DELETE, OPEN FOR OUTPUT)
   - CLOSE (CLOSE GIVES UP BUFFER SPACE)
   - EXTEND (IN DOS OPEN FOR EXTENSION)

DURING THE LAST QUARTER, THE BOOTSTRAP VERSION OF THE PASCAL COMPILER HAS BEEN COMPLETED, AND WORK IS PROGRESSING ON A COMPILER WRITTEN IN PASCAL ITSELF. THE NEW VERSION WILL INCLUDE THE ENTIRE DEFINED LANGUAGE PASCAL, TOGETHER WITH THE EXTENSIONS ALREADY PRESENT IN THE BOOTSTRAP VERSION, AND IS BEING DESIGNED SO AS TO MAKE FUTURE EXTENSIONS EXTREMELY EASY. THE INTENTION IS, IN PART, TO ALLOW EXPERIMENTATION WITH LANGUAGE CONSTRUCTS TO BE AS SIMPLE AS POSSIBLE.

LANGUAGE AS IT EXISTED IN JULY 1974

ANOTHER DESIGN CONSTRAINT IS THAT THE CODE-GENERATION ROUTINES SHOULD BE EASILY CONVERTED TO GENERATE CODE FOR OTHER MACHINES, SUCH AS THE LOCKHEED SUE.

THE BOOTSTRAP COMPILER HAS BEEN FROZEN AT ITS PRESENT LEVEL, SO THAT WORK CAN PROGRESS ON VERSION 2.

THE DIFFERENCES BETWEEN THE LANGUAGE ACCEPTED BY THE BOOTSTRAP VERSION AND THE LANGUAGE DEFINED IN THE PASCAL REPORT ARE AS FOLLOWS:

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1) VARIABLES OF TYPE SET ARE NOT CURRENTLY PERMITTED.

2) ONLY FILES OF TYPE CHAR MAY BE DECLARED. HOWEVER, A FILE MAY BE DECLARED AS A BINARY FILE, IN WHICH CASE IT MAY BE TREATED AS A FILE OF INTEGER.

3) RECORDS MAY NOT INCLUDE ARRAYS AS SUBFIELDS, AND A DECLARED TYPE MAY NOT INCLUDE AN ARRAY.

4) PROCEDURE/FUNCTION PARAMETERS ARE NOT YET IMPLEMENTED.

5) FUNCTIONS MAY RETURN ONLY SIMPLE VARIABLES.

6) THE GOTO STATEMENT HAS BEEN SUB-DIVIDED INTO TWO FORMS. THE FIRST ALLOWS BRANCHES WITHIN THE CURRENT BLOCK, AND IS INVOKED BY

GOTO <LABEL>;

THE SECOND ALLOWS ONLY BRANCHES OUT OF THE CURRENT BLOCK, TO A DECLARED LABEL, AND IS INVOKED BY

EXIT <DECLARED-LABEL>;

THIS MAKES PROGRAMS EASIER TO COMPREHEND, AND REMOVES SOME POSSIBLE AMBIGUITIES.

7) POINTER TYPES ARE NOT IMPLEMENTED.

8) PACKED ARRAYS ARE NOT EXPLICITLY IMPLEMENTED. HOWEVER, IF A VARIABLE'S VALUES FALL IN A SUB-RANGE OF -128..127, THE VARIABLE WILL BE STORED IN A BYTE, SO SOME PACKING IS DONE IMPLICITLY.

9) ARRAY AND RECORD PARAMETERS MAY NOT BE CALLED BY VALUE.

10) PROCEDURE AND FUNCTION PARAMETERS ARE NOT YET IMPLEMENTED, BUT IT IS EXPECTED THAT THEY WILL COME UP PRIOR TO VERSION 2 OF THE COMPILER.

11) THE TYPE 'REAL' IS EQUIVALENT TO INTEGER.

12) ANY PROCEDURE MAY BE DECLARED 'FORWARD'. THIS ALLOWS MUTUAL RECURSION OF PROCEDURES. THE PARAMETERS OF THE PROCEDURE MUST BE DECLARED AT THE FIRST DECLARATION OF THE PROCEDURE. IF A PROCEDURE IS DECLARED FORWARD AND NOT SUPPLIED, A RUNTIME ERROR IS CAUSED ON THE FIRST ATTEMPT TO EXECUTE IT.

13) A PROCEDURE MAY BE DECLARED EXTERNAL.
THIS IMPLIES THAT THE BODY OF THE PROCEDURE IS RESIDENT ON DISK, AND SHOULD BE LOADED. THIS PERMITS COMPILATION OF PROGRAMS WHICH ARE TOO LARGE TO BE COMPILED AS A WHOLE. IT ALSO PERMITS A PROGRAM TO OVERLAY ITSELF IN A NATURAL MANNER. CURRENTLY, AN EXTERNAL PROCEDURE CAN ONLY COMMUNICATE WITH ITS CALLER THROUGH THE PARAMETERS ON THE PROGRAM STATEMENT.
THE PROCEDURE QWERTYUIOP, DECLARED EXTERNAL, WILL BE SEARCHED FOR UNTIL THE TITLE OF QWERTY.COD, UNDER FIRSTLY THE CURRENT USER, AND SECONDLY [1,1]. THIS ALLOWS PUBLIC PROGRAM LIBRARIES TO BE SET UP.
E.G.

```
PROGRAM MAIN;
```

```
                I: INTEGER;
            PROCEDURE QWERTYUIOP(ASD: INTEGER; VAR FGH: INTEGER);
            EXTERNAL;
            BEGIN
                    QWERTYUIOP(4, I);
                    WRITE(I, EOL);
            END.
```

IS A POSSIBLE MAIN PROGRAM. IF THE PROGRAM

```
            PROGRAM Z(I: INT; VAR J: INT);
            BEGIN
                    J←I*I;
            END.
```

IS SUPPLIED ON DISK UNDER THE TITLE QWERTYUIOP.COD, THE OUTPUT WILL BE

```
               14
```

NOTICE THAT THE PARAMETERS DECLARED SHOULD CORRESPOND, IN NUMBER, ORDER, AND TYPE, BUT THE NAMES PROVIDED NEED NOT AGREE.

14) THE CASE STATEMENT HAS BEEN EXTENDED TO ALLOW 'ELSE' AS A CASE SELECTOR. THE STATEMENT AFTER THE 'ELSE' IS EXECUTED IF THE CASE VARIABLE TAKES ON NONE OF THE VALUES OF THE OTHER CASE SELECTORS.

15) THE STATEMENT WRITE(X:0), WHERE X IS AN INTEGER, CAUSES X TO BE PRINTED WITH NO LEADING SPACES. THUS

```
            WRITE(2:0, 4:0);
```

CAUSES OUTPUT

```
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```

FURTHER EXTENSIONS, TO PERMIT OCTAL AND HEXADECIMAL FORMATS ARE BEING CONSIDERED.

Page Feed
Line Feed
Space Any
ASCII

16) THE WRITE AND READ STATEMENTS HAVE BEEN EXTENDED TO ALLOW THEM TO APPLY TO AN ARBITRARY FILE. THE SYNTAX IS

```
            WRITE MYFILE(A, B, C);
```

17) THE FILE DECLARATION STATEMENT HAS BEEN EXTENDED. THE CURRENT SYNTAX IS

ZXC: FILE [<DIRECTION>, <FILETYPE>, <DEVICE>] OF CHAR;
THE EXTERNAL NAME OF THIS FILE WILL BE <PROGRAMNAME>.ZXC.
THE PARAMETERS TAKE ON THE VALUES
<DIRECTION> : CAN TAKE ON VALUES

- IN - THE FILE CAN ONLY BE USED FOR INPUT.
- OUT - THE FILE CAN ONLY BE USED FOR OUTPUT.
- EXT - THE FILE WILL BE OPENED EXTEND, IF IT EXISTS, AND OUTPUT, IF IT DOES NOT ALREADY EXIST.

<FILETYPE> : CAN TAKE VALUES

- ASCII - THE FILE IS A DOS ASCII FILE. ANY INTEGERS TRANSFERED TO/FROM IT WILL BE CONVERTED TO/FROM ASCII. THE DEFAULT FILES INPUT/OUTPUT ARE ASCII FILES
- BINARY- THE FILE IS A DOS BINARY FILE. IT ESSENTIALLY CONSISTS OF A BIT STREAM. READING/WRITING CHARS TRANSFERS A BYTE FROM/TO THE STREAM, WHILE READING/WRITING INTEGERS TRANSFERS TWO BYTES.

<DEVICE> : THIS FIELD CAN TAKE ON THE NAME OF ANY AVAILABLE DOS DEVICE. IF A NON-EXISTENT DEVICE IS SPECIFIED, A FATAL ERROR WILL BE CAUSED, AND THE PROGRAM TERMINATED.

Code Generated

18) THE STANDARD FUNCTIONS EXTEND(FILE) AND CLOSE(FILE) HAVE BEEN ADDED.

19) THE ASSIGNMENT OPERATOR MAY BE USED INSIDE AN EXPRESSION. THUS, A[I←I+1]←J←K←1; IS LEGAL.

20) A STRING IS TREATED AS A CONSTANT ARRAY, AND MAY BE PASSED AS A PARAMETER.

A:ARRAY [0..20] OF CHAR;
A←'THIS IS A STRING';
IS A VALID STATEMENT.

22) THE READ/WRITE STATEMENTS HAVE BEEN EXTENDED TO ALLOW SPECIFICATION OF AN ARRAY ARGUMENT.

E.G. VAR A:ARRAY[0..79] OF CHAR; B:ARRAY[0..10] OF INT;
READ(A,B);
WILL READ 80 CHARACTERS FROM THE INPUT FILE INTO A, AND WILL READ THE NEXT 11 INTEGERS ON THE INPUT FILE INTO B. IF A CHARACTER ARRAY IS READ FROM AN ASCII FILE, THE READ IS TERMINATED BY AN EOL, OR BY THE END OF THE ARRAY, WHICHEVER OCCURS FIRST. WRITING A CHARACTER ARRAY ONTO AN ASCII FILE IS TERMINATED BY AN EOL, FF, VT OR ANY NEGATIVE CHARACTER.

23) IT IS POSSIBLE TO READ/WRITE TO/FROM AN ARRAY INSTEAD OF A FILE. AN ARRAY IS ASSUMED TO BE AN ASCII FILE.

THERE ARE SEVERAL ROUTINES IN THE RUNTIME PACKAGE FOR WHICH SUITABLE LANGUAGE CONSTRUCTS ARE NOT YET AVAILABLE. THESE INCLUDE

A) CORE ALLOCATION/DEALLOCATION PROCEDURES, IN READINESS FOR THE IMPLEMENTATION OF POINTERS.

B) A LOADER, CURRENTLY USED BY EXTERNAL PROCEDURES, AND BY OVERLAYS IN THE RUNTIME SYSTEM ITSELF. THERE WILL EVENTUALLY BE SOME TYPE OF CONSTRUCT TO PERMIT RUN-TIME CORRESPONDENCE BETWEEN A PROCEDURE AND A FILE.

C) A PROGRAM MAY START UP A PROCEDURE AS AN INDEPENDENT JOB, OR AS A DEPENDENT, ASYNCHRONOUS PROCESS. THIS IS ONE FORM OF ALLOWING MULTI-TASKING.

IN ADDITION TO THE WORK ON PASCAL, DEC'S MACRO ASSEMBLER HAS BEEN MODIFIED SO THAT THE PERMANENT SYMBOL TABLE MAY INCLUDE REGISTERS, CONSTANTS, AND PRE-DIGESTED MACROS. A PASCAL PROGRAM HAS BEEN WRITTEN TO TAKE A MACRO LIBRARY AS INPUT, AND PRODUCE AN OBJECT MODULE SUITABLE FOR LINKING TO MACRO.OBJ AS OUTPUT.

Variant - Records

With

Deallocation procedures

SUCC & PRED

SUBJ: MILL ENVIRONMENT

DATE: Ø2-Ø5-75
FROM: GORDON BELL

* *
PLEASESEND TO: FILE
* *

SUBJ: COMMENTS ON THE MILL ENVIRONMENT, WHERE DO WE GO NOW?

To: Distribution

The parts of the mill that have been worked on are really beginning to shape up and show some potential. I truly hope the energy we have expended trying to make it work is worthwhile. I think at this point it is worth thinking about how the scheme, system, work, etc, is going to be evaluated.
The only complaint (a side from orange poles) has been from a manager who has not been involved and worries about the expenses. Therefore, the way to squelch this is to get a notion of the true expenses, and show what has been traded off...i.e. some sort of cost-benefit analysis. The tradeoffs appear to me:

Ø. We trade off general fix-up once to reduce mean time to move (to 4 hours according to Harold).

1. Electrical and telephone installation time versus lower cost of redoing the area next time around.

2. Non-permanent walls at lower costs, trades off specialized walls, and hence, the cost of moving and expanding (i.e. putting more people in a given area--which will be inevitable as we expand).

3. General trade off increased expenses for paints as a way of creating a more pleasant environment in which we hope people will perform better.

In some cases we do better both in costs and in performance. (In some sense, maybe the right way to handle the notion of moving is to perhaps put all the walls in the office supplies catalog, and let people order these supplies in the way way they order stationery and desks, tables--clearly the early bookcase/partition should be in this category.

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FROM: GORDON BELL

I think a lot of costs can be made lower by doing a better job of refabrication in the factory, e.g. in the electrical case. If your factory makes up the electrical outlets on pigtails, then the first operation is simply drilling the holes in the floors and putting the pigtails through. The electrician goes down below and runs the conduit among the boxes locating the boxes near the pigtails. There is only one operation on a floor, hence, no running back and forth between the floors. Also, it is probably worth getting the box out of the floor which will pick up dirt. The partitions, bookcase/desk housings and other things are all factory built and should be stocked.

It seems to me there are several things that we want to get formalized (ritualized) in regard to the business of living in the mill:

1. Lighting--I didn't realize how bad the tube problem was until I saw the thing at night, looked at it a bit, and then saw the contrast as we walked among the areas. I am really looking forward to Chris Ripman's entry in the "cover the lights sweepstakes." (He went over to PK3, and as a critical young architect, was pleasantly surprised with the overall place--very impressed with the cost, and only unhappy with the lights. Probably because that's his specialty.) I hope that he will come up with something more practical than the other 3 experiments.

   The other problem with the lighting, that bugs me a bit ecologically, is that it seems awfully expensive to have all these lights on all the time, especially with people not in the offices, and for those offices that like local lightings.

   We really could run a campaign in DIGITAL THIS WEEK on turning out lights. Also, we would offer to put a pull chain on the lights that people say they will turn off. At 150 watts/fixture and 4 cents per KWHR, it costs $.006 to run each light/hour. This amounts to about $15/year/light: For the mill it costs about $42/hour. But more locally, if a switch can be put in a fixture for say $4.00, then the payoff is about 700 hours, or if one saves 3 hrs/day, then it is about a year. The lifetime for bulbs is unaffected, and the only issue is whether the switches last long. As an experiment, it would probably be worthwhile in trying the switches in one of the new areas and put the whole thing on a recording watt/hour meter to see if in fact we do save anything over a period of several months. (This should be purely experi-

mental, as it may not work,)

Lighting should also reflect the "importance of the corridor"... going down to more than every fourth light in the lowest orders. In the cage stockrooms of building 3-5, there is too much lighting--a switch would do wonders--remember $15/year/light!

2. Air conditioning. The removal of walls certainly gets at the air circulation problem. When we repair or replace windows, we permit them to be opened, then we have a really big $ saving chance through lower cost air conditioning. In the case of building 12, it might be worth trying the idea my wife suggested, which was to put some barn-type ventilators, or even an exhaust fan, in the top so that during the marginal days we just use fans...a few days of non-air conditioning pays for installation costs. There are clearly many days where we could run without air conditioning if we could open the windows.

3. On the windows. Let's try 6 or so more experiments. I emotionally don't like getting rid of the ones we can see out, mainly because they are high enough that you can't see street activity. But I can't believe you get the openness effect of windows with the highly opaque ones. If/when we have to, we should try to stay with openers, as it relates to the air conditioning...which I want to try to have less of to save money. I also don't want to cover up windows with masonite. The 2 areas in 5-2 with/without are in stark, depressing contrast.

4. Floors. You're right, this is a problem. The issue to me is what is the tensil, shear, and dent strengths of the various materials? It is on these grounds that the various wood products: masonite, marine plywood, etc, compete with one another. I don't know the numbers. In general, if the floors are good enough, we probably ought to stay with what we have, and doing anything on other than an experimental basis will prove costly because we don't know now what to do. Thus, if a floor can be used at all--don't do anything with it until we know something that's better. Experiment only with really bad ones.

Antique houses often scrub down the floors and then apply linseed oil--beautiful color, not sticky, no nail resetting. The best solution is probably to do nothing, because the most awful looking floors are those which we repaired.

and the repair failed (e.g. tile, linoleum, panels painted grey, etc.).

5. Large isles. What can we put there? Picnic tables? Xerox machines in little cubby holes--how about files with rear ends out? Dead storage? Is it too late in 5-2 to use the space somehow? Safety is a problem no doubt.

6. Wall covering. Let's avoid covering up brick. This happened in an area or two already, and I'd like to avoid doing it because we pay $ to get what I believe is a worse solution.

7. Noise. This is a relatively bad, but difficult to deal with problem. I believe there are several things we want to do. Get the sound baffles for the various typewriters and teletypes into the standard DEC office catalog, so that it is painless to get them in the typewriters,,especially those bloody teletypes.

   I believe it would be worth getting BBN back to see what is needed to help in some of the deadening. It will also include background white noise, music, etc. We should re-read their recommendations to see if there is insight we have missed.

   Probably the biggest noise reduction should come through the elimination or proper scheduling of various carts, and the rubber tiring of the carts. 5-2 is bad due to 5-3. We should walk around with a sound level meter; take some readings; and see just how far we are from a reasonable level; and where we would like to get to set some goals, and then try an area. The 3-5 conference room gets lots of noise from the computer room next door containing our noisy machines. Maybe just acoustic tile in the computer room + plugging holes would solve the problem. Also, what do the panels that Chris Ripman talked of look like?

8. Painting. Here we seem to have come the furthest. It is really a contrast to walk into an all grey area from the ones which have been painted. This has certainly rubbed off too, as evidenced by the recent painting in the software areas which hadn't occurred until this decoration was done. We may get to the point of having to really control expenses in redoing. However, I still believe in the notion that if you think about the design problem, it doesn't cost much more to do it right, and then you save

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FROM: GORDON BELL

by not having to redo the job. Also, the key is to stock a few basic paint colors to avoid the time and hassle of someone picking out paint for their offices. Standardize NOW--and get my permission to deviate. This will avoid the stuff that happened in Jim Bell's area with pastels. There is also a problem of control for super graphics--
Pat and one of the designers should control this for now.

10. THE JOHNS. These are almost all quite bad. Can they be spruced up using paint without doing anything drastic in terms of money? How much would it cost?

11. CIRCULATION PLAN. Can an analysis be made of the corridor system, and the noise coupling among floors. We screwed up in not putting production on the lower floors of 5. What is the width needed for a corridor for internal trucks? and the turning radius for corners? What is the width for heavy duty corridors through which furniture can easily be moved? What is the minimum width for internal access corridors in a group's own territory?

On major corridors which must be wide and cannot be cluttered there is some need for creating interesting relief. Super-graphics in paint on long walls is one solution. Another solution is to utilize from each group a large board that represents their product or "interest". This could be hung as a large display panel from the ceiling ala a "hanging." This "hanging" would identify the territory by which a person was passing. These "hangings" could either be ones that might first be used in a central display area--a lobby or museum--and then go to the "group." Or they could be developed by the group, produced according to a standard format and then be used as needed for special displays, shows, meetings, the front lobby etc, etc. I have the original artwork of some 11 parts that is useful this way.

Where do we go from here?

1. I'd like to get a notion of where we are relative to the various new moves. I've lost track of who's going where, and want to get the update, particularly in terms of whether I've given space to production that will be hard to get back. I don't want the corporate stockroom (unless John Trebendis tells me otherwise) to be in the mill. (My guess is that it's a dead storage for somebody operating under an alias.) Let's track them down and probably refuse them...they are not engineering!

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2. The library. With the activity level they have now, this should be a nice space, because we expect people to go in there and really work. Also, if we can eek out some more space for them, then a really quiet place would be nice when we have people who want to get away from their areas and write programs, or work.

3. Some displays for the lobby. I would like to warm up the museum in the mill using the junk I haveand probably displaying some of the new products there, too,if we can can get the prototypes. I am borrowing an 8 to make music at the New England Conservatory, and it could be used in the lobby for a month or so. Also, we might put a 10 terminal there for a demo to play games, program on, etc.

4. Cafeteria...Is it worth doing anything? Now that we have a reasonable conference room in 3-4, we may not have the big need for a large conference room it has served as. The cafeteria is awfully dreary, and a bit of paint and large graphics there would really help it. This would also hit a good cross section of employees who are not all enjoying rennovated areas--show we are doing something.

5. Central stores. Since you are the storekeeper, one can direct what happens by what's in stock. The things that would get stocked include the new and earlier wooden partitions. Hence, moving is something that can be almost ordered from office supplies. It would include both the old and new partitions, all the accessories for the partitions, sound deadeners for the typewriters, open office type blackboards and visual/sound baffles. If we come up with any other sound baffles, then this could be included too--possibly white noise sources also, and definitely the fixed paint!

6. Finishing our modular furniture. It looks like Plant Engineering has provided most of the accessories needed to complete the system. Let's tune them up, and put in the catalog...i.e. bookcases, tackboards, blackboards, hanging plant racks, the older bookcase/desk backboard, clamp-on lamps, acoustic-visual barriers, etc. The same goes for the supervisor areas (e.g. lidded offices, conference rooms). I'd like the schemes to be documented and purchasable by new movees. A set of before, after, after move in pictures would help movees ordering from the catalog.

7. Publicity--a small exhibition of before/after in the mill lobbies might be helpful, and get DEC interested in a better place

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to work.

8. Publication. Pat might talk with a magazine re problems, and where we are. Are any of the designs worth describing outside?

GB:mjk

Distribution

Harold Trenouth
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cc: Mark Abbett
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digital

February 5, 1975

Ted Kehl
Department of Physiology
University of Washington
Seattle, Washington

Dear Professor Kehl:

Enclosed are manuals on the PDP-16/RTM system that Allen suggested I send to you.

The K(PCS) was used in the 16/M sub-minicomputer we built with the modules. Please let me know if you have trouble obtaining these parts. Our Components group (Logic Products) sells them and has more information. You might write or call Dwight Baker (DEC, Marlboro, Mass.) if you need more information.

Sincerely,

Gordon Bell

Gordon Bell
Vice President
Office of Development

GB:mjk

cc: Allen Newell, CMU

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