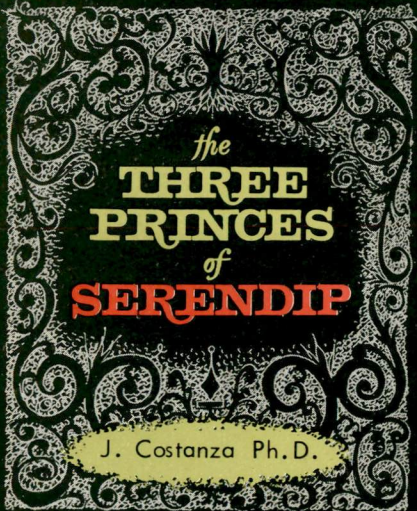


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serendipity associates

Los Angeles: 9760 Cozycroft Ave., Chatsworth, Calif. (213) 341-0033
Washington, D.C. 8027 Leesburg Pike, McLean, Va. (703) 893-5950
San Francisco: 199 First St., Los Altos, Calif. (415) 941 3300



the
**THREE
PRINCES**
of
SERENDIP

J. Costanza Ph.D.

Volume 1

OPTIMUM BLACKJACK STRATEGY MATRIX

YOUR CARDS TOTAL	DEALER'S UP CARD									
	2	3	4	5	6	7	8	9	10	A
4	S	S	S	S	S	S				
5										
6	S	S	S	S	S	S				
7										
8				S						
9	D	D	D	D	D					
10	D	D	D	D	D	D	D	D		
11	D	D	D	D	D	D	D	D	D	D
12	S	S	S	S	S	S				
13										
14	S	S	S	S	S	S	S			
15										
16	S	S	S	S	S	S	S	S	S	S
17										
18+	S	S	S	S	S		S	S		
A+A	S	S	S	S	S	S	S	S	S	S
A+2				D	D					
A+3			D	D	D					
A+4			D	D	D					
A+5			D	D	D					
A+6		D	D	D	D					
A+7		D	D	D	D					
A+8										

MATRIX INDICATES STRATEGY FOR EACH NEW SITUATION BY:

D = Double Down

S = Split hand when total is composed of a pair

■ = Take a hit, re-enter matrix with each new total

■ = Stand

Always obey letter rather than color when possible.

ASSUMPTION:

Dealer must stand on any 17 or over and hit less than 17.

STRATEGY RESULTS IN:

Player's overall expectation of breaking even.

Game has high variance, use partial progressive betting.

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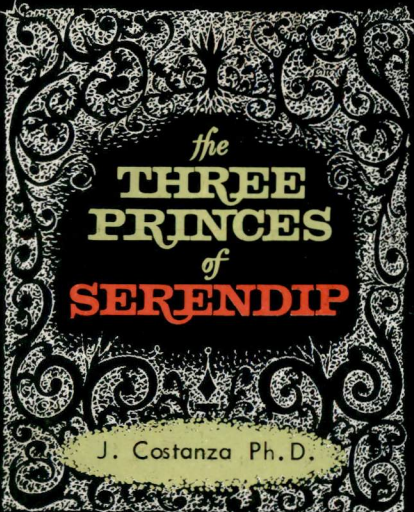
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the
THREE
PRINCES
of
SERENDIP

J. Costanza Ph.D.

Volume III

POKER PROBABILITIES

CHANCE OF IMPROVING ORIGINAL HAND

IN 7 CARD STUD:

To a straight from —

Q J 10	.190
Q J 10 X	.112
Q J 10 9	.429
Q J 10 9 X	.315
Q J 10 9 X X	.174
Q J 10 8	.270
Q J 10 8 X	.179
Q J 10 8 X X	.087
K Q J	.131
K Q J X	.076
A K Q	.072

To a flush from —

3 flush	.180
3 flush + 1 odd	.106
3 flush + 2 odd	.042
4 flush	.472
4 flush + 1 odd	.350
4 flush + 2 odd	.196

To a full house from —

Triplets	.402
Triplets + 1 odd	.389
Triplets + 2 odd	.333
Triplets + 3 odd	.217
Pair + 1 odd	.073
Pair + 2 odd	.051
2 pair	.196
2 pair + 1 odd	.124

To a low hand —

You hold	(7 low)	(9 low)
7 3 2	.190	.490
7 3 2 X	.112	.330
7 3 2 X X	.044	.148
7 3 2 4	.429	.724
7 3 2 4 X	.315	.585
4 3 2	.131	.469
4 3 2 X	.076	.299
5 4 3	.072	.411
5 4 3 X	.040	.275

IN 5 CARD DRAW:

Drawing 3 cards to —

Pair for any improvement	.287
Pair for 2 pairs	.160
Pair for 3 of a kind	.114
Pair for a full house	.010
Pair for 4 of a kind	.003

Drawing 2 cards to —

Pair + 1 for any improvement	.260
Pair + 1 for 2 pairs	.172
Pair + 1 for triplets	.078
Pair + 1 for full house	.008
Triplets for any improvement	.104
Triplets for a full house	.061
Triplets for four of a kind	.043
3 of a suit for a flush	.042

Drawing 1 card to —

Triplets + 1 for any improvement	.085
Triplets + 1 for full house	.064
Straight, open 1 end	.085
Straight, open inside	.085
Straight, either end	.170
4 of a suit for a flush	.191
2 pair for a full house	.085
Straight flush, open one end	.256
Straight flush, open inside	.256
Straight flush, either end	.319

CHANCE OF A PARTICULAR HAND OR BETTER IN FIRST 5 CARDS

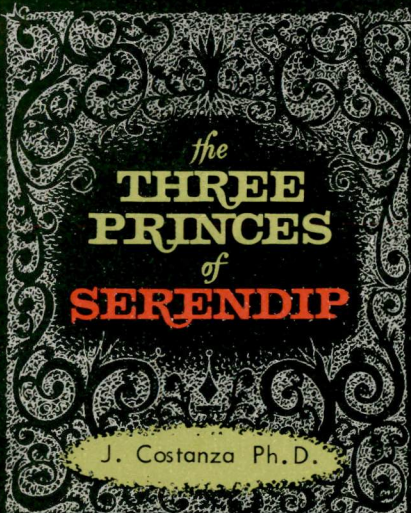
No pair	.501
Any pair	.499
Pair of jacks	.206
Pair of queens	.174
Pair of kings	.141
Pair of aces	.109
Two pairs	.076
Three of a kind	.029
Straight	.008
Flush	.004
Full house	.002

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the
**THREE
PRINCES**
of
SERENDIP

J. Costanza Ph.D.

Volume II

Top Box = House Pays:
Middle Box = Correct Odds:
Bottom Box = House Percentage:

1 to 1
1.028 to 1
1.402%

9 to 5	7 to 5	7 to 6	7 to 6	7 to 5	9 to 5
2 to 1	3 to 2	6 to 5	6 to 5	3 to 2	2 to 1
6.66%	4.00%	1.5%	1.5%	4.00%	6.66%

PASS LINE

Don't Pass

Don't Come Bar

4 5 6 8 9 10

COME

Pays Double Pays Double

2 · 3 · 4 · 9 · 10 · 11 · 12

Don't Pass Bar

PASS LINE

"BANK CRAPS" LAYOUT

4 to 1 **7** 4 to 1

9 to 1
7 to 1
30 to 1
15 to 1

ANY CRAP
7 to 1

4 to 1
5 to 1
16.66%
9 to 1
10 to 1
9.09%
7 to 1
8 to 1
11.11%
30 to 1
35 to 1
13.88%
15 to 1
17 to 1
11.11%
7 to 1
8 to 1
11.11%

1 to 1	1 to 1	1 to 1	1 to 1	1 to 1
6 to 5	1.028 to 1	1.028 to 1	1.11 to 1	1.028 to 1
9.01%	1.414%	1.402%	5.26%	1.414%

Best bets are:	House %
Take or give the "Odds"	0
Don't Pass or Don't Come	1.402
Pass or Come	1.414
Place 6 or 8	1.5

Shooter's Point

4 or 10	5 or 9	6 or 8
2 to 1	3 to 2	6 to 5
2 to 1	3 to 2	6 to 5
0	0	0

Always take or give the "Odds" by placing your Odds bet (in proportion to the odds on the particular point) behind your initial bet after the shooter has established his point. Bank % on Pass + Odds = .848; on Don't Pass + Odds = .832.

Bet one unit on the pass line and take the odds for every decision. If you lose continue to bet one unit and take the odds. If you win increase your bets according to the progression: 1, 2, 3, 5, 8, 10, 10, 10, 10 . . .



INTEROFFICE
MEMORANDUM

DATE 31st March, 1967.

SUBJECT Olivetti

TO Ken Olsen

FROM John Leng

.c.c. Jean-Claude Peterschmitt

Mr. Pomella 'phoned me and a meeting will take place shortly at their facilities in Italy. Jean-Claude Peterschmitt is organizing this. He knows Pomella and Piol from his ADL work.

(April 12)

Hoping to report either PDP-8 or 8/S sales to them shortly!

John.

JL/hc

dec

INTEROFFICE
MEMORANDUM

→ showed Ted
DATE 31 March 1967

SUBJECT

TO Ken Olsen

FROM Denny Doyle

This report on Canada that was in U.S. News and World Report alarmed me - in fact I was just about to tell our government boys to straighten things out. But then I read the attached report on Canada in the Detroit Free Press, which says everything is OK - in fact better than in the U.S. So let's assume that the one cancels the other.

My own serious opinion is that both are indeed correct and pretty fair assessment, and in a sense they are saying the same thing - it is a booming economy, but is probably underdamped at this point in time.

Denny

DJD:jp
att.



INTEROFFICE MEMORANDUM

DATE March 30, 1967

SUBJECT PDP-8I I/O Bus Design

TO Ken Olsen

FROM Ed de Castro

CC: Mike Ford

The PDP-8I input, output bus will operate with negative logic levels and will be completely compatible with the present peripherals. This bus will be driven and received by a set of modules which serve no other function and thus they may be replaced by a different type if it is ever desired to change to a positive logic bus. In addition a positive system will exist within the machine. All options which are wired into the main frame will connect to this system. I expect that the paper tape reader & punch, the card reader, the plotter and the small display control will eventually be wired into the main frame.

This scheme allows all but the very complex options to be redone with integrated circuits immediately, and also allows us to offer our OEM customers a machine which will interface directly to any equipment that they presently connect to PDP-8's. We will also be able to ship the very first machines with a complete complement of peripherals.

Ed

jeg

digital

INTEROFFICE MEMORANDUM

DATE: March 30, 1967

SUBJECT: Northern Electric

TO: Ken Olsen

FROM: Lewis Illingworth

CC: Pat Greene

Following your comments on the lack of knowledge regarding the module tester supplied to Northern Electric, I phoned Jim Milton of the Carleton Place Office and found that there have been no written complaints about the system. However, there are weak spots.

- a) The addressing matrix is poor and limits rise times to 100 ns.
- b) The Datapulse generator, while working well, is not flexible enough and does not provide a programmable number of pulses.
- c) The programmable power supplies we supplied with the machine were too slow; they have since been replaced by faster ones, but now suffer from ringing problems.
- d) The manual is poor.

Jim Milton reports that Northern Electric are quite satisfied with the machine. It does the job for which it was intended.

Lewis

ds

DATE: March 30, 1967

SUBJECT: Cable connectors for the PDP-9

TO: R. Savell
K. Olsen

FROM: Larry Seligman

The PDP-9 uses the following cable connectors:

*W015 Memory Stack Connector
*W016 Memory Stack Connector
*W017 Memory Stack Connector
W019 ?
W031 Inter Bay Cable Connector
W033 Console Cable Connector
W037 Indicator Cable Connector
*W850 IO Bus Connector
G795 Memory Bus Terminator and Connector

The asterisk connectors use twisted pair, the rest use flexprint.

I have discussed changing from split lugs to posts on these connectors with Bob Ames, one of our production people. Bob has had some experience on use of various types of lugs at Honeywell; experience there indicated:

1. Use of a post around which the wire is wrapped did not reduce the percentage of bad (cold) joints.
2. Use of post greatly increases production time since many more operations are required (the girl needs to use pliers).

The only reasonable course of action seems to be improving the manufacturing process sufficiently that these problems will go away. As a longer-term solution, we can investigate crimped pin assembly techniques.

FIRM **AG BROWN-BOVERI & CIE**
 STREET **Abt. AU**
 CITY **Baden / SWITZERLAND**

SAL SMAN **Klaus Kyris**
 OFFICE AREA **Munich / Germany**
 AREA CODE _____ PHONE NO. _____
 PHONE (OURS THEIRS) _____ LETTER _____ VISIT _____

PERSONS CONTACTED	EXTENSION	EST. ANNUAL POT.		CK.	NEW	CK.	PRODUCT	VISIT	
		UNDER \$20K	\$20 - 50K					CK.	TY.
Mr. Ginnel					OLD		MODULES		
Mr. Dotzer				X	HIGH		A/D		
					MED.		COMPUTERS	X	PL
					LOW		SPECIAL SYSTEMS		
							OTHER		

REMARKS

Visit: Febr. 2, 1967

We have a quotation running at BBC for a PDP-9. It should be used in a controlling system for the Swiss Railway Co. (SBB). Presently, the people are waiting for the decision of the SBB; this decision is expected in April/May 1967. So far we were without any competition, now S C's is quoting a ODP-516.

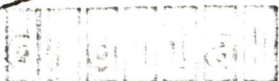
Customer told us that he feels that lack of a hardware index register is a certain handicap. They want to confirm us that our power supply is good for 50 Cyc. ± 5 %.

We discussed also the general maintenance scheme; S C's intends to open a service center in Switzerland. Customer is also interested in PDP-9 with less than 8K memory; eventually 4K. So far DEC is still in favor.

ACTION TO BE TAKEN **More programming info., specially concerning API. Periodical contacts.**
Visit on my next trip to Switzerland

FOLLOW-UP DATE **March 1967** BY **Klaus Kyris**

SPECIAL COPIES TO



INTEROFFICE MEMORANDUM

DATE: March 30, 1967

SUBJECT: Visit of Mr. Zuercher of Brown-Boveri, Switzerland

TO: Ken Olsen
Tom Dalzell
Ron Smart
Bela Csonth

FROM: Ted Johnson

Mr. Zuercher, Head of Computers at Brown-Boveri in Switzerland, will be visiting the plant on Friday, March 31, 1967 to discuss "the possibility of working with us on the European market". He will be arriving between 10:00 and 11:00 a.m., and a discussion will take place in my office.

Attached for your information is a copy of Klaus Kyris' Sales Call Report on his visit to Brown-Boveri on February 2, 1967. They have since received a quotation for a PDP-9 computer.

mr



INTEROFFICE MEMORANDUM

DATE: March 29, 1967

SUBJECT: Visit to Albert Einstein College of Medicine with
Dr. Moore

TO: Ken Olsen

FROM: Mort Ruderman

Attached to this memo is Cliff Pitz's Field Service Summary of calls to Albert Einstein from installation through March 7, 1967.

Also, there was a meeting held with Dave Dodge, Frank Purcell, and Dr. Vaughn on March 15, 1967. During their meeting, the conclusion was that Dr. Vaughn had no Field Service complaints at that time concerning the operation of the LINC-8, or any of the Field Service personnel. His major complaint was that perhaps he initially should have purchased an expanded 8, but he purchased a LINC-8 primarily for the software which was known to be available with this machine. His evaluation upon receiving the machine was that it had very pretty software, but not the specific software which he needed to run his experiments. He indicated that I had probably influenced him into purchasing the LINC-8, and he voiced that perhaps he would be happier with an expanded 8.

I took this opportunity to call Dr. Vaughn and set up an appointment for Dave Dodge and me to meet with him on Tuesday, March 21, 1967. Dr. Vaughn was present with one of his research assistants, and his programmer. I asked Dr. Vaughn what we could possibly do to satisfy him at this time, and what was particularly on his mind. Well, he voiced again that he is aware that most of the appropriate software to do his experiments resides in various laboratories throughout the States, and he was quite disappointed that these were not delivered with his machine. I informed Dr. Vaughn that we had been making significant efforts to ask people for contributions to DECUS. We have assisted by documenting their programs and evaluating them. The present library of LINC software actually was developed in this manner.

This didn't seem to satisfy him completely. He felt that we should have a roving applications programmer to see that these were part of the library. I explained that this was the goal which we are working toward.

The machine has been fully operational since the beginning of March, and he is quite satisfied. He personally has not spent much time with the LINC-8. One of the problems is that Dr. Vaughn's engineer who took the Maintenance Course somehow or other got into Check-out, and overheard individuals complaining about the state of the diagnostics. Well, this was in error, because at that time the diagnostics were just being evaluated, and any errors which were found in Check-out were being brought to the attention of the programmer.

The diagnostics with the LINC-8 are, in my opinion, more than adequate. There are the new diagnostics which have been written for the LINC-8, the PDP-8 diagnostics, and the original LINC diagnostics. So, independent of the new diagnostics, there are sufficient ones to determine malfunctions in the machine at any time. I personally brought down the latest available set of diagnostics, and also a program which would give his programmer and Dr. Vaughn ideas in writing their basic programs for research. I also pointed out a number of programs in the library which would be useful to him with slight modification, and would accomplish some of the things he wanted to do.

To my knowledge, I would evaluate Dr. Vaughn's position as follows: He had minor problems with the machine up until March 8, 1967. At that time he wrote the letter, being quite disturbed and he took this opportunity, accompanied with late delivery of the machine, to go directly to the top of DEC to place his complaint. Since that time, he has nothing to complain about because the machine has been solid and operational.

Since his initial complaint was concerning machine problems which no longer exist, he now has decided to be dissatisfied with the software. I feel he is quite happy with the machine, and given time, he will be a good user. He was also happy to be informed that yes, we are beginning to write applicational software, and that we will be having the DECUS Biomedical Meeting in New York in June, so that we can openly discuss what basic software should be supplied for machines in this laboratory environment. He hopes to participate in the meeting.

In summing up: Dave Dodge in particular is doing an extremely good job with Dr. Vaughn at Albert Einstein. He is giving them assistance in Module Applications and also giving assistance to their programmer. Field Service has in general handled this extremely well. The only area of complaint might be originally

Ken Olsen

-3-

March 29, 1967

in the insistence that the acceptance should be signed off.

I will send Dr. Vaughn a teddy bear which he requested, and I also will send him a letter asking him to please keep us informed of any other problems he might have. Also, I hope to meet with him again at the DECUS Meeting and the Federation Show.

If there are any further questions on this, please contact me immediately. Thank you.

Mort

CC: Win Hindle
Jack Shields
Cliff Pitz
Frank Purcell
Dave Dodge

Enc.
MER/sb



INTEROFFICE
MEMORANDUM

Express:
Confidential:

SUBJECT PDP-9 deliveries

DATE 29th March, 1967.

TO Ken Olsen

FROM John Leng

Ken, I am absolutely disgusted with the situation on the PDP-9 deliveries. It seems to me that we have had to face the same situation again and again on every product since the PDP-5, including modules and peripherals. The present situation is even more annoying in view of the extensive selling job that was done on us to sell these machines with promises of realistic delivery dates and the like.

I realize that by getting annoyed, the way I have, with Nick and John Jones and company, from this remote location, that I am going to end good friendships. This is a terribly frustrating situation and I'm sure will be very harmful to our International business and in turn to the Company as a whole.

JL/hc

digital

INTEROFFICE MEMORANDUM

DATE: March 28, 1967

SUBJECT: I R COMPETITION

TO: ✓ Ken Olsen
Nick Mazzaresse
Stan Olsen
Win Hindle
Mike Ford
John Jones
Pat Greene
Bob Lane
Bill Landis
Mort Ruderman
Allen Kluchman

FROM: Steve Bowers

Industrial Research Magazine's I.R. 100 Competition is here again. The deadline for entries is June 1, 1967.

The contest chooses the 100 most significant new technical products of the year. The event is climaxed by the I.R. 100 Award Presentation and Exhibit at the New York Hilton Hotel on September 18th and 19th.

The PDP-8 and 338 Display are among the past winners for Digital Equipment Corporation in the contest. This year's rules for eligibility permit entry of any new "technical" product developed or announced in the United States or overseas between January 1, 1966, and May 31, 1967. "Technical" is defined broadly to include all products that are scientific or technical in origin or use.

I believe the broad eligibility dates will allow us to enter the LINC-8, PDP-8/S, PDP-9, PDP-10 and PMA-8. I would appreciate your feelings on these selections and also any other products you feel might be worthy of entry.

I would appreciate your reply by April 14th so we may get our entries into Industrial Research as far in advance of the deadline as possible.

rsn
cc. Ken Gold

digital

INTEROFFICE MEMORANDUM

DATE: March 28, 1967

SUBJECT:

TO: Ken Olsen

FROM: H. Mann

I have made a review of the Stockholder's list which was effective as of February 17. In examining this list, it appears that we have approximately 550,000 shares in the hands of the general public as of that date.

In preparing this list, I have assumed that all employees except those who are members of the Executive Committee, are part of the general public. I based this decision on the fact that quite a few of our employees have sold the stock which they purchased under the initial purchase plan and others who purchased shares at the time of the initial offering.



jm

TO KEN OLSEN DEPT.-LOCATION MAYNARD

FROM KEN LARSEN DEPT.-LOCATION PALO ALTO OFFICE

SUBJECT SERENDIPITY ASSOCIATES DATE 3 / 27 / 67

MESSAGE

Thought you might be interested in seeing the "business cards" used by the principles of Serendipity Associates.

Regards



ORIGINATOR-DO NOT WRITE BELOW THIS LINE

SIGNED

REPLY

DEPT.-LOCATION

SIGNED

DATE / /

TO	KEN OLSEN	DEPT.-LOCATION	MAYNARD
MAIL TO	KEN LARSEN	DEPT.-LOCATION	PALO ALTO OFFICE
SUBJECT	SERENDIPITY ASSOCIATES		DATE
			3 / 27 / 67

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Regards



ORIGINATOR - DO NOT WRITE BELOW THIS LINE

SIGNED

REPLY

DEPT.-LOCATION

SIGNED

DATE

/ /



INTEROFFICE MEMORANDUM

DATE March 27, 1967

SUBJECT PDP-8/I

TO ✓K.H. Olsen
Mike Ford
Loren Prentice
Ed DeCastro
Dick Sogge
Dick Mitchell
Ron Cajolet

FROM Jim Jordan
Stan Znamierowski

On Friday, March 24, a meeting was held concerning the PDP-8/I. Those in attendance were:

Ken Olsen
Mike Ford
Loren Prentice
Ed DeCastro
Jim Jordan
Stan Znamierowski

We first established that the product objectives for the PDP-8/I are:

1. Sell at a price of \$10,000
2. Reflect the new technology of integrated circuitry thru appearance
3. Fit a 19 inch rack & be adaptable to a table top unit
4. Maintain family identity
5. Make the machine adaptable to militarization

It was next decided an optimum logic layout of 40 blocks in a 4 x 10 configuration will provide the most flexibility and safety margin plus the bonus of wired-in options, and ease of production.

Lastly, it was determined that the PDP-8/I would take the following configurations:

1. A 19 inch cabinet mounted unit in which the logic and power supply will hang vertically, each on its own set of slides. All options will be mounted above the console.

March 27, 1967

2. A table top unit which will contain the logic and the console. The power supply will be mounted in the teletype pedestal. This will be the basic PDP-8/I.
3. The paper tape reader & punch will be offered as an option, and in this case the power supply can be mounted behind the reader/punch. Since the reader/punch is not visually compatible with the PDP-8/I, we recommend a "face lift".

At the present time, we do not have sufficient knowledge of the size and number of components specific about configuration. Consequently, placement of this unit behind PTR/P and in the teletype pedestal is necessarily vague and subject to change.

/pgj



INTEROFFICE MEMORANDUM

DATE March 27, 1967

SUBJECT RANDOM ACCESS CARD MEMORY

TO Ken Olsen
Nick Mazzaresse
Win Hindle
Loren Prentice

FROM Roland Boisvert

I have been recently contacted by the Chief Engineer of Applied Magnetics Corporation, concerning a random access card memory that they have developed. Because the unit closely competes with present head customer products they have decided not to market it and are looking for a company who would like to acquire manufacturing rights.

The specs are listed below.

Total storage	90 million bits
Access time to any card	120 milliseconds
Number of cards	64
Density	800 bpi
Speed	400 ips
Transfer Rate-	320 Kc
Parallel output	10.2 megabits/sec

The unit has both read/write capability. And any card can be recycled instead of stored. The magnetic cards are of the same size as the NCR and RCA cards.

I have told AMC that I cannot speak for D.E.C. on a matter such as this and that they should contact the appropriate officials of the company.

Their preliminary marketing price for this device is \$32,000.00 in quantities of one. They feel that it heavily competes with large on a dollar per bit per access time basis.

RB/crh



INTEROFFICE MEMORANDUM

DATE March 27, 1967

SUBJECT SMALL/INEXPENSIVE TAPE DRIVE

TO Ken Olsen ✓
Gordan Bell
Loren Prentice

FROM Roland Boisvert

I have spent considerable time investigating what is available on the market for tape drives. I feel that the suggestions made at our last meeting are more sound than purchasing a unit outside.

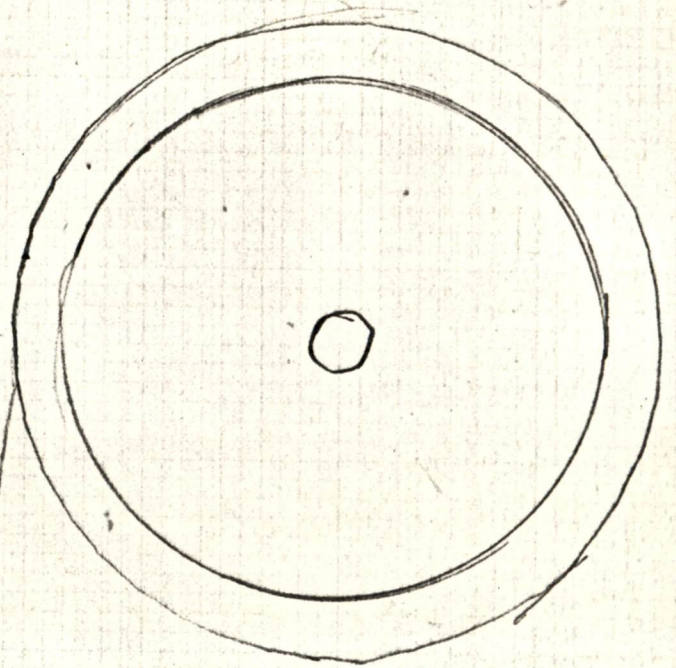
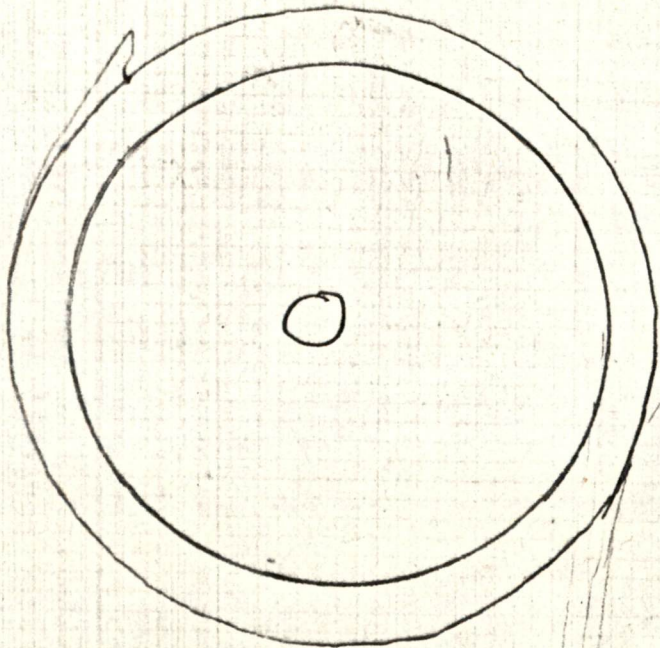
I have made a rough sketch and have enclosed it with this memo.

I propose that the tape unit have the following characteristics:

- a. Dectape Reels and Hubs
- b. Be a single capstan unit, the capstan driven by a UMC stepping motor.
- c. The reel motors be those of General Industries, 4.6 oz in and a cost of \$5.22 in lots of 100.
- d. The density be 200 bpi serial
- e. Write char rate 0-1000 bits sec (2.5 ips sync)
- f. Read char rate 0-1000 bits/sec (2.5 ips sync)
- g. Eot/Bot Detection
- h. A 10 channel Digital head which would cost \$55.00 in quantities of 100.
- i. The estimated cost for parts for one prototype is \$1436.00
- j. The estimated cost for parts for production is \$253.00
- k. Development labor for prototype approximately \$3,000.00
- l. Assembly and checkout labor per unit is \$300.00
- m. Estimated selling price of this unit with control is: \$1500.00 to \$1800.00.
- n. Competition is \$2,000.00 for unit and \$500.00 and up for control.

This unit is the best compromise with which I can provide stepping /synchronous operation and still maintain simplicity of design. This unit is heavily designed around existing compents at D.E.C. thereby retaining D.E.C. design indentity.

RB/crh

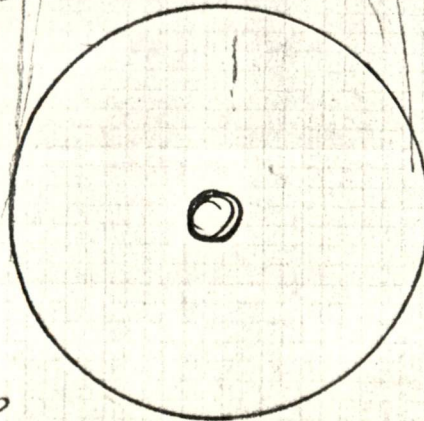


PROTOTYPE PARTS

PARTS:	1 UMC STOP MOTOR	
	2 GE MOTORS	150
	1 HEAD	30
	2 GUIDE POSTS	600
	1 CAPSTAN	30
	2 REEL HUBS	50
	1 EOT/BOT SENSOR	32
	1 W042	40
	2 R 201	80
	1 CONTROL PANEL	44
	1 MATRIX BOARD	100
	1 READER/WRITER	100
	1 JIG PLATE	90
	1 PJ	35.

DETAILS

- : DEC TAPE REELS & HUBS
- : 10 CHANNEL HEAD
- : WRITE 0-1000 char/sec
- : read 0-1000 char/sec
- : DENSITY 200 BPI SERIAL
- : SYNC SPEED 2.5 IPS
- : RWD SPEED ?



← 1.273" at 200 BPI
 .6365 at 400 BPI
 .31825 at 800 BPI

digital

INTEROFFICE MEMORANDUM

DATE: March 22, 1967

SUBJECT: I. C. Tester

TO: See Distribution List Below FROM: Lewis Illingworth

Minutes of a meeting held to discuss Tom Stockebrand's objections to the proposal for an Integrated Circuit Tester. March 21, 1967

Those Present:

Bob Hughes
Ed Gianetto
Tom Stockebrand
Lewis Illingworth

Points Under Discussion:

- 1) That it would be easier, quicker and cheaper to manufacture a series of small individual testers.
- 2) That the proposed addressing matrix could not handle the high speed pulses required for accurate measurements.

Tom Stockebrand proposed that a number of small testers should be constructed. Each tester would just test a few parameters, would be simple to design, quick to build and cost \$500.00 on average. His suggestion was based on experience gained with strates. With this scheme, each IC would pass through a series of tests, a complex module having a relatively large number of tests, whereas a simple IC only two or three.

An initial objection to this scheme is that in the number of insertions into the various jigs, but no doubt a jig could be devised that would not unnecessarily strain the IC.

In order for this system to be competitive, each tester must test more than one module. For instance, each IC may require an average six tests involving six separate testers.

Now by having the capability to test 25 different types of modules 25 x 6, or 150 individual tests are required, unless some of the tests can be shared.

Unfortunately the IC's, like modules are different. It was impossible to make any snap decision about the practicability of the system. The decision raised the point that not all of the testers would be simple, some would undoubtedly have to be complex to test the complex logical functions of many of the circuits. Estimates of average cost ranged from \$500. to \$5,000. Using these figures and a requirement for 75 testers, the overall cost would be between \$32,500. and \$325,000.

A system of this nature requires individual propagation time measuring capability. It was considered impossible to achieve a high degree of accuracy (10%) with a system simple enough to be used in large quantities. The Bob Hughes proposal uses one highly sophisticated piece of equipment for all measurements.

The general conclusion reached was that this approach is in fact more complex than Bob Hughes proposal. It may cost less but on the other hand, it may well cost more. Without a great deal of detailed investigation, it is not possible to forecast the amount of equipment, or to time required.

The committee then looked into the addressing matrix for Bob Hughes system in detail. A matrix is used for DC tests, but no attempt is made to pass the fast AC signals through it. A series of adapter boards are provided instead in which the lead length and capacitance is minimized. The system seems sound, and essentially combines the best points of the individual tester approach with the flexibility of the computer system. The discussion ended with complete agreement that Bob Hughes proposal should give optimum results.

Lewis Illingworth

ds

March 22, 1967

Distribution: Ken Olsen (Chairman) Alan Kotok
 Ed deCastro (Secretary) Larry Seligman
 Nick Mazzaresse Bill Long
 Stan Olsen Larry Portner
 Win Hindle Tom Stockebrand
 Dick Best Dick Ward
 Bob Savell Al Devault
 Loren Prentice Saul Dinman
 Jack Shields Bob Hughes
 Ed Gianetto Pete Kaufmann

AUS660
23.3.67

TO KEN OLSEN
FROM ROBIN FRITH

YOU ASKED ME TO LET YOU KNOW AN APPROPRIATE TIME TO VISIT AUSTRALIA. WE HOPE TO HAVE A LARGE PRESS RELEASE ON THE ARL PDP-10 ORDER IN TWO TO THREE WEEKS, AND AT THE SAME TIME RECEIVE ANOTHER LARGE PDP-10 ORDER FROM QUEENSLAND UNIVERSITY. I GUESS THESE ARE THE TWO MOST SIGNIFICANT EVENTS IN THE HISTORY OF DEA. HOW IS YOUR SCHEDULE?

DIGITAL EQUIPMENT CORP.
TECHNICAL SUPPORT DIVISIONS

1967 MAR 21 PM 8:22

RECEIVED

DATE: March 22, 1967

SUBJECT: EMPLOYEE BENEFITS

TO: Executive Committee

FROM: H. Mann

Salaries and paid fringe benefits such as Medical Insurance, etc., are generally speaking at higher levels in the computer industry, than in industry in general. This is particularly true in the case of professional people and technicians which are in short supply. Clearly, we must match or be ahead of these benefits if we are to attract the best people and continue to enlarge the business.

Over and above these benefits there are other employee related factors that are subject to considerable debate. We should reach an agreed upon plan relating to these other areas and proceed with them in an orderly fashion. At the present time because of differences of opinions and unclear policy, there is a great deal of rivalry between groups and friction between managers which is not productive and indeed in some ways is destructive.

The first question relates to who should have private offices and how large should these offices be? Also, how should they be furnished? Nick Mazzaresse has made a start in proposing the answers to these questions. I believe, however, that we have used the term professional people rather loosely around the company, and hence we've got to be more specific when talking about private offices as to who is and who is not a professional person. Also, we have to answer the question as to whether technicians who reach a salary level are to be given private offices.

Another question which constantly comes up relates to office services for people in this same category. For example, should everyone who has a private office also have his own telephone? Should this telephone provide for unrestricted service or should it be restricted to in-house use plus all outgoing calls clearing through the switchboard? The question of a secretary also comes up. Should each person entitled to a private office have a girl at his personal disposal to get him coffee, do his filing, answer the telephone and take dictation, or should we be in a position where we have one or two girls servicing a group of people, who can do the filing, answer the telephone, and take dictation for a group.

Another personnel question relates to the matter of air conditioning. Is the cost of air conditioning justified because of its effect on the morale of people? There are probably six or eight days during the course of the summer when the heat and humidity is truly oppressive. Obviously on those days, less work gets done than normal. On the other hand people feel the strong desire to have air conditioning because there are probably additional days when the environment would be a bit more comfortable with conditioners, but not necessary for efficiency. This, in other words, becomes a morale question. The problem of air conditioning becomes severe when we use only

March 22, 1967

low partitions because it is then impossible to air condition individual offices with small units effectively. A considerable investment is required for air conditioning as well as expensive up-keep and power consumed.

Finally, we come to the question of a stock purchase plan. We have discussed this previously as it relates to the company contributing a portion of the cost for those people who wish to buy company stock. This too, is an expensive program and can add considerably to our costs, the exact amount being dependent on the number of people who want to participate.

It is evident that all of these questionable areas can add considerable cost to our overhead. Inasmuch as our goal is to sell small computers which will be competitive price-wise, high overhead costs make it more difficult to achieve this goal, unless we are convinced that the output of our professional people would be so enhanced by these things that they would more than pay for themselves.

The other factor that we have to consider is that at some point in time, and my guess is that within two to three years, the computer industry will mature to the point that the ability to pass on these larger than industry-wide costs to customers will be largely dissipated. If this is true, profit margins will be badly squeezed and at the same time other manufacturers not now in the computer industry are going to be strongly tempted to get into the business once the mystery goes out of it. If we have provided our people with all the conceivable benefits that they could want and these costs are now built into our system, it is highly improbable that we could satisfactorily change them at a later date and get more austere. In brief, therefore, I am saying that we embark upon an irreversible procedure by adding things. Clearly we can never take them away.

I feel that this is a very important subject that should be given top priority in one of our early meetings of the Executive Committee. In fact it might be appropriate for a Woods Meeting.

jm

Rex Olsen



INTEROFFICE MEMORANDUM

DATE: March 21, 1967

SUBJECT: LONG RANGE PLANNING

TO: Executive Committee

FROM: H. Mann

cc: C. Rix

There are numerous items of cost which do not increase with volume, and others which increase more slowly than volume itself. Some examples of these are advertising, administration, marketing, sales promotion and engineering.

In the past, we tended to budget and spend as though everything varied directly with volume. Circumstances may have required this but as of today, I feel we must recognize that we will lose a large part of the advantages from increased sales unless we plan to control these costs.

As a start, I suggest that all product lines budget for the coming year for all items below the gross margin level, at the present level plus 50% of the change in volume expected. This would not apply to each line of the statement, but the cumulative totals of all selling cost (line 49), engineering (line 59) and administration (line 60) should each be no more than the amount suggested by the formula.

For example, let us assume the 12 months actual for engineering expense this year is \$1,000,000 and net sales only \$10,000,000. Next year's net sales budget is \$15,000,000 then the engineering expense would be budgeted for not more than \$1,250,000.

Any exceptions to this rule would be justified to the Executive Committee.

HSM/jm

Rex Olson

digital

INTEROFFICE MEMORANDUM

DATE: March 20, 1967

SUBJECT: COMPANY VEHICLES

TO: Frank Kalwell
Henry Crouse
Jack Shields

FROM: H. Mann

cc: Executive Committee

I would propose that the three men to whom this memorandum is addressed form an AD HOC Committee to consider the desirability of placing all company vehicles under the direction and control of one individual. A recent memorandum from Jack Shields outlined a new service, which he was instituting, to and from Logan Airport for material and personnel. In addition to this, I know that Henry Crouse frequently has a vehicle going in and out of Boston to make deliveries and pick-ups. I am not sure whether Frank Kalwell has a problem in this regard or not.

The way most larger companies work is to have all company vehicles under the direction of the Traffic Manager. The Traffic Manager then receives all requests for delivery and pick-up within the local area, and he in turn arranges the dispatching of the vehicles in order to avoid having more than one going to a given area at the same time. The result of this attention, of course, is to get far more effective use from the vehicles available, thus improving service at no added cost.

I would suggest that a report be prepared by the committee for the review and approval of the Executive Committee.

HSM/jm

Henry

Ken Olsen

DEC INTEROFFICE MEMORANDUM

DATE March 16, 1967

SUBJECT PDP-8 Order Rates and Backlog

TO All Executive Committee Members FROM Mike Ford

cc: Howie Painter

I have heard comments that the PDP-8 has a "holey" backlog, that orders are dropping off and, as a result, that the PDP-8 budget should be reduced. I would like to present some data for the members of the Executive Committee to analyze with such comments in mind.

Certainly the backlog has holes in it by virtue of the nature of our product and our market. 40% of the PDP-8 business is OEM business that specifies specific months for shipment of ordered equipment. They don't want it before that month or after that month, they want it IN that month. Similarly, certain options on backlog cannot be shipped immediately because they are associated with systems containing some other option of longer checkout cycle. For these reasons, it is not always possible to obtain a customer today who will accept a processor or a peripheral tomorrow even though we have a significant backlog for processors and that peripheral.

It is always possible, however, to sell any piece of equipment today for delivery within a few weeks (delay incurred by P.O. generation time) by simply phoning any one of several salesmen and telling him to find a new customer who wants instant delivery. For this reason, we implement in our scheduling and forecasting process speculation processors and a few peripherals. This technique has sold over 30 PDP-8's that wouldn't have otherwise been sold during Fy 1966.

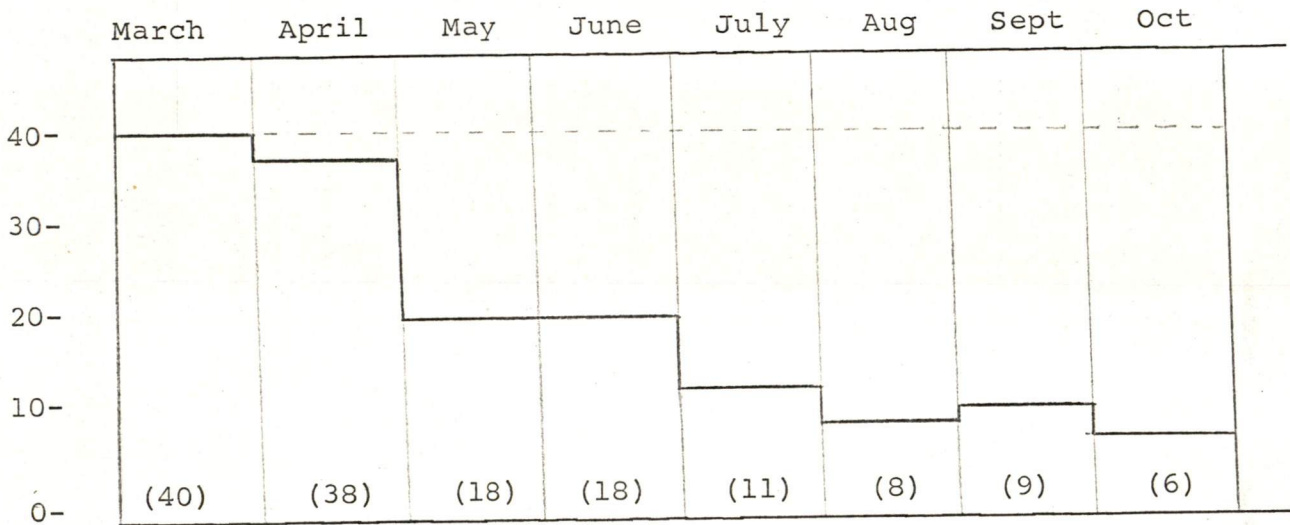
The data presented below is divided into two areas, processors and peripherals. The data is obtained from Al Alexanian's backlog record and the backlog reports provided by Accounting.

Processors (as of March 1, 1967)

<u>8-month</u> <u>Average Booking Rate</u>	<u>2-month</u> <u>Average Booking Rate</u>	<u>Production</u> <u>Rate</u>	<u>Backlog</u>
processors/month over 8 months	processors/month over last 2 months	units/month requested from Pro- duction	total units
37.5	41	40	148

The above chart shows the near-term bookings rate to be essentially equivalent to the booking rate over the past 8 months, and essentially equal to the production rate. Thus, a stable system exists where we are building and shipping almost exactly what we are booking and no downward trend in bookings is indicated over the past few months.

The chart below shows the 148 machines distributed into the months they are scheduled.



This chart is valid as of 1 March 1967. Since that time, 20 PDP-8 orders have been logged as of March 15. These 20 orders are not counted in the 148 machines or on the above chart. This chart has essentially the same shape as it has had for the whole of FY 1967.

Peripherals (as of March 1, 1967)

The attached table reflects the 8 month average booking rate, current backlog, current production rate (Feb.) and the resultant delivery if the options were ordered as an add-on. System orders do cause holes in the backlog for some options, however, we have yet to produce more options than we can sell, and we have been operating with these sort of rates since December.

<u>Option</u>	<u>\$ Value</u>	<u>8 mo. aver. Book Rate</u>	<u>Prod. Rate</u>	<u>Backlog</u>	<u>Current Delivery</u>	<u>Comments</u>
CR01C		1	1	2	2 months	OK
DM01		2 1/2	2	9	4 1/2 mos	Increasing Prod. rate
KR01		5	4	16	4 months	Increasing Prod. rate
LT08A/B		A - 2 B - 3	A - 1 B - 3	A - 4 B - 6	4 months	Increasing Prod. rate
TTS Systems		2 1/2	5	9	1 month	OK
PC01,2,3		4	4	35	6 months	Increase Prod. rate in May
34D/ RM503		4 1/2	5	10	2 months	OK
RM08		1	1	4	4 months	OK
TC01		7	16	46	3 months	OK
TU-55		18	34	79	3 months	OK
138E		4 1/2	6	17	3 months	OK - barely
139E		4	6	13	3 months	OK - barely
552		1	3	7	3 months	Phasing out
580		1	1	3	3 months	OK
57A		1	1	2	3 months	OK
182		1.5	6	8	2 months	Cutback requested
183		5	10	16	2 months	Slight cutback
184		6	12	29	3 months	Slight cutback
188		2	2	1	1 month	OK
189		2 1/2	4	11	3 months	OK
680 Systems		3	3	8	3 months	Increasing in April

The comments listed in the last column of the table indicate the adjustments made in the Forecast to Production submitted the 1st Tuesday of this month.

It is absolutely necessary to watch the option order rates very carefully and to carefully tune production capability to optimize system and peripheral lead times, while not running out of customers in any particular peripheral. This takes considerable surveillance and judgment which we are undertaking to perform. So far, the results have been satisfactory in that we have never run out of customers for any peripheral.

Future Business

Every indication shows we have a strong 9 months ahead for the PDP-8. The following are new OEM customer agreements we are about to sign.

UCC-----50 to 200 machines starting in July (8/month)

Technicon-----50 to 100 machines starting in late Fall (8/month)

General Electric-50 machines starting in late Fall (1-680 system/
2 weeks)

RCA-----5 to 50 machines starting in late Fall (680 systems)

In addition, on some 45 OEM and Quantity Discount Agreements totaling some 300 processors, we have releases for 50 (already counted in the 148 machine backlog). However, that leaves some 250 machines on agreement, but not released. Assuming 50% realization of this potential, we can expect 125 orders for regular delivery over the next 10 to 12 months from these customers that require very little selling.

eem

INTEROFFICE
MEMORANDUM

DATE March 15, 1967

SUBJECT Memory Test Equipment Discussion in Maynard

TO Win Hindle
Ted Johnson
Pat Greene
Jack MacKeen
Lewis Illingworth
John Leng
Gerry Moore
Jean-Claude Peterschmitt

FROM Bela Csonth

On March 13, 1967 we had a meeting on General Memory Test Equipment problems and especially on the problems of the 1527 Memory Tester delivered to COPRIM, Evreux, France.

Present at the meeting: Pat Greene
Jack MacKeen
Ron Evans (part time)
Leo Gossel " "
Frank Murgida " "
Bela Csonth

Subjects of the meeting:

1. 1527 Tester Problems in Evreux

I presented the problems at COPRIM which I tried to clarify during my visit in Evreux with Jean-Claude Peterschmitt (Feb. 23, 1967), and by discussions with Dave Lawrence.

A. Problems

Main Problems

- a) The tester cannot be applied for a load giving $V_b = 75V$ (after the latest changes $V_b = 70V$).
- b) Current Drivers - $T_d = 4 \mu\text{sec}$ instead of the specified $T_d = 10 \mu\text{sec}$.
- c) No fault counter has been delivered (5 decimal digit display).

- d) The tester was until the last changes (23 Feb. 1967) non-operational.
- e) There is no system specification (including current drivers and switching system).

Minor Problems

- f) High noise peak on the sense wire, at the firing moment of the line selector switch transistor (due to the too tight capacitive coupling of the trigger transformer coils primary vs secondary)
- g. Much noise on the sense amplifier (discriminator) input, if the sense wire signal is put through the sense switches.

B. Decisions and Proposals

- a) Experiments will be carried out on the switches to boost the performance to the required $V_b = 75V$, and rise times. (Probably the current driver power supply voltage has to be increased by 5V too). Application of SCR's instead of the present transistors will be tested.
- b) $T_d = 10 \mu\text{sec}$ can be changed easily, the necessary information will be given to Dave Lawrence to carry out the necessary changes in Evreux.
- c) The required fault counter will be delivered.
- d) The target system spec is set as follows:

Case A

$$V_b \leq 50V$$

$$I \leq 1 \text{ amp}$$

$$R_L \leq 100\Omega$$

$$T_R \geq 50 \text{ nsec}$$

Case B

$$V_b \leq 75V$$

$$I \leq 1 \text{ amp}$$

$$R_L \leq 150\Omega$$

$$T_R \geq 100 \text{ nsec}$$

- e) The noise peak at the triggering moment can be decreased by physically dividing of primary and secondary coils of the pulse transformer.
- f) Decreasing of the noise level through the sense switches could be achieved by making more compact the reed relay unit (control circuit should be removed to a separate module).

It has been decided that we will give Jean-Claude Peterschmitt the specification of the tester we are going to guarantee, as well as the date on which the tester will be operational under the new specification requirements. Target date for this information will be 3/17/67

2. General Discussions

A. Special Tester For Very Fast Core Memories

Pat Greene has explained that he had already plans to do design effort in this field.

It has been suggested that the switching circuitry and connectors should be arranged symetrically around the plane to be tested. (f.e. in the form of a table)

B. Programmable Current Driver

A possible solution has been presented applying a Boot Strap linearization circuit. The amplitude can be regulated by a DC clamping level.

C. System Acceptance Test

The application of a special matrix plane has been suggested.

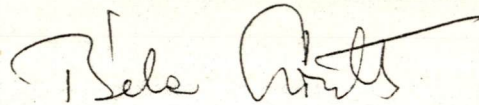
This plane has the usual 64 or 128 contact tags, but has only one core wired in. The contact tags are bussed together on both the "hot" and "ground" sides.

- a) The variation of the core output is a measure for the current uniformity.

- b) By selecting one address the different readings of the discriminator while scanning the sense switches, give a measure of the quality of the sense switches.

D. Sales Promotion in Europe

- a) The presentation of the current drivers with a 4 x 4 switching system and discriminator would give a good impression of the quality of our Test Systems at trade shows.
- b) It would be very useful to ship a complete PMA-8 system to Reading for demonstration, and invite the potential European customers and prospects.
(f.e. around June 1967)



Bela Csonth

DATE: March 13, 1967

SUBJECT: Long-Term Planning and Buce Payne & Associates

TO: Executive Committee

FROM: Ted Johnson

Bruce Payne is a leading consultant specializing in the field of long-term planning. He and his organization have had experience including work with the IBM World Trade Organization. He is a lecturer at the Northeastern Management School and author of a book on long-term planning.

I propose that we discuss how we might utilize this organization in helping the Executive Committee develop a clear, documented 5 plan (or longer) and/or a sub-set of this plan for where we will market our products (an international long-range plan) and what kind of program we should follow.

Summary:

Harry Mann, John Leng and I have met with Bruce Payne and I met again with him in Boston on 3/9/67.

The initial intent was to evaluate whether or not he could help us in developing a sound program for international business.

After fighting an initial desire to seek expertise in specific problem areas involved with our current planning, I conclude that Mr. Payne could be of value in:

1. Working with the members of the Executive Committee in developing step-by-step, a detailed, objective, long-range company plan. His concept is to force us to put our plan down on paper in a comprehensive manner.
2. Given key objectives and a basic corporate plan, work with me and members of the Executive Committee in developing a plan for international business. This plan, as I see it, would evaluate the impact of international marketing decisions on the corporation, lay out the alternative approaches and isolate key decision factors.

Mr. Payne believes there is only one systematic way to develop an LRP (Long-Range Plan).

1. Objectives

First to establish the basic, overall objective of the corporation. These objectives have to be stated generally enough to allow realistic planning.

2. Corporate Strengths

Identify the key strengths of the company which will lead to achieving its objectives.

3. Corporate Weaknesses

Identify the weaknesses of the company which will affect its ability to achieve its objectives.

4. Competitive Strengths

Identify the strengths of the competition and how that will affect our ability to achieve the company objectives.

5. Competitive Weaknesses

Identify the weaknesses of the competition and how we should consider them in our program of reaching our objectives.

6. Environment

I suppose he includes here the economic and political factors in time which will affect our ability to achieve objectives.

7. Technology

Identify, insofar as possible, the impact of technological change on the market and competitive situation and the ability of the corporation to achieve its objectives.

8. Plan

He believes that only after going through the first seven steps in detail, forcing out this information and assumptions, can a company really develop a clear, logical plan. This plan will go into organizational requirements, financial requirements and considerations, facilities, location, etc.

We went through a non-confidential plan developed by K & E. I was impressed by the detail and content. I also concluded that we have developed substantial planning material which should be organized in a formatted planning manual. I believe that we could develop a detailed plan, well-documented, within 3 - 6 months. I believe Bruce Payne & Associates would be a substantial assistance in expediting and systematizing this process.

If I am to proceed on the international side, I would like to:

1. Proceed with agreed upon, meaningful guidelines and objectives.
2. Have established limits on what information I can use.

3. Involve the members of the Executive Committee, probably on a one-by-one basis, in my use of Bruce Payne & Associates.

I have to work this out in detail, but I think we could develop a problem statement and, for example, look at our European business along, establishing intra-company effects and ways of measuring them as we go along. The most efficient approach, however, would be to integrate international planning within corporate long-range planning.

We could, and should, look beyond the 5 year period when it is possible and meaningful.

Notes on Bruce Payne Discussion:

1. Acquainted B.P.A. with the products, organization and history of DEC.
2. Discussed general ways to approach planning (what to plan) and what information is needed.
3. Observed that the process was necessarily a long one unless I developed and organized as much as I could and felt free to include B.P.A. in all available planning information.
4. Got Payne's opinion that we would develop a DEC World Trade Organization in the long term, as our operations become more developed and autonomous.
5. Determined to get information on the I.B.M. World Trade Organization and try to determine why and how this international operation has contributed so much to I.B.M. profits.
6. Determined to, again, specify groundrules for where and how we will sell. Should we ever be non-direct?
7. Determine to plot the market for each present and potential area, one sheet per year. (Do back in time as well.) The process now going on at DEC of estimating the applications markets for each product will be useful.
8. Investigate the meaningfulness of the question: "How fast, and under what possible conditions, could the international area grow without hurting the U.S. operation?" This might lead to the conclusion that we move faster to exploit a competitive advantage in Europe.
9. I.B.M. has optimum sizes established for everything: factory sizes, offices and staff, etc. This has its dangers but coincides with recent conclusions from our experience.
10. We should generalize our product areas to try to determine the available size of the market in time.
11. Discussed various criteria in the future for what we do in Europe (U.K. and EEC, national attitudes toward U.S. business, available skills).

12. B.P.A. could probably direct us to expertise as we develop our plan (our meaning DEC, B.P.A. only helps us do our own plan.)
13. A staff person, (K.H. Olsen's Assistant) would be a coordinator. He would provide added continuity and document much of the developed material.(essentially act as minute-taker and information seeker and organizer.)
14. I will try to develop an outline of what questions we have to answer in developing an international plan.

TJ:mr

XERO COPY

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DEC INTEROFFICE
MEMORANDUM

DATE March 13, 1967

SUBJECT Direct Labor Charged by Drafting Work Activity

TO K. Olsen ✓ N. Massarese FROM R. Melanson
 W. Hindle L. Prentice
 S. Olsen C. Rix

Total direct labor charged against established categories of drafting work activity during the four month period --- November 1, 1966, to February 28, 1967.

<u>WORK ACTIVITY</u>	<u>TOTAL LABOR</u>
Supervision	7 %
Design Layout	10
Special Drafting	1/2
Detail and Assembly	23
Checking (electrical and mechanical)	14
Block Schematic	9-1/2
Wirelist (all operations)	7
ECO Drawing Effort (electrical and mechanical)	9-1/2
List Preparation (includes typing)	1-1/2
Electrical Drawing	3
Sketch Drawing (product development and prototype)	6
Drawing Correction (after checking)	3
Drawing Change (finished drawings)	2
Wirelist Change	3
ECO Wirelist Effort (all operations)	3/4
Replenish/Reproduce Wiring Lists	<u>1/4</u>
	100 %

RECEIVED

1967 MAR 10 AM 11:19

DIGITAL EQUIPMENT CORP.
TECHNICAL PUBLICATIONSOMM+
DIGITAL CPL

DIGITAL MAYN

DIGITAL MAYNARD

MSG 821 3.10.67

TO DENNY DOYLE

FROM ELSA CARLSON

WE HAVE RECEIVED YOUR MEMO OF MARCH 3RD REGARDING KEN'S ENTRY IN THE
ENGINEERING NEWSLETTER ON TECHNICAL WRITING. HE WOULD LIKE TO
PRINT YOUR COMMENTS IN THE NEXT ENGINEERING NEWSLETTER, BUT WOULD
LIKE TO HAVE YOUR APPROVAL FIRST, OF COURSE.

END AND THANK YOU

RECEIVED

1967 MAR 13 PM 2:06

DIGITAL EQUIPMENT CORP.
TECHNICAL PUBLICATIONS

*OT
DIGITAL MAYN
DIGITAL CPL

MES 1943 13 MARCH 67

TO ELSA CARLSON
FROM DENNY DOYLE

RE MES 821

IT IS ALRIGHT TO PRINT MY COMMENTS IN THE NEXT ENGINEERING
NEWSLETTER.

ALSO



INTEROFFICE MEMORANDUM

DATE March 13, 1967

SUBJECT PROPOSAL TO CONSTRUCT INTEGRATED CIRCUITS TESTER

TO Engineering Committee

FROM Robert Hughes

Proposal Summary

1. Volume - Product Line Sources projected

6/30/67	47,200 IC's/month
6/30/68	279,000 IC's/month
6/30/69	379,000 IC's/month
2. Test Capability - 180,000 units a month of all IC configurations.
3. Competitive Bids - DEC Tester lowest cost for performance.
4. Tester - AC/DC Tester with PDP-7
5. Payback - 7.4 months based upon 3% defective rate.
6. Construction Cost - \$121,780
7. Construction Period - 3 months
8. Testing Integrated Circuits - 3 1/2 months
9. Cost of Testing I. C.'s - 7.2¢ each

Robert Hughes

amg



INTEROFFICE MEMORANDUM

DATE March 13, 1967

SUBJECT Tester for Integrated Circuits

TO P. Kaufmann

FROM R. Hughes

cc: H. Crouse

Estimated usage for integrated circuits has been obtained and is listed for the various groups.

	1/1/67 to 6/30/67	6/30/67 to 6/30/68	6/30/68 to 6/30/69
Analog to Digital	.6K to 6K/mo.	.6 to 6K/mo.	.6 to 6K/mo.
Small Computer	.6K/mo.	50K/mo.	50K/mo.
Large Computer	.6K/mo.	3K/mo.	3K/mo.
Modules	12K to 40K/mo.	100K to 220K/mo.	320K/mo.
Maximum			
Quantity/mo.	47,200	279,000	379,000
Est. Dollar			
Value/mo.@ \$1.50 ea	\$70,800	\$418,000	\$568,000
*Est. Cost Manual			
Test @ \$0.50 ea	\$23,600	\$139,500	\$189,500
Minimum			
Quantity/mo.	13,800	153,600	373,600
Est. Dollar			
Value/mo.@ \$1.50 ea	\$20,700	\$230,400	\$560,400
*Est. Cost Manual			
Test @ \$0.50 ea	\$ 6,900	\$ 76,800	\$186,800
Est. Cost Automatic			
Test @ \$0.072 ea	\$ 995	\$ 11,060	

The high cost of manual test makes it mandatory to test semi-automatically or automatically. It is estimated that using a computer controlled tester we may test the average module in eight seconds, four seconds for test and four for insertion and removal.

This would give us 7.5 tested units per minute or 450 per hour on a twenty hour day for twenty days we could test 180,000 per month.

*The manual labor cost does not include capital equipment and assumes one circuit tested in six minutes.

This would satisfy the minimum estimated usage per month of 153,600. If we need to meet the maximum estimate of 279,000 per month, I suggest we build two testers, which would be controlled by one computer. (We can use one computer to control several testers.)

Competitive Bids

The cost of Texas Instruments' Tester would be:

Tester	\$138,510
Engineering (6 months)	\$ 25,560
Interface	\$ 10,000
Software (1 year)	\$ 25,000
PDP-8 (8K)	<u>\$ 31,000</u>
	\$230,070

This approach involves extensive software work and engineering to interface the Texas Instruments' System with our computer and would require Texas Instruments maintenance for some time. Earliest realistic testing for integrated circuits would be one year because the software can't begin until the design engineering is done.

The cost of Fairchild's Tester would be:

Tester	\$143,840
Engineering (6 months)	\$ 25,560
Interface	\$ 10,000
Software (1 year)	\$ 25,000
PDP-8 (8K)	<u>\$ 31,000</u>
	\$235,400

This system like the Texas Instruments' System involves extensive software work and engineering for interfacing with our computer. Earliest testing date would be one year because software can't start until design engineering is complete. The system would also require maintenance by Fairchild for a length of time.

Tektronix no bid yet.

Teradyne

DC tester no computer \$48,000.

The cost of a Teradyne DC-DEC AC tester is:

Teradyne DC Tester	\$ 48,000
DEC AC Tester	<u>\$118,000</u>
	\$166,000

DEC AC-DC Tester

Materials	\$ 70,000	
PDP-7	\$ 35,000	
Direct Labor & Overhead (1 Engineer)	\$ 7,500	3 months
Direct Labor & Overhead (2 Technicians)	\$ 5,280	3 months
Direct Labor & Overhead		
Drafting	\$ 2,500	
Model Shop	\$ 1,500	
	<u>\$121,780</u>	

The advantage of our own system, in addition to low price, is we are going to use the same basic design as AMT-2, so all the common routine programs of AMT-2 will be used in the Automatic Integrated Circuit Tester. Software will only take two weeks. The result will be circuit testing in three and a half months.

Description:

The DEC A. I. C. T. will be controlled by a PDP-7 computer. It will perform fan-in, fan-out, VCE, leakage, sensitivity, rise and fall times and propagation times on RTL, DTL and TTL integrated circuits. These tests can be performed on integrated circuits having up to sixteen connections. Consideration will be given to MOS testing during the design phase.

D. C. Testing

- 1) Connection to integrated circuit made through a 16 pin - 6 BUS matrix
- 2) DC Simuli
 - a) Programmable Power Supplies
Two 0 to ± 2 volts in 1 mv increments
Three 0 to ± 15 volts in 10 mv increments
 - b) Programmable Current Source
0 to ± 70 ma
- 3) DC Loads
 - a) Programmable Current Sink
0 to ± 70 ma
 - b) Programmable Resistive Loads to GND
1 Ω to 2K Ω

4) D. C. Measuring Device

DEC 12 - Bit A/D (Accuracy ± 2.44 mv)

5) Output capacitance to GND = 30 Pf max.

6) Actual DC measurement time = 36 μ sec.

A. C. Testing

1) Programmable Burst Generator, Clock and Delay Range - 10 CPS to 10 mc

Pulse width - 25 ns to 1000 ns

Rise time - 5 ns

Fall time - 5 ns

Amplitude - ± 1 to ± 6 volts

Delay Range - 30 ns to 12 μ sec.

2) AC Measuring Devices

1) TEK 567 sampling scope
(overall accuracy $\pm 3\%$)

2) Event Counter

Both AC and DC testing should be done because on the RTL circuits we, presently, buy, our AC rejects are about 3%.

Assuming a 3% AC defective rate and that it took ten minutes to repair a module with a defective integrated circuit. The repair labor rate is \$2.50 per hour. The overhead rate is 375%. The repair cost is then 1/6 of \$11.87 per hour or \$1.97 plus the part cost of \$1.50 for a total of \$3.47. Three per cent of the minimum estimated usage per month 153,600 is about 4,600 units. At a repair cost of \$3.47 per unit. This would be a monthly cost of \$15,962. The AC portion of the tester cost is \$118,000. The payback period would be 7.4 months.

Plan: Some of the preliminary design has been completed. Attached is a time schedule for the system.

The system will be built in ninety days after approval.

Cost of testing automatically:

System Cost	\$121,780	
Direct Labor & Overhead		
2 Girl Operators	\$ 14,000	(1 year)
Direct Labor & Overhead		
1 Male Operator	\$ 10,000	(1 year)
Direct Labor & Overhead		
1 Maint. Technician	<u>\$ 10,000</u>	(1 year)
	\$155,780	

180,000 circuits per month is 2,160,000 circuits per year, which comes to 7.2 cents test cost per circuit.

R. Hughes

amg

MAR 15 1967

digital

INTEROFFICE MEMORANDUM

DATE: March 14, 1967

SUBJECT: Albert Einstein College

TO: Jack Shields
CC: M. Ruderman
R. Clayton

FROM: Cliff Pitz

I spoke to Frank Purcell on Friday, March 3, 1967 in regards to problems at Albert Einstein College.

The following is a breakdown of calls.

February 3 Machine arrived. PDP-8 segment checked out by Phil Charland.

February 6 J. Fazzino checking out Line section.

February 7,8,9 No work performed due to bad weather.

February 10 Machine accepted, "quote" - after a good fight.

It seems that Dr. Vaughn wanted to run the system for two-three weeks using his own routines. For some reason he did not feel that our diagnostics, etc., were sufficient.

February 23 Service call - Intermittent tape problem. Problem - P'2 pulse too wide (S603) broken capacitor lead on Dectape.

February 27 Service call - No problems

March 7 Service call

CLA
TAD X - Single step using continue.
JMP

Intermittent: AC rotate one place left after TAD.

INTEROFFICE
MEMORANDUM

DATE March 10, 1967

SUBJECT Manpower Requirements

TO Stan Olsen
Nick Mazzaresse
Win Hindle

FROM Pete Kaufmann

In order to assist manufacturing in our detail manpower planning for 1967-68, would appreciate your giving us the following information on the attached form.

New Products expected to be released or phased out during 1967-68.

Approximate Month of Release or Phase Out

Manufacturing Manpower requirements to reach June 1968 level.

After totaling this and integrating with Personnel's capabilities, hopefully, we will be in an improved position to make detail plans and commitments.

In order to make this planning effective and so that additional requirements do not surprise us during the year, would appreciate as much thought as you can give this.

Thanks.

Pete

DISTRIBUTION LIST

Mike Ford
John Jones
Loren Prentice
Ed Harwood
Dick Richardson
Bob Brown
Tom Stockebrand
Cy Kendrick
Jack Smith
Steve Mikulski
Henry Crouse
George Wood
✓ Ken Olsen
Harry Mann
Pat Greene



INTEROFFICE MEMORANDUM

DATE March 10, 1967

SUBJECT Office Planning

TO Ken Olsen

FROM Jim Jordan

At your request, I am submitting the following preliminary outline which will serve as the basis for a guide to plan in-plant, domestic, and foreign offices.

Subjects to be considered are the logo, space planning, color, furnishings, sinage, lighting, and exhibits.

With this as a start, we should be able to assemble an increasingly useful body of information that will save us time and money and present the corporation at its best.

To further the effectiveness of this guide, there are four steps that should be taken.

1. Visit the offices, or examine photos of them, in order to get a feel for the problems and particular situations that exist.
2. Make a preliminary proposal to solicit comments and suggestions from the offices. Include as many of these people in fact finding so they feel a sense of participation. Include in this, an analysis of present office costs and a projection of future needs.
3. Write and distribute a Standards Manual based on fact finding which will reflect economic realities, design goals, and long term corporate objectives.
4. Offer the services of industrial design on a consultant basis for office design.

I am proceeding to gather information on the above topics, however in-depth investigation will take time. Let me know what you think of the form and topics.

A. Logo

1. Purpose
2. Color
3. Form
4. Applications

B. Interiors

1. Engineering office
 - a. Furnishings
 - b. Color
 - c. Size
 - d. Other considerations
2. Sales office
 - a. Furnishings
 - b. Color
 - c. Size
 - d. Other considerations
3. Public space
 - a. Furnishings
 - b. Color
 - c. Size
 - d. Other considerations
4. Meeting rooms
 - a. Furnishings
 - b. Color
 - c. Size
 - d. Other considerations
5. Secretarial and Reception
 - a. Furnishings
 - b. Color
 - c. Size
 - d. Other considerations

C. The Exterior

1. Building
2. Color
3. Sinage

Ken Olsen



INTEROFFICE
MEMORANDUM

DATE March 9, 1967

SUBJECT Design Review of M Series Modules

TO Executive Committee

FROM Joe Sutton for Engineering Review
Committee

It is the considered opinion of the committee that the M series modules are not ready to be announced as a product line at this time because the design is not finished. The period of time devoted to engineering before announcement was simply too short.

There are several major problem areas which the designers must have a chance to resolve before this product line is announced.

1. What method is to be used for timing the logical decision of this line? Pulses or square waves?
2. How are these signals to be generated and distributed so that the skew specs of flip-flops are not exceeded and the systems can run properly.
3. If we intend to use pulses it is obvious that pulse amplifier design should be first priority. What width pulse? How reshaped?
4. In-house experience indicates problems due to skew in clock timing. No little effort is needed to specify the 7476N flip-flop to guard against these problems.
5. Most important after the above problem of clocking and skew immunity are dealt with, announcement of line should come after successful breadboarding of:
 - a. 16 bit up-down counter with comparator to stop at a preselected point.
 - b. 16 bit 2-register parallel register to register swap scheme with gating circuits to allow read-in from separate source. These sample problems will go some distance to demonstrate the validity of the above solution.
6. With the advent of more complex cards, say a M210 or M161, the module designer must take time to have a better idea of what the modules will be used for. Since blue modules constitute less than 5 per cent of module sales, the present uses of blue modules should be canvassed by the designers as to their present use of blues and what intergrated forms they would prefer. Then the designers can have more firm ideas about what modules are needed. The committee feels that the present series may not be as useful as could be but is incapable of being judged properly at this time.

7. The designers have already incorporated committee suggestions about expander nodes on external pins. But this restriction could make the line unwieldy for module sales. Thought and study will be required here.

In all fairness it must be recognized that most of these areas were on the schedule for the designers to look at. But in the face of sales and management's desires to get it out for the show, some skimming over is evident and understandable.

bwf

Ken Olsen



INTEROFFICE
MEMORANDUM

DATE March 9, 1967

SUBJECT Design Review of K Series Modules

TO Executive Committee

FROM Joe Sutton for Engineering Review
Committee

The committee's opinion on K modules is that this line of modules could be announced at this time. The line appears to be rather well thought through and the operating problem of this new environment seems to be dealt with.

Specific changes which are recommended:

1. Pin C will be ground on K series modules. Pin A is +5 volts. Pin B will stand plugging into -15 volts making lines compatible.
2. Use an existing logic symbology instead of a new super hybrid even if unwieldy. We understand K series will now use old NEMA.
3. Have K200 series reviewed and redesigned by a good logic designer as better techniques of counting are probably available.
4. K230 shift register must have all flip-flop outputs or is almost useless. Make card double size if need be.
5. Add crude circuits from B/r series to conversion charts.
6. It would be advisable to breadboard some proposed system to demonstrate that the noise immunity really works.
7. Since K may be used for some DEC peripherals, tighter specs on delays and rise and falls will be needed.
8. K303 recovery time probably won't meet 0.1 percent of maximum delay.
9. K716 should use a socket which will not break. The new 36 pin molded with only 18 pins inserted should be available by fall.
10. The connectors that are cabled to the K508 input converter and the K604 output connector must have pins assigned in such a manner that no damage will occur when they are plugged into a normal FLIP CHIP powered socket or into each other's socket.

bwf



INTEROFFICE MEMORANDUM

DATE March 9, 1967

SUBJECT DEC Logo

TO Al Devault
Win Hindle
Nick Mazzaresse
Stan Olsen
Ken Olsen ✓
George Wood
Loren Prentice
Bob Cesari

FROM Jim Jordan

In order to maintain the equity we have in the corporate designation "DEC" and retain it as a registered mark, we must use it. No particular form is mandatory. We are currently using "Digital" in blocks as our logo. We do not want to confuse our customers with two means of identification. One way to display both, but not confuse, is to play one down. It should not appear to be a poor second cousin. An answer that seems to satisfy the clarity and legal requirements is to put "DEC" in plain block letters next to "FLIP CHIP", another registered trademark, on our logic modules. This can be done on the film positives of circuits. When the cards are etched and soldered, the words "DEC FLIP CHIP" will appear as bright metal on the colored background. As time goes on and the opportunity presents itself, we can put DEC on all of our modules, power supplies, and other internal components.

We plan to institute this change at the earliest possible time. If you have any questions or comments let me know.



INTEROFFICE MEMORANDUM

DATE March 9, 1967

SUBJECT MODULE MARKETING REVIEW - Report of K Series and M Series,
March 7, 1967

TO Al Devault
Russ Doane
Stan Olsen
Saul Dinman
John Jones
Mort Ruderman
Allen Kluchman
Ken Olsen

FROM Howie Painter

SUMMARY

There is no doubt in anyone's mind that both the K and M series modules are necessary products. The M series is needed to provide DEC with a monolithic integrated circuit line, without which we are non-competitive. The K series is needed to make inroads in the industrial area, a high volume market.

All are agreed that the IEEE show is the key time and place to announce these new lines of modules.

Announcement plans for IEEE, although hastily made, are fairly complete. Advertising, news releases, news leaks, and a hand-out brochure are finished or nearly ready.

The firm's plans for follow-up after IEEE are vague at this time. Unless these marketing plans are thought out and executed, the announcement at IEEE could prove to be largely wasted effort.

RECOMMENDATIONS

1. That, after the IEEE announcement is over, those concerned with module marketing layout a one year marketing plan for the K and M series.
2. That a follow-up review be held by April 28, 1967, for the one year marketing plan.

Attached is a copy of the review outline. The following comments were brought out during the review:

(continued)

1. Planned Markets

- A. Industrial Line - Machine tool industry, heavy industry such as steel, heavy industry suppliers and present customers who buy R series modules on a price basis, and who do not need the two MC speed.
- B. M Series - Current B series customers, research oriented and OEM customers who are building computer interfaces or special Digital systems.

2. Market Size

- A. Industrial Line - assumed dollar volume to be at a sales rate of 7.5 million per year by June of 1968.
- B. M. Line - five million dollars per year by June of 1968.

3. Competition for and Advantages of:

- A. Industrial line - Competition is primarily Versallogic, manufactured by Decisional Controls, Norpack, G.E., and Alligned manufactured by Cutler Hammer. The advantages of K series are small mechanical assembly, easy plugability, powerful gating structure, better noise rejection, and a good line of functional modules.
- B. M Series competition are such people as CCC, SDS, Redcor, ECO and others. It is an extremely price sensitive market, and the current planned pricing for the M series would give us a cost per gate advantage as well as a cost per flip-flop advantage which is reasonably significant.

4. Approach to Markets

- A. Preliminary Technical specs have been prepared and are being forwarded to the field offices. A notebook and application note file are coming and are planned to be in reasonably good shape by late spring or early summer. Both new lines of modules have been announced at regional meetings, and this will continue throughout the spring in order to let all the field salesmen know the scoop.

(continued)

B. Application support at this point in time consists only of Russ Doane and Al Devault. They would like to have an applications group, but plans for this group are not yet firm. An applications group will be extremely important in solidifying OEM business. Firm prices have not been established, either list price or discount schedules.

5. Marketing plans and announcement

Space ads are planned for around the time of the IEEE show. Tentative plans are to have approximately an ad a month thereafter. Dates are to be firmed up. Trade show announcement will be at IEEE with follow-up at Wescon, ISA, Nerem, NEC and possibly the Design Engineering Show.

No definite plan for a handbook has been mapped out, but Russ feels strongly about having one available. Such a handbook with good applications information will be a key to selling the industrial line of modules. An excellent time to have that handbook available would be at the ISA show next fall. No mailings are currently planned, but roughly two per quarter are expected. Seminar plans are being mapped out and will be scheduled starting this spring. News releases and IEEE show at the time are planned. Preliminary promotional literature is planned for the IEEE show, but will be lacking in detail on the M series, and will also lack prices.

6. Projected Product Life - is approximately three years for each line of modules.

7. Production Plans and Delivery

A. Deliveries will begin in small quantities in June of July of 1967. The normal expected delivery will hopefully be off the shelf, but that will not happen until about the first part of 1968.

8. Sales Personnel Commitment - This has not been settled yet, but it is expected that with an emphasis on selling to OEM markets the dollar volume per salesman should increase over what it has been with the current R series of modules.

9. Budget - A new budget will be developed shortly after the IEEE show.

ewm

Ken Olsen



INTEROFFICE MEMORANDUM

DATE March 9, 1967

SUBJECT DELIVERY SERVICE TO LOGAN AIRPORT

TO EXECUTIVE COMMITTEE FROM Jack Shields
 ALL MANAGERS
 Frank Kalwell
 Ray Michel

Due to a large increase in the amount of material shipments for Field Service use, we will make a scheduled trip to Logan Airport on a daily basis, Monday through Friday, starting Monday, 3-13-67.

The vehicle will be available for company personnel to use as transportation should they have an airline flight coincidental with this schedule. We will also try to pick up any incoming people should their flight arrive around 2:30 p.m. to 3 p.m.

The vehicle is a nine passenger van and seats will be available on a first come, first serve basis. This vehicle will leave at 1:30 p.m. from the Thompson Street parking lot opposite building five. To utilize this service call Harriet Stewart at extension 576 before 1:15 p.m. Give her your name and the extension at which you can be reached. This list will then be forwarded to the Field Service driver. He will go to the lobby of building five at 1:20 p.m. to pick up personnel. If an individual is not there whose name appears on the list, he will be called or paged.

The vehicle will leave promptly at 1:30 p.m., NO EXCEPTIONS.

When pick up of personnel at the airport is desired, we will require Name, Badge Number, Air Line, Flight Number and ETA to be called in to Harriet Stewart before 1:15 p.m. (Only flights arriving from 2 p.m. to 3 p.m. apply.)

If the person or persons are not DEC employees then the appropriate Manager must approve and explain the pick up; e.g., John Doe, prospective employee, pick up for plant interview, R. Lassen.

Passenger Logs will be distributed to the Executive Committee and cognizant managers monthly.

We will be happy to drop parcels off at the respective air freight offices in cases of emergency shipments.

JJS:ned

cc: Paul Gadaire, Glenn Ford, Walter MacKenzie



INTEROFFICE MEMORANDUM

DATE 3/3/67

SUBJECT Wire Mesh Partitions

TO Stan Olsen
cc/ Ken Olsen
Nick Mazzaresse
Harry Mann
Al Hansen

FROM Frank Kalwell

I would like comments on the feasibility of using wire mesh partitions and enclosures on future in-plant moves. It seems we spend a great deal of time and money erecting and disassembling 2' x 4's used to build the various stockrooms.

A price comparison on the new recommended 60' x 60' Module Administration Stockroom using wire mesh vs 2' x 4's and chicken wire is as follows:

I Wire mesh concept

46 pcs. (5'x 10') at	32.50 ea.	1,495.00
1 pc. 5 x 10 door at	105.00 ea.	105.00
1 pc. Fixed Service Window	61.50 ea.	61.50
		<hr/>
		1,661.50
10% of total cost for installation time		166.15
Total cost of 60' x 60' area		<hr/>
		\$ 1,827.65

Advantages

1. Reusable (if future moves occur)
2. Full visibility
3. Full circulation of air, light and heat
4. Ease of installation

II 2 x 4 plus chicken wire concept

Total cost (including Labor & Material) does not include painting

4.00/linear foot

\$1,440.00

1,827.65 Method I

1,440.00 " II

387.65 Less using
Method II

Advantages of II Method:

1. Utilization of present manpower

Disadvantage:

1. Permanent and cannot be moved.

Even though our in-plant #2 method is slightly less, we should consider the wire mesh concept if not just for the "Ease of move and portability" advantage; thereby creating a long-term savings when future moves do occur.

SEE ATTACHMENT

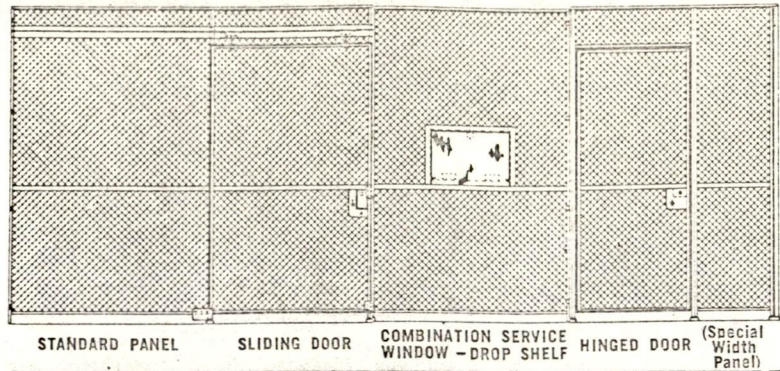
Frank Kalwell

FAK/mz

WIRE MESH PARTITIONS and ENCLOSURES

FIT ANY AREA EASY TO INSTALL EASY TO MOVE

HEAVY 1 1/2" DIAMOND WOVEN MESH 10 GAUGE WIRE WITH 1"x1/2" CHANNEL FRAME. CROSS FRAMES WELDED AND RIVETED.



• SECURE STOCKS — TOOLS • FULL VISIBILITY
• FREE CIRCULATION OF AIR, LIGHT, HEAT

STOCK SIZES

- 3 PANEL HEIGHTS 7' 8' 10'
- 5 PANEL WIDTHS 1' 2' 3' 4' 5'
- 2 SWING DOOR WIDTHS 3' 4'
- 3 SLIDING DOOR WIDTHS 3' 4' 5'

DOORS — 7' high with transom above. Bronze cylinder locks, keyed on outside, recessed knob on inside.

SWING DOORS — have hinges on left and open out.

SLIDING DOORS — have ball hanger tracks, brackets and lock keeper, and slides left on outside.

Included is top steading channel rail, secured by U bolts, necessary nuts and bolts, and cast floor sockets.

FIXED SERVICE WINDOW W/SHELF
 SIZE — 5' w. PANEL x 7' 8' 10' Hgt.

PANEL WIDTHS	PANEL HEIGHTS		
	7'	8'	10'
A-5'	\$24.00	\$25.50	\$(32.50)
B-4'	22.50	24.00	29.50
C-3'	19.50	21.00	26.50
D-2'	17.50	18.50	24.00
E-1'	15.00	16.50	20.00

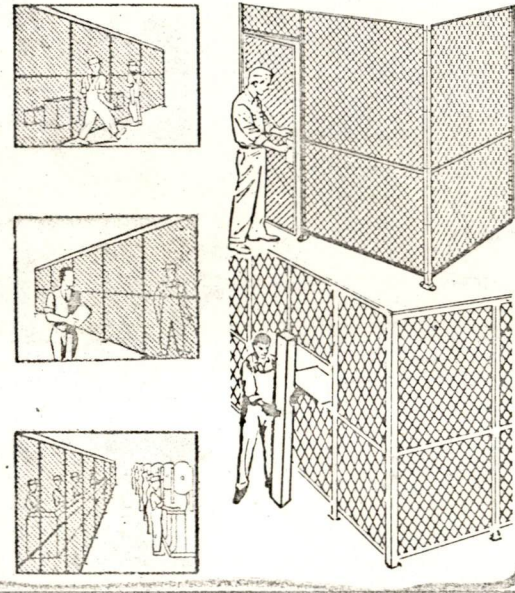
SWING DOOR WIDTHS	PANEL HEIGHTS		
	7'	8'	10'
F-3'	\$62.00	\$67.00	\$ 80.50
G-4'	70.00	77.50	93.00

SLIDING DOOR WIDTHS	PANEL HEIGHTS		
	7'	8'	10'
H-3'	\$73.00	\$79.00	\$ 95.00
J-4'	77.50	83.50	99.00
K-5'	83.50	88.50	105.00

FIXED SERVICE WINDOW W/SHELF	PANEL HEIGHTS		
	7'	8'	10'
L-5' (wide)	\$51.50	\$56.50	\$ 61.50

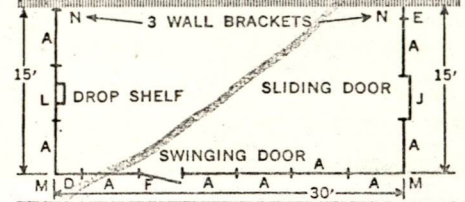
CORNER ANGLE	ANGLE HEIGHTS		
	7'	8'	10'
M-	\$ 3.75	\$ 4.10	\$ 4.85

N- WALL CLIPS AT END OF RUN .75
 O- SPECIAL WIDTH PANELS ADD \$4.00 TO NEXT WIDEST PANEL.



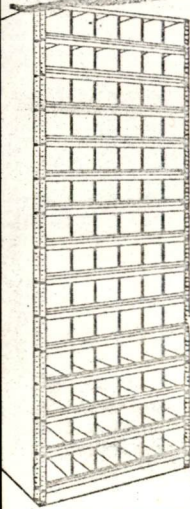
HOW TO ORDER . . .

Provide sketch giving **TOTAL HEIGHT, LENGTH AND WIDTH** of enclosure. Indicate position and type of **DOORS** and **SERVICE WINDOWS**. List (by **CODE LETTER**) the number of **PANELS, WINDOWS, etc.** See Example Below.



QUANTITY	PANEL (WxH)	PRICE (ea)	TOTAL
9	A — 5'x7'	@ \$24.00	\$216.00
1	D — 2'x7'	@ 17.50	17.50
1	E — 1'x7'	@ 15.00	15.00
1	F — 3'x7'	@ 62.00	62.00
1	J — 4'x7'	@ 77.50	77.50
1	L — 5'x7'	@ 51.50	51.50
2	M — x7'	@ 3.75	7.50
6	N —	@ .75	4.50
			\$451.50

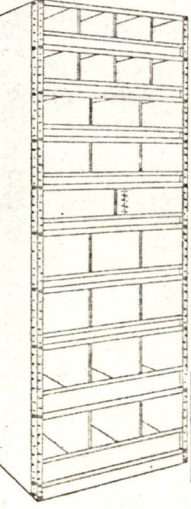
Prices NOT Installed



UNIT L-100
 Consists of: 84 openings 6" x 6" with Bin Fronts on all openings.

All Bins Finished In Grey Baked Enamel.

Depth	Price
12"	\$101.90
15"	119.80
18"	128.50



UNIT L-300
 Consists of: 8 openings 8" x 9" 6 openings 8" x 12" 2 openings 8" x 18" 6 openings 10" x 12" 6 openings 12" x 12" with appropriate Bin Fronts on all openings.

All UNITS ARE 36" WIDE 7'3" HIGH

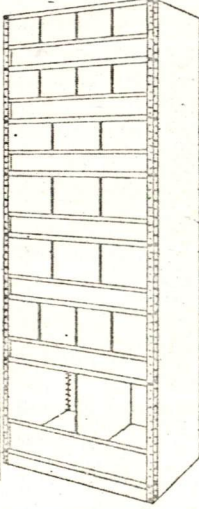
Depth	Price
12"	\$63.60
15"	72.85
18"	79.25

STORAGE and SMALL PARTS BINS
 CHOICE OF 3 DEPTHS

UNIT L-400
 Consists of: 8 openings 10" x 9" 3 openings 10" x 12" 6 openings 12" x 12" 4 openings 12" x 9" 2 openings 18" x 18" All openings with appropriate Bin Fronts.

All UNITS ARE 36" WIDE 7'3" HIGH

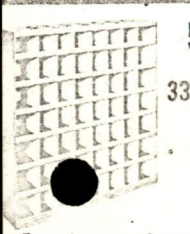
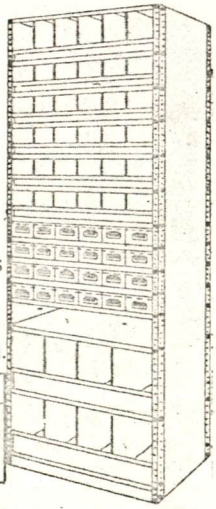
Depth	Price
12"	\$58.45
15"	66.80
18"	72.90



UNIT L-766
 Consists of: 6 openings 8" x 6" 30 openings 6" x 6" 1 opening 6" x 36" 8 openings 12" x 9" 24 Box Drawers 5 3/8" x 2 3/8" x Depth. Appropriate Bin Fronts as shown.

All UNITS ARE 36" WIDE 7'3" HIGH

Depth	Price
12"	\$124.35
15"	139.20
18"	149.15



56 BIN UNIT
 33 3/4" x 9 1/4" x 34 1/2"
 MODEL 5003
 \$46.85

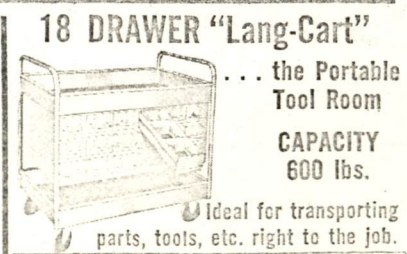
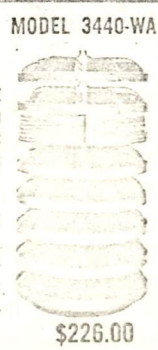
For storage of unpackaged small parts. Each compartment 4" W. x 4 3/4" H. x 3 3/4" D. adjustable widths on 1" centers. Label holder on turned up shelf front.



"ROTABINS" . . . 34" DIAMETER
 EACH SECTION ROTATES INDEPENDENTLY
 Dividers form 5 — 21" W. at face x 15" D. x 7" H. W/2 3/8" H. Removable Bin Fronts which serve as label holders. Adjustable Bin Dividers can be inserted to make up to 30 compartments in each section — Adjustable on 1" centers.

Eight sections with a total of forty compartments, efficient storage for wide assortment of parts, bolts, screws, fittings or accessories.

Eight sections with up to 298 compartments. Drawer units with removable dividers make up to 228 drawer compartments.



18 DRAWER "Lang-Cart"
 . . . the Portable Tool Room
CAPACITY 600 lbs.
 Ideal for transporting parts, tools, etc. right to the job.
 O. A. CART SIZE: 36" l x 24" w x 36" h
CHOICE OF 2 DRAWER DEPTHS
 "A" 11" Deep 5 3/8" Wide 3 3/8" High \$69.95
 "B" 17" Deep 5 3/8" Wide 3 3/8" High \$79.95

Ken Olsen



INTEROFFICE
MEMORANDUM

DATE March 2, 1967

SUBJECT BACKLOG

TO Ken Olsen

FROM H. Mann

cc: Executive Committee

I feel that the present manner in which we maintain our backlog is the traditional, conservative method and coincides with the rest of the Accounting policies and general company posture which I believe you wish to sustain. For this reason, I urge that we do not change the ground rules as far as calculating and reporting our backlog are concerned. At the same time, I recognize the dilemma which you outlined in your memorandum of February 27 on the subject. It seems to me that the dilemma can be resolved if we think in terms of the total of backlog plus budgeted bookings for the coming months rather than simply think of backlog by itself. Ted Johnson prepares his budget and revises it each quarter. For bookings, he takes into consideration all of the orders which are expected to be formalized on a month by month basis and, hence, includes in part all things which are current - letters of intent, discount agreement potentials and other verbal promises for orders about which he and his field force know. I believe it is the general mix of this latter group of probable orders which causes confusion in terms of the size of the work load ahead of us. If we accept my suggestion in regard to looking at the sum of these two numbers, I believe we can avoid the confusion which now exists.

If we decided to define backlog to include all of the probable orders for which we had letters of intent, discount agreements or other kinds of informal commitments, I believe that we would face a very difficult task because my experience has shown that it is impossible for sales people to get consistent termination dates as to what to include in probable orders in an objective fashion. If bookings are going well, then the sales people tend to reach less towards probable orders in their reporting, whereas, if things are going poorly, they tend to include more things of the 'iffy' type in their backlog calculation. In other words, this becomes a very subjective kind of number and, indeed, very suspect as a result.

HSM/jm

H. Mann



INTEROFFICE MEMORANDUM

DATE October 12, 1966

SUBJECT DISCS

TO Ken Olsen
Win Hindle
B. Savell
L. Prentice
E. DeCastro

FROM Ken FitzGerald
Steve Lambert

1. Since March Steve and I have designed 4 different 32K word, disc units.
2. Models of all of them were made and tried out-all worked to our design specs.
3. We will have 2 prototypes completed before the end of this month.
4. These units were designed with simplicity, low cost, reliability, and 416,000 bit size as prime factors. Therefore no attempts were made to push the state of art by crowding bits per inch or tracks per inch.
5. In designing and building these units we have determined the parameters that will control the design of bigger and better disc systems. The following is a list of general specs that we feel can be delivered in a larger system. Note that this system will fit a standard 19" rack mounting and can be built from mechanical & logic components that have been produced or are presently being produced for either ourselves or others:

5,250,000 Bits
17" Disc
128 Tracks, one side
32 Head shoes, (4 heads per shoe for the present)
10.5" Inner track dia
15.54" Outer track dia
12" High 19" rack mounting
Retractable Heads
Rated for 1200 BPI
1.2 Microsecond Bit to Bit transfer rate N.R.Z.I. (Serial)
1800 RPM 33.3 Millisecond worst case access time
44,000 Bits/track 36,800 data bits
300 Nanosecond B-B transfer rate 4 track parallel
for PDP-10 only (additional \$100.00 approximate cost
increase in electronics)

If we were to start building this larger unit our present schedule for the small disc would not allow us to actively work full time on it until 1st of January. However, there are items of design that will take longer than others to be resolved, and they might be started sooner. They are:

1. Disc material & quality
2. Head configuration (No. of heads/shoe)
3. Head Gimbaling & retraction
4. Dynamic disc parameters
 - A. Balance

- B. Runout
- C. Wobble
- D. Maximum RPM.

5. Suggested control paramets

These problems necessitate equipment design or purchase, and materials searches.

The equipment needed is mostly in the nature of testers such as:

1. Disc surface tester
 - A. To scan the complete surface to be used for dropouts & signal losses
2. Head Tester
 - A. To determine head electrical uniformity
 - B. To determine correct dynamic flying specs
3. Head alignment tester
 - A. To determine correct interleaving
4. Disc Dynamic Tester
 - A. Wobble
 - B. Runout
 - C. Balance
 - D. Speed Limit
5. Disc Static Tester
 - A. Flatness

- B. Finish
- 6. Life testers
 - A. Retraction
 - B. Disc Surface
 - C. Motor

ESTIMATED COST

128 Heads @ \$15.00 /hd approximately	\$1,920.00
Disc	250.00
Motor	150.00
Mtg Plate Disc & Motor	100.00
Head Mtg. Plate	250.00
Shock Mounts, slides, covers, etc.	250.00
Mechanical Assembly	250.00
Diode Matrix Board	50.00
Readers Writers timing & format Cont.	
(Serial track R/W)	<u>400.00</u>
	\$ 3,620.00



INTEROFFICE MEMORANDUM

DATE March 2, 1967

SUBJECT DATA DISC

TO Ken Olsen

FROM Steve Lambert

In reference to your memo of February 13, 1967, I was aware of the Data Disc interface to the PDP-8, last fall. At that time, I was told that the disc applications were for systems where bit reliability was not important. I would be interested to know if these disc units are used to store programs or as a buffer for large amounts of data.

Apparently, most of the effort at Data Disc has been directed toward increasing reliability at the 3,000 bits/inch density on the fixed head disc. This unit appears to be the best investment for all purpose use, but the data rate is a little difficult to cope with inexpensively. I would recommend buying this unit with electronics. Their readers, writers, matrix and timing controls would be necessary to interface the disc to our computers to maintain product reliability.

The cost of \$7,450.00 makes the unit unattractive in comparison to our estimated manufacturing cost of \$3,000.00. The 6 million bit disc in comparison to our proposed 5.2 million bit system are identical in terms of binary addressable word or block storage. Although we would utilize slightly more rack space, our interface logic would be included. Thus with our own mechanical design, space utilization would be an improvement over the Data Disc layout.

The specifications proposed October 12, 1966 remain the same at present with exception of the possibility of obtaining 16 heads/shoe at reasonable cost and remaining contact start/stop. The timing track head would remain 4 heads/shoe. Most of the problems that will be encountered in the proposed disc have been solved in the present disc development program. Our present disc continues to operate reliably for hours at a time without failure but the margins still need to be further developed.

SAL/crh

dec INTEROFFICE
MEMORANDUM

DATE March 1, 1967

SUBJECT Proposed Office Standards

TO Executive Committee

FROM Nick Mazzaresse

1. Who qualifies:

Engineers, salaried technicians, and professional salaried employees (i.e., promotional writers, computer administration, production supervisors, etc.)

2. Office size:

- a) Standard office to be 9' x 12' for single occupancy and 12' x 12' for double occupancy
- b) Manager office size (for managers reporting directly to members of executive committee) to be 12' x 15'
- c) Non-salaried technicians to have 8' of bench space and access to work table and lockable storage

3. Office equipment:

Can include desk, chair, file cabinet, work table, blackboard, bookcase, as required by individual

NJM:cmp

dec

INTEROFFICE
MEMORANDUM

Memo #7

DATE March 1, 1967

SUBJECT Ventilation System, Building 11 1

TO ✓ Harry Mann
Ken Olsen
Cy Kendrick
D. Widder

FROM Al Hanson

We have an industrial hygiene problem in the plating area (Building 11-1), in as much as the concentration of Trichloroethylene vapors is much too high. The accepted threshold level for trichloroethylene is 100 ppm. We took air samples throughout the area and recorded readings as high as 200 ppm.

In order to solve this problem, I propose that we install a gas fired air make up unit that will supply 10,000 CFM of tempered air into this area. This will result in a 10 minute air change.

Below are two quotes from two different vendors on the necessary equipment:

The Air Conditioning Equipment Company	\$7,400.00
New England Engineering	\$7,520.00
The electrical work would amount to	\$ 500.00

In reviewing this problem with Cy Kendrick, he also informs me that the screen printing area will require a temperature controlled ventilation system because of the concentration of xylene vapors and because they cannot tolerate any thermal change in the stainless steel screens. If all these requirements are met, it would require an air conditioning system using 100% outside air and probably based on a 1 or 2 minute air change in the room. I do not have any quotation on this system but I would estimate the cost at approximately \$4,000.00.



INTEROFFICE MEMORANDUM

DATE March 1, 1967

SUBJECT DETAILED ADDENDUM TO PRICE & DELIVERY SCHEDULE FOR TU/79
PLAN OF PROGRAM TO ACHIEVE DELIVERY & PRICE SCHEDULE
TO Jack Jones FROM Loren Prentice

Product Line Managers
Ken Olsen
Pete Kaufmann
Harry Mann
Phil Backholm
Roland Boisvert

1. Complete capstan servo design and proof test now underway.
2. Complete all testers needed for manufacture and inspection for major components. This is underway and partially complete.
3. Make one preproduction, 7 track unit for life test.
4. Make one preproduction, 9 track unit for life test.
5. Make one 7 track and deliver to Product Lines for tests by June 1st.

Production schedule is as follows:

1. Two per week starting the week of November 6th, checked out and ready to ship.
2. With a 90 day notice after that date, production could be increased to four per week, which would require two additional technicians.
3. Five per week is a maximum of manufacture, as now planned, and would require new manufacturing practices and testers needed for any additional number over five per week.

The savings on labor of going from two per week to four per week, would be \$70.00; and to five per week would be a savings of \$100.00 per unit. There might be some additional saving in quantity buying of the vendor components.

The pricing schedule breaks up as follows:

Circuitry, electronic circuitry and modules (standard cost plus 8% variance)	\$1,479.00
Capstan Servo amplifiers	150.00

Reel servo amplifier	50.00
Cabling	100.00
Mechanical parts including the main plate, shock mounts, bezel, panels, vacuum pump, cabinet, doors, and so forth.	1,000.00
Power supplies and power control	<u>563.00</u>
TOTAL\$2,784.63

VENDORED ITEMS:

Capstan motor & optical tachometer	\$ 550.00
reel motors (two at \$100/ea)	200.00
feedback tachometers (two at \$20/ea)	40.00
7 track read/write heads	<u>600.00</u>
TOTAL ,	\$1,390.00

As a result of this pricing, efforts are now underway to again check the list of module requirements to see if any savings could be made, and also the same is true of power supplies. Quantity buying of some of the items might save in the neighborhood of 10% to 15% on the vendored items.



INTEROFFICE MEMORANDUM

Memo #6

DATE February 28, 1967

SUBJECT Air Conditioning Building 12-3.

TO Harry Mann
Ken Olsen

FROM Al Hanson

Alternate #1

Proposal submitted February 9, 1967, for 20 tons of Air Conditioning using 2-10 ton units.

Price \$9,300.00

Alternate #2

20 - 1 ton window units

20 - 1 ton Fedders Units	20 X \$178.00	---	\$3,560.00
Erection Cost	20 X \$ 75.00		1,500.00
Electrical (200 Amp 3 phase 230 ft.)			1,480.00
Partitions			250.00
			\$6,790.00

Alternate #3

10 - 2 ton Window Units

10 - 2 ton Fedders Units	10 X \$277.00		\$2,770.00
Erection Cost	10 X 75.00		750.00
Electrical (200 Amp 3 phase 230 ft.)			1,480.00
Partitions			250.00
			\$5,250.00

Remarks:

Electrical load

Alternate #1	90 Amps
Alternate #2	206 Amps
Alternate #3	175 Amps

As indicated, the electrical consumption for the window units is much larger than the central system; consequently the operating cost is much larger. It is also much less expensive to maintain one unit as against 10 or 20 separate units. It is also important that window units will only throw the cool air approximately 12 feet, at which time it returns to the unit. This means that the center section of Building 12-3, will not appreciate a y considerable amount of cooling.

My recommendation is to use the central system, which will supply better air distribution and operate at half the cost.



INTEROFFICE MEMORANDUM

DATE February 28, 1967

SUBJECT SCHEDULED DELIVERY AND PRICE OF TU/79 TAPE TRANSPORT

TO Jack Jones
 Product Line Managers
 Ken Olsen ✓
 Pete Kaufmann
 Harry Mann
 Phil Backholm & Roland Boisvert

FROM Loren Prentice

1. Production to start ten units September 1st.
2. Two to be checked out and ready to ship the week of November 6th and two per week after the above date.
3. Manufacturing price includes the following items:

All purchased parts	\$1,390
All in-house manufactured parts	3,142
Assembly time	180
Off line test time	180
On line test & check-out	30
Engineering time required for learning curve during initial manufacturing amortized over first 100 units.	<u>150</u>

TOTAL \$5,072

The above pricing and schedule is dependent on commitments of delivery and price made by the main suppliers of the following items:

reel motors	optical tachometer
capstan motors	feedback tachometers
read/write heads	

We could probably find some substitution for all other items that go into manufacture which would not delay it.

If there are delays or price changes in the above items, they will definitely effect the delivery and pricing of the TU/79 tape transport.

This document will be substantiated further by plans and details on a second memo to follow later.



INTEROFFICE MEMORANDUM

DATE February 28, 1967

SUBJECT Departmental Responsibilities

TO

Mike Ford	Bob Savell
John Jones	Bob Lane
Pat Greere	Dick Ward
Mort Ruderman	Jack Shields
Saul Dinman	Bob Lassen
Ed deCastro	Loren Prentice
Clark Crocker	Roger Melanson
Stu Ogden	Larry Portner
Henry Crouse	Allen Kluchman
Jack Smith	Dick Richardson
Tim McInerney	Steve Mikulski
George Gerelds	Al Hanson

FROM Executive Committee

With our product-line organization, we must have clear-cut guide lines fixing responsibility for internal budgeting, planning, scheduling, and delivery. We have adopted the following general policy:

POLICY Prior to the beginning of each quarterly budgeting period, each product line group is responsible for planning and scheduling its requirements with each functional group. The functional group is responsible for providing a firm budget and schedule to accomplish the task.

As the budget period progresses, the product line group must keep the functional group informed of any schedule changes so that work-load shifts can be made. If the functional group finds it is unable to meet the promised budget or delivery schedule, the product line group must be informed as early as possible to allow an optimum solution to the delay.

All product line groups and functional groups should plan their operations to take responsibility as outlined.

WH/bwf

cc: Ken Olsen	Harry Mann
Nick Mazzaresse	Ted Johnson
Stan Olsen	Pete Kaufmann
Win Hindle	



INTEROFFICE MEMORANDUM

DATE 2/24/67

SUBJECT Allied Radio

TO Ted Johnson
cc/ Ken Olsen
Stan Olsen

FROM Frank Kalwell

Mr. Jerry Drapekin-Industrial Merchandising Manager from Allied Radio called on 2/14/67 pertaining to a PDP-8/S purchase order he has obtained from Bendix Corp., Kansas City. After pointing out that our distributor policy with Allied applies only to Modules, he felt he should receive the Module discount on Computer orders. He is interested in the following points:

1. Can we drop ship an 8/S?
2. Availability-He claims March delivery (6 weeks) was quoted by unknown party at DEC and that the unknown party also quoted prices so they assumed they could sell 8/S.
3. Field Service on the 8/S?
4. Commission?

I've only outlined the basic questions posed by Allied. I answered all such questions but high pressure tactics are being used in an attempt to receive a commission. They have called me several times and also called Bill Landis and Stan Olsen, who clearly outlined our policy.

I'm certain that either Ted or Ken will now receive a call after Stan's last conversation on not granting a commission due to their price cutting of our equipment.

Any such calls should be referred to Stan or me for additional clarification on our firm stand.

FAK/mz

February 24, 1967

Check-Out and Field Service Installation Reports

Dick Best
cc Ken Olsen

Angela J. Cossette

Regarding Ken's reference to the manner in which the reports are being filed, I would like to say that Bob Maxcy originally set up the file by customer; and I understood that this was done under Ken's direction. We accepted the responsibility of maintaining the file from Bob, and I agreed to supply personnel to maintain the file only. I felt it was not up to me to reorganize the file, as I was not involved in its formation. I might add that it would be somewhat difficult to track down a computer always by number; in the majority of cases, people reference the customer.

I agree that there may be a less expensive way to file these reports; but since we took over the file in December, no one has requested information from it. Therefore, we could not determine if this is the best working system or not.

May I suggest that you have Judy talk to Mark Bjorklund, as she set up the file for Bob. She may be better able to explain the "mysterious" reasons for filing the reports by customer.

AJC:ml

Angela

COPY



**INTEROFFICE
MEMORANDUM**

DATE February 23, 1967

SUBJECT Department Title Change

TO

Ken Olsen	Ted Johnson
Harry Mann	John Jones
Win Hindle	Bob Lassen
Nick Mazzaresse	Mort Ruderman
Stan Olsen	Mike Ford
Pete Kaufmann	Pat Greene
Dick Best	Dave Packer

FROM

Al Alexanian *AA*

The SMALL COMPUTER SALES ADMINISTRATION department title has been changed to SMALL COMPUTER ADMINISTRATION.

The new title will more accurately describe the function of the department.

AA:nb



INTEROFFICE MEMORANDUM

DATE February 23, 1967

SUBJECT THE UNIVERSITY OF ALABAMA

TO Ken Olsen

FROM Al Alexanian *AA*

Reference: A. Attached letter to Ken Olsen
B. Attached letter from Al Alexanian

The referenced attachments and the following list of telephone calls is the action that has transpired to date, concerning The University of Alabama matter:

Telephone calls

Monday, February 20, 1967

1. I called Michael Perry. He was out of the office. I talked to his secretary, Norma McSweeney, and left my name and company name. I briefly explained the nature of the call (i.e., delivery and apology) but I told her that I would also call back and talk to Michael Perry.
2. I called back, and received no answer.
3. I called back again, and the line was busy.

Tuesday, February 21, 1967

1. Michael Perry was not at the University

Wednesday, February 22, 1967

1. I called and talked to Norma McSweeney again. Left approximately the same type message. She gave me another telephone number to call (205-325-4191).
2. I called the new number and received no answer.
3. I called three more times, and the line was busy.
4. I called again, and left word for Mr. Perry to call me collect on Thursday.

That is the extent of the action to date, with the exception of a telephone conversation I had with the Huntsville office today (Wednesday).

I will send a follow-up report when the matter is completed.

AA:lf

XERO COPY XERO COPY XERO COPY
THE UNIVERSITY OF ALABAMA
MEDICAL CENTER
1919 7TH AVENUE. SOUTH
BIRMINGHAM, ALABAMA, 35233

*Attachment
A*

February 13, 1967

DEPARTMENT OF MEDICINE

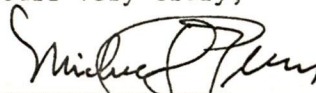
AIR MAIL

Mr. Ken Olsen, President
Digital Equipment Corporation
Maynard, Massachusetts

Dear Mr. Olsen:

We are still anxiously awaiting the arrival of our equipment order placed 13 months ago in January 1966. Is there any possibility of every receiving the two teletypewriters, four TU55 tape units and cabinets?

Yours very truly,



Michael D. Perry
Cardiovascular Research
205/325-5146

MDP:fa

cc: T. J. Reeves, M.D.
R. B. Shepard, M.D.
Don Henderson, DEC Huntsville Office

XERO COPY XERO COPY XERO COPY

attachment
B

digital

February 21, 1967

The University of Alabama
Medical Center
1919 7th Avenue South
Birmingham, Alabama 35233

Attention Mr. Michael D. Perry

Gentlemen:

References: Your letter dated February 13, 1967
Purchase Order No. MC4390 DEC #15011

Digital Equipment Corporation will ship the material listed on your referenced purchase order during the month of March 1967.

I should like to take this opportunity to apologize to you for the unnecessary delay and hardship which we have caused The University of Alabama, and you in particular. Your order has been subjected to a series of administrative blunders.

Your purchase order has pointed out serious pitfalls in our administrative system which have been, or, are being corrected.

In closing, I once again extend my apology to you, and also wish to thank you for your patience and understanding.

Most sincerely,

Albert Alexanian
Albert Alexanian
Computer Administrator

AA:lf



INTEROFFICE MEMORANDUM

DATE February 23, 1967

SUBJECT Discipline for producing and improving technical literature for less cost and within assigned schedules.

TO Ken Olsen
H. Mann
S. Olsen
N. Mazzaresse
W. Hindle

FROM Dick Ward

To get books completed faster we need more engineering support. The following "basic rules" are presented for your evaluation. As an adjunct to this memo, manual outlines are appended that cover typical CP and peripheral equipments for maintenance manuals.

A. Engineering

The following steps should cover "worst case" situations and can vary with complexity of equipment and subtilty of design.

1. Do not start writing schedule until design is 90% complete and the available drawing set reflects this.
2. Before any writing begins, provide
 - complete prints (logic, timing, flow).
 - documented (or on tape) system specifications
 - dictate onto tape (recorders will be available from publications) a clear definition of the equipment definitions of major system elements and their functions (instruction oriented)
 - discuss programming aspects if applicable
 - discuss any adjustment procedures and purpose.
3. Establish an individual on the project to be always accessible to the writer and who will be responsible for providing all project documentation (memos, etc.) pertinent to the manual effort.

B. Writer

1. Review all initial material and provide project engineer with a complete book outline annotated to reflect specific coverage and level.
2. After review of engineer and before writing, discuss coverage and scope with cognizant representatives of Field Service and Training. (It is important that material be covered in a format and to a level that augments their efforts.)

3. At this point, original schedules and commitments should be reviewed and any variations immediately brought to the attention of the project engineer. Proceed with writing effort and submit partial manuscripts to engineering as dictated by the scope of the project.

C. Output

In addition to whatever interim submittals are agreed upon between engineer and writer, each project must include scheduling for -

1. Final complete draft with artwork for review by
 - Engineering
 - Field Service
 - Training
2. If a preliminary manual is required -
 - Scheduling must include a cut-off date for a print set to be following in producing the preliminary version - and no rewriting should be done to accommodate design changes that occur after the cut-off date
 - Final draft should be a rewrite to final approved prints.

In addition to these basic procedural improvements, much work should be done to improve drawing set data, particularly to include signal source information.



**INTEROFFICE
MEMORANDUM**

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

DATE February 22, 1967

SUBJECT Tore Arbeus

TO Ken Olsen

FROM Bill Farnham

Tore Arbeus formerly worked with AMPEX selling MAG TAPE TRANSPORTS in Germany and Holland. According to Tom Dalzell, he was discharged due to poor relationships with his customers.

Tore then moved to Sweden where he went to work for his brother-in-law, a man named Jenssen, one of the principal founders of Telare. While with Telare, he sold our products up until the time Telare hired Kjell Reistadt in July of 1966, at which point Kjell represented DEC products and Tore concentrated primarily on the Mathatronics line. Telare collapsed in December of 1966. We hired Kjell who will be operating out of our Stockholm Office and is considered quite competent. Tore continued representing Mathatronics which brings him up to date. When Tore was dealing with DEC prior to July, Tom Dalzell reports he caused a lot of trouble with very poor administrative procedures and over-commitments to customers.

Tom has no idea as to why Tore would be visiting DEC and was definitely negative about Tore's capabilities.

AREL
ARENCO ELECTRONICS



Tore Arbeus

Civilingenjör

Tekn. konsult, Datasystem

Telefon 08/54 81 20

Arenco Electronics AB · Industrigatan 4 · Stockholm K

Söglarvögen 13

Lidingö 3

766 3778

Notes on Conversation with Tore Arbeus - 2-23-67

Possible Customers for DEC Products

- 1) University of Gottenberg
- 2) Hospital associated with University where one of the AGA PDP-8's has already been sold
- 3) ASEA - Swedish G. E. - we have sold one machine
- 4) Swedish Atomic Energy Commission - we already have made sales

Competitive Computers

In Denmark - Grier - Model D-5

In Sweden - ASEA - quite similar to Grier machine

Modules

Philips sells less expensively, but according to Tore, the modules are not as high quality. However, most decisions are made on price.

Tore also mentioned that he was interested in selling the Monroe Desk Calculator with a FLIP CHIP interface to an ASEA Computer, but I really think that he would prefer the 8/S.

Tore felt Stockhom is the best location for our office as most of the government offices are there.

The second largest city, Gottenberg, would be his alternative.

Tore's conversation was primarily general in nature and it was hard to pin him down specifically. He did mention that a representative's life is not worth it since, if he does well, the principal will move in with his own salesmen.

W. H. Farnham

Curriculum Vitae for Tore G. Arbeus

- Date of birth: February 12th, 1925 in Örebro, Sweden.
- 1944 Bachelor of Science of Electrical Engineering degree from the Technical Gymnasium in Örebro, Sweden.
- 1949 Master of Science of Electronic Engineering degree from the Royal Institute of Technology in Stockholm.
- 1949-1953 Employment as Research Engineer at the Research Institute for National Defence in Stockholm working on hydroaccustics and computer technology. (Analog computers and ultrasonic memories).
- 1952 Leave of absence during one year for a traineeship through the American-Scandinavian Foundation working at RCA, David Sarnoff Research Center in Princeton N.J. Research work on ferrite core memories for computers under Dr. Jan Rajchmann.
- 1953-1956 Employed as project engineer at the Swedish Board of Computing Machinery working on development of a ferrite core memory for the digital computer Besk. Also worked as chief engineer for the operation of this computer.
- 1956-1960 Employed as sales manager for computer products at Elektronikbolaget AB in Stockholm representing Ampex Corp. for instrumentation and digital tape systems, RCA digital computers and Indiana General Corporation for ferrites and core memories.
- 1960-1961 Employed as European Sales Manager at Ampex International S.A. in Fribourg, Switzerland for Ampex Videotape products.
- 1962-1963 Employed as Sales Manager for Europe at Indiana General Corporation in Fribourg, Switzerland for marketing of IGC-products including ferrites, core memories, magnets and high precision motors.
- 1963-1964 Employed at Ampex-Europe GmbH in Frankfurt/M as sales manager for Ampex core memories and digital tape systems for computers in the territory Germany, Holland and Austria.
- 1965-1966 Employed at Telare AB in Stockholm as sales manager for computers and modules manufactured by Digital Equipment Corporation. Around 20 DEC-computers sold in Scandinavia during 1965-66.
During 1966 also worked for Aresco Electronics AB as computer systems consultant and also at Telare AB as sales manager for Mathatron desktop computers in Sweden and Finland.

CONFIDENTIAL




INTEROFFICE
MEMORANDUM

DATE February 21, 1967

SUBJECT Xerox

TO Ken Olsen
Stan Olsen
Ted Johnson
Roger Handy

FROM Fred Gould 

We are at present involved in three projects at Xerox ISD, and in an effort to facilitate discussion I have listed below the programs, their potential to DEC, and the time scale as we know it.

Project C-3

Product to be announced at IEEE Show. We must make every effort to refrain from referring to our product in that machine for the time being. This should be passed on to all DEC people attending the show and to field sales personnel.

April '66	June '66	January '67	March '67	March '68
7 systems		110 systems		568 systems

We have \$1,400,000 to date on this project, and product life expectancy, by their own estimate, will run an additional \$2,600,000 which will be through 1969. This system uses the discrete component X Series.

Project 46

Product has been test-marketed as Micro Data System, a data retrieved system based on IBM card size and Xeroxgraphic techniques. We have built a prototype and are delivering 8 pre-production systems this month and 54 additional systems in the next two months. The system is expected to sell over 5,000 units over the next 3 years with a module value of \$2,200,000. This system uses the discrete component X Series.

Project 25

This is a highly classified Xerox project. Its existence is a secret. It originally was intended to be the vehicle for Xerox's own module line, XEPT, but our disclosure of the proposed "M" Series has caused a massive shake-up within Xerox.

Last week we proposed to construct semi-functional "M" Series boards to accomplish the Project 25 logic package. Our price was slightly lower than XEPT's and we offer several other advantages. Purchasing and Engineering are lining up behind the DEC "M" Series while the XEPT people are fighting for survival.

We are hosting a group of XEPT people on February 27 and 28. Their visit will be a final attempt to show us inferior to their product.

Insiders give us a 90% to 10% edge in the struggle. I suspect both XEPT and DEC will get a piece of Project 25, but DEC getting the 'lion's share' and Xerox adopting our 288 pin connector as one of their standards.

This Project will be in prototype and pilot production stages through 1967 with small production orders coming in early '68, and peaking out at a two million a year rate in early '69. Total value at today's prices run from six to eight million dollars in logic cost.

/mp
cc: Saul Dinman

R. Olson

XERO COPY

XERO COPY

XERO COPY

XERO COPY



INTEROFFICE MEMORANDUM

DATE February 21, 1967

SUBJECT ADDENDUM TO TOOL CRIB PROCEEDURES

TO All Authorized Supervisors FROM R. W. Richardson

The following addendum to the tool crib proceedures will be effective February 27, 1967:

1. All tools and equipment located in stockroom "A" (John Trebendis's area) will be transferred to the tool crib located on the ground floor of building 7. In the future, all tools used by technicians, engineers, wiremen, engineering aids and female assemblers will be issued and controlled by this stockroom.
2. Anyone requiring replacement of a tool that is defective, worn, broken or damaged must return the damaged item at the time of exchange along with a "tool loan" slip that has been signed by his supervisor.
3. Lost tools will be replaced upon the presentation of a "tool loan" slip that has been signed by the appropriate supervisor.
4. All non-expendable and large dollar items must be signed out on a "permanent loan" slip by the appropriate supervisor.
5. Supervisors must sign and will be held responsible for tools issued to contract workers and part-time help.
6. Any area requiring tools that are to be used expressly by them, can continue to requisition them through purchasing. However, when the item is received, it will go to the tool crib, a number will be assigned and it will be issued on a "permanent loan" slip. These tools must be accounted for during our regular tool inventory inspection.
7. A quarterly report will be issued to each supervisor on the losses and replacements for his area of responsibility.
8. A notice will be issued with every tool box stating that the owner could be subject to charges for lost or missing tools at the time of inspection or termination.
9. It is the supervisor's responsibility to see that terminating employees turn in all tools that are charged out to them and the check-out slip is properly signed prior to their exit interview. Personnel will not issue a final paycheck is this is not complied with.



INTEROFFICE MEMORANDUM

DATE February 21, 1967

SUBJECT Preparation of Releases for the Sales Newsletter

TO All Contributors

FROM ^{Bill} Bill Farnham

The Sales Newsletter is, at present, the most widely-used media for disseminating product information, operational procedures and policies. Our distribution is in the neighborhood of three hundred copies per week. I have tried to organize the Newsletter so that product information will be contained on attachments which allows individuals the freedom to break the Newsletter into parts and keep them in the appropriate area of their Sales Notebook. Often the product lines request that an extra number of attachments are printed in order to use them for other purposes, which sometimes includes sending them directly to customers. With this large distribution, and also with the possibility of the Sales Newsletter, or parts of it, going directly to customers, it has become necessary to insure that the information is well organized, well written and properly punctuated.

I would like to review the proper procedures for submission of news to the Sales Newsletter.

- 1) When the news item does not have an attachment, it should be printed on plain bond paper, it should have a subject and an author, and it should be submitted directly to myself. The text should be exactly as the author wishes it to appear, and the punctuation and spelling should be correct and in finished copy format.
- 2) When submitting news items that include an attachment, the attachment may be delivered to Dean Lewis or to myself. Attachments should be on plain white bond paper, original copy, and in final format, which will allow it to be photographed and a plate made for offset printing. If product line masthead paper is to be used, a note should be attached indicating this, and if more copies are desired than normal sales distribution (300), a note stating the number of extra copies should also be added.

At the same time, the text you wish to insert into the body of the letter referring to this attachment should be sent only to my attention and should follow the rules in para. 1) above. If the attachment is not included, there should be a note stating that it has been delivered to Dean Lewis. Finally, I would like to urge strongly that the above procedures be followed to insure that there will not be any omissions from the Newsletter.

In regard to the requirements for proper grammar, punctuation, spelling, and overall general appearance of the finished copy, I feel that these should be standard operating procedure so as to allow the Sales Newsletter to appear as a quality publication that is in harmony with the balance of our company, especially if the attachments are sometimes given to our customers.


dec**INTEROFFICE
MEMORANDUM****DATE** February 20, 1967**SUBJECT** BBN and Telcomp**TO** Ken Olsen**FROM** H. Mann

This is just a reminder of the meeting you and I had with Dr. Bolt several weeks ago. I believe that we owe him a current answer on our attitude towards special delivery terms on PDP-9's. You may recall he asked us, because of his problems, if we could one way or another, give them slots for PDP-9 deliveries in less than six or nine months. I believe he was talking in terms of something like three months. My suggestion would be to go back to him with the idea that he could give us a Letter of Intent for the PDP-9's and that we could then schedule for him on that basis, with hope that there would be sufficient information on Letters of Intent and flexibility on our part that we could reasonably well, meet his requirements.

The other two items that he mentioned which are not of immediate concern, but which we should bear in mind, related to future help we might be able to give them in the international market, and what value if any, we might mutually see in having some of their Telcomb centers in the same physical office with our Field Sales and Service group. You will recall that his point was that an arrangement such as this would give us a wonderful demonstration tool in the office at no cost to ourselves. Possibly there would be an added advantage of sharing some office costs.

The fact that he made no suggestion concerning joint ventures, etc., is good, and I am sure that we are in agreement that we are not interested in trying to pursue such an idea at the present time.

HSM/jm





INTEROFFICE MEMORANDUM

URGENT ←

DATE February 20, 1967

SUBJECT UCC (University Computing Company), Houston, Texas (AC713-CA 8-0903)

TO Nick Mazzaresse
Mike Ford
Stan Olsen
Ron Smart
Ken Olsen ←

FROM Ted Johnson

Forenote:

The terminal processing systems, COPE 45 and subsequent versions, are highly confidential at this point. No one in DEC should use this term until it is announced. Announcement date is the March stockholder's meeting.

Summary of Situation

1. Leroy Towell, the system prime mover, expects an order mid-March for PDP-8 terminal "kits". He is trying for an order for 200, with 50 in 1967, beginning full scale two per week in July, and balance to be scheduled in October.
2. SCC is in the picture to the extent that they might be selected as the second stage if Sam Wylie, President of UCC, buys SCC. Towell is opposed, wants reliable delivery. However, pressure will exist here for SCC to get all or part of work.
3. Uptime (1500 cpm reader) has already committed to delivery. I assume Analex (1250 lpm) has also.
4. Anything we can do to make it easier and less expensive to put this together will help clinch this. At this point, their logic is basically defined and they are doing the programming on their 8K PDP-8 (on line to the reader and line printer).
5. They will make a big splash in March and are pressed for time to get into production. At this point, they were planning environment sales movies of the remote unit (see sketch).
6. They need a firm commitment that we can deliver (the whole "kit" if possible) at 2 per week.
7. Future prospects, if all goes well, are excellent for 85 slower-speed terminals and possibly automatic dialing PDP-9 systems.
8. The technical planning indicates care and conservative selection of parts and design.

Application

UCC gets its name from work done for MSU in Dallas. They went over-the-counter in September. Their stock recently jumped from 13 in January to 30. They still have the bulk of the \$6.5 M they raised for investment.

They have 8 service bureau setups. One they bought from CSC in Los Angeles (CSC service bureau, Univac 1107, on Sepulveda in the CSC building). They have 6 1107s and 4 1108s on order. Also, apparently, 3 - 360 Mod. 50s.

The COPE 45 system replaces the Univac 1004. It is cheaper and faster (the remote terminals will be faster than their on-line equipment in-house).

The 1004 apparently has only 120 lpm capacity, 550 with Telpak 8. This new system is capable of simultaneous Send/Receive. The 8 system apparently can transmit FORTRAN messages at 750 lpm, with a card reader at 1500 cpm and 1250 lpm. An 8S COPE 45 would have 400 lpm and 600 cpm capability.

The terminal station, as shown, has a PDP-8 (4K) mounted below, expansion capability to 12K. Also underneath are the MODEM, power supplies and 4 panels of our logic. Each panel has 48 - 55 modules, machine-wrapped. (approximately \$4K per terminal of DEC modules and accessories.)

The plan apparently is to make future use of CRTs, etc.

The programs for the LOCAL-REMOTE and LOCAL-1108 is being written around executive programs that they feel are quite sophisticated. The operator can halt the whole system from the line printer or reader without affecting the data.

The 50 COPE 45 systems for 1967 (already signed blanket agreement for 50 PDP-8s) are for internal use (their own centers). They then plan to offer them to anyone with 1108s. One problem is "what to do with all of the 1004s they have". Tony sees, therefore, a minimum order of 50 machines.

The unit has one console mounted above the table, with a face-plate that we are supplying at \$38 each bearing their company name and the brand COPE 45.

I strongly suspect that their promotion will capture great attention and be assured of any additional Texas money they might need for backing.

Terminals will operate from distances like 100 miles from the centers. A terminal might have several line printers per computer.

The 1500 cpm reader from Uptime was recently ordered by SDS (10/month for 30 months) and the Spectra series uses them. It has operated without crunching a card for 6 weeks at UCC and allows significant card mutilation without loss of data.

They are very happy with Tony's cooperation and our support. I think the people (Towell and Harry Scott, head of programming) are very capable people.

I think the only special requirements on the logic are:

1. The wire-wrap service (they plan to provide the cards).
2. The I/O Bus connector cards and cables.

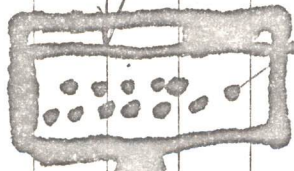
The following requires 12 - 10" and 6 - 4' cables per terminal kit. (15 pair #22 stranded, one wire of each pair grounded to a common bus.)

They'd like us to clean up the connector card, probably with connector lugs and a printed circuit common bus.

Proposed Steps:

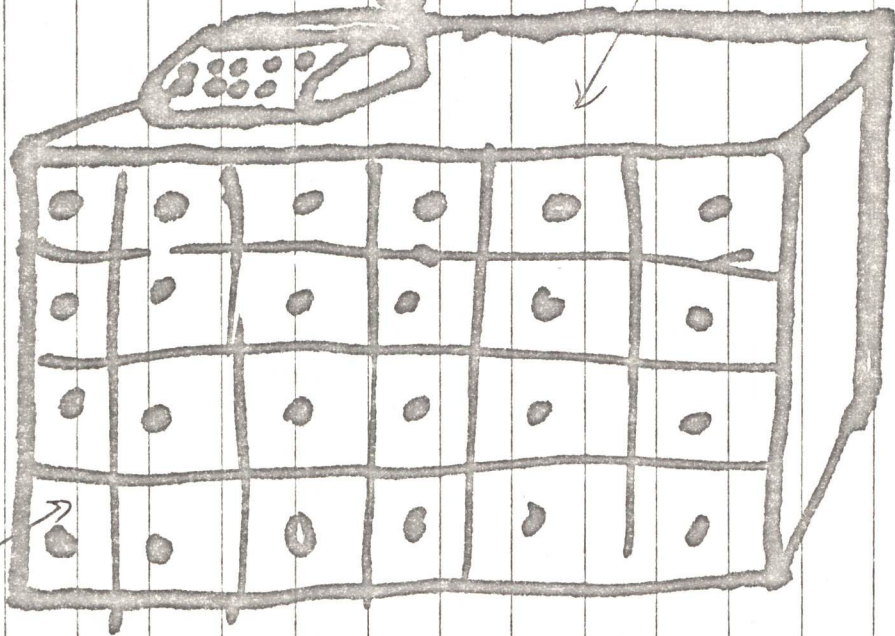
1. Help Harry Scott by seeing what is available (source listing or actual rewritten program) for card-oriented MACRO 8. The slow paper tape is hurting his program development. Mike Ford was going to have someone call Harry Friday PM, 2/17/67.
2. Write a firm letter of commitment to deliver the PDP-8s as scheduled and also declaration of ability to deliver the logic part of the set with each PDP-8 beginning July. This will require some more detail from Tony but it looks straightforward, so we should commit to it now.
3. Consider what we can tell Leroy about 1968 as an edge on SCC.
4. Offer help in getting the bugs out of the wire-wrap program. I suggest Saul Dinman and Mike, or Nick, pay a call to make sure we make known any new hardware developments that might be useful in their planning now and indicate our intent to keep them informed. Leroy seems very keen on the 8S idea and Saul could certainly fuel this fire.
5. They must have their letter by Thursday, February 24 at the latest, either Nick or Ken Olsen should sign it, and we should see if Leroy would want a visit within two weeks, prior to his pitch to cooperate for final approval.
6. Apparently we can't significantly help them by building the welded tubular steel table frame (they get it for \$70 each), but every possible idea for short-cutting their assembly problems should be considered.
7. Ron Smart will get involved to act as additional coordination between product lines and Tony to make sure we provide a consistent front.
8. Tony Liveris will stay on top of this and be sensitive to any other factors. Towell wants us, so he will be candid. Let's make sure we let him know of our interest and support.
9. They want to get the "jump" on this market, so they really need us for speed and security.

UNIVERSITY COMPUTER CO. | CORE 45



8" console

simulated leather
formica top

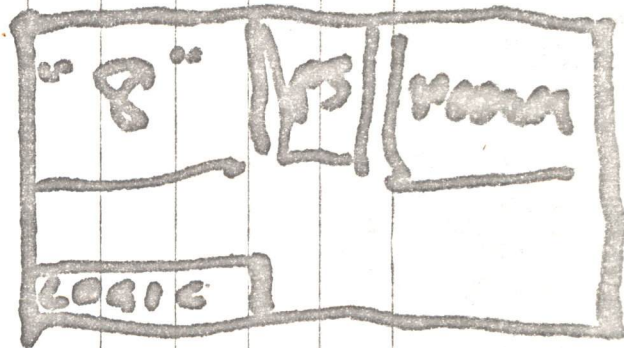


4-4 1/2'

fancy real walnut panel

~ 5'

TOP



FRONT

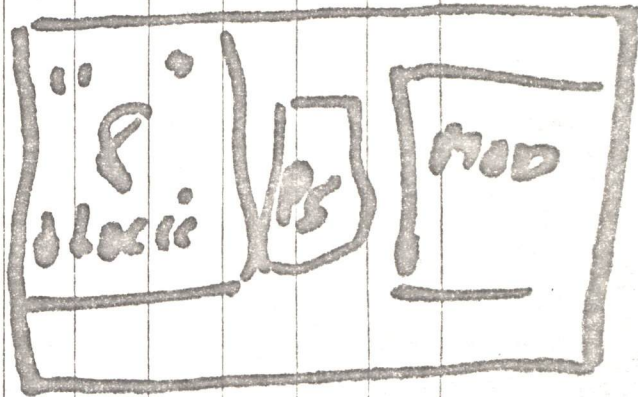
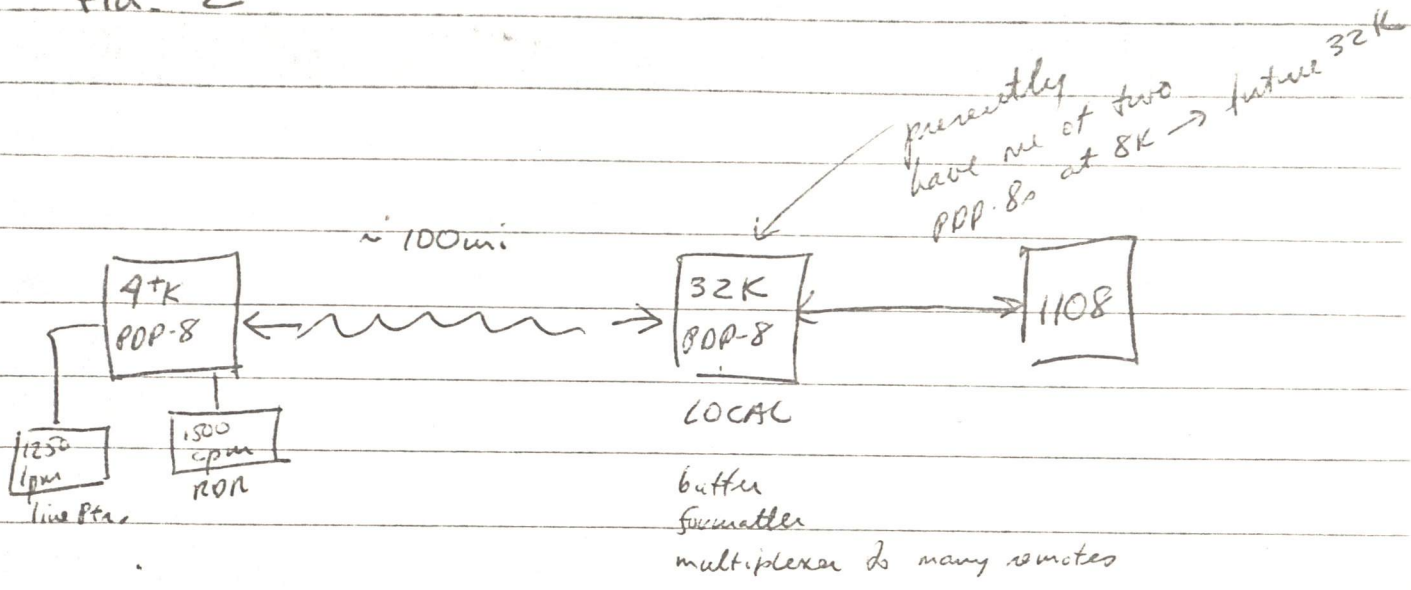


Fig. #1

TERMINAL "REMOTE"

FIG. 2





INTEROFFICE MEMORANDUM

DATE February 20, 1967

SUBJECT EUROPEAN MANAGEMENT SCHOOLS

TO Ken Olsen 
Harry Mann
Stan Olsen
Nick Mazzaresse
Win Hindle
Pete Kaufmann
Ed Schein

FROM Ted Johnson

Being interested in the possibility of on-the-spot management schools in Europe, which may have some additional international educational benefits, I called General Doriot at AR&D to get his comments. In particular, I was interested in the possibility of sending John Leng to such a school to add to his value and increase his interest in remaining with the European scene.

There are three management schools that the General considered worth mentioning. One is run by Aluminum Ltd. in Germany. He rated this one as not being very good. Another is a school in Lausanne, Switzerland, called IMEDE, which is operated under contract by Harvard Business School, and originally funded by Nestle's Corporation. I am familiar with people who have taught there and I believe Professor Christensen at Harvard Business School is the man to contact. I believe this is a one-year school but, again, the General tended to play this one down. The third school he mentioned is INSEAD in Fontainebleau, France. This is a one-year school run in three languages where the attendee must know at least two and have some knowledge of a third (English, German, French). It is attended by young men from 27 different countries. General Doriot played a key role in starting this school and feels strongly that this is the best one in Europe. Again, this is a one-year school so there is some doubt as to whether it would prove to be of any real value to us. I believe that Jean-Claude Petterschmitt taught at this school as a side project while with Arthur D. Little. There are currently no short courses in these schools, such as the PMD and AMP programs at the Business School, which is unfortunate, since I think this would better meet our needs.

One possible exception is a school in Paris which is run from 5 p.m. to 7 p.m. It is called CPA (Centre Perfectionnement aux Affaires). John Leng was going to find out a little more about this school from Petterschmitt.

Along these lines, we probably should consider sending some of our bright young Europeans to management schools which will build modern-thinking business attitudes in the key technical people we hope to build on over the long term.

TJ:mr

CONFIDENTIAL

dec

INTEROFFICE
MEMORANDUM

DATE February 16, 1967
SUBJECT Regional Managers Meeting of 1/25/67
TO Ken Olsen **FROM** Ted Johnson

Please look over our detailed minutes of the first Regional Managers Meeting. I plan to hold these quarterly. Ron Smart was secretary for the meeting. I would be interested in your comments on the approaches.

TJ:mr

Attachment



INTEROFFICE MEMORANDUM

DATE February 16, 1967

SUBJECT Memo Feb. 10, 1967, re. Summer Institute of Linguistics in
Mexico letter 2 Feb., 1967.

TO FROM

Ken Olsen

Gordon Bell

CC: H. Burkhardt

I assume the above proposal was a follow up of the proposal I looked at 1 month ago. They neglected to estimate the job size, number of users, etc.

Disk Considerations

The drum or disk that's referenced, which opefully DEC will someday build, is 6000 pages or approximately:

6000 X 128 X 12 \approx 9,200,000 bits.

This size seems to be necessary for a number of applications involving Time Sharing, and it's what I would want here if we proceed with the TS-8 that I outlined in a Feb. 6, 1967 memo on Time Sharing an 8 or 9.

I have no doubt they need this size disk.

Serial vs. Parallel Hardware Interface

In interfacing their hardware (parallel output typewriters), the Teletype interface is harder to work with (program) and that's undoubtedly why they dislike it. The DEC interface was designed to give lowest cost for serial data transmission, (Teletypes) but if they can afford individual buffers for each Teletype, then the programming is undoubtedly easier.

The Teletype serial data assembly instructions are a bit hard to use, and we are considering making a change in this area, too, and for about the same reasons:

1. For some reason, the actual teletype lines cost a great deal, when all the smoke clears. There may be too many line types to design for the flexibility, at a low cost.
2. They want parallel interfaces for typewriters.
3. We want high speed interfaces (2400 bits/sec.)
4. A possible solution for them is to use a scanner to find active lines, and build a system like outlined by me 6 Feb., 1967.

Hardware Summary

I believe a nice solution to the whole problem of communications interfaces (and include parallel transmission too) can be found. I think there's both large markets for low cost message switching computers, and an opportunity to have a re-look at our own I/O to improve performance use, at a much lower cost. (Their solution is at a high cost.) Any good solution probably has to come in terms of using the computer's memory for data storage, and operating the thing with built-in special instructions. The PDP-8I can take this into account.

Overall Feasibility

I don't see how such a system can be written in 4K of core. (A general system may hopefully be written in 8K.)

Package

For the real significant cost savings to come, there has to be a standard package deal for these types of jobs which get marketed simply. STC (message switching), BBN (TEL COMP), etc. all have about this same configuration:

PDP-8 (4K-8K)
Teletype interfaces
Power failure, multiply-divide, parity
Tape (1 or 2 units) (Backup-Sign on-Sign off)
Drum/DISK (if time sharing)

Mods

I believe that there needs to be some built in hardware ability to run several programs simultaneously.

An Alternative Approach

I would really like to see the PDP-8 modified and a package produced which includes hardware and software for general Time Sharing.

If such a system were built, I think system such as the S.I.L. proposal could be build quickly and easily. Also, other systems for multiple user typesetting, editing, etc. could also be constructed easily. This approach is much more significant than the fore-ground/background approach being taken in present monitors designs.



INTEROFFICE MEMORANDUM

DATE February 16, 1967

SUBJECT HP2116A Computer

TO Ken Olsen

FROM Gordon Bell

CC: W. Hindle
S. Olsen
N. Mazzaresse

Summary

The HP2116A has 1 large printed circuit card per I/O option, with an integrated circuit of about the same size as a present Flip Chip module. The PDP-8S uses Printed Circuits for back panel connectors. Why not use one plug in card for standard, single I/O options in PDP-8I? The integrations can plug in on the large card.

I just received a brochure of the above from John Koudela. The computer is based on DEC PDP-8, 9 etc. with only minor improvements, with flaws not in PDP-8, and may unrealized changes possible with 16 bits which aren't possible with 12. In general, a rather insignificant attempt to make another 16 bit machine, it's unfortunate they have such a large marketing effort and will undoubtedly sell a pile of them.

One thing that they did do which I think is subject to violent agreement or disagreement, conceivably analysis, is the packaging of single I/O options on a single printed circuit card. As one knows, I'm rather fond of large cards (and occasionally have gotten carried away with them). There's no way to really see whether large cards were bad, because it wasn't the logic on the cards that caused the trouble, but rather the fact that the circuits themselves didn't work. Thus, it's possible to put badly designed circuits on large cards as easily as small cards.



INTEROFFICE MEMORANDUM

DATE February 15, 1967

SUBJECT

TO K. Olsen ✓

FROM J. Smith

Below is a breakdown of the cost of the DEC paper tape reader and punch.

	<u>Labor</u>	<u>Overhead</u>	<u>Material</u>	<u>Total</u>
PC02 (Reader Only)	28.96	36.26	356.14	421.36
PC03 (Punch Only)	25.00	31.00	409.00	465.00
PC01 (Reader and Punch)	35.62	63.69	746.24	845.55

Jack

JFS/sm



INTEROFFICE MEMORANDUM

DATE February 14, 1967

SUBJECT: Stepping Motors

TO K. Olsen

FROM E. de Castro

The only problem I can see that we might encounter using the 72 step slo syn motor is a lack of torque at high speed. The motor we are currently using, #HS-50, is rated at 90 oz. in. at 600 steps per second. The only 72 step motor that I know of is the TS50 and although it would have to operate at half the speed, it has only 40 oz. in. at 300 steps per second. The present system requires gradual acceleration and will not run above 800 steps per second, thus I don't believe that we have much torque to spare.

EDC:jeg

C. Olsen

February 13, 1967

Possible Loud Outcry from Module Customer

Al DeVault

Ron Smart

cc: Ken Olsen ✓
Ted Johnson

Dr. Haddard of New Jersey Neuro. Institute has had several thousand dollars worth of our modules for over a year. He has had far more applications support from the New York office than his purchase justifies (we have been supporting him fairly solidly for a year) and we are now getting much tougher with him. He might react by "going to the top" or at least "phoning Maynard."

We have supported him to date to show we were prepared to stand behind a new salesman's over-enthusiasm, in the interests of the company image. It has gone on long enough now.

I suggest you have him talk to me if he calls.

YDS

gds



INTEROFFICE MEMORANDUM

DATE February 13, 1967

SUBJECT Gordon Bell's Proposal on Time Sharing the PDP-8 and/or PDP-9

TO Ken Olsen

FROM Larry Portner

Ken, I am trying to arrange a meeting of the recipients of Gordon's memo (plus a few others) to see if we can agree on the marketability of this type of system.

/lr

digital MEMO

CONFIDENTIAL

DATE February 12, 1967

TO Ken Olsen, Nick Mazzaresse, Stan Olsen FROM Ted Johnson
and Win Hindle

Attached is a list of DEC computers in the U.K.

:mr

Computer	Installation Date	Application	U	r			
PDP-8	Sept. 65	Interface development	AERE, Harwell	Abingdon 1900	x 493/586	Hooton	
PDP-8	Feb. 65	Van de Graaff	AERE, Harwell	Abingdon 1900	x 2155	McDonald	
PDP-8	March 65	Diffraction control	AERE, Harwell	Abingdon 1900	x 4313	Martin	
PDP-8	July 65	Input & output for computing service	AERE, Harwell	Abingdon 4141	x2052	Morgan	
PDP-8	Nov. 65	Multi-channel analysis in pile neutron research	AERE, Harwell	Abingdon 4141	x 5036	Hall	
PDP-8	-	Chemistry Division	AERE, Harwell	Abingdon 4141	x 2307	Hallett/Peck	
PDP-8	Jan. 66	High energy physics	Rutherford Lab.	Abingdon 1900		Maskell	
PDP-8	May 66	For use with Herald reactor	AWRE, Aldermaston	36-4111	x 5703	Maslin	
PDP-8	July 66	Movement control of fissile material	AWRE, Aldermaston	-	-	-	
PDP-8	July 66	-	Univ. Aberdeen	0241	x 350	J. Webster	
PDP-8	Oct. 65	Dept of Chemistry	Univ. Birmingham	021-SEL-1301	-	Spragg	
PDP-8	Oct. 65	Program editor	Univ. Edinburgh	031-NEW-1011	x 3268	-	
PDP-8	March 66	Not disclosed	Min. of Defence	-	-	-	
PDP-8	April 66	Process control (DDC)	George Kent, Luton	0582-28514	x 37	-	
PDP-8	March 66	Nuclear physics	Univ. Glasgow	041-WES-8855	-	-	
PDP-8	Nov. 65	On-line control of micro-circuit manufacturing	Hawker Siddeley	0707-2-2300	-	-	
RDP-8							
PDP-8 (8)	Aug. 65	Diffraction Control	Hilger & Watts	01-GUL-5836	-	Len Wood	
	Feb. 66					Rippon	
	May 66						
PDP-8	Oct. 66	Data logging	Hydrological Research	923-2381	x 283/279	Shaw	
PDP-8	May 66	Circuit analysis	Imperial College	01-KEN-5111	x 562	-	
PDP-8	Dec. 66	On-line analysis and display of speech and electro-physiological signals	Univ. Keele	Keele Park:371	x 121/279	Answorth/Wright	
PDP-8	Dec. 66	On-line control of elect. power supply	Lancashire Dynamo	Rugeley:3271	-	Cunliffe	
PDP-8	Oct. 66	Data film analysis	Univ. Liverpool	-	-	-	
PDP-8	Oct. 65	High energy nuclear physics	Univ. Manchester	061-ARD-3333	x 27/3	-	
PDP-8	Aug. 66	Automatic message switching	Mobil Data	01-REL-8881	-	-	
PDP-8	Dec. 66	Memory testing	Mullards	Horley:5544	-	Underhill	
PDP-8	Jan. 67	-	National Phys. Lab.	-	-	-	
PDP-8	Dec. 66	- Chem Eng Control studies	Univ. Nottingham	0602-2-56101	x 2415	Mecklenburgh	
					x 2416	Coggan	
PDP-8	March 66	Bubble chamber analysis	Univ. Oxford	00x-2-54141	-	Mulvey	
PDP-8	Feb. 66	Nuclear physics spark chamber analysis	Univ. Oxford	00X-2-54141	-	Macefield	
PDP-8	Sept. 66	Bubble chamber analysis	Univ. Oxford	00X-2-54 141	-	-	
PDP-8	March 66	Teaching and research in on-line control and logical simulation	Univ. Reading	84372	-	B.S. Walker	

Computer	Installation Date	Application	User			
PDP-8	June 66	Stress analysis of bridges	Road Research Lab.	DSL-3-41271	-	-
PDP-8	Nov. 66	-	Royal Inf. Glasgow	041-BEL-3535	x 380	P. Mcfarlane
PDP-8	July 66	Process control	Solartron	95-44433	x 300	-
PDP-8	Sept. 66	Process control	Solartron	95-44433	x 300	-
PDP-8	Dec. 65	Message switching	S.T.C.	01-HAD-4141	-	B. Porter/Dr. Smith
PDP-8(3)	March 66	Research	S.T.Labs.	0279-6-21551	-	-
	Nov. 66					
PDP-8	Jan. 67	-	S.T.C.	-	-	-
		<i>GPF</i>				
PDP-8	Dec. 66	Message switching	S.T.C.	Limerick:61623	-	White/Strachon
PDP-8	March 66	Hybrid system	Univ. Swansea	OSW-2-25678	x 478/7202	Griffin
PDP-8	May 66	High energy physics	Univ. College	01-EUS-7050	x 376	-
PDP-8	Nov. 66	On-line business control	Westinghouse	0249-2881	-	-
PDP-8	May 66	Spark chamber analysis	Univ. Southampton	-	-	-
<hr/>						
PDP-4	Aug. 64	Neutron physics data collection and analysis	AERE, Harwell	Abingdon 4141	-	G. Dean
<hr/>						
PDP-7	May 66	For use with Van de Graaf particle accelerator	AWRE, Aldermaston	-	-	-
PDP-7	April 65	Display research	Univ. Cambridge (Maths. Lab.)	OCA-3-56491	-	-
PDP-7	June 66	- <i>Nuclear Physics (Cavendish Lab.)</i>	Univ. Cambridge (Cavendish Lab.)	OCA-3-54481	x 368	-
PDP-7	July 66	Display research	Univ. Edinburgh	031-NEW-1011	x 6448 x 6447	Oldfield Computer Room
PDP-7	May 66	Nuclear physics	Univ. Glasgow	East Kilbride:20222	x 721/757	-
PDP-7	Jan. 67	Display research	Imperial College	-	x 467	G. Braun
PDP-7	Sept. 66	Nuclear Physics (Van de Graaff)	Univ. Liverpool	-	-	-
PDP-7	Jan. 66	Nuclear Physics (Van de Graaff)	Univ. Manchester	-	-	-
PDP-7	Dec. 65	On-line data acquisition	NGTE (Min. Works)	-	x 397	-
PDP-7	June 65	Nuclear physics (Van de Graaff)	Univ. Oxford	-	-	-
PDSP-7	April 66	Tactical trainer (naval)	Solartron	-	-	Williamson
<hr/>						
PDP-6	-	<i>Nuclear Physics</i>	Imperial College	-	-	-
PDP-6	Feb. 67	Processing experimental data in elementary particle physics	Univ. Oxford	-	-	-

Computer Installation
Date

Application

User

PDP-5	July 65	High energy physics	Rutherford Lab.	Abingdon 1900	-	-
PDP-5	July 66	Program development	DEC (UK) Ltd.	83366	-	-

Mem. T. 1517	Sept. 66	Memory testing	Plessey, Towcester	-	-	-
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INTEROFFICE MEMORANDUM

DATE 10 Feb 67

SUBJECT New Director

TO Ken Olsen

FROM Ken Geld

I would like to prepare news releases and photographs on Mr. McLean for:

Massachusetts

1. Boston Globe
2. Herald/Traveler
3. 128 Business World
4. Chamber of Commerce Publications
5. our own nearby newspapers

NY/NJ Area

1. The Stevens Indicator
2. Newark News
3. Newark Star Ledger
4. N.Y. Times
5. World Journal Tribune
6. ~~Mr.~~^{Dr.} McLean's home town paper

National

1. Wall Street Journal
2. Electronic News
3. Computer trade magazines

In each, I would give ~~Mr.~~^{Dr.} McLean's background, along with information about Digital. Included would be one paragraph describing the products we manufacture and market.

Harry Mann says there is a wealth of background data on ~~Mr.~~^{Dr.} McLean available with his secretary at Stevens. Should I call Stevens to ask for the information, or would you prefer to request it in your letter? We would also need one 8 X 10" glossy head and shoulders portrait for us to photocopy and reproduce. Glossy photos are easier to photocopy than mat-finish ones.

Ken



INTEROFFICE MEMORANDUM

SUBJECT Seed Money

DATE February 9, 1967

TO Ken Olsen

FROM Harry S. Mann

Several weeks ago you asked in a memorandum for reactions to providing a certain sum of money in the budget for undefined and unknown projects that might come up during the period covered by the budget. I am not in favor of doing this for the following reasons.

1. Your recently distributed plaque which said, "We have one set of plans by which we hire people, plan inventories, etc." tends to be in conflict with the idea of setting aside some money without specific ideas of what people, etc. would be involved in spending the money.
2. Since we revise our budget each quarter, there is really no need to worry about providing some money in the budget for things not apparent at the time the budget is in preparation. It seems to me that relatively few ideas would occur in any three months period which would require any sizable expenditures during that quarter. If a new idea developed during the quarter, by the time the plans are established, people found to be in work on the project, etc., relatively small sums would be spent in that period. It would then follow, however, that when we revise the budget for the new and ensuing quarters, we would certainly include the money for the then approved, new budget.
3. I do not believe that our budgeting is so precise that it cannot permit reasonable amounts of money being spent which were not contemplated in the specific plan on which the budget was based. I am sure that there are just as many things which are anticipated in the budget that do not come to pass and, hence, require spending money as there are new things that come out that require spending money that we hadn't planned to do.

Last, and always, it should be remembered that a budget is nothing more than a plan which has been quantified with a common denominator being dollars. It must not be a strait jacket and, therefore, should not limit us from doing new jobs which appear to be important even though not anticipated in the budget. If we follow this concept and devise budgets quarterly, I think we have adequately taken care of the situation which you are thinking about.

Harry S. Mann

HSM:jeb



INTEROFFICE MEMORANDUM

SUBJECT Spring and Fall Conference

DATE February 9, 1967

TO /Ken Olsen

FROM Harry S. Mann

You pointed out that Xerox holds such conferences for their key people each year and wondered if we should do the same thing. I believe at some time in the next few years we may well want to implement that kind of a program and include somewhere in the neighborhood of 20 or 25 people from the Company in it. I do not think we are ready to do this as yet.

My reason for suggesting that it is a good idea, but not timely, comes from the fact that we are just now learning to work together effectively at the very top level of the Company through our "Woods Meetings." If we can use those day-long sessions to take care of our planning problems for the next year or so, coincidentally learning to work together as a homogeneous group, and then replace those meetings (or make them less frequent) and rely on these semiannual affairs including other people at that time.

Harry S. Mann

HSM:jeb



INTEROFFICE MEMORANDUM

DATE February 9, 1967

SUBJECT Air Conditioning - 12-3

TO K. Olsen
Harry Mann

FROM Al Hanson

In regards to your memo for air conditioning the area in building 12-3. I have procured quotes based on the following loads:

People	40
Lighting	3 watts/sq.ft.
Ventilation	3800 CFM
Heat gain through roof, walls, glass, etc.	

Vendor

New England Engineering
18 tons of refrigeration supplied from two roof top units with necessary ductwork, supply and return air grills, etc.

Price - \$10,200.00

Does not include Massachusetts Sales Tax, if applicable and all wiring.

Vendor

The Air Conditioning Company
20 tons of refrigeration supplied from one or two roof top units with all ductwork, supply and return grills, all electrical wiring, etc.

Price - \$8,400.00

Does not include Massachusetts Sales Tax, if applicable.

In addition, we will have to supply a new electrical service of approximately 150 amps @ 208V, which will cost approximately \$650.00 and extend the corridor partitions to the ceiling.

Summary -

20 tons refrigeration	\$8,400.00
150 amp electrical service	650.00
Partitions	<u>250.00</u>
Total	\$9,300.00



INTEROFFICE MEMORANDUM

DATE February 9, 1967

SUBJECT Painting new area in 5-3

TO K. Olsen
H. Mann

FROM Al Hanson

I thought it might be a good idea to paint the new space in Building 5-3, which we have just acquired. If we plan on staying there for some time, it would be to our advantage to paint now, before the area is occupied.

I have a quotation from Roland Prescott to spray paint the entire ceiling and walls, where it's necessary, and all columns, for \$1,400.00, complete.



INTEROFFICE MEMORANDUM

DATE February 8, 1967

SUBJECT Plating for printed circuits

TO Stan Olsen
Ken Olsen
Nick Mazzaresse
Dick Best
Loren Prentice
Henry Crouse

FROM George H. Wood

Report on meeting Boston Branch AES Feb. 2, 1967
Speaker: L.J. Durney, Enthone Inc.

Mr. Durney addressed the group as to the special requirements of the Electronics Industry with respect to plating. He challenged the group to obtain a basic familiarity with electronics, so as to better understand the needs of that industry. He also pointed out the usefulness of a "Broad-Based" supplier, (this was obviously a poke at Shipley who has concentrated their efforts in the electronics industry) in that a supplier who understood electronics and who also had experience in metal strippers, solvents, cleaning, etc., is prepared to handle such problems as the effect of solvents on surface resistance.

Throughout his talk, Mr. Durney dropped terms like: Q factor, magnetic shielding, RF radiation, dielectric strength, etc., so as to support his position in the industry, and then cited the following examples of quantitative developments over the last few years.

1. Electroless nickel over copper plated dacron cloth used in the manufacture of a rubber-cloth-rubber laminate for radar antennas.
 - A. Copper was a grounding medium
 - B. Nickel prevented the sulphur in the rubber from corroding the copper, and acted as a radiation shield.
 - C. Nickel being (Ni + Ni₃P) was also a magnetic shield
2. Plating coils on the neck of a standing wave tube.
3. Plated on plastic rod a gigacycle transformer

4. Polysulfone provides, for the first time, an "engineering" plastic which meets the adhesion requirements and temperature needs for circuits applications.



INTEROFFICE MEMORANDUM

DATE February 8, 1967

SUBJECT CONFERENCE ROOMS

TO Ken Olsen

FROM H. Mann

I feel that your suggestion of solving the conference room problem should be tied in with our desire to establish some reasonable plant layout. In the interim I see no reason why we can't insist that the person arranging a luncheon or meeting in the conference rooms on the first floor of Building 12, ~~not~~ make his own arrangements for cleaning up, as well as preparing whatever refreshments may be required.

If we are going to put any conference rooms in Building 5 the people will be willing to use for outside guests, they will undoubtedly be reasonably well done and of at least the same quality that exists over in Building 12 at present. It would be a shameful waste of money to build one of these things in a hurry at this point, without knowing where it really belongs.

The information we now have from Maynard Industries suggests that we will probably get the balance of Building 5 either June 1 or July 1. There is a number of finished offices available on the second floor of that building, which from a quick look-see would be reasonably adequate with some minor cleaning up for a conference room. I would feel that we could defer our decision to build a new conference room and work under the arrangements proposed above until that time.

HSM/jm

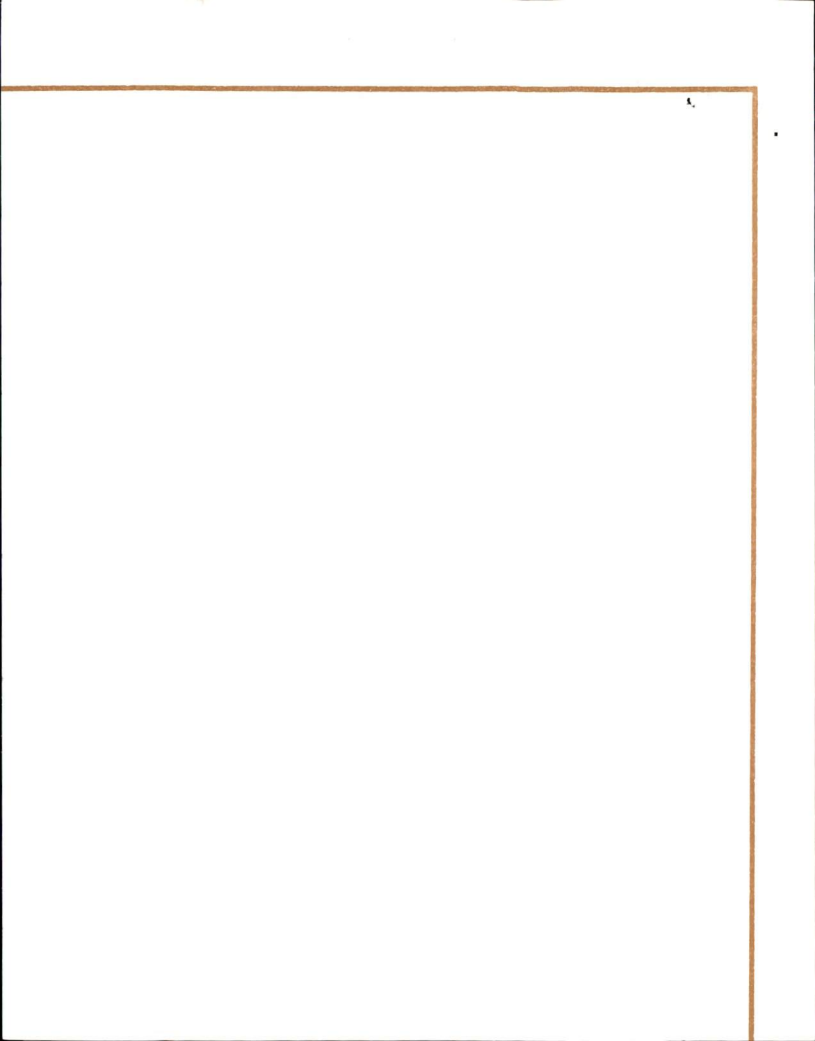
2-8-67

digital

EQUIPMENT
CORPORATION
MAYNARD, MASSACHUSETTS

To
Ken Olsen

From
Russ Doane



NEW INDUSTRIAL CONTROL MODULES

Engineers involved with all types of process controls from the simplest transfer machines to the most sophisticated numerically controlled systems have been looking for fast solid state logic that closes the gap between awkward relay substitutes and exotic computer-speed electronics. New K-series Industrial Control modules from Digital Equipment Corporation fill the bill.

K series modules incorporate all-silicon diodes, transistors, and integrated circuits, artificially slowed for noise immunity. They offer a choice of English or NOR logic, using familiar symbology for easy design. K series hardware is designed for convenient installation in standard NEMA enclosures.

Modularity is achieved through the proven FLIP CHIP connector used on two generations of DIGITAL's computers and on modules used for years in every conceivable application from steel mills to lathe controls. Even the connection between terminal strips and electronics is pluggable, so the logic can be bolted in after field wiring is complete and removed quickly for modifications or additions.

Sensing and output circuits operate at 115 volts AC for full electromechanical capability. Inputs from contact devices see a moderate reactive load to insure normal contact life. Solid state AC switches are fully protected against false triggering, and provisions for interlocking are included. Voltages from the external environment are excluded from the wire-wrap connections within the logic.

New Industrial Control Modules
Page 2.

Checkout and trouble shooting is easy with K series logic. Every system input and output has an indicator light at its screw terminal. The special test probe provides its own local illumination and built-in indication of transients as well as steady states. Every point in the system is a test point, and consistent pin assignments reduce the need to consult prints. If desired, an indicator panel can be built into the system with a meaningful arrangement of lights to make system status plain at a glance.

Construction materials and methods are the same for other high-production FLIP CHIP modules, including a computer controlled operating test of each completed module. And K-series modules give you the size reduction, reliability, flexibility, and low cost of solid state logic with an added bonus of easy interconnection not only with the electromechanical environment but with ultra-fast logic on a computer too.

PRELIMINARY SPECIFICATIONS

K003 GATE EXPANDER

Three circuits. Each can be used either to add three AND inputs to the two built into a K123 circuit, or to add a second two-input AND gate ORed with the two-input AND of a K123 circuit. Thus one expander circuit can make either a five-input AND or an XOR (Exclusive OR) out of one K123 circuit. Use with the K113 is identical, but the output will be inverted.

K113 AND/NOR GATE

Three circuits. Each circuit is a two input AND gate followed by an inverting amplifier. Two connection points are provided for use with K003 expander. One of these allows more AND inputs to be connected; the other allows external AND gates to be added and ORed ahead of the inverting amplifier. This gate by itself is theoretically capable of performing any logical function imaginable, and with the aid of the K003 can do so economically. It is also useful as a NOT element in English logic implementation using K123 gates.

K123 AND/OR GATE

Three circuits. Each circuit is a two input AND gate followed by a non-inverting amplifier. Two connection points are provided for use with K003 expander. One of these allows more AND inputs to be connected; the other allows external AND gates to be ORed in. One circuit has a control connection at pin C which may be grounded to multiply its response time. With the control point grounded this section may be connected as a latch with extra high noise immunity.

PRELIMINARY SPECIFICATIONS

Page 2.

K210 DECIMAL COUNTER

Four T^2L monolithic integrated flip-flops connected as a decade scaler with BCD (binary coded decimal) outputs. Inputs and outputs slowed and buffered for the same level of noise immunity as gates and other modules. Hysteresis trigger at counter input allows a wide variety of signal sources to be accommodated. Grounding pin C rejects high frequencies, slowing counter to 10 Kc max.

K220 DECIMAL UP/DOWN COUNTER

Four T^2L monolithic integrated flip-flops connected as a BCD up/down counter. Same inputs and outputs as K210 with added direction control. Same input conditioner as K210.

K230 FOUR BIT SHIFT REGISTER

Four T^2L monolithic integrated flip-flops connected as a shift register. Same input conditioner as K210.

K273 RETENTIVE MEMORY

Three circuits. Each circuit has a bistable mercury-contact relay that follows the state of its input. A Hold input provided may be connected to the Power OK output of the source module. Bulk of the relays uses an extra module location. This module allows fail-safe retention of system status if power fails.

K303 TIMER

Three circuits. Each circuit is an off-delay timer if driven by a K123 non-inverting gate, or an on-delay timer if driven by a K113 inverting gate. Both direct and inverted outputs are provided. A fixed or variable control resistance may be located nearby or at a distance without destroying noise immunity. Calibrated controls for mounting on the delay module are described below. Longer delays than are practical with RC networks alone may be obtained with counters. Either the line frequency output from the source module or two R303 timer circuits connected in a loop may be used to drive the counter.

K374 TIMER CONTROL

Two screws make both mechanical and electrical connections between this calibrated 10 ms to 300 ms control and one section of a K303 Timer module. If two timer modules are mounted in the end slots of a K941 mounting panel up to six calibrated timer controls will have ready access. Logarithmic control taper gives easy settability over entire range.

K376 TIMER CONTROL - Same as K374, but 100 ms to 3 seconds.

K378 TIMER CONTROL - Same as K374 and K376, but 1 second to 30 seconds.

Preliminary Specifications
Page 4.

K508 AC INPUT CONVERTER

Eight circuits. Each circuit rectifies, filters, and standardizes the output from a center-tapped 6.3 v AC transformer winding such as those in the K716 Interface Block. Two feet of flexible ribbon cable tie the handle end of the module to a connector module that fits one of the sockets in a K716. This module uses two locations.

K604 AC SWITCH

Four circuits. Each circuit includes a transformer isolated driver and a solid state 250 VA switch with both overvoltage and dv/dt suppression to prevent unwanted firing. An interlock input which must be returned to supply voltage to enable permits additional safety. Includes ribbon cable and connector module to fit K716. Uses two locations.

K671 DECADE GLOW TUBE DRIVER

Accepts B C D inputs. Converts to 10-line outputs for driving gas filled display tubes such as Burroughs' NIXIE. Includes two foot flexible ribbon cable and mounting board with socket for side view tubes.

K716 INTERFACE BLOCK

Eight inputs and eight outputs at 115 v AC using wires up to #14 can be terminated at the clamp type barrier strips on this unit. An indicator light and space for identification are provided at each terminal. Three sockets accept the connector cards from one K508 and two K604 modules. Each input drives the primary of a small transformer with enough energy storage to promote the arcing necessary for contact reliability in standard limit switches, etc.

K731 SOURCE MODULE

Provides sufficient logic power to drive any typical system up to the full capacity of a K941 mounting bar. Also includes sources of signals wanted once per system: a Power OK monitor signal, a line frequency logic level, and a system initializer energized when power is first applied. Large components on this module fill the space between the mounting surface and the first two module locations where this double-size module is ordinarily inserted.

K771 DISPLAY SUPPLY

Provides both power and physical support for up to six K671 decimal display boards.

K791 TEST PROBE

This handy tool contains two pulse-stretching drivers with indicator lights. One light indicates each logic level; neither lights on open circuit. Loading is negligible. A built in illuminator makes it easy to see pins and wiring. Connects to the logic power supply.

K941 MOUNTING BAR

Has room for four H800 blocks and includes a separate mounting foot. Because of its light-weight, compactness, and the use of flexible ribbon cable for connections, the K941 can be mounted on the door of any standard enclosure for ready access. Interface blocks are best mounted on the rear of the enclosure. Design is such that a one plane path

K941 Mounting Bar(continued)

for ribbon cables from modules to interface block sockets is easy to arrange. Connector assembly is held to mounting foot by two slotted hex bolts for quick assembly. Order H800 blocks separately. Bar may be sawed where fewer than 32 connectors are required.

K942 MODULE CLAMP

Holds modules firmly in sockets during shipping or vibration. Fits K941 mounting foot.

INDUSTRIAL CONTROLS HANDBOOK

Detailed module specifications and many helpful design examples are offered in this new DIGITAL handbook. With it you will be able to go from process concepts to control hardware with a minimum of lost motion. Fill in the reply form below for your copy.

My interests include:

Sequencers

Numerical Control

Transfer Machines

Data Collection

Welding Controls

Computer Interface

NAME

COMPANY

ADDRESS

ZIP



INTEROFFICE MEMORANDUM

DATE February 6, 1967

SUBJECT

TO Possibility of making many Peripherals at DEC with a
Common Interface to all present and future computers.

FROM

Ken Olsen ✓
Nick Mazzaresse
Win Hindle
Stan Olsen

Gordon Bell

CC: A. Kotok
R. Savell

From time to time this has been considered, but has not been practical because the interface has been at the computer-peripheral control boundry. Also, because the designers want to optimize each system there is a tendency to design each control to tune a system. A common interface would benefit software design, as well as giving production flexibility, and minimizing system designs. I think that due to increased emphasis on remote terminals there is a trend (good one) to be able to remote any device, and as such the specialized interface will hopefully vanish from our universe. For example, IBM will shortly announce a card reader, card punch, line printer combination that connects to a standard Data phone.

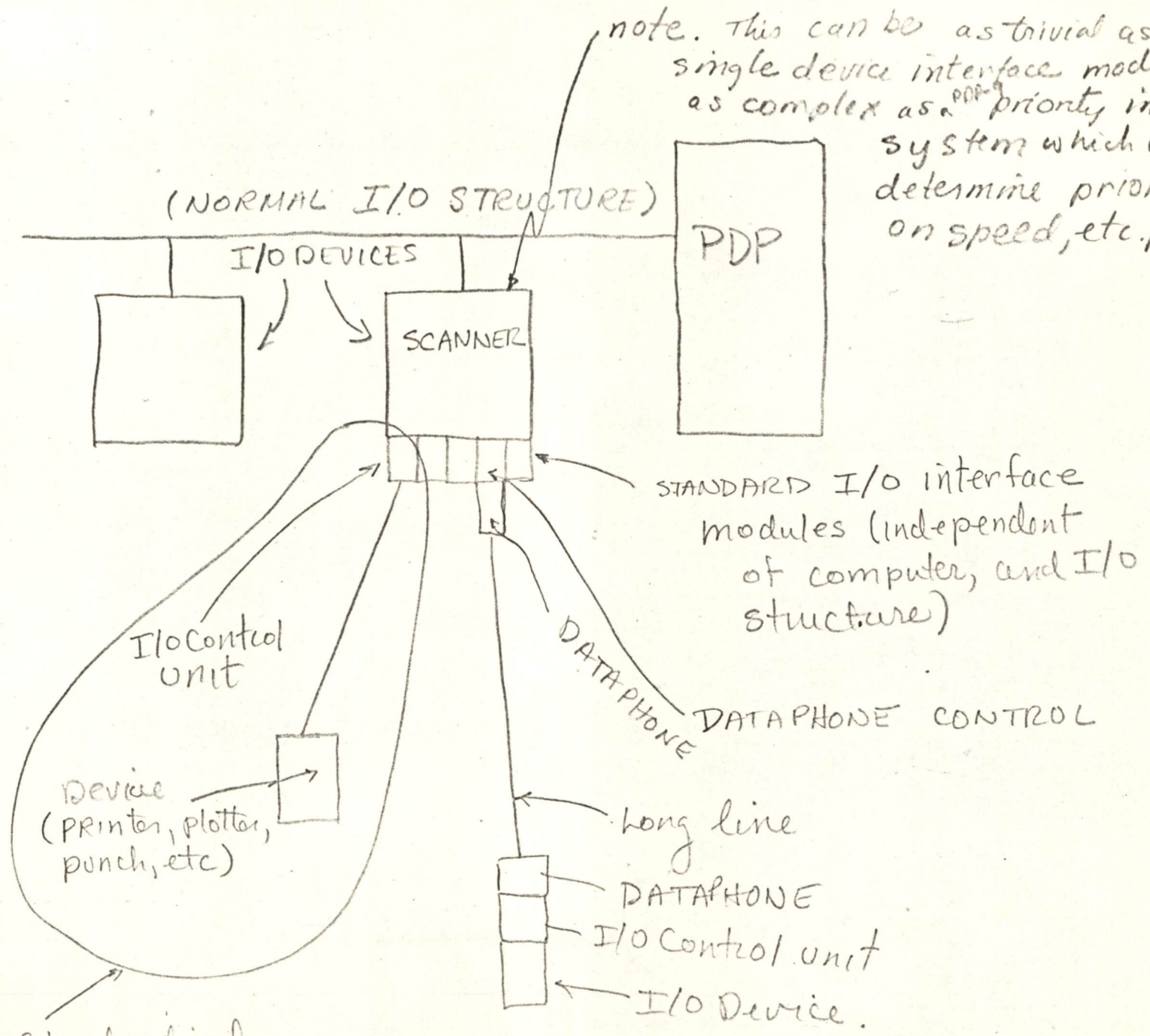
Therefore, I hope that since PDP-9, 10, and 8I are in their pre-peripheral design phases, such an approach be studied as a means of having common I/O controllers across all computers and lines including new ones. Obviously, not all equipment fits the mold.

The equipment which looks most likely:

A-D-A
Paper Tape Readers & Punches
Card Readers and Punches
Printers
Plotters

Teletypes, Typewriters
Dataphones, and Phone Transmission stuff
slow displays
audio units
computer-to-computer buffers
relays, etc. (digital I/O)
Discs, Drums, mag. tape, DEctape, and Displays are
undoubtedly too fast.

One possibility for such a system would be: (See attached
sketch.)



Methods of Constructing Standard I/O Devices
 CG 13 1/25/67



INTEROFFICE
MEMORANDUM

DATE 2/6/67

SUBJECT ADDITIONAL SPACE

TO Stan Olsen
cc/ Ken Olsen ✓
L. Prentice
A. Hanson

FROM Frank Kalwell

With our Module business on the increase, we require additional space for storing and shipping Modules. The Module finished goods area next to personnel is inadequate (Spacewise). Please use this memo as a request for consideration when you review plant space requirements.

Present space 1245 sq. feet
Requested space 2000 sq. feet

Thank you

Frank Kalwell

PAK/mz



INTEROFFICE MEMORANDUM

DATE February 6, 1967

SUBJECT Sales Newsletter

TO Ken Olsen

FROM Ted Johnson

I am not aware of your reasons for wanting to edit the Sales Newsletter. This has been treated as an "open forum", so we haven't stressed "polish" but, instead, good data and encouragement of frequent contributions.

Please let me know how you feel we should improve the Sales Newsletter.

TJ:mr



INTEROFFICE MEMORANDUM

DATE February 6, 1967

SUBJECT Time Sharing (via Program Swapping) on PDP-8 and PDP-9.

TO Nick Mazzaresse
Stan Olsen
John Jones
Mike Ford
Larry Portner
Larry Seligman
Henry Burkhardt

FROM Gordon Bell

CC: Win Hindle
Ken Olsen ✓

This memo is an appendix to a similar memo by me on Sept. 21, 1966 together with recent discussions in Maynard, and people here (Perlis, Nevell, Nickerson, etc.) on the subject.

Potential Products to be sold

1. PDP-8 or 9 with general stand alone software to allow general purpose sharing. A PDP-8 job would be limited to 4K, and a PDP-9 to 8K. Additional memory would be used for multi-programming to improve response time and also for special devices I/O services. I think it's mandatory to be able to use standard PDP-8 or 9 software with only minor (I/O) mods.
2. PDP-8/or 9 used with special real time software for special I/O devices. The special I/O would reside in the monitor area or in extra core reserved for direct control. The bulk of the computation for the real time process would be done as a standard, shared (swapped) job.

This type of system could be marketed with software to cover the bulk of programming for almost any process control, message switching, etc. job.

3. Used as a message switching device which would be connected to a large, general purpose time sharing system. (A job beyond the scope of the small system could be transmitted to the larger system.)

Size of Configurations

	<u>PDP-8</u>	<u>PDP-9</u>
Memory	8K basic	16K basic
tape (for getting on and off the system)	1 unit	1 unit
Disc (5-10µs/word)	5 X 10 ⁶ bits	5 X 10 ⁶ bits or greater
Messages intercom	5-50 TTY (680)	5-100 TTY (690)
Number of users	5-20 (10 avg.)	10-40 (20 avg.)
Options:	2400 baud power fail Dataphone interface multiply/divide	

PDP-9

I feel that a general time sharing system such as the above can be built more easily, and quickly with wider use and market appeal than the presently talked of fore-ground/back-ground thing.

Ken suggested I call his friend, Prof. Francis Lee at MIT, one of the designers of LARC, etc. about such a system. Lee may be planning such a system to be used there for general student use, because there are only 4 or so consoles on the time shared PDP-1 there; and because the PDP-1 is used for experimental development by Jack Dennis. Lee is enthusiastic and assuming MIT has funding would probably enjoy working on a system which would have general marketing appeal.

Lee and I basically agree on the framework, and that a general approach is the best one. I think it would be worthwhile for people at DEC to visit him before going much further on foreground/background processing. (He hadn't considered the PDP-8, maybe because of incremental cost reasons.)

PDP-8

From DEC's point of view, the development of the PDP-9 system would undoubtedly have better payoff, and with limited manpower would be the best one on which to concentrate. On the other hand, the basic system cost will always be less with a PDP-8, and most jobs are not processing limited. Also, there is a much larger user machine base using PDP-8's.

PDP-8 Time Sharing Proposal from CIT

I am in the early study stages of proposing that CIT supply \$ (for a disc) and manpower to develop a time sharing system around the PDP-8, assuming DEC will loan us the memory, tapes and 680 stuff. So far, Perlis is very enthusiastic, and the only negative factor is that we may have to write our own 360/67 software. I have just started a grad student on the study, to investigate response time, hardware mods, and the types of jobs, service, etc. that could be done on it.

From our point of view, the 8 is ideal because we do not want to do intermediate sized jobs on it, and its 4K limit on core will help the swap time as well as placing an artificial limit on job size. Our design would first be general in order to stand alone for small jobs, followed by software to allow the transshipment of data to the 360/67, followed by some partitioning of jobs between the two systems.

At any rate, when we have some basic plan for the design, we would come formally to DEC. The principle thing that CIT would like, I hope, is that the system would be actively marketed by DEC. In addition, of course, if it's practical we would buy several units.



INTEROFFICE MEMORANDUM

DATE February 2, 1967

SUBJECT

TO ✓ Ken Olsen
Harry Mann
Win Hindle
Stan Olsen
Nick Mazzaresse
Ted Johnson
Henry Crouse
Jack Smith
Cy Kendrick

FROM Pete Kaufmann

During the month of January, we received subcontracts from outside vendors of 46% of our total subassembly needs, 23% of our module needs, and 15% of our metal shop needs.

I am going to watch this trend carefully during the next few months. If this trend continues and the difficulty of obtaining machine shop and assembly people continues, am going to make a proposal that we establish an assembly plant where assembly people are easily available. The proposal will indicate the cost savings that would be obtainable.

Pete

PJK/jab



INTEROFFICE MEMORANDUM

DATE February 2, 1967

SUBJECT Toric Development Disc Storage Unit

TO K. Olsen
L. Prentice
H. Crouse

FROM Clayton Rix

In order to keep all our Engineering expenses appearing on the proper line of our Statement of Operations, the expense of Toric Development would be more appropriately charged to Cost Center #330, Mechanical Engineering, rather than #644.

dec**INTEROFFICE
MEMORANDUM**

DATE February 1, 1967

SUBJECT Quantity Discounts

TO Nick Mazzaresse
CC: Ken Olsen

FROM Harry S. Mann

Mike Ford's report gave a good overall estimate of the effect of the discount structure on profitability. I don't want to make this subject a battle ground, and also I recognize profitability in this area is primarily your authority and responsibility. I do want to be sure, however, that you recognize the point I am trying to make about discounts at the higher levels.

To consider the problem from my point of view, we must look at the specific order or orders enjoying say the 25% discount - not the average of all orders. Using the 8 line as an example, you sold \$6,866,000 of product at list prices during the last six months. The cost to manufacture, sell, engineer and administer this program totalled \$4,582,100, leaving a margin on the list price basis of \$2,283,900, or 33%. On a particular order where we give 25% off, we are realizing 8% profit before taxes.

The question I ask, then, is this attractive business on that basis? If we are manufacturing limited, would it be better to offer lower discounts, thereby losing some business, but then be in a position to give better delivery, etc. on the higher margin business and channel our resources to the higher profit areas?

Needless to say, the profit margins on the 8s as a whole, are excellent and no one in their right mind would complain about it. My only point is that we are, to some degree, using scarce resources on some portion of our business which is yielding this lower margin. Maybe other benefits derived make it a wise move. This is where your judgment comes in.

HSM:pah



INTEROFFICE MEMORANDUM

SUBJECT Dr. Frank Verzuh

TO Ken Olsen

DATE January 31, 1967

FROM Win Hindle

I heard from Frank Verzuh today, who asked about Andy and requested information on our machines. He asked if you would call him sometime to discuss a new product idea he has.

Address: Dr. Frank Verzuh
180 Commonwealth Avenue
Boston, Massachusetts 02116

Telephone: 536-4818

WH/bwf



INTEROFFICE MEMORANDUM

DATE January 31, 1967

SUBJECT Entrance and Exit at Loading Dock

TO K. Olsen

FROM Al Hanson

cc: P. Kaufmann

H. Mann

D. Richardson

Sgt. Hopkins

All employees working in the shop area supervised by Dick Richardson (Bldgs. 7-1, 6D-1, 3-1) will be allowed to enter and leave the premises via the door located by the loading dock in building 7-1 under the following conditions:

Normal working hours

Morning - The door will be open from 8:00 to 8:15 A.M.

Noontime - " " " not be open through noontime hours.

Evening - " " will be open from 5:00 to 5:10 P.M.

Overtime working hours

Morning - The door will be open for a period of 15 minutes prior to start of shift.

Noontime - The door will not be open through noontime hours.

Evening - The door will be open for a period of 10 minutes after commencement of shift.

Dick Richardson has agreed to monitor and enforce these rules and accept full responsibility for this procedure. Any violations will result in discontinuing this policy.



INTEROFFICE MEMORANDUM

DATE January 30, 1967

SUBJECT FLOOR SCRUBBER

TO Ken Olsen
Harry Mann

FROM Al Hanson

I have evaluated several floor scrubbing machines and have concluded that the Clarke Model #TB24 is the best machine for this plant. This machine can be purchased, or leased with option to purchase.

This machine could be very advantageous for scrubbing main aisles, lobby areas and large open areas.

Attached is a brochure which includes a complete description, together with prices.

XERO COPY

XERO COPY

XERO COPY

XERO COPY

JAN 27 1967

MAIL ADDRESS
P. O. BOX 24



PAPER TRADING CORPORATION



PHONE
755-5288

ONE FAY STREET

OF
WORCESTER

MASSACHUSETTS

01604

January 26, 1967

Digital Equipment Corp.
146 Main St.
Maynard, Mass.

Att: Mr. Allen Hanson
Plant Engineer

Gentlemen:

We are pleased to submit the following quotation for the TB 24 Clarke Automatic Scrubber Vac which we demonstrated for you at your plant last Tuesday.

Your cost for a machine of this type complete with automatic battery charger and twin brushes is \$2,245.00 FOB Muskegon, Michigan.

We suggest that you also equip your machine with a set of neoprene driving pad assemblies so that you can use nylon pads on tiled floors and other smoother areas. Two such assemblies are required at \$49.50 ea. We further recommend a set of steel wire brush segments, eight per machine, at \$5.00 each. Delivery time is approximately two weeks from receipt of order.

The alternative plan for leasing a machine rather than purchasing is as we explained. The leasing cost is 10% of the total cost quarterly for twelve quarters. Monthly payments can be made if you prefer. You may renew the lease after expiration of the 12 quarter period for one-half of the quarterly payment per year. A purchase option is available if requested when the lease is signed and the amount of the purchase option is one additional quarterly payment. The Clarke national leasing program is handled by the United States Leasing Corporation.

A COMPLETE LINE OF CHEMICAL SPECIALTIES
AND SANITARY MAINTENANCE ITEMS



JAN 27 1967

PAPER TRADING CORPORATION

1/26/1967

Digital Equipment Corp. -2-

We appreciated the opportunity to show this equipment to you and John Culkins. The effective demonstration gave you an indication of the value of a Clarke TB 24 and its labor saving and time saving qualities. Certainly this equipment will enable you to completely clean and maintain your plant at minimum cost to you.

Thanks again, Mr. Hanson, for your time and co-operation. We shall be happy to work with you and your staff in any way to insure complete satisfaction.

Sincerely,

PAPER TRADING CORPORATION



Edmund L. Tivnan

ELT/eg
Enc.

JAN 27 1967

CLARKE

NEW MODEL TB-24

MEDICATION

CLARKE-A-MATIC

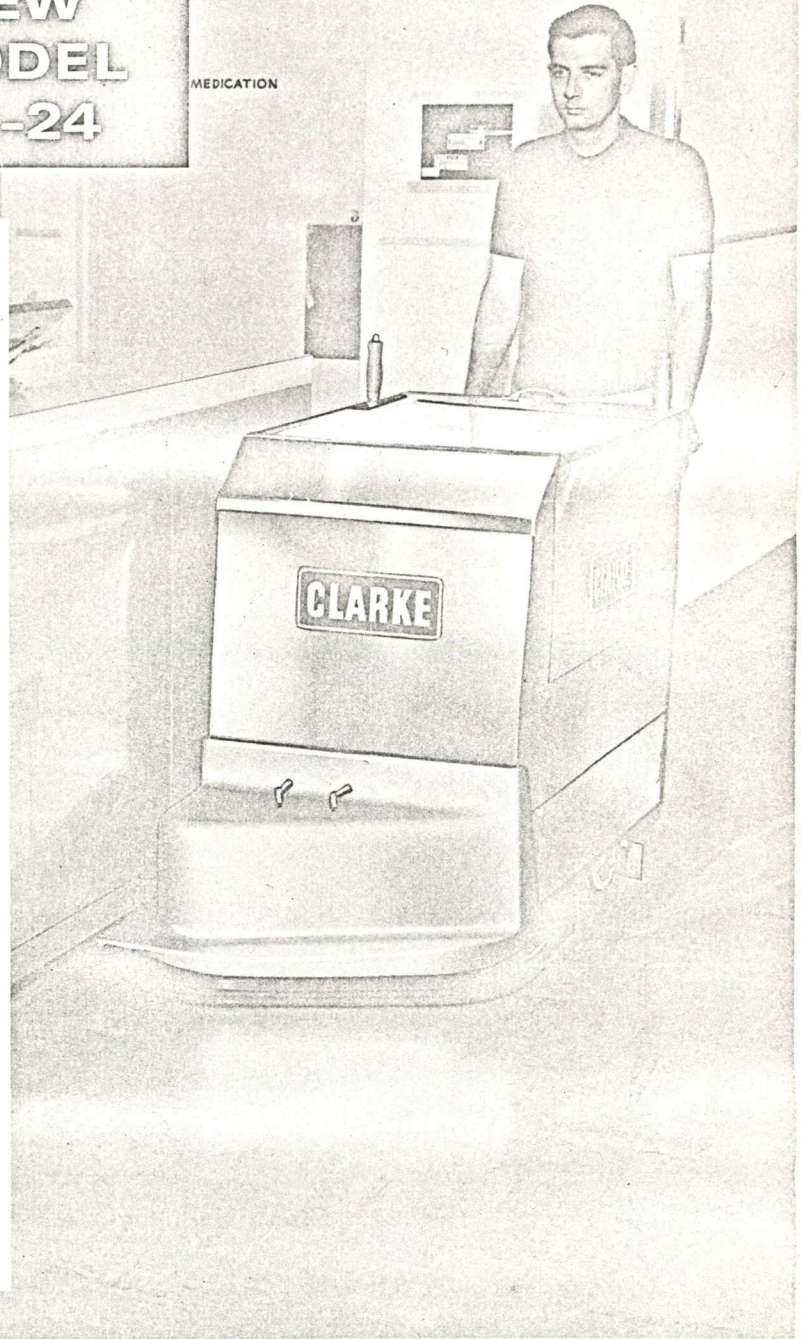
SCRUBBER-VAC

- Direct Traction Drive
- Direct Brush Drive
- No Belts, No Clutches, No Gear Boxes
- Ultra-Quiet, Trouble-Free Performance

You start it simply by flicking a switch and depressing the steering handles. It moves out smoothly, silently—you find yourself wanting to *look* to be convinced the brushes are turning. But you need only glance behind to see how very well it cleans.

The all new CLARKE-A-MATIC TB-24 is an engineering breakthrough. It reduces noise — and trouble—to an unprecedented minimum by eliminating all clutches, belts and gear boxes. An exclusive slow-speed, permanent-magnet DC motor is connected directly to an automotive type differential by a husky roller chain for quiet, powerful traction. Two similar motors are mounted directly on the brush heads. The contra-rotating brushes are gimbal-mounted for thorough, uniform action on rough or uneven floors.

You clean a 24½" swath in one effortless pass as the TB-24 automatically meters solution, scrubs, picks up wet soilage and squeegee dries. You clean up to 22,500 sq. ft. per hour. And you can work an 8-hour shift without recharging the batteries! See Specification and Performance Data on back page—ask a Clarke distributor for a demonstration on your floor.



- | | |
|----------------|--------------------|
| • Hospitals | • Office Buildings |
| • Schools | • Retail Stores |
| • Supermarkets | • Shopping Centers |
| • Banks | • Institutions |

PLUS ULTRA-SIMPLE CONTROLS

Just flip the switch and depress the steering handles to start forward—elevate the handles for reverse. If handles are released, machine coasts to gentle stop.

XERO COPY

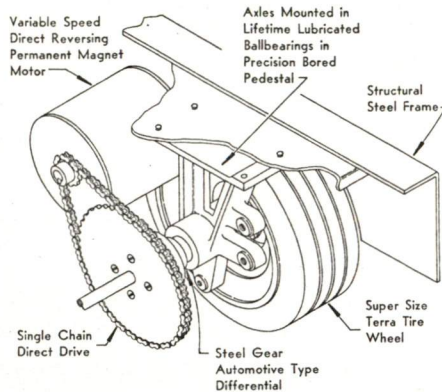
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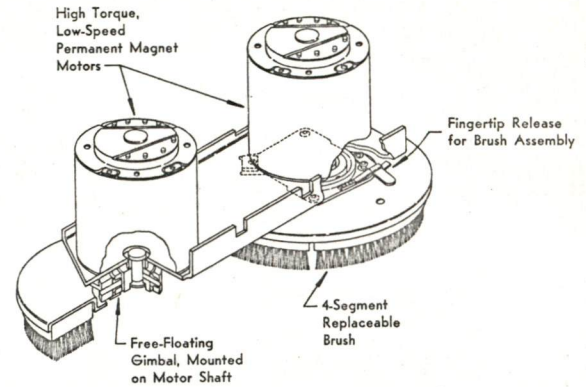
HERE'S WHY THE ALL NEW TB-24 IS SO QUIET, SO DEPENDABLE

DIRECT TRACTION DRIVE



With direct traction drive and direct brush drive, Clarke eliminates all clutches, belts and gear boxes. Result—fewer moving parts to wear — or to hear!

DIRECT BRUSH DRIVE



AUTOMATIC, ONE-PASS CLEANING — UP TO 22,500 SQ. FT. PER HOUR

Compare these TB-24 savings with your current maintenance costs.

Floor area in square feet	One man with mop and bucket	One man with 17" Floor Machine and Wet Vac	One man with TB-24
5,000	15 hr.	7½ hr.	13 min.
10,000	30 hr.	15 hr.	27 min.
20,000	60 hr.	30 hr.	53 min.
50,000	150 hr.	75 hr.	2.1 hr.
100,000	300 hr.	150 hr.	4.2 hr.
250,000	750 hr.	375 hr.	11.0 hr.
500,000	1500 hr.	750 hr.	22.0 hr.
1,000,000	3000 hr.	1500 hr.	44.0 hr.

SPECIFICATIONS AND PERFORMANCE DATA FOR CLARKE-A-MATIC MODEL TB-24

VACUUM MOTOR: One ¾ hp by-pass, continuous duty. Plug-in attachment for vac motor leads. Automatic float shut-off in pick-up tank. Clean-out plate at top of intake tube.

BATTERIES: Six Clarke storage batteries, 225 ampere hours each, in 36 volt system. Provide full 8 hour shift operation. Slide-out battery trays available.

SOLUTION TANK: 15 gallons. 14 gauge welded steel with vitreous enameled finish. Metered solution control—solution tank drain valve and hose.

PICK-UP TANK: 20 gallons. 14 gauge welded steel with vitreous enameled finish. Tank easily and quickly emptied through dump valve.

SQUEEGEE: 30" double-blade.

SCRUB SWATH: 24½" from two 13" brushes. Overlap 1½".

BRUSH DRIVE: Two ½ hp DC motors, low-speed, permanent magnet, mounted direct.

TRACTION DRIVE: Permanent magnet ½ hp direct-reversing motor. Direct chain connection to automotive-type differential. No belts or clutches. Reversing and speed-control in steering handles, depress for forward, lift for reverse.

FORWARD SPEED: 0 to 185 feet per minute.

REVERSE SPEED: 0 to 150 feet per minute.

BRUSH SPEED: 260 RPM, contra-rotating. Direct drive from motors mounted on brush heads. Sectional brush assembly mounted on gimbals. Scrubs up to 22,500 sq. ft. per hour.

BRUSH FORCE: May be varied by operator from 60 to 100 pounds. Added force may be used momentarily or continuously.

TOE BOARDS: Will scrub under 5" toe boards. Bumper wheel on scrub head to follow walls. Adjustable apron on scrub head.

DRIVE TIRES: 13" diameter x 5" wide pneumatic. Terra-tire type.

CASTERS: Two dual wheels, 5" diameter x 1½" face grooved—ball bearing (4 point suspension).

CHARGER: Fully automatic 30 ampere charger.

DRY BUFF & DUST PICK-UP: Optional accessory.

PAD ADAPTER: Available as an option.

WEIGHT: 1040 lbs. complete with batteries.

SHIPPING WEIGHT: 1130 lbs. complete with batteries.

SIZE: Length 60", Body width 22¾", Overall width 27¾", Height 38½", (43¾" over handles).

CLARKE FLOOR MACHINE DIVISION
Studebaker
CORPORATION

30 EAST CLAY AVENUE • MUSKEGON, MICHIGAN • 4944

Authorized Sales Representatives and service branches in principal cities.
In Canada: G. H. Wood & Company Ltd., Box 34, Toronto, Ontario



PAPER TRADING CORP.
1 FAY ST., WORCESTER, MASS.
PHONE (617) 755-5288

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dec**INTEROFFICE
MEMORANDUM****SUBJECT** Personnel Requirements**TO** Bob Lassen**DATE** January 30, 1967**FROM** Harry S. Mann

It would be very helpful to get a clear picture as to where we stand requisition-wise on the personnel requirements outlined in your memo of December 30. It seems to me that you should have in your hands all requisitions for additional people needed over the next six months right now. The budgets have been firmed up, we are all working to one plan, and hence there should be no surprises.

The way requisitions come in now, I am suspicious that they are not carefully thought through. Even if they are, it is difficult for us to put a few requisitions at a time into perspective of the total plan. The only ones that should come in on a day by day basis would be for replacements.

To get this started you would have to tell people what you now have on order from them, and ask that any additional needs be documented, say within ten days of your report. If anyone comes in with additions after that, we could then spend time on an exception basis finding out why it is needed and not planned in the original budget.

HSM:pah

CC: ✓ K. Olsen
W. Hindle

Copy to Win Handle

1/31/67



INTEROFFICE MEMORANDUM

DATE January 26, 1967

SUBJECT Attached Letter from General Motors Corporation

TO Ted Johnson
✓ Ken Olsen
Nick Mazaresse
Stu Ogden

FROM Bob Fronk, Ann Arbor

RFJ

Attached is a copy of a letter we received from the General Motors Corporation.

I feel we should try to participate in this. We would like to still consider it, if possible. Could we have some help on it?

We sincerely hope we can as it would give us a "giant step" into General Motors along with becoming known to other organizations. When we consider 500 people representing 44 activities, in attendance, it may be worthwhile spending some time.

Please inform us as to your feelings so that we can start soon in the proper direction.

Synopsis due:	February 6.
Acceptance to Occur:	During February
Final Version of Accepted Papers Due:	No later than March 15.
Meeting to be Held:	April 5 and 6.

RLF:tmb
Enclosure

KEN OLSEN

Bob, we should try for this, maybe with help from Maynard. What do you think?
Frank



RESEARCH LABORATORIES

GENERAL MOTORS CORPORATION

2V *[Handwritten signature]* E E - 200 /

January 18, 1967

RECEIVED

JAN 23 1967

DIGITAL EQUIP. CORP.

Mr. Frank Hibberd
Digital Equipment Corp.
3853 Research Park Drive
Ann Arbor, Michigan 48104

Dear Mr. Hibberd:

The General Motors Committee on Engineering Computations will hold its eleventh Annual Meeting on April 5-6, 1967. The objectives of this Committee stated very tersely are: to provide a forum for General Motors' computer users, to suggest standards and to provide for exchange of information. A major activity of the Committee is the Annual Meeting at which a timely computer-oriented theme is pursued. The program consists of technical papers prepared and presented in a General Session and several parallel subcommittee meetings.

The General Session of the 1967 Annual Meeting to be held during the afternoon of April 5 has been opened to include technical papers presented by individuals representing organizations outside of the General Motors Corporation. The subject of the papers should support the meeting theme, "SPECIAL PURPOSE COMPUTERS." The intent of the session will be to explore the use of computers in particular dedicated applications. In some instances, these applications will use the capability of a general purpose computer. Process control, management information systems, data acquisition and on-line test control systems are typical subjects encompassed by the meeting theme. Descriptions of applications exploiting other kinds of on-line "things" are also candidates for the General Session.

If your organization is interested in being considered for a place on the program at the 1967 Annual Meeting of the GM Committee on Engineering Computations, please submit the following information concerning the paper you are offering by February 6, 1967.

1/18/67

Send: 1. Title of Paper
2. Speaker's Name
3. Background information on the speaker
4. An Abstract (about 100 words)
5. An estimate of the presentation time
(the usual presentation time is about 30 minutes)

To: D. E. Hart, Chairman
GM Committee on Engineering Computations
Research Laboratories
General Motors Corporation
12 Mile and Mound Roads
Warren, Michigan 48090

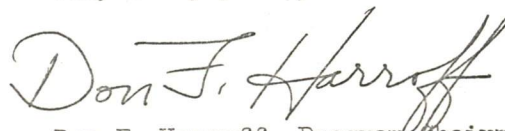
The final paper selections will be made during February. If your paper is accepted for presentation, the final text of the paper, as it is to be presented must be submitted no later than March 15, 1967.

For your information, the attendance at the 1966 Annual Meeting was 500 people representing 44 major Corporation activities located from New York to California.

As has been customary, there will be a social hour and dinner the evening of April 5, 1967. All of the speakers at the General Session are invited to attend this function, as a guest of the Committee, to provide an opportunity for informal discussion.

If you have any questions and wish to discuss this subject further, please don't hesitate to call.

Very truly yours,



Don F. Harroff, Program Chairman
GM Committee on Engineering Computations

DFH/nc



INTEROFFICE
MEMORANDUM

COMPANY CONFIDENTIAL

DATE January 26, 1967

SUBJECT ENCLOSED GRAPH

TO Ken Olsen ✓
Stan Olsen
Ted Johnson
Al Devault

FROM Frank Kalwell

The attached graph indicates a record of module orders booked and billed for the current fiscal year through January 21, 1967.

FKalwell

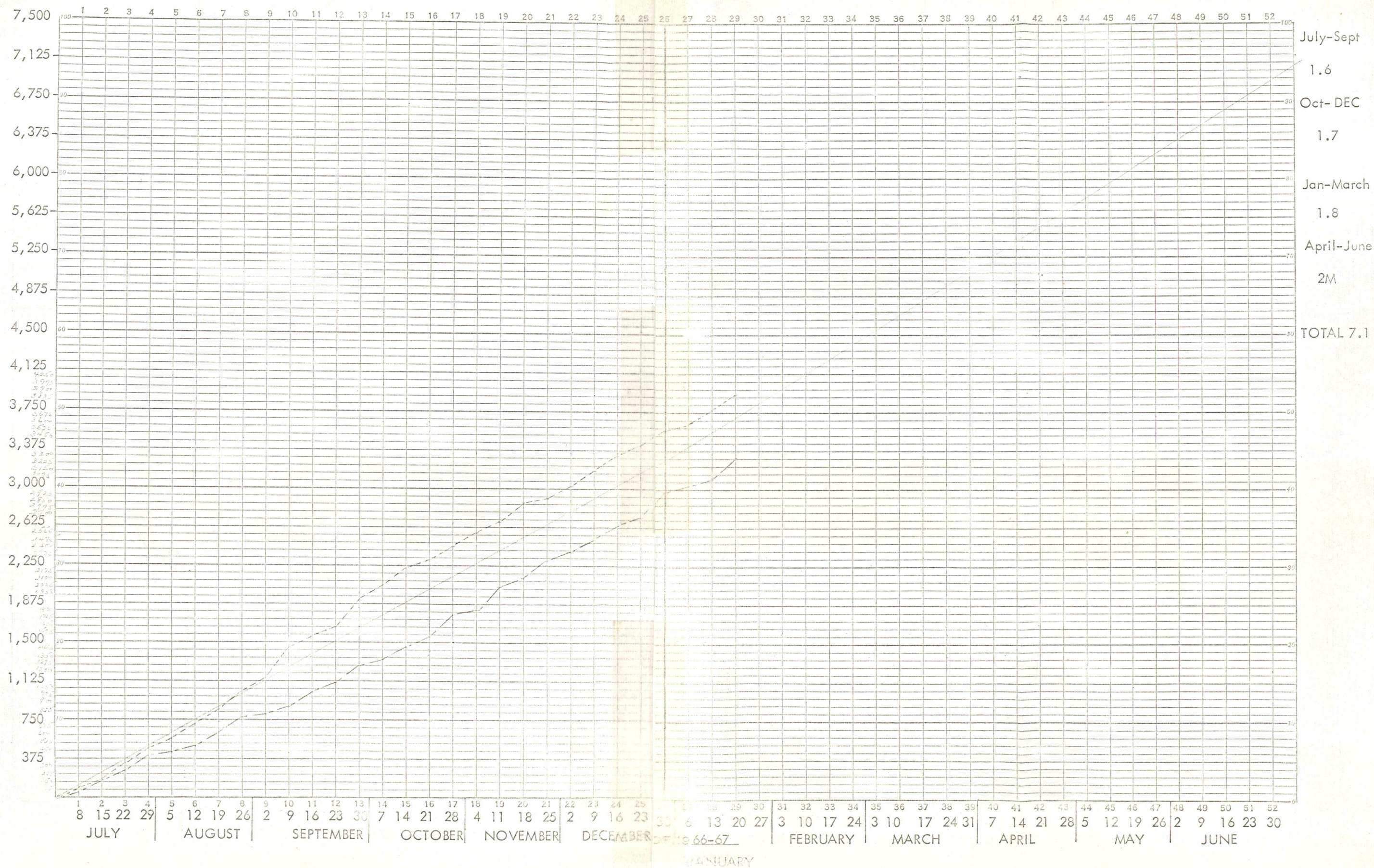
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COMPK BOOK COMPANY, INC. NORWOOD, MASSACHUSETTS, PRINTED IN U.S.A.

NO. 4102. ONE YEAR BY WEEKS X 100 DIVISIONS.

BILLINGS ———
MODULE SALES FORECAST ———
BOOKINGS - - - - -

COMPANY CONFIDENTIAL



Copy to Ted Johnson

1-31-67

dec

**INTEROFFICE
MEMORANDUM**

DATE January 26, 1967

SUBJECT Mitre Corporation, Complaint Report

TO Ken Olsen **FROM** Mike Ford

cc: N. Mazzaresse
H. Painter
R. Handy

Mitre Corporation's complaints were as listed below:

1. RFQ given to Dick Sorensen was not answered.
2. Purchasing told Sorensen of a bad TTY. Sorensen said a man was coming to fix it. Sorensen failed to get this across to Field Service - thus, no one showed to fix.
3. Salesman promised \$12,000 worth of credit on PDP-8 for returned modules. When transaction took place, such credit was only \$7,500.
4. "New" PDP-8 was delivered with hour-meter reading of 406 hours.
5. Response time of their bi-lateral purchase order has been as much as 4 to 5 weeks. Last one was lost and turned up in Mike Napper's in basket.
6. DEC failed to honor our own Terms and Conditions as requested on the face of a P.O. by not notifying a Mitre engineer when his machine was beginning acceptance test.

I have discussed all of these problems with Dave Pike (Purchasing) who is an old friend - he agrees that Items 1, 2, and 3 were basically the result of a misunderstanding between he and Dick Sorensen. I explained Items 4, 5, and 6 to his satisfaction. We ended the conversation on a positive note. He said the following:

1. DEC has wonderful products - we get 100% of Mitre's business.
2. DEC has always "bent over backward to give good service".
3. DEC has "great delivery".

Mitre is not unhappy now. We should pay special attention to servicing their orders and requests as rapidly as possible from here on out.

Mike

ejb



INTEROFFICE MEMORANDUM

DATE January 25, 1967

SUBJECT Quantity Discounts

TO Ken Olsen
cc: Harry Mann

FROM Nick Mazzaresse

Attached please find analysis I had Mike Ford do back in August. Does this answer your questions about the "profitability" of our discount policy? Also note that we are the only product line that took the time to ANALYZE the effect of the Quantity Discount. Your criticism was misdirected.

NJM:cmp
Enclosure

dec

INTEROFFICE
MEMORANDUM

DATE August 2, 1966

NJM	
JAN 25 1967	
FILE	

File Budget Note Book new Budget section

SUBJECT New Quantity Discounts and List Prices - Revision 1

TO Nick Mazzaresse FROM Mike Ford

cc: Harry Mann
John Jones

The attached are the PDP-8 versions of the Computer Quantity Discount Plan. The attached and John Jones' edition will be combined into one set of documents, since they are almost identical in wording and will be submitted in a few days.

The attached plan utilizes the common per cent vs. volume discount schedule. The discounted price is computed by subtracting the applicable per cent of list price from the list price of all discountable items except the PDP-8 processor itself. For OEM customers, only the processor discount is computer by subtracting the applicable per cent of \$16,000 from \$16,000. For non-OEM customers, the processor discount is computed by subtracting the applicable per cent of \$18,000 from \$18,000.

It is further proposed that the following be adopted as NEW LIST PRICES effective 1 September, 1966:

183 Memory Extension Control	\$1,500
184 Memory Module	\$7,500

The average standard cost for these items is as follows:

183 Memory Extension Control	\$ 400
184 Memory Module	\$2,500

To assure ourselves that adoption of these pricing policies will not diminish the PDP-5/8 gross profit too much, we can calculate the average discount for Fiscal '66, the average discount for Fiscal '67, and obtain the difference. This difference of average per cent discounts may be subtracted from the budgeted gross profit per cent to determine the per cent of gross profit under the new discount plan.

This is going quite close to book! (see p 3)

To do this computation, we make the following assumptions:

- A. 66% of total PDP-5/8 volume is in PDP-8 processors*
 20% of total PDP-5/8 volume is in PDP-8 peripherals
 13% of total PDP-5/8 volume is in PDP-8 memories
- B. 40% of processor volume is discountable
 10% of peripheral volume is discountable (~~X~~ 40% '67)
 40% of memory volume is discountable
- C. Average quantity and OEM discounts for Fiscal '66 are:
~~10.4~~
~~9.5%~~ for processors
 5% for peripherals (OEM discount only)
 22% for memory

Thus, for Fiscal '66, from Assumptions A and B:

Processors: 66% (volume) x 40% discountable = 26.4% of volume
Peripherals: 20% (volume) x 10% discountable = 2.0% of volume
Memories: 13% (volume) x 40% discountable = 5.2% of volume

Average discount for Fiscal '66 is then: (from assumption C)

Processors: 26.4% (volume) x ~~9.4%~~^{10.4} discount = ~~2.5%~~ 2.77%
Peripherals: 2.0% (volume) x 5% discount = .1%
Memories: 5.2% (volume) x 22% discount = 1.1%
AVERAGE DISCOUNT FOR FISCAL '66 ~~3.9%~~ 3.9%

FISCAL '67

Assumptions:

1. Assumptions A and B hold for Fiscal '67.
2. That the average quantity discounts for Fiscal '67 would be as follows:

17.8% for processors
 7.0% for peripherals
 40.0% for memories

Thus, for Fiscal '67, the average discount would be:

<u>Processors:</u>	26.4% (volume) x 17.8% ^{20%} discount = 4.5% ^{5.3%}
<u>Peripherals:</u>	2.0% ^{5%} (volume) x 7.0% discount = .14% ^{.72%}
<u>Memories:</u>	5.2% (volume) x 40.0% discount = <u>2.1%</u> ^{no}
<u>AVERAGE DISCOUNT FOR FISCAL '67</u> <u>6.7%</u> ^{7.1% = 8.12%}	

The year end figures show a gross profit of 49%. The above analysis indicates a reduction in this gross profit of 3% (~~6.7%~~^{3.7%}) down to ~~46%~~^{46.4%}. However, the Fiscal '67 budget budgets a ~~46%~~^{46.4%} gross profit of ~~46%~~^{46.4%} and thus the proposed pricing policy is in line with the Fiscal '67 budget.

In addition, the effect of a 20% reduction in PDP-8 processor manufacturing cost has not been factored into this analysis. The proposed pricing does not endanger the proposed profit margin at all.

last budget assumed 10% somewhat less!

APPENDIX

Justification for Assumptions

A. The average billing per system (before discounts) in Fiscal '66 was \$28,000. Thus, $\frac{18}{27} = 66\%$ of total volume was processors

We have built approx. 180 184 memories @ \$10,000 = 1.800K

We have built approx. 156 183 memory controls @ \$3,000 = 450K

TOTAL MEMORY VOLUME = 1.250K

Total volume = 10,000K

% of volume due to extra memory = 12.5% = 13%

B. As of July 1

112 customers have received <u>1</u> machine	
31 customers have received <u>2</u> machines	62
7 customers have received <u>3</u> machines	21
<u>5</u> customers have received <u>4</u> machines	20
4 customers have received <u>5</u> machines	20
<u>3</u> customers have received <u>6</u> machines	18
2 customers have received <u>7</u> machines	14
1 customer has received <u>8</u> machines	8
<u>1</u> customer has received <u>9</u> machines	9
1 customer has received <u>10</u> machines	10
1 customer has received <u>21</u> machines	21

Thus, 112 customers received 0% discount

- 103 ~~43~~ customers received 0% quantity + 9% OEM = 9%
- 69 11 customers received 2% quantity + 9% OEM = 11%
- 31 2 customers received 5% quantity + 9% OEM = 14%

Weighted average discount on processors then is:

103 43 x 9 = 387	927
69 11 x 11 = 121	759
31 2 x 14 = 28	434
<u>203</u> 56) 536 = 9.5%	<u>203</u> 2120
	10,40%

Average discount on peripherals is judged to be 5% OEM price since very few multiple (non-memory) peripherals were ordered of any consequence.

Average Discount on Memories

OEM discount = 20%
 Quantity discount = 2% (The majority of OEM extra memories fall into the 5 - 9 (2%) range)
22%

C. Based on the same table used in C above, the average system discount '67 would be for processors:

83	38 customers @ 5% quantity + 11% OEM = 16%	1330
58	12 customers @ 10% quantity + 11% OEM = 21%	1248
31	4 customers @ 12% quantity + 11% OEM = 23%	1713
32	1 customer @ 15% quantity + 11% OEM = 26%	832

Weighted average for processors = ~~24.7%~~ 17.8% 4093

Weighted average for peripherals = 7%

Weighted average for memories = 10% quantity + 30% (price reduction) = 40%

to carry this forecasting down to the level of the individual salesman. Previously, frustration was experienced when budgeted expenses could not be executed without going back to Maynard for approval yet again. Ted is working on this problem. Individual regional year-to-date results were presented for comparison against sales budgets recently prepared by the regions, but there was no discussion of individual figures. Some further work is necessary to arrive at a smooth, automatic procedure for feeding back performance figures to the regions regularly.

Policy and Procedures

Ted emphasized the importance of our playing by the "company rules" and of the people at the plant really trusting that we are doing this. The Policy and Procedures Manual should lay out most of our guidelines. It is confidential to Regional Managers but we must make certain information available to the individual salesmen, (e.g., expense policy) and could plan toward marking documents which are suitable for distribution to salesmen.

With a view to rehashing the existing "black book", copies of the index were distributed (a March 18, 1966 memo actually). Regional Managers were requested to note down what policies should be under these headings, and generally to contribute to the establishment of an effective manual. (Please mail this information back to Bill Farnham.)

Long Range Planning

Two documents were issued, one (copy of memo from Ted Johnson to Stan Olsen and Nick Mazzaresse) discussing sales policy with regard to present coverage of market areas, immediate needs for office development and a discussion of "how to sell." The second document contained guidelines for office selection and a schedule through 1969 for establishing new offices.

Ted emphasized the importance of finding the right man to open up a new area, pointing out that this was the major factor determining timing. There is an obvious need for a higher level of training for a man opening up a new remote area. The initiative for establishing new offices was expected to come from the Regional Managers and the final decisions on timing, people, location, facilities, etc., to be worked out in conjunction with the Sales Manager.

Field Service/Sales Liaison

Ted presented a memo on "Lines of Responsibility and Authority in the Field Service/Sales Organization" and the subject was discussed at length. There was strong feeling that local field service and sales people should be located at the same site, where possible, and be encouraged to cooperate closely. This should encourage the field service man to act in a selling role (distributing computer and module handbooks, feeding back useful tidbits of sales information) and minimize any feelings on the part of the field service man that the customer is "out to get all he can from DEC, and he is out to stop him." The problem to be avoided when sales and service people work closely together is the salesman attempting to pre-empt the service-man's time directly without working through field service management.

The point was made that previous field service training left the trainee without a good orientation toward life in a field office - practical working habits, time accounting, assisting the sales effort, etc. Jack Shields was working on this deficiency. It was suggested that Regional Managers could help in orienting new field service trainees toward contributing to the sales effort of the field office.

Reporting System

A document describing the new reporting system was submitted and discussed. There was a diversity of feeling on Sales Call Reports, with the objections questioning their usefulness to the product marketing people. Their local usefulness was agreed to and for some regions (e.g., Australia and Mid-Atlantic) they have been very effective as a management information media. The Sales Call Report question was not discussed exhaustively. However, it is clear that salesmen must document their contact with customers, etc., since this constituted important company information and should be permanently recorded.

The Regional Managers Monthly Summary and Forecast Review were described in the document "New Reporting System." These reports are expected to evolve quickly in format to a solid reporting system back to the product people, and to be supplemented periodically with special reports or forecasts on demand. This new reporting channel from the regions, through the Sales Manager, is an important facility. Its effectiveness will be a measure of the success of regionalization.

Training and Sales Support Information

Training programs for new applications people were discussed. There was fairly general agreement on a pattern involving:

1. A few weeks of orientation in the field office looking through the files, reading the literature, tagging along with an experienced man on customer calls.
2. About 3 weeks in Maynard attending a maintenance and a programming course, plus a schedule of meetings with product marketing people, learning what we have to sell and how to sell it.
3. Return to field office (or spend a few weeks in another office to get a broader experience) and work on some non-critical customers, preparing small quotes, doing logical design jobs, following-up bingo cards, giving modules seminars, etc.

It was generally agreed that there is a need for additional courses on:

How to Sell (especially how to sell in DEC's environment)
DEC Procedures and Policy

It is also apparent that programming training, especially basic concepts and some hands-on experience, must play a more important part in our field force training program than it has in the past. In considering the kind of "programming" man to hire, there is room

on the regional level for a programming specialist, especially a high level systems man. The pure programmer (mathematician) salesman (as proposed by Dave Cotton later) seemed to be considered an extreme limit, but the engineer/programmer combination constituted an attractive background for a DEC sales trainee.

Clearly, this subject of who to hire and how to train, needs further examination.

Sales support literature was discussed at this, and later, sessions. Areas of need are:

1. "Salesy" boiler plate for inclusion in proposals.
2. Keyword subject index for sales notebooks.
3. Applications oriented sales training and customer information literature.

Wage and Salary Review

Ted issued questionnaires to be filled out in private and returned, giving typical salary levels and ranges for all types of regional staff. It is important for Regional Managers, particularly those from non-domestic areas, to lay out and update periodically, salary levels for the various job categories. It is up to the Regional Manager to see that his sub-management is adequately paid, so that the structure of his region is safe. Emergency salary adjustments should be kept at a minimum by keeping on top of the salary position.

The company aims to match compensation to the contribution of the individual. For comparison purposes, the bookings per man, based on actual 1966 results are:

- \$250K for modules
- or \$500 - 750K for small computers
- or \$650K for large computers

Evaluation techniques were discussed (e.g. Ken Larsen weighted calls per day scheme) and it was suggested that everyone submit suggestions for an evaluation sheet.

There was considerable discussion of the salary review process. The point was made that managers need to give Ted adequate backup information to support salary change requests, so he can do the best job at the review committee. There were requests for spelling out exactly how this review process works:

Salesmen - Personnel sends listing to Ted (on the anniversary of employment date) who forwards names to Regional Managers, with comments on what to be alert for, if necessary. Regional Managers return recommendations to Ted which he then takes to the Review Committee. The system soon saturates if the committee feels salaries are out of control, due to too frequent emergency adjustments. There is no 6-monthly review for these people. If recommended, it would be classed as an emergency adjustment.

Field Service - Salaried people are processed the same way, except that Personnel communicates with the field through Jack Shields and if there is a Regional Field Service Manager, the request for review should go to him. The Regional Sales Manager should still, however, take part in the salary recommendation.

Hourly Field Service and Secretarial - These people are reviewed after 3 months and, if satisfactory, generally receive an increase. Thereafter, they are re-evaluated calendar quarterly and usually their wage rate is adjusted in July, based on the April/May review. For hourly people, both field service and secretarial, the review request comes from Personnel to the Regional Manager, who must ensure that it is attended to by the appropriate manager (District Sales Manager or Regional Field Service Manager) and returned to Personnel.

Hourly to Salary Transition - Jack Shields reported that hourly field service staff were limited to \$3.25 to \$4.00 per hour. When they reached about \$3.40 per hour, and were good company representatives, they go onto a salary of over \$7,000. Although they no longer get overtime, and would likely lose money if they had been working a lot of overtime, they now have gotten past the salary ceiling and are not dependent on overtime (which cannot be assumed to continue indefinitely). It is not, of course, assumed they will cease working overtime!)

Treasurer's Comments

Harry Mann made the following points relating to our exercising good business sense.

1. Look out for customers signing discount agreements facetiously.
2. Help in applying our net 30 days payment terms, since our budgeting and pricing is based on prompt cash collection.
3. Our F.O.B. terms mean payment becomes due whether or not the customer has a going piece of equipment after 30 days (e.g. damage in shipment).
4. Sales cost for \$1 billed is a useful measure of sales success, however, there are other approaches. For example, as we get bigger we have a very sizable investment in inventory, office space, furnishings, etc. (capital expenses we can buy, but not so easily "un-buy"). These expenses are not as directly related to sales volume as are other operating expenses. As a big company, our profit is measured not only against sales volume but also against invested capital. Our problem is how to do a greater volume of business with a minimum outlay in capital.
5. Some of the controls exercised, e.g. on expenses, first class travel, etc., are to ensure all employees have the same working conditions. DEC doesn't have preferential treatment (e.g. Harry doesn't have a private parking slot!)
6. Concerning property leases, considerable lead time is needed to look over these leases as we don't yet have our own attorney. Try to plan ahead and avoid the crisis as often as possible.



INTEROFFICE MEMORANDUM

DATE January 25, 1967

SUBJECT SCHEDULE TO IMPROVE DOCUMENTATION SERVICES

TO K. Olsen

FROM Roger Melanson

H. Mann
P. Kaufmann
W. Hindle
T. Johnson
N. Mazzaresse
S. Olsen
L. Prentice

To meet the established schedules it is necessary for certain members of the Production, Accounting, Purchasing, Field Service and Engineering Departments to work closely together to develop the detailed procedures that are so important before the systems can effectively and efficiently be used.

I. Better Model Control

Immediate action to control changes taken by Production
Written procedure -- February 20th.

II. Common Parts List

In Manual Form -- March 10th.
Computer Print-out -- April 17th.

III. One ECO System

April 1st.

IV. Drawing Check List

March 6th.

V. Unified Part Numbering System

Accepted and is being implemented.

VI. Print Distribution System

Feasibility Study -- March 31st.
Operational -- May 1st.

rh



INTEROFFICE
MEMORANDUM

DATE January 24, 1967

SUBJECT Technicon

TO

Nick Mazzaresse
Howie Painter
Mike Ford
Ken Olsen
Dave Denniston
Dave Dodge

FROM

Mort Ruderman

I recently received a call from Al Brooks, and his request was to schedule someone in the Maintenance Course. His call gave me the opportunity to ask him how they were doing. Al is one of the more reasonable people at Technicon, and he says they will be ready for the Federation Show, in the middle of April, to demonstrate Technicon's equipment on-line to the PDP-8. This is the most encouraging news I have heard in a long time. He indicated that hardware is in good shape, and their programming is coming right along.

I am informing you of this so that you will keep the faith, and I feel that we are getting closer to success with Technicon.

Thank you.

MER:djc



INTEROFFICE MEMORANDUM

DATE January 24, 1967

SUBJECT Move Proposal

TO Harry Mann
Nick Mazzaresse
Win Hindle
Stan Olsen
Ken Olsen
Jack Smith

FROM Pete Kaufmann

This is a proposal to occupy the second half of the third floor of Building 5.

The anticipated moves are on the attached chart. The move would accomplish the following:

1. Give an additional 3200 sq. ft. to the PDP-9 group.
2. Give an additional 13,800 sq. ft., on the fifth floor of Building five, for: Linc 8 expansion, PDP-10, and Digital Test Operation. Digital Test would move into offices vacated by Jack Smith.
3. Mike Ford's group could move to the third floor of Building five and take the space vacated by Pat Green.
4. Accounting could utilize the space now occupied by Mike Ford.
5. A minimum number of offices would have to be built. Offices will only have to be built for Production Control, Jack Smith and Pete Kaufmann.

Pete

PJK/jab

Building 5 Fifth Floor
Move 1

PDP-9 Expansion
PDP-10 Space available
Digital Test

Building 5 Fourth Floor
Move 1

Peripheral Assembly and Test
Mag Tape
DEC Tape
Teletype
Tape Transports
Disc
Displays
Peripheral Stockroom

Building 5 Third Floor
Move 1

Pete Kaufmann's Office
Jack Smith's Office
Production Control Office
Stockroom
Super 8 - Final Test
PDP-8 Off Line Peripheral Test
Sub Assembly

Crating

Mike Ford

Move 2 (if Necessary)

Basic 8's

Building 5-3

available space 26,400

	<u>Current</u>	<u>Proposed</u>	
Stockroom	3600	7200	
Prod. Ctr.	716	1000	
Basic 8's	5,600	5600	MOVE 2
System 8	2,400	2400	
PDP-8 options	900	1500	
Sub-assembly	3,500	4800	
Crating	1800	1800	
Office area	<u>1200</u>	<u>1500</u>	
	19,716	25,500	

This would vacate

17,000

5-5

10,000 sq ft.

5-4

Building 5-5

Lines	1800	
PDP-9	8800	12,000
PDP-10	0	

This would allow 13,800 sq ft for Lines equipment and PDP-10

Building 4-4 available space 13,000

Doc Tape assembly & Checkout TC01 - TC02
Mag Tape assembly & Checkout 57A - 545 - 580 - TV77
Disc.

Peripheral assembly & Test Teletype, reader, punch
Displays 340, 343, 338

Peripheral Storage Teletype, reader, punch.

Building 4-2 Available space 13,000

currently occupying 7,000 sq feet.

would allow for expansion 6,000 sq. feet



INTEROFFICE MEMORANDUM

DATE January 24, 1967

SUBJECT TU/79 Review

TO Ken Olsen
S. Olsen
N. Mazzaresse
T. Johnson
W. Hindle
H. Mann
TU/79 Review Committee
R. Boisvert
P. Backholm

FROM Ed Harwood

There was overall agreement that the appearance of the transport was good and quite compatible with the computers they would be connected to. There was a suggestion made concerning changing the color of the base plate from black to grey.

The committee suggested removal of the density switch, which Roland agreed to do. The committee also wishes to make note of the fact that the sliding glass door works well.

The logical layout was reasonable and the inside of the cabinet looked pretty clean.

It was very difficult to discuss the ease and cost of production at this time. Some slight changes in the design may have significant effects on the cost of production. It was brought out that the manufacturing cost was now estimated at around 4K. It was initially estimated at 3K.

Listed are some unanswered questions which must be resolved.

1. Is it going to be a 7 or 9 channel drive and where are the plans in writing about what is going to be done.
2. There are insufficient, well defined bench marks in the schedule. We were unable to get a clear picture about what would be accomplished during the times noted on the schedule.

3. The specifications need more definition concerning:
 1. Number of acceptable permanent read errors.
 2. Number of acceptable recoverable read errors.
 3. Number of acceptable permanent write errors.
 4. Number of acceptable recoverable write errors.
4. The power control should be changed to the new 110 volt type.
5. The temp. specs need clarification. (Are they the same as the rest of the computer system?)
6. May need module hold down bars.
7. If the reel servo is able to stop from full speed rewind, we could eliminate sensor and step down in speeds.
8. To run reliably at 800 BPI, we should run our tests 10% higher or 880 BPI.
9. There is a problem getting the capstan motor and tachometer in time.
10. There should be strain isolation between the jig plate and the cabinet and also perhaps between the vacuum columns and the cabinet.
11. There should be two running time meters added, one for AC power, the other for running time.

General Conclusion

Although it is still early in the project, much has been accomplished. Much more remains to be done. There should be another review in approximately three months and possibly by a different committee.



INTEROFFICE MEMORANDUM

DATE January 23, 1967

SUBJECT Status of Dual Dectape Units Type 555

TO Ken Olsen

FROM Nick Mazzaresse

The Type 555 Dual Dectape Unit is a standard part of our PDP-6 computers. This unit was discontinued in the Small Computer Product Line some six months ago and we have ordered no units during that time. The PDP-6 group has booked an order with Manufacturing for three units this year. The PDP-6 group is not ordering any further units as they will not be using the 555 in the PDP-10 computer. The status of the 555 inventory is currently being checked by Jack Smith, and he will advise you when he has this completed.

NJM:cmp

cc: Jack Smith

INTEROFFICE
MEMORANDUM

DATE January 22, 1967

SUBJECT OEM Business in Sweden

TO Product Line Managers
Ken Olsen ✓
Harry Mann

FROM Ted Johnson

Here is a list of OEM prospects in Sweden. We will add more. I think the "potential" is underrated, especially with ASEA and SAAB, but at least this indicates some of our high potential business there and this should be of interest to you with our office going in there.

TJ:mr

Attachment

OEM Sweden

<u>Company:</u>	<u>Dollar Potential '67:</u>
1. Aga	300,000
2. ASEA	60,000
3. ARENCO	50,000
4. Standard Radio & Telefon	80,000
5. L.M. Ericsson	50,000
6. SAAB	30,000
7. SKF	30,000
8. Kockums	15,000
9. Nya Materiel Test	20,000
10. Solartron	?
TOTAL:	<hr/> 635,000 <hr/>

JL/hc
6th January, 1967.



INTEROFFICE
MEMORANDUM

SUBJECT: FOXBORO

TO: All Office Managers

cc: Ken Olsen ←
Ron Wilson

DATE: January 19, 1967

FROM: Ted Johnson

Some rumours have been circulating about our current relationship with Foxboro. Here are some of the facts and the information you should have to deal with any false information that may be around.

We have not lost Foxboro as a customer. They will continue to purchase PDP-8s to use in their PCP 80 system. They are also going to use PDP-9s for power plant applications in place of the PDP-7. We have a letter of intent for one PDP-9. After Ron Wilson and Foxboro complete the purchase specifications, we will receive their purchase order.

Foxboro has ordered one SIGMA II. This will be tied to an analog computer and used as an analog controller in an evaluating system. They have been placing all of their eggs in one basket and now feel the need to at least try out or evaluate some other computers. The analog controller will be an EAI which they will use for application simulation. The SIGMA II will test the system and act as a test controller.

It is very possible that having another vendor in Foxboro will prove to be an advantage to us, if only to give the customer a more realistic comparative view of equipment and service. We feel we have been giving them excellent service and look forward to a continuing relationship with Foxboro.

TJ:mr



INTEROFFICE MEMORANDUM

DATE 19 January 1967

SUBJECT Proposal for Basic Programming Course.

TO Ken Olsen ✓
Stan Olsen
Win Hindle
Nick Mazzaresse
Ted Johnson
Pete Kaufmann
Harry Mann

FROM Jim Davis

Reference: Original proposal of December 29, 1966 (see attached copy).

A meeting was held on the original proposal on January 16, 1967. The people attending were John Jones, Howie Painter, Bill Landis, Ron Wilson, Mort Ruderman, Bob Lassen and myself.

The high point of the discussion was the need of a basic programming course and how to implement it. The conclusion was that we do need the course and it should be first taught using an instructor in a classroom and lab setup, with the possibility of computer aided teaching in the future. Other points of the proposal were discussed with no recommended changes.

I submit the proposal for your approval.



INTEROFFICE MEMORANDUM

DATE 18 January 1967

SUBJECT Basic Programming Course.

TO Nick Mazzaresse
Win Hindle
Stan Olsen
Ted Johnson
John Jones
Mike Ford
Bill Landis
Mort Ruderman

FROM Jim Davis

I propose the Training Department offer a one week basic programming course. The objective of such a course would be to bring a student with little or no computer experience to the level necessary to enter the PDP-9, PDP-8/8S or the Linc-8 Programming Courses.

The course should be offered initially at six week intervals with the possibility of increasing to one each month, if necessary.

Each class will accommodate 15 students. The first course would be scheduled in May, 1967.

Advantages of the course:

1. It will allow the course level of the existing programming courses to be raised to include more peripheral equipment.
2. It will be a good sales tool to reach non-computer users.
3. It will familiarize incoming technicians with computer terminology and basic programming.

Cost of the courses:

1. Charge each student \$300.00. (The cost per student week for the period of July thru November 1966 was \$119.00.) By charging a fixed fee of \$300 (no free seats) the course will make money, if this is the philosophy we wish to follow.
2. We can accomplish this program without increasing the Training budget.
3. The course can be scheduled so that it will not require any additional classroom space.

Attached is the proposed course outline.

sg

BASIC PROGRAMMING COURSE OUTLINE

MONDAY

I. Number System.

A. Conversions.

1. Decimal to binary.
2. Decimal to octal.
3. Binary to decimal.
4. Octal to decimal.
5. Binary to octal.
6. Octal to binary.

B. Complement Numbers.

1. One's.
2. Two's.
3. Seven's.
4. Eight's.
5. Nine's.
6. Ten's.

C. Operations.

1. Addition.
2. Subtraction.
3. Division.
4. Multiplication.

II. Logic Operations.

A. And.

B. Or.

C. XOR.

Homework: Number Exercise.

TUESDAY

I. Review Homework.

II. Basic Computer Block Diagram.

A. Film (25 minutes) on computer basics.

B. Input and Output.

TUESDAY (continued):

II. Basic Computer Block Diagram (Continued):

- C. Memory.
- D. Arithmetic Unit.
- E. Control Unit.

III. Computer Terminology.

- A. Bit.
- B. Word and Types of words.
- C. Direct and indirect address, location, register.
- D. OP Codes.
- E. Register transfers.

IV. PDP-8 Block Diagram.

- A. Memory as 256 words.
- B. Registers and purpose.
- C. Control states.
- D. Input and output transfers.

V. PDP-8 Control Panel.

- A. Indicator and switches.
- B. Load Address.
- C. Deposit.
- D. Examine.
- E. Start.

WEDNESDAY

I. PDP-8 Instruction Set (partial).

- A. Memory reference instructions with full addressing of 256 word memory.

WEDNESDAY (continued):

I. PDP-8 Instruction Set (partial) (Continued):

B. CLA, HLT, OSR, CMA, IAC.

II. Simple Programs.

A. Add two numbers ($A + B$).

B. Subtract two number ($A - B$).

C. Add two numbers and store the results.

D. Move some words.

III. Flow Charts.

A. Film (15 minutes) on problem analysis and flow charts.

B. Discussion of flow charts.

C. Problem solution using a flow chart.

IV. Lab.

A. Toggle in the programs that were written in class.

B. Run programs with single instruction switch on.

Homework: a program to write.

THURSDAY

I. Review Homework.

II. Expanded instruction set.

A. All operate group 1.

B. All operate group 2.

C. Input-output instructions.

THURSDAY (continued):

III. Assembler.

- A. What it is.
- B. How to use it.

IV. Input-output.

- A. Device flags.
- B. Converting from computer word to output code for teleprinter, etc.
- C. Program Interrupt.
 - 1. General.
 - 2. How it is used.

Homework: Write a problem in assembly language.

FRIDAY

I. Discuss homework problem.

II. Concept of a loader program.

III. Lab.

- A. Assemble homework problems.
- B. Load the program.
- C. Run the program.
- D. Use desk calculator.
- E. Run demonstration program.



INTEROFFICE MEMORANDUM

DATE January 18, 1967

SUBJECT Slow Moving and Obsolete Inventory

TO ✓ Ken Olsen FROM Pete Kaufmann
Harry Mann

cc: Stan Olsen
Nick Mazzaresse
Win Hindle
Henry Crouse
Jack Smith
Cy Kendrick

A breakdown of the slow moving and obsolete inventory in the manufacturing stockrooms is attached, a complete breakdown of which has been supplied to Ed Simeone.

It consists of the following:

Obsolete Inventory	343,654
Slow Moving Inventory	<u>280,420</u>
	\$624,074

These numbers do not include any slow moving or obsolete material that might be in Digital Test Stockroom, Metal Shops, Large Computer Stockroom, or the module test area.

This is a serious problem. Am sure that the slow moving inventory will shortly be obsolete. I think it is necessary for us to take the following action to try and recoup some of these dollars.

<u>Action</u>	<u>Responsibility</u>
1. Equipment on loans and lease should be analyzed, set in a separate inventory account and either be written off or controlled carefully by the Product Lines.	Product Lines
2. Equipment being used as test equipment in manufacturing should be capitalized or rotated monthly and shipped.	Computer Prod.

Responsibility

3. Equipment residing in other departments should be analyzed, written off, capitalized, or rotated and shipped.

Product Lines

4. Analysis should be made by Purchasing and Engineering to see if any of the slow moving and obsolete material could be used or substituted in the present products.

Purchasing &
Product Lines

5. We should set up a separate dead storage stockroom for all material and attempt to return to vendors or sell to surplus houses.

Purchasing

In order to prevent this from happening in the future, it will be necessary to thoroughly plan the discontinuance of a product in our line, keeping inventory dollars in mind so that we can minimize this cost. In other words we need to sell out our inventory as best as we can prior to discontinuing a product.

Pete

PJK/jab

SLOW MOVING AND OBSOLETE INVENTORY

<u>Module</u>	Slow <u>Moving*</u>	<u>Obsolete*</u>	<u>Total</u>
Raw Material	\$82,815	\$57,583	\$140,398
 <u>Computer Production</u>			
Raw Material	17,100	134,316	151,416
Manuf. Parts	3,345	82,279	85,624
WIP	109,081**	16,293	125,374
Finished Goods	<u>68,079</u>	<u>53,183</u>	<u>121,262</u>
	\$280,420	\$343,654	\$624,074

**Equip. on loan or lease \$16,301 (list attached)

Equip. residing in other depts. that should be capitalized or returned for sale \$41,914 (list attached)

Equip. being used as Test Equip. by Manuf. that should be capitalized or rotated for sale \$50,867

*Includes 4 PDP-7 as follows

	Slow <u>Moving</u>	<u>Obsolete</u>	<u>Total</u>
Raw Material	17,100		
Manuf. Parts		8,704	
Finished Goods	<u>15,236</u>		
	\$32,336	<u>8,704</u>	<u>\$41,040</u>

Equipment on Loan or Lease or at DEC Offices

M-8-196	New Jersey Office	\$ 3,849.52
M-08-8CP-141	New Jersey Office	500.00
M-08-8Mem-219	New Jersey Office	462.13
M-8-472	DEC Palo Alto	6,987.67
M-08-8CP-592	DEC Palo Alto	432.23
M-08-8Mem-572	DEC Palo Alto	386.54
M-08-183-12	8-97, (Loan) MIT	514.52
M-08-183-79	8-438, (Loan) Stanford	446.88
M-08-184-123	(Loan) Stanford	2,721.30
M-22-TU55-163	7-5, (Loan), New York Univ.	----
M-22-TU55-166	7-5, (Loan), New York Univ.	----
TOTAL ON LOAN OR LEASE		\$16,300.79

DIGITAL EQUIPMENT CORPORATION, 300 NAWA WAREHOUSE DRIVE, BOSTON, MASSACHUSETTS

Work In Process (Continued)

Equipment Residing with Other Departments that should be Capitalized or Returned for Sale

M-07-175-18	7-101, Larry Portner	\$ 261.12
M-22-647A-4	Larry Portner	168.92
M-07-444B-55	PDP-9 Development	30.83
M-22-PC0-4	PDP-9 Development	755.36
M-08-160	Special Systems, P. Greene	2,416.99
M-08-8CP-184	Special Systems, P. Greene	500.00
M-08-8Mem-131	Special Systems, P. Greene	600.00
M-08-364	T. Stockebrand	6,906.73
M-08-8CP-418	T. Stockebrand	432.20
M-08-8Mem-390	T. Stockebrand	395.81
M-08-183-64	T. Stockebrand	408.96
M-08-184-103	T. Stockebrand	2,522.84
M-08-189-40	T. Stockebrand	326.24
M-08-804-141	T. Stockebrand	173.45
M-08-KR01-11	T. Stockebrand	200.00
M-22-KC01-4	T. Stockebrand (F. Haefner)	199.58
M-22-AA03B-10	C. Crocker	287.19
M-22-139E-47	C. Crocker	1,793.14
M-08-804-163	8/S Prototype (S. Olsen)	97.37
M-22-PC0-10	8/S Prototype (S. Olsen)	711.62
M-22-125-2	Module Tester (J. Cudmore)	440.62
M-22-550-61	Module Tester (J. Cudmore)	3,238.74
M-22-2322-16	Large Computer (W. Hindle)	378.18
M-22-2322-18	Large Computer (W. Hindle)	594.89
M-22-2322-17	Field Service (P. Gadaire)	505.07
M-22-2322-19	Field Service (P. Gadaire)	623.45
M-08-360	TC01 Test Group (E. DeCastro)	5,582.31
M-08-8CP-403	TC01 Test Group (E. DeCastro)	445.76
M-08-8Mem-398	TC01 Test Group (E. DeCastro)	398.08
M-08-8CP-104	PDP-8 Prototype (E. DeCastro)	779.81
M-08-8Mem-455	PDP-8 Prototype (E. DeCastro)	445.50
M-08-8Mem-541	PDP-8 Development (E. DeCastro)	386.47
M-08-230	DEC Training	7,385.22
M-08-8CP-306	DEC Training	440.14
M-08-8Mem-271	DEC Training	529.55
M-08-804-78	DEC Training	551.90

TOTAL TO BE CAPITALIZED OR RETURNED

\$41,914.04



INTEROFFICE MEMORANDUM

DATE January 18, 1967

SUBJECT Bi-Directional Clutch Brake Single Capstan

TO Ken Olsen
cc: D. Best
L. Prentice
P. Backholm

FROM Roland Boisvert

I have made a preliminary investigation of an alternative single Capstan Drive System with P. Foret.

In summary, his present commercial line is not suitable because of sleeve bearings and clutch response time. He proposes a four phase development contract.

Phase I Cost \$12,550.00, time 3 months develop, fabricate, Assembly & Tests of bidirectional drive, ball bearing unit with redesigned valve for faster response. See attached fig.

Phase II Cost \$4,815.00, 1 month redesign from test results.

Phase III Cost \$16,790.00, 4 months.

Preproduction, incorporative changes from test, Casting, reduce cost of manufacturing tooling cost in this phase is approximately \$10,000.00 of the \$17,000.00.

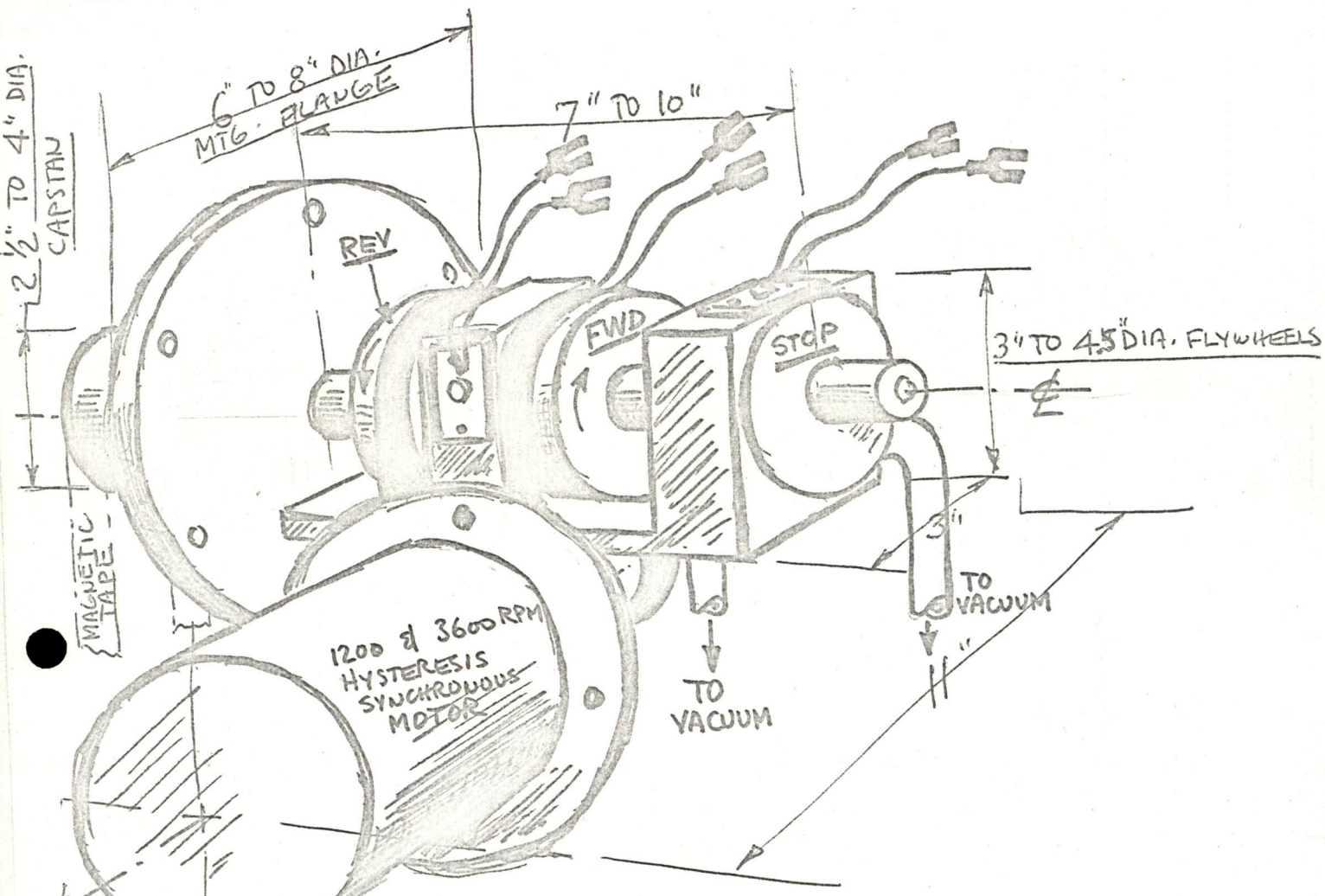
Phase IV Production estimated cost of unit in 100 quantities is \$500.00

Phil and I will forward recommendations in the near future.

Foret
COMPANY

88 Stanton Road
Sudbury, Mass 01776
PHONE 1517 443-8888

vacu corp
electro-vacuum drive
SINGLE CAPSTAN
BIDIRECTIONAL TAPE DRIVE



- TAPE VELOCITY = 75 IPS OR 225 IPS
- BIDIRECTIONAL DRIVE
- START-STOP DISTANCE LESS THAN .600" TOTAL
- START-STOP OR DIRECT REVERSAL FREQUENCY IN EXCESS OF 60 HZ.
- MYLAR BELT DRIVE THROUGH HYSTERESIS SYNCHRONOUS MOTOR.
- TORQUE IN EXCESS OF 320 INCH-OZ.

Foret
1-14-67



38 station road sudbury massachusetts 01776 phone (617) 443-9958

research-development-electro-mechanics

January 16, 1967

Mr. Roland Boisvert
Digital Equipment Corp.
146 Main Street
Maynard, Mass.

SUBJECT: PROPOSAL FOR THE DEVELOPMENT OF A SINGLE CAPSTAN DRIVE
MECHANISM, BASED ON THE VAC-U-TORQ PRINCIPLE.

Dear Roland:

At your request and with reference to the several meetings with you and Phil Backholm, I am pleased to submit a development effort directed toward the production of a bidirectional single capstan drive, tailored for your company and based on our Vac-U-Torq principles.

This proposal is offered as a best effort only, at a fixed cost of \$34,655.00, and with the understanding that an additional \$50,000.00 of production units will be purchased from the Foret Co. during the calendar year 1968 if the developed prototype meets Digital Equipment Corporation specifications.

It is further understood that the basic patent disclosures of the Vac-U-Torq drive, and all its rights, will remain the exclusive property of the P.G.Foret Inc.

It is requested that a sum of \$11,300.00 be advanced to the P.G.Foret Co. Inc., at the signature of the contract. The balance between

the \$34,655.00 and the advanced payment will be billed following delivery to Digital Equipment Corp. of the equipment specified in each phase of work.

It is further agreed that the P.G.Foret Co. Inc. will sell the production Vac-U-Torq single capstan drive mechanism developed under this proposal to Digital Equipment Corp. only, provided that all terms of this agreement are met by both parties.

In production, the P.G.Foret Co. will provide the bidirectional drive assembly, including capstan, but less hysteresis synchronous motor, at a price not exceeding \$500.00 per unit in quantity of one hundred (100) or more at a time.

DIGITAL EQUIPMENT CORPORATION REQUIREMENTS

1. Single capstan tape drive mechanism
2. Bidirectional operation with positive stop
3. 96 inch-oz. torque
4. 75 IPS standard tape velocity
5. Rewind velocity of 225 IPS
6. .600" total start-stop distance
7. Start-stop frequency of 100 Hz

The prototype must be developed as rapidly as possible. The first production run is scheduled to start in December 1967. The drive will include capstan, self-contained drive mechanism for tape deck flange mounting, and a two speed hysteresis synchronous motor. The first mechanical system must include vacuum pump, regulators, gauges and all pneumatic connectors. The remaining electrical portion of the system will be furnished by Digital Equipment Corp.

PROPOSAL- (reference to sketch for clarification)

The commercial Vac-U-Torq clutch does not meet the Digital Equipment Corp. performance specifications.

Without modifications, calculated start-stop distance of the electro-vacuum clutch is .975" at tape velocity of 75 IPS, with an operating frequency of 50 Hz and output torque up to 500 inch-oz. The distance and frequency limitation is due to the large inductance of the commercial coil of 63 millihenries and a still large disc cavity volume.

However, with a tailored development program, the Vac-U-Torq can achieve a start-stop distance comfortably lower than the specified .600" and, with conventional electronic controls, a frequency above 70 Hz at 75 IPS velocity.

Based on calculation and available data, it is possible to achieve a frequency of 100 Hz at 75 IPS, with a start-stop distance optimized at .375". This last goal, however, can only be accomplished by using the so-called electrical hammer blow technique.

We propose a best effort to meet the full Digital Equipment Corp. objectives in four phases:

Phase I- Development, fabrication, assembly and tests of the Bidirectional Drive prototype #1, to be assembled by flange mount to the present Digital Equipment Corp. tape transport prototype. This task will take three months and cost \$12,550.

Phase II- Build and test prototype #2, which will be a modified version of prototype #1, incorporating all improvements resulting from earlier tests. This task will take 1 month and cost \$4,815.00.

Phase III- Bidirectional drive #3 will be the first preproduction prototype, with design modifications incorporating castings instead of separate model shop parts. During this phase, attempt to drastically reduce manufacturing cost will be made, based on predicted production quantity. It is expected that tooling expenses alone will run around \$10,000. This task will take four months and cost \$16,790.00.

Phase IV- This last phase will be the actual production phase. Production specifications, continued life tests and continued improvement program are part of this last task. This bidirectional single capstan Vac-U-Torq drive is expected to cost Digital Equipment Corp. in the order of \$500.00 in quantity of 100 units.

SUMMARY- The total mechanical development program is therefore offered at \$34,655.00.

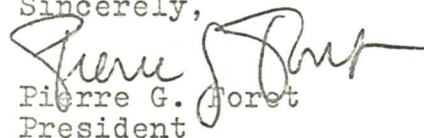
The first production unit would be produced between 8 and 9 months after the start of the program.

Four units would be built during the program, including one vacuum pump system.

Production unit in 100 quantity would be sold to Digital Equipment Corp. at around \$500.00 each, motor excluded.

Hoping that this meets with your approval, I remain

Sincerely,

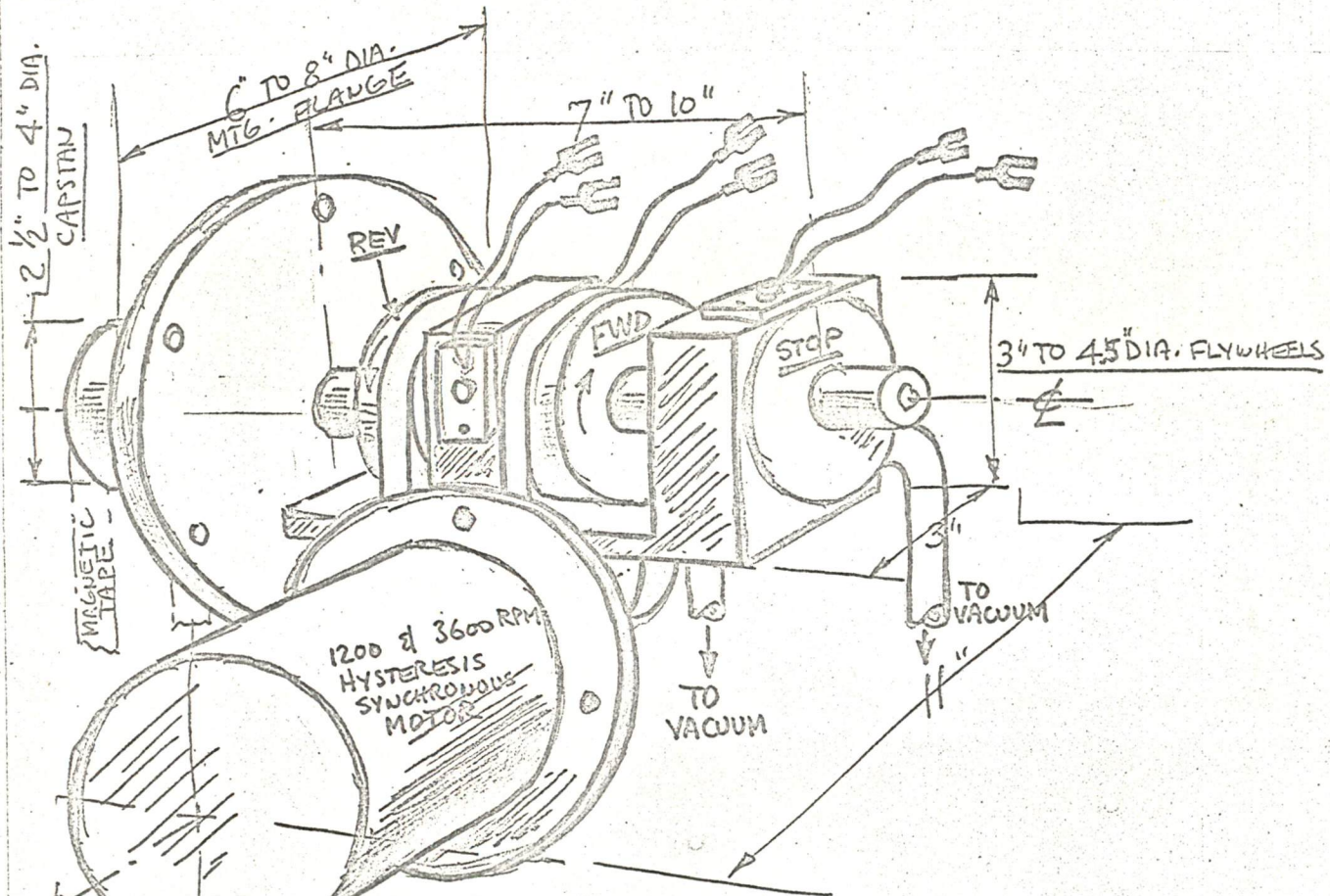

Pierre G. Foret
President

PGF/jf
Encls: sketch

Foret COMPANY

38 station road, sudbury massachusetts 01776 phone (617) 443-9958

research • development • electro-mechanics



- TAPE VELOCITY = 75 IPS OR 225 IPS
- BIDIRECTIONAL DRIVE
- START-STOP DISTANCE LESS THAN .600" TOTAL
- START-STOP OR DIRECT REVERSAL FREQUENCY IN EXCESS OF 60 Hz.
- MYLAR BELT DRIVE THROUGH HYSTERESIS SYNCHRONOUS MOTOR.
- TORQUE IN EXCESS OF 320 INCH-OZ.

Paul Foret
1-14-67



INTEROFFICE MEMORANDUM

DATE 17 January 1967

SUBJECT Diode Array

TO Ken Olsen

FROM S. Ogden

CC: T. Stockebrand

From a trip to MIT I learned that Autonetics in California is building the Diode Array mentioned in the attached MIT Reports on Research. MIT paid Autonetics about \$4k to develop the masks for this particular application. Each silicon on sapphire substrate will cost MIT \$300. Original plans were to put about 26 x 70 diode positions on each substrate. The low yield obtained so far has forced reduction of this goal to 26 x 26 diode positions on each silicon slab, with interconnections used to build up the larger arrays. All the active electronics in the MIT system have to be external to the substrate, which presents a reasonably difficult interconnection problem.

No substrate had been delivered by early December. The single prototype substrate was broken by Autonetics during a lead-bonding step in the manufacturing process. I estimate Autonetics program is about 6 months behind at the present time. MIT's program seems further behind than this.

Don Garr of Autonetics in Cambridge called me after Christmas to arrange an appointment in Maynard to talk about displays. He came out 4 Jan and at my suggestion brought both pictures and more detailed information about the MIT diode program. He and Tom Stockebrand discussed prices and possible DEC uses of this type of diode array. No conclusions were reached as Autonetics has not decided what to do with the program after filling the MIT order. They seem only mildly interested in the three possibilities of licensing the process to another firm, making and marketing the item themselves, or closing off all interest in the product.

I believe the Read Only Program Store of the PDP-9 is a better item for any new character generator for the larger DEC displays: It seems cheaper in a system; it has flexibility of character font; and it has a known availability.

SO:mg

Enclosure

K. H. OLSEN

11/19

Steve Ogden

fluence of such a field, the random action of the salt ions is changed. Further activity is promoted by interaction with electric fields—which are found in all ionic aqueous solutions.

The experiments have revealed a substantial thickening of the ice flakelets due to magnetic fields even with fast freezing, says Professor C. M. Adams, of M.I.T.'s Metallurgy Department, and a veteran ice researcher.

Because of the tremendous difference in electrical properties between saline water and solid ice, the researchers are also carrying out experiments with electric fields. Prof. Adams believes that the combination of fields may excite the ions still further and bring about major changes in both the nucleation and growth characteristics of the aqueous solution.

It's too early to say whether the techniques can be utilized on a large scale, but Prof. Adams thinks that magnetic and electric fields may help put desalinating by freezing on a par with distillation plants, electrodialysis, selective membranes and atomic reactor water conversion.

NEW LIGHT ON CATALYSIS

For many years, industry has sought to produce new catalytic systems with increased productivity, improved selectivity and higher conversion.

In many cases, the experimenters have been frustrated in their aims because once the optimum temperature for a catalytic reaction is exceeded, the conversion rate ceases to rise. In fact, the rate may slow down as the reaction becomes equilibrium-controlled.

Also to be considered is the fact that some materials are thermally sensitive and begin to decompose before an optimum reaction rate is achieved.

Seeking to resolve such problems, researchers in M.I.T.'s Department of Chemical Engineering, Professor Raymond F. Baddour and Assistant Professor Michael Modell, investigated the possibility of altering the reaction rate of a metal-catalyzed, gas-phase reaction independent of temperature and pressure.

Their work has literally thrown new light on solid-phase catalysis.

For their experiments the Institute research team used a high intensity mercury arc lamp. Because such lamps emit a number of frequencies, the researchers placed in front of their light source a series of filters—each of which cut out all but a specified band of the spectrum.

Using a quartz tube as a miniature reactor, the experimenters passed carbon monoxide and oxygen over a palladium wire, which served as a catalyst in oxidizing the gas.

The researchers ran the experiments in the dark. Then they turned the lamp on.

By making corrections to account for the small rise in temperature of the wire caused by the light's heating effect, they were able to determine to what degree light increased the reaction.

With the light on, catalytic activity increased dramatically—in fact by as much as 300 per cent.

Profs. Baddour and Modell also discovered that the effect was limited to a very narrow range of light frequencies. The use of any other frequency raised the temperature of the wire but did not promote catalysis.

The exact mechanism that caused the increase in the catalytic activity is still somewhat in the realm of speculation.

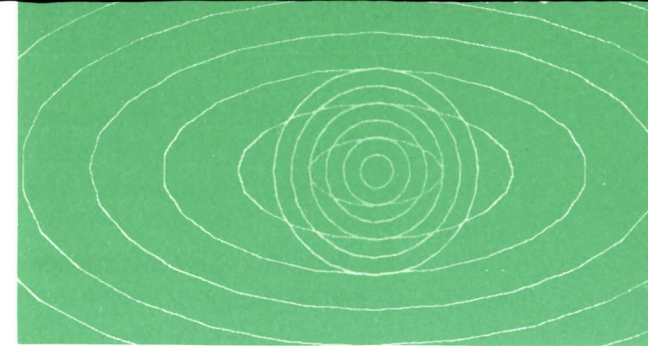
Prof. Modell believes that when the energy from the lamp is absorbed by molecules on the surface of the catalyst, electrons associated with these molecules are excited. They thus are raised from a ground state to one of higher energy, he says.

This brings about a change in the strength of the chemical bonds—both the bonds which make up the molecules and also those between the molecules and the surface of the catalyst. Since the normal catalytic process involves breaking old bonds and forming new ones, the weakening of bonds by the light's action is bound to produce a corresponding chemical reaction, Prof. Modell concludes.

The process has not yet been tried with other reaction systems. But, the professor says that "if the intensity is high enough and the frequency is right, we should be able to get enough molecules excited to make the effect actually observable in other systems—perhaps in all metal-catalyzed reactions."

In the future, he believes, lasers may be used as light sources for the process. Yet different reactions require different excitation frequencies; so researchers must await the development of lasers that can "lase" at a wide variety of frequencies.

Where will the findings to date lead? The two M.I.T. professors believe that the work may prove to be a foundation for much greater selectivity in catalysis and for simplifying reactions that are now difficult to carry out. Perhaps the M.I.T. researchers have discovered a vital first step toward creating entirely new catalytic processes.



Polaroid photographs of characters and drawings on the screen of Project MAC's experimental display.



FAR-OUT DISPLAYS

There is today an increasing demand for display devices by which an engineer can carry on a meaningful conversation with a computer in geometrical, graphical terms. It's the old story of a picture (or a graph, a plot, a chart) being worth more than 10,000 words.

Large, expensive graphical display devices are available in computational centers, but their presence at the computer hub does little to resolve the problems of engineers and scientists located at remote control stations in time-sharing setups.

It would be prohibitively expensive to put the type of displays now available in each and every remote outpost. Then, too, the entire time-sharing system might be overtaxed if such displays were set up in remote control stations.

For example, M.I.T.'s pioneering time-sharing project, MAC (for machine-aided cognition), has at present some 150 remote stations linked by telephone lines to the main computer. Predictions are that when new computing equipment is installed there will be as many as 500 outposts.

The current setup has no displays at the remote terminals. Teletype machines provide the information requested at the outposts in offices and labs and even in the homes of professors. The teletypes print only 10 characters per second (far slower than normal reading speed), and this has been considered something of an annoyance to users. The teletype system is set up basically to handle alphanumeric characters in standard line format, although crude graphs and pictures (the kind made with Xs on a typewriter) can be drawn.

"What was needed was a display-type terminal—costing not more than twice what it now costs for a teletype. One that could handle alphanumerics at 200 characters per second and draw lines and points in a

generalized format," says John Ward, assistant director of the Electronic Systems Laboratory.

He and other engineers, including Robert H. Stotz, set to work (under the sponsorship of Project MAC) to design a terminal that answered the prescription.

Data regeneration was one of the primary problems tackled. When a display device with a standard cathode ray tube is used, data must be regenerated regularly at high speed (30 or 40 times per second) to avoid flicker. Such regeneration typically is handled by high-speed memory devices—which were too expensive to be considered in the design of a low-cost display apparatus. So the group instead used a direct view storage type of cathode ray, one on which an image can be traced by electron beam and on which the image will remain for as much as an hour (although the viewer can wipe it off at any time during that period).

"The advantage of this approach is that all electronics can be of an inexpensive low-speed type and there is no memory limitation on picture complexity," says Mr. Ward.

The generation of both alphanumerics and plots and vectors also presented a challenging problem.

A graduate student, Thomas Cheek, proposed the use of a dot-matrix character generator of a type which—because of speed limitations—has been largely superseded in high-speed regenerative displays. Speed is not, however, a problem in a storage tube display. Also, a dot-matrix generator (such as is used on a football scoreboard) could share many circuits with the line generator.

The display the Institute group used features a 7 by 9 raster of dots, on which individual characters are created by intensifying appropriate dots. Characters—each of which requires 63 bits for specification—are stored in a read-only memory addressed by 7-bit character codes.

A newly-manufactured integrated-circuitry diode array, which contains 13,440 diodes on a half-inch square chip, serves as character memory. This read-only memory contains an array of 96 63-bit words—enough to specify all printable symbols of the new American Standard Code for Information Exchange (ASCII), which will be used in the Project MAC system.

Here, basically, is the way the completed bread-board system works:

A stream of binary code from a telephone line is

read at the rate of 2,000 bits per second to the generator, which translates it into commands and data. Characters appear on the screen at the rate of 200 per second—20 times faster than characters handled by the teletype printer. Drawings can be reproduced rapidly also—at the rate of 200 inches per second. Lines, points and characters have already been printed in a variety of formats.

Perhaps, however, cost is the most promising feature of the experimental display. The total parts cost of the lab's breadboard apparatus—including the oscilloscope used as display device and all electronic parts—was \$3,000. Mr. Ward thinks that complete consoles can be marketed for under \$5,000 per complete unit, once they are in quantity production.

'COPTER DOCTOR

By 1980 executives may be making their intercity business trips by short-haul VTOL aircraft. Such craft, including helicopters, show promise of being no more expensive and as practical from a carrier viewpoint as are other proposed short-haul vehicles—including high-speed trains and buses.

"Airbus" systems would fly passengers at a speed of 400 m.p.h. from the heart of one city to the center of another metropolis. For example, a trip from downtown Boston to Wall St. would take only 30 minutes at the nominal cost of about \$9.

The helicopter has come into its own in Vietnam; but probably nobody reminisces fondly about the comfort of such trips. Travel by chopper (the soldier's sobriquet for helicopter) is rough—and choppy chopper rides probably won't sit well with tomorrow's traveler. The vibrations that jar passengers also are hard on the helicopter itself, designers say.

Such vibrations cause fatigue, faster parts usage and higher maintenance costs, thus detracting from performance, says Rene Miller, H. N. Slater Professor of Flight Transportation at M.I.T.

Prof. Miller, an internationally-known expert on flight transportation, says "There is a strong likelihood that the new generation of helicopters will be limited by vibration even before they reach their potential maximum cruising speed."

For one thing, the basic theory of rotor-induced vibration is not really understood, says Prof. Miller, a member of M.I.T.'s Aeronautics and Astronautics Department. Thus, design is based largely on empirical knowledge and experimental flight data. Engineers usually deal with vibration by adjusting the rate

at which the rotor blade vibrates—a partial solution at best as fuselage vibrations continue unabated.

Prof. Miller and his associates—Prof. Norman Ham and Research Assistant Michael Scully—are currently compiling data on the basic nature of such shudders by making an analytical investigation of the rotor airload. (Cornell University and the VTOL division of The Boeing Company are also studying the problem.) Pictures showing the flow or wake left by a rotor as it cuts through the air are also being used to advantage by the Institute researchers.

To get such pictures they set up a small rotor in the laboratory and forced smoke through a tube in the blade—then photographed the smoky swirls emanating from the end of the blade.

The investigators found that the wake, represented by the free trail of smoke, did not remain in a rigid spiral, as researchers had always assumed it did. Instead, the spiral continually changed shape beneath the blade. From this observation, they concluded that the wake or vortex may be in collision time and time again with the spinning rotor, which has sort of a miniature flapping action.

The researchers believe that such collisions—the wake is a tornado in miniature—can change the blade's angle of attack, thus altering the pitch. In fact, the performance of the aircraft could be altered so much that the helicopter would stall in mid-air, they say.

Because such possibilities exist, Prof. Miller believes that it becomes "all-important that the unsteady aerodynamic effects associated with this wake be included in the studies in which helicopter airloads are to be determined."

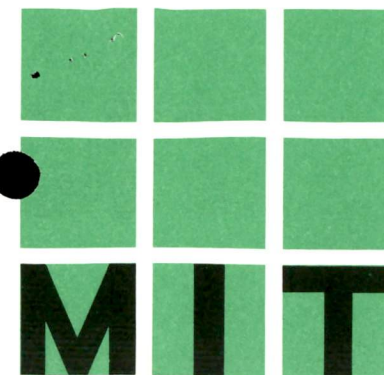
Other wakes—trailing and shed wakes—have still other effects on one or the other side of rotor blades, causing lift and drag variations capable of hindering range and flight endurance.

Designers may never find a generalized all-purpose solution to the complex problems created by wakes, Prof. Miller says. But, he adds, high-speed computers are making it possible to obtain numerical solutions for specific cases.

From such solutions, it may be possible to obtain a better understanding of the physics of the problem, Prof. Miller says.

Once such understanding is gained, he concludes, the data now available from experimental flights may take on new meaning.

*Published at the Massachusetts Institute of Technology
November, 1966
Ellison Smith, Editor*



REPORTS ON RESEARCH

NOT FOR PUBLICATION



This is a chunk of sea water frozen in the lab. At 3x magnification the tiny platelets stand out clearly.



... And a fast-frozen sample of sea ice magnified 30 times. Note the close stacking of the ice crystals.



... In ice frozen slowly, the plates are more spread out. The goal: Fast freezing with plates still separated.

STACKED DECK

If you have ever tried to deal a deck of damp playing cards, perhaps you can sympathize with the problem of the scientific researcher who seeks to wrest saline-free ice crystals from partially-frozen sea water. Nature's cards are stacked against him; for each crystal takes the form of a paper-thin platelet (or flakelet) separated from the next platelet by a film of concentrated and non-potable brine.

Unlike the card player, the researcher can't call for a new deck when the platelets are so stacked that it is virtually impossible to wash them free of brine. (If a card player had to use such a pack, he'd probably give up the game.)

Thus, the researcher keeps looking for more efficient and more economical means of washing his deck of ice cards.

If the ice is frozen slowly, the crystals are not stacked as they are in being fast-frozen. Unfortu-

nately, slow production is not economically sound—since fast freezing is called for if a maximum yield is to be achieved in a minimum time.

Despite this chilling effect on the potential of sea ice desalination, a number of companies are devoting time and cold cash to resolving the problem. The stakes are high because of the existing need in the world for supplemental fresh water supplies. Less than two years ago, for example, our government announced a crash program for "advanced desalting technology."

At M.I.T., sea ice desalination research focuses on techniques for converting the crystals to shapes other than flat platelets—with their tendency to stack up snugly. If nature refuses to go along with new shapes, researchers at the Institute hope at least to make coarser crystals and thus get a greater water yield more rapidly.

Most promising is their technique for subjecting the saline solutions to magnetic fields. Under the in-



INTEROFFICE
MEMORANDUM

SUBJECT Economics of Integrated Circuits

TO Ken Olsen

DATE January 16, 1967

FROM Harry S. Mann

A while ago you suggested that we should visit the top people in companies making integrated circuits to test the economics of that market. We made a start by seeing Sprague Electric. This seems like a worthwhile venture. When should we do some more visiting?

HSM/pah



INTEROFFICE MEMORANDUM

SUBJECT Monthly Report

DATE January 16, 1967

TO Ken Olsen

FROM Harry S. Mann

Your memo of January 13 asking for another report is very timely. I have been struggling, without much success, to develop the information you are seeking. Maybe your pressure in this area will help.

In the terms of accounting, you are seeking two sets of data: (1) a projected profit and loss statement, and (2) a balance sheet projection.

The operating budgets are supposed to give us the profit and loss statements for future months. Based on our recent discussions, it becomes clear that the Product Managers were not budgeting in the manner you and I had assumed they were. As of now, we still have the problem of getting the correct projection from them. Until we get this cleared up once and for all, I would be hard pressed to provide this part of the report you are seeking.

The second part, balance sheet forecast, is likewise bogged down because of inventory planning, or lack of some, and the resistance to my efforts to keep capital expenditures in line with the budget. These are the two most important items to pin down in order to get a meaningful cash flow.

Help!

HSM/pah

January 16, 1967

Spear, Inc.

Win Hindle

Mort Ruderman

C
O
P
Y

In the past you have asked if you might be helpful in obtaining any information concerning Spear Corporation. Just recently I heard that they have some additional financial backing, whether this means they have sold some more of the Company, or whether they have a benefactor is uncertain. If it is convenient for you to learn this information, I would be very interested .

This also is of interest since they have gone into a much greater development effort for relatively low volume for their product. There has to be considerable financial support to do this.

Thank you for any information you might be able to obtain.

djc

cc: K. Olsen⁷



INTEROFFICE MEMORANDUM

DATE January 10, 1967

SUBJECT Electro-Vacuum Drive as possible replacement for Printed
Motor Drive

TO Roland Boisvert
cc: L. Prentice
K. Olsen
D. Best

FROM Phil Backholm

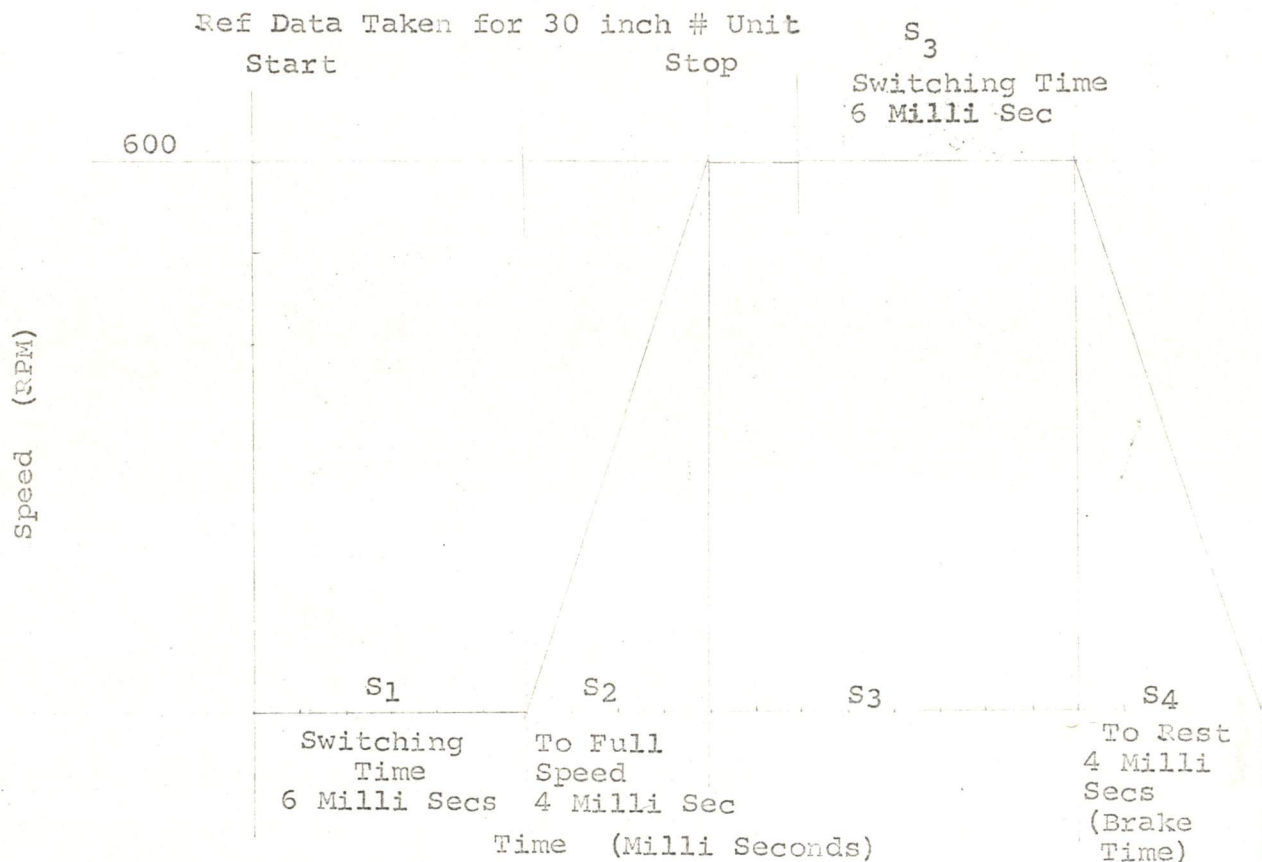
On January 4, I made a visit to Foret Company to discuss the possibility of using a Electro Vacuum Drive in the TU 79 Transport.

At the present time Pierre Foret is building a wide range of units with a torque range from 10 inch # to 480 inches #. The unit that comes closest to our requirements will be a modified F-1110, which has a rating of 10 inch #. The modification is the addition of another clutch. This means additional length to the unit. He is building a clutch, brake, clutch system that has a torque rating of 30 inch LB, that sells of \$351.00 This is approximately the price of the modified F-1110.

We discussed our requirements and he indicated to me with improved control switching circuits, we can bring the start time and stop time distance down to meet the requirements of 9 Channel Recording. The Capstan Assembly Drive will be made up of a clutch, -brake, -clutch assembly, a vacuum pump assembly, and a synchronous motor with a belt & pulley system.

If we make the decision to investigate this system perhaps we should use vacuum brakes for the reel motors as well. The brakes that are available are directly interchangeable with the present system we now are using. In making the comparison with

the Warner RF250 and the Simplatrol BF60, the vacuum brake has a faster reaction time (almost 50% faster) with a life period 300% greater.



$$S_1 = \frac{1}{2} Vt.$$

$$S_1 = \frac{1}{2} 0 (.006)$$

$$S_1 = 0$$

$$S_2 = S_4 = \frac{1}{2} 75 (.004)$$

$$S_2 = S_4 = .150 \text{ Inches}$$

$$S_3 = Vot = 75 \times .006 = .45$$

$$\text{Stop} = S_3 + S_4 = .45 + .15 = .6$$

$$\text{Start Distance} = S_2 = .150$$

$$\text{Total Stop \& Start} = S_2 + S_3 + S_4 = .750 \text{ inches}$$

Stop & Start = .750 inch which is too great for 9 Channel Recording
 However, with a improved switching time, say 3 Milli Seconds, we can make the specification of under .600 inches IBM Spec.



INTEROFFICE MEMORANDUM

DATE January 10, 1967

SUBJECT Flexprint Cables

TO K. Olsen ✓
R. Ames
V. Augello
R. Best
H. Crouse
G. Gerelds

FROM J. Trebendis

Since our last meeting concerning the availability of Flexprint and the manufacturing of Flexprint cable in-house, the following has been accomplished.

We have received on rental from The Eraser Company a wire stripping machine.

Bob Ames has had the machine in use, approximately, three weeks. He reports that we can make a complete cable, including labor and material for just about half the price Sanders is, presently, charging us. Sanders' price for twelve inch cable is \$4.60, while we can make it for \$2.81.

On investigating different sources for cable, I find Type M polyester and mylar are the same material.

The following vendors submitted quotes, which are as follows:
OVER

VENDOR	1000 FT.	5000 FT.	10,000 FT.	10,000 FT.	OVER
GT Schjeldahl Minn.	.455/ft.	.357/ft.	.292/ft.	.292/ft.	NO SET-UP CHARGE
Tape Cable Rochester, N. Y.			.515/ft.	.485/ft.	NO SET-UP CHARGE
W. L. Gore & Assoc. Newark, Delaware		.38/ft.	.33/ft.	.33/ft.	\$250.00 SET-UP CHARGE
Electro- Mechanisms Methuen, Mass.	.38/ft.	.38/ft.	.22/ft.	.17/ft.	NO SET-UP CHARGE

All the above quotes are for the following type cable:
3 Mil mylar, 2 oz. copper conductor, 30 Mil conductors on 60 Mil centers.

The two cables that we are, presently, using were purchased from Tape Cable and G. T. Schjeldahl.

I recommend we purchase from G. T. Schjeldahl or from Electro-Mechanisms.

John J. Trebendis

amg

000
INTEROFFICE
MEMORANDUM

DATE January 9, 1967

SUBJECT Rocker Switch & Indicator Light Design

TO Win Hindle

FROM Bob Savell

The time spent on the indicator design on the part of everyone concerned - Jim Jordan, Dave Nevala, Draftsmen, technicians, myself, Alan Kotok, etc. has been small. Since we introduced only one feature that differs at all from the other indicator designs - using a number of small printed circuit boards rather than one large one - the only effort on Alan's part has been to aid in deciding which lights go where. I would conservatively estimate his total time on this as 2 days. His estimate is 1 day.

The rocker switch design has indeed taken more time since the switches are new. This feature has been no secret, and indeed has been well accepted as a good idea by all who have seen it. Neither Alan Kotok nor any other member of the logic design team has spent any more time on the rocker switches than they would spend on any other switch layout. Their primary contribution has been to determine which switch goes where, and what the labels should read.

The rocker design was used to conserve valuable above-the-console cabinet space for paper tape reader and dectape units.

Without going into specific numbers of hours, I can unequivocally state that neither the rocker switch design nor the indicator design have resulted in delay in the logic and circuit design of the processor. I would be interested to find out specifically what facts would lead anyone to suspect otherwise. Delay in the circuit and logic design has arisen from a number of factors all of which have been previously pointed out in Biweekly reports, and the monthly project reports to the Product Line Managers. They are 1) Our inability to hire the circuit designers authorized for the project, 2) Underestimation of the size of part of the logic design job, 3) Underestimation of the amount of time required for module allocation, 4) Underestimation of the amount of time we would lose during the many-week-long moving process, 5) More troubles than expected developing wiring rules for interconnecting modules. These troubles would have lessened to a great degree if we had been able to start the project with the required number of circuit designers.

My goals for the PDP-10 in order, are:

1. Do the job right the first time
2. Meet the schedule.

I am convinced that in the long run this is the least expensive approach both in dollars and in time and will result in the most profit over the life of the project. Naturally I also have attempted, by such means as taking Derrick Chin off the memory to work on processor circuits, to keep the project on schedule too.

I hold up the 164 memory as a recent good example of the results of this philosophy. There are many examples in existence of what happens when the order of importance is reversed.

In conclusion, I sympathize with Ken's concern that we load our mechanical engineer (singular, since Dave Nevala is the only engineer available for computer systems, all others having been assigned to special projects) down with too much re-design of "standard" things. I feel the same way, except that I think the statement should read "redesign of things that should be standard." The statement doesn't just apply to mechanical design either. The redesign on computer after computer of interfaces for the same old peripherals is a horrible waste of time and money. To stop the waste in both these areas requires that we look far enough ahead in time and consider the requirements of all of our product lines together and develop a real set of standards.

The system we use now of letting many different groups go along in many different directions will not result in standardization, nor will standardization by edict solve the problems.

RS/bwf



INTEROFFICE MEMORANDUM

DATE January 9, 1967

SUBJECT DECUS Statistics, Six Month Report for Period From July 1 through
December 31

TO Executive Board
cc: Ken Olsen
Win Hindle
Nick Mazzaresse

FROM Angela Cossette, Executive Secretary

The statistics below indicate the increased growth of DECUS for the past six months, in membership as well as work volume:

MEMBERSHIP

New Applications received - 272

DECUSCOPE

Circulation Increased to - 1,975

Number of people on mailing list - 1,010

PROGRAM LIBRARY

Programs sent out - 884

Number of paper tapes involved - 2,133

New Programs submitted - 37

PUBLICATIONS AND MATERIAL (OTHER THAN DECUSCOPE) ISSUED

1966 Proceedings to all delegates and DEC field offices
DECUS Binders to new deletates
DECUS Library Catalogs to all new individual members
Procedures and form for submitting material to DECUS to complete mailing list
Fall 1966 Meeting particulars to complete mailing list
Individual requests for Library catalogs, brochures, DECUSCOPE, proceedings.
application forms, and other DECUS literature

Work in process for completion in January:

1966 Fall Proceedings
New DECUS Brochure
New DECUS Library Catalog



INTEROFFICE MEMORANDUM

DATE January 9, 1967

SUBJECT DECUS Statistics for Year 1966

TO DECUS Executive Board
cc: Ken Olsen ✓
Win Hindle
Nick Mazzaresse

FROM Angela Cossette

Below are the statistics of DECUS activity for the year 1966 and a comparison to 1965:

<u>MEMBERSHIP</u>	<u>YEAR</u>	<u>AMOUNT</u>
Number of members:	1966	850 (385 delegates, 465 individual)
	1965	426 (211 delegates, 215 individual)

DECUSCOPE

Circulation at end of year:	1966	1,975
	1965	1,400
Number of individuals on mailing list at end of year:	1966	1,010
	1965	575

PROGRAM LIBRARY

Number of programs submitted:	1966	58
	1965	44
Total number of programs in DECUS Library:	1966	198
	1965	164
Programs issued to requestors:	1966	1,692
	1965	644
Number of program tapes involved in completing requests:	1966	3,460
	1965	1,735

<u>PROCEEDINGS ISSUED</u>	<u>YEAR</u>	<u>AMOUNT</u>
Spring and Fall issues:	1966	2,000
European:	1966	450 (Approximately; 400 by DEC in Reading)
	1965	900 (Approximately)

FINANCIAL STATEMENT

Balance in DECUS Checking Account, December, 1965		\$207.94
Plus Income		
Notebooks	\$ 24.00	
DECUS/JUG Workshop	85.00	
Spring 1966 Meeting Registration Balance	112.25	
Fall 1966 Meeting Registration Balance	<u>339.80</u>	
Total Income		<u>561.05</u>
Balance		<u>\$768.99</u>
Less Expenses		
Petty Cash	\$ 5.00	
Computer Dictionary	4.95	
Checks	3.00	
Car Rental (JUG Library Committee Mtg.)	53.77	
Registration (JUG Workshop)	10.00	
Check to DEC, Reimbursement for Notebooks	<u>21.00</u>	
Total Expenses		<u>97.72</u>
Balance in DECUS Checking Account, December, 1966		<u><u>\$671.27</u></u>

MEMO

to: KEN OLSEN
from: BELA CSONTI

Maynard, March 31, 1967

My answer on the question whether we should stay in the memory test business:

YES

But we should improve the obviously weak points (switching system: circuitry & lay-out; current drivers) NOW

Please see the attached memo, pages 2, 3, (4).

Bela Csonti



INTEROFFICE MEMORANDUM

DATE 9 January 1967

SUBJECT

Advertising

TO

A. Klutchman

FROM

A. Titcomb

CC:

K. Olsen ✓
N. Mazzaresse
J. A. Jones
D. Lewis
E. Hendrickson
R. Ward

My experience with our advertising agency has been poor. At the moment they are late and we have seen no evidence that they have done any writing or otherwise progressed.

The other day Jonah Kalb showed us a box of multi-lined paper and gave a very knowing (snowing?) speech. After considering this and subsequent developments, I have come to the conclusion we need a new agency or, at least, we should stop spending money on the present one.

For the Physics meeting we need the scheduled material. Will you determine if the agency will have their show ready and if not, what we can do in plant to avoid embarrassment.

AT/lnc

JAN 9 1967

dec

INTEROFFICE
MEMORANDUM

DATE January 6, 1967

SUBJECT Feedback of New Systems

TO Nick Mazzaresse
/Mike Ford

FROM Ken Olsen ←

It has always been our policy to have the engineer who designs a product or system to also have the responsibility to make it work. This is the only feedback we have to make sure that we do not design things that cannot be built. The engineer who designs equipment with a lot of troubles spends more of his time solving production troubles and has little time for developing new products. If systems have feedback in the right direction, after a while most of our products would be designed by engineers who design equipment with little troubles.

I want to point out that if you are breaking this tradition in the PDP-8/I, I am not against breaking the rule, but I do want to make sure we enforce extra controls on this to make sure they design equipment which can be tested and manufactured. With integrated circuits, there is going to be a very serious danger of building modules with R210 and R211 problems. After the quad size board in the PDP-6, we swore that we would never put a lot of logic on one board. We may be tempted to commit the same crime again, and, in this case, the man who commits the crime may not have to live with the results.

Ken

ecc

Although the schedule calls for Dick Sogge to phase out of the PDP-8I project at a certain point, I feel the designed feedback still exists to a large degree. Dick will be involved in designing the AMT to a certain extent and will not phase out of the 8I project until the immediate circuit problems are solved. The longer range problems will reflect back to Dick if they can't be solved by the production engineering crew.

M. Ford



INTEROFFICE MEMORANDUM

DATE 6 January 1967

SUBJECT Light Pen

TO Ken Olsen

FROM S. Ogden

CC: D. Brown L. Prentice
B. Long D. Chin
H. Crouse G. Gerelds

About two months ago, Roger Gosselin came to DEC with a proposal that he build a new Light Pen for DEC. He proposed that he could make a light pen with an electronic switch, with a screw-on tip having a sharper point than our present pen, with an optical lens and plastic fiber light pipe that provide higher performance than our present optics, and with a more aesthetic appearance in general. There is a great reduction in the number of parts in the proposed pen. Bill Long and Dave Brown pursued these negotiations. Jim Jorden submitted a modified mechanical design (attached) for Gosselin's consideration about a month ago.

Gosselin proposes that as a maker of light pipes he is in an ideal position to expand his line with light pens. He proposes an "open stock" of pens and parts. Cost to DEC of assembled pen (without pipe or electronics) is under \$50. Gosselin's light pipe will be slightly cheaper and more flexible than our present pipe. Our same electronics can be used, or we can use Gosselin's electronics.

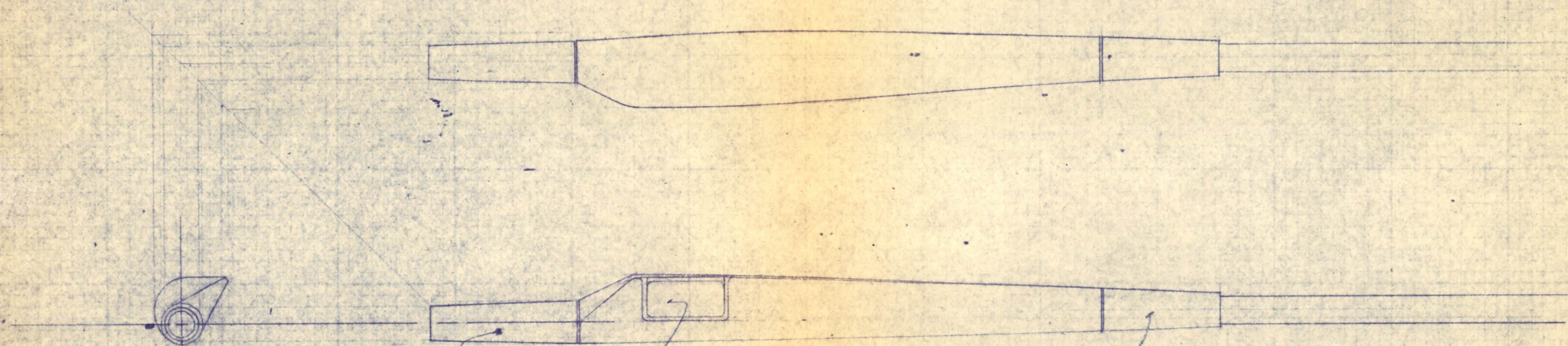
An actual test has been made of Gosselin's optical system including both his lens system and plastic-fiber light pipe. This test demonstrated a sensitivity superior to that of our present optical system.

In pursuing the whole matter of a better light pen design, Bill Long has given two "outside" designs to Jim Jorden for Jim's consideration. The first design came from the Ft. Mead users of our displays. It is mechanically better than our present pen (aesthetically nicer, smaller tip, etc.) but has about the same optical-electrical characteristics. The second design came from Boeing. This design was mechanically much better (no mechanical shutter and fewer parts), but with unknown optical properties.

The possibility of a split light pipe has been considered. Gosselin will stock this item, and his electronics will provide the light source. Alternatively, we can provide the light source as a modification to our equipment. The same pipe and pen may be used in any event.

When Gosselin returns with a proposed design, with a price, and with proposed production capacity, the matter will be referred to Henry Crouse for procurement of sample quantities.

SO:mg



REMOVEABLE TIP

BUTTON, MEDIUM GRAY
(REMOVE BUTTON FOR
ACCESS TO LIGHT PIPE
ADJUSTMENT SCREEN)

STRAIN RELIEF

DESIGN SKETCH
DIGITAL EQUIPMENT CORPORATION
LIGHT PEN
NOVEMBER 29, 1966

SCALE: 1:1
COLOR: BLACK



INTEROFFICE MEMORANDUM

SUBJECT LINC #18

TO L Ken Olsen
cc: Win Hindle
Steve Mikulski

DATE January 4, 1967

FROM Mort Ruderman

We have cannibalized LINC #18 to make LINC #30 which was shipped to Prague. Attached are the list of items that were taken from LINC #18. To rebuild LINC #18, we will need mostly modules. LINC #18 will be used in-house in Bob Brown's area, for training backup, and by the library for tape reproduction. It should cost about \$7,000 in additional parts to complete this LINC.

All the truly obsolete stock for LINC was written off in fiscal 1966. Attached is a copy of a memo to Harry Mann. The total written off was approximately \$10,294.

I. TRULY OBSOLETE LINC PARTS

<u>PART NAME</u>	<u>QNTY. IN STOCK</u>	<u>UNIT COST</u>	<u>TOTAL</u>
LINC console mech.	3	154.71	471.
Tee-bar F & R	4	10.	40.
Tee-bar sides	2	5.	10.
Z bar front	1	22.	22.
Z bar rear	1	24.	24.
Z bar rear	1	22.	22.
Z bar front	1	24.	24.
Top plate	3	5.	15.
Bottom plate	1	7.	7.
Top door	2	2.	4.
Top side panel	6	3.25	20.
Lift off hinge	18	.11	2.
LINC logic	1	2900.	2900.
Fantail plate	6	17.	102.
LINC mounting brackets (front)	15	4.41	66.15
Ground Strip "A"	6	2.07	12.42
Ground Strip "B"	4	2.03	8.12

Ken Olsen

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January 4, 1967

Ground Strip "C"	10	1.26	12.6
Console button (red)	10	1.	10.
Console button (white cover)	44 (11 sets)	15.	152.
Subtotal			3924.29
		(Approx. cost)	
Bottom door	1	20.	20.
Console light	1200	20	240.
Switch bulbs	200	10	20
Light strips for console			
Console (silk screened front panels)	3	30	90
Chime boards	10	.25	2.50
Plug-in "A"		200.	200.
Subtotal			<u>552.50</u>
Truly obsolete inventory total			4476.69

II. SPARE PARTS INVENTORY

Motors	12	50	600.
Soraban keyboard (training)	1	650	650
Memory Stacks (have to be ordered)	2	1350	2700
Power Supply	1	1214	1214
Total			2464
To be ordered			2700

LINC #18 has been depreciated for approximately the last year at \$620 per month. We will again start depreciating this in March at a capital cost of approximately \$12,000.

Ken Olsen

3

January 4, 1967

Original costs	\$18,000
1 year depreciation	<u>7,500</u>
	\$11,500

Capital Equipment credit for material used to make LINC #30:	\$7,000
	<u>\$11,500</u>
	<u>7,000</u>
	\$ 4,500

Present cost of LINC #18 as capital equipment	\$ 4,500
Cost of rebuilding LINC #18	<u>7,500</u>
Total to begin depreciation starting March, 1967	\$12,000

If another classic LINC were to be ordered, its price would be \$38,500 and have 4 to 6 months delivery after receipt of order. We would have to order cabinets, cables, memories, etc.

I am quoting to Wes Clark, one set of everything from truly obsolete inventory for \$3,000. Our cost of this was originally \$3,500 (approximately). Some items, i.e., console light, mech. console assemblies, etc., I am only quoting each one.

MR:jeb

DATE June 13, 1966

SUBJECT Slow Moving Inventory

TO Harry Mann

FROM Mort Ruderman

CC: Ed Simeone

Win Hindle

Item #1:

The attached list is what I term the slow moving inventory. In the left hand column, those items with the (1) are definitely slow moving inventory and can be either obsoleted or written off the books and for all intents and purposes, done away with. Those items that have a (2) are items that field service should keep in their spare parts stockroom, so that the (2) totals, therefore, would be the total of everything on this list which is \$10,294.90, less the items that should be reserved for field service spare parts which in this case would be less \$5,228.00. Therefore, the total of very slow moving inventory is \$5,066.90.

Item #2:

Obsolete LINC Modules--20 1783's reside in LINC-8 (my stock).

Item #3:

Existing LINC's available:

- 1) Serial #10, presently on rental to U.C.L.A., has been on rental since July 1, 1965 at \$1,453.00 per month.
- 2) Palo Alto office LINC, serial #19, available for rental.
- 3) Serial #16 in Maynard available for rental. Previously at Brown University, and to date has realized \$6,000.00 in rental.
- 4) In training, serial #18 presently used for LINC-8 development and also as a training machine--because of very poor construction, should not be rented or sold, but sometime in the distant future should be obsoleted.

To my knowledge, this is all the LINC inventory and what my present thoughts are on its disposal.

Q111.

<u>PART NO.</u>	<u>PART NAME</u>	<u>IN STOCK</u>	<u>UNIT COST</u>	<u>TOTAL</u>
(1) 74-4143	LINC console ass'y.	1	\$ 580.86	\$ 581.00
(1) 74-4088	" " mech.	4	154.71	625.00
(2)(1) 32-2863A	Power Supply	2	1,214.00	2,428.00
(1) 74-4438	Cabinet frame	1	35.00	35.00
(1) 74-4439	Tee-bar F & R	4	10.00	40.00
(1) 74-4440	Tee-bar sides	8	5.00	40.00
(1) 74-4441	Z bar front	2	22.00	44.00
(1) 74-4442	Z bar rear	2	24.00	48.00
(1) 74-4443	Z bar rear	2	22.00	44.00
(1) 74-4444	Z bar front	2	24.00	48.00
(1) 74-4445	top plate	4	5.06	20.00
(1) 74-4446	bottom plate	2	6.99	14.00
(1) 74-4447	top door	3	1.77	5.00
(1) 74-4449	top side panel	2	3.29	6.00
(1) 74-4450	bottom side panel	6	2.82	18.00
(1) 74-4451	Tee-bar conn.	4	5.00	20.00
(1) 74-4452	Lift-off hinge	28	.110	3.00
(2)(1) 73-1K	LINC Memory	2	1,200.00	2,400.00
(1) 70-4144	LINC Logic	2 10	161.67	161.67
		10	2,928.23	2,928.23
(1) 70-4166	Fantail plate	6	17.01	102.00
(2)(1) 71-4145	LINC cables	1 set	400.00	400.00
(1) 74-4190	LINC mtng. brkt.	15	4.41	67.00
(1) 74-4192	Ground Strip "A"	10	2.07	21.00
(1) 74-4193	" " "B"	7	2.03	14.00
(1) 74-4194	" " "C"	15	1.26	20.00
(1) 74-4655	Console button (red)	10	1.00	10.00
(1) 74-4656	Console button (white)	44 320	1.00	32.00
		120	10.00	120.00

\$10,294.90

COPY

DATE December 30, 1966

SUBJECT LINC #30

TO Dick. Clayton,

FROM Jim Scanlan

The following parts were taken from LINC #18 to complete LINC #30:

1. Console 74-4143
- 1 Soroban Keyboard 74-4430
- 1 Data Terminal Frame 74-4132
- 6 Lift Off Hinges (Female) 74-4452
- 3 Door Magnets
- 4 LINC boxes 74-4401
- 1 set AC Power Cables
- 1 Keyboard Cable
- 1 Console Power Cable
- 1 Complete set of Modules (see list)

Jim

JCS:mab

Attachment

cc: Mort Ruderman

<u>TYPE</u>	<u>QUANTITY</u>	<u>TYPE</u>	<u>QUANTITY</u>
1001	6	4123	24
1151	8	4127	13
1304	2	4143	36
1561	3	4204	22
1571	6	4205	19
1582	1	4221	7
1583	2	4303	5
1607	1	4407	1
1669	9	4410	3
1783	2	4525	5
1784	1	4604	13
1954	1	4606	31
4102	32	4677	5
4112	16	4995	4
4113	15	4996	2
4114	6	4997	2
4115	14		



**INTEROFFICE
MEMORANDUM**

DATE **January 3, 1967**

SUBJECT **Financial Statements**

TO **Harry Mann**
cc: **Ken Olsen**
Stan Olsen
Win Hindle
Ted Johnson

FROM **Nick Mazzaresse**

Interest has been expressed by the product line managers from time to time for a total financial statement of the corporation each month. The reasons for this are obvious but perhaps ought to be restated.

1. To evaluate the percentage of total effort in the service areas that is being directed towards his product line.
2. In our role as members of the corporate planning group this kind of background seems to be essential.

I would propose that we give each product line manager his own product line statements and a corporate summary statement each month.

Unless there are problems with this, I suggest that we inaugurate it starting with the statements for the month of December, which should be due in about a week.

NJM:cmp



INTEROFFICE MEMORANDUM

DATE January 3, 1967

SUBJECT Applied Dynamics Visit

TO Ken Olsen

FROM Ted Johnson

Bill Wood (President) and Gene Graber (Marketing Manager) of Applied Dynamics plan to be here on January 13th. Dave Cotton has some correspondence back and forth with them and we are going to look at their requirements. I hope that you will be able to meet with Mr. Wood on the 13th to indicate our interest in establishing a good, businesslike relationship with them. I hope to be there as well.

If we are able to satisfy most of their requirements (and they seem to be asking for quite a bit of support, particularly in software) I believe we will have to support them more actively from the Ann Arbor office. Dave Cotton is really on top of the situation quite well as far as I can see. They claim to have a potential of half of million dollars this year in business for us - Dave thinks it is more like two hundred and fifty thousand. I suggest you talk with him before ADI appears if you are able to meet with them on that day.

I am thinking about what you might be doing if you do go to Europe. Could you let me know how much time you would want to spend and what your general interest would be? I still think it would be a good idea to visit ASEA and possibly those leads in Stockholm.

TJ:mr