



# INTEROFFICE MEMORANDUM

DATE February 24, 1966

SUBJECT OEM (Industrial and Large User) Support

TO K. H. Olsen ✓  
N. Mazzaresse  
S. Olsen

FROM T. Johnson

Our Foxboro relationship and their views and ours of difficulties in maintaining our position there, strongly suggest some general and specific programs and solutions which we should consider strongly.

1. Special OEM accounts must be kept up to date on engineering and hardware changes.

Suggestion: Engineering changes notices with supporting points and explanatory material should be made available to them immediately. The best general solution would be to have some group or engineering support person responsible for receiving these and supplying them (in a systematic and controlled way) to their engineering head.

2. Special committed OEM accounts should be given special attention on delivery scheduling.

Suggestion: Local liaison should handle this, but be able to obtain direct product line support in providing weekly or bi-weekly reports on current delivery progress, as well as possibly scheduling on the basis of expected user needs to protect their business.

3. Certain big accounts justify senior engineering sales account representatives.

Suggestion: Foxboro be assigned a more senior sales engineer who is mature and able to establish a friendly rapport with their management. He makes sure we get a open and reliable channel into and out of Foxboro.

4. Their management should be made to feel our management cares about their big chunk of business.

Suggestion: The initiative be taken by DEC management to call on their key people instead of waiting for problems to build up and create a difficult situation.

5. Special engineering attention is necessary to develop further OEM business.

Suggestion: We should have senior engineering people who organize support (#1) for these people and can visit periodically and work our good proposals for special work required to obtain fairly large OEM accounts.

- a. Evaluate value to DEC at certain level of volume to determine guidelines for what we can provide in engineering assistance.
- b. Possibly have Special Engineering group which is non-related to Special Systems fabrication and performs a semi-marketing function as well as providing engineering consultation and support, being responsible to develop sound OEM business.
- c. Possibly have an Industrial or OEM support manager working for the Sales Manager or a Product Line. I believe this need crosses product lines and should develop module and computer business. I believe the level of person(s) required is heavy in systems engineering background and can perform as a senior representative of the company.

Despite our successes in OEM for computers (Systems Houses), we really have not faced up to a solid program of large account development, particularly in Industrial Accounts. This area demands special attention, close liaison with DEC capabilities within all product lines and dedicated, mature approaches. It should be a commitment on our part and an organized, dynamic, free-traveling operation.

Jean Lebel operates as a systems consultant to large Systems Houses, helping them do initial design and suggesting and proposing implementation approaches with our equipment. We could do some of the same and get a large return in continuing, fairly stable business. We will also get good ideas ourselves in many areas as well as customer paid for development of some special modules and other hardware.



file

**dec** INTEROFFICE  
MEMORANDUM

**DATE** February 22, 1966

**SUBJECT** SCHEDULES OF COSTS FOR THE CAPACITOR FORMER AND TAPER

**TO** Ken Olsen  
cc: Stan Olsen

**FROM** Loren Prentice

Disassemble black oxide parts - two weeks

Redesign the follower - 8 hours @ \$9.95/hr \$ 79.60

Shop time to rebuild the follower - 16 hours @ \$8.15/hr 130.40

Syntron Feeder - one week of shop time \$ 320.00

Controls - one week of design \$ 398.00

one week of shop time 320.00

Debugging controls in the complete unit - 2 weeks \$ 796.00

\$2,044.00

The work is scheduled to start March 28th with a completion date of May 15th.



INTEROFFICE  
MEMORANDUM

DATE February 21, 1966

SUBJECT Small Computer Maintenance Programming

TO K. Olsen ✓  
N. Mazzaresse  
E. Harwood  
W. Long  
All Programmers

FROM Leonard M. Hantman

To permit a greater proportion of my time to be spent on System Programming and the Program Library for the PDP-7 and PDP-8, effective this date, Marvin Horovitz will assume responsibility for small computer maintenance and diagnostic programming within the Small Computer Programming Group.

All requests for new programming, and comments concerning any maintenance programs can be addressed to Marvin directly.





**INTEROFFICE  
MEMORANDUM**

DATE February 21, 1966

SUBJECT LOGIC LABORATORY SALES ESTIMATE

TO Stan Olsen  
Saul Dinman  
Bob Maxcy  
Ken Olsen ✓

FROM Ted Johnson

Attached is a survey of the Lab Kits which people feel they could sell in the next three months. In addition, we are looking into beefing up the sales of Lab Kits by Reps and Distributors and I feel very strongly that we could use four or five Lab Kits per office (23 offices) as evaluators to help people get started using Flip Chips. I am very concerned that we are not solving our production problems quickly enough and see the Lab Kit as a tool to make up for our marketing delay in the module line. Please give your full attention to these problems and see what you can do to down the sales force in Lab Kits. I am sure that under any circumstances, we could use all the Lab Kits producible within the next three or four months.

TJ/mr

Attachment



# INTEROFFICE MEMORANDUM

DATE February 3, 1966

SUBJECT Logic Laboratory Sales Estimate - 3 months

TO Ted Johnson ✓  
Stan Olsen  
Saul Dinman

FROM Tim McInerney *TJM*

The recent survey, by Ted Johnson, of Lab Kit estimated sales for the next three months, resulted in an estimate of 183. This is broken down by Field Offices as follows:

Australia	5	
Northeast Sales	30	
(per Al Ross 2/3/66)		
Huntsville	30	
Philadelphia	10	
Los Angeles	12	
Chicago	3	<i>iw</i>
New York	8	
Orlando	20	
Rochester	5	
Reading	5	<i>iw</i>
Denver	10	
San Francisco	10	
Ann Arbor	10	
Munich	5	
Pittsburgh	5	
Carleton Place	10	
Toronto	2	
Washington, D. C.	3	
	<u>183</u>	

TJM:kge

*Mary  
see me*





INTEROFFICE  
MEMORANDUM

*K. Olsen*  
COMPANY CONFIDENTIAL

DATE February 21, 1966

SUBJECT Minutes of Seventh Disc Committee meeting, February 17, 1966, 1:00 P.M.  
TO Committee Members and Attendees FROM Steve Lambert

PRESENT: K. Fitzgerald, P. Backholm, L. Prentice, E. DeCastro, G. Bell, R. Best, J. Jones,  
D. Wardimon, J. Godbout, J. Jordon, S. Lambert, S. Mikulski, R. Savell, K. Olsen

Presiding chairman was Ed DeCastro

Recording Secretary's Report:

The minutes of the previous meeting were not considered.

Old Business:

GUIDE MECHANISM

Action #1 - Dan Wardimon indicated the present spring loaded guide mechanism shows no wear.

New Business:

NEW PAPER TAPE READER REVIEW:

Jim Jordon presented sketches of the reader front cover plates and indicated that these parts could be plastic and vacuum formed. The tooling charge would be approximately \$2,000 and the vacuum formed covers would be approximately \$10 not including tooling charges. The cost of the present reader tray catches is \$60 per pair. The upper and lower cover plates are \$8 each. John Jones indicated that the estimated quantity of sales per year would be 300 readers. Jim Jordon indicated that it would be two weeks to a month before a sample cover could be made and two months before production of these covers could begin. The life of these plastic covers should be from two to five years. There are three action items:

Action #1 - Jim Jordon is to go ahead with obtaining the samples of plastic covers, however, on the first prototype units, sheet metal covers and bends will be used.

Action #2 - Ed DeCastro, Joe Godbout and Ken Fitzgerald are to build up 6 prototype units.

Action #3 - Ken Fitzgerald is to stop the building of more tape catches provided there are enough to cover the requirements of existing systems and the six new units.

## DECTAPE REVIEW

John Jones indicated the production has stopped on TU55's. It was suggested that the TU55 testing program be speeded up in order to get the DECTapes back into production as soon as possible.

Action - Dan Wardimon is to propose a wear test on tape guides, tape and head assemblies in a defined environment.

Meeting adjourned at 2:45 P.M. Next committee meeting is February 24, 1966 at 1:00 P.M.

If there are any errors or omissions in these minutes, please correct and send to Becky Lizotte.



*Ken Olsen*



**INTEROFFICE  
MEMORANDUM**

**COMPANY CONFIDENTIAL**

**SUBJECT** PDP-8 Cost Reduction  
**TO** Ken Olsen  
Nick Mazzaresse

**DATE** February 21, 1966  
**FROM** R. Savell

It seems obvious that the major area to attack in the 8 is memory since its cost is about \$3000 out of the total of \$7700. Of this, about \$1000 is tied up in 4 types of modules.

It would seem that a completely new memory wing design is easily justified if we assume a savings of even \$500 per unit. Going to a 3 wire stack, not 2 1/2 D however, will save about 20% of the stack cost. It seems to me that the stack should plug in. I believe that some thought on construction techniques could save a possible \$100 out of the \$150 now included in the stack cost to hand wire from the stack to the connectors on the stack enclosure. The stack vendors, or at least the salesmen, seem to be at a loss as how to reduce costs further. Their only suggestion is to use 16K mats instead of 4 K.

How about different cores to produce a higher output voltage? This might allow savings in sense amp transistors, but would the cores cost more? Do we presently use two power supplies for Read/Write and Inhibit? If so, why? Can one be eliminated?



INTEROFFICE  
MEMORANDUM

COMPANY CONFIDENTIAL

DATE February 18, 1966

SUBJECT Cost Breakdown on PDP-8 Power Supply #708

TO Ed DeCastro  
Ken Olsen

FROM Nick Mazzaresse

The following is Cost Accounting's actual cost breakdown on the Type 708 power supply for the PDP-8:

Material	\$253.18 (see parts list attached)
Assy. Labor (34 hrs. x 1.90)	64.60
Testing (1.65 hrs. x 2.25)	<u>3.72</u>
Sub total	321.50
Overhead	<u>155.28</u>
Total cost	\$476.78

Note: There has been an increase in the cost of material over the past two months of approximately \$40 from \$212.87 to \$253.18.



PART NUMBER: 708

DIGITAL EQUIPMENT CORPORATION

PART NAME: Power Supply

LOT SIZE \_\_\_\_\_ DATE \_\_\_\_\_

JOB NUMBER: M-46-00708-( )

SERIAL # \_\_\_\_\_ ISSUED \_\_\_\_\_

Page Two of Three

PER UNIT	UNIT COST	INV.	TOTAL COST	PART NUMBER AND NAME
1			1218	12-XAM33-20Amp Circuit Breaker
1			1280	12-1450 Pilot Light
1			1251	12-160-4 Amp. Receptacle
1			1252	12-160-5 Amp. Plug
2			1200	12-8038-1G3 Trans. Socket
1			1269	12-1920 Knbb
1			1208	12-M1-1906 Hour Meter
1			1202	12-8363-K7 Switch
10			1406	12-S1389-1 Capacitor Brkt.
1			2244	12-144PCC-W Connector
1			2176	12-KRP-14DG Relay
1			3087	12-78-RS11 Tube Socket
1			2837	12-0-30V Meter 2 1/2"
2			2766	
4			2435	12-S1389-3 Mounting Brkt.
2			1897	13-1.5K-5W Resistor W/L
2			0278	13-220-2W Resistor
1			2888	13-100-25W Resistor
2			3068	15-DEC3715 Transistor
1			2755	16-1032 Transf. (T57084)

Copy # \_\_\_\_\_

10/6/65



PART NUMBER: 708

DIGITAL EQUIPMENT CORPORATION

PART NAME: Power Supply

LOT SIZE \_\_\_\_\_ DATE \_\_\_\_\_

JOB NUMBER: M-46-00708-( )

ISSUED \_\_\_\_\_ SERIAL # \_\_\_\_\_

VENDOR'S MODEL YES Page 010 of 100

ISSUED	PER UNIT	UNIT COST	INV.	TOTAL COST	PART NUMBER	QTY NAME
	1			2832	53-708-2017	Front Panel
	1			2829	53-708-2008	Right Side Panel
	1			2830	53-708-2009	Left Side Panel
	1			2827	53-708-2006	Rear Panel
	1			2831	53-708-2010	Term Cover
	1			2828	53-708-2007	Diode Plate
	1			2834	53-708-2025	Relay Bracket
	1			2833	53-708-2024	Connector for P1
	2			2903	53-2011-9	Protection Cover
	1			3150	53-2011-7	Protection Cover
	5			0138	11-1N3208	Diode
	2			1819	11-1N3210	Diode
	2			1610	10-.01mfd-50V	Capacitor
	1			2153	10-2X.1mfd-600V	Capacitor
	2			0089	10-950mfd-75V	Capacitor
	4			2811	10-8600mfd-25V	Capacitor
	10			0098	10-35000mfd-25V	Capacitor







# INTEROFFICE MEMORANDUM

DATE : February 17, 1966

SUBJECT Automated Design Continuation Proposal

TO

FROM G. Bell

## SUMMARY

Already design costs are a major factor in the profitability of our products, and will continue to be as product manufacturing costs decrease. We decrease these effective costs in several ways:

1. Selling more units (as/PDP-8)
2. Doing a better design job.
  - a. More design checks, therefore less errors.
  - b. Better documentation for manufacture
  - c. Forced standards for drawings, logic configurations, etc. to ease manufacture and checkout.
3. Shortening the design time
  - a. Lower cost to design
  - b. On Market sooner

Automated Design or Computer Aided Design significantly effects items 2 and 3.

With some of the programs listed below, I feel it is possible to reduce design costs by at least a factor of 2.

## PROPOSAL

### People

1. Retain a computer aided design group to work on DEC internal automated logic design.

The group would not build a system which is necessarily marketable, although members of the group might consult to the display marketing group. The group would report to one of the product line managers, or the chief engineer, or programming manager.

2. Procure replacement for C. Stein to head group, add 1 additional programmer to supplement J. Pitts, and get assistance from Tech. pubs to document use of system.



3. Hire C. Stein as a consultant for \$2K to finish present DECADE Drafting System in conjunction with J. Pitts.
4. The work would be done on the PDP-7 which has been set aside for computer aided design, but with the following equipment:

a.	Calcomp Plotter for hard copy output	\$18K
b.	Drum of 131,000 words for program, data, etc	43.4K
c.	One Magnetic Tape Unit and Control	30.9K

- 5a. Another computer would be used for card to tape, tape to card, and tape to printer conversions.

or 5b. Move present card reader, line printer, and card punch to PDP-7.

#### PROGRAMS

6. Some of the items which would be done include:
  - a. Finish DECADE drafting.
  - b. Integrate and debug DECADE drafting and DEC drafting.
  - c. Modify present wire list program.
    1. Use other equipment (remove mag. tape).
    2. Change input format to simplify language, and lessen input data by factor of 10.
    3. Incorporate modifications status history so that mods can be made easily and correctly.
    4. Change output format, to shorter print time.
    5. Use a better run ordering algorithm so that runs will not have to be done manually.
    6. Manage Bus bars, components, inter-bay cabling, and inter-bay wiring to dummy pins automatically.
    7. Make formats IBM compatible so that other computers can be used for peripheral operations.
  - d. Modify wire wrap program:
    1. Punch more information so that machine wiring errors can be fixed if they occur.
    2. Punch at highest possible speed.
    3. Handle new configuration of panels.
    4. Modify wire placement for lower densities, and less crosstalk.
  - e. Link DECADE to the Wire list program.

- f. Incorporate additional programs to simplify design process.
1. Automatic lists for utilization of modules, and parts, cables, etc.
  2. Logic and circuit design checking against rules.
  3. Module spatial allocation.
  4. Flow charts, Timing diagrams, Flow diagrams, Cable diagrams, System Block diagrams, etc.
  5. Checking of Flow charts against Block schematics and generation of Block Schematics from Flow Charts.

GB/bwf





# INTEROFFICE MEMORANDUM

DATE February 16, 1966

SUBJECT

TO Ken Olsen  
cc: Personnel Committee

FROM Ed Harwood

From all indications the Personnel Committee has been negligent in its duties. Our meetings are sporadic and usually only deal with minor problems.

I feel the committee can be a great service to the company and suggest immediate moves to accomplish this.

1. Remove all Works Committee members with the exception of the chairman.
2. Add new members to replace those removed, plus additional ones to total six members plus the chairman.
3. Review all matters pertaining to personnel morale and disciplines. No personnel matters should go to Works Committee without having been through Personnel Committee.
4. Meet regularly with special meetings whenever necessary.
5. Investigate and recommend additions or changes to existing benefits and plans.
6. Publicize the fact that there is a Personnel Committee with comments on how to send suggestions and complaints to the committee.
7. Set up sub-committees of the Personnel Committee to look into specific areas such as insurance, wages, schooling, etc.



# INTEROFFICE MEMORANDUM

DATE February 16, 1966

SUBJECT RENOVATION OF BUILDING #8

TO Ken Olsen

FROM Loren Prentice

INSIDE  
LABOR

OUTSIDE  
EXPENSE

ELECTRICAL:

55 eight foot light fixtures and installation		\$ 990.00
10 double duplex outlets for benches, 22 office outlets, 100 amp line from building #6A module to building #8 (a distance of approximately 195')		<u>910.00</u>
		\$1,900.00

CARPENTRY:

224 feet of partitions at \$4.00/foot for material & labor		\$ 896.00
3 work benches: Material - \$150.00 - Labor (two men for two days) - \$152.00	\$ 302.00	
Removal of wire partitions - \$7.00/hr for 16 hrs.	<u>\$ 112.00</u>	
	\$ 414.00	<u>\$ 896.00</u>

PAINTING:

Scrapping the ceiling and brushing down the walls and painting one half of building #8		\$ 756.00
Sealing the floor (3,780 sq. ft. at \$0.045 for materials)		\$ 175.00
Our labor for applying at \$5.00/hr.	\$ 100.00	
8 gallons of seal spar for the office partitions at \$3.75/gallon		\$ 30.00
Labor to paint trim and apply seal spar (36 hours at \$5.00/hour)	\$ 180.00	
	<u>\$ 280.00</u>	<u>\$ 961.00</u>



	<u>INSIDE LABOR</u>	<u>OUTSIDE EXPENSE</u>
PLUMBING:		
Extend air line to building #8 and pipe down to the three work benches and disconnect the line to the second floor in bldg. #8.		\$ 200.00
		<u>\$ 200.00</u>
MISCELLANEOUS:		
3 fire extinguishers		\$ 90.00
1 guards key		<u>5.00</u>
		\$ 95.00
GRAND TOTAL - - - - -	<u><u>-\$ 694.00</u></u>	<u><u>\$4,052.00</u></u>
		\$4,746.00

INTEROFFICE  
MEMORANDUM

DATE February 16, 1966

SUBJECT Overdue Accounts Receivable

TO Product Line Managers

FROM Harry S. Mann

CC: Ken Olsen ✓

I am gravely concerned about the large number of overdue accounts which we are carrying on our books. In an attempt to bring these current, Jim Myers is continually running into complaints from the customer that they are refusing to pay because either equipment has been found to be defective or we have not met all of the conditions of our purchase orders.

Jim advises me that for the past four months or so he has been bringing these matters to the attention of the product lines, but he has not been too successful in getting the deficiencies cleared up so that collections can be made.

I have, therefore, instructed Jim that he is to take a very aggressive attitude within the company to clear up these deficiencies since the the collection of accounts receivable is his direct responsibility. I would suggest that each product line designate one person who is to be the contact point for Jim Myers so that this work can proceed smoothly and effectively.

  
Harry S. Mann

HSM/clw





# INTEROFFICE MEMORANDUM

DATE February 16, 1966

SUBJECT Attached Module

TO Ken Olsen

FROM Rod Belden *RB*

You may wish to have the attached Flip Chip Module for your office.

It illustrates:

1. transistor insertion flush to the board
2. continued production use of the strate

( -3 volt string)

This module was taken from a run of 650. At present, I am inserting strates into 8 different Flip Chip boards.

INTEROFFICE  
MEMORANDUM

DATE February 15, 1966

SUBJECT Module Selling in Europe (A Review of Trip 1/25 - 2/8)

TO Stan Olsen

FROM Ted Johnson

cc: Ken Olsen ✓  
John LengSummary:

My trip gave me considerable encouragement about our prospects for selling modules in Europe. If we follow a complete program, and I propose the ingredients in a program in this memo, I am convinced we can establish a solid foothold as the modules supplier over the next few years. This foothold will enable subsequent new programs to compete with home industry in the various countries. John Leng and I discussed every point herein in detail.

Main Points

1. Current progress and active potential in each country and requirements for fast success.
2. To translate or not to translate.
3. Distributors.
4. Recommended European Program.
5. Module Prospects: a new set of targets (see Appendix).
6. Jean Label.
7. CERN.
8. Competition.
9. Stocking.
10. Catalog Duties.
11. January Budgets and Reports.
12. Gunter Huwe.
13. Mailing Lists.
14. New Call Reports.
15. Hanover Fair Plans.
16. Products.



1. Current progress and active potential in each country with requirements for fast success.

A. U.K.

Geoff Shingles is one of our best module salesmen already. His customer interest and technical approach are excellent. His seminar at CERN was very well received. I hope our sales meeting stimulated further creative insights into the U.K. market.

The main problem is manpower and promotion. The Spring Electronics Show should be great and a distributor would help (see SASCO, distributors). As it stands, John Leng has his hands full doing a comprehensive job straightening out Europe. With Peter Herke going to Germany, that leaves only Geoff Finch and Ray Jones on computers and Geoff Shingles on modules with an organizational job of cleaning up the U.K. systems, not to mention the move to new facilities.

Our budget allows getting another modules man. I would like to see getting at least two young engineers as soon as possible.

We discussed the possibility of a pay-as-you-go training program. Geoff liked the idea of hiring young, capable engineers, each to give a two day module and logic course every two weeks. We could charge \$20/man, which would offset the salary of the man and build up a staff this way. (20 students at \$20, or \$800/month).

Lab Kit demonstrations and better surroundings will help significantly.

The catalog is probably going to have the most powerful immediate impact in English speaking countries (U.K., Scandinavia, Holland, Switzerland, Germany - in that order.)

I believe a step function result of sales effort, similar to our domestic experience, (1958-59) can be obtained.

Modules are particularly insensitive to political attention, versus computers. In turn, they will create further arguments for buying our computers.

Current number of module customers: 30

2. Germany - Holland

A. Cologne

We have a good start with good computer placements and some module customers. Gerry will have to guide Juergen. Juergen is technically good but needs direction. We believe he will do a fine job at module seminars and are setting up a program of seminars (invitational), one per month, in key cities. Juergen did not feel we should

charge, especially university people. But, we can see if a program is feasible similar to the U.K. Proposal.

We will need to control the handouts of catalogs at the Hanover Fair. There will be too many people going by (more than 100,000). I strongly urge an insert or separate handout in German, giving the key features and telling how to use the catalog. Juergen will write or translate. (See translations.)

I believe we should hire another sales-oriented German as soon as possible, preferably with sales and hardware experience. I suggested to Juergen and Gerry that we keep in touch with the schools and hire young engineering graduates possibly training through field service or applications backup. Engineering help is of considerable importance. (See Lebel and competition.) We can get the best people if we try early, since other American companies go all out and sign work contracts.

Gunter's demise appears to have no affect on our sales or reputation to date, but we will have to explore customer relations in depth.

#### B. Munich

Klaus Kyris is tops. He has contacted and has full awareness of key modules potential. He is also convinced we can sell and is working very, very hard. So far, he is the shining light among our continental sales engineers. More support and Gerry's help will do wonders for him. He respects Juergen's technical capability quite highly.

Perhaps we should reactivate contact with Bela Csont, who left Phillips for Siemens-Munich, to sell memory testers and modules (4 languages.)

Modules customers to date: 19

#### C. Switzerland

Klaus's work and Saul Dinman's seminar should pay off at Brown-Boveri and others.

So far, CIR, Lebel's system customer, and CERN are the two key users.

After much prodding, Jon Fadiman set up the CERN seminar for Saul in September. Subsequent contact and Geoff Shingles' last seminar, which was better arranged and done in a simpler, hand-holding way is paying off in prospects for two PDP-7's, a solid near-order for a PDP-8 and a high probability of success for modules.

We have never sold CERN completely throughout on modules. For many reason, the timing now is critical. It is either DEC or monolithics. Delivery, Tor Lingjaerde's help, and better response from Iselin and other key electronics people will help. We have arranged a lab kit to be left for their use. Geoff Shingles will see that



Tor gets a good set of modules as a knowledgeable user. Tor reminded us of dust-covered, but gleaming-when-polished simple advantages: reusability, 100% testing so no circuit debugging, and short-circuit proof design.

CERN is delicate. John Leng has been instructed to monitor all contact. Follow-up must be intensive. With a commitment for local field service and continued interest (despite 6600 problems, they are now buying two 3400s, showing their response to the attention CDC has given), we should be in great shape, but there are pockets of ego there that are crazy obstacles to insensitive selling.

Tor might possibly be our physics specialist in Europe, but there are personal problems.

#### D. Scandinavia

The markets should be Sweden, Norway, Copenhagen and Finland - in that order, by present signs, although Denmark could be a dark base.

Telare is not selling modules. We will try again to get Arengo off the drive, but Telare is blocking our progress. We are budgeting a man for Scandinavia (all products) within 6 months. We should tweak up Telare's commission if that looks reasonable, for the short term.

Telare does not appear to be equipped to do a good job as a distributor, but, again, the brains of the operation are at Arengo and I'm sorry we couldn't visit them and AGA. Perhaps Ken could on his trip there. I disagree somewhat with John Leng on where we can base Swedish sales, since I don't think a Swede can sell effectively in Denmark and vice versa. An American for 6 months in Sweden could tell us a lot, and help find a good man. (CERN contacts also will help there). (Jack O'Connell might do the job).

Module customers to date:

#### E. France

Bernard Haus has not effectively sold modules. I believe we'll get some mileage out of him now, but we need to get technical support and prepare to establish a basic program of technical selling. The modules show looked good. Geoff Shingles speaks enough French to get by in most cases. We might put Val Kassessinoff to work, with John Leng, to get after key prospects and ensure our image.

Jean Lebel is both an aid and a blockade. He views us as competition (since he sells engineering know-how and we sell this with our technical seminars and approach). Until I learned of his involvements, I suggested he be a distributor or do our seminars. (See Lebel)

Jean Lebel is very happy with our modules and is eager for more technical aids, such as OCTAID.

Despite all the noise, we can sell in France, but with a minimum effort (highly centralized market). We have prepared to slash the expenses once and for all and looking toward our customers' interests there. Jon Fadiman has not converted College de France to Flip Chips. A distributor might help, but it looks messy. John Leng and I had a good talk with a good friend of mine from HBS, Alain Chain-tran, Sales Manager for a large French-based connector company. John Leng was encouraged to see that it is possible to find a straightforward, communicative, no-nonsense (relatively) Frenchman. Perhaps he can help, especially since he wants my advice on their marketing of high quality connectors in the U.S.A. We need to first make sure we cover ourselves and our invested time with customers and we'll see how Bernard responds to our visit and more supervision.

#### F. Italy

Jon Fadiman has done a better job here than in France. Still, he has sold mostly PDP-8s.

Somehow, he doesn't want to read other people's call reports (mine on ASW Saclant and claim personal credit. In fairness to Bernard, I think this neurotic tendency on Jon's part has created, in large part, the suspicious climate in that office. John Leng will close in on those sales. We will have at least one PDP-7, several 8s and modules prospects. I think we should hire an Italian for field service now (or a Swiss) and use him in Germany or the U.K. By the way, our field service men, especially in France, are "Aces in the Hole". They look very good and excellent technically. Another American Manager for France and Italy could do wonders. I am going to look into M.I.T. and HBS for possible Americanized French or Italian candidates. Other leads will be developed, here and there. I think we could get by inexpensively, servicing first from Geneva. I have my eye on Antonio Grasselli at the Milano Politecnico. Italy may be a better bet than France in terms of numbers of customers and ease of cooperative business with top university and industrial people. We'll see how Bernard, who speaks fluent Italian, works out before he's allowed into Italy.

Modules Customers to Date: 1

Estimated volume of sales we could reasonably achieve this year in Europe:

U.K.	-	400K
Germany - Holland	-	280K
Scandinavia	-	150K
Switzerland	-	250K
France	-	150 - 250K
Italy	-	50K



2. To Translate or Not to Translate

Germany

Sample Comments:

Dr. L. Steipe - Sales Manager Europe, Amphenol-Borg

"You can get by, but to do a really good job selling in depth, you should translate into German."

K. Kyris

"Not necessary. The digital vocabulary most universal in Germany is English. Siemens and Telefunken have different terms."

(i.e., "Alles in Deutschland ist nicht Ordnung" - or "Germania in multis partes divisement.")

J. Kesper

"Absolutely necessary. 20,000 catalogs at the Hanover Fair is a waste without translating the whole catalog. Technicians won't read it, engineers won't like it."

Proposal

1. Do a logic handbook, basic and cheap, that will get Germans to use our terms. We can get a real grip on the market in symbology and orientation. They are hungry for this.
2. Do the foreword and specs in German, with a guide to reading the catalog (many revised words) for the Hanover Fair. Klaus Doering can do with our GmbH editing.
3. Let J. Kesper translate the course workbook and seminar notes, and we ship a mimeographed quantity with a nice cover for their seminars and give them plenty of lab kits for demonstrations.
4. Measure the reaction (G. Moore) and develop future plans.
5. Support the office with mailings of German letters and applications notes as prepared by sales trainees. (They generate the list and instructions, we mail.)

(I would like to see a German course offered to anyone here in the plant, stressing business and technical vocabulary. Evenings. I hope to write a primer as a hobby anyway.)

I think the remark by Steipe is most valid. Kyris' comment is what I like to hear, but a dangerous over-simplification in the face of rising nationalism and Klaus' training with ICT and DEC. Our object: where possible, make it easy to buy.!

### France

#### Bernard's Comments:

"The whole catalog must be translated, and because of duties in France, should be done in France."

My comment: If wishes were horses, etc.

#### Jon's Comment:

"Me too." (on either of above).

### Other Countries

Italy will need help for depth. Otherwise, we're all set up.

### Costs

The main factor is printing, not translation. I believe our people should do the translating. They know the terms. Also, we can refine as we go along, if we go easy. Possible cost for technical editing by outsider to polish (\$1.50/page).

We should come to a sensible and flexible plan on paper support between myself and Jack Atwood and Product Managers and build this into the budget. I believe the basic advisability of doing one thing or another should be left up to our European Management and myself, subject to discussion and budgetary approval.

## 3. Distributors

### General

There are no distributors on the scale of Allied, etc. in Europe. Reps are of marginal utility. 3C is dropping BFI (Tom Dalzell says they are one of the best as reps go) and I will discuss their 3C experience with their New York office at the earliest opportunity. See below for specific recommendations.



A. U.K.

Contacted SASCO.

Strictly mail-order, non-technical sales branch offices in a few key cities. But look like best U.K. has to offer. President, Mr. Stewart, quite impressive. Got excited about modules (Shingles set up meeting) and continued interest in Meeting #2 in Paris. Mailing list: 25,000. Catalog already wrapped up (will get new version in a few weeks for your review. Will do a special flyer on us. Need \$85K plus per year, 5X turnover. Willing to invest \$15K in inventory as initial commitment.

One complication is controlling interest by Phillipis (Mullard). Stewart says not a problem, but Steipe (they handle Amphenol-Borg) not so sure.

Proposal:

Pending review of their financial report which I will receive, suggest we go ahead.

Reasons:

1. I like the fact they are non-technical and won't confuse the sales/service relationship.
2. They want to use our technical support.
3. They have good U.K. name.
4. Steipe says they are quite aggressive.
5. We need to unload processing from U.K. Office.
6. They will be enthusiastic.
7. Fast entry into 3,000 accounts, tying in nicely with Spring Show.
8. Relieve inventory load in U.K. Office.
9. They prefer non-exclusive, let's see how we like each other, arrangement.
10. No tie-ins with American interests and confined to England (they are starting in U.K. but doubt any success there, so out of question).
11. John Leng/Geoff Shingles are enthusiastic about it.
12. Believe they can work out simple relationship, not draining our time.

We should meet a few of their representatives, check their reputation, and go ahead on a flexible basis, since I can't see 85K necessarily the first year. I strongly stressed the principle of complete disclosure of accounts and customer choice of ordering.

**B. Germany**

<b>Contacted:</b> (by me)	Rohde & Schwartz	(phone)
	ERA (Raytheon)	(phone)
	Amphenol-Borg	(phone, meeting in Paris)
(by Klaus)	Neumueller	(not able to follow-up)
	Omni - Ray	(not able to follow-up)

**Observations:**

**Rohde & Schwartz (Tektronics) - not interested. They want rep arrangements with \$500K per year volume. I was disappointed but we may want them later. Surprisingly, Mr. Moutog, the Sales Manager, does not speak English.**

**ERA - Tied in with all of Raytheon now. (Have had P-B modules and computers for over two years.)**

**Amphenol-Borg (Steipe)**

**Too bad Steipe is so expensive. He'd like working for us, I know, and he would be great. Zander would personally string me up, however.**

**Because Germany tends to have localized distributors (Munich, Stuttgart, etc.), they felt (according to them) that they needed to set up their own distributorship in Germany, so they have 6\* offices with technical men to support their non-Amphenol products and do represent others. They have a Sylvania-like connector, so this could be a problem, but ship at 11:00 a.m. when order in at 8:30 a.m., same day. So far, this is best bet. Steipe will review and contact Leng.**

**They have the following advantages:**

1. Bonded warehousing.
2. American management.
3. Steipe (although he doesn't handle Germany, everything else).
4. Translation and printing services (extensive).
5. Good-looking people (like Steipe).
6. Broad coverage.
7. Flexibility.

**Disadvantages**

1. Amphenol, although biggest manufacturing, does not support their European operation well and my friend Chaintran says they run a poor third to a German and his company. Cannon does better. However, they are experiencing their best year ever and might be hungry.

\* Main offices in Berlin, Hamburg, Dusseldorf, Munchen, Frankfurt, Stuttgart



2. Steipe is an excellent consultant for marketing throughout Europe and a combination Physicist and components distribution expert. Highly regarded.
3. Has American name; lose possible advantage of identity.
4. Possible conflict (although works both ways) on connector marketing. (I'm sure he'll be candid on this).

I can't speak highly enough of Steipe and his wife. They are Austrians, self-taught linguists, very civilized yet informal. He's meant for better things than connectors and has kept up on device (circuit) developments. He would offer real attraction to European employees (Continental).

Proposal:

Pursue this until we find if it can't be worked out. Need to meet the equivalent of Steipe in the inland (German) sales - i.e., the distributor chain. (Otherwise, they work through other distributors).

Also, quietly pursue other leads. Perhaps we should take a longer term view and consider Rohde & Schwartz (low-cost computers, wide distribution) on other future instrument-quality products.

C. France

Contacted: Radiophone (General Radio)

Personal, didn't get to meet again.

BFI

Couldn't meet.

Radiophone and their semi-related component distributor might be interesting. Reputation looks shady, however. (Kickbacks). Label reacted very negatively, but then, I don't completely trust Label on his objectivity.

Conclusion:

Go slow. Go direct, minimal but high engineering content. Stress seminars, invitational, to key people and clean up ease of order processing and communications.

(Same reaction on Italy - direct!!)

Use Label's sales to systems houses with care, nurse this along because of his reputation and high level European space research and other contacts until we have our own image securely established.

4. Recommended European Program

Summary of Points:

- A. Stress technical seminars and engineering image.
- B. Work out ways to add sales effort, to get more manpower per dollar.
- C. Do some translations, especially to teach our concepts in Germany and, to a lesser degree, France (Italy).
- D. Consider having more design done for customer in some cases (Germany).
- E. Load down with Lab Kits and Catalogs.
- F. Get direct engineering sales in Scandinavia and possibly Holland and Italy. (Holland and Scandinavia are budgeted).
- G. Do some key advertisements with budgetary proposals quarterly.
- H. Use high-level approach where possible (K.H.O., S. Olsen, S. Dinman, myself, J. Leng) to promote large account activity.
- I. Solve supply problem (quick delivery) probably by centralized bonded warehouse wherever best located. (London, Cologne)
- J. Establish base (F.S., stock) in Geneva.
- K. Go in with distributors on experimental (6 months minimum) basis where can get coverage. Support with referrals and easy terms, offer a basic inventory commitment. Start with SASCO. Next Holland, Scandinavia or Germany.
- L. Do "target" selling, supported by mailings by Maynard to maximize effectiveness of sales personnel.

5. Modules prospects: A New Set of Targets

Appendix I gives the list of top potential modules customers in Europe as generated at our Sales Meeting in Paris. I stressed aggressive and creative selling - going after people who should buy, rather than waiting for leads. This was imminently successful and gave an opportunity to be thrilled by Klaus and Geoff as to their awareness and cooperative attitude. It was exciting and now we can go after it full bore. I intend to send this list back and have each office add two or three sentences explaining what the company does and when we should sell and why. Then they can add to this list as we go along and generate a top-quality prospect and mailing list for direct mail support.

6. Jean Label

We had a very interesting discussion.

Key Points:

- i. Jean is happy with the modules. He'd like better service and I apologized for the office problem and said we would give better



technical and ordering support in the future.

2. He could be interested in doing seminars for us, but it came out that, since his business is doing the engineering design, providing a wire list and checkout of the prototype after the customer has built it, he views our technical support activities as potential competition. We discussed our sales approach, which generally wouldn't threaten him.
3. OCTAIDS and similar devices for simplifying his job and also OCTAIDS will possibly offer him a chance to develop his own "proprietary" approaches and black-boxes, such as time-code generator logic, etc.
4. His lines to systems work for ESRO and other European ventures are excellent. He bid against Astrodata's affiliate to get the CIR job.
5. His subsequent proposal was to consult to us on proposal preparation (large system and a certain number of days per year on a fixed fee "on-call" basis.) We should explore having this capability but I suggest an arms' length approach and independent operation, with a lot of cooperation in his direction.
6. He wasn't interested in the distributorship idea, which I now agree with, understanding his role in life.
7. Delivery must be helped by a European supply point.
8. Jean Label will be on the B.O.D. of the new British company developing the small integrated-circuit computer (De Vitry), to represent the French money interests. Arnaud warned us of Label's future conflict of interest problems. But, Jean still is an excellent salesman for our modules in Europe.

#### 7. CERN

Now ripe for a complete sales job. Shingles follow-on seminar helped. Tor is selling, the foe is monolithics. Tor's main points are: REUSABILITY, SHORT-CIRCUIT PROOF, FULLY TESTED MODULES against the circuit debugging required. CERN physicists run the danger of minimizing real implementation problems.

The encouraging fact is that we now seem to have new friends because of revived interest in small computers at CERN. John Leng will coordinate follow through. We should ease their delivery fears, which we had a chance to do with Tor but a supply depot will help. When we have a field service man there, he can maintain a small stock.

CERN - Geneva could be a logical point to keep some equipment since passers-through could pick up equipment themselves at times in their frequent visitations.

## 8. COMPETITION

Situation not much different.

ERA (Packard Bell) claims they have sold \$50K per month the last few months. (Klaus says he doesn't believe it) and found it took engineering help, (applications and black-box work). They provide the wiring list in many cases.

We need to push on the APPLICATIONS - PARTS LISTS effort. Here in Europe, parts lists ready made provide the built-in engineering they lack and need to get started buying. We should set up competition or whatever needed to encourage these notes on a standardized format.

A system of rewards for accepted application notes and accepted translations, both requiring formal submission and acceptance, would be worth considering.

3C is setting up offices in two months. We went to their booth number (see AD attached) but some mistake had been made. Nobody there had even heard of them. "Good start, Sid." I'll be able to get useful information from their ex-reps (I assume they will be out in a few months).

I believe we must sell the modules idea. Our main effort will be again integrated circuits, with local manufacturing of them hurting us but the field is wide open. ICT's people were stunned to hear we've been making 10 mc logic for years.

Steipe thought that technical seminars and good applications documentation are really the way to do it in Europe. Our Lab Kits are a powerful sales opener.

Please, 200 Lab Kits for our "dealers" by March 30.

## 9. STOCKING

The London Airport's facilities for stocking don't look too good. Perhaps we should stock in Germany instead, since that market looks good and they are relatively easy to deal with. SASCO (if we go that way) would minimize our stocking requirement in England.

We are investigating possibilities.

## 10. Catalog Duties

We are gathering (Shingles, Kyris, Haus) more information, but the situation looks as follows:



A. U.K.

Literature sent to a trade show is duty free except that the surplus is dutiable. We'll investigate educational literature and ways to get extras from the show to the office without paying.

B. Germany

No problem. As long as you don't sell it, it is duty free.

C. France

Everything is dutiable. Charges are by the pound, and it is high (more than 50¢ per catalog). It is expensive to ship and distribute literature in France and I think future plans will necessitate doing special literature printings (or some inexpensive method) in France. We'll prepare the figures. Uncontrolled mailings to France by Tech. Pubs. would be very expensive, so we'll set up severe controls on present literature.

We are investigating shipping catalogs in from Germany, and we may want to charge for catalogs to offset the duty (for large quantities).

11. January Budgets and Reports

We spent a good deal of time going over budgets, explaining their use, and actually preparing January reports in a workshop session at our sales meeting.

This is the first try but it was imminently successful in pointing out the need for expense control and the true costs of sales. I'm sure we can smooth this out nicely. I'm also sure we will largely eliminate the confusion and get better cooperation with less red tape effort and time.

The time distribution (sales) and product expenses versus budget are available and will be given to each product manager.

12. Gunter Huwe

Now with Phillips somewhere. I'm pleased to see that he is not lingering on. His sister has been terminated and a new bookkeeper-clerk hired. (worked in the U.S., looks very good.)

13. Mailing Lists

In line with what I think we should do domestically, it is even more useful, where we have a problem of building up an identity and early family of customers as in Germany, that we set up the system of office (country) mailing lists, selected by potential and interest, and prepare the envelopes,

labels, or whole mailings in Maynard. This is the cheapest and least costly in sales time. Also, it offers an approach highly valued in Europe, good product information by mail. I hope Tim McInerney will have time to devote to this.

14. New Call Reports

John Leng and I discussed ways to get good reports without creating a large secretarial problem and load. I will propose a change in the system in a separate memo which I think offers a simple solution and fits our needs as "selling engineers".

15. Hanover Fair

We are going in. I think, as stated before, we should have a flyer in German with basic sales arguments and specs, also telling how to use the catalog.

Klaus and Gerry will submit a proposal for what we can do to fix the current booth up to look reasonably substantial.

16. Products

A common recommendation was that we increase our A/D information and add to our product line. My own experience will back this up. A high percentage of people, perhaps a majority, are interested in A/D. Our catalog will help, but I would like to see some good plans here, outlining what we should offer (how "low-level" we should get, etc.) People didn't understand John Jones' Sales Newsletter item about discontinuation of packaged A/D converters.

OCTAIDS would be good.

I believe we should look at Europe in the following ways:

1. Will respond to high level technical approach.
2. Europe has our 1958 position with respect to company image, calling for direct mail and advertising.
3. Should plan more coverage, the sales are there.
4. Continue to gather as much information as possible as we go along (Creative Marketing) on translating, seminars, source of sales engineers, engineering support, stocking.
5. Push a directed, company-supported sales strategy.

TJ/mf



Module Prospects by Application (Company or Organization Function)

	<u>U.K.</u>	<u>Germany</u>	<u>France</u>	<u>Scand.</u>
Test Instrumentation and Measurements	8	5	4	3
Physics	9	7	10	3
Data Acquisition	6	3	2	2
Process Control	7	5	7	4
Computer Manufacturing	2		2	2
Schools	2	2	2	4
Typesetting	1		2	
Cartography	1			
Medical	1		1	1
Analog	1	3	2	1
Display Int.		3		
Radioscope		1		
X-Ray Spectrom		2		
Machine Tool Control		1		
Training Devices			3	
Computer Interface			3	3

MODULE PROSPECT LIST

Scandinavia, Switzerland and Italy

John Leng

Asea		Process Control Systems
Arenco		Race Course Special Computers
Saab		Military Systems and Control
Raytheon	Denmark	Military Systems
Raytheon	Switzerland	Military Systems
Raytheon	Italy	Military Systems
AGA		Medical Systems, Data Gathering
SINTEF	Trondheim	Process Control Systems
Fiskers	Finland	Military Systems
Atomic Energy	Sweden, Stutsrich	
Atomic Energy	Norway, Kjeller	
Atomic Energy	Denmark, Roskilde	
University of Oslo		
Technical High School	Stockholm	
Chr. Michelsen	Bergen	
Short Bros. and Harlund	Belfast	
CERN		
L.M. Ericson		

February 1966



MODULE LEADS - Geoff Shingles

Sperry  
D-Mac  
Lancashire Dynamo  
Winfrith  
Donnreay  
MEL  
Elliotts  
Harwell  
Leeds University  
Birmingham University  
National Hospital Group  
Cossor Electronics  
RAE Farnborough  
Oxford University  
Cambridge University  
University College of London  
Imperial College  
Ferranti  
Burden Neuro  
I.C.I.  
Manchester University  
Liverpool University  
Rutherford Lab.  
Hawker Siddey  
BAC  
Road Research Labs.  
GEGB Research Labs.  
E.E. (Nelson) Research Labs.  
General Precision  
Southampton University  
Foxboro - Yoxall  
EEL  
Evan - Electro Selenium Ltd., Halsted, Essex

February 1966

MODULE PROSPECT LIST

	<u>Klaus Kyris</u>	
Max-Planck Institute	Munich	Physics
Deutsche Krebsforschungszentrum	Heidelberg	PHA
BBC (Brown, Boveri & Co.)	Baden, Switzerland	Process Control
BBC - Krupp	Kernforschungszentrum, Zurich	Process Control
M-A-N	Augsburg	Instrumentation
University Giessen	Strahlencentrum	Physics
	Physics Institute	Physics
Fa. Schlumberger		Instrumentation
Fa. Oening Ray (Omni-Ray)		Tool Machine Control
Fa. Siemens Reiniger Werke		Medical
Fa. Alchord		Test Equipment
Fa. Contraves		Instrumentation
ETH	Zurich	Hybrid Systems
General Electric Research Lab.		Display
Fa. Univac		Display
AEG	Berlin	Process Control
AEG	Heiligenhaus	Process Control
DESY	Hamburg	Physics
ATLAS-Werke	Bremen	Process Control
Max-Planck Institute	Heidelberg	Physics
Aviation Dusseldorf		Space Simulation
Teldix	Heidelberg	Space Simulation
Ruchlipsch Stahlwerke		Control for Spectrometer
Stahlwerke Witten/Ruhr		Control for Spectrometer
University of Heidelberg		Physics
University of Marburg		Physics
Kernforschungszentrum	Karlsruhe	Physics
University of Freiburg		Physics
University Mainz		Physics
T.H. Munchen		Hybrid Systems
T.H. Aachen		Physics
T.H. Aachen	Professor Deth...	Instrumentation
University of Bonn		Physics



Prospect List - Klaus Kyris - Continued

University Erlangen		Physics
Fraunhofer-Gesellschaft		Physics
Estec	Holland	Space Simulation
Eslab		Instrumentation
Ingenieurschule	Berlin	Training
Institute of Fleisbaum (sp.)		Data Acquisition
Technische Hochschule Kiel		Data Acquisition
Nymwegen	Holland	Physics
University Leyden	Holland	Physics
T.H. Stuttgart		Display
Telefon Noralbein (sp.)		Process Control
TNC	Frankfurt	PHA
University Saarbrucken		Data Acquisition
University of Bonn (Institute Astronomy)		Control for Radioscope

Physics (PHA) 7

Process Control 5

Control for Radioscope 1

Space Simulation 3

Test. Equip. Instrumentation 5

Tool Machine Control 1

Control for X-Ray Spectron 2

Display Interface 3

Data Acquisition 3

Hybrid System 3





PROSPECT LIST - Bernard Haus - Continued

CFP

Petrol Company

Avions Breguet

Observatory of Paris

Toulouse

S.A.T. Telecommunications Co.

A.O.I.P. Telecommunications

Intertechnique

C.F.A. Automation Company

Ecole Polytechnique

Ecole Normale

Deberny

Typesetting

CNET

SEA

Displays and Computers

Euratom



MODULE PROSPECT LIST

Switzerland and Italy

Jon Fadiman

SWITZERLAND

CIR - ESRO

CERN

Physics

Watches and Timing Devices

Ebauches

Batelle (Geneva)

University of Geneva

ITALY

Officine Gallileo

Industrial Equipment

Universita de Roma

Physics Experiments

Universita de Padova

Special Digital Set Ups

Salenia - Roma

Military Applications  
Telemetry Applications

Salenia - Napoli

Fiat

Control Applications

Agip-Milano

Control Applications in Petroleum Industry

Universita de Bari

Interface Work with Physics

ENEL

CNEN

February 1966

PEPR BIDDERS' CONFERENCE

February 15, 1966

DEC Attendees: R. Lane, A. Titcomb, and D. Tringale

Bidders: DEC, IBM, SDS, CCC, ASTRO-DATA, CDC.

Univ. Represented: MIT, BONN, Oxford, Yale, Rochester, Brookhaven, Maryland, Johns Hopkins, DUKE, Princeton, Brown, Rutgers, Argonne, Vanderbilt.

Special Guest: AEC, Mr. Dave Richtman

The above conference was hosted by MIT - Dr. Pless  
B. Wadsworth

We were all surprised to find there will be two rounds of bidding:

- (1) Budgetary Estimate to Dr. Pless - March 15, 1966.
- (2) Procurement by AEC - I guess about July, 1966.

The purpose of round 1 will be for the AEC to estimate cost of the systems and prepare a budget (fiscal 1967).

The purpose of round 2 will be for procurement. I estimate the AEC will procure approximately 3 to 6 complete systems in fiscal 1967.

Maryland	MIT	Rutgers
Johns Hopkins	Rochester	?

The proposals are to include the controller, interface to the PDP-6, Scan Table (but not the optics or film transports) and the TEDS. They do not want a separate proposal for the controller. MIT will acceptance test all systems for the end user and payment will be authorized upon delivery and acceptance at MIT. The controller & PDP-6 interface will be performance specified and the manufacturer will be responsible to guarantee the performance. The Scan Table is to be built from a well specified set of drawings, instructions, etc. and MIT will be responsible for performance of this section, the manufacturer for workmanship. (This part we can subcontract.)

R. L. Lane  
2/16/66



The effect of all this is very interesting. While the manufacturers, MIT, and the AEC are busy creating a diversion, we will continue to sell Yale type PEPR Controllers. (Bonn, Oxford, Princeton, Yale.)

I am going to propose we contact "CELCO", a New Jersey firm, and co-bid the complete system with DEC having System responsibility. Alan and I can rough estimate the first round and during the second round (when it gets here), we can either no bid, bid it all, bid controller only, etc. The first round carries no obligation on either part (customer or manufacturer).

CC: K. Olsen ✓  
W. Hindle  
T. Johnson  
N. Mazzaresse  
J. Jones  
A. Titcomb  
J. Leng  
G. Finch  
K. Larsen  
R. Handy  
D. Tringale

R. L. Lane  
2/16/66

DEC INTEROFFICE MEMORANDUM

TO: K. Olsen ✓  
R. Lassen

FROM: J. Smith

DATE: February 15, 1966

The single most critical area affecting scheduled PDP-7 and PDP-8 delivery commitments is the availability of qualified checkout technicians. After reviewing the situation with Personnel, all indications point to a shortage in the pipeline until sometime in June or July. The need for PDP-7 and PDP-8 checkout personnel is immediate; machines have completed construction and are being delayed due to the non-availability of checkout personnel.

Due to the percentage (70%) that these schedules contribute to the overall company effort, this problem should be viewed on an overall company basis. Immediate relief can only come from in-house qualified technicians currently performing tasks in areas other than Checkout.

I would suggest that some centralized authority immediately take a company-wide audit of all technicians and the current tasks they are performing. This information, when available, should be reviewed to assure that the efforts of technically qualified personnel are being utilized to optimize the current overall company goals.

I would hope that a program such as this would result in some short-range adjustments that would in turn release technicians for checkout responsibilities for the next couple of months.





# INTEROFFICE MEMORANDUM

DATE February 15, 1966

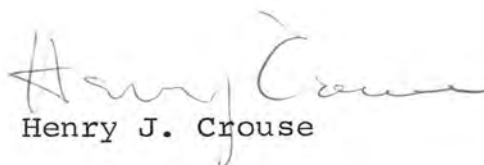
SUBJECT Harvard Cooperative Society

TO Kenneth H. Olsen

FROM Henry J. Crouse

I have enclosed the charge card for the Coop. Please sign the reverse side for identification.

When you make a purchase, please send me the charge slip for our records.

  
Henry J. Crouse

Enclosure

# HARVARD COOPERATIVE SOCIETY

HARVARD SQUARE, CAMBRIDGE, MASS. 02138

PHONE: TROWBRIDGE 6-3000

STANLEY F. TEELE  
PRESIDENT

FEBRUARY 14, 1966

JOHN G. MORRILL  
GENERAL MANAGER

MR. HENRY J. CROUSE,  
PURCHASING AGENT  
DIGITAL EQUIPMENT CORP.  
MAYNARD, MASSACHUSETTS

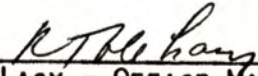
DEAR MR. CROUSE:

RELATIVE TO MY CONVERSATION WITH YOUR SECRETARY, I AM ENCLOSEING  
THE CREDIT CARD TO BE USED WHEN MAKING PURCHASES AT OUR STORE,  
IN PERSON.

WE SHALL ALSO BE ONLY TOO GLAD TO HONOR ANY PURCHASE ORDERS YOU  
MAY WISH TO SEND BY MAIL.

VERY TRULY YOURS,  
HARVARD COOPERATIVE SOCIETY

RTD/gs  
Enc. (1)

  
R.T. DELACY - OFFICE MANAGER

A/c card # 170006

DIGITAL EQUIPMENT CORP.  
PURCHASING DEPT.

1966 FEB 15 AM 10:35

RECEIVED





*equipment corporation*

MAYNARD, MASS. 01754

TWinoaks 7-8822 TWX MAYN 816

February 15, 1966

Mr. R. T. DeLacy  
Harvard Cooperative Society  
Harvard Square  
Cambridge, Massachusetts 02138

Dear Mr. DeLacy:

We received your credit card and are appreciative of the courtesy you have extended us.

It is my understanding, that a discount schedule is applied to student purchases. Will such a rate be applied to ours?

Yours truly,

A handwritten signature in cursive script that reads "Henry J. Crouse".

Henry J. Crouse  
Purchasing Agent

HJC/amg



# INTEROFFICE MEMORANDUM

DATE February 14, 1966

SUBJECT List of Managers

TO K. H. Olsen

FROM Bob Lassen

Managers Over Age 32

R. Brown	• L. Hantman
H. Mann	• E. Harwood
G. Moore	• W. Long
H. Anderson	• D. White
R. Dill	R. Boisvert
R. Lassen	R. Handy (Cambridge Sales)
E. Simeone	• T. Johnson
R. Pate	R. Musson (L. A. Sales)
R. Ward	K. Larsen (Palo Alto Sales)
J. Atwood	H. Doyle (Washington D.C. Sales)
J. Nangle	R. Lindsay (Pittsburg Sales)
P. Grieve	C. Hickman (Denver Sales)
W. Hindle	R. Wilkinson (Washington Sales)
R. Lane	• R. Best
G. Bell	• L. Prentice
R. Savell	• C. Kendrick
R. Beckman	• M. Sandler
N. Mazzaresse	R. Richardson



Managers Under Age 32

J. Shields	E. DeCastro
D. Packer	L. Seligman
H. Crouse	G. Belden
J. Lozouski	R. Melanson
A. Stephens	J. Cudmore
A. Klutchman	K. Doering
M. Ruderman	J. Smith
A. Dinman	J. Jorgenson (Philadelphia Sales)
L. Portner	D. Denniston (New York Sales)
D. Cotton	T. Quinn (Chicago Sales)
M. Ford	J. O'Connell (Florida Sales)
J. Jones	F. Gould (New England Sales)
H. Painter	G. Rice (New England Sales)
	D. Henderson (Huntsville Sales)

The following is a list of people who should be carefully watched and evaluated for future supervisory and management jobs, primarily because of the nature of their current responsibilities. In all probability, we will find that some of these people have limited potential, but all bear our attention at this point in their careers with DEC.

K. Gold - Tech Pubs	R. Sogge - S. C. Eng.
E. Bogusz- Tech Pubs	J. Booth - S. C. Eng.
J. Padian - Tech Pubs	R. Mangsen - S. C. Checkout
J. MacKeen - Dig. Test Syst.	M. Horovitz - S. C. Prog.
I. Jacobs - Module Sales	J. Murphy - S. C. Eng.
F. Kalwell - Module Sales	B. Vachon - S. C. Sales
A. Ross - N. E. Sales	D. Murphy - S. C. Eng.
R. Eisenhower - N. E. Sales	R. King - Purchasing
P. Backholm - Mech. Eng.	P. Brown - Purchasing
G. Wood - Mech. Eng.	P. McGaunn - Purchasing
D. Plumer - L. C. Sales	P. Chambers - Personnel
R. Clements - L. C. Eng.	J. Gaffney - Personnel
S. Mikulski - L. C. Eng.	B. Garvin - Accty
A. Blackington - L. C. Prog.	J. Myers - Accty
L. Gossel - L. C. Prog.	F. Mariani - Accty
W. Segal - L. C. Prog.	F. MacLean - Accty
T. Hastings - L. C. Prog.	B. Fitzgibbons - Accty
J. Solito - L. C. Checkout	J. Hansen - Accty
J. Sullivan - L. C. Checkout	R. Clayton - Linc.
D. Kicilinski - Comp. Prod.	D. Busiek - Field Service
T. McInerny - Trade Shows	R. Brooks - " "
W. Farnham- Home Office Sales	J. McPherson - " "
J. Jordan - Ind. Design	F. Purcell - " "
D. Widder - Mech. Eng. (Coop)	W. Henton - " "
A. Hall - L.C. Eng.	R. Willis - " "
A. Titcomb - S. C. Sales	A. Kimmel - " "
T. Whalen - S. C. Sales	G. Slaw - " "
H. Burkhardt - S. C. Sales	F. Hibberd - " "
J. Hastings - S. C.	K. Senior - " "

(Con't)



D. Zereski - Field Service  
J. Davis - Training  
P. Smith - Training  
E. Steinberger - Training  
J. Kelly - Training  
R. Fronk - Sales  
R. Oakley - Sales

Note: Please note that we have not made any attempt to define our managers and potential managers in our foreign operations at this time.

*K. Olsen*



INTEROFFICE  
MEMORANDUM

DATE February 14, 1966

SUBJECT Billings' System

TO K. Olsen  
N. Mazzaresse  
W. Hindle  
D. Best  
J. Shields  
L. Prentice  
P. Backholm

FROM R. Boisvert

The system at Billings has had the following malfunctions during the past four weeks:

- 1. Loop Failure - Switch adjusted
- 2. Tachomer - Replaced, the brushes were worn out
- 3. Stop Valve - Replaced - not received, awaiting valve to investigate failure cause.

Item 3 has begun to show signs of another area of the transport where the part will not hold up. We have had 6 valves in total fail during the past 6 weeks. The failures have been reported to Midwestern and four valves returned to date for investigation. The problems as pointed out to Midwestern appear to be primarily in the production process rather than design.

Another point of interest is the new shock mounts for the compressor. Our transports are always on a skid on wooden floor. When the unit is installed on a concrete floor with tile covering the vibration is so bad that one cannot read the pressure gauges. I strongly urge that Phil give full time attention to this problem. -- We may be mechanically beating areas of the transport such as the valves to mechanical failure.

Finally, a noteworthy item. We have done off-line testing with the new flat clamp arm drive shoe. We have excellent performance and are away from the Capstan a tight 4 mils rather than a tight 1 mil. Further tests are to be performed before a recommendation is made on this item.





# INTEROFFICE MEMORANDUM

DATE February 14, 1966

SUBJECT Morgan Guaranty Trust Co., Visitors

TO Ken Olsen

FROM Harlan Anderson

The men from the Morgan are David Dyche of the investment side of the bank and Herbert Ayers of the Operation Research Office of the bank. They are interested in the question of time sharing a large computer vs. individual use of a small computer. They have had a lot of information provided to them on time sharing and would like some information on the individual approach. They are particularly interested in any description of DEC's future role in the computer industry.

Per our discussion, I have asked them to contact you when they arrive at 11 a.m. on Monday, February 21. I would suggest that Nick might be able to contribute to the discussion.

Andy

HEA:ncs

February 14, 1966

Mr. David B. Dyche, Jr.  
Investment Research Officer  
Morgan Guaranty Trust Company  
23 Wall Street  
New York, New York 10015

Dear Dave:

I wanted to confirm that Ken Olsen is expecting you and Mr. Ayers on Monday, February 21, at 11 a.m. My own plans have changed so I will not be with you, but Ken is looking forward to your visit.

Sincerely,

Harlan E. Anderson

HEA:ncs  
cc: K. Olsen

C  
O  
P  
Y



*K. Olsen*



INTEROFFICE  
MEMORANDUM

COMPANY CONFIDENTIAL

DATE February 14, 1966

SUBJECT Minutes of the Sixth Disc Committee Meeting, February 10, 1966, 1:00 P.M.

TO Committee Members and Attendees FROM S. Lambert

PRESENT: Ed DeCastro, Loren Prentice, Steve Lambert, Phil Backholm, Ken Fitzgerald,  
Dan Wardimon, Dave Nevela, Steve Mikulski

Presiding Chairman was Ed DeCastro.

Recording Secretary's Report:

The minutes of the previous meeting were read and approved.

Old Business:

In the Fifth Committee meeting, there was only one action item listed under  
PROCESS FLOW CHARTS. There were no reports given to contribute to the development  
of the procedure as requested.

New Business:

IBM HEAD AND DISC

Steve Lambert presented two letters from IBM. One indicating that stripped  
down versions of the Disc Pack are not available for sale. The other letter indicated that  
the IBM 2310 Arm and Head Assembly is for sale and the upper arm assembly costs \$129  
and the lower arm assembly costs the same. The estimated delivery is 40 days.

Action - Steve Lambert is to see that both arms are purchased for the disc  
development program.

57A STATUS

Steve Lambert reported the number of 57A's in the field is approximately  
36. The commitment to production is 48. A letter from Ron LaFosse in production and  
Don Zereski in Field Service indicate that these controls and the interfacing require small  
modifications. Steve has spent 4 days and plans two more to see that the drawings and  
documentation are brought up to date to meet the requirements set forth by Field Service.  
There are nine sets of drawings involved with this modification request.

Action - Steve is to clean up the 57A problems and get back to the disc  
development program as quickly as possible.



## GLASS DISC SUBSTRATES

Steve Lambert brought to the committee meeting an IBM compatible disc substrate made out of 0311 Corning glass. A letter from Corning indicated the precision to which these substrates can be made.

Action - Steve is to investigate the deposition process of either oxide or nickel cobalt to glass with Bob Brown and John Hitch as consultants.

## PRELIMINARY RESULTS OF RE-EVALUATING 4523 SENSE AMPLIFIER

Dan Wardimon indicated that between 16 and 32 KC there was less than 1 microsecond phase shift in the old 4523 amplifiers. In the lower frequency range, the zero crossing was leading by less than 1 microsecond phase shift. In the upper end, the zero crossing was lagging by less than 1 microsecond. In the range from 10 to 50 KC, the shift was 1.2 microseconds leading at the lower end and 1.2 microseconds lagging at the upper end. Dan further pointed out that the phase shift introduced by losing 1 channel in the head creates as much as an 8 microsecond phase shift which is a result of mechanical skew problems.

No action was brought forth on this item.

## THREE PROPOSED SCHEMES FOR REDESIGNING THE GUIDE MECHANISM

Dave Nevela presented the first guiding mechanism. This is a spring loaded plate pushing the tape against one edge of a fixed guide. This mechanism has been built and tested with only a few hours of running time. However, Dan Wardimon indicated that the dynamic skew seems to have dropped from 4 to 5 microseconds down to 1 microsecond.

The second guidance system is a tapered guide approach. Loren Prentice indicated that the guide that was developed has too much taper, but a new taper guide is being developed. The present taper is .0060 to the inch, the new one will be .0010 to the inch. This guide system has not been tested yet, however, it was indicated that the production cost of this system would be less than using the spring loaded guide system.

The third guidance idea has not been worked on yet, but involves roller guides based on the same principle used in IBM tape systems. Here again, the price of this system would be approximately \$40 more than the present or equivalent to the additional cost of the present spring loaded guiding scheme. There were four action items brought out on the guidance mechanism:

Action #1 - Dan Wardimon is to examine the wear characteristics on the new guidance mechanism.

Action #2 - Dan Wardimon is to connect a running time meter to this system and get as many hours use possible before the next committee meeting.



Action #3 - Dave Nevela is to work on the guiding arrangement using a leaf spring idea suggested by Loren Prentice.

Action #4 - Loren Prentice is to acquire a gram scale meter to be used in the development of spring loaded guides.

#### HEAD SKEW ADJUSTMENT

Dan Wardimon indicated that it is necessary to have perpendicularity of pole tips to tape edge of less than  $\pm 50$  microinches or 1 microsecond skew.

Action - Dave Nevela is to look into the head alignment mechanism and propose a head adjustment scheme that will meet the desired skew tolerances.

The committee meeting adjourned at 2:00 P.M.

Next committee meeting will be held February 17, 1966 at 1:00 P.M.

If there are any errors or omissions to these minutes, please correct and send to Becky Lizotte.

QTYEQUIPMENT & MACHINERY

2/11/66

1	Computer
4	Oscilliscopes
4	Basic Logic Laboratory kits
	Torque measuring instruments 0 oz/in to 10 lbs/ft
1	Environment test chamber 4' x 4' x 8'
1	Shake, rattle & roll table
2	Vacuum test stands
1	50 cycle generator
1	Surface profilometer
1	Stroboscope
1	Tachometer
1	Drill press 1/2" cap.
1	Precision drill press 3/16" cap.
1	Milling machine 24" x 30" cap.
1	Lathe 11" tool room
1	Rotary hand turrett punch (Rotex)
1	Foot shear 4' x 1/8" cap.
1	Hand shear precision 12" x 1/16" cap.
1	Box & pan brake
1	Small paint booth
1	Air supply
1	Surface grinder
1	Spot welder
1	Dust free assembly area 10 x 10 20,000 square feet



PROPOSED PERIPHERAL EQUIPMENT DEVELOPMENT DEPARTMENT

1. Administrative Level
  - a. Manager
  - b. Secretary
  
2. Electrical Section
  - a. Engineer - Logic & Circuit Design
    1. Technical Assistant
  - b. Engineer - Servo & Power Design
    1. Technical Assistant
  - c. Engineer - Checkout & Test
  
3. Drafting Section
  - a. Electrical - Logic & Circuits
  - b. Electrical - Wire lists & Layouts, Etc.
  
4. Programmer - Checkout & diagnostic programs
  
5. Mechanical Section
  - a. Mechanical Engineer - Product design & packaging & specifications
    1. Design draftsman
    2. Detailer
  - b. Mechanical Engineer - Producability, tooling testing & specs.
    1. Design draftsman
    2. Detailer
    3. Technical assistant - expedite, testing, prototype assembly
    4. Technical assistant - shop work, proto assembly



# INTEROFFICE MEMORANDUM

DATE February 10, 1966

SUBJECT TECH PUBS BUDGET - CALENDAR 1966

TO Ken Olsen

FROM Jack Atwood

The attached budget sheets incorporate all the changes proposed and agreed to during the course of our review sessions. They provide a detailed listing of our projected activities on a project-by-project basis, with either estimated production costs or production and labor/overhead costs for each project.

The sheets covering technical writing projects include labor/overhead figures in parentheses. This indicates that, while the writing will probably be done in whole as in the past by the technical writing group, the funds are provided for in the promotional budgets and these amounts have been excluded from the technical writing budgets.

There are also amounts set off by brackets. These are contract labor dollars to which overhead had not been applied.

Please let me know if you have any questions.

J. L. A.

cal  
Enclosure



CALENDAR 1966 BUDGET - GENERAL ADMINISTRATION

K. Olsen

ACTIVITY	12 MONTHS	1st QUARTER	2nd QUARTER	3rd QUARTER	4th QUARTER
<u>Space Advertising</u>					
Institutional advertising in yearbooks, benefit programs, special editions, etc.					
Preparation	\$ 150		\$150		
Space	1,000	\$100	700	\$100	\$100
	\$ 1,150	\$ 100	\$ 850	\$ 100	\$ 100
Planning, writing, layout, finished art, etc.	100	10	70	10	10
Overhead at 100%	100	10	70	10	10
	\$ 1,350	\$ 120	\$ 990	\$ 120	\$ 120
<u>Publicity</u>					
Corporate publicity in newspapers, magazines, trade publications, etc.					
Planning, writing, typing, mailing, etc.	\$ 3,000	\$1,000	\$ 500	\$ 750	\$ 750
Overhead at 100%	3,000	1,000	500	750	750
	\$ 6,000	\$2,000	\$1,000	\$ 1,500	\$1,500
<u>Literature</u>					
Annual Report (15,000 copies)					
Production Cost	\$ 5,000			\$ 5,000	
Planning, writing, layout, finished art, etc.	2,500		\$1,500	1,000	
Overhead at 100%	2,500		1,500	1,000	
	\$10,000		\$3,000	\$ 7,000	
<u>Shows</u>					
ARD Annual Meeting					
Production cost of special displays	\$ 500	\$ 500			
Planning, layout, finished art, etc.	100	100			
Overhead at 100%	100	100			
	\$ 700	\$ 700			



CALENDAR 1966 BUDGET - GENERAL ADMINISTRATION (continued)

ACTIVITY	12 MONTHS	1st QUARTER	2nd QUARTER	3rd QUARTER	4th QUARTER
<u>Other Services</u>					
ON LINE					
Production Cost	\$ 4,800	\$1,200	\$1,200	\$ 1,200	\$1,200
Planning, writing, layout, photography, art, etc.	4,800	1,200	1,200	1,200	1,200
Overhead at 100%	4,800	1,200	1,200	1,200	1,200
	\$14,400	\$3,600	\$3,600	\$ 3,600	\$3,600
<u>Total</u>	\$32,450	\$6,420	\$8,590	\$12,220	\$5,220
<u>Approved Budget</u>	\$32,000	\$6,000	\$9,000	\$12,000	\$5,000



dec

INTEROFFICE  
MEMORANDUM

DATE 10 February 1966

SUBJECT Timing of Salary Review

TO Ken H. Olsen

FROM John Allen Jones

cc: H. Mann

The annual Salary Review seems to have clear problems:

1. It ties up key management personnel for a large block of time, rather than spreading the task throughout the year.
2. All salaried personnel know when everyone gets their raise. This leads to mass comparison of raises and if there are gripes, they get amplified.

I suggest:

1. A permanent salary committee be set up to review wages on a monthly basis.
2. Salaries be reviewed on the date of each employee's anniversary with company.

This change should ease the task of salary review, permit managers to spend more time discussing the review with the affected employee, and cut down on the wage increase gossip that goes on each year.





INTEROFFICE  
MEMORANDUM

COMPANY CONFIDENTIAL

DATE February 9, 1966

SUBJECT PDP-8 Costs

TO Ken Olsen

FROM Nick Mazzaresse

As you requested in your memo of February 1st, I am enclosing a copy of the cost breakdown for the PDP-8 and the memo I sent out asking for suggestions for reducing its cost.





# INTEROFFICE MEMORANDUM

DATE February 9, 1966

SUBJECT PDP-8 Costs

TO G. Bell  
E. DeCastro  
H. Painter  
J. Jones  
L. Seligman  
R. Sogge  
E. Harwood  
K. Olsen

FROM Nick Mazzaresse

I am attaching a cost breakdown for the PDP-8. Would you please send Ken Olsen and myself a list of your suggestions on how we might lower its price.

Manufacturing Cost of Table Model PDP-8  
as of November, 1965

Central Processor Modules (See Appendix "A")		\$1,500.23
Memory Wing Modules (See Appendix "B")		1,659.51
Left Hand Memory Wiring	\$112.00	
Left Hand Marginal Check Assembly	35.00	
Resistor Mounting Plate Assembly	50.00	
Left Hand Fan Housing Assembly	30.00	
Left Hand Logic Assembly Labor and Overhead	23.00	
Left Hand Logic Assembly Total		250.00
Right Hand Central Processor Wiring	175.00	
Right Hand Marginal Check Assembly	30.00	
Right Hand Fan Housing Assembly	35.00	
Right Hand Logic Assembly Labor and Overhead	20.00	
Right Hand Logic Assembly Total		260.00
Left Hand Door and Connector Block Assembly		145.00
Right Hand Door and Connector Block Assembly		165.00
Memory Stack		1,200.00
Control Panel Assembly		210.00
Inter-Connecting Cables		120.00
Lower Frame Weldment		50.00
Upper Frame Weldment		50.00
Cover (Plastic Bubble)		59.00
708 Power Supplies		<u>436.00</u>
ASR 33 Teletype		652.00
PDP-8 Assembly		
Direct Labor 10 hours @ 1.91 (ava. rate)	19.10	
Manufacturing Overhead 175%	33.43	
Total Assembly		52.53



PDP-8 Checkout

Direct Labor 60 hours @ 2.39 (ave. rate)  
Manufacturing Overhead 85%

\$143.00  
121.55

\$ 264.55

Total Checkout

Total PDP-8 Manufacturing Cost

\$7,073.82

PRICE = 2.57x M. Cost

J. Hansen  
12/22/65

Appendix "A"  
Central Processor Modules

<u>Type</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
R 002	9	\$ 2.26	\$ 20.34
R 107	7	10.13	70.91
R 111	23	5.92	136.16
R 151	1	13.56	13.56
R 181	4	13.72	54.88
R 203	3	11.52	34.56
R 210	13	27.96	363.48
R 211	12	30.70	368.40
R 202	1	10.16	10.16
R 284	2	15.53	31.06
R 302	3	21.12	63.36
R 401	1	18.37	18.37
R 405	1	15.06	15.06
R 603	13	12.99	168.87
R 650	1	9.45	9.45
R 602	8	11.13	89.04
W005	1	5.07	5.07
W501	1	7.08	7.08
W640	1	13.73	13.73
R 121	1	6.69	6.69
Total	<u>106</u>		<u>\$1,500.23</u>

J. Hansen  
12/22/65



Appendix "B"  
Memory Wing Modules

<u>Type</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
G007	12	\$29.70	\$ 356.40
G008	1	34.08	34.08
G209	8	43.74	349.92
G603	8	29.90	239.20
G208	6	19.17	115.02
W050	1	5.32	5.32
W300	2	24.91	49.82
W607	1	15.11	15.11
W640	2	13.73	27.46
B 104	1	5.80	5.80
B 204	1	13.21	13.21
B 360	1	25.57	25.57
B 602	1	12.46	12.46
R 002	1	2.26	2.26
R 107	1	10.13	10.13
R 111	2	5.92	11.84
R 202	6	10.16	60.96
R 203	1	11.52	11.52
R 205	1	12.02	12.02
R 220	6	16.03	96.18
R 603	3	12.99	38.97
R 650	16	9.45	151.20
R 405	1	15.06	15.06
Total	<u>33</u>		<u>\$1,659.51</u>

J. Hansen  
12/22/65

file

SMALL SCIENTIFIC COMPUTERS  
Sales Prices \$18M to \$400M

	<u>Installed</u>		<u>On Order</u>	
	<u>Amt. (000)</u>	<u>%</u>	<u>Amt. (000)</u>	<u>%</u>
Computer Control	\$ 7,672	2.3%	\$ 3,891	3.6%
Control Data	67,500	20.3	2,850	2.7
Digital Equipment	23,950	7.2	9,999	9.3
IBM	196,300	58.9	77,100	71.8
Raytheon	6,896	2.0	1,530	1.4
Scientific Data Systems	30,437	9.1	10,949	10.3
Systems Engineering Labs	<u>506</u>	<u>.2</u>	<u>1,001</u>	<u>.9</u>
	\$333,261	100.0%	\$107,320	100.0%





# INTEROFFICE MEMORANDUM

DATE February 8, 1966

SUBJECT Single sided dual taper pin connector - 18 contact

Ken Olsen

TO cc: Henry Crouse

Dick King

FROM Paul McGaunn

Methode has quoted the request for a single sided dual taper pin block, 18 contact as follows:

5000	1.51/ea
10000	1.39/ea
Tooling	\$3000.00
Delivery	6-8 weeks ARO

Paul McGaunn



# INTEROFFICE MEMORANDUM

COMPANY CONFIDENTIAL

DATE February 7, 1966

SUBJECT Minutes of the Fifth Disc Committee Meeting, February 3, 1966, 1:00 P.M.

TO Committee Members and Attendees FROM S. Lambert

PRESENT: K. Olsen, R. Best, L. Prentice, G. Bell, K. Fitzgerald, E. DeCastro,  
S. Lambert, D. Wardimon, P. Backholm, S. Mikulski, R. Boisvert,  
D. Nevela, N. Mazzaresse, E. Harwood

Presiding chairman was Nick Mazzaresse.

The minutes of this meeting are as follows:

## DISC REPORT

Steve Lambert brought to the committee, proposed specifications for the Digidisk. These specifications included desirable specs for the disc, possible specs and a disc to DECTape comparison. The desirable specs were compared to the IBM 2310. There was no action required on this report.

Ken Fitzgerald reported on the mechanical problems involved with the disc system. He indicated that Ferroxcube, hopefully, would provide us with all the necessary details in designing a gimbling device. John Gorecki of Ferroxcube mentioned over the phone that Ferroxcube is now building a head for oxide surface contact recording. He also stated that IBM, Burroughs and Liberscope all used the same principle in gimbling the head. John is sending drawings and paperwork showing the different types of head configurations that Ferroxcube now makes and also curves plotting force required vs. inches per second for the various types of heads. No further actions were brought before the committee pertaining to discs.

## 570 TRANSPORT REVIEW

Roland Boisvert presented his review on the 570 in a flow chart form. He indicated that manuals and paper are available to assist the various personnel involved with the 570. They are a Magnetic Tape Unit Calibrator for 570 manual, an Incoming Quality Control manual, and an Off-Line Checkout Production Procedure manual. In addition to this, Roland presented a paper which he wrote in 1963 showing organizational structure necessary to insure high quality for the 570. He further indicated that these procedures were not followed. This concluded the 570 report.

## PROCESS FLOW CHARTS

Ken Olsen presented to the committee a procedure of what we ought to do before we put a product into production. The procedure implies that a developed item, regardless if it is a module or mechanical unit, must have a process flow chart before it is introduced to production. Furthermore, an industrial engineer presently not available, is to examine the process flow chart and correct where necessary. The industrial



engineer will also be responsible for introducing the new product into production. During the time that a product is being developed, a committee is responsible for seeing that the new product is properly evaluated. Ken further indicated that the engineering attitude must change in this area and that there must be much more thorough documentation. The engineer must spell out what is to be done and how he is going to do it. Ken asked that all members of the committee think about the problems involved in a process flow chart and contribute to the development of the procedure. This concluded process flow charts.

### DECTAPE PRODUCTION

Dan Wardimon presented his preliminary process flow chart for the production of the TU55. After Dan completed his presentation, a discussion took place not pertaining to the details of his report. Instead, a general discussion, unorganized, but on the general subject of DECTape, took place.

### OLD BUSINESS

The meeting adjourned at 3:00 from Ken's office and went to Conference Room A to cover the action items of the previous meeting. Two action items were discussed under DECTAPE SKEW STATIS AND DYNAMIC.

Action #1 - Dan Wardimon was to look into the problem of the 4523 and indicate whether the 4523 can be fixed in the field or replaced with a new version of the 4523. There was no definite answer to this action. The following statements were made:

An off-line test using a standard signal generator into the 4523 produced a phase shift as indicated in the previous meeting.

The new amplifier is expected to work under a greater skew tolerance than the old.

Dan Wardimon said the phase shift was not the problem, that the problem is involved with the combination of poor amplifier gain, mechanical alignment problems and other unknowns.

Gordon Bell pointed out that the problems in the field usually resulted in a head change, motor change and things of this nature. In some cases, you play musical chairs with the read amplifier and the problem keeps switching ahead as you switch the read amplifier from unit to unit. He indicated that four units on a bus won't work in some cases but if you remove two, the other two will work.

It was implied that things that were fixed on the TU55, would also apply to the 555 DECTape. It was also indicated that cable impedance seems to change and may be a problem.

Another point that was brought out was head bus termination which is related to the DECtape problems.

This concluded items under Action #1.

Action #3 - Dave Nevela indicated that the zero skew tape now used is really not a zero skew tape at all. Dave is working on a unit to produce the most accurate zero skew tape that we are capable of doing.

The second session of the committee meeting adjourned at 4:30 P.M.

If there are any errors or omissions to these minutes, please correct and send to Becky Lizotte.

NOTE: A complete file is kept on each Disc Committee meeting containing all paperwork pertaining to that meeting. Please send a copy of any paper you write pertaining to or resulting from a meeting to Barbara Fisk in Engineering for inclusion in that file.





# INTEROFFICE MEMORANDUM

DATE February 7, 1966

SUBJECT

TO Disc Committee Members

FROM S. Lambert

The Fifth Disc Committee meeting was conducted with a complete lack of organization and self-discipline. The status of all the action items brought forth by the previous committee meeting was not checked. The proper procedure in a committee meeting is to bring out all old business and conclude the old business before examining new business. All details discussed were repetitive to material presented at previous meetings and this discussion would not have taken place if the minutes of the previous meetings had been evaluated.

Another point that should be made clear is the procedure in discussing an article. When an individual has the floor, he presents material pertaining to the article only. Questions may be asked during the presentation, however, comments from the assembly are out of order and it is the responsibility of the chairman to see that commentary is kept out of the presentation.

Discussion may follow the presentation, but the discussion must conform to the material presented. There are time limits set for both the presentation and discussion.

A proposed time limit might be:

Presentation	15 minutes
Discussion	5 minutes
Conclusion	1 minute

The agenda for a committee meeting must contain the following:

## Old Business

Reports on all action items of previous meetings (if work has not been completed on a previous action item, it must be so stated.) A previous action item may be modified under New Business only.

## New Business

New topics to be discussed. When a new subject is presented, it is not a report. The object is to uncover new details which may or maynot require action. It is important that any new items undertaken by a committee be listed on the agenda. Under no circumstances should an article be discussed unless it is listed on the agenda. As each new item is discussed, a conclusion must be stated either requiring action or no action, and indicating who is undertaking the responsibility. Again, time limits must be enforced. A suggested time limit for each article under New Business is 5 minutes.





# INTEROFFICE MEMORANDUM

SUBJECT Massachusetts General Hospital

DATE February 4, 1966

TO File  
cc: K. Olsen  
N. Mazzaresse

FROM Harlan Anderson

On Monday, January 31, 1966, I spent several hours at Mass. General Hospital with Dr. Frank Ervin, Dick Martin, Steve Larch, and Henry Littleboy (a new employee, formerly with the Eaton Peabody Laboratory at Mass. Eye and Ear). This report is a chronological list of items covered and is not reorganized by subjects.

Dr. Ervin has been our long time contact at Mass. General and feels that there is no question but that we have an excellent instrument in our small computers and that he feels we should have no trouble in selling them. He feels however that when visitors from other hospitals and laboratories come to Mass. General to look at the computing equipment involved, they are normally in a cloud as to what it is they need to establish a similar laboratory in their own hospitals. He feels quite strongly that our sales force is not effective in getting the message across. With the exception of Mort Ruderman, who has concentrated on the medical area, he feels there is virtually no one with whom a typical potential medical user can converse. He feels that we have a real problem in communicating the input-output philosophy differences between DEC products and someone like IBM.

In this area, he feels a strong "social involvement" with our problems and volunteered to assist at a sales meeting where we would be trying to acquaint our sales people on how to approach the medical market. He has been in situations where our sales people have been trying to talk to some medical research people in various parts of the country and has witnessed these things on occasion. He feels it is the wrong approach to talk about memory speed, word length and other parameters that a typical medical research person is not able to think in terms of unless he has already used computers in this kind of research which very few have. By contrast he claims that Control Data Corporation sells on the basis of software and that they have made some reasonable inroads into what should be a market area ideally suited for us. He cited in particular the Langley Porter potential customer at San Francisco which he thinks is likely to go to Control Data Corporation. In the input-output area, he feels that the interrupt system, the scope, and the simplicity of connecting an analog to digital converter were significant features that we had in a unique way several years ago. He feels we did not sufficiently exploit these and that they are now becoming common place on most computers.



Frank took a programming course here at DEC on the PDP-7 this past summer. His class had approximately half biomedicine people and the other half engineers. He was quite disappointed that there was nothing in the course that was helpful to him in using DECTape, the interrupt system, nor the scope and light pen. In general, these are the mystery areas that people have the most trouble with but yet they are the ones that we do not cover in our typical course. With permission of the instructor, he invited the other biomedical people to take a day off in the course and visit Mass. General Hospital and learn how Mass. General had solved those problems by discussions with people such as Dick Martin and others.

Henry Littleboy quoted his former boss who is Nelson Kang as saying, "an experimenter cannot do his own programming". The group as a whole thought this to be an extreme point of view but they did feel that programming is a significant bottleneck and a mystery and that DEC does very little to make it easier for the researcher. They felt that DEC software was abominable and that the documentation was also abominable.

They felt that it took them three months to get their PDP-7 up and going as a useful tool after it was delivered primarily due to programming difficulties with Fortran. They also found the compatibility problems from their old PDP-4 to their new PDP-7 to be more significant than they had anticipated. Their PDP-4, of course, was one that was very different from any other PDP-4 and had many problems associated with it as described in a letter from Frank Ervin.

They also mentioned that what they called a social intercourse or a friendly group relationship existed between their people and our people. They said that if this had been a normal arm's length transaction with someone like IBM, they would have felt justified in suing us over some of the problems they had. They said this and laughed but nevertheless did feel an involvement in solving our problems and felt that a casual relationship existed. They referred to the gross underestimating of the length of time to add an extended arithmetic element onto their PDP-4 as a past example of this. In addition, the several delays in delivery of their PDP-7 were treated lightly per their description. They mentioned the fact that we had forgot to send an invoice for a \$12,000 memory unit as an example of the casual relationship. I understand that particular invoice situation has been taken care of now but they suspected there was a similar situation with an analog to digital converter which they have received but do not think they have been invoiced for.

Concerning documentation, they modified their original statement to say that the hardware documentation was not nearly as bad as software documentation. They did say that they thought their people taking part in the checkout of the machine in our production area knew more about details of the computers than our own people did.

When the PDP-7 was delivered, it was about one week in the acceptance period at Mass. General due to difficulties in the bailing board module on the memory, which was solved by replacing the module and was blamed on a crack in the board. This could be the same problem with the transformer leads breaking off that was discovered



in the PDP-8. In addition, there was a transistor that was burned out in the reader which caused a delay.

They were annoyed at the fact that we requested the scope and DECTape which had been connected to their PDP-4 to be brought to the factory for integration in PDP-7 system longer before the delivery of the 7 system than they thought necessary. Since these were items that had been in use at their place this deprived them of their use on what they considered to be a needless basis. The several delays in the PDP-7 system aggravated this.

Dick Martin mentioned two specific problems in hardware. One of these was that we are using a fast pulse amplifier in the in-out skip portion of the machine and this picked up noise and caused trouble when they tried to use DECTape. This was redesigned and checked out and was apparently fixed prior to delivery of the machine. The second trouble however was more serious and was not fixed until several months after the machine was delivered and represented a design change to all PDP-7's in the field. The serial number of their machine was 33 and they discovered the problem by themselves. It had to do with the CAL instruction. Some of the transistors of the instruction register were extra fast so that wide pulses would get through gates connected to the instruction register while it was in the transition phase. This problem only showed up when the compiler was being used on a warm day. Dick Martin finally tracked down what the difficulty was by single stepping through the compiler which was a very tedious and laborious task.

They used DECTape extensively in their applications. They feel the DECTape routines are awkward and the information of how to use them was inadequate. As a result they have been trying to write their own. They have a description of the programs known as DECTRIEVE but were unable to obtain the tapes from our librarian who indicated that these were not yet available from the programming. This is the current state of affairs on this. They tried using DECSYS with Fortran and felt it didn't work well enough to be useful to them. They feel that this program is an excellent idea and would be very useful but it does have to work before it is of any value to them. They concluded that the 4K Fortran System does not work and this was the reason why they ordered 8K with their PDP-7. When they inquired, some time ago, about 4K Fortran problems, the reaction they got was someone in England was using it successfully. They think the paper tape Fortran is almost impossible due to the long sequence of loading of tapes which has to be done with no intermediate indication as to whether you might have made an operator mistake. The DECSYS apparently is very slow since the various things that have to be utilized by it have been put on the opposite ends of the DECTape reel requiring frequent rewinding from one end to the other. Their summaries of these general thoughts is that so many of our things are 91% really elegant but they are never quite finished. This requires that an exceedingly skillful user has to work with them and that there are just too many pitfalls for the unsophisticated user. Their corollary point with this is that there are not many sophisticated users available. For example, Frank Ervin, characterized himself as an unsophisticated user not capable of working through our software. By contrast Dick Martin, who is a computer buff and has spent the past two and a half years working with a PDP-4 from a hardware and software viewpoint, is a sophisticated user and can get many things



to work that Frank Ervin cannot. On the world scale of medical user sophistication, Frank probably ranks quite high.

They felt that the PDP-7 documents were considerably poorer than the PDP-8.

Referring again to the Langley Porter potential computer sale in San Francisco, there was some unfortunate thing involved in our quotation where we described a 580A Tape Transport in the quote but said this was not available for use on the PDP-7. They are familiar with this because they have been hired as consultants to help Langley Porter select a computer. This created a confused situation and left a bad impression with the customer as to what our people knew about our equipment. They claimed that our salesman came back and suggested using a Kennedy Tape Transport with the PDP-7 in order to lower the price. They then went on to say that Mass. General Hospital had several Kennedy Tape Transports that they tried to use over the past several years and have concluded that they are an unsatisfactory unit. (When we suggest a particular item we must be exceedingly cautious not to endorse it unless we are willing to take some responsibility for it. This subtle distinction may be impossible.)

They mentioned a new CRT display made by Fairchild which apparently is attractive to some of the medical customers. They claim this unit costs \$4,000. They have developed the impression that we are not interested in doing the interfaces because our quotations for these come out to be very expensive. They feel that we are making some manufacturing errors by not prewiring most of the options into the computer. They mentioned that it takes five weeks for the computer to go through checkout if there is any in-out equipment involved and this seemed awfully long to them. They concluded that the reason it takes so long is that these are all treated rather specially. They feel we could save time and money in checkout and in field installations by prewiring all these options with a Gardner-Denver machine and converting DECtapes to FLIP CHIPS.

In general, they feel that DECtape is very expensive and that it was overdesigned when we went to the direct drive motors compared to the original LINC tape.

They feel we need discs badly and thought the 1311 was a good unit.

In summary, even though they offered many criticisms, I think they are a reasonably satisfied customer. Part of this is because the closeness and the sympathy and understanding they have for our problems. They also have a feeling of involvement with us so it is hard for them to be critical and demanding on us.

Andy

HEA:ncs





# INTEROFFICE MEMORANDUM

DATE February 3, 1966

SUBJECT Proposed Specification for Digidisk

TO Committee Members

FROM S. Lambert

1600 bits/inch

## Desirable Specs

1. Removable Disc (Compatible to one unit).
2. Selling Price less than \$10K.
3. Worst case access time less than 1 1/2 sec. (assume 100 tracks).
4. 256 tracks  
 $1 \times 10^7$  Bit capacity      $\frac{10^7}{10^2} = 10^5/\text{Track}$       $\frac{10^7}{24} = 4K/in$
5. Reliable 5000 hours without maintenance.
6. No mechanical field adjustments.
7. Compatible with PDP-7X and PDP-8.

8" x  $\pi$  = 24"  
 24K x 128 = 3.2M  
 x 256 = 6.4M  
 512 = 12.8M  
 (IBM) 400 = 10M

## Possible Specs

1. IBM compatible
2.  $3 \times 10^7$  bit capacity
3. Interchangeable discs unit to unit
4. Disc cost \$5 - \$10.

## Disc-DECtape Spec Comparison

1. Same (desirable spec)
2. \$7.5K
3. 30 sec worst case
4.  $3 \times 10^6$  bit capacity
5. Same (desirable spec.)
6. " " "
7. " " "



Data Rate Comparison

$$\text{DECtape} \quad \frac{3 \times 10^6}{30 \text{ sec}} = 100,000 \text{ bit/sec}$$

$$\text{Disk} \quad \frac{1 \times 10^7}{5 \text{ sec}} = 2,000,000 \text{ bits/sec}$$

Note: The worst case access time for IBM 2310 single disc unit is 3 seconds in single step (track to track) mode.



## INTEROFFICE MEMORANDUM

DATE February 3, 1966

SUBJECT Lamb Vacuum Cleaner Motors

TO Ken Olsen

FROM Jack Shields

The motors have been very reliable with the following considerations.

1. Brushes must be replaced every one thousand hours as part of preventive maintenance.
2. We have had problems with the bearings due to carbon built up. After wear of approximately three sets of brushes, we replace the bearing with a sealed bearing and this seems to solve that problem quite nicely.





# INTEROFFICE MEMORANDUM

DATE February 3, 1966

SUBJECT Manufacturing Steps for the Production of DECtape

TO Disc Committee

FROM D. Wardimon  
D. Nevela

## General

We are trying to present a production scheme for the manufacturing steps of DECtape Transports TU55. It has a dual purpose:

1. To outline a well-planned and documented production procedure of this particular item.
2. To serve as a basis for outlining similar procedures for other products such as the mag tape and disc.

Due to the short time involved we could develop only a rough idea and therefore it is open for criticism and improvement. In addition we believe that this work should be carried out by a production engineer who is familiar with production procedures. We should therefore have this kind of a man whose function would be to systematize and put order into the production of items we contemplate making in the future. One benefit will be to relieve the design engineers from being constantly detracted by production problems.

Basically the idea is as follows:

The set of mechanical prints do not give all the information needed in order to complete manufacturing of an item. In addition we need the following:

### I. General Flow Diagram

This will show at a glance the total picture of how the item is being formed from the raw materials and components, to assembly of the whole unit.

This is necessary for easier allocating of responsibilities and to enhance one's idea of the process involved as mentioned above.

The flow chart showed here is believed to represent the case with the micro tape.

One might argue that more detailed information is needed here and thus have what is known as a Route Sheet. It may be well needed as an addition to the above flow chart especially when more complicated items are produced.

For example: In the square representing machine shop, we should also specify and name the parts that have to be done there.



2. Part Manufacturing Procedure

Each part to be manufactured will have a document that specifies what are the steps to be taken in machining the said part, what kind of machinery, and what jigs or fixtures are used at each step.

In addition the sheet will have information pertaining to the inspection method and instruments needed to check that part.

The forms that are presented here which are concerned with the DECtape parts are (as mentioned above) give only the basic idea. No doubt forms of this kind have been adopted in the industry for a long time and we should take some of them and modify them to our particular needs.

The big advantage of these forms is besides standardizing on some manufacturing process is the documentation that we lack so far and which makes us depend so much on the fellow who knows how to do a certain part. Naturally the content of this form should be updated every time there is a change in the manufacturing process for any reason, and thus they should be subjected to the same rules of filing and changing our regular prints.

3. Mechanical Assembly Procedure

Detailed instructions attached.

4. OFF Line and ON Line performance checkout procedure

5. Performance Test Procedure



CONFIDENTIAL

dec

INTEROFFICE  
MEMORANDUM

DATE February 2 , 1966

SUBJECT Some Thoughts I Have Had With Respect To Personnel and Company Acquisition Opportunities

TO Ken Olsen FROM Ted Johnson

I Manufacturing - I was delighted to hear last Friday that the man often credited with production success at SDS, Lyndey Criddle (sp.), who had recently been named Vice President of Manufacturing there, has left SDS to take over responsibility for a small company in the enunciator business in Los Angeles. The name of the company is United Controls and they are currently doing about \$3,000,000. This man's reputation is such that I think you would very much enjoy, and possibly benefit by meeting him, if only to discuss the general subject of small computer manufacturing. This might offer an ideal opportunity to acquire a small competent manufacturing facility on the West Coast. If you are planning any trips to the West, I would be pleased to arrange a get-together with him.

II George Rice - I had a good conversation with George and a need of mine consistent with my planning for organization might be very well in line with what George could do best and would enjoy doing. This would be to organize technical support for our sales offices and could include technical sales support, some OEM industrial sales and technical training within sales engineering organization.

It confines his interest in being involved in product planning, information gathering and stresses technical representation, which is the part of selling that he identifies with.

III CTC - We could obtain a real monopoly in the tester business if CTC would be desirable as an acquisition and we could split off memory testing as a completely separate line of business.

IV A/D Capability - I am concerned about many coordinated plans by the product lines to solve our A/D requirements. I believe A/D, or other instrumentation, an important adjunct to our sale of modules. Three companies that it would seem to be worthwhile investigating are Adage, Applied Dynamics and SEL, whose primary reputation is based on excellent front end equipment.

A possible candidate as A/D engineer is Clark Crocker from Adage. If we follow up on Dave Sudkin, I think one of his prime advantages would be to get some marketing activities and A/D instrument background into the company.

V I/O Engineering - I am concerned that we might not be taking the advantage of experienced engineering in electro-mechanical equipment design for project management. In particular, I remain somewhat mystified by the reaction to Jim Crosby who, in my mind, represented the kind of engineering management capability, as well as technical competence and experience, which we can't afford to be without. As I have stated, I am not selling Jim Crosby, since the basic evaluation must be made by other

people than myself, but I don't think the reason that he is too high powered for us is valid.

VI Tom Dalzell - Tom will be relocating to Geneva, Switzerland for Hewlett-Packard in June. John Leng will be visiting shortly and I believe we should decide once and for all whether or not Tom represents a short-term assist to John Leng or a long-term opportunity to work with a person experienced in OEM marketing by having him work in the U.S. for at least a year. His terms for the latter move are quite reasonable.

VII Training - This subject is a slight departure, but Jack Shields is very concerned about the adequacy of our training program for the high level service technicians we need in the company and feels we should break out this area from the present confusion with customer training. He would like to set up his own training group and I think our need for quality technicians is such that this possibility should be considered as it can, in fact, do a better job.

I think Ron Wilson would be an excellent man to head up such a program.

TJ/mr



*K. Olsen*



INTEROFFICE  
MEMORANDUM

DATE February 2, 1966

SUBJECT 570 Tape Transport

TO

FROM Roland Boisvert

In an effort to review the 570 Project and learn from it I am returning the original copies distributed 3 years ago to those people who responded to it at that time, and am asking them to re-comment on the basis of additional experience.

I am asking those not on the original distribution to comment at this time.

For those persons who have responsibility for checkout, etc. I would like you to add in your comments, manpower and equipment requirements based upon ten tape units a month.

Please return your copies with comments as soon as possible.

INTEROFFICE MEMORANDUM

November 20, 1963

37  
03  
From: Roland Boisvert

The general outline for the Tape Transport Type 570 Production Manual is enclosed for your consideration for flow throughout the Company. Any comments concerning the manual should be written and not oral. I openly solicit your comments. This is a preliminary outline.

DISTRIBUTION:

J Smith  
M Dill  
L Prentice  
P Backholm  
R Hughes  
K Doering

            
J Shields  
R Best

K. OLSEN  
H. ANDERSON  
N. MAZZARESE  
W. HINDLE  
G. BELL  
D. W HITE  
E. HARWOOD



## FOREWORD

The purpose of this manual is to outline product flow for the Tape Transport Type 570 through various stages in this Company and to define the responsibilities at a particular stage. In addition, any assembly details necessary will be discussed.

Comments:

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CHAPTER

FLOW

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Incoming Quality Control

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Operational Quality Control

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Production Wiring

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Intermediate QC Wiring

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Off Line Testing

6

Cabinet Shop

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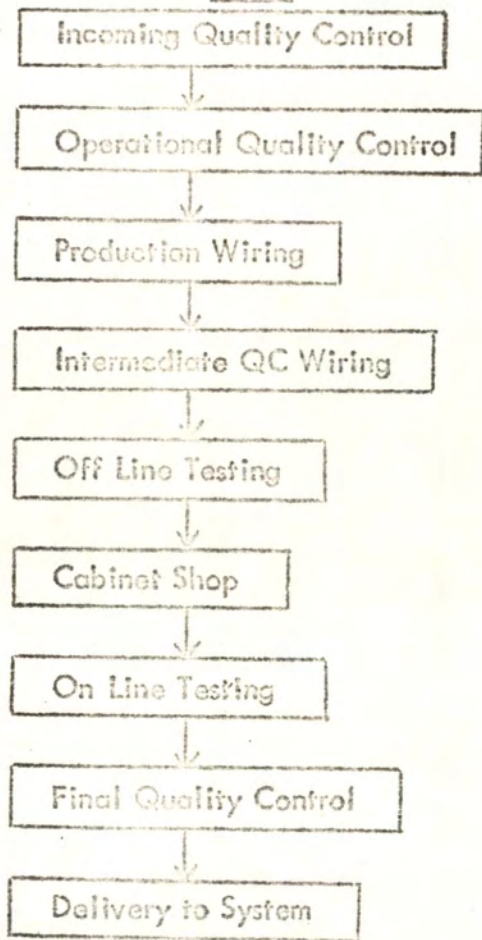
On Line Testing

8

Final Quality Control

9

Delivery to System





CHAPTER I  
INCOMING QUALITY CONTROL

The transport will be uncrated and given a complete physical inspection. Those items in particular which should be looked for after a complete check against the purchase order for what has been received.

2. Broken, bent, or scratched components
3. All screws that hold any component on are tight.
4. No broken wires
5. The modules will be removed and inspected for component damage.

Comments:

## CHAPTER II

### OPERATIONAL QUALITY CONTROL

The transport will be given a complete operational test.

1. A set of read/write electronics will be attached and the transport will be run from my computer.
2. The complete function of every switch on the manual control panel will be checked.
3. All interfacing levels will be checked for proper operation.
4. The skew of the transport will be checked to see that it falls within specification.
5. The start stop times will be checked to see that they meet specifications.
6. Interecord gap consistency will be checked at all specified cyclic rates to see that the transport meets specifications.
7. Loadpoint and End point operation will be checked.
8. Speed variation will be checked.
9. Compressor and vacuum system will be checked for proper operating ranges.

Comments:



CHAPTER III  
PRODUCTION WIRING

At this stage the transport read/write electronics buss panel, power control, and power supply will be installed and wired in accordance with the assembly drawings listed below.

The drawings and the work to be performed per drawing will be described in detail when they are completed.

Comments:

CHAPTER 11

At this stage the transport wiring will be given our standard QC lookover for wiring. The transport will not be delivered to off live testing until the inspection has been satisfactorily passed.

Comments:



CHAPTER V  
OFF LINE TESTING

At this stage the transport will be checked out by the Production Checkout group. An off line tester will be provided. Complete instructions for checking out this transport will be constructed as an on the job effort during the first run of units. Since the drive mechanism will have been checked during incoming inspection, the primary function to be performed is to see that all of the wiring is correct and that the skew delays are set properly for this transport.

Comments:

CHAPTER VI  
CABINET SHOP

At this stage the transport cabinet will be completed in accordance with the instructions and drawings as set forth by Phil Backholm who will write this section.

Comments:



CHAPTER VII  
ON LINE TESTING

The tape unit will be delivered to my PDP-4 where it will receive another operational test with heat and margins.

Comments:

CHAPTER VIII  
FINAL QUALITY CONTROL

This is the normal final quality control of all units.

Comments:



CHAPTER IV

DELIVERY TO SYSTEMS

The transport will be delivered to the particular computer system it is to go with in house or a member of Field Service will be present for on line testing before the transport is sent directly to a customer.

Comments:

INTEROFFICE  
MEMORANDUM

COMPANY CONFIDENTIAL

DATE January 31, 1966

SUBJECT Minutes of Fourth Disc Committee Meeting, January 27, 1966, 1:00 P.M.

TO Committee Members and Attendees FROM Steve Lambert

PRESENT: K. Olsen, R. Best, L. Prentice, G. Bell, K. Fitzgerald, E. DeCastro, S. Lambert, D. Wardimon, P. Backholm, L. Seligman, N. Mazzaresse, D. Nevela

Item #1 - DECTape

DECTAPE SKEW STATIC AND DYNAMIC

Ed DeCastro indicated that the skew in all drives is as much as  $\pm 12$  microseconds. Approximately 6 microseconds is dynamic skew or flutter as a result of the guidance of tape and 6 microseconds of static skew as a result of mechanical alignment and shimming problems. The logical strobe window will allow as much as  $\pm 8$  microseconds of skew. The dynamic skew is also resulting from a phase shift in preamps. Ed DeCastro indicated that at 5 KC the phase shift is twelve microseconds, at 10 KC, the phase shift is 2.5 microseconds. Misalignment of the redundant tracks produces a static skew which adds to reduce signal and if the skew is 16 microseconds, the redundant channel output will be zero signal. The following actions were requested:

ACTION #1 - Dan Wardimon is to look into the problem of the 4523 and indicate whether the 4523 can be fixed in the field or replaced with a new version of the 4523.

ACTION #2 - Ed DeCastro is to look into the production problem involving static skew in the DECTape transport.

ACTION #3 - Dave Nevela is to work on a better tape guidance system to reduce the dynamic skew.

DO WE WANT TO MAKE A 19" DECTAPE UNIT AS PER MODEL?

The vote was yes. No action necessary.

DO WE HAVE TO GRIND BASE PLATE TO LOWER THE SKEW VALUE?

The vote was yes.

ACTION - Dave Nevela and Loren Prentice will work on this problem.



FOR THE 19" DECTAPE UNIT, SHOULD WE MAKE NARROWER TRIM FOR THE PDP-7X AND STANDARD CABINETS?

The vote was yes. Ken Fitzgerald commented that if two or more units were mounted in a CAB-3 design, there will be a 1/4" gap between the two units measured from the trim.

DO WE WANT TO MAKE A TAPE CERTIFYING UNIT WITH GROUND PLATE AND MINIMUM GUIDE WIDTH?

It was suggested that both minimum and maximum width be measured and that the width be checked with a special gadget. It was indicated that seven samples out of twenty were not in spec on tape width. Various questions were brought out through the discussion of certifying tape, they are:

Should the tape be certified in the field or in the plant?

If we have spring loaded guides, do we have to certify the tape width?

There were two actions to be taken:

ACTION #1 - Dave Nevela is to build a width tester.

ACTION #2 - Ed DeCastro and John Jones are to examine the tape certification program.

Item #2 - Discs

Steve Lambert presented to the committee pictures indicating the data recorded on an IBM 1311 Disc by an IBM Head as opposed to the data recorded on the same disc and same area with a Ferroxcube Head. The densities obtained with the Ferroxcube head were close to 4 times that recorded by IBM. Data was recorded and played back on a 600 rpm disc at a 6 1/4 inch radius. Using the data format proposed at the committee meeting of January 20, 1966, the maximum recording density obtained was 2100 bits to the inch which is in excess to the proposed format of 1876 bits to the inch. Steve indicated that the disc surface was being destroyed as a result of improper gimbling of the head. It was pointed out that the gimbling leaf spring does not have enough elasticity and has no more effect than if a solid steel rod was used to gimble a head. It was also indicated that the adjustments in the gimbling device are too coarse to accurately adjust the head over the disc surface.

ACTION - Ken Fitzgerald will work on a new leaf spring and fix the course adjustments. Ken Olsen suggested that we consult an aerodynamic designer such as would be found in the aircraft industry. He indicated the possibility of obtaining help from a helicopter designer.

HEAD POSITIONERS

Steve Lambert requested that work be done on a head positioner so that

further testing could be accomplished with track to track spacing. A swinging arm positioner has been designed and built by Kendick Manufacturing capable of moving an 8" arm 1 mil per step on the slow sync motor. Ken Olsen suggested that we test this positioner along with designing a linear positioner where both positioners would be tested and compared for repeatability at 256 tracks.

ACTION - Ken Fitzgerald will set up the existing positioner device and along with Ken Olsen design and build the linear positioner.

There were no reports given on Mag Tape during this meeting.

Meeting adjourned at 3:00 P.M.

If there are any errors or omissions in these minutes, please correct and send to Becky Lizotte.



M E M O R A N D U M

TO: Ken Olsen  
FROM: Dick Musson  
DATE: 28 January 1966  
SUBJECT: PRIDE Program

Attached you will find a package describing North American Aviation's PRIDE Program.

After looking at this, I feel it indicates a great deal of value for an organization such as ours which is growing very rapidly.

I thought you would be interested in reviewing some of PRIDE's possibilities for use in our company.

RFM/d

*in file marked  
"Letter Enclosures"*



*G. Olsen*

*K. Doering*



**INTEROFFICE  
MEMORANDUM**

DATE January 26, 1966

SUBJECT DECTape Problems

TO	J. Streeter	R. Beckman	FROM G. Bell, S. Mikulski & D. Wardimon
	L. Gossel	J. Smith	
	R. LaFosse	L. Prentice	
	E. DeCastro	D. Busiek	
	J. Shields	K. Doering	
	L. Portner	T. Stockebrand	
	H. Anderson	R. Best	
	W. Hindle	N. Mazzaresse	

Some known problems are categorized below. If there are solutions to some of the problems or additional problems, we would like to know about them. Hopefully when the problems are verified, and organized, attack can be proposed.

Tapes and Tape Certification

1. Tape width of 747" - 750", and head guide of 750" - 751" conflict, especially since head guides are 746" - 751". This problem is not under control, and field measurement equipment and methods to detect faulty guides is inadequate.
2. "Light tapes are bad, dark tapes are OK" stems from a head guide problem above, although some other tape property may be at fault. Unless evidence is presented this should be treated as a myth.
3. Present PDP-4 control gates out extra 25 codes in block mark section, resulting in faulty tapes going through control. PDP-6 and 8 find end zones in middle of tape. The 550 control needs a mod to detect errors in this zone.
4. PDP-4 certifying program does not check all features of tape used by 6 and 8, and the program needs a mod. The PDP-6 and 8 should take PDP-4 certified tapes, and check them prior to use apparently.
5. The "DEC Standard DECTape Unit" is not kept in an environment which could be considered "a standard," but is used in a production environment, which may wear and misalign it. This transport should only be used to write "Standard" tapes which in turn are used to align transports. The myth about tape certification must be clarified and we must specify whether any aligned transport, can be used to produce certified tape. If this is true, perhaps some of the load, on the production PDP-4 can be lightened, the DECTape backlog dropped, and the rejected tape halted by producing tape elsewhere.

This basic specification must be clarified!



555

1. Specification and test procedures appear inadequate to deliver 555's at reasonable production rate. The field measurement methods do not allow us to repair units, or get a system working.
2. The Reader-Writer Module is apparently badly designed and causes problems that we now solve by other fixes.
3. Units may work on the bench, and on installation, face plate deflection causes faulty operation. The units are sometimes fixed by different tape, different motors, different heads or different control. We do not understand the problem.
4. Units which work on PDP-4 do not work on PDP-6. This now happens, but we do not know why.
5. A zener diode in tape controls to hold -15 constant, apparently helps the Reader/Writer performance. This is a DEC rumor, and evidence is needed to attack the problem. (see 2)
6. The various times (up to speed, etc.) are not specified and vary between uses, people, controls, etc.

551/136

1. A mod is in progress to make more comprehension diagnostics of the 136 possible.
2. The 4230 in the 136 has problems with too many eyelets. Good soldering and checking can not take place.
3. Time pulses are too large, and go through new 4127 and 4129's. Re-modify 4127, 4129, and PA's. Meanwhile a warning has to be written by Engineering. (G. Bell)
4. Unused inputs on 2 - 4217's and a 4129 may be picking up noise.
5. The error flag should be gated off which the unit is stopping. Although this has not caused problems, we do not know that it won't.
6. The write all mode is not synced off.
7. A sum check may occur if reading begins in the center of a block.
8. ALL HALT mode is not wired to the control.
9. State of direction should be saved when unit is stopped.

TU55

1. Specifications, Test Procedures and production test equipment problems.
2. Grounding methodology is not specified.
3. The module block is mounted precipitously on standoffs.
4. AC power bridging from unit to unit is necessary.
5. The modules door catch on prototypes aren't adequate.
6. Modules numbering start at A5 and B5 rather than A1 and B1.
7. The prints are relatively unintelligible; do not use standard symbology and are not laid out too well. (G. Bell will assist D. Wardimon on this.)
8. The selection switch causes pinched fingers, and is tough to turn.
9. The finger pincher preventor between the reels might as well be eliminated, it costs more and hinders loading. People would rather pinch fingers than be prevented from loading tape.



# INTEROFFICE MEMORANDUM

DATE January 26, 1966

SUBJECT Contacts with Lybrand, Ross Bros. and Montgomery

TO Ken Olsen ✓  
Harlan Anderson  
Ted Johnson  
Product Line Managers

FROM Harry S. Mann

In order to keep the charges from our public accountants to a minimum, we need the cooperation of all key employees. I am advised from Mr. Irving at Lybrand that their offices receive inquiries from a number of people at DEC and that they feel obligated to service such inquiries. Inasmuch as their charges to us are on a time basis, these inquiries do increase our costs.

It is suggested, therefore, that when information on financial, accounting, or tax matters is being sought that the inquiry first be directed to either myself, R. Dill, or B. Garvin. I am confident that, in most cases, we either have or can obtain the information requested in expeditious fashion. In those cases where further classification is needed, we would then contact Lybrand as necessary.

I do recognize that there may be, on rare occasions, certain inquiries which key people would prefer to make directly with the public accountants rather than clearing through our Accounting Department. We certainly want to leave such inquiries to the discretion of the managers. Our only purpose in trying to channel as many inquiries as possible through us is to minimize the Lybrand bill.

HSM/clw

INTEROFFICE  
MEMORANDUM

COMPANY CONFIDENTIAL

DATE January 24, 1966

SUBJECT Minutes of Third Disc Evaluation Committee Meeting, January 20, 1966, 1:00 P.M.  
TO Committee Members and Attendees FROM S. Lambert

Present: K. Olsen E. DeCastro  
R. Best S. Lambert  
L. Prentice D. Wardimon  
G. Bell P. Backholm  
K. Fitzgerald L. Seligman

Nick Mazzaresse, Chairman, did not attend. Ken Olsen presided as chairman over the third committee meeting.

I. DECTape Report (Agenda item #2)

1) IS DECTAPE CERTIFIED WHEN IT IS SENT TO THE FIELD?

Both Dan Wardimon and Ed DeCastro indicated that the answer is no. The sleding tolerance on DECTape is not measured, and, as a result, customers may get tapes which will not go through the DECTape guide assembly. It was also indicated that every DECTape machine in the field varies in both mechanical and electrical specs, and, as a result, a certified tape may not be effective on some machines.

ACTION: A formal proposal from Quality Control on implementation of certifying tape is to be taken care of through the responsibility of Ed DeCastro.

2) THE FLAT FACE PLATES AND READ/WRITE HEAD PERPENDICULARITY.

Phil Backholm is working on an optical cathelometer for setting up perpendicularity and track reference on DECTape units.

ACTION: Dan Wardimon and Ed DeCastro are to work on the face plate problem and work on engineering specs to find out where the problem areas are and propose a solution.

3) MODULE MOUNTING IN TU55's.

The module mounting is flimsy and pins can easily be bent.

ACTION: Dave Nevela is attempting to fix this problem.



#### 4) AC POWER

It has been pointed out that AC power cannot be plugged from one TU55 to another TU55 continuously down the line as there must be both male and female receptacles.

ACTION: Dan Wardimon is responsible for seeing that the AC power receptacles are provided as required.

#### 5) POORLY CONSTRUCTED DOOR CATCH

The door catch has poor holding qualities and requires modification.

ACTION: Dave Nevela will take care of this situation.

#### 6) TAPE FLAP

Tape Flap appears under the original logic design, however, a correction was implemented to take care of this problem, but requires logic change or rework in the back panel wiring.

ACTION: Dan Wardimon will take care of the necessary changes.

#### 7) GROUND STRAPS

It was pointed out that certain ground rules must be followed in the TU55 system.

ACTION: Dan Wardimon will take care of documenting the procedures.

#### 8) READ AMPLIFIER

The existing Read Amplifiers in the field are marginal and have the tendency to phase shift randomly at different frequencies of flex reversals. It was pointed out that different problems in the field such as replacing motors and heads may be related to the present problem of the read amplifier.

ACTION: Dick Sogge is presently working on a new preamplifier under the direction of Ed DeCastro.

#### 9) UNIT SWITCH SELECTOR

The present unit switch selector consumes a large amount of space and is considerably more expensive than the old version. It also has the tendency to pinch fingers.

ACTION: Jim Jordan is to search for a new switch under the guidance of Ed DeCastro.

## 10) TURN AROUND SPECIFICATION

It was originally established that the TU55 turn around time would be 200 milliseconds as is published in some preliminary papers. However, the first unit measures to 250 milliseconds turn around time and it was proposed that 300 milliseconds turn around time be used as a published figure. However, there is not enough data. It was also indicated that the TU55 presumably was to be mixed with old DECtape systems where the time was a function of program time.

**ACTION:** It is the responsibility of Ed DeCastro and Dan Wardimon to indicate the proper parameters on compatibility and propose or indicate corrections necessary.

## 11) TU55 CABINET COMPATIBILITY

Ken Fitzgerald indicates that the TU55 does not fit into the 19" customer cabinet. Ken proposed that we either make 19" cabinets or adjust blocks so that we can use our existing 19 1/2" cabinets. There are two actions to be taken:

**ACTION 1:** Ken Fitzgerald and Jim Jordan will come up with a new front panel for the TU55.

**ACTION 2:** Loren Prentice will investigate the possibility of 19" cabinets.

## II. Tape Development Report (Agenda item #1)

### 1) HOW LONG SHOULD THE VACUUM COLUMN SWITCH LAST?

Dick Best indicated that the present vacuum switch for the new TU79 will last 5,000,000 operations, which is equivalent to 58 days of life assuming one second cycle time on the switch. It was noted that a 50% duty factor is involved in actual application, implying 116 days of life. This is a worse case condition seen only at a few of our customer installations.

**ACTION:** Roland Boisvert and marketing are to determine what the life of the switch should be.

### 2) SHOULD THE SERVO SYSTEM BE DESIGNED FOR 112.5 IPS or 75 IPS?

It was pointed out that the cost of the system reflects proportionately to the torque or speed required.

**ACTION:** It was indicated that 75 IPS is compatible to the customer requirements, however, marketing should be consulted.



### 3) SHOULD THREE PHASE MOTORS BE USED FOR REAL SERVOS?

The present servo design is based on DC servos. If three phase AC servos are used, the customer will be required to have a three phase outlet. Dick Best indicated that three phase motors are less costly than the present DC servo motors. Phil Backholm indicated that the present DC lamb motor operates for 10,000 hours and that the caps and servo must be a DC motor.

**ACTION:** Marketing must provide Roland Boisvert and Dick Best the data on the present customer power requirements.

### III. Disc Report (Agenda item #3)

#### 1) MANPOWER REQUIREMENTS

Each member of the committee received a disc schedule and manpower request for a technician.

**ACTION:** Nick Mazzaresse, Ed DeCastro and Steve Lambert are to solve the requirement for a technician in the project.

#### 2) LAMINATED DISCS

Bob Cesari, our company patent lawyer, has indicated that we should investigate a patent for the laminated disc idea. Henry Crouse is working on details to establish a contract with Custom Coating and Lamination Company to construct a prototype disc which is to be delivered approximately 1 month from now.

**ACTION:** No action necessary.

#### 3) DISC TESTING

There are approximately 48 sets of data curves required in the disc test phase shown on the schedule. The test equipment has been set up with an IBM disc on a 1200 RPM motor with a Ferroxcube A Channel Head. It was found that the Read/Write Head worked to the limits of the tester or 800 nanoseconds per flex reversal. The density of recording was determined to be 1600 flex reversals to the inch.

**ACTION:** Further tests are to be made by Steve Lambert as shown on his schedule.

If there are any errors or omissions in these minutes, please correct and send to Becky Lizotte.

MINUTES OF AD HOC PRODUCTION  
COMMITTEE

January 24, 1966

Present: K. Olsen, S. Olsen, M. Sandler  
R. Belden, D. Packer, R. Maxcy

1. December and January Production

Module A December output totaled 34,000. Operating rate is now 6 - 7000 per week. Backlogs should be largely cleared by mid February.

2. Canadian Production

R210 materials are being sent to Canada for assembly. Output is scheduled at 200 per week, starting this week. J. Smith will maintain close contact with Canada.

3. Production D Inventory

Production D will maintain stocks of all materials used in its raw material inventory. Because most items are unique to D production, little duplicate stocking will result.

4. Overshipments

Product lines have the option to reject delivery of modules that number more than 10% above firm orders. Manufacturing departments will hold excess modules until a firm order is received. They will remain work in process inventory.



5. Standard Monthly Reports - Module Production

- a. List of all WIP module lots over two weeks old. Due first Friday of fiscal month.
- b. Monthly Production Report, showing requirements at start of month, deliveries against requirements and ending backlog of requirements. Due first Friday of fiscal month.
- c. Production Schedules. Due third Tuesday of fiscal month (for following month).

DWP/clw

1/28/66

Distribution:

K. Olsen ✓  
S. Olsen  
M. Sandler  
R. Belden  
R. Maxcy  
R. Richardson  
F. Kalwell



# INTEROFFICE MEMORANDUM

DATE 20 January 1966

SUBJECT DEC Parking Facilities

TO Harry Mann  
Info: Loren Prentice  
Ken Olsen ✓  
Bob Lassen

FROM Bob Pate

Re: Your Conversation with Bob Lassen on Parking Facilities.

At the present time DEC has enough parking space available for 670 cars. this total includes the following areas:

Large Thompson Street Lot (without lines)	425
Small Thompson Street Lot	85
Main Street Lot	102
Building 12 Area	16
Building 11 Area	31
Building 6A Area	11
	<u>670</u>

Presently we have 940 employees in the building daily, 8:15 to 5:00. This total includes our part time and temporary employees.

A survey of our parking lots has shown that approximately 65% of our employees drive with the remainder "car pooling". We have only 59 spaces available for future employees.

For a short range solution to our approaching parking problem, I would recommend that money be allocated to "line off" the Large Thompson Street lot. If we do this we can improve the present capacity to 530 cars. A gain of 105 spaces. This gain will be realized by better parking discipline coupled with a higher density per available square footage.

For a long range plan to our parking problem, I would like to have a meeting with you, Loren Prentice, Bob Lassen and myself to explore possible solutions and identify what action will be required to accomplish them.





# INTEROFFICE MEMORANDUM

DATE January 20, 1966

SUBJECT CARD READERS

TO Ken Olsen ✓  
Nick Mazzaresse  
Ted Johnson  
John Jones  
Dick Best  
Small Computer Guidance Committee  
Large Computer Guidance Committee

FROM Jack Shields

CC: Don Zereski

The other day I spoke with Howard Briscoe from Lincoln Labs, a PDP-7 customer, about card readers. Howard had ordered a 100 cpm reader from us but did not realize it was an NCR reader. When he found this out, he decided he would rather not have this unit but would go ahead and purchase a 200 cpm Burroughs Reader from us.

I asked him why he made this decision and his comments were as follows:

1. He has seen this card reader in operation before and thinks it has low reliability and is not easily maintained.
2. He said that SDS had the same card reader on two installations at Lincoln Lab and jumped the rental price by a factor of four. The reasons they gave for this were because of the difficulty to maintain the NCR 100 cpm. (SDS has dropped this unit from its product line.)
3. Howard said that if cards were a primary source input for a system, it is his feeling that this card reader will not do the job.

Our experience with the card reader so far has been good. We had one rash of problems at Westinghouse and had to replace the original card reader. Since that time, it has been running quite well.

Our experience with NCR for back-up support on this reader has not been satisfactory, and we have found that our own service people

RE: CARD READERS (continued)

are either as good as, or, for the most part, better than the NCR service people even though our own people have had practically no training on this unit.

I think these inputs from Mr. Briscoe are a warning flag which merit immediate attention, as we could find ourselves with another peripheral device which needs considerable engineering on our part.

To my knowledge, no formal or effective evaluation was carried out on these card readers. Can we do it now?

Thanks for your cooperation.





INTEROFFICE  
MEMORANDUM

*[Handwritten signature]*

DATE January 13, 1966

SUBJECT Program to Obtain Disc Sources

TO Disc Committee

FROM Steve Lambert

DISC SOURCES PROGRAM

I. Acquire knowledge of disc vendors

a. Firms that provide finished discs.

- 1. Firms' production capability.
- 2. Disc quality.
- 3. Recording media i.e. nickel cobalt or oxide.
- 4. Disc history through field use.
- 5. Disc cost.

b. Firms that provide discs according to DEC specifications.

- 1. Firms' production capability.
- 2. Disc quality.
- 3. Recording media i.e. nickel cobalt or oxide.
- 4. Disc cost.

c. Firms that provide disc substrates.

- 1. Firms' production capability.
- 2. Surface qualities after machining or molding.
- 3. Material and labor costs per substrate.
- 4. Repeatability in mechanical quality.

d. Firms that provide a recording media on a DEC supplied substrate.

- 1. Production capability.
- 2. Coating quality.
- 3. Surface finish.
- 4. Unit to unit repeatability.
- 5. Coating diameter limitations.
- 6. Recording density limitations.
- 7. Tested or untested discs.
- 8. Costs.

2. Specifications

- a. Copy competitors' specifications
- b. Prepare DEC specifications
  - 1. Provide drawings indicating dimensions, runout figures per inch within an inch etc.
  - 2. Write an engineering specification for mechanical configuration.
  - 3. Write engineering specification for recording media.
  - 4. Write engineering specification for disc testing.
  - 5. Make mechanical drawings for disc cover.
  - 6. Write engineering specifications for disc cover.

3. Request for Quote

- a. Obtain price breakdown, quantities 1-10, 10-100, etc. from firms that sell discs as a standard production item.
- b. Obtain quantity costs from vendors who make discs according to DEC specifications.



# INTEROFFICE MEMORANDUM

DATE January 18, 1966

SUBJECT Minutes for Disc and Tape Meetings

TO K. Olsen ✓ K. Fitzgerald FROM Nick Mazzaresse  
E. DeCastro L. Prentice  
R. Best J. Hastings  
S. Lambert  
D. Wardimon  
R. Boisvert  
P. Backholm  
G. Bell

In order for our meetings to be effective, it is necessary for us to record the events that take place at these meetings in an action oriented manner.

To this end, Steve Lambert has been appointed as the official "minute taker". This is a job with a large amount of responsibility. It is up to Steve to summarize discussions and then indicate in his minutes those action items which have been decided upon. In the Small Computer Guidance Committee minutes, we have indicated these items by putting them in bold type (Steve might want to read a few of these to get the general idea).

Procedurally, in the meeting, it will be up to the manager of the personnel in each project to verbally summarize the subject and indicate the proposed action. In the case of DECTape for the Disc, this will be Ed DeCastro's responsibility. In the case of the Mag Tape development, this will be Dick Best's responsibility. Of course, Steve Lambert's responsibility is clearly recording these decisions. Each meeting will then be a discussion of the progress on these action items and any new business which might be appropriate. It is also the responsibility of the "minute taker" to remind the committee of any loose ends or uncompleted action.

Attached to this memo is the agenda for the next meeting.

DISC AND TAPE DEVELOPMENT MEETING

Thursday, January 20th, 1:30 P.M.

K. Olsen's Office

AGENDA

- |                            |             |
|----------------------------|-------------|
| 1. Tape Development Report | R. Boisvert |
| 2. DECTape Report          | D. Wardimon |
| 3. Disc Report             | S. Lambert  |

Each item should take no more than 15 - 20 minutes. It is proposed that time be distributed between brief status reports, and remaining time be devoted to discussion of existing problems and resolution of action items identified at previous meeting.

Members: K. Olsen, N. Mazzaresse, E. DeCastro, R. Best, S. Lambert, D. Wardimon, R. Boisvert, P. Backholm, G. Bell, K. Fitzgerald, L. Prentice, J. Hastings





# INTEROFFICE MEMORANDUM

DATE January 13, 1966

SUBJECT Modifications for Design Corrections and Updating 570 Transports

TO N. Mazzaresse W. Hindle FROM Roland Boisvert  
J. Shields R. Best  
K. Olsen G. Bell  
P. Backholm J. Jones  
L. Fryer D. Zereski

The following is a list of modifications to the 570 transport for either design corrections or convenience to maintain.

1. All Capstans to be replaced under warranty by Midwestern. They request date, time on machine and serial number of machine when new Capstans are installed. New Capstans are warranted 2500 hours.
2. All Capstan clamp arm shoes that are scored are to be replaced under warranty by Midwestern. The new shoe allows a 4 mil clearance between Capstan and shoe and could be incorporated on all units at an exchange price of \$26.00.
3. The pull tape out of columns is modified to be done by an applied DC voltage.
4. The diaphragms of the column sensing switches are to be relaced.
5. The transducer assemblies are to be replaced.
6. The stop blocks of the clamp arms are to be replaced.
7. The stop pins are to be replaced.
8. Vacuum tape cleaners and filters are to be installed.
9. Flow restricter is to be placed in series with air supply to clamp arm air cylinder.
10. New Capstan flow control regulator to be installed.
11. New statis discharge arms to be installed.
12. New clips for holding vacuum column glass to be installed.
13. Modifications to both 4550 and 4526 modules.
14. New Caravell fan to be mounted in rear of compressor.



15. New doors which allow greater CFM are to be installed.
16. New sliding door stop blocks to be installed.
17. New shock mounts for compressor.
18. One ball bearing removed from unit selection switch.
19. Rework spacer on clamp arm air cylinder.
20. Check fans in top of tape unit for proper flow direction.

The cost of materials for these modifications is approximately \$225. The amount of labor is one week for installation and checkout, minimum on-line testing of 48 hours without adjustment before shipment.

I have consulted with the mechanical assembly group in production and have found that they are heavily committed manpower wise for several weeks. I therefore, suggest that since the tape unit development project has been suspended for an unknown length of time, that this original group start a program of retrofitting the 570 tape transports.

Phil Backholm will take responsibility for ordering and installing those modifications which are classified as mechanical. I will take the responsibility for ordering and installing those modifications which are electrical. A. Leese and one field service representative, if possible, will do most of the installation and off-line checkout of the units. I will perform the on-line checkout of the units. We are in hopes that field service will be able to assign a different individual every two weeks, thus allowing a number of these people to get first-hand on-the-job training on these tape drives.

Below is a suggested schedule for retrofitting units:

<u>No. of Units</u>	<u>Location</u>	<u>Completion Date</u>
2 RW	Lin. Labs. , Montana	Jan. 28, 1966
2 RW	" " Locally	Jan. 28, 1966
2	JPL	Feb. 11, 1966
1	JPL	Feb. 18, 1966
2	Acken	March 11, 1966
2	Bohn	March 25, 1966
1	SRL	Feb. 25, 1966
3	Brookhaven	?

Acken and Bohn may slip in the schedule because of delivery problems both ways.



The plans are to build up two of the new units for delivery to L.L. When those units in Montana are returned they will be retrofitted and sent to JPL. The units which are received from JPL will replace the last unit at JPL and the unit at SRL. These units will then be retrofitted and sent to Acken. Two units in production will be built up and sent to Bohn. The units from Brookhaven will be retrofitted if Large Computer Group deems it necessary.

It has been suggested by N. Mazzaresse that we utilize as many of the new transports in production for accomplishing the retrofitting and to end up with four machines for accounting which we can utilize for further engineering and programming backup as necessary.

At the end of this we should end up with 8 machines back in the house. It has been further suggested we do retrofit only as many as people feel that they can use up in-house and that the remaining units become a source spare parts.

RB/bwf



# INTEROFFICE MEMORANDUM

Page 1 of 2

DATE January 13, 1966

SUBJECT GPS Instrument Co., - Module Usage at NSA, Ft. Meade, Md.

TO Harlan Anderson

FROM Ron Eisenhauer *RRE*

CC: Stan Olsen

Ken Olsen

Saul Dinman

Dick Best

George Rice

As requested in your memo of 28 December 1965 I discussed their application of our system modules, specifically type 4225, in the computer system at NSA. The trouble that NSA encountered proved to be a defective 4225 module which they isolated by interchanging modules. The module was returned to us for repair. In checking with our module repair facility I found they were replacing the unit rather than repairing it due to the fact it had been repaired once already, and it seems that several transistors and diodes were defective. NSA was upset at the length of time it took us to repair this module, but have encountered no problems since it was returned, according to Mr. John Nilsen of GPS.

GPS has 3 or 4 similar systems in the field and have not had any problems of this nature with any of them. (One system that I am personally involved with is at the U. S. N. Supply Depot at Newport.)

The engineers at GPS informed me that they initially had problems with the 4225 module; in particular, when used in the first stage of the clock which operates at a full lmc rate it appeared to be temperature sensitive and was prone to intermittent conditions if the operating temperature rose slightly above normal. They feel quite strongly that this could be the problem at NSA.

I have requested that Mr. Nilsen inform me immediately of any further problems that the agency may have with the clock so that we may take any necessary action to either repair or replace the modules in use. The possibility of this being a loading problem has been eliminated since the clock feeds directly into the counter with no additional loading.



Page 2 of 2

January 13, 1966

I suggest, if it is convenient and has not already been done, that we temperature test this module to insure that it does not have any inherent temperature problems. Please let me know if I can do anything further on this matter.

Ron

P.S. To satisfy my curiosity and Mr. Nilsen's, would you tell me how you got the name of Y. T. Lee, since he is not an employee of GPS, but rather a Doctor at M. I. T., and ironically, is in charge of the group that is purchasing a Hybrid Computer from GPS which involves our PDP-8 computer.

RBE:mcp



# INTEROFFICE MEMORANDUM

DATE January 13, 1966

SUBJECT Program to Obtain Disc Sources

TO Disc Committee

FROM Steve Lambert

## DISC SOURCES PROGRAM

- I. Acquire knowledge of disc vendors
  - a. Firms that provide finished discs.
    1. Firms' production capability.
    2. Disc quality.
    3. Recording media i.e. nickel cobalt or oxide.
    4. Disc history through field use.
    5. Disc cost.
  - b. Firms that provide discs according to DEC specifications.
    1. Firms' production capability.
    2. Disc quality.
    3. Recording media i.e. nickel cobalt or oxide.
    4. Disc cost.
  - c. Firms that provide disc substrates.
    1. Firms' production capability.
    2. Surface qualities after machining or molding.
    3. Material and labor costs per substrate.
    4. Repeatability in mechanical quality.
  - d. Firms that provide a recording media on a DEC supplied substrate.
    1. Production capability.
    2. Coating quality.
    3. Surface finish.
    4. Unit to unit repeatability.
    5. Coating diameter limitations.
    6. Recording density limitations.
    7. Tested or untested discs.
    8. Costs.



2. Specifications

- a. Copy competitors' specifications
- b. Prepare DEC specifications
  - 1. Provide drawings indicating dimensions, runout figures per inch within an inch etc.
  - 2. Write an engineering specification for mechanical configuration.
  - 3. Write engineering specification for recording media.
  - 4. Write engineering specification for disc testing.
  - 5. Make mechanical drawings for disc cover.
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3. Request for Quote

- a. Obtain price breakdown, quantities 1-10, 10-100, etc. from firms that sell discs as a standard production item.
- b. Obtain quantity costs from vendors who make discs according to DEC specifications.



# INTEROFFICE MEMORANDUM

DATE January 13, 1966

SUBJECT Attached Material

TO Kenneth Olsen ✓  
Harlan Anderson  
Product Line Managers

FROM Harry S. Mann

I thought that the attached article which I have edited somewhat would be of particular interest to all of us. At least it reflects a lot of my philosophy of business management.

I recognize that we face a particular combination of problems in that our short-term challenge is to increase production and quality of production so that we can satisfy a high demand; while the long-term challenge is, of course, to have continuing new products which are technically superior to those of our competitors.

This article places the brunt of its emphasis on what I consider to be our long-term challenge and minimizes the short-term hurdle which we have to jump.

Harry S. Mann

HSM/clw

Attachment



# Managing Today

There are two ways—or perhaps two points of view—from which one can view management. These are the *managerialist* and the *traditionalist* points of view.

## The "Managerialist" Viewpoint

The *managerialist* point of view conceives of a company as primarily a social institution with social responsibilities of a high order—a device through which the demands of stockholders, employees, the general public, and the needs of the business are carefully balanced or composed—a device through which work processes, and even the lives of human beings are carefully organized and ordered, often for the sake of order itself. This is an over-simplification, of course, but the viewpoint is there. It is often apt to be the view of academicians and, to some degree, of staff people. If it is a dominant view in any actual company, it tends to be most prevalent in those companies not in highly competitive areas—large utilities, perhaps, or companies enjoying competitive advantages that make their positions relatively secure and their prospects relatively stable.

## The "Traditionalist" Viewpoint

The *traditionalist* point of view, on the other hand, is concerned with company growth and survival. It focuses upon the objective of profit-making to assure these goals. It is a dynamic point of view rather than a static one, and it is, for most companies, the only realistic view to take. Most companies today are fiercely embroiled in heavy competition. They must look first to their own survival, and if they are wise, they look to growth, for they realize that not to grow may very well be tantamount to ultimate decay and death. Certainly, many find that today's profit structure makes provision for long-term growth much more difficult than they should like to envision.

These two points of view are not mutually antagonistic. Companies are social organizations with social responsibilities, and today's progressive traditionalist executive is very much aware of it. Companies do need to survive, and even the most ardent managerialist would concede this.

## Growing Complexity of Business

Today, we are faced with a growing complexity both of the business enterprise and its internal management environment, and of the economic, governmental, and social climate in which it exists. There is also the growing specialization of management which creates an ever-expanding requirement for planned mutual objectives, basic understanding, and intelligible common management language, without which top management decisions, however right, will never become fully realized.

We must learn to look upon management itself as a system—not just an organization chart or a group of people. If one examines an organization chart, it will be found that a whole series of management functions exist within the system. The basic problem of management is to transmute functional knowledge into a coordinated effort, with profit as the end product.

To accomplish this coordination is difficult. In too many cases, functional heads tend to think and act independently without regard to other functions—they think of themselves as a separate management organism, *not* as a part of the whole.

Progressive management, then, continues to seek a means to cope with the myriad of problems, both internal and external to their corporate structure, which will allow for greater profitability. *Internally*, they are continuing their quest for means to develop an operational structure that will provide for the proper delegation of responsibilities, authorities, and relationships within the complexity, that will allow an individual to function effectively, and which will achieve a higher level of profitability through individual, group, and corporate effectiveness. From the standpoint of *external environment*, management is faced with the problem of a rapid rate of technological change. This must be recognized as a continuing phenomenon, one in which the tempo will accelerate with time. Further, they are faced with an accelerating change in the socio-economic climate in which they must exist, and with the rapid development of foreign competition. The external environment is one over which a given management has little control. These fac-

tors, however, have an immeasurable influence on the future of any given corporation. They must be recognized in their planning process and in their strategic decisions.

FORTUNE's editors in a recent advertising piece made the following observations:

*"No product is safe in an innovating world."*

*"No corporation, however big, is safe; in an era of radical change they all live dangerously and try to hear the potentialities in the market."*

*"No management technique can survive as a conditioned response to a situation, for the situations will no longer be the same."*

*"No marketing plan can avoid becoming obsolete when there are vast swings in mass habits, when there is intense and imaginative competition."*

One would be amazed if he were to examine the FORTUNE magazine lists of *The 500 Largest U. S. Industrial Corporations* for 1964, compare it to the list published in 1955, and note those corporations which have toppled from the upper strata of success. While there is little public documentation as to the reason for these declines, undoubtedly the basic reason can be attributed to dormant management.

Radical alterations are taking place, not only in the quantity of the present United States economic activities, but also in its quality. Further, management's objectives and policies must be hewn with an eye to the dangers and opportunities that these changes will foment. In the current phase of economic development, man is becoming less necessary insofar as his direct use in the production of goods and processing of information is concerned. Because of automation, fewer production workers are employed despite the continued upward trend of industrial production. Therefore, as a company and as a nation, we are faced with a situation where much of our present knowledge, experience, and skills, are rapidly becoming obsolete. As a probable result, a significant proportion of management and workers will need to be re-educated and re-trained periodically, and in some cases almost continuously, to keep pace with the change in methods of business operation.



There are five areas where I believe we can readily detect change:

1. Management attitude,
2. The structure of the work force,
3. The increasing tempo of innovation,
4. Changing marketing patterns, and
5. Changing organization.

#### Change in Management Attitude

A large part of the changing characteristics of the economy will have the effect of reducing the number of relatively non-creative jobs and increasing the number of relatively creative jobs. Certainly, the business community must take the lead in contributing to a public understanding of this imbalance and to the formulation of solutions to the problem. The waste of human potential is appalling, and no civilized society can tolerate it and continue to survive. It is one of the great tragedies of the world.

*If an organization is to adapt successfully to the changes that confront it, there must exist a climate favorable to creative thinking and conducive to the acceptance of new ideas.*

Most managements have failed to grasp the significance of their problems in this area, especially in the area of *management obsolescence*. This latter problem can best be summed up by quoting a statement contained in the report of the Conference Secretary-General titled, *Sound Management and Management Development as a Factor in Technological Progress*, which was presented at the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas held in Geneva in 1963.

*"Technological development leads to an ever higher degree of specialization and complexity within human society. As this process advances the need for coordination and the organization of systematic action becomes imperative. To manage is to introduce conscious action into the natural course of a process so as to direct it into the most effective channel possible. Thus management is far more than the mere day-to-day running of the affairs of an industrial enterprise. As such it has an important part to play in the process of development.*

*"The major obstacle to the application of modern management techniques is the absence of people with the required training.*

*"To some extent the transfer of technical knowledge, the teaching of techniques, is concentrated towards the lower end of the organizational hierarchy. Work study, production control, costing, etc., are implemented by people at what may be called the technician level. On the other hand, the information produced by these techniques is used for managerial decision-making at the higher level and the use made of all techniques is a matter for top management decision. Top management must therefore know their potential, how and where they can be used, and must be prepared to accept and implement the consequent organizational, and, in some cases, institutional changes.*

*"The major management training tasks can therefore be roughly divided into two parts along the same lines as we have followed so far—the imparting of techniques to technicians and lower management and the imparting of an appreciation of the techniques and a broad knowledge of the management process to higher management—plus the changing of attitudes, particularly the attitude towards change itself.*

*"Another problem is that of implementation, the problem of getting the acquired skills put into practice. Generally speaking, the men who have been trained are willing enough to put this training to good use, but organizational obstacles are placed in their way. In most cases the use of their acquired skills necessitates organizational changes which top management is unwilling to implement. Both these problems can be largely overcome by the education of top management itself."*

This is harsh criticism, but, it is valid in too many instances.

#### Change in Patterns of Work Force

The changing patterns in the work force, together with the considerable increase in creative types of persons in an organization, will in the future require a much more sophisticated management than generally exists today. This sophistication can only be accomplished through continuous management training with exposure to the new advanced techniques being introduced. Top management is

not the only group that needs continuous training since the rebuilding of skill and knowledge must apply to every person within the organization. Through these efforts we will overcome one of the basic problems of most management today—the *unwillingness of many managements to accept organization and operational changes vital to economic growth.*

Another problem that will be created by changes in the structure of the work force will be an increasing rigidity of the cost structure of business because the more technically-oriented people referred to will enjoy a high stability of employment and, for the most part, will not fluctuate with production volumes as do members of the hourly paid work force (except, perhaps, over a fairly extended period). Therefore, this portion of the labor costs will become increasingly a fixed cost for business to absorb.

These people will also create a rather severe problem in how they will be managed. Presently we know the costs, but we do not have a means to measure what they contribute or even what they should contribute. Management also faces an equally difficult task in respect to salaries and promotional opportunities for the technical worker. Most of them will be specialists concerned with a single field of knowledge, but they must direct their work towards a common business goal in order to produce profitable results. To be effective, they will need to be managed by a very competent management team just as the management team will likewise need the technical knowledge and the dedication of these technical personnel to be effective in their efforts.

#### Increasing Tempo of Innovation

Another challenge to management is the increasing tempo of innovation. The accelerated increase in the rate of technological development will create some very fundamental problems for management, especially in the way in which the technological innovations will be put to work. Management will be forced to learn to manage, and to cope with, innovation. The life of product lines will shorten. Consequently, the reaction time of management must shorten. Managers must learn where innovation efforts should be directed and how extensive and intensive they must be. Management must also develop the means to measure the risk



of innovation and the degree of risk the particular company can afford to take, even though the odds against success may be very high. Of course, there is the final problem (and perhaps the biggest of all)—the management problem of making the results of innovation truly profitable.

### Changes in Marketing

Another area of problems will be the marketing of the new and improved products resulting from technological advances.

It is realistic to say that, today, most managements are still product-minded or process-minded. They look upon the job of management as selling the product they produce. Comparatively few appreciate that it is equally the job of management to plan for tomorrow's market requirements.

Another impact on both domestic and foreign marketing will be changes in social and cultural patterns. In many instances, these may have as much impact on an individual company as the technological changes now taking place. The rising cultures in the now less developed areas will ultimately create vast new markets—markets that will be new and that have new requirements that must be well understood.

### Increasing Emphasis on Sound Financial Planning

Another area that will produce extreme new challenges to management will be the requirement for better financial planning to insure that the financial structure of a business is suited to its needs and economic characteristics. The change in the structure of the work force, the rapid technological change, the increase in new innovations, the change in marketing climates will all place an increasing burden on financial management to insure that all capital funds are fully utilized, whether they have been obtained from outside sources or from the retained earnings of the company. In the past, and currently, we are all aware of companies that have failed due to inadequate financial planning. While business today is complex, its complexity will increase to such a degree that failure to plan properly for the necessary financial structure can well come from a company to failure even though it has excelled in all other aspects.

### Impact of Change

Many of the accepted business concepts that exist today will change. Managers must look forward to developing a higher return on investments in order to justify the increased risk involved. Second, management will be forced to take a longer view of profits; that is, instead of planning for a fixed return for a year, it will become increasingly necessary to re-orient aims to profit for a given business cycle. Third, the concepts of overhead and labor productivity must change as the direct labor impact diminishes. The allocation of overhead costs must reflect the tremendous and disproportionate increase in productivity in some sections of the business. The traditional separation of front office and the plant will alter as production is increasingly automated and controlled by a company-wide information system through improved scheduling and actual factory control using electronic data processing systems.

### Change in Organization—Top Management

Advances in communications will allow for quicker feedback of information among many geographic points. This will allow management to both centralize and decentralize various sectors of its decision functions. Finally, the role of middle management will change quite drastically. It will change from a supervisory group to a second-level decision making group dealing with operating problems while the top management will turn their attentions to long range planning—i.e., freeing themselves for a greater planning effort for ten to fifteen years ahead in the areas of:

Products—what *kind* for what *markets*,  
People—what *skills* will be required,  
Plant—*where, what type*, and  
Finance and *profit*.

### What Management Tools Will Be Available

In meeting the new challenges and increased complexities that will face management in the next decade, most managements will be forced to employ many of the same tools that they are using today. However, these men will also find that they will be expected to know, to understand and to handle new concepts and new

tools of management. They will find, increasingly, that they will be expected to use systematic methods of analysis and decision-making, supplemented by new techniques of analysis, communication, computation, and presentation.

Management should expect that the so-called management sciences such as operations research, the decision-making logic, and the new electronic tools and systems are going to make a difference, even to the smallest of companies. Management will find that its job is going to be so complex, so vast and so demanding that it will require all the tools of simplification and systemization that can possibly be obtained.

### Long-Range Planning

The management tools mentioned will be used most effectively in the area of planning, especially long-range planning. We must develop a management environment that will anticipate problems before they develop, and the only manner that this can be accomplished is through the role of long-range planning. While planning in some form has always taken place in the management environment, long-range planning as a formal tool of management is of recent vintage.

Today, there are only about 100 corporations within our country that have formal planning staffs. The question is, however, how well the managements make use of this tool in their management process. Many of these staffs do not have enough influence on their particular managements. Many of the staffs are status symbols for management, much as were computers a decade ago. Nevertheless, it is impossible for a corporation to develop realistic objectives and accompanying policy without a well-structured planning process. It is in this process that we will eventually find the greatest use of the scientific tools now being made available to management. With these tools, it will be possible for the members of management to display their best judgment using all the knowledge at their command. From this planning process we will also find that we will have the ability to develop better criteria for measuring performance, establish control, and thus improve the ability to take corrective action when operation deviates from plan.



### Realization of Expectations

Let us turn for a moment to examine how well some of our expectations in the application of the more advanced tools are being realized. In the hardware area, generally, efforts to date have been aimed at the use of electronic data processing systems (or other hardware) as a general substitution for clerical paperwork efforts. Little effort has been devoted to a dynamic analysis of the entire management process to determine the interaction of components, to informational requirements, and to the use of more advanced management tools known to be available.

On the clerical side, we can say we are doing very well indeed; of course, there have been problems. Experience has not always been good. In many instances automation was followed by something akin to chaos. Usually, these are problems of ill-advised haste or over-selling on the part of over-enthusiastic supporters, or simply management error in trying to use the more advanced tools for a purpose for which they were not intended. Very often, I believe, companies have made the mistake of over-computerizing. They have been hurried into systems that are too big, too general, and not definitive enough for the specific goals they were expected to obtain.

In spite of these pitfalls, progress has been steady and substantial. Surely, it would be a very blind management that did not realize their tremendous potential, as well as their limitations, and did not devote serious study to their use.

### Summary

Within the next decade, it will be generally understood that the prime challenge will turn, not around the production of goods and services, but around the difficulties and the opportunities involved in a world of accelerating change and widening choices. With this future climate, it is not surprising that we hear a clamor about automation and its effect on employment. Some see only economic peril ahead. In the past, however, machines have not just replaced men, machines have freed them to perform more productive labors and to create more goods and services. Historically, these improvements have brought both increased productivity and higher standards of living.

We must reject the feeling that our present generation is the only one that has faced the problems of change, the challenges of new and revolutionary industrial and management equipments and concepts—these problems have been faced by our forefathers and their ability to answer them objectively and with dignity is the reason for the freedom, the free enterprise environment, and the high living standards we enjoy today. Our responsibility, as management, is not to panic in the face of our growing complexity, for civilization dictates that each generation shall find deeper and more complex problems to solve than did its predecessor. We, individually and as a nation, are better prepared and able to meet these great challenges and those of the future because of the toil, the devotion, and the teachings of the many pioneers who preceded us.

It would be unthinkable to manage today's great organizations without the use of existing management tools. Tools alone, however, will not do the job. The key is to find ways of introducing into management demanding and challenging goals which stimulate individuals to put forth their best efforts at all times, and developing an environment that makes it possible for them to organize their efforts within a total framework.

The statement made by Jean Monnet, the architect of the European Common Market, is very apropos in our own given situation: "*We must not be overimpressed by material problems. They are not very hard to resolve. What counts is to make up our minds to see things in the perspective of building the future, not of preserving the past.*" ■

Note: The preceding article is condensed from the October 1965 issue of Financial Executive magazine--"Managing Today with Tomorrow's Tools" by Norman Ream, page 10.





# INTEROFFICE MEMORANDUM

DATE • January 10, 1966

SUBJECT Two Head Transport

TO Tape Disc Committee

FROM Roland Boisvert

The original TU79 specifications call for a TU79C which consists of both a seven and a nine channel head mounted in the tape path. I believe we should eliminate this configuration from our proposed line because of the following reasons:

1. The head is the most significant contributor to poor tape life thus one-half the heads double the life.
2. Tape which has been used for some time develop a polish pattern which results in poor head to tape contact when a seven channel polished tape is used on a nine channel head and vice versa.

Tape rehabilitation has been the only effective solution to the problem of seven vs. 9 channel tapes.

K. Olsen  
D. Best  
N. Mazzaresse  
G. Bell  
E. DeCastro  
S. Lambert  
D. Wardimon



# INTEROFFICE MEMORANDUM

DATE 10th January, 1966.

SUBJECT PEPR Controllers.

TO Ken Olsen.

FROM John Leng.

From telexes I have received recently concerning the PDP-7/PEPR sale we made to Nijmegen, it sounds as if we do not intend going after the PEPR controller job to be specified by MIT. I've no need to go into the details of the future requirement of this type of system as the survey given by Bob Lane at the PDP-6 seminar outlined the tremendous increase expected in this type of work. The important thing about this is not so much the fact that there will be a considerable market for PEPR controllers but for the modules that go in them and the computers that sit on the end of them. My concern is that we get the lion's share of this business; if we don't then it could mean the beginning of the end of DIGITAL in a field where with comparative ease we have cornered the market.

An analysis of all of our sales to date would, I believe, be quite revealing. Up to now we've maintained a "physics list" but it never really told the whole story or, in fact, included all of the machines. In the U.K. alone out of a total of 46 machines sold to date, no less than 34 of these are for physics work. The continent shows a good ratio of physics sales and I'm sure the picture in Canada and the U.S.A. must show a significant physics content.

To date we have not spent a great deal of money promoting these sales or doing systems work, compared to our competitors in the pulse-height analyzer business, and yet we acquired the work. One of the big reasons for this is the unawareness of our competitors in the computer business, apart from SDS, who started somewhat later, of the potential of this market.

- Continued -



Right now we really have this competition from CCC, SDS, CDC and IBM in a big way. They are paying a lot of attention to this market and are coming out with some really competitive products. My two big worries are the CDC-1700 in the small field and the IBM 360/44 in the large field. The 1700 appears a beautiful product and sits right between our 7 and 8 in price. For a major part of the on-line physics work it is ideal with its 16 bit word length. Its speed and disc file back-up make it a giant.

Now that physicists are used to spending money and are working on larger budgets, the 1700 is easy to afford, even with PDP-8's around.

One of the interesting things about the pulse-height analyzer market was, in spite of the computer companies coming into it, the sales have gone up and they're still selling 400-500 analyzers a year. Many of these are small systems but nevertheless they are still taking sales which we should have acquired. If the other computer manufacturers start to do systems work in this area it will be really tough for us. If they don't, then we're still going to have a fairly rough time.

I believe that we've enjoyed the major part of our business with the PDP-7 and PDP-8, unless we are prepared to put far more work into our applications selling, and to me that means doing some systems work both hardware and software wise.

The 7X, if it comes off, will give us a tremendous boost and will give us equal weapons with CDC. However, I really don't think that this in itself will be enough. We seem to be forever in this rat race of having to chase each others' tails and end up coming out with new machines before the previous model has really done its work. The PDP-5 and PDP-7 are cases in point. If we had gone more deeply into applications selling with more systems and programming content, together with a few more OEM customers, we would give a much longer life to our products.

- Continued -



The analyzer people have been selling their systems for years with 5 to 10 us. cycle times because they've been giving more thought to the customers' actual requirements and not so much on how many cycles per second their competitors' machines are running at. Agreed the computing business is different but with a combination of the "special systems' peoples" approach to customer problems, together with computer competitive spirit one could really do well. Incidentally, it looks as if Adage are taking this approach, and, of course, the LINC was more customer orientated.

The new "6" also promises to be a very competitive product, but I've not seen any figures for how many we expect to sell or where we expect to sell it. One area, of course, is physics and particularly high energy work and in turn PEPR. The competition is the 9300, the 3200 and the 360/44, particularly the latter. The 44 was designed in the U.K. after many consultations with high energy physicists and they have shown interest in doing the complete PEPR job. If we just compete on the computer level we have the same old battles. If we build the complete system and offer these, together with the programmes that are being written for the "6", we will clean up the market. What's more some of those people that already have 360's for PEPR work could change over to the "6", Nijmegen have expressed such a possibility.

The other potential for the new "6" is for all present physics users, particularly in the low energy field. Many of them are doing significant amounts of computing for the first time and will shortly be requiring computing throughput far in excess of their 8's or 7's capabilities. Many of these will want their own PDP-6 capability in a year or two from now.

The physics market looks to be capable of taking 50 new PDP-6's in the next three to five years. For the new 7 possibly 200 machines and possibly 400 more PDP-8's. With our present approach to marketing we would likely get  $\frac{1}{3}$  of this total, assuming that the competition don't do any more than they're doing now. If we become more customer orientated then it's not unreasonable to consider taking  $\frac{2}{3}$  of this total.



Up to now I've considered only computers. I believe it is true to say that physics users are some of our best module customers. If we bow out of the physics market then we can expect a corresponding decrease in our capability to sell modules.

In conclusion, I'm suggesting that in particular we go after the PEPR job in earnest and in general we increase our overall physics programme in order to maintain and improve our position in the market place. I don't think the second suggestion can be successfully done without doing the former.



c.c. Harlan Anderson.  
Win Hindle.  
John Jones.  
Stan Olsen.  
Bob Lane.

Ted Johnson.  
Nick Mazzaresse.  
Pres Behn.  
Al Titcomb.

*K H Olsen*



INTEROFFICE  
MEMORANDUM

DATE: January 10, 1966

SUBJECT Diode Considerations Part Two

TO K H Olsen  
R Brown  
R L Best  
D A White  
R Sogge  
R Hughes  
G Wood  
T Stockebrand

FROM Walter Bonin



DIODE DESIGN CONSIDERATIONS - PART TWO

## 2.0 Forward Voltages at Various Currents

Part Two of this series is basically a reiteration of Part One. By referring to Fig. 1-1 of the first portion you will observe that the voltage across a diode is the sum of the potential across the junction (diode drop) and the series drop at the bulk resistance. To calculate the bulk resistance of a diode we merely apply the basic equation:

$$\text{Eq 2-1} \quad R = p \frac{L}{A}$$

where

p = resistivity of the material in  $\Omega\text{-cm}$

L = thickness of the material in cm

A = area in  $\text{cm}^2$

To the voltage drop across this resistance we add the diode drop graphically presented below:

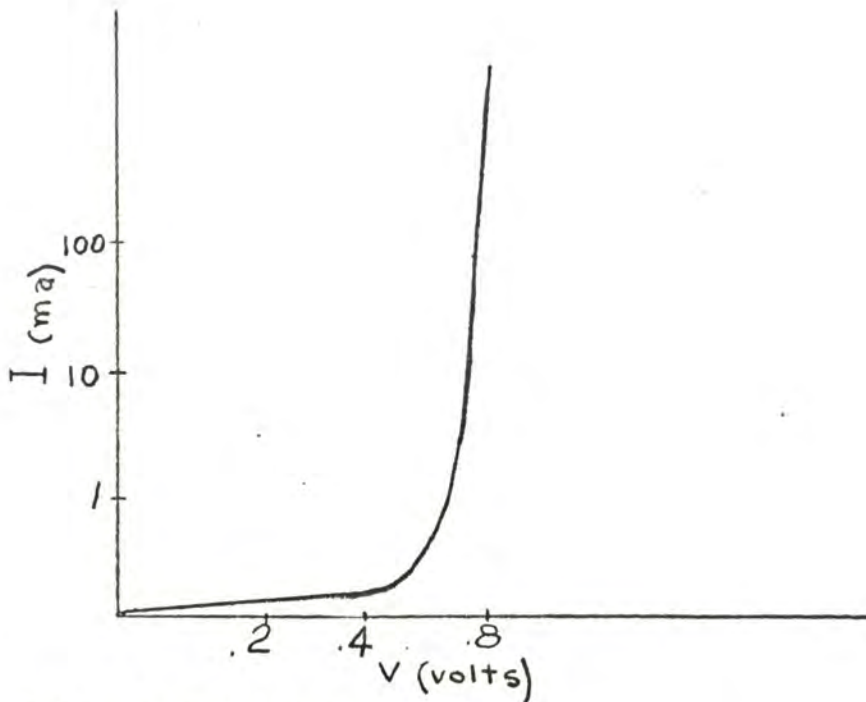


Fig. 2-1 basic diode  $V/I$  characteristic

The table appearing on page 5 of Part One gives the bulk resistance of a representative diode and its resulting voltage drop. It is obvious that the use of low resistivity material presents no problems to the designer of a device in regard to excessive forward voltage drops. However the manufacture of certain diodes which require low junction capacitance necessitates the use of low resistivity material. To avoid the bulk voltage drop inherent in this material the designer must use epitaxial wafers. (See Fig 1-2 Part One).

The process of epitaxy involves the placing of very low resistivity material called a substrate in a furnace of suitable temperature and gas atmosphere which results in the "growth" of an epitaxial layer which possesses the same crystal structure as the substrate. (The word epitaxial means continuous crystal structure). This layer is high resistivity material necessary for low junction capacitance and being very thin contributes negligible forward voltage drops. The resistivity of the material which may be varied during its manufacture by changing the gas flow is generally on the order of  $.5\Omega$  cm to  $10\Omega$  cm. Its thickness may run from 5 to 30 microns or more (25 micron = one mil) depending on how long the substrate is left in the furnace during "growth". Since thicker films contribute higher resistance it is desirable to use the thinnest epitaxial layer possible consistent with the diffusion conditions being used.

In summarizing the only devices that present problems in regard to undesirable bulk resistances are low capacitance diodes and transistors. However, since most components fall within this category the designer must use the relatively expensive epitaxial material coupled with close diffusion control to insure the quality of semiconductor devices produced.

WB:ASJ





## INTEROFFICE MEMORANDUM

DATE January 7, 1966

SUBJECT A little background on Combustion Engineering

TO Ken Olsen

FROM Fred Gould

We are selling modules to Dynage, Inc., Hartford, Connecticut. They, in turn, manufacture Control Station Safety Systems and Start Up Controls for C. E.

C. E. stated early in our sales effort that they were willing to pay for the development of a vendor as G. E. was in the driver's seat and they were not happy with that arrangement.

We agreed to develop 3 modules, unique to their requirements, and received from them \$6,000 plus for the development expense.

We now have 1 order in house; Dynage has 2 additional orders not yet released to us, but with no where else to go with them and two letters of intent for systems 4 and 5. These systems average out at 30K each and we have signed a 250K module discount agreement with Dynage.

Combustion Engineering did 270 million the first 9 months of '65 and now have a backlog of 550 million. Their stock has gone from low 30's to mid-60's during the same period.

They acquired National Tank Co. 6 months ago which is active in the petroleum industry and some time ago acquired the Lumas Co., a consulting firm in the same industry.



# INTEROFFICE MEMORANDUM

DATE January 7, 1966

SUBJECT Xerox Corporation

TO Ken Olsen ✓  
Stan Olsen  
Ted Johnson  
George Rice  
Robert Bocek

FROM Fred Gould

Ed Nutter, Manager - New Products, Exploratory Development, has requested an in-plant visit on Friday, January 14, 1966.

He will be accompanied by Eze Meekie, one of his circuit people, and Albert Hayes, a system engineer from the same group.

These are the engineering people who have been talking multi-million dollar module orders. They plan to arrive here in the morning via their Corporate plane. Bob Bocek will hitch a ride with them.





# INTEROFFICE MEMORANDUM

DATE January 7, 1966

SUBJECT Vacuum Column Sense Switches

TO Ken Olsen

FROM R. Boisvert

cc: R. Best

We have given serious thought to changing the lever operated micro switch to a lever operated magnetic Reed relay to further reduce the production cost of this item.

Since you have Linc working in this area, it would be of mutual benefit to have Linc construct this type.



100  
INTEROFFICE  
MEMORANDUM

DATE January 6, 1966

SUBJECT Disc Sources and Costs

TO Disc Committee

FROM Steve Lambert

The IBM Disc Substrate is made by Raytee Company. The company is located at 761 East Slauson Ave., Los Angeles, California. It has 180 employees, a three to six million dollar business. It is a division of the Cost Centralless Grinding Company. Telephone No. 213-233-4261. The person who I spoke with is Ron Raitee. Ron indicated that IBM supplies the raw materials, that is the aluminum stock which is shipped from Alcoa. The material type is 7075. IBM has proprietary rights over the materials, process and tooling required to produce the disc substrates. The raw material cost per disc is approximately \$1.40. After machining, heat treating and surface finishing, the cost is approximately \$8.00. The surface finish is brought to a runout of 1 1/2 thousandths of an inch. Surface deformations are in the order of 20 microinches. The yield factor is 75%. Due to IBM's proprietary rights, Raytee Company will not sell us the reject disc substrates, nor will they build us a direct copy of the IBM substrate. All rejects and substrates are sent back to IBM. If we want a substrate built by Raytee Company we must send mechanical specifications and request for quote before they will give us an accurate estimate on the costs. However, Ron did indicate what the approximate charges would be. The first item would be a punch and die set, costing approximately \$1200. This would be used for obtaining the rough substrates out of sheet stock before machining. The cost for one to ten substrates would be approximately \$30 - \$40 depending on the acquisition of materials. IBM uses such a large quantity that they can obtain their raw materials at very little expense per substrate.

In order for us to get the same price break we would have to obtain 25,000 lbs. of aluminum where the weight per disc is approximately 1 lb. IBM coats their own disc with a 200 Micro-inch thickness of oxide, where the variation and the surface texture is not greater than 20 micro-inches. The coercive force of the oxide is approximately 280 orstedes as compared to coercive force of recording tape of 260 to 265 orstedes. The particle size is slightly smaller with a thermal setting binder.

I also spoke to George Wilhelm of Thin Films, Inc. He will nickel cobalt plate the IBM substrates at a cost of approximately \$250 for one to ten units; \$200, 10 to 100; \$150, for 100 to 500; and \$100 or less for 1000 to 10,000. For quantities up to 100,000 the price would be \$37.00 including testing. He indicates he gets a 75 to 90% yield, with a coating thickness between 10 and 35 micro inches depending on the specifications. He also indicated at this time that he is making available nickel cobalt plated 1/2" mylar tape on reels at \$50. per reel.



In regards to laminated discs, Roger Plourde has indicated that he will do the laminating work for us on aluminum substrate material. He would prefer that the material be in sheet form and the oxide coated or the nickel cobalt plated coated mylar be in roll form. We would have to either die cut or rotary cut the disc substrates out of the sheet material. Roger also indicated that he can obtain the flatness desired although some time would be required in developing the flatness. However the cost involved in doing this operation would be approximately \$75 for his charges and whatever we could do in getting the oxide coated mylar.

I have received one quote from Memerex which involves 1500' of mylar, 2'+ wide for approximately \$900. Shorter runs are possible but we may not get the exact specifications required for the oxide coating and orientation.

I consider it a worthwhile investment to spend a few hundred dollars in developing a laminated disc that may ultimately be less expensive than any of the other approaches existing now. By obtaining aluminum or plastic sheets coated with an oxide on both sides, we are not limited to any particular size or configuration of disc outside of setting up a cutting device to produce the desired dimensions (inside and outside diameters).

In regards to oxide versus nickel cobalt, those in the field who are selling nickel cobalt indicate that you can get twice as much density as oxide in surface recording. However, using flying heads the differences are negligible due to the inverse square law effect as you increase the distance between the medium and the read-write head.

I have found another possible nickel cobalt plating outfit called Burten Silver Plating Company, Burten Research Inc., Culver City. They claim to be capable of making discs.