Box 3 Memos from Olsen
Folder 17

Ken Olsen memoranda, 1965, 1965-01-04-1965-12-31
Digital Equipment Corporation records
Executives' papers: Ken Olsen papers: Memoranda
X2675.2004, *Box 3; 4*
102737387

1 of 6

THE COMPUTER HISTORY MUSEUM
1 027 3738 7

INTEROFFICE MEMORANDUM

DATE May 27, 1965

SUBJECT

TO Jim McKalip
Roland Boisvert
Phil Backholm

FROM Kenneth H. Olsen

I am unhappy with our present layout for the tape unit. It doesn't have the beautiful simplicity of the center capstan unit and it doesn't have the fully automatic load which we have to have. The straightforward center capstan unit like IBM's hybrid tape and Potter's new units have the disadvantage of short vacuum columns, short tape guiding area, and the necessity for moving the head mechanism after loading. Here is a simple way of having the advantages of all systems with the feature of automatic loading.

Put the capstan in the center, as high as possible, between the reels. Use all the distance from the vacuum columns to the capstan for tape guidance. The tape columns then are long and simple.

To load the tape, one simply lays the tape horizontally across the top of the vacuum columns. When the door is closed, the vacuum columns load. Then a simple arm comes up from between the vacuum columns and lifts the tape over the capstan. If this is done quickly, it will be a very impressive loading cycle.

The motions which this arm has to go through seem rather elaborate but I think they could be made very straightforward. The arm would have two hinged fingers. As they come up, the fingers will be close together and will pull the tape between the heads and tape guides. As soon as the tape passes the last tape guide, the fingers spread out so the distance between them is wider than the diameter of the capstan. Just below the capstan is a ramp which turns the tape 90° and lets it slide right over the capstan. As it gets over the capstan, it again flips back into position so when the fingers are withdrawn the tape will stay on top of the capstan.

If pressure bars are used on the opposite side of the head, they will have to be withdrawn by a separate mechanism during the loading cycle.

There are many ways in which we can get this linear motion. I think it should be done by a relatively powerful motor so that we can use rather sloppy guides on the arm. The arm could be a piece of flat bar stock going between nylon guides. If the jig plate extends only down to 1/3 the length of the vacuum columns, then the mechanism could be in the area below the jig plate. It could be a wheel and crank shaft like a steam engine wheel, or it could be driven by a cable on a drum or by a chain and sprocket. I like the chain and sprocket.

Some tape units have a positive pressure system inside the door. If we think it is a good idea, we should consider having pressure columns instead of vacuum columns because we'd have a simpler system. One doesn't have to pipe pressure and vacuum to two columns. One pressure pipe is enough. It might also get around the IBM patent on vacuum columns.

Ken Olsen

KHO:ecc

DRAFT

dec INTEROFFICE MEMORANDUM

DATE May 25, 1965

SUBJECT

TO Sales Newsletter

FROM Henry Crouse

I am running a school for salesmen. I know DEC has tried to train its salesmen of the various techniques, but I would like to offer a seat in my office to anyone who would like to see both good and bad selling.

In hearing some of the complaints from DEC field offices, I have the feeling that some DEC salesmen feel that selling is like an AND circuit where they need the best product, the lowest price, the fastest delivery, and the best literature. If they lack any one, they can't sell.

When you watch a good salesman, he operates like an OR circuit. If he has only one thing better than the rest, he sells real hard.

INTEROFFICE MEMORANDUM

DATE May 25, 1965

SUBJECT

TO Nick Mazzarese
Stan Olsen
Harlan Anderson

FROM Kenneth H. Olsen

On Friday afternoon, May 21, General Doriot had three visitors from the Monroe Company, which has been part of Litton for some time. They are interested in selling the PDP-8 as a commercial computer. They now have small computers and they don't plan to go into large computers, but they do need one somewhat larger than their present capability as a replacement for those installations which have outgrown a Monroe machine.

The three people were: Daniel McCarthy, President of Monroe Division
Eugene Murphy, Director of Marketing for Computers
William N. Burkhart, Vice President, Product Development

The address is: Monroe Calculating Machine Company
Division of Litton Industries
550 Central Avenue
Orange, New Jersey

Telephone: 673:6600

The two people who we should first contact on this project are:
Richard J. LaManna, Research Director
James L. Hinton, a programmer

They have the attitude which we like to see. They have no inclination to build their own machine and would like to buy from us and then sell to the commercial market. The conversation went very well; almost deceptively positive. We still have to decide how promising Litton is before we offer any exclusive market to them. We, of course, have to settle our price and a number of other details.

Royal is part of Litton, which is interesting because we plan to use their punches on the PDP-8. Monroe has not done well in the computer market, but they do own the company which makes the punched price tags used in most stores and they own Sweda which is the second largest cash register company. They plan to solve the point of sale recording problem which would indeed need a medium-size computer. I didn't want to talk business details with them until we had decided whether we were technically compatible and so during the IFIP Show I said that we would have a couple people visit them to discuss the ways of tieing in/out equipment in and to discuss the programming possibilities. They are concerned as to whether the in/out equipment will tie in readily.

Ken

KHO:ecc

COMPANY CONFIDENTIAL

INTEROFFICE MEMORANDUM

DATE May 24, 1965

SUBJECT Mechanical Mounting of Disc

TO Ken Fitzgerald

FROM Ken Olsen

cc: Jim McKalip

The secret to a successful disc file is going to be the simplicity of its mounting. I believe we should concentrate on making this simple and then keep it a secret as long as possible because the simple things are the easiest for others to copy.

I visualize that the heart is a 17" x 17" half inch thick piece of jig plate. The motor is fastened to the top with four openings for heads. The head adjustments are all done from this surface. The disc is mounted just below the jig plate and covered with a 14" x 14" x 1 3/4" deep square illuminum can from Zero Corporation. This cover is held into place by four screws at the corners of the can and to threaded holes in the jig plate. The jig plate is then rubber mounted into a simple sheet metal frame which holds the front panel and the slides.

We don't know yet how much electronics it will take but we should plan on leaving room for a large number of modules. I think that part of the front panel should be hinged to make ready access to the electronics. When the hinge door is open all the pin connections should be available as they are in the new DECtape. This means that the modules will be mounted directly behind the front panel and if it need be there will be room for two complete mounting panels full of electronics. I would guess that we would only need half a dozen or so modules, however. The heads would plug into module slots and, of course, the cables to the computer would plug in there also.

I don't know how we can filter the air neatly. I like using automobile filters but they take so much room and there is a lot of sheet metal involved in using them. Because we are re-filtering the same air all the time, we might get by with a very small filter and we should perhaps contact Millibore Corporation in Bedford and ask their advice. The mechanics work out so nicely if you leave out this fan and filter that it might not be worth the trouble. It hurts me to ruin such a neat design with messy sheet metal or air hoses.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE May 20, 1965

SUBJECT End of Tape Sensing Device

TO Roland Boisvert
Jim McKalip
Jim Hastings

FROM Kenneth H. Olsen

There is a piece of illuminum foil near the end of a spool of IBM tape which is sensed to indicate that the end is approaching so that the tape transport will go into reverse. The end of tape sensor consists of a small lamp bulb and a small photo cell put together into a piece of plastic. Because it has to be done in a very small space, it is a relatively tricky device to build and exceedingly difficult to change in most transports. I propose that we have the photo cell and the light source over with the electronics and that the light be transported with fiber optics. The fiber optics would be one light pipe brought up to the surface of the tape which is broken into two bundles of fibers at the electronics. One bundle is brought to the light source and one bundle is brought to the photo cell. It would work best if the in and out fibers are uniformly distributed across the surface.

This is the first application that I know of where one fiber pipe is used for the light going in both directions.

Ken

KHO:ecc

cc: Bob Cesari, Patent Attorney

INTEROFFICE MEMORANDUM

DATE May 18, 1965

SUBJECT Semi-conductor Operation

TO Henry Crouse

FROM Kenneth H. Olsen

The cost of our semi-conductor operation is much higher than what I was led to believe when we started it. Will you initiate an investigation to see what it would cost to have our diode capacitor diode gates made in integrated circuit form, either with just 7 diodes and we'll take care of the resistors and capacitors, or the complete unit. The other item we should investigate having made in integrated circuit form is the two diode input inverter. Dick Best or Don White can give you the circuit specifications on these.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE May 17, 1965

SUBJECT

TO Harlan Anderson
Win Hindle
Nick Mazzarese
Bob Lassen
Jack Shields

FROM Kenneth H. Olsen

Our study to see what the present company's production capability is was rather straightforward, except for the question of Field Service. We can readily see what we can produce and what slight imbalances there are which can be filled with a very small number of people. However, Field Service appears to need a tremendously large number of people in order to take care of the present rate of production.

Up until now we have assumed that Field Service will somehow figure out what services they have to supply to the computer groups. I would like to change the obligation around now. The computers are paying for the Field Service and I think that the product line managers should order ahead the services they need and then take the obligation to pay for them whether or not they use them. I would like to have Andy, Nick, and Win prepare for Tuesday's Works Committee, what their Field Service needs would be in the next six months or a year if we produced at our present production capabilities.

The other item I would like to bring up at the Works Committee is Plans for the Foreign Operation. I would like to decide on some long-term way of measuring the results of our offices, particularly Australia and Germany and I would like to come to some conclusion on plans for Scandinavia. Five weeks ago I made a proposal but so far we have made no step toward a decision, which embarrasses me a little bit because I promised them we would answer their questions.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE May 17, 1965

SUBJECT

TO Dave Packer
Tom Stockebrand
Bob Brown
Dick Best
Henry Crouse
Jack Smith

FROM /Kenneth H. Olsen

The proposed budget for the semi-conductor development group next year is many times that which I originally imagined it would be. I would like to stop all expenditures on the semi-conductor group until we make an evaluation of what we expect to get out of it. I would like to have a committee made up of Dave Packer, Bob Brown, Tom Stockebrand and Jack Smith to look over the proposed cost of that operation for the next year to see what we expect to get out of it and then report to the Works Committee on May 25th. If it looks like we will save money by making our own semi-conductors, we'll then continue work on the project.

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WUI NY 11+
DIGITAL MAYN
85184327"
DIGITAL READING
DIGITAL MAYN
MSG NO 476
TO: JOHN LENG
FROM: ELSA CARLSON (KEN OLSENS SECY)

EARLIER THIS WEEK, IN KENS ABSENCE, I MAILED LITERATURE ON OUR COMPUTERS TO MR. KENNETH SINCLAIR AND, AT THAT TIME, SENT YOU A NOTE ADVISING WHAT I HAD DONE. WHEN KEN RETURNED HE DISCOVERED THAT HE HADNT GIVEN ME MR. SINCLAIR'S BUSINESS ADDRESS SO IS ASKING THAT YOU CALL HIM AND APOLOGIZE FOR THIS ERROR. HIS BUSINESS ADDRESS IS: BRITISH SUGAR CORPORATION, 134 PICADILLY, LONDON W.1.

INTEROFFICE MEMORANDUM

DATE May 17, 1965

SUBJECT

TO Harlan Anderson
Win Hindle
Stan Olsen
Nick Mazzarese

FROM Kenneth H. Olsen

I would like to schedule a trip every month or two by the product line managers to each of our offices in Europe. Will you tell Elsa when you would like to make a trip to Europe and then we will schedule it so that not everyone goes together but that Europe is well covered. It is already a month since I have been in Europe and it is time to start planning for other trips.

Ken

KHO:scc

INTEROFFICE MEMORANDUM

DATE May 14, 1965

SUBJECT Cost of FLIP CHIP Line

TO Dick Mills

FROM Kenneth H. Olsen

At the present time, the cost of operating the FLIP CHIP line is all put into the cost of goods sold for the very small number of FLIP CHIPs which are being made. I would like to have that whole operation written off as an engineering expense and charge them an arbitrary number like 50¢ or 30¢ for each useable CHIP that isn't delivered to the PDP-8.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE May 12, 1965

SUBJECT

TO Jim McKalip

FROM Ken Olsen

For some time I have been suggesting that we carry on the development of two disc systems. One will have a single, movable head that would be indexed with a stepping motor. The other would have a fixed head for each track. The first system would be inexpensive but slow access between tracks and would probably be used more with the small computers. We would hope that the latter disc would replace the drums in the computers.

If we could make the fixed head disc approximately equivalent in price to the movable head disc, we would, of course, have many obvious advantages. There would only be one item to develop, only one item to inventory, and only one item to write programs for.

The fixed head system has high cost because of the high number of heads. They cost about $10.00 each. For 128 heads, this would cost about $1,300. If we can get the same amount of storage with half the number of heads, it probably wouldn't be worth developing the movable head disc at all.

There are several things we could do to increase storage and decrease the number of heads. The obvious ones increase the density, but the most significant one is to only use the outside of the disc.

I think we can get by with 64 heads if we get twice as many bits around the disc as we now have on the inside diameter. We can do this by using only the last two inches of diameter and decreasing the space between tracks or by having 32 heads on each side of the disc. If we increase the density on the inner track, we can use more of the disc; or if we increase the diameter of the disc, we can probably put 64 on one side. The obvious problem arises that any time you can simplify a product by improved techniques, there is always the temptation to increase the capability instead.

We are having more and more pressure on this project, and I think we ought to lay out plans for getting it done immediately and sacrifice on capability and even cost in some areas. It would seem to me that our most important problem is to develop a source of discs.

INTEROFFICE MEMORANDUM

DATE May 7, 1965

SUBJECT

TO Nick Mazzarese
Maynard Sandler
Jack Smith

FROM Kenneth H. Olsen

The new DECtape is apparently done and I have asked to have a batch of ten made. No one has taken this seriously and I would like to see us stop making the old ones. They are a disgrace to have on the market and they really don't work well at all. I would like to see us stop taking the orders for the old ones and take orders for the new ones and maybe we can get them built.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE May 7, 1965

SUBJECT Labeling of New DECtape

TO Dan Wardlman
Nick Mazzarese
Dick Best
Jim Jordan
Dave Nevala

FROM Kenneth H. Olsen

The labeling on the new DECtape has bothered me for some time and it finally dawned on me what is wrong. First of all, there is too much lettering and, secondly, the lights logically go along with the switches but physically they are completely separated. The words right and able are on the left side and on the right side.

I suggest that we change it to the following way: that two outside switches be the reverse and forward switches and that we don't even put the words down but simply arrows, maybe on top or maybe along side of them. Arrows mean much more than reverse or forward because no one knows which direction forward is.

The two inside switches would then be right and able and remote. The indicators could then be directly above the lights and one label would do for both the lights and the switches. If we had switches which would light up, it would be even more straightforward.

The question that is not clear in my mind is whether or not we need to label both the up and the down position of the switches.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE May 4, 1965

SUBJECT

TO Roland Boisvert

FROM Kenneth H. Olsen

I would like to start scheduling the tape transport project and start to show more interest in it. Will you make a list of all the components that go into it and, along side, put a word or two as to where we will get them.

If we have this list to work from, we might put Purchasing to work to get some of them for us and also we may have different groups independently do engineering on the pieces.

Some of the devices we may spell out and have the design done by contract designers on the outside. Items like the photo cell and end of tape censor, we might present the problem to the Epoxy Molding Company of New Hampshire and they will come back with a little unit all packaged for us.

There are a number of the items which I thought about a few years ago which I might be able to whip out very quickly for you. I think I could design the vacuum components for you very easily and the little magnetic right lock-out switch.

I think it would be worth making a completely new cabinet if we can get by with a narrower cabinet. I like the richness of this wide cabinet but if we could make it somewhat smaller it would have some advantages.

Our tape unit has to be very simple, its components and its assembly. I think if we put everything together with tab connectors we can save a lot in assembly time.

I'll wait until you give me a list of these components and then we can have a meeting to go over the items to see what suggestions we can get for a good share of them.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE May 4, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

Amphenol is now advertising a standard socket like the one we buy from Sylvania. Will you get the prices on these and a sample so that we know about them.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE May 4, 1965

SUBJECT Production of PDP-6's

TO Harlan Anderson
Maynard Sandler
Jack Smith

FROM Kenneth H. Olsen

In order to clarify my statement on the resumption of production of PDP-6's, let me put it down on paper. I agree that we can start putting modules into the PDP-6's which we now have on the production floor on the condition that it in no way slow down the items which could possibly be delivered by the end of the fiscal year.

When the emergency production for the end of the year delivery is over, then we will have a promised delivery schedule of one PDP-6 per month. Until then, all promises are in danger of being broken if there is production work available that could be delivered this fiscal year.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE May 4, 1965

SUBJECT Suggestion for New Module Line

TO Stan Olsen

FROM Ken Olsen

Here is an idea for a new module line. The slo-syn stepping motor is quite commonly used now and we are also using it in several products in the Company. If we offered modules that would drive the slo-syn units, I think they might get us new module business.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE May 3, 1965

SUBJECT Magazine Ads

TO Bob O'Hagan
Nick Mazzarese

FROM Kenneth H. Olsen

I have always been fascinated by the idea of having one column ads in magazines on a regular basis. It could be a small picture with a caption at the top and quite a bit of room for text to give the detailed story. I feel that these are often more effective than full page ads because they lend themselves to giving a detailed but short story.

This idea hasn't gone over very well with most of the product managers but maybe we should consider it for some of the specialty fields like oceanography. For not too many dollars you might have an ad in one of the oceanography magazines every month or every other month.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE May 3, 1965

SUBJECT Module Sales

TO Stan Olsen

FROM Kenneth H. Olsen

We've got to do something clever to sell modules. There is no reason why we shouldn't have all the world's module business. One possibility would be to change our advertising approach and hit all the local IRE magazines and most of the key college magazines, like "Technology Review."

If we had a real good ad, we might run the same ad for many months and just distribute that ad to many places, even to some of the student electrical engineering groups.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE April 30, 1965

SUBJECT

TO Alan Ross
Jack Atwood

FROM Kenneth H. Olsen

Here are some ideas on dramatic colored photographs that we could take for our micro logic processing. The important thing we want to accomplish is to demonstrate that we too are doing a lot of dramatic things. This is not very original and many other companies have the same type photographs so I think all we want to accomplish is to show that we too are doing these things,

1. A photograph of mask-aligning device with the light leaking through the cracks.
2. A close-up of the opening in the furnace showing the wafers and a photograph of the boat being taken out of the defusion furnace.
3. A close-up of our dramatic expensive microscope.
4. A close-up of our automatic handling mechanism made by AMI.
5. A very close-up photo of the wafer scribing machine with a diamond needle scratching the wafer.
6. A close-up of the chips coming from one of our furnaces with the orange glow in the furnace. I don't think the heaters really glow orange and so a red colored bulb inside the furnace would probably do this for us.
7. A very close picture of the bonding operation close enough to show the wire.
8. I don't know if our automatic silk screen machine photographs well or not but the pusher arms which put the chips onto the belt might be good for a picture.

Ken Olsen

KHO:ecc

RECEIVED
1965 APR 30 AM 9:44
DIGITAL EQUIPMENT CORP.
SALES DEPARTMENT

WUI NY 11+
DIGITAL MAYN

DIGITAL MAYN
85184327"
DIGITAL READING
DIGITAL MAYN
MSG NO 345 4-30-65

TO JOHN LENG
FROM KEN OLSEN

DO GIVE LETTER OF INTENT FOR NEW BUILDING. HAVE YOUR LAWYER REVIEW AND SEND A COPY TO ME FOR OUR LAWYER TO REVIEW. DO SIGN FOR LEASE WHICH ALLOWS WITHDRAWAL IN SEVEN YEARS AND CONSIDER OPTION ON LAND NEXT DOOR.

PLEASE DO SEND LAYOUT DRAWINGS OF BUILDING. ALSO SEND ME A PROPOSAL AS TO SCHEDULE AND COST OF IMPROVEMENTS YOU PLAN TO PUT INTO THE BUILDING. WE DO NOT PLAN TO SPEND MONEY IN THE NEXT TWO OR THREE MONTHS UNLESS ABSOLUTELY NECESSARY.

I DO THINK WE CAN FILL THE REQUIREMENTS OF ICT. I BELIEVE THAT FOR THE VERY LARGE QUANTITIES WE WILL BE ABLE TO SELL SINGLED UNITS FOR UNDER 2,000 DOLLARS WHICH IS ALMOST ONE FOURTH THE PRESENT DUAL UNIT PRICE. THE STOP TIME ON THE PRESENT UNITS IS 20 MILLISEC. WE WILL GIVE YOU A FORMAL QUOTATION NEXT WEEK. YOU MIGHT CALL ICT TO LET THEM KNOW WE ARE ACTIVELY CONSIDERING THIS AND WE ARE OPTIMISTIC AS TO THE PRICE. BE SURE YOUR OFFICE IS READY TO TAKE THE QUOTE NEXT WEEK AND GIVE IT TO ICT.

I LOOK FORWARD TO SEEING THE PROPOSAL ON OPENING AN OFFICE IN SOUTH AFRICA.

HERE ARE THE ESTIMATES OF POWER:

10 SCOPES - 5,000 WATTS
50 LUMENS PER SQ FT. - 1,125 WATTS
4 PDP-8'S - 5,200 WATTS
4 P
4 PDP-7'S - 6,000 WATTS

TOTAL - 17,325 WATTS

SHOULD HAVE A MINIMUM OF 18 KW
WOULD BE BETTER TO HAVE 20 KW

END OR GA PLS

END

RECEIVED
1965 APR 30 AM 11:40
DIGITAL EQUIPMENT CORP.
SALES DEPARTMENT

WUI NY 11+
DIGITAL MAYN

DIGITAL MAYN
84226697"
CLEARGO PARIS
120 1632 +
DIGITAL MAYN

DIGITAL MAYN

MSG NO 347 4-30-65

TO JON FADIMAN
FROM KEN OLSEN

I AM SORRY THAT I MISSED THE CHANCE TO VISIT WITH YOU IN PARIS LAST WEEK. I HAD AN EXHAUSTING BUT VERY WORTHWHILE TRIP. HERE IS A PROPOSAL I MADE TO ANDY THAT I WOULD LIKE TO HEAR YOUR REACTION TO.

I SUGGEST THAT WE GIVE A TWO-YEAR CONTRACT TO TELARE TO SELL IN SWEDEN AND INCREASE HIS FEE TO 5 PERCENT. IN ADDITION, WE')) WE'LL GIVE HIM 6 PERCENTAGE FOR TAKING CARE OF MAINTENANCE BUT THIS WILL NOT BE PART OF THE TWO-YEAR CONTRACT AND CAN BE CANCELLED ANYTIME WE FEEL THEY ARE NOT DOING GOOD MAINTENANCE. WE WILL ALSO GIVE THEM NORWAY, DENMARK, AND FINLAND BUT WITHOUT A CONTRACT SO THAT WE CAN TAKE OVER IF WE FEEL THEY ARE NOT DOING A GOOD JOB.

JOHN LENG WOULD LIKE TO DO THE SERVICE IN SCANDINAVIA SO THAT WE WOULD BE READY TO OPEN AN OFFICE THERE WHEN IT IS WORTH-WHILE. I FEEL THAT WE HAVE TO SHOW CONFIDENCE AND BE GENEROUS TO TELARE IF THEY ARE GOING TO DO A GOOD JOB AND I HAVE SUGGESTED TO JOHN LENG THAT HE USE THAT TIME AND ENERGY IN STARTING AN OFFICE FOR SWITZERLAND AND NORTHERN ITALY. I AM SUGGESTING THAT READING BE THE COMMUNICATION CENTER FOR EUROPE AND, THEREFORE, EFFECTIVELY THE SUPERVISING POINT. WE ONCE BEFORE SAID THAT JOHN WAS THE SUPERVISOR OF EUROPE BUT NONE OF THE COMMUNICATIONS WENT THROUGH HIM AND HE WAS THEREFORE IN NO WAY A SUPERVISOR. I THINK WE SHOULD CONSIDER THE FRENCH OFFICE BEING RUN BY BERNARD AUS AND THE EUROPE POSITION AS JUST AN OBSERVER AND HELPER SO THAT IMMEDIATELY HE WOULD REALIZE HE IS WORKING FOR JOHN LENG. PUTTING ALL COMMUNICATIONS THROUGH READING WILL BE LIMITING IN SOME WAYS BUT I THINK ADVANTAGES WOULD OVERWHELM THE LIMITATIONS. I FURTHER SUGGEST THAT THE FRENCH OFFICE PAY FRANCE AND BELGIUM AND PROBABLY SPAIN AND THAT READING IMMEDIATELY TAKE OVER ITALY AND SWITZERLAND AS THE FIRST STEP IN THE PLAN TO SET UP AN OFFICE THERE. I WOULD SUGGEST THAT OUR OFFICE BE LOCATED NEAR CERN BECAUSE I AM VERY DISAPPOINTED WE HAVENT MADE SALES THERE. I WOULD ALSO SUGGEST THAT THE DUTCH BUSINESS BE TAKEN CARE OF FROM READING BECAUSE I THINK THE DUTCH ARE CLOSER TO THE ENGLISH THAN THEY ARE TO THE GERMANS AND I THINK THE READING OFFICE WILL BE MORE COMPETENT THAN A GERMAN OFFICE FOR SOMETIME.

AS YOU CAN SEE, I AM PROPOSING THAT WE CUT DOWN IN SOME OF THE RESPONSIBILITIES OF GUENTER BECAUSE, ALTHOUGH NO ONE WILL SAY HE IS DOING A POOR JOB, NO ONE WILL SAY THEY HAVE CONFIDENCE IN HIM.

WE ARE SENDING APPROVAL TO JOHN LENG TO SIGN A LEASE FOR A NEW 15,000 FOOT BUILDING.

LET ME KNOW WHAT YOUR REACTIONS ARE TO THIS PROPOSAL.

END OR GA PLS

WAS MSG RECEIVED PLS

YES
THANK YOU
END

DIGITAL MAYN
+
CLEARGO PARIS

T
WUI NY 13+
DIGITAL MAYN
10"+
DIGITAL MAYN

WUCNY TLX K

COULD U PLS GIVE ME PARIS AREA CODE?"
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TKS VERY MUCH
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DIGITAL MAYN
84226697"55
WUI NY 12+
DIGITAL MAYN
84226697"
CLEARGO PARIS
118 2213 +
DIGITAL MAYN

MSG NO 338
TO: JON FADIMAN
FROM: KEN OLSEN

GO AHEAD WITH FRENCH COMPANY BUT BE SURE THAT IT WILL EVENTUALLY BE 100 PER CENT DEC OWNED.

GO AHEAD WITH BEST OFFICE SPACE. YOU DECIDE WHETHER 11 OR 22 MONTH LEASE. IF THERE IS NO ADVANTAGE IN 22 MONTH LEASE YOU MIGHT AS WELL TAKE AN 11 MONTH LEASE.

SHOULD WE MAKE A TWO YEAR COMMITMENT TO TELARE OR SHOULD WE TAKE TIME TO CONSIDER THE OTHER SWEDISH FIRM WHICH ARNAUD DE VITRY HAS SUGGESTED?

END OR GA SVP

+
CLEARGO PARIS
DIGITAL MAYN

PLEASE GIVE THE ABOVE MSG TO MR FADIMAN O F DIGITAL EQUIPMENT CORP

END TU V

RECEIVED
1965 APR 28 PM 5:15
DIGITAL EQUIPMENT CORP.
SALES DEPARTMENT

dec INTEROFFICE MEMORANDUM

DATE April 28, 1965

SUBJECT

TO Harlan Anderson
Stan Olsen
Nick Mazzarese
Gerry Moore

FROM Kenneth H. Olsen

There is a control show in Dusseldorf, Germany (INTERKAMA), October 13-19, in which our agents in Sweden are going to demonstrate their new control modules. This show happens only once every four years and if we want to demonstrate our modules for control or PDP-8, or cooperate with our agents, we should consider it very soon.

Ken

KHO:ecc

COMPANY CONFIDENTIAL

INTEROFFICE MEMORANDUM

DATE April 27, 1965

SUBJECT Report on Trip to Europe - April 16 - 26

TO Harlan Anderson

FROM Kenneth H. Olsen

I spent a very worthwhile but busy 2½ days each in Sweden, England, and Germany. I landed in Paris on April 16th but everyone was away for their very long Easter holiday so I just stayed over night and went on to Stockholm the next day. Monday, the 19th, was a holiday in Sweden also but Sven Janssen and Tore Arbeus of Telare spent the whole day with me and, because of the informality of the day, it was probably the most worthwhile part of the trip. In the morning we saw the town and visited the zoo and then had lunch with two of our customers at AGA and later had coffee with their families. The next morning I visited the head of Arenco Electronics, Mr. Åke Svantesson.

We then flew to London where we were met by John Leng and after dinner I went to Reading with him to visit with the fellas in the office. I didn't get back to the hotel until 2:00 a.m. On Wednesday we visited the Show and had lunch with a job candidate and in the evening had dinner with someone who wants to go into business using the PDP-8 as a business machine. The job candidate was good -- the man who wanted to go into business was a nut.

Thursday I visited the London office again and spent time with Hugh Osborne of ICT who wants to buy 1,000 DECtapes. Friday I flew to Hanover and spent Saturday and Sunday visiting the DEC booth at the Fair and studying the competition, which is partly because I couldn't spend the evening with Guenter as he had a bad cold and could hardly talk. Our agents in Sweden and our man in England seemed to very much appreciate the interest I showed by visiting them but Guenter didn't seem to see any need for someone from the States to check up on his work.

Observations and Suggestions -

These suggestions should be taken with a grain of salt because I visited the offices only for a very short period of time and I haven't been close to the background.

1. I was able to see no significant competition for our modules except American integrated circuits. We've got to set about to answer the doubts of our own people in Europe and also the potential customers on monolithic integrated circuits.

2. I can see no competition for PDP-7 and PDP-8 except the IBM 1130 and 1800. In talking with our people, there seems to be no limit to PDP-8 sales.

3. I got the feeling that our people in Europe are a little afraid of the PDP-6 -- especially the Swedes.

4. Telare is very pleased with the support they receive but John Leng feels he deserves part of the credit for this. Our English fellas don't complain to me about others but after being with them for three days I am sure they feel the Teletype wires are often broken at the Maynard end. We have to have all inquiries come through one man in Maynard and all have to be logged to be sure they are answered. We should also be sure to send them literature which we think they need and not wait for them to ask for it.

5. I would like to suggest that we give Telare Sweden, Norway, Finland, and Denmark; Jon Fadiman France and Belgium, and let the Reading office sell to Holland and look over the operation of Telare.

6. John Leng would like to do the service in Scandinavia so that we can put our own office there some day but I feel that we have to show a lot of confidence in Telare if we want them to do a good job. If John has time and energy to hire people and start new offices, let him open one to take care of Italy and Switzerland or South Africa, which are the two offices he feels we need. I have no idea who should take care of Spain and Portugal.

7. I would like to see Digital Equipment Corporation (UK) Limited changed to simply Digital Equipment Limited. We use DEC only in lab modules so I can see no reason for making a very complicated American sounding name just to keep DEC, although another possibility is Digital Equipment Company.

8. The State Department is loosening up on its restrictions for selling to Europe and we should consider what our policy is going to be on this. We should perhaps bring this up at the next Board meeting if we give the Directors time to think about it before.

9. I think our Swedish agents are good people. I think we should either show we have confidence in them or drop them. I suggest we go ahead and sign a two year contract with them and raise their fee to 5% of the PDP-7 and 8 and say nothing about PDP-6. We might consider raising the percentage on modules. With a high percentage on modules they may really get out and try to sell hard. They would like to do the servicing and I think we should allow them a certain percentage to take the responsibility for servicing. They would also like to be able to give a discount to their customers. I think we could allow this by marking up the prices in Sweden by 2% and they could give a 2% discount but they should have the choice.

10. John Leng would like to rent larger quarters. We looked over the new buildings which are available. They don't instill enthusiasm. They are somewhat bare and the workmanship is poor. There are several available but in my mind the choice is between staying where we are now and

being crowded for awhile or going to the larger of the buildings, which is 15,000 sq. ft. and costs about $1.40 a foot per year without heat and would need a certain number of leasehold improvements. They now only sign a 21 year lease but one can get an option to get out of the lease in 7 years but a new price is then negotiated. My one concern about the English office is who is going to take over when John leaves. If he were there permanently I would be happy to expand the office now because I feel it would probably be one of our most significant offices in the whole world.

11. We have to realize that with our liberality in accepting letters of intent the letters are showing less and less intent and maybe we have to put some percentage factor on the letters of intent. Some things which we see as letters of intent are really just hot inquiries when they get to our foreign offices.

12. AGA (pronounced and not just initials) is the most promising customer in Sweden. They had been in the gas business for many, many years and from that got into the medical business and now have a blood testing machine which uses LGB-15. They need the speed of a PDP-8, however, and they are getting a PDP-5 for a June 15th medical show in Stockholm. They now have four letters of intent for PDP-8's and feel they will sell two a month. Some, though, will be sold outside the country and we have to decide how the commissions will be distributed because some hospitals will use the computers for other processing. They may buy the computer without going through AGA. I suggest that we give this regular percentage to Telare if the machine is sold to AGA but if it is sold to AGA's customer then the agency in that country should get the commission.

13. Mr. Hugh Osborne of ICT visited us in Maynard a few weeks ago to talk about microtapes for a new small computer they are making. They are also considering a multiple disc unit, probably CDC, and another tape unit. They were disappointed to find out the poor stop time and would like to know if they could get more on a tape by avoiding redundancy. I promised to send photos of the new microtape and quantity prices to them within two weeks. I also will tell them the new stop time and give them our thoughts on increased density or using less redundancy. His address is ICT House, Putney, SW 15.

14. I think we should consider having a written proposal or a short questionnaire made out and presented to the Works Committee before every trade show. As certain trade shows seem less and less important, they get less interest in their very important part of the image we present to the world. We ought to decide who we're going to sell to and what we're going to sell and what equipment we're going to present. John Leng is not very interested in trade shows and his booth was not very inspired. Guenter made a booth which was very well done and he was rightfully very proud of it. However, it was all black and white and needed a splash of color. The PDP-8 and the modules did not show off very well.

KHO:ecc

Ken Olsen

digital EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

SALES CALL REPORT NO. 9101

DATE April 27, 1965

FIRM Lear Siegler, Inc.

STREET 714 North Brookhurst Street

CITY Anaheim, California

SALESMAN Kenneth H. Olsen

OFFICE AREA Maynard

AREA CODE PHONE NO.

PHONE (OURS THEIRS) ☐ LETTER ☐ VISIT ☐

PERSONS CONTACTED | EXTENSION

EST. ANNUAL POT.	CK.		CK.	PRODUCT	CK.	TYPE
		NEW		MODULES		
UNDER $20K		OLD		A/D		
$20 - 50K		HIGH		COMPUTORS		
$50 - 150K		MED.		SPECIAL SYSTEMS		
$150K UP		LOW		OTHER		

REMARKS

On Tuesday, April 27th, Mr. R. C. Koperek and Mr. C. L. Ambler visited to talk about using a DEC computer in their systems work. They would like a special distributor arrangement in order to give them a discount price so they can compete with CDC and SDS, who have captured computer manufacturing in-house. I will write a letter to them saying that we cannot afford a special arrangement because we are dependent on selling to all systems houses and we must treat them all equally.

They left me a proposal from White Sands for a system which needs a very large computer or several small computers. They called back on Thursday, May 6th, to find out what our suggestions were to fill this need. I told them we would call them back by Friday May 7th to let them know.

We should call the Product Engineer who is Les Thompson or Mr. Charles L. Ambler. The telephone number is: Area Code 714 PR 4-1010.

ACTION TO BE TAKEN

FOLLOW-UP DATE BY

SPECIAL COPIES TO
Norm Cannina

SALESMAN'S COPY

INTEROFFICE MEMORANDUM

DATE April 27, 1965

SUBJECT

TO Stan Olsen
Al Ross

FROM Kenneth H. Olsen

I saw some miniature banana plug patch cords at the Hanover Fair which look a lot less expensive than the ones we're using now. These are the same ones which we saw at the IRE Show about seven years ago but at that time they weren't available in stacking form and so we never used them. Now, with the new educational line, we don't need stacking pins and we should look into these again.

The plug is made from bunched wire and formed into shape. This type is quite commonly used in Europe. The units were made by a company called Beyer, Bunann & Schultz. We didn't know how to spell Beyer, but it is either Beyer, Beier, Baier, or Bayer. The trade name for the company is BEBUSCH.

We should look through our catalog file and see if we have information on this company; otherwise, find out who sells for them in this country.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE April 27, 1965

SUBJECT

TO Loren Prentice

FROM Kenneth H. Olsen

Enclosed is a brochure on name plates which I picked up at the Hanover Fair. These are rather interesting name plates because they are formed out of metal and then filled with plastic to give a solid three dimensional effect. I don't know how we might use this but I'm enclosing it in case you have some ideas.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE April 27, 1965

SUBJECT

TO Jack Atwood
cc: Harlan Anderson
Gerry Moore

FROM ~~Kenneth~~ H. Olsen

The German price list just sent to the Hanover Fair was wrong. It was simply the American dollars multiplied by 4 which is the conversion to DM, but we multiply by a factor of 4.3 or 4.8 or 4.95 to take care of shipping and tariff. It gets more complicated because certain organizations are free from certain tariffs.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE April 27, 1965

SUBJECT

TO Mike Ford
Nick Mazzarese

FROM Kenneth H. Olsen

John Leng would like to see our new re-do of the display scope done in the modular form so that people can expand it in the field.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE April 27, 1965

SUBJECT

TO Dick Best
Nick Mazzarese
Jim McKallp

FROM Kenneth H. Olsen

We should plan our drum program with Vermont Research. They now feel they can get four times the density on our drum. They do this by twice the bits per inch and twice the density of tracks. We had to figure out a better way of mounting circuits on the drum. The ones we now have don't look very business-like. Maybe monolithic integrated circuits would fit in a location like this or when there is a place where you need large numbers of the same circuit.

VR is now installing $100,000 worth of plating equipment and we should go visit them to see their latest developments.

I told them about our Data Disc and offered to let them know any information about it.

Ken

KHO:ecc

Copy to Ken Olsen.

NC
O
NC

DIGITAL MAYN

DIGITAL READING

22.4.65

TO H ANDERSON
FROM K OLSEN

I SUGGEST THAT WE PROPOSE THE FOLLOWING ARRANGEMENT WITH TELARE

1. 2 YEAR CONTRACT FOR SELLING

2. 5 PERCENT COMMISSION ON PFP-7 AND PDP-8

3. NO COMMISSION ON PDP-6

4. 1, 2 OR 3 PERCENT FEE FOR MAINTENANCE OF 8 OR 7.

5. MAINTENANCE WILL BE TAKEN UP BY DEC WITHOUT NOTICE IF DEC FEELS THAT TELARE MAINTENANCE IS NOT SATISFACTORY.

JOHN WOULD LIKE TO HAVE DEC DO MAINTENANCE IN SWEDEN SO WE CAN GET A FOOT IN THE DOOR. I WOULD LIKE TO SHOW COMPLETE CONFIDENCE IN TELARE OR NONE AT ALL. DE C CAN USE THE ENERGY AND TIME IN DEVELOPING OTHER OFFICES.

PLEASE READ ANY LETTER THAT COMES TO ME FROM TELARE. LET US DECIDE ON POLICY EARLY NEXT WEEK.

PATENT SOLID STATE DECTAPE IMMEDIATELY.

END OR GA PLS

END
OK

DIGITAL MAYN

DIGITAL READING

MSG NO 136

TO K. FITZGERALD
FROM K. OLSEN

PLEAS CONSIDER USING A MAGNET TO HOLD RAM IN V BLOCK.
BLOCK WOULD BE MADE IN TWO PIECES EACH BEING A POLE.

RECEIVED
1965 APR 21 PM 2:54
DIGITAL EQUIPMENT CORP.
SALES DEPARTMENT

DIGITAL EQLA

DIGITAL MAYN

MSG NO 1750
TO; DICK MUSSON
FROM; ELSA CARLSON

KEN OLSEN WILL BE BACK AT THE OFFICE ON TUESDAY APRIL 27TH.

ALSO

;&-27

DI001 PD MAYNARD, MASS. APRIL 20

HOTEL GILLET
STOCKHOLM, SWEDEN

MR. KENNETH OLSEN

INFORMATION FROM DAVE PACKER AS FOLLOWS:
DETAIL OF DELIVERY SCHEDULE IS PREPARED.
ARE IN PROCESS OF CHECKING FOR CASH FLOW IMPLICATIONS.

ELSA CARLSON
DIGITAL EQUIPMENT CORP.

END

RDI001WU TXS

INTEROFFICE MEMORANDUM

DATE April 14, 1965

SUBJECT

TO Engineering Newsletter

FROM Kenneth H. Olsen

On Monday, April 26th, the Merrimac Valley Subsection of the IEEE is having a lecture entitled, "Hybrid Film Circuits Come of Age" by J. C. King of Bell Labs.

I think it would be a good idea for all interested engineers to attend.

Merrimac Valley Motor Inn in North Andover
Dinner at 6:30 - reservations necessary
Lecture at 7:30 - free

George Wood
Phil Backholm
Georg Geruldo
Ulrich Skowronek

RECEIVED
1965 APR 14 AM 9:57
DIGITAL EQUIPMENT CORP.
SALES DEPARTMENT

WUI NY 14+
DIGITAL MAYN

DIGITAL MAYN
841524226"
DIGITAL MCHN
DIGITAL MAYN
MSG NO 300 4-14-65

TO GUENTER HUEWE
FROM KEN OLSEN

PLEASE ADVISE HOTEL WHERE YOU WILL BE STAYING DURING THE ANNOVER FAIR.

INTEROFFICE MEMORANDUM

DATE April 14, 1965

SUBJECT IEEE Lecture

TO Tom Stockebrand

FROM Kenneth H. Olsen

Tom:

On Monday, April 26th, the Merrimac Valley Subsection of the IEEE is having a paper entitled "Hybrid Film Circuits Come of Age" by J. C. King of Bell Labs. I think it would be a good idea if you could make that one and it would also be good to encourage the Engineering Department to attend.

Ken

dec INTEROFFICE MEMORANDUM

DATE April 9, 1965

SUBJECT Consultant

TO Tom Stockebrand

FROM Kenneth H. Olsen

A consultant called me this week to offer to solve our several migration problems. I told him to get in touch with you when you get back from California. I am writing this note to you to mention that even though at the time I wasn't impressed enough to remember his name, after thinking about it I concluded that we might very well want to get to know this man because he was a senior or the senior engineer at Cornell-Dubilier Electronics Research Group.

Ken

KHO:ncs

dec INTEROFFICE MEMORANDUM

DATE April 9, 1965

SUBJECT Eyebolts for PDP-5

TO Loren Prentice
cc: Nick Mazzarese

FROM Kenneth H. Olsen

When I saw the picture of the PDP-5 being hoisted with a crane onto the Coast Guard Ship, I started to wish that we had eyebolts in the top. Should we now consider drilling holes through the top part of the frame so that eyebolts could be screwed into place when the machines are going to be lifted by crane. We do not have captive nuts, but we could have to have eyebolts and separate nuts when we need to use them.

Ken

TBRD EL SEG
DIGITAL EQUIPMENT CORPOATION
146 MAIN STREET
MAYNAD, MASS

PLS CANCEL RESERVATIONS MADE FOR MR. KENNETH OLSEN FOR NIGHTS APRIL 5, ,6 AND 7, L965.

PLS ACKNOWLEDGE

GA P,S

MRES CAN TKS END C

END JS

RECEIVED
1965 APR -5 PM 1:32
DIGITAL EQUIPMENT CORP.
SALES DEPARTMENT

dec INTEROFFICE MEMORANDUM

DATE April 2, 1965

SUBJECT New Rack Mounted Cabinet for PDP-8

TO Ken Fitzgerald
Nick Mazzarese
Ed de Castro
Jim Burley
Stan Olsen

FROM Kenneth H. Olsen

The rack mounted PDP-8 which we offered at the IEEE Show is very attractive and did show the cleverness of our mounting and also showed off our modules very well. However, I am not a bit happy with this arrangement because it uses up so much space and one gains very little by putting the PDP-8 into the rack. In order to add a scope, Microtape, or high speed paper tape reader and punch, one needs another cabinet. I would like to see us change the arrangement in the following way to give us room to put in/out equipment above the control panel.

Let's mount the computer itself on the very bottom of the cabinet on slides that pull out from the rear. There would be no plenum door. The fans in the bottom would take air up through holes in the bottom which have a large filter over them.

The power supply would be mounted behind the control panel like it is in the table mounted version and would pull out on slides to the front. We'd then have all the room above the control panel for in/out equipment and a lot of room in the back for logic.

There are spaces for 12 5 1/4" panels in a cabinet. The bottom 4 would be taken up by the computer. There will be 3 or 4 inches behind the blank panel covering the front which might be used for something. The table takes up about the next 2 inches. Then the control panel takes up $10\frac{1}{2}$" and the scope will take up 7". This then allows us a $10\frac{1}{2}$" panel which I believe could hold our new low speed reader and low speed punch. The top $10\frac{1}{2}$" then could be a single DECtape unit.

We could also mount a Data Disc in the area above the control panel.

We may want to mount the Data Disc on the side of the cabinet and assume that all expansion would take place on the left of this main frame.

The 2" behind the table top is wasted and we might do well in raising the computer up into that area which would allow us more room in the bottom for a small plenum chamber and filter.

On the back we would have room for 7 or 8 mounting panels which might take care of all of our in/out controls. It might eventually wire them all as one panel and just put modules in as the options are used. This whole arrangement could be pulled out on slides to change modules.

IBM will not deliver their new small computers for sometime and they're starting to hurt us because they have taken an integrated view of their computers and in/out equipment. We have to do the same and do just as well on the over-all system as we have been doing on the computer itself.

Another approach of this would be to make a king size PDP-8 rack which has gates that hold 5 mounting panels each. This would then allow an extended memory on one gate to be free wired with the original computer and on the other gate there would be room for the standard in/out logic. This would then fill the space behind the Microtape and paper tape reader and punch. Otherwise, it could be in front of the computer in that blank area underneath the table. There are 4 mounting panels for the space there and the very shallow power supply could be built for this. This might be a very nice way of spreading out the power supply. It could extend slightly out from the front of the computer.

Ken Olsen

KHO:ecc

RECEIVED
1965 APR -2 PM 5:20
DIGITAL EQUIPMENT CORP.
SALES DEPARTMENT

WUI NY 11+
DIGITAL MAYN
841524226"
DIGITAL MCHN
DIGITAL MAYN
MSG NO 263
TO: GUENTER HUEWE

FROM: ELSA CARLSON

PLEASE MAKE RESERVATIONS FOR KEN OLSEN ON APRIL 23 AND 24. HIS WIFE AND DAUGHTER WILL BE WITH HIM SO PERHAPS WE CAN HAVE A DOUBLE ROOM WITH ADJOINING SINGLE ROOM. THANKS VERY MUCH.

END OF MSG

+
DIGITAL MCHN
DIGITAL MAYN
V

DIOO3 PD MAYNARD, MASS APR 1

GENERAL GEORGES F. DORIOT
EUROPEAN ENTERPRISES DEVELOPMENT CORP.
8 RUE GALILEE
PARIS 16, FRANCE

CONSIDERING HIRING GORDON WILLARD AND JAMES NEWTON HBS 1965
FOR PLANNING AND PRODUCTION POSITIONS RESPECTIVELY.
WOULD APPRECIATE YOUR EVALUATION.

KENNETH S. OLSEN
DIGITAL EQUIPMENT CORP

END

RDI3WUTKU

Apr. 2.

Agree Willard & Newton

Doriot

RECEIVED
1965 APR -1 AM 4:50
DIGITAL EQUIPMENT CORP.
SALES DEPARTMENT

DIGITAL EQPA

DIGITAL MAYN

MSG NO 1449
TO; KEN LARSEN
FROM; KEN OLSEN

I AM MAILING AIR MAIL, TODAY, BROCHURES AND PRICE LISTS ON THE PDP-6, 7, 8 AND TYPE 30, 31, AND 340 DISPLAYS TO DR. DAVID CALDWELL DEPT OF PHYSICS, UNIV. OF CALIF AT BERKELEY. DR. CALDWELL IS PREPARING A PROPOSAL ON OUR EQUIPMENT AND DISPLAYS IN THE NEXT 2 WEEKS. PLEASE CALL HIM AND SEE IF YOU CAN BE OF FURTHER ASSISTANCE.

INTEROFFICE MEMORANDUM

DATE April 1, 1965

SUBJECT Mounting of Royal McBee Punch

TO Ken Fitzgerald

FROM Kenneth H. Olsen

There are two ways of mounting a Royal McBee punch. One way would be to mount it outside the surface of the panel like Royal McBee did on the tape varifier. This seems the most straightforward in some ways but would mean making a decorative cover for the whole mechanism and a chad receiver for the front. This would be time consuming and expensive and it sticks out quite a bit more from the front panel than anything else we would have.

It was my suggestion that we mount it behind the panel very much like we did the brpe punch on the PDP-1. We then won't have to cover the punch at all. It still would need a somewhat strange looking bracket because of the odd places in which they put the feet on this machine.

I am only interested in fanfold tape which means that we have to hold a box of fanfold tape behind the panel. It may not be possible but it would be nice if we could have a single panel that would hold both the punch and the new paper tape reader. This would be easy on the PDP-7A where the panel would be about 26" wide but may not be possible on the PDP-8. Because of the size box that holds the fanfold tape, the panel would probably have to be $10\frac{1}{2}$" high.

We are now making a little panel which will have all the control for a display, paper tape reader, paper tape punch, and card reader. This will only take two mounting panels and will fit nicely into a single PDP-8 rack. However, we don't have the panel space to mount this equipment. This may encourage us to design a new single cabinet for the PDP-8 model. I don't know if we can get all of this on but it might be worth looking into.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE April 1, 1965

SUBJECT

TO John Culkins

FROM Kenneth H. Olsen

The new men's room, and probably the ladies room, in Building 3 looks good. I do have a few suggestions, however, as to how we can make it operate a little better. I would like to see signs at a high level along side the doorways so that people won't make mistakes and, even more important, so people will realize what the doors are.

There should be a mirror over the lavatories. This is not the most practical use of space but it makes the place look much more attractive. Sears Roebuck, in one of their lightweight sales brochures, has mirrors on sale. We should, perhaps, keep several good sized mirrors on hand so that you can put them up wherever it seems worthwhile. I think we should use sheet glass mirrors and then we can use larger ones than if we get plate glass. Sheet glass is quite good enough nowadays. The prices on mirrors in the big catalog, but not on sale, on page 1347 are $9.37 for a 30" x 40" mirror, $5.89 for a 16" x 60" mirror, or $11.89 for a 22" x 68" mirror.

Sears also has a good selection of shutter doors which might make our rest rooms more attractive. On page 1528 they have some rather attractive looking ones which they call their economy models which come 41" high and either 30, 32, or 36" wide. The price varies between $10.47 and $11.97. I think that when we order them in quantity we get a discount from Sears.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE April 1, 1965

SUBJECT

TO Gordon Bell
Joe Nangle
cc: Chuck Stein
Mike Ford

FROM Kenneth H. Olsen

I got a call on Wednesday afternoon, March 31st, from Mr. Jonathan Barnett of "Architectural Record" magazine. He is making a study of equipment which will be available to make computing services available to architects. I pointed out to him that the big problem is in the software and deciding what one wants to do and not in the hardware. I told him that Gordon Bell would call him back to give the over-all picture because Gordon has thought about this more than most people.

I also offered that he could talk with Chuck Stein if he was interested in other input.

It was also obvious that the price of the large computer, which is necessary, is a serious problem and told him about the system which Adams is installing with the PDP-6. I suggested that he contact Jack Gilmore to get a picture of how commercial time-sharing might influence this and also to get Jack's picture of the future of display as it might influence architecture.

I told him that we had the computer's light pens and display equipment which is necessary and told him that we are now developing a display with a small computer built in so that it can run in the end of a phone line and need very low performance telephone lines and a small part of computer time so that it would lend itself to time-sharing. He is interested in this product.

He is collecting this information to prepare an article which will describe the equipment which is available. I would like to have Joe Nangle contact him and offer to give photographs and specifications on all our equipment which would lend itself to this and, particularly, the new display with a built-in computer.

He was pleased to hear that I subscribe to his magazine and was able to get on their subscription list because several years ago I claimed I was interested in the influence of computers on architecture. It is normally impossible to get on the subscription list of these magazines unless one is an architect.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 31, 1965

SUBJECT

TO Henry Crouse
Bob Hughes
cc: Maynard Sandler
Jack Smith

FROM Kenneth H. Olsen

We are considering the possibility of assembling PDP-8s in England to eliminate the extra tariff restrictions. I would like to have you consider the possibilities of using English components as much as possible. The two things I have in mind are the Fairchild transistors assembled in Hong Kong and Ampex memories which are wired in Hong Kong. Ampex says that these are counted as items manufactured in England.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 31, 1965

SUBJECT Mechanical Parts for New Paper Tape Reader

TO Ken Fitzgerald
Jim McKalip
Joe Godbout

FROM Kenneth H. Olsen

Our new paper tape reader seems to be working out very well and I believe that, if we can just get the mechanical parts designed, we can go into production of the item. Most of the design is very straightforward except for two tape hold-downs.

The first tape hold-down is the one which keeps the tape in contact with the read head assembly and guides. I think this should be spring loaded in such a way that the operator can simply slip the tape underneath the springs from the side without moving any levers. This could be two wire springs which come out from the panel and hold the paper down on each side of the photoelectric tape head.

The more difficult mechanical hold-down is the one which holds the tape in contact with the sprocket wheel. This is designed so that we can have full 90° contact with the sprocket and we should take full advantage of this. Because there are 50 teeth in the sprocket, this will give us about 12 teeth in contact with the tape, which will eliminate any ripping of the feed holes.

I think that we will probably have the paper fed from one of our vertical fanfold holders. It would then go through the reader in a 90° turn and then be caught in a horizontal catcher somewhat like the one on the BRPE punch.

I think that this hold-down is going to have to have a lever on it to pull it away from the sprocket so that the tape can be inserted into place and then the units sprung back into place. Because the operator will have two hands, this could be simply spring loaded and the operator would use the one hand to press the lever to keep it open when the tape is in place and just lower it back.

The sprocket is screwed to the shaft of the motor with the correct distance from the surface of the motor to the tape. There is a 1 1/2" hole in the panel and two mounting screw holes for the motor which are rather sloppy so that the motor can be rotated to give the adjustment necessary to line the holes up with the photo cells.

When there is no power on the motor, there are magnetic detents which I believe happen to be the same positions which the motor will stop after each group of four pulses which is when the holes should line up with the photo cells.

Superior Electric has the new precision stepping motor which is the next size larger and somewhat deeper than the usual ones. This has much more power and will operate at much faster speeds. This is not in production yet, however, and will not be available until June. I think that, at that time, we should change over to this motor which will not only allow faster speeds but I believe will allow a full 1" thick sprocket. With this sprocket, the whole unit will be much more rugged and will allow us more freedom in our hold-down bar. We might even consider going to the motor of that size which is presently available so that we could use the big sprocket and, for now, run it at slower speeds. The sprocket we now have on the experimental unit has been cut down on a lathe to lower its inertia. This next larger size motor would take a larger hole punch in the panel which will allow fastening of the sprocket to the motor before assembly and would also allow putting some adhesive between the sprocket and the shafts besides the set screw to make it a more permanent installation.

The photo cells are made up by laminating sheets of glass and plastic. The first layer is the 1/16" piece of glass based epoxy. Next, the cell is cemented on top of the first piece as a spacer and then on top of that a black opaque thin piece of phenolic is cemented over both the spacer and the photo cells. In this piece, there are drilled eight holes which allow the light to come through the paper tape. On top of this is glued a microscope slide glass or microscope slide cover glass.

A variation of this would be to skip the glass phenolic and silk screen with ceramic paint onto the microscope slide with black ink except those areas where we want light to come through. An opaque resin should cover up the end of the assembly so that light will not come in through the edge.

This whole thing could then be cemented onto a block of aluminum exactly 1" wide to which side plates could be screwed for guides. The same screws which mounted in the panels could hold the guides in place. We should check with Bob Savell to find out exactly what the space should be between the guides. We could add another layer of 1/16" glass and hide two small nuts between the spacer in this new piece so that the assembly could be screwed into the block. Which approach we take will depend on the reliability of the photo cells.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 26, 1965

SUBJECT Tape Controlled Milling Machine

TO Loren Prentice

FROM Kenneth H. Olsen

Superior Electric Company who makes a slow-syn motor is now offering tape controlled milling machines. This looks a lot simpler and a lot more straightforward than the machine we now have. It will go 60 inches per minute.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 26, 1965

SUBJECT Foxboro Delivery

TO Nick Mazzarese

FROM Kenneth H. Olsen

If we're going to be delayed in the Foxboro delivery, we should find out very soon and let them know. Because of the importance of this one, either you or I should make the contact with them and let them know the delivery status.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 26, 1965

SUBJECT

TO Tom Stockebrand
Dick Best

FROM Kenneth H. Olsen

I visited the booth of Electra Precision Products Company at the IEEE Show. They make precision resistor networks on ceramic base which might be very useful to us in our FLIP CHIP line. They get tolerance of 0.25%. They make them on a flat piece of ceramic which is quite thin and solder the leads onto the surface very much like Sprague does.

Those places where we need precision resistors in networks, like in sense amplifiers, we could buy the chip from them with leads and pot them in our regular cans as if they are FLIP CHIPs. They probably should be less expensive than precision resistors and should take less space and would give the feeling of consistency to our FLIP CHIP line. I don't know what material they use in their resistors but they apparently cover them with glass so that they are willing to sell them to us without any further coating and they would fit well into our normal encapsulation system.

I have a sample of this which Tom can look at in detail to see if he gets any ideas as to how to protect resistors with glass.

Electra calls their material low delta cermet and they claim it is the only cermet today which is capable of post-firing adjustment to 0.25% tolerance plus load life stability better than 1% delta are to end of life. We might consider the possibility of buying a license from them for their material.

Metal films can be held a plus or minus 25 PPM per degree centigrade while the low delta cermet is always positive 200 PPM per degree centigrade.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 26, 1965

SUBJECT Development Project

TO Ken

FROM

System

1. Redo PDP-7
2. Redo LINC
3. PDP-6 B
4. 24-bit computer

Computer In/Out Equipment

1. Paper tape reader and punch
2. Magnetic tape handler
3. Disc storage

Component

1. "FLIP CHIP" straits
2. Diodes and transistors
3. Cores and memories

INTEROFFICE MEMORANDUM

DATE March 22, 1965

SUBJECT

TO Bob Brown

FROM Kenneth H. Olsen

cc: Tom Stockebrand
Dick Best

In the March 8th issue of "Electronics" magazine, there is a short report describing the system with which Burroughs covers their semiconductors with glass to protect them so that they have very simple packaging. It would be very good if we could work out a system so that we can cover our semiconductors with glass also. This is to make it different from IBM and do it with a gas rather than with a frit such as IBM uses.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 22, 1965

SUBJECT

TO Ted Johnson

FROM Kenneth H. Olsen

In the March 8th issue of "Electronics" magazine, there is a review of the Semiconductor Conference held during February in Philadelphia. It might be good to reprint this or summarize it because it gives a hint or an indication that the industry will go toward ceramic hybrid circuits like our own instead of monolithic integrated circuits.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE March 11, 1965

SUBJECT Printing Reject Data on Automatic Module Testing

TO Chuck Stein

FROM Kenneth H. Olsen

cc: Jim Cudmore
Maynard Sandler

Maynard Sandler told me about your idea to copy all failure data on micro tape and printing it out later. Here are a few other ideas that you might consider. First of all, code the information in such a way that it can be gotten out in very concise form, hopefully on only one line. You then might be able to get it out on a Teletype writer while the next module is being inserted or while the tests are being made on the next module.

Line printers are relatively inexpensive if they are limited to a small number of characters and particularly if they are limited only to numbers. If the Teletype wasn't fast enough, we could use the strip printer and a little sheet could be ripped off for each reject module and sent to module repair.

Ken

KHO:ecc

XEROX COPY

dec INTEROFFICE MEMORANDUM

DATE March 10, 1965

SUBJECT

TO Harlan Anderson
cc: Jim McKalip
Dick Best

FROM Kenneth H. Olsen

I would like to suggest that you ask Jim McKalip to prepare a comparison chart for the next PDP-6 Guidance Committee which would lay down the characteristics and prices of the new large, inexpensive memories which people are supplying. Ferroxcube has announced in a magazine that they are selling very large memories at 1 to 2 cents per bit with 10 to 12 microsecond cycle. Ampex is offering one with $2\frac{1}{2}$ microsecond cycles but more cost and Electronics Memory demonstrated one to Dick Best and me last Fall in San Francisco but I don't think the speed and price were fixed at that time.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE March 9, 1965

SUBJECT Driving Printed Circuit Motor for Single Capstan Tape Drive

TO Jim McKalip
cc: Dick Best
Roland Boisvert

FROM Kenneth H. Olsen

I have only neutral interest in building a pinch roller type tape drive. We may save money in doing this but we do have only a limited resource in developing a product and I would like to see more come out of it than simply lowering of cost. Before we reject a single capstan drive I would like to see us do some experimental work to see how difficult it would be.

I can see that the speed control using a tachometer is difficult to do because we want to come to a standard speed after a small fraction of one revolution of the motor.

Another approach to controlling this tape would be to drive it from a constant voltage source. This is a shunt motor and under a fixed load it should run at a fairly constant speed. Being a viscous drag, it would help control the speed.

Even better than a constant voltage would be a special supply which increased the voltage linearly as the current increased. The equivalent circuit of the motor is a generator with a series resistance. If it were not for the series resistance the motor would run constant speed when there is a fixed voltage applied to it. Now, because we know the value of this resistance it is theoretically possible to make a power supply which will keep the voltage across the generator constant.

This is very much like a negative output resistance audio amplifier. This is a trick people used to do in audio systems. They tried to make the lowest possible output impedence so that they could get good reproduction but even with zero output impedance they still had the problem of internal resistance in the loud speaker so they designed a feed back system which would have negative resistance to compensate for the resistance of the loud speaker. Dick Best's Master thesis did something like this in driving display yokes.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 9, 1965

SUBJECT

TO Chuck Stein

FROM Kenneth H. Olsen

I am interested in designing a new micro module with a micro socket, but it is important that we be able to wire it on a Gardner-Denver machine. Will you send me a note telling me the highest density pattern in spacing which can be done on the Gardner-Denver machine. I suppose this can be done both on a square pattern and on a diamond pattern. I should know what is the smallest in each of these two patterns because the socket design may dictate one or the other.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 9, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

It would be very nice if we had a socket that would take our FLIP CHIP module and use taper pins for connections. This would not have to be molded in a large block but single connectors would do.

Will you check the connector suppliers and see if they happen to have one which is 18 pins and 1/8 inch centers. There are quite a few like this but most of them have 0.156 inch centers.

Ken

KHO:ecc

CONFIDENTIAL

INTEROFFICE MEMORANDUM

DATE March 8, 1965

SUBJECT Organization by Product Lines

TO Board of Directors
Works Committee Members

FROM Kenneth H. Olsen

To develop closer ties between engineering and marketing, we are going to organize the Company by product line. This means that engineers, marketing people, technical writers, and some draftsmen will be assigned to a specific product line. Some assignments will be short; others may be permanent. From this organization we expect not only improved liaison but also greater certainty of available resources for projects in which we are involved.

The three major product line groups and their managers are:

Large Computers - (Harlan Anderson)
Small Computers - (Nick Mazzarese)
Modules - (Stan Olsen)

A fourth group, called Special Projects, will include activities that fall outside the major product lines. It will be headed by Win Hindle and will include Pat Greene's Digital Test group, Chuck Stein's Computer-Aided Design group, and Mort Ruderman's LINC.

The Engineering Department will continue to be headed by Dick Best. Under him, Don White will supervise and coordinate module design, and Jim McKalip's group will design memories and magnetic tapes. We will also continue to have a mechanical engineering group under Loren Prentice and drafting and model shop departments from which people may be borrowed on a short-term basis.

The in/out equipment on the Large Computers is usually completely different from the in/out equipment for the Small Computers, so we will not have a general in/out group but each product line will work out its own in/out equipment. The Small Computer Department may, in the future, form a display development group but for now display work will be done under Ed Harwood.

Many of Jim Hasting's duties will now be done by product line managers, which will free Jim to take up the bulk of Win Hindle's professional recruiting activities. While we do not believe that this organization change solves all problems, we do feel confident that it will help to re-orient our thinking somewhat.

Also, we are changing our attitudes on product development. We will no longer offer to sell or commit ourselves to a computer or system early in its developmental stage. Instead, we will start several computers and schedule each one in detail with check points. At each check point we will decide whether the progress warrants continuing. The fact that we start a project in no way implies that we are committed to finish it. After the prototypes are running, we will decide which machines are best suited for sale and production. At times we may make exceptions and deviate from this policy. The fact that we deviate doesn't mean that the policy is not there.

Ken Olsen

KHO:ecc

PERSONNEL ASSIGNMENTS

LARGE COMPUTERS (H. Anderson)

Sales:

Robert Lane (Supervisor)
Perry Harris
Norman Canning
Roger Handy

Checkout:

Robert Beckman (Supervisor)
Lawrence White

Laboratory and Applied Science Representatives:

Steve Mikulski

Engineering:

Robert Savell (Supervisor)
Gordon Bell
Burt Scudney
Alan Kotok
Derrick Chin
Alan Titcomb

Promotional Writer:

Howard Hubbard

Technical Writer:

Norm Hirst

Programming:

Lawrence Portner (Supervis.)
Thomas Hastings
Thomas Eggers
Donald Witcraft
William Segal
Clark Frazier
Alan Blackington
Steve Piner
Ed Yourdon
Peter Samson
David Gross
Leo Gossell

SMALL COMPUTERS (N. Mazzarese)

Sales

James Burley
Rod Belden
John Jones
Michael Ford
Don Smith
Dave Brown

Special Systems:

Edward Harwood (Supervisor)
Donald Vonada
Richard Sorensen
William Long
Donald Murphy
Thomas Leonard
Richard Tringale

Engineering:

Ron Wilson
Lawrence Seligman
Edson DeCastro
Richard Sogge
Don Smith

Technical Writer:

Robert Buyer

Programming:

Len Hantman (Supervisor)
Dave Fellows
James Murphy
Russell Winslow
Marvin Horowitz

Promotional Writer:

Allen Kluchman

MODULES (S. Olsen

Sales:

Richard Kennedy
Robert Bocek

Engineering:

Russell Doane
Pat Sullivan

GENERAL ENGINEERING (R. Best)

Arthur Hall

Circuits:

Donald White

Memories and Mag Tapes:

James McKalip (Supervisor)
Roland Boisvert
Daniel Wardimon
Thomas Hughes
Steve Lambert

Drafting:

Roger Melanson

Model Shop:

George Gerelds

Mechanical Engineering:

Loren Prentice (Supervisor)
Richard Clemente
David Nevala
Kenneth Fitzgerald
Richard Richardson
Renald Cajolet
James Jordan
Phillip Backholm
David Widder
George Wood

Component Development

Bob Brown
Tom Stockebrand

SPECIAL PROJECTS (W. Hindle)

Digital Test:

Patrick Greene (Supervisor)
Ulrich Skowronek
John MacKeen
Lee Butterworth
Jonel Sutton

Computer Aided Design:

Charles Stein

LINC:

Mort Ruderman

Technical Writer:

Ed Bogusz

INTEROFFICE MEMORANDUM

DATE March 8, 1965

SUBJECT Book Shelf for Office

TO Dick Richardson

FROM Kenneth H. Olsen

I have needed another book shelf in my office for sometime but I keep postponing ordering it, hoping that the load on the carpenters will ease off. Now I figure that it will not ease off for a long time so I would like to put this request in.

Ep Toumi made a two-shelf bookcase for me and it now sits in the corner of my office. It is made out of 1" plywood with rounded edges. The one I would like to have made now would be built the same way and would be 8' long, although it would be better to have it 10' or 12' long if we had 1" plywood in that size.

This one will go between the windows in my office and will be the same height as the old one. The old one is not symmetrical because it goes in the corner but the new one will be symmetrical and both ends should look like the outside end of the present one.

It would be very clever to have a piece of plywood between the shelves which supports it on the wall because this is not readily observed and completely hides the mechanism which holds the bookcase to the wall.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 4, 1965

SUBJECT Guidance Committees

TO Harlan Anderson
Stan Olsen
Nick Mazzarese
Win Hindle
cc: Ted Johnson

FROM Kenneth H. Olsen

It has been suggested by a number of people that we set a permanent schedule for our various Guidance Committees so that people can plan their schedules ahead of time. I would also like to suggest that we start a committee meeting that would guide and show interest in the projects which Win Hindle is supervising.

A number of the committee meetings are fixed in their times right now and when you have the times set for your various committee meetings, please tell Elsa and she will generate a memo which we will send out to all employees.

Those committees which now have fixed times are as follows:

Tuesday at 8:30 - Works Committee
Wednesday at 8:30 - Components Meeting
Thursday at 8:30 - Special Module Committee
Thursday at 9:00 - Module Guidance Committee
Friday at 8:30 - Data Processing Committee
Friday at 1:00 - Manufacturing Methods Committee Meeting

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE March 4, 1965

SUBJECT ASME Show

TO Dick Best

FROM Kenneth H. Olsen

The Mechanical Engineers have an equivalent to the IRE Show on May 17 - 20 in New York City. There are a few sessions which you might be interested in attending because the problems are very close to the ones we face.

Monday evening it is a round table discussion on "Preparing Effective Engineering Proposals."

On Wednesday at 9:00 a.m., there is one titled, "The Management of the Smaller Engineering Department" and also on "Advancements in Drafting."

On Thursday at 9:00 a.m., there is one entitled, "Creativity in Engineering" and also one on the "Development of a Successful New Product by a Smaller Company."

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 4, 1965

SUBJECT ASME Show

TO Harlan Anderson
Stan Olsen
Jon Fadiman

FROM Kenneth H. Olsen

At the ASME Show in New York on May 17 - 20, there is a Monday evening session at 7:30 which is a round table discussion on "How to Handle Engineering in Overseas Plants."

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 4, 1965

SUBJECT ASME Show

TO Loren Prentice

FROM Kenneth H. Olsen

There are a number of sessions at the ASME Show which maybe we should have someone attend.

Tuesday morning, May 18, at 9:00, there is one on Progress in Coatings and Platings and also on Newer Engineering Materials. Tuesday evening there is an interesting one entitled, Functions of an Advanced Design Engineering Section and also another one on The Development of the First Working Prototype.

Wednesday, May 19, there is one on Advances in Drafting.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 3, 1965

SUBJECT Notes on PDP-7 Cabinet

TO Loren Prentice
cc: Nick Mazzarese
Rod Belden
Ron Wilson

FROM Kenneth H. Olsen

Here are some notes on the PDP-7 cabinet which I would like to have the industrial designer start work on this Thursday. I think this is the cabinet we'll use if we re-do the PDP-6 or if we re-do the LINC. I like the cabinet so much that I also think it is perhaps the way we should have made the PDP-8.

I laid out the swinging door on the back and concluded that there will be no interference with the modules because of the large radius. The width of the cabinet will be 22" for the socket, 2" for the plenum door, 2" for the cabinet pipe and 5/16" clearance on each side of the plenum doors we now have, which totals 26 5/8".

I made some sketches as to where we could lay this out. Directly behind the plenum door will be a solid sheet to keep the cooling air within the logic. This might be made up of panels put in with Dzus fasteners so it could be taken out easily. The rest of the cabinet will be of airtight plenum and there will be a standard furnace type filter resting on the top but may be recessed that could be either 10" x 20" or 10" x 25", which I think are standard sizes. Directly underneath this will be several fans which will suck air through the filter and fill the cabinet with air. We'll have holes punched in that sheet which will feed air into the modules and the optimum pattern, but largely in the center, and then the air will escape through holes at the bottom and the top.

The power supply will be mounted underneath the table in the first three mounting panels in the front. This will make 15 3/4" x about 26", which will be plenty large enough for the power supply and power control units. Then there are about 2" for the table thickness and then the rest of that panel space and the next two panel spaces would be the PDP-8 type control panel. This will be approximately 13 3/4" high. This makes a very large control panel and we should be able to put all of the indicators we want on it. I do plan, however, to have the indicator drivers mounted in modules plugged into the wiring in the back because modules are still our cheapest way of mounting transistors and really cheaper than mounting them on indicator panels.

Now, above the control panel, we have six standard panel widths for in/out equipment. The standard configuration I would like to see is one 10 1/2" panel which will contain the paper tape reader and punch. We are now working out our own reader which I think will go between 100 and 200 characters per second and

read fanfold tape. There will be very little on the panel because all of the electronics will be wired into the logic of the computer. There has to be a fanfold holder and catcher for this, however. I think it will be sprocket fed and so there will have to be a 90° turn as the tape goes over the sprocket and I think it would be best to load the tape into a vertical holder and the positive into a horizontal holder across the front. On the same panel, we can mount a Royal McBee punch which costs about $300 but is 50 characters per second. The paper supply of this also should be vertical but should be mounted backward behind the panel and its tape catcher should be a continuation of the catcher from the reader. This, I think, should make the most convenient paper tape system we've had and one that is really very inexpensive.

This then leaves us space above for two of the new style DECtape units. This panel, however, will be 26" wide and our standard DECtape is only 19" wide. I would like to see us make a special DECtape panel for this. Everything would be the same as the DECtape except that the panel would be 26" wide. In that blank space which would be left over to the left, I would put another swinging door like we have covering up the logic in the DECtape. Behind this door I would put the marginal checking supply behind one DECtape panel and the marginal checking switches behind the other. When there is no DECtape used, these panels would then be used only for supporting the marginal checking.

I am now proposing that we go back to the original PDP-1 way of marginal checking where we had a panel which contained all of the marginal check switches. This turned out to be impractical at that time because there was difficulty in wiring in the switches but we can now very readily make a switch panel connected to a ribbon cable which plugs right into the logic and connected to the marginal checking.

There is now a lot of space behind the control panel and some behind the power supply. If we have to get very efficient and use the space, we might use these for something. We're now talking about a disc storage or its equivalent which might very well fit into this area. If the control panel comes out on a slide, this unit could be mounted on the same slide directly behind the control panel and we would have very easy access to it.

The weakness of this design is that we'd have only a limited area for module sockets.

We will have to have two plenum doors in the back because the wire-wrap machine will take a door no larger than eight mounting panels and we can mount a total of eleven. I think on the PDP-7 we will make the memory fit into three mounting panels and the rest of the computer into eight. I think we'd make the two plenum doors swing and hinge separately and have a separate pivet point welded into the center section of the cabinet. If we then want the two part of the doors to swing together, we can tie them together but at least they will each be well supported.

Ken Olsen

KHO:ecc

March 3, 1965

There are several questions we are often asked.

We are asked if the future of DEC is safe and secure. The answer is no. We feel more enthusiastic about the future of DEC than we ever have before but this is a very dynamic and changing industry and no one can say the future is safe.

We are asked if the new technologies which are constantly being reported in the technical and popular press will not limit the competitive position of Digital. I suppose any business is always in danger of being severely hurt by some new technological development. We might be overly cocky and confident but we feel we are setting the pace in the using of the most promising of the new technologies.

We have here our first production model of our new small computer, the PDP-8. It is not scheduled to be finished until late this month and so it is not completely done as yet but starting next month we plan to make these on an assembly line with conveyors and automatic devices like television sets. This is a real computer with a traditional internal organization with no tricky things left out to save money but still the complete operating system costs only $18,000 because of new technologies. We already have 79 orders and letters of intent for this machine.

The other question we are often asked is when will Digital stock be made public. Now we love stockholders and Wall Street analysts because someday we do expect to be a publicly owned corporation. However, let me remind you that one of the big things which American Research has to offer a small company is an isolation from the stock market which is so necessary to allow a company to grow and mature to a point of stability. If ARD is forced to release the stock of companies to the public as soon as they are profitable, one of the big reasons for people coming to ARD will disappear. Some of us feel that this temporary isolation is very important because it seems to us that many of our friends who started small businesses did well until they were on a public market, after which pressures forced them to do short-term things which severely hurt their companies.

Usually when we are asked when DEC stock will be available, we feel rather flattered. We may be like the beautiful girl who looks modest but really enjoys a little flattery. However, I must admit a little distrust to the motive of people who put strong pressure on ARD to have DEC stock become public. Those people who make a commission on every stock sale, I am sure are only interested in the stockholders and never interested in adding a little excitement to the market. In listening to those who think it is a moral obligation of ARD to release DEC stock, I get the feeling that they are motivated to take their profits which might come from the sale of DEC stock and not take a chance on the future of DEC. I admit this is a legitimate thing to do but as one whose obligation is to plan for the long-term future of DEC I just can't get so sympathetic with them as to encourage ARD to put DEC stock on the market.

INTEROFFICE MEMORANDUM

DATE March 2, 1965

SUBJECT

TO Nick Mazzarese
Stan Olsen
cc: Harlan Anderson
Win Hindle

FROM Kenneth H. Olsen

Andy had Chet Gadzinski make up a Sales Plan for the PDP-6. I haven't had a chance to read it yet but it might be a good idea if you get ahold of a copy of this because it might be a good outline for a sales plan to be presented to the Board of Directors. I think it would be a good idea to present a sales plan for each of our marketing groups during the April meeting. Let me know what you think of this because I would like to promise it to the Board of Directors during our March 9th meeting.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 1, 1965

SUBJECT Reports for March 3 Meeting

TO Members of Components Committee

FROM Kenneth H. Olsen

We should, perhaps, appoint a Secretary for the Components Committee so that we will have minutes which will remind us of those things which we plan to cover in the future.

From my notes, here are the reports which we have agreed to have presented on March 3. There are two reports on the testing of strates which were supposed to be presented on February 24 but weren't ready and so we will have them at this time.

Bob Hughes is going to give us a report on the present AQL level on diode chips we are now buying and a proposal as to what we should do in the future.

Tom Stockebrand is going to write a plan for encapsulating the strates. This will describe what equipment we will need to do large quantity production so that we can evaluate whether the present encapsulating plans are practical. Tom is also going to put down on paper a plan for the resistor grinder so that we will all know what the commitments and plans are.

The misunderstandings that come about from this probably result from not having a secretary and minutes from our meetings.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE March 1, 1965

SUBJECT

TO Win Hindle

FROM Ken Olsen

I would like to hear your reaction to the man from Philco that Bill Congleton suggested to us. I think we have need for senior, mature, experienced technical people and, from what I hear, I think we should call him in for a visit.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE March 1, 1965

SUBJECT

TO Stan Olsen
Harlan Anderson

FROM Kenneth H. Olsen

For the Board Meeting next week, I think it would be a good idea if we had a presentation for the plans of our sales force, both in this country and overseas. I think it would be good to lay out a plan for expansion and what activity we expect to get from each group. Stan will be in school but I think it should be done on paper. It will take very little presentation.

INTEROFFICE MEMORANDUM

DATE February 26, 1965

SUBJECT

TO Ken

FROM Ken

Three people have approached General Doriot lately with the proposition of buying Digital. In general, their approach is almost ridiculous but we should be polite because each of the organizations are potential customers. Captain Hammond, who is a pleasant, older gentleman and a friend of General Doriot with many Navy connections, invited the General to dinner with Admiral Nimitz, who is now President of Perkin-Elmer. He is reasonably young and not long retired from the Navy. He is the son of the famous Admiral Chester Nimitz.

Norman Frost, who is a Washington lawyer and member of General Counsel at Sperry Rand, suggested that they might be interested in acquiring Digital. He will be at the ARD meeting and we should be polite to him.

Dr. Hurd, who was formerly a wheel at IBM and now President of Computer Usage, suggested that we should get together with Jeffries of Data-Control. He too will be at the meeting at American Research.

dec INTEROFFICE MEMORANDUM

DATE February 25, 1965

SUBJECT

TO Nick Mazzarese

FROM Kenneth H. Olsen

It is my understanding, from the results of our meeting on Monday, that you are setting up a program to develop new, inexpensive DECtape controls which will have an 18 bit buffer that can be used with the 12 bit buffer and be the same control for both the PDP-7 and 8.

If this plan doesn't work out as you develop it, please let me know because I would like to keep up-to-date on it. You might have a report made on this at next Wednesday's Computer Guidance Committee. At the same time, we're going to have a detailed schedule presented on the PDP-7.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE February 25, 1965

SUBJECT

TO Nick Mazzarese

FROM Kenneth H. Olsen

I just had a visit with Bob Smith and he talked about his ideas for markets that we might go into. He reminded me that conveyor business is a very large potential user of computers and I would just like to remind you to pay particular interest to those conveyor companies who have made inquiries to us.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 25, 1965

SUBJECT

TO Win Hindle

FROM Kenneth H. Olsen

Here are the names of three people who Bill Congleton thinks we should consider.

Alan Frank, who is Director of Data Recognition at Philco, got together with a man named Spangler and proposed starting a character recognition company. American Research decided not to go into this and they have decided that they really didn't want to or couldn't start a company so Frank is now looking for a job. He is a very senior man and quite expensive. The department he ran at Philco was a $4 million a year department. Bill Congleton doesn't have his phone number but if we call Spangler's phone number at area code 215 - 643-1435 and ask for Frank, whoever answers will know how to get in touch with him.

Bill is particularly impressed by Tom Kennedy who is now Manager of Corporate Planning at RCA. Of all the people that Bill has interviewed for us, this is the one he likes best.

Another man which General Doriot remembered is Richard Wallace who used to work for General Electric and now works for Model, Roland & Company in New York, an investment firm. Bill thought he was weak because he hadn't any direct accounting experience. This man will be at the ARD meeting but will be happy to come out to meet us earlier if we desire.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 25, 1965

SUBJECT

TO Rod Belden

FROM Kenneth H. Olsen

cc: Nick Mazzarese

Will you make a survey of the attitudes within the Company on paper tape readers. First of all, I would like to know what the present attitudes are on the reliability of the paper tape reader we're using on the PDP-7.

Secondly, I would like to know whether people like fanfold or spool tape. I am thinking that as we make a new paper tape reader we can make it read either fanfold or spool tape but I would like to design it for one or the other. My impression is that the present fanfold arrangement on paper tape punch is satisfactory but I would like to know what the users think of this, both from the maintenance point of view and from the programmers point of view.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 25, 1965

SUBJECT Notes on IBM's New Announcement

TO Nick Mazzarese

FROM Kenneth H. Olsen

The FORTRAN they offer will be a variation of FORTRAN 4 and they don't know how much of the 4K memory it will fill, which means it is not completely written as yet. They will have many arithmetic subroutines available and a monitor system which is significant. I think they will take advantage of the full library of scientific programs they have in the 1620 which will give them a big head start in the scientific programming area. FORTRAN written for this computer will run on the 3600 but not vice versa. The disc holds 1 million characters or 1/2 million words.

The 1800, but not this machine, can be used as an input device to the 3600. The memory cycle time is 3.6 microseconds. An add instruction takes 8 microseconds and an add instruction with indexing takes 11.7 microseconds. There are three index registers which sounds like there must be three of the memory registers assigned to this.

We have to weigh the weaknesses of this machine and push hard on these in our advertising. We can't compare the 8 microsecond add time to our 3.2 microsecond time.

They have a 15 character per second tape reader which is going to be very tedious. I think we have to get an inexpensive fast reader which will also use a big advantage over them.

An 8K 1130 is approximately equivalent but slightly larger than a 1620 16 bit machine with an additional parity bit. It comes with 4K but is expandable to 8K.

Floating point subprogramming will be either 23 or 31 bits in precision.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE February 24, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

IBM announced a new disc file. For about $10,000 it will store 8 million bits of information. I think this is patterned after the data disc storage device made by Data Disc in Palo Alto, California. Will you get all the information you can on this because there is a possibility we may want to buy this from IBM and offer it with our line of products. Don't tell them this but there is also the possibility we may want to buy the discs from them and have someone like Data Disc make the equipment.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 24, 1965

SUBJECT

TO Dick Best
cc: Nick Mazzarese
Ed Harwood
Jim McKallp
Stan Olsen

FROM Kenneth H. Olsen

I suggest that you transfer Dick Sorensen to Ed Harwood's group so that his work will be directed toward the systems. He is working almost 100% for these people but they don't feel content that they're getting their fair share of his time. It will then be up to Stan Olsen to hire one or two people to take up the module A-D circuit work.

Nick Mazzarese will then have no excuse for not having a firm A-D package to offer with the PDP-7 and PDP-8.

Ken Olsen

INTEROFFICE MEMORANDUM

DATE February 17, 1965

SUBJECT

TO Loren Prentice

FROM Kenneth H. Olsen

Please start the mechanical design of the single unit Solid State Microtape. I think we can start laying out the unit without waiting for the industrial designer. We want to have a much simpler unit with very little of the special brackets and extensive use of the rivy nuts that the present unit now has. We want to wire it largely with rivy nuts. It would be good if we could use Cutler-Hammer type rocker switches. We could fit the unit in a 7" panel but if we go to a 10 $\frac{1}{2}$" panel we might be able to make a very simple unit. We might want to build the tape portion on a separate small plate like the MIT tape units do.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE February 17, 1965

SUBJECT

TO Harlan Anderson

FROM Kenneth H. Olsen

General Doriot called and said there are three companies who have expressed an interest in DEC. They are Remington Rand, Data Control and the small control company which is run by Chester Nimitz, Jr. I told General they should all buy DEC equipment but they are only interested in DEC because they want us to solve their problems, not because they should be joined with us. They are just too lazy to figure out how to use computers and they think making ties with us will solve their problems.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 16, 1965

SUBJECT

TO Harlan Anderson
Gerry Moore
Stan Olsen
Jan Fadiman

FROM Kenneth H. Olsen

I would like to suggest that you draw up a written policy on spare parts inventory for each foreign operation. I don't think we should have gotten caught without a flexowriter in Europe, seeing that it has been our most dangerous component. I think once we have a written policy we will then all know the chances we're taking and be content at the cost and those times when we get caught without parts.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE February 16, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

RCA makes a bulk memory storage device which stores information on magnetic cards which they call the RCA 3488. Will you get information on that if they are interested in selling it on an OEM basis.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 16, 1965

SUBJECT

TO Bob Beckman

FROM Kenneth H. Olsen

Greenhouse supply stores sell polyethylene plastic 40, 50 and I think even 100 feet wide. This might be a convenient way to run the heat tests on the PDP-6s. You simply droop it over the cabinets without making a tent frame at all.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 16, 1965

SUBJECT

TO Bob Hughes

FROM Kenneth H. Olsen

We plan to move Test Equipment Headquarters down to the Engineering floor. Will you talk to Loren Prentice about the space available and propose a plan. I would like to have the equipment signed out by the girl who maintains the stockroom but would like to have it maintained by the present fellow who is in Test Equipment Headquarters. This will need a written statement of organization which I would like to have you prepare.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 16, 1965

SUBJECT Display

TO Mike Ford

FROM Kenneth H. Olsen

I would like to see you set up a proposal in which you add all the logic which people propose. There is a lot of money that can be saved by redoing the present display. The hardware is exceedingly expensive. The precision resistors do not have to be fan cooled in elaborate, expensive heat sinks. The high voltage power supply does not have to be mounted in an expensive box.

However, I do believe that logic becomes relatively inexpensive. We can wire it up to everything in it and just add the modules as options when people want it.

Let me know what you think of these ideas.

Ken

KHO:ecc

COMPANY CONFIDENTIAL

DRAFT

dec INTEROFFICE MEMORANDUM

DATE February 16, 1965

SUBJECT Inexpensive Paper Tape Reader

TO Dick Best
Nick Mazzarese
Bob Savell
Jim Hastings

FROM Kenneth H. Olsen

We badly need an inexpensive but fairly fast paper tape reader for our inexpensive computers. For an $18,000 or $45,000 computer, we cannot afford to pay $1,000 or $2,000 for a paper tape reader; particularly for paper tape readers that have a lot of trouble. Here is a proposal for a very simple paper tape reader which I believe should go at least 200 lines per second. The mechanism is very simple and can be mounted on the aluminum panel on the front and all the electronics wire-wrapped into the logic panel.

The drive of this unit would be a model SS 25-1002 bifilar wound stepping motor from Superior Electric Company. This motor has 200 steps but I would tie on-to it a 52 sprocket wheel. For each command for character, a two flip-up counter would go through the sequence of pulses necessary to go through the four steps to locate the hole. The next clock pulse would then do the sensing of the hole and there would be no need for a photo cell on the sprocket holes.

This motor is designed for 5.9 volts and .88 amps for each of two windings. When driven from a 10 volt source with 4 olms in series, these will run at 500 steps per second. I would suggest that we drive it from 24 volt supply with 20 olm/15 watt resistor in series with each winding. This will make the operation significantly faster. In addition, I would work out the logic in such a way that after the unit is stopped it will be started up at half speed or less for the first few cycles. This way, I think we can make it run at 800 to 1,200 pulses per second which should make it read tape from 200 to 400 lines per second.

I am afraid of leaving it oscillate when it is stopped but it has much more torque than is necessary and it could drive a viscous damper. Sometime ago we asked them to look into viscous dampers and they now claim they have one. When I questioned as to how it worked, they said they simply fill the case with oil.

I would like to see us propagate fan fold tape for our small computers. In order to make this fan fold and still have grip over a significant part of the sprocket, I would suggest that we add a vertical fan fold source very much like the ones we have on the digitronic paper tape readers but that the receiving tray be horizontal like it is in the paper tape punch. This allows a 90° wrap around the sprocket.

Henry Crouse is getting price and delivery information on the damp slow-syn motor. Undamped, it would cost about $40 in quantity. I have also asked him to get quotes on a sprocket wheel of the appropriate size and he is collecting information on the International rectifier solar cells for read-out.

An alternate version of this paper tape reader would be a sprocket-less capstan with a pressure roll and electronics of the capstan could stop at any of the 200 positions. This would mean that the tape cannot stop exactly in the center of the feed holes but I think it would be close enough that it would be workable. This is not as positive as the first system and it needs a photo cell to sense the feed hole but it might be easier to build and control.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 16, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

There is a company in Chicago whose name is La Vezzi that makes most of the sprockets for paper tape readers. I think they got into the business by making sprockets for movie cameras and projectors. Will you get a quote from them on a lightweight sprocket for feeding paper tape that would have 50 teeth in it. This is for standard 1" paper tape which has a spacing of 1/10 of an inch between the teeth. They have experience in the design of sprockets and so we would take their recommendations as to the design.

There are two ways of making a sprocket. One is to make a shoulder the full width of the tape with teeth coming out in the appropriate place. The other way, which perhaps is the way we should go because it is lower inertia, is to make a flat tooth wheel just wide enough to support the teeth and then have a stationary surface to support the tape over the rest of the area. We would like to fasten this to a shaft 1/4" in diameter.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 16, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

A few weeks ago I got a call from a salesman, or engineer, from Superior Electric Company in Bristol, Connecticut. I had, apparently, sometime ago made an inquiry about a slow-syn motor which was damped. An ordinary slow-syn motor when it is stopped will vibrate back and forth for awhile before it really comes to a stop. This man called to say that they finally have one which is damped. I think he said that all they did was fill the case with oil. Will you call them and find out the price and delivery of this unit. The number of the undamped one which would be equivalent is SS 25-1001. The undamped one costs $65.00 and I think the quantity discount is 25% in quantities of 100 or more. Will you check the price and also the quantity discount and delivery for both the damped and undamped models.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 16, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

Most paper tape readers now get their photo cells from International Rectifier Company. They build a simple panel with 9 or 10 separate photo cells in them. Please get in touch with them to find out what they have available for reading 1" standard tape, the price, and other pertinent information.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 15, 1965

SUBJECT

TO Roland Boisvert

FROM Kenneth H. Olsen

Ferroxcube is advertising that they make recording heads. Will you contact them and see if they have recording heads that would do for the disc or drum recording. I think they advertise that they have floating heads and we would like to know how well-proven they are and, of course, the density in which they can record.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 15, 1965

SUBJECT

TO Roland Boisvert

FROM Kenneth H. Olsen

Will you ask the Purchasing Department to get a list of companies who would do plating on magnetic discs for us. 3M did offer to do this at one time and if they are out of the business they will probably give us a list of people who will dorthe work. I think we should only be interested in metallic plating. It might be impossible to get someone to do this because Vermont Research still puts oxide down and I think they would be happier with metal coating. We might be able to do small discs ourselves but it would be very nice if we could get someone on the outside to do it for us. We might also consider making a disc out of glass and vacuum depositing a surface on it like people do who make thin film memories.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 15, 1965

SUBJECT

TO Jim McKalip

FROM Kenneth H. Olsen

Will you, or whoever has been contacting Photo Circuits Company about their motors for driving magnetic tape, get in touch with them and ask them what they have in motors that would do for driving a paper tape reader. We want to make a very simple and very inexpensive paper tape reader with a speed of between 100 and 500 characters per second. The main requirement is that it be inexpensive. Photo Circuits make their own tape unit but we would like to make our own. We want to have all of the mechanical parts mounted on a simple panel and then all the electronics wired as part of the electronics in the back panel.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 15, 1965

SUBJECT

TO Maynard Sandler

FROM Kenneth H. Olsen

Please get for me the approximate cost of the 728 power supply. Then I would like to have this broken down between components, labor and testing.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 15, 1965

SUBJECT

TO Dan Wardiman

FROM Kenneth H. Olsen

As we design the new single unit Microtape, we'll be able to make the mechanical assembly very simple. Please consider carefully exactly what is needed for the forward and reverse switch. This is the most difficult to wire and most expensive unit in the whole assembly. If we can get by with a very simple switch we can make a significant contribution to the economy and simplicity of the unit. We could use two separate switches, one for forward and one for reverse, if accidental pushing of both switches will not destroy things.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 15, 1965

SUBJECT

TO Jim Hastings

FROM ~~K~~Kenneth H. Olsen

I would like you to get a technician for Dan Wardiman right away because the Solid State Microtape project he is working on is very important.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE February 15, 1965

SUBJECT

TO Jim Hastings

FROM Kenneth H. Olsen

Please get in touch with Loren Prentice right away to introduce any suggestions you have on the layout of the Engineering floor. They are going ahead to start moving partitions immediately.

I am suggesting that Gordon Bell move back into his office and that you move into Gordon's office here so that you can take over much of Win Hindle's responsibility in professional recruiting. I think that you can maintain other activities from here quite well but I don't think you can really take over the recruiting activities until you move next to Win.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 15, 1965

SUBJECT

TO Jim McKallp

FROM Kenneth H. Olsen

It seems to me that the wiring of the stack and the baluns is getting to be a large part of the cost of any computer system. I would like to get together with you and others and discuss what we can do to cut the cost on this part of the unit. I suspect it is best to connect the baluns in the regular plug of modules and let's make assembly that way. This still, however, leaves a big part of the cost of connecting the stack to the connector on regular plugable units. George Gerelds has done work with flexible printed wiring. This might be a way to make very inexpensive connections. The flexible wire might be connected to FLIP CHIP type boards and plugged in one cable at a time.

When you get your thoughts organized, let me know and I would like to get a meeting together of the appropriate people to see what ideas we have.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 15, 1965

SUBJECT Newspaper Computer

TO Mike Ford

FROM Kenneth H. Olsen

I suggest that we go after the newspaper business wholeheartedly and with a minimum price. Our computers can be inexpensive because we have the least expensive reader and punch and I suggest we try to capture the market with this. If we don't get the market with this approach, then I think we should drop it. I think if we don't have an advantage over IBM they will take a big part of it. They may take most of it in spite of what we do and, in which case, I think we then ought to get out.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE February 4, 1965

SUBJECT Small Computer Advertising

TO Nick Mazzarese
Stan Olsen
Jack Ridgeway
Jack Atwood

FROM Ken Olsen

Raytheon is now advertising that their PB 250 is the lowest priced FORTRAN computer. This, of course, is not true because our PDP-8 is significantly less expensive and, I believe, with a better FORTRAN. It is also, of course, a lot faster. I think we should not let this slide but should take up advertising our software as a vehicle for presenting the computers.

SDS has convinced the world that their programming is great. I would guess that their programming is just passable but they have gotten this reputation by telling the world. Our software, by now, should be well-proven and in very good shape and we'd better set about to tell the world. I would suggest that this be the main push of our small computer advertising.

In addition, of course, we have to make sure that our programming is good. Dit Morse told me that Foxboro is giving up on our PDP-4 assembler and has gone to BBN to have it redone. When we hear complaints like this we should chase them down and be sure we make the customer happy or at least get straightened out in his mind so that we do not develop a reputation for poor software.

Ken

KHO:ecc

CONFIDENTIAL

INTEROFFICE MEMORANDUM

DATE February 4, 1965

SUBJECT New Computers

TO Harlan Anderson
Stan Olsen
Nick Mazzarese
Dick Best
Gordon Bell

FROM Kenneth H. Olsen

We have a new policy on the development of computers. This is not a new policy but is rather getting back to our original policy. We will no longer commit ourselves to a full computer program but will only commit ourselves to small steps in its development. The first step we will agree to is the money necessary to develop the specifications, price estimate, a detailed schedule and quotes on the software. A part of the schedule will be several check points. The project is only committed to continue up to the check point, at which time it is evaluated to decide whether we go on or not. We do not offer to sell the computer or go into production on it until the prototype is done and we are convinced that the project is worthwhile.

It is not expensive to design and build computers this way. The expensive part of computers is doing the design after they are built. We do this because we are in a hurry but I am afraid we end up taking much more time.

It is indeed true that the final compromise is not made until we have an order but I propose that we motivate people by starting several competitive computer projects within the organization. It is obvious that we can't go into production on all of them but only those which are most promising and farthest along when it is time to make a commitment we will be committed to production.

I can see four computers which could be worthwhile starting at this time. They would be very low level projects except for the 6A. For quite sometime the investment would be small. The four computers that I can see that would be natural for us to start are as follows:

The PDP-6A is started and fairly well defined. The conditions which we have outlined above should put some control on its expansion and I believe everybody realizes that we are not making a final commitment but will truly evaluate it at each check point to see whether it is worthwhile continuing.

I think it will be worthwhile doing the preliminary work on a 24 bit computer. This should be a very simple computer and I think should sell for less than $30,000. It should be as compatible as possible with the present 24 bit computers and maybe even have exactly the same order code as one of the more popular units. It could use two PDP-8 memories to get 24 bits and use two megacycle circuitry. This will make a reasonably fast computer, although multiply and divide will be a little slow.

Because there are a number of programming houses who have done programming for this type machine, we ought to be able to get it done rather inexpensively.

The third machine which I think is worth considering is another re-do on the PDP-7. This machine would use two megacycle logic and would have the same addition speed as the 7 but would be slightly slower multiply and divide. It should be significantly less expensive because of the price of these modules and also because we would wire it all in one piece and there would be no assembly wiring after it comes back from the wire-wrap machine. The console would use the PDP-8 type control. It would take a new cabinet design but it is probably the cabinet we would use for the PDP-6A, the 24 bit PDP-9 and this 7A. The big feature of this cabinet design is that it would take full advantage of the maximum size that could be done on a wire-wrap machine. The memory would be wire-wrapped separately so that memory units could be expanded.

The fourth machine that I would like to see us consider is the PDP-8A. This is a very inexpensive PDP-8 which uses a drum memory. This would be a 4K drum with twelve stationary heads. It would take the PDP-8 order code but would be very slow. This would be great for educational uses and for some controll applications. We should consider this one fairly soon because if we don't do it I am afraid someone else will. We should consider it thoroughly before we write our PDP-8 manual because it might be worth discussing both the PDP-8 and the PDP-8A. We might hire Dean Arden as consultant to do the logical design on this machine for us because he did the design on the Harvey Wells drum computer.

The one piece of in/out equipment which I think we should develop ourselves to really make our small computers competitive is a medium speed paper tape reader. They should read fanfold tape at 200 - 400 characters per second. The mechanical part should be mounted on a panel. All of the electronics could be wire-wrapped into our logic panel and the circuits be on standard modules. This would make the assembly and maintenance very straightforward.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 29, 1965

SUBJECT Automatic Power Supply Tester for PDP-8

TO Bob Hughes
Jim Cudmore
Dick Best
Nick Mazzarese
Jack Smith

FROM Kenneth H. Olsen

I believe that we should make a fairly well automated power supply tester but, because it will be expensive and very high speed, I propose that we should put it at the end of the power supply production line and use it for checking out all power supplies. We will then deliver tested out power supplies to the PDP-8 assembly line.

I suggest that we no longer serial number our power supplies nor carry test data sheets with them. However, I think it would be a good idea to take readings on a digital voltmeter with an automatic print-out. Hewlett-Packard has an automatic model, type 3440, with a print-out device, model 562. With all the accessories, this would cost almost $3,000. There are a lot less expensive units available, however, but I'm not sure that they have automatic polarity and automatic range selection which is very convenient for this type of operation.

I think we should separate the tester for the logic power supplies from the memory power supply testers. This would make much simpler logic, particularly when we're usually only checking power supplies without memory sections. It would mean two hook-ups for those supplies which have both units in them.

In the following proposals, I have simplified several of the tests and it would be worthwhile to review them to make sure that we cover the important points.

To measure the DC voltage of the supplies, we simply would use the digital voltmeter. In order to read the ripple, I propose that we AC couple to a step-up transformer and rectify the output and read this as a DC voltage on the digital voltmeter. We'd use multi transformers and just the taps of the DC reading is the same as we would read on an oscilloscope for that amount of ripple. I would build a load panel for each voltage. There would probably be two for -15, one for + 10, one for 35 volts and two for memory voltages. These would contain a relay which would select between minimum load and maximum load. Load resistors would be selected by SPDT cargo switches. The panel would contain a voltmeter and an ammeter. We may want to put a rectifier type AC meter so that we can read the hum on the panel. The load would be connected to this panel through a banana jack and the signal for driving the relay would also come in on a banana jack from the logic panel.

On a dual voltage supply, I would make eight measurements and would use three counting flip-flops to drive three relays to select the eight steps. Here are the measurements I would make:

ACM	-15 Load	+ 10 Load	Measure
125 VAC	Mi. Load	Mi. Load	-15 DC & Ripple
125 VAC	Mi. Load	Mi. Load	+10 DC & Ripple
105 VAC	Full Load	Mi. Load	-15 DC & Ripple
105 VAC	Mi. Load	Full Load	+ 10 DC & Ripple

Checker for Memory Supplies

I would only make four measurements in a memory supply. They are:

1. The DC voltage
2. The ripple
3. The output impedence
4. The voltage change resulting from a change of thermistor resistance

The first one is obvious and the second one I would make the same way we measured ripple on the logic power supplies. I would measure the output impedance by hooking up the voltmeter to measure ripple and then with a mercury relay, switch the load off and on with a mercury relay hooked up to 60 cycles.

To measure the variation due to thermistor value changes, I would vary the thermistor resistance with a mercury relay and then measure the output voltage change as if it was ripple.

We could also do this with three counting flip-flops which drive relays. The most significant flip-flop would select between the two memory power supplies and the other two would take DPDT relays to switch in the meter rectifier and to select thermistor and load shoppers.

The three counting flip-flops in the logic power supply tester would be hooked up as follows:

The first would switch between DC and AC tests in every count pulse.

The next most significant would select between the -15 and the + 10 supply and the other pole would select between the -15 and the + 10 load selecting relays.

The least significant digit would select between 105 and 125 volts AC and its second pole would be in series with the other contact which drove the load switching relays so that there were minimum loads during the first four tests.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 29, 1965

SUBJECT Wiring and Testing PDP-8 Control Panel

TO Jack Smith
cc: Nick Mazzarese

FROM Kenneth H. Olsen

We still have one tedious hand operation left in the PDP-8 and that is the wiring up of the cables to the PDP-8 indicator panels. There are approximately 80 wires which have to go from the solder lugs along the top of the control panel up to a loop of 18 pin cards. I would suggest that we make a jig for this operation of the traditional harness making types except that we will solder the final connection as we lay out the cable. We can have the wires all the same color because we will solder both ends at one time. We cut the wires long and have one end strip so that we can solder it directly into one end, then stretch them out and cut and trim the other side. We can then lace and tape up the cable when we're done.

The test tube we use for this is going to have to be a little more clever than what I had at first considered. One nice way to make this test would be to hook it up in such a way that every time you turned on one of the rocker switches on the control panel it would turn on all those lights directly above it. This would not check for all possible errors in wiring the control panel but I think it is very unlikely that any would get through. We would, in addition, have to figure out some way of hooking the switches under those lights with writing to those lights in such a way as to give a reasonably good test for them. This will be a relatively simple test but someone will have to think it out and it will have to wait until we get the final wiring schedule from Ed De Castro.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 28, 1965

SUBJECT Rambling Notes on New Computer Cabinet

TO Loren Prentice

FROM Kenneth H. Olsen

I think we should schedule enough engineering and drafting after we get the new PDP-8 settled down so that we can make a prototype of a new computer cabinet that will take full advantage of the automatic wire wrap machine.

The wire wrap machine will take 22" x 40" work area and Chuck Stein thinks that the holder can be an inch wider on each edge. Now that I see our rectangular pipe frames, I like this as a way of making large wire wrap panels. Once we get the bars lined up, I'm sure they will stay lined up with an iron pipe frame. The complete frame, however, does take panel space and it would be nice if we could work out a system for our usual type mounting panel but rugged enough to allow shipment of this very large area.

I would guess that if we contracted a large number of bars to seam in the saw company that they would make up bars for us in the way they make their flat ground stock that wouldn't cost very much. We might then weld those to flat pieces of steel for the side pieces. This might be an inexpensive way for getting high precision mounting bars.

The present plenum door is 58" high. If we broke down the plenum door into two pieces 44" high and 12½" high, we could then mount 8 rows of sockets in one and 2 rows of sockets in the other. We would then have to weld a cross bar through the frame so that we could swing both of these as gates.

The problem of a swinging door is the width which it needs. There's 22" for sockets, 2" for the pipe of the door, 2" for the pipe of the frame, 1" clearance, plus 2" clearance for the swing. The total is 29", which is very wide for just 22 useful inches of mounting panel.

I think we should plan on mounting the sockets on the stationary side of the console. This would mean either putting the console table on a swinging gate or else using a separate cabinet. However, we could put 12 rows of sockets in the front part of the cabinet if we didn't have to weld up a complete rectangular frame. The largest group which the machine will wire wrap is 8 mounting panels and so we would have to do it in two groups, which add up to 12 or less and no one of which is greater than 8. This cabinet could then be 22" plus about 2½", or about 24½" wide.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 27, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

In speeding up our production and testing operation, I think that we will probably want to consider making more extensive use of digital volt meters. Will you collect literature on various suppliers of these units.

Here are a few of these suppliers:

Beckman Instruments
Industrial Electronic Engineers of Van Nuys, California
Packard
Princeton Applied Research Corporation, Princeton, New Jersey
Dana Labs, Inc., Irvine, California
Allied Radio has one for $495.00

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT Fast Assembly Methods for Power Supplies

TO George Gerelds
cc: Maynard Sandler

FROM Kenneth H. Olsen

We are now taking much too long a time in assemblying our power supplies. Here are a number of ideas I would like to have you follow through on and make a report at Friday's Methods Committee on whether or not they are worthwhile:

1. I think we use too many nylon lacing ties. These are expensive and they take time to install.

2. Let's consider again the possibility of making up harnesses on the flat bench. This would be particularly useful if we had tab terminals on all the components.

3. Let's get tab terminals on our large filter capacitors. If these were flat, they wouldn't stand up so high as to touch the top of the chasis type power supplies. In most cases, two tabs should be sufficient. If we had the tabs shaped like the tabs on the General Electric capacitors used with a resonant transformer, they could be equally convenient for soldering.

4. The 2x.01 switch filter capacitor which you had Purchasing look for with tab terminals is apparently not readily available. Will you look into the possibility of having that made in a bath tub but surface mounted and with three terminals. If we have to buy tooling for tab terminals from now on, I think we might have just three terminals and it would make it a little easier to use. In addition, the shape should be like the General Electric terminal. Please consider the availability and the desirability of having our switches with tab terminals and trying to get tab terminals already installed in our meters, time meters, circuit breakers, and other components. I don't think we should have resistors or diodes with tab terminals because they get hot. Those items which cannot be bought with tab terminals could have them installed like we now install solder lugs.

   Let's have tab terminals on all of our Jones terminal strips like the one we get from Kulka. We might change the one we get from Kulka. We now have two tabs one one side and a solder lug on the other. I think it would be wiser to have two tabs on the out going side and a tab on the top of the inside and a solder lug on the bottom of the inside. This would be very convenient when we use all tabs but the times when we want to solder on the inside we could raise up the inside tab and expose the solder tab.

5. I don't think it is practical to eyelet all components. It does give a little bit of the radio or television look but a few of the items makes it look rather professional. We should eyelet all Jones or Kulka strips to the power supplies or power control panels. We should also eyelet the Amphenol power sockets in place.

6. Sometimes we use Tinnerman nut holders on the power transformers. It would seem that this would depend on what the model builder used. I would suggest that we use these consistently if there is no reason for not doing it. The bath tub capacitors could also be eyeleted down.

7. The power capacitor brackets which we have made up specially probably don't need slotted holes in the feet. The slotted holes were necessary to make them useable in general applications but they do not make a secure grip for the nuts. If we have a round hole we might be able to use nut holders.

8. I wouldn't bother putting snap covers over unused holes in our panels. If the hole is there it looks like you might have done it on purpose but if the covers are on, it looks like you are covering up a mistake.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Ed de Castro
Ron Cajolet

FROM Kenneth H. Olsen

I have been spending time thinking about a new computer and I have concluded that the next time around it will be easier and less expensive to leave the transistors, diodes and resistors off the etched board which holds the indicators. We'd then make indicator drivers on standard FLIP CHIP modules. I believe this will be a lot less expensive because we can insert the parts so much more easily on the modules than we can on one large etched board. Any failure of these components would be much easier to take care of also. This might also leave us room to put sockets on the etched board so that we can plug cables into this panel.

The indicator driver would not have -15 wire to it so there would be 16 logical pins available so that 8 indicator drivers could be mounted in the module.

It is probably too late to do this on the PDP-8, but if we are ever forced to make a change, it might be worthwhile to take this into account.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT General Electric Meter

TO Ron Cajolet

FROM Kenneth H. Olsen

Here is the type meter which the industrial designer would like to consider using on the PDP-8 power supply.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT PDP-8 Sub-unit Testers

TO Jack Smith
Ken Fitzgerald

FROM Kenneth H. Olsen

The sub-unit testers for the PDP-8 should be designed to be efficient but they also have to look good because this assembly line is going to have to be a show place. I would be willing to invest in our own blue racks for the equipment. For the two wing testers, we might make brackets on the side on which we can hang the wing and then we could swing them back and forth almost at a 180° angle to have easy access to it. This will only mean a small right angle bracket on the bottom of the spring loaded bracket on the top to lift the gate unit out with.

The power supply tester should be very simple. We want this for high line voltage and low voltage and full load and unloaded. In addition, we would like to be able to switch in several resistor values to thermistor temperatures. Plus 10, minus 15 have brought tollerances but the memory supply voltages should be read very precisely, particularly during load variations. The module checking supply has to be tried out over the full range but it is far from being critical.

I think it would be a good idea to read the memory power supply voltages and record them during the heat test of the complete system.

If we weld the brackets we use to hold our Hollywood plastic trays, we could store Gates power supplies and front panels before they are tested.

We also need a control panel tester. I think it would be a good idea to talk to Dick Best about this. I think we should return all the lights to two switches which would turn them off and on. Returning them on two switches will allow us to take alternate wires in each cable to a different switch so that if there is a short somewhere between adjacent wires it would show up. I think we can test the switches by putting them all in series and measuring the total contact resistance of all of them. This could then make a very fast and a reasonably good test.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Henry Crouse
George Gerelds

FROM Kenneth H. Olsen

Ohmite has a new low power variable transformer called VT 1. I think this is a lighter weight than the one we're now using in our inexpensive module power supplies. Will you get hold of one of these so that George Gerelds can try it out and see if it is smaller and lighter weight.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Phil Backholm

Tom Stockebrand

FROM Kenneth H. Olsen

Considering a second AMI device to drop pastes between chips that are being stacked, I would suggest that we don't consider a second unit but, instead, an arm opposite the pick-up arm on the same loading mechanism. This is already going through the right motion and is located in the same place. It would have to have independent adjustments in order to make accurate location.

We also should consider rolling or silk screening a thin layer of paste on the wafer before we scribe and break it in order to avoid this operation altogether.

There are several things we can do to cut down the number of leads we have to bond on series diodes. Where we now have two diodes in a series, we have four bonds. If we stack two high, we can get by with two bonds. If we put two chips, one in opposite direction from the other, side by side, and put the bonding wire across the top, we still have two bonds and we avoid the problem of stacking.

Where we have four high, we could make two stacks of two high and end up with the same number of bonds we would have with four high if two of them are reversed. If we can't stack at all, four alternating chips have just four bonds as compared to the eight bonds we have with four separate diodes.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

We are interested in assemblying more and more of our power supplies with tab terminals. Will you see if we can get a double tab terminal to mount on the studs behind our meters. I think these are 1/4" screws so we need a 1/4" hole in the tab.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Maynard Sandler
Henry Crouse

FROM Kenneth H. Olsen

We have heard from several sources that Western Electric has developed a much better gold plating system for etched board contacts. They use less gold and have no nickel plating. If we keep after Sel-Rex they might tell us how to do it and save us some time on our gold plating process.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Jack Smith
Ken Fitzgerald

FROM Kenneth H. Olsen

I am about ready to agree with Ken Fitzgerald that we should bolt the PDP-8 to a flat piece of plywood with an out-feed during the whole assembly and testing phase. I am afraid that the feet would limit the conveyor operation too much.

With a flat base, we can then use a 24" conveyor with either roller skate wheels or wide rollers. We can then make right angle spurs by having a ball section. We could then have two or three spurs for test section and then one spur would be an oven. We could push the computer straight into the oven and drop a curtain over it.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Tom Stockebrand
Henry Crouse

FROM Kenneth H. Olsen

Wells Electronics Company of 1701 South Main Street in South Bend, Indiana is one of the manufacturers of small parallel gap welders. They weld ribbon and wire from .0003 up to .050 inches in diameter. This might be much more simple than the nail head bonding we're now doing. This should be good enough for the ceramic capacitors and the 662 diodes. If it happens to work out a lot better than the nail head bonder, we might design our 664 diodes in such a way that we have a large welding area.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Tom Stockebrand

FROM Kenneth H. Olsen

On page 66 of the January "Electronics Industries" magazine, there is an article on packaging micro electronic devices. It discusses the problem of metals on ceramics and there might be some things which will be of interest to you in this article.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

I would like to have catalog information and prices on the digital capacitance meter made by Electro Instruments, Inc., of San Diego, California.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

On page 84 of the January "Electronics Industries" magazine, there is an article on how a ribbon cable is welded to connectors. This might be of interest in welding the ribbon cable you're looking at from Sanders Associates.

When we're buying ribbon cable to put on our own connectors, we can then consider other people as sources for these cables.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

Several years ago the salesmen from RCA were saying that they were going to offer miniature glass enclosed read switches, the kind they make read relays out of. At that time they were talking about 40 cents a switch. Will you find out for me what miniature read switches cost now and if RCA did go through with this product.

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Stan Olsen
Alan Ross

FROM Kenneth H. Olsen

We ought to get a good magazine article on the wonderful way we have for mounting FLIP CHIPS in our cabinet. The way we put our power supply in the swinging door and the neat way in which we do etched wiring would make a good article and it is a message that we have never really gotten across.

I like 3C module ads where they show all the products they have. I think we ought to do something like that with our FLIP CHIP modules. This might be a good way in which we show that we use both integrated circuits and conventional modules and that we cover both the high frequency, low frequency and analog lines along with memory drivers.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Loren Prentice
Ron Cajolet

FROM Kenneth H. Olsen

If we use well-nuts to fasten the PDP-8 to the skid, it might contribute a little bit to shock mounting and also might make it easier to fasten to the skid.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT Suggestions for Simplifying Production and Testing Out Power Supplies

TO Maynard Sandler
Bob Hughes

FROM Kenneth H. Olsen

I would like to have a proposal prepared for the Methods Committee on Friday on ways of simplifying production and testing out power supplies. Here are a few suggestions which I think would lower the cost.

1. Let's stop putting serial numbers on power supplies.
2. Let's develop no-go tests for all power supplies that go into computers and let's consider the possibility of go no-go tests for the units we ship out to module customers. The only advantage that I can think of is that it lets people know how much hum and regulation we expect out of our power supplies. This could be obtained by also closing a preprinted inscription of the test and including that with each unit.
3. We are now handling and carrying our power supplies around too much. Let's make a setup for testing them right in the same area in which they are manufactured. We might use our roll of conveyor units to drop the supplies on after they are assembled and they can be fed directly to a test setup. They could accumulate on they conveyor and, as they are tested, lifted off and put on a cart to be run to finished goods.
4. Let's develop new testers that will test the supplies very quickly with a small number of tests. We may want to use digital volt meters for the output to make it easier to read. There's no reason why the test in each power supply should be more than one minute. The memory power supply testers should be a separate test on the special tester with resistors switched in to stimulate different thermistor temperatures.
5. We should look to see if the power screw driver's rather speedy ways of assembly are practical. We should also make sure that we are using optimum size soldering irons. For this type of work, we can use very large and hot soldering irons that make joints very quickly. We should also use tab connectors wherever practical.
6. We should make the power supplies in large batches. If we set up the benches for assembly of large numbers of units at one time we can increase the efficiency significantly. It will also make it practical to precut and strip each of the wires on the automatic stripping machine. If we made 100 or 200 of each power supply, we could strip the number of wires ahead of time and the assembly should go quite fast.
7. We should consider using eyelets or rivets for tieing down the components of the panels such as the capacitor clamps.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Chuck Stein
Roger Melanson

FROM Kenneth H. Olsen

On page 24 of the January "Electronic Industries" magazine, there is an ad by K + E for a photographic automatic drafting system. This might possibly be of interest to us or might lend itself to computer control.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Bob Hughes
Maynard Sandler

FROM Kenneth H. Olsen

We now spend a lot of time taking the flecks off the terminals in our power supplies and power control panels. I understand that flecks do no harm and so we just do it for the looks. Will you bring up, at this Friday's Methods Committee, the question of whether or not we should clean the flecks off. If we have to clean the flecks off, I think we should then go very thoroughly into tab connectors to avoid soldering altogether. If the flecks are excessive, we might cut it down by using less flecks in our solder.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO George Gerelds

FROM Kenneth H. Olsen

The fan panel which we are now using on the PDP-7 can be made a little more businesslike looking, I think, if we went to tab terminals. Right now all the motors are parallel on the Jones strip and it would seem to me that we could do it easier and cheaper if we had two groups of our pass through tab terminals that we use to parallel the units. I wouldn't cut the leads to length but let the extra length dangle a little bit.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Ken Fitzgerald
Jack Smith

FROM Kenneth H. Olsen

Standard Computer Company has a rotary table to go with their roller conveyors like the round table in a railroad yard. They have three models and the middle one holds 450 pounds. This might be a way to push computers off on a 90° siding for testing or it might make a good work station which can be rotated.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT Rocker Switches

TO Loren Prentice
George Gerelds

FROM Kenneth H. Olsen

Would it be faster in assembly if we used rocker switches instead of the type of switches we are now using in our power supplies and power control panels? The rocker switches need a rectangular hole but they then mount with two screws into threaded holes in the switch. In this case, I'm thinking of the fairly large rocker type switches made by Cutler-Hammer. We could use the slide switches of the type we're using on the PDP-8 marginal checking but they are too small for tab type connections, which I think we want to use more and more of in our power supplies.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE January 26, 1965

SUBJECT

TO Loren Prentice

FROM Kenneth H. Olsen

I have asked Maynard Sandler and Bob Hughes to look over the production of power supplies to cut out unnecessary testing and to simplify the production and, in particular, to eliminate unnecessary handling. I would also like to consider the possibility of cutting down the assembly cost.

Radio manufacturers use cadmium plated steel for their chasis. Would it be cheaper for us to go to steel and have them cadmium plated? We could have them chrome coated and they would look very much like the illuminum. We then could use weld nuts or tab weld nuts which should simplify our assembly quite a bit. If we have the nuts mounted on the panel, we could then use a power screw driver for screwing down the various components.

Another approach would be to continue using illuminum but to get an automatic fed machine for inserting the Tubular River Company's threaded nuts. If we inserted those by machine, they may add very little cost but speed up the production and leave a panel that has a somewhat more professional look just because it doesn't look like it came out of the basement workshop.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE January 25, 1965

SUBJECT

TO George Gerelds

FROM Kenneth H. Olsen

The plastic feet we now put on our chasis power supplies were never made for this use but were really plastic rivets. Loren Prentice has some literature on Fastex nylon feet which are made for this use. We're not making many of these power supplies anymore, I don't believe, but if there is a plastic foot which would go into a standard power supply conveniently, it might be worth making a change. I would like to have you look into this and would be happy to have you make the decision as to whether this is worthwhile or not.

When we make power supplies now we screw standoffs into the edge to keep from scratching the front panel. This is a rather time consuming operation now that we want to make these quickly and in quantity. On those panels which we have bath tub capacitors sticking up the back, we probably don't need the feet at all because it is unlikely that they will get scratched. For those other panels, we should have a quick release foot. It is unfortunate that the ny-lock snap fastener needs a 5/16" hole because it would make a real fast device for this. Will you look into other nylon rivets or other devices which might make quick feet to use during the assembly of power supplies.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE January 18, 1965

SUBJECT New Computer Cabinet

TO Loren Prentice
Ron Cajolet
Gordon Bell
Alan Kotok

FROM Kenneth H. Olsen

I am thinking of a new computer cabinet which is designed to take advantage of the techniques we have learned in making the PDP-8 and to take best advantage of the Gardner-Denver automatic wire wrapping machine. I feel that we should continue our standard type construction with swinging doors, hung on end panels, and I also feel it should be the same height and width so that we can continue to add on our standard cabinets and equipment. However, they should be wider because the Gardner-Denver machine will wire panels which are 22" x 44" and it is very wasteful if we can't wire full width. In addition, the console front which we are making for the PDP-8 promises to be tremendously less expensive but it does take somewhat more width than our standard panels. I think it is clear that our wiring should be 22" wide and either 44" or 54" in length. If we can get 54" we should, of course,do that; otherwise, we might as well standardize them 44". The big question we should decide is whether or not this wiring panel should be on the plenum door. It does have advantages to have it on the plenum door because one has ready access to it. The plenum door is only 46" high and this allows us 20" underneath for power supply and the fans. We will use too many psychologics from now on and so we'll need very little power conveyed into one standardized unit such as we use in the PDP-8. In those cabinets which have a lot of logic and no console front, we can have a plenum door arrangement on both front and back. Perhaps we should move it down 5 1/4" so that we could have a PDP-6 type indicator panel at the top.

The cabinet would then be 22 + 2 1/2 + 2 1/2, or 27" wide. Our standard construction would be plenty strong for this larger plenum door. The amount which we can hold in one of our glass console fronts is limited by the center distance of the switches which is 9/16". This comes out to be 20.2" for 36 bits and 13.5" for 24 bits, which means it would fit quite comfortably in a 27" panel. An area 22 x 44 would hold 44 x 16 or 705 modules.

We expect practically no assembly time on the PDP-8 because all the different parts get patched together with cables. Because each of the individual parts would be tested separately, the machine ought to work immediately after being cabled together. I heard that this cabling system did not work out on the PDP-7 but, in questioning people more closely, I believe they say that it didn't work out because they ran out of space and had to use those sockets for modules.

Another possible way of constructing the cabinet would be to fasten the modules in the front of the cabinet like we do now which would make the cabinet only about 24" wide. We could then put the console on the plenum door. The plenum door could then be the same width as the cabinet and mounted outside of the cabinet because there would be no doors

outside of the plenum door.

There could be mounted inside the cabinet and close to the top surface of the modules, a vertical sheet which would keep the air being blown up from inside the modules from floating out into the cabinet and take care of the cooling of the full 44". When the plenum door is open, the modules would be hanging free and would get the cooling from normal conduction. The power supply in the very bottom could take care of the fan and the filtering.

Because of the shallow depth taken up by the modules, the paper tape reader and paper tape punch could be mounted above the console like we now have on the PDP-1. As we're re-doing solid state microtape, we perhaps should make sure it is shallow enough so that two could fit in and still leave room for modules.

After the PDP-8 mechanical problems are solved, I would like to see us build one of these type cabinets so that we can have the confidence to go ahead and commit ourselves to the computer using them.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 18, 1965

SUBJECT

TO Bob Hughes

FROM Ken Olsen

cc: Henry Crouse

We are now committing ourselves to using the Stackpole Carbon Company slides which is in the PDP-8. We are going to have a large number of these in the field before we find out if they are reliable or not. Have we asked Stackpole if they have any life history of their application and low voltage, low current use. If you haven't, would you make this inquiry and let me know what the results are.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 18, 1965

SUBJECT

TO Stan Olsen

FROM Ken Olsen

cc: Mort Ruderman

Will you, for tomorrow's Works Committee meeting, make a proposal as to what we do with the PDP-5's when we take them back from Westinghouse. I think it would be a good investment to give one to Bill Papian. If you think we should re-do them in Canada, work that into the plan and get the details worked out with the Canadian office.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 18, 1965

SUBJECT

TO All Mechanical Engineers:
Loren Prentice
Ken Fitzgerald
Phil Backholm
Ron Cajolet
Dick Clemente
Dave Nevala
Dave Widder

FROM Kenneth H. Olsen

We have decided to use the inexpensive Stackpole slide switch in our PDP-8 computer. This looks like a very straightforward design which should be reliable but we have not had experience with this and we are taking some gamble. There is a possibility that, with an emergency, we may have to quickly change over to a different switch and, of course, the most serious danger of all is the possibility of replacing some of those in the field.

Because of this danger, I would like to remind all mechanical engineers of this possibility so that some preliminary thinking might be put into other possible ways of accomplishing this type switch within this base. I don't think we should invest very much in work on this but just thinking about it would give us a head start if we ever have to make a change.

There is one approach which we could consider and that is to make a bat handle like we now have but have a simple cam in the back which would operate a snap action switch. Another approach would be to mold the cams and put them on a long bar which would then operate wafer contacts of the type which are screwed onto the back of switch craft lever switches. This latter way might be even cheaper than the approach we are now using and it uses contacts which we have had a lot of experience with.

Another approach would be to mold the bat handle with a pin through the center of it but leave a space in which to glue a permanent magnet. This would then be mounted close to the hermetically seal drive read switches which, of course, would be very good contacts for low voltage.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE January 18, 1965

SUBJECT

TO Loren Prentice

FROM Kenneth H. Olsen

I have been trying to work out a system in which the assets and facilities of the Corporation are, ahead of time, committed to the different projects. The way it is now going, the project in which the company has the biggest investment has priority on people and assets when it gets into trouble. The result is that it keeps getting bigger and bigger and each time it gets into trouble it has an even higher priority for people and assets. I haven't figured out how to do this in engineering so until then I would like to tell you approximately what assets in Mechanical Engineering that I now see we should commit. I think that, for at least the next six months, we should assume that Phil Backholm and Ken Fitzgerald will be working full time on the FLIP CHIPS and automating module production.

After Ron has the PDP-8 problem solved, I would like to have enough of his time assigned so that we can make the prototype of a new cabinet design which is wide enough to take full advantage of the Gardner-Denver wiring machine and the new PDP-8 console design.

In addition, I would like to assign, sometime in the future, one engineer so that we can build a model of a paper tape reader.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 15, 1965

SUBJECT MILEAGE POLICY

TO R. Mills

FROM Ken Olsen

This will notify you that as of January 15, 1965 the mileage allowance is .09 a mile.

KO/pr

INTEROFFICE MEMORANDUM

DATE January 15, 1965

SUBJECT

TO Dick Best
Jim Hastings

FROM Kenneth H. Olsen

In continuing our policy of breaking up the Company into Product Line Groups, I would like to immediately start assigning the circuit engineers to product lines. Here is the breakdown which I would like to make next week:

Russ Doane and Dick Sogge on FLIP CHIP modules, reporting to Stan Olsen.

Joe Sutton for PDP-7 and 8, reporting to Nick Mazzarese.

Burt Scudney on the PDP-6 and 6A, reporting to Harlan Anderson.

Ulrich Skowronek reporting to Pat Greene for memory testing.

This would free Don White and yourself from all administrative and scheduling responsibilities for these engineers and should free you to take a more active part in the design and to take care of emergencies.

We'll wait until Monday to make this decision but, if there are no overwhelming reasons for not doing it this way, I would like to go ahead with it at that time.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE January 12, 1965

SUBJECT

TO Henry Crouse
cc: Jack Smith

FROM Kenneth H. Olsen

We're now using ribbon cables with FLIP CHIP plugs on each end in the PDP-8 and we will be using them in many other applications. About a year ago, Sanders Associates tried to sell us their ribbon cable but at that time it was only 16 pin to go into IBM sockets. Will you check and see if they have tooled up now to make 18 pin that would go into our socket and what the price would be. Our socket is compatible with the Univac in the Minneapolis-Honeywell sockets so it is possible that they would have it tooled up by now. Maynard or Jack Smith would be able to give you the price to make our own cables.

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 11, 1965

SUBJECT

TO George Gerelds

FROM Kenneth H. Olsen

Will you see if we have stock stickers which say "High Voltage" on them. If we have them that are small enough, it might be a good idea to put them on the resonant capacitor in the power supplies using the new type transformer. Normally, one wouldn't worry about the high voltage in these terminals because it is well protected and people should be able to keep their hands out of power supplies. However, with the transistor voltages, I am afraid people might become more careless, particularly when we're using these units for educational use. If we have labels and they work out well, will you somehow get them into the system.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE January 11, 1965

SUBJECT PDP-8 Advertising

TO Jack Atwood
cc: Nick Mazzarese

FROM Kenneth H. Olsen

Here is an idea for an ad for the PDP-8. We should push the fact that this is a real computer for $18,000. It is a traditional block diagram like the big computers. In fact, you might even show the block diagram in the ad. There are no tricky cost-saving features such as serial registers in the machine. In addition, we should push how easy it is to put A-D converters in and the fact that the complete FORTRAN is in. We should also mention how readily we address large memories.

Ken Olsen

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE January 11, 1965

SUBJECT

TO Harlan Anderson
Win Hindle

FROM Kenneth H. Olsen

Ted Johnson has proposed that we give out playing cards with DEC module symbols on the back. This might be a clever advertising stunt but I am a little concerned about the image. I would like to hear what you think about this.

Society has a dual standard on many things. We often take part in things freely but are still very doubtful of those who propagate the activities. They might drink but they are very doubtful of liquor dealers. They might play pool but they are sure that pool halls are very evil places for anyone else. Is this true of cards also?

Ken

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 11, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

cc: Ron Cajolet

For awhile, I would like to make the glass panels in the console of the PDP-8 in our own plant. When we are completely sure what we want you may want to order them in quantity from the outside. It would also be good to be able to make them inside so that we could make custom fronts for people who want to have their name on the computer.

We should use ceramic ink and fire them. The present box kiln is only 18 x 18. These glass panels are $10\frac{1}{2}$ x $19\frac{1}{2}$.

Will you call the local ceramic supply house and see what they have that would do for firing glass panels of this size. If you tell them exactly what we want to do, they might have different suggestions as to how we should load the kiln and just what size we should use. I think we only need to go about 1400° F.

You gave me the catalog for the American Art Clay Company of Indianapolis, Indiana when we were looking at these the last time. They have a kiln, model #HF-105, which is a firing chamber size of 30 x 20 x 24. This costs $642.00 without a pyrometer and $672.00 with a pyrometer.

Ken Olsen

INTEROFFICE MEMORANDUM

DATE January 11, 1965

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

The next time you order something from Sears, will you order a break-lining kit, #28H1933 at $1.49 and the weight is 1 lb. 4 oz. This is a little hand riveting kit which might possibly be a convenient thing to give with our blank modules for riveting on handles.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 11, 1965

SUBJECT

TO George Gerelds
Ron Cajolet
Ed de Castro
Nick Mazzarese

FROM Kenneth H. Olsen

For the first model of the PDP-8, it will be important that we have bat handle switches but we will not have them molded by that time. Will you have Linc cut and glue up 26 switches like he did the sample he made for me a few days ago. He'll have to glue them with epoxy glue because the plastic glue doesn't work well on these plastics.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 11, 1965

SUBJECT Power Cord for PDP-8

TO Ed de Castro
Ron Cajolet
George Gerelds
Nick Mazzarese

FROM Kenneth H. Olsen

It was decided to bring power into the desk model of the PDP-8 with an extension cord like we do with the test equipment power supplies. There is a male and female recess socket mounted behind the power supply.

This won't work, however, in the cabinet model version and we have worked out a very neat solution for this. We will bring the power into the top two terminals of the circuit breaker which are readily available. We'll then replace the male recess socket with a second female and it will make the power supply look like it was designed for this.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 11, 1965

SUBJECT Company Stationery

TO Jack Atwood

FROM Kenneth H. Olsen

I think the Company stationery is very poor. I would also like some better stationery of my own. Let's call in an outside stationery firm to make proposals to us. If we bring in several, we'll surely get some good proposals.

Ken

KHO:ecc

dec INTEROFFICE MEMORANDUM

DATE January 5, 1965

SUBJECT Notes on PDP-8 Power Supply

TO Dan Wardimon
Dick Best
George Gerelds
Ed de Castro

FROM Kenneth H. Olsen

I would like to suggest that we use plastic covered octal plug-in unit relays for the PDP-8. A dp/dt unit with 10 amp contacts which could quite comfortably break the main power line if both sides are broken. The number of operations of this relay during the life of a computer is very small.

I think we should have an identical relay for break 110 volt line which will be used to supply delayed signal to the other devices.

I think we should use another plastic enclosed plug-in relay with low voltage contacts to break the memory supply lines. I don't think we should use a contactor which is made for very large currents at 110 volts AC. The gold plated, low voltage contacts will be enclosed in plastics. Plastic is much more reliable and a lot less expensive. I would suggest that all of the diodes, modules, and the bulk of the wiring be made on one plate. On this plate, a right angle racket could hold the three relay sockets, the circuit breaker and the time meter. If all of this is wired on one flat panel, it would make assembly a lot easier.

I am very much worried about the transients being sent through the system when we turn on the memory supply voltages with the relay contact. We should try some kind of filtering for this.

Voltage coming in and out of this panel should go through our flush mounted tab contact filter capacitor.

If we lay out the supplies so they could also go on the back of the plenum door, we might end up with more freedom as to how we mount the computer in a cabinet.

If we put marginal intake switches onto the frame of the computer, we could use our rocker type switches which are quite economical. When we reorder the power supply we may want to send a tap winding on the marginal check supply in order to cut down the number of diodes. We could make the marginal check supply a lot smaller by making a supply with the potentiometer and a rectangular meter.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 5, 1965

SUBJECT

TO Bob Hughes

FROM Kenneth H. Olsen

I am concerned with the quality of the octal tube socket which we use for our relays. At one time we specified a cinch socket which was of military quality but I'm not sure what we are using now. It would be a good idea to make sure that we are using the best socket.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 4, 1965

SUBJECT PDP-8 Power Supply

TO George Geralds
cc: Dan Wardimon
Loren Prentice

FROM Kenneth H. Olsen

The power supply we need to put in the PDP-8 box is not very complicated and is not very big but the biggest problem we have is that we really need a panel to mount the controls and there is just no panel space available. I suggest that we use the back panel of the computer for all these controls. We might snap over this a decorative panel if people want to so that it is not always open.

On this panel, I would put the module checking knob and meter. Also the circuit breaker and I'd also put a standard male and female socket like we do in our standard power supplies.

If we use a Chicago lock power switch on the front panel, we'll need no power contactor within the power supply and we can get rid of that relay. Dick Best says that we don't have to supply delayed signal for the peripheral equipment so we can get rid of that relay. We have so much control in those regulated supplies it would seem to me that we could be clever enough to turn off the regulator in order to get a delayed memory voltage. If we can do that, we can get rid of the third relay which simplifies the supply quite a bit.

I would mount the diodes, the sockets, and the regulator transistors on the front panel. Check with Dan Wardimon and see if the power transistor can be mounted on the front panel without a separate heat radiator. The front panel is so large that I would guess the heat radiator is not necessary.

Remember, we have to have a filter in the bottom of this power supply because it will supply the filtered air for the rest of the computer.

I would like to see along the top of the back panel, a row of our tab terminal 2x.1 filter capacitors. These then would be the terminals for the signals going in and out of the power supply and would both be filters and terminal strip.

There should be feed through tab terminals on the front panel to drive those switches on the control panel which are connected to the power supply.

Ken Olsen

KHO:ecc

INTEROFFICE MEMORANDUM

DATE January 4, 1965

SUBJECT Further Notes on the PDP-8 Control Panel

TO Loren Prentice
cc: Ren Cajolet
Nick Mazzarese

FROM Kenneth H. Olsen

Panel Layout

After looking at the front panel layout for several days, I have concluded that the labeling of the switches is quite confusing. I think we should very carefully consider the abbreviations and see if we can't come up with something better. I find that the single step and single instruction are particularly confusing.

Personally, I would like to see the extended field lamps in vertical line with the extended field switches. I think this would tie the switches and lights together in a more logical way than it is now.

I think there should be only a small space between the register switches and the control switches. Instead of the present blank switch, if we had 3/16 or 1/4 of an inch space, I think it would be less confusing and more efficiently spaced.

If we have a key switch on the computer at all, I'm afraid it has to be in the front. It is quite impractical to expect people to open up the machine to get at the key. I suggest that we have two Chicago key switches on the front panel. One could be for power and they can handle 10 amps and so there would be no need for a power contactor at all. The other would lock out the control panel. The main reason for having two switches is for symmetry. I think they will fit nicely, one on each side of the panel.

The Chicago type 4073-2 has normally open contacts which are rated at 10 amps at 110 volts AC or 10 volts DC. The key is removable in off and on positions. It fits in a 3/4" diameter D hole and is about 1 1/2" deep. It has soldered terminals. It is a very attractive switch and the key itself is quite good. It is available only in single pole, single throw.

The Chicago type 4235 looks the same as the 4073 from the front panel but I believe it has a microswitch installed in the back. It comes single pole, double throw but the contacts are only rated for 7 amps.

We should consider making the front panel 19" wide and substandard height so that it can fit in any 19" panel.

When we get our industrial designer here, we should make sure we use the layout of the glass panel from an artistic point of view. It seems to me that some of the separating lines are too wide. This is such a dramatic vehicle, it's a shame not to take advantage of it. Maybe we should have some of Jack Atwood's artists also

see if they can come up with some ideas.

Mechanical Construction

I'm afraid of our present way of constructing the control panel. I am afraid that it is going to be flimsy, expensive, and very hard to build.

Here is a brute force way which would make a heavy but simple control panel. Laminate the silk screened glass to a piece of pre-cut, drilled Benlux 70 (masonite.) The sandwich would then be 3/4" thick and it could be edged with table molding. The molding could be nailed right into the masonite. A nice thing about this sandwich would be that threaded studs or bushings could be installed before the laminating and it then makes a very simple way to tie the etched wiring board to it and to tie the whole panel to the frame of the computer.

The angle on the bottom of the panel could also be tied directly to the masonite. If the angle is cut out of sheet aluminum with a cutout for the switch position and then bent to an angle, then the Chicago switches would hold this angle in place.

Etched Wiring

I'm afraid that our present approach to etched wiring indicator lamps and switches is going to be a very crowded and unbusinesslike collection of parts and wiring. I would like to see us separate the lights from the transistors and have a row of terminals or etched contacts on the edges of the board. We could have a row of 81 terminals along the top and then two or three rows of transistors with the resistors. I think we can do this all with one sided etched wiring and end up with a very neat board.

If we have enough room behind the mounting panel, it would be nice to mount Sylvania sockets the way George Geralds is mounting them on the new educational line.

I don't think that we will be able to mount the switches on etched wiring. The grease that comes in the switches is very important and we'd lose that if we wash the switches out like we normally do with things mounted on etched wiring. However, there is very little to gain with etched wiring and we might as well tie the switches directly to the cable. This means, however, that we have to mechanically mount the switches somehow. I would suggest two strips of steel angle. The switches could be riveted, eyeleted or spot welded to this. I suggest steel because it has to be quite strong.

Switch Bat Handles

When I first suggested the shape bat handle on the switch, I had in mind not having any strip underneath the switch. Now that we have the strip there, we can reconsider the design of the switch. I would suggest that we simply cut off the tabs which are at right angle with the main line of the switch. The switch now has three planes which show from the front. This will keep it down to just two.

KHO:ecc

Ken Olsen