INTEROFFICE MEMORANDUM

DATE August 28, 1964

SUBJECT

TO Henry Crouse
cc: Stan Olsen

FROM Kenneth H. Olsen

As soon as we get our new small ceramic chips, I'd like to cement them onto tie clasps and use these for advertising. I think they will be much more effective than the handles which Stan is now handing out. Will you find tie clasps for us which would be smaller and would be suitable for mounting the new small chip on. The base of the tie clasp which we give to those who have been at Digital for 5 years would be good.

Ken Olsen

KHO:ech

digital MEMO

DATE 8-25-64

TO Ken Olsen FROM Arthur Hall

Ken,

The computer refered to in the Business Week article was ours. The article meant to say system instead of computer. They run this system 24 hrs/day except when it goes down. The computer has been down twice for an hour or so each time (AC board & Teleprinter board.) U.S. Steel & Foxboro are very pleased with the operation of the computer.

AH/m

dec INTEROFFICE MEMORANDUM

DATE August 24, 1964

SUBJECT

TO Arthur Hall

FROM Kenneth H. Olsen

On page 88 of the August 15th "Business Week" magazine, is part of an article on a review of computer controlled oxygen furnaces. They quote a man from U. S. Steel as saying that the biggest problem they have with their computer is getting it to the point where it can be operated without servicing. Since the end of January, they have had only 85% useable time, which is poor for a controlled computer.

This sounds like our computer and I'm appalled at the poor operating rate. I'm sure this is not the whole story but I would be interested if you could find out more details on this from Foxboro.

Ken

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 24, 1964

SUBJECT

TO Bob Hughes
Jim Cudmore
cc: Len Hantman
Maynard Sandler

FROM Kenneth H. Olsen

I have been disappointed that we have not been able to cut down the module test personnel more drastically since we have incorporated the automatic module tester. We at one time had great plans and made great promises. We even at one time said that this would be ideal for the small production module because it would eliminate making a test jig and one could just call up the test he needed by punching a tape on a Teletype typewriter.

Many of these things may be impossible and we may be now getting optimum use out of the module tester but I think it is now time for us to review in detail our accomplishments and make our plans for the module tester's future. Will you prepare a report for the September 2nd ~~Module~~ Computer Guidance Committee. This should be very short and it can be in outline form but it would be a good idea to have it on paper so that we can document what our plans are.

Ken

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 24, 1964

SUBJECT News Releases

TO Jack Atwood

FROM Kenneth H. Olsen

We're now doing a lot of interesting things -- new modules, new computers, and computers being used in strange places and I think we ought to have a news release in the local newspapers every week. Will you have your news release man make out a schedule for the next few months listing what news release we will release each week.

Ken Olsen

KHO:ech

cc: Harlan Anderson

INTEROFFICE MEMORANDUM

DATE August 24, 1964

SUBJECT Belmont Springs Water Coolers

TO Henry Crouse

FROM Kenneth H. Olsen

I am starting to doubt our wisdom in buying Belmont Springs water. The water coming out of some of the water coolers tastes rather foul to me and I usually avoid drinking it. I believe it is also quite expensive. Will you look into the cost and wisdom of buying water this way and compare it with having water coolers which can be connected to the plumbing. One possible solution would be to buy units tied to plumbing from now on and put them in the areas which can be connected readily. We have enough bottle-type units to be used in those areas with no plumbing.

Ken

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE August 24, 1964

SUBJECT

TO Maynard Sandler

FROM Kenneth H. Olsen

I went through the plant on Sunday when it is possible to see things that one often misses when there are a lot of people around. We, in general, are a very neat plant and we do get a number of favorable comments. However, in our minds I am afraid we are competing in neatness with the Universal Toy and other local factories when we really should be competing with people like IBM and Xerox and I think we should set higher standards of neatness and cleanliness. Here are some suggestions - most of which I think are things which you can take care of.

We could very inexpensively put sheet rock on the outside of the studs of the wall covering the Accounting area. We could do this and paint it with the summer help. It only has to go seven or eight feet high and above that the studs could show.

The portion of Santa Claus's shack which is in the corridor outside the Carpenter Shop should be thrown away or stored somewhere which is less conspicuous. This corridor should be completely clean and neat.

Some of the machines in the Module Production area are dust-covered like the Eubanks and underneath the machines are parts and stuff which has accumulated for months and will probably be eventually thrown away anyway.

Paul Green's old work benches look poor. Maybe we should move him back in the far corner or maybe give him more bench space or maybe just moving him might clean up the benches during the move.

Jack Smith's area should be swept more often.

Ken

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 24, 1964

SUBJECT

TO Loren Prentice

FROM Kenneth H. Olsen

On the Engineering floor, there are one or two of our standard computer cabinets which are unused or not very well used and it might be a good idea to pick them up and paint them and use them for some of our production equipment which we are building. In the display area, there's an unpainted cabinet which is rusting and looks completely unused and we might be able to salvage if we take it now.

Ken

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 20, 1964

SUBJECT

TO Jim Hastings
cc: Russ Doane

FROM Kenneth H. Olsen

I understand that Russ Doane is going to talk about the 30 MC Module line to the NEC Conference in October. Will you make sure that the schedule is set up for this talk so that it is written well before the conference and that we have a dry run so that people can give suggestions well before the Conference. It might well be good to have Russ write it and give this to the Sales Meeting in September or we might want to give it at a special noontime seminar where Russ can present it.

We want to schedule the slides because they are very important and we want to make sure that the slides which we have are attractive, meaningful, and can be read by a large audience. When you have the schedule for this, please send a copy to me and a copy to Jack Atwood because he will be involved in bringing the slides.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 20, 1964

SUBJECT

TO Phil Backholm

FROM Kenneth H. Olsen

When laying out the resistor trimming device, I would suggest that you build it on two of our standard 6' cabinets and put a PDP-6 type winged console on it. The winged console will allow storage of the devices before and after test and with two cabinets we then can have the freedom to have our extensive type monitoring equipment. I would guess that we want to grind up to six components at one time but they can be various mixtures of resistors and capacitors. We need a room for just resistor monitoring. We will then have problems in measuring capacitors.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 20, 1964

SUBJECT

TO Maynard Sandler
cc: John Culkins

FROM Kenneth H. Olsen

When we made the new parking lot, the contractor was going to put lawn on the edges. We told him no because we planned to put multi flora roses which would make a very dense and attractive screen there. However, the project dragged on so long that we forgot what our plans were and it is now well past the planting season. Will you make note that next spring we want to put multi flora roses in and you might want to consider the possibility of using our present summer help to rake down the area so that when spring comes we can very easily put in the multi flora roses. We ought to rake down the area and put a little topsoil on it and put some temporary winter rye in right now to hold the soil and help enrich it before spring comes.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 20, 1964

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

We were eventually going to put power transistors on our new small modules. We will need a heat sink in order to do this. The new Burroughs high-speed card reader has modules very much like ours but twice as wide and they have a very neat heat sink. Will you look for a standard heat sink which we could fit on our module like Burroughs does. Because we want to stand out high enough to dissipate heat it will have to take two slots. It could be about 3/4 of an inch high. The fin should run vertical when the module is plugged in.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 18, 1964

SUBJECT

TO George Rice
cc: Dick Best

FROM Kenneth H. Olsen

Dick Best has been working out a new cabling system for the PDP-6 which uses smaller cables and the new small modules. This will eventually cut the cost significantly in the PDP-6. You might get in touch with Dick Best to see how far along this is worked out. It might be a good idea to sell this system to M.I.T. and would be a good chance for us to debug it before we use it on the PDP-6.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 18, 1964

SUBJECT

TO George Rice
cc: Stan Olsen

FROM Kenneth H. Olsen

I think your biweekly report which criticizes our computer advertising is very good. Why don't you try handwriting a few ads and see if we can get the message across. Don't try to do it in polished form because we can easily get people to criticize and correct after we get some ideas down on paper.

One conclusion I drew from your criticism is that we should have an ad like 3 C's does which gives a complete picture of all the computers which we have to offer.

If BBN criticized our software, it's their fault. They bought the machine when there was absolutely no software and the promise that there would never be any. We paid many thousands of dollars to them to get software which was never really delivered.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 18, 1964

SUBJECT Temperature Specs on New Module

TO Module Guidance Committee
cc: Loren Prentice
Scott Miller

FROM Kenneth H. Olsen

When we found that we are limiting the economy and driving capability of our new module line by making it go to 100° C., I arbitrarily but definitely said that this will not be part of our specification. We will make an economical quality unit which will run at the temperature range in which one can reasonably expect any of our users to need. 75° C. is probably way beyond that range. 75° C. is probably low enough, however, that it doesn't cost us anything to go that high.

I feel that for now we should use a low temperature plastic handle and later on if we want to make the modules go higher we can then pay the price and buy the more expensive plastic.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 17, 1964

SUBJECT Conveyor for Oven

TO Ken Fitzgerald
cc: Jack Smith
Tom Stockebrand

FROM Kenneth H. Olsen

Several conveyor people, including Boston Gear, have a flat type conveyor chain which has the links on 1 1/2" centers and 3 1/2" wide. If we made our silk screen conveyor with this type unit, it would make it possible to make very positive indexing so that we would always know where a chip was and we could unload it onto the oven conveyor very precisely.

There are special sprocket drives for these conveyors, one of which has 25 teeth or 12 1/2 indexes around it. If we drove this from a Superior Electric stepping motor, we could count the pulses so that we indexed the conveyor 1 1/2" per step. We could then dump one silk screening's worth of chips on each section.

Our teflon coated fiberglas cloth belts are not very good looking and one of these units might look better. They are available with nylon tops but I'm not sure that would tolerate the temperature that we want to drive the units on.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE August 17, 1964

SUBJECT Possible Pitches for "Electronic News" Release

TO Jack Atwood

FROM Kenneth H. Olsen

"Cost saving of integrated circuits without limitations in integrated circuits."

"Economy of integrated circuits without problems of integrated circuits."

"Part of a computer-aided design program."

"Used in the new PDP-7."

1. Order wrapped on Gardner-Denver machine.
2. Wire wrap instruction cards programmed on PDP-4 computer.
3. Secretative low price of PDP-7.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 13, 1964

SUBJECT "Flip Chip Module" Catalog

TO Jack Atwood
cc: Stan Olsen
Burt Scudney
Ted Johnson

FROM Kenneth H. Olsen

A number of good ideas came out of our meeting this morning. We decided that the cover should be a large picture of the module with some of the bear chips showing the resistors and conductors on them, laid out some way so that they could be seen clearly.

We also decided that the key messages which we want to get across will be done with photographs and captions. We'll have the following pictures:

1. Automatic module tester -- assures the proven DEC quality in quantities to supply OEM users.
2. Mass production facility -- allow uniform product at lowest price.
3. Ceramet circuits -- use most modern technology and allow optimum circuit design.
4. Design for automatic system design with application rule so simple the machine can understand them.
5. Automatic wiring -- for too high production of systems.

Picture number 1 is a close-up of our automatic tester. Hopefully, we could have some kind of a conveyor bringing the modules up to the testers for the photograph.

Number 2 is a picture of our automatic etching line or modules coming off the conveyor or ceramic chips coming out of an oven.

Number 3 is a close-up of a chip showing the printed resistors and conductors and semiconductors.

Number 4 is a close-up of system design being done on the computer display with a light pen.

Number 5 is a close-up of a Gardner-Denver machine wiring our panel. Chuck Stein is suppose to have gotten this last picture when he was out at Ohio.

Barbera Stephenson is collecting a list of all the miscellaneous modules which we will include in the back page. We'll divide this into sections. The first section will be the 10 MC modules, the next section will be the A-D modules, the next section will be the converter and special modules. We should also mention the fact that we have cabinets and indicator panels and power supplies. Maybe the power supplies and mounting panels should have their prices listed.

Ken Olsen

dec INTEROFFICE MEMORANDUM

DATE August 13, 1964

SUBJECT Allowance for Automobile Travelling

TO Ted Johnson

FROM Kenneth H. Olsen

I've heard that a number of people have criticized our policy of paying $.08 a mile for the use of one's own automobile. I think it comes under your job category to work out a proposal which would be fair to everyone.

I have been involved in this enough to realize that there is an awfully lot of cloudy thinking. Some people will charge twice for tires, for example. They will depreciate for the car if it was brand new and, in addition, charge for tires, which is, of course, foolishness. I don't think that it is practical to go into all sorts of detail and answer everybody's questions individually but I would like to have you write a proposal for the Works Committee which will be in the form that we could then send out to employees as a statement of Company policy if it is accepted by the Committee. I think it should be based largely on what other companies do. We have made limited surveys of this and the results are probably available. We also have a number of handbooks and Bob Lassen had contact with many other companies and we can see what they do.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 10, 1964

SUBJECT

TO Win Hindle
cc: Harlan Anderson

FROM Kenneth H. Olsen

At times we have had propositions from organizations to help us train our middle management. I think we should review these possibilities because I think that, as our organization is becoming more structured, it is becoming more and more important that our people understand what a manager is and what his responsibilities are. We have a number of managers who have certain general ideas of what it means to manage but have very definite gaps in their knowledge. I think some of those with the biggest gaps are those who have worked with me for many years or who have come from MIT where there's little appreciation for management.

If we're going to send Jon Fadiman to Europe in the immediate future, we should consider taking the time now to send him to some school where he would learn some of the skills and responsibilities of managing.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE August 10, 1964

SUBJECT

TO Russ Doane
cc: Don White
Dick Best

FROM Kenneth H. Olsen

There's a possibility that we may want to re-do the PDP-6 using small modules with automatic wiring. As you continue working on the regular modules on the PDP-6, will you think how you would relay and mount the small modules so that if we want to put on an emergency push you'd at least have some thinking done already.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 10, 1964

SUBJECT Soldering of the New Modules With Chips

TO Cy Kendrick
Loren Prentice

FROM Kenneth H. Olsen

When we get into the production of modules with chips, I think we should develop a completely different way of handling the modules. Right now we have girls assemble them and then we store them and then put them in the soldering. This involves a lot of handling which will not be necessary when we're installing a small number of parts.

Here's the way I think we should do it. We'll have a conveyor belt running down the middle of the bench with girls on each side. This conveyor will be the same chain conveyor which goes into a wave solder machine. It will actually be on top of the bench and it will be made up of the wave solder machine components which Hollis makes. Ideally, after soldering, the conveyor will take it through two or three steps of cleaning and then they will be piled up. Each girl will completely assemble a module. She'll have those chips which are necessary and she will drop them in with little or no crimping of the wires. Then while the board is still held upright, she will drop it on the conveyor or it will go into the solder machine and never be tipped on its side or have any other handling after the girl drops in the parts. Because there are so few chips per module, assembly time will be very short and if we don't work out very streamline methods of handling the unit, we will spend more time and money handling the modules than we will in assembling them.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 10, 1964

SUBJECT

TO Maynard Sandler

FROM Kenneth H. Olsen

I'm sure that you are taking care of this already but while I am thinking of it, I'll drop a note to you.

Our automatic inventory system does not take into account that we are obsoleting the PDP-1 and PDP-4 and that if we follow the rules conscientiously, we'll build PDP-1 and PDP-4 modules even after we've stopped making the machines. We should add some sophistication to the system so that we have an automatic means of taking obsolescents into account.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 10, 1964

SUBJECT

TO Chuck Stein

FROM Kenneth H. Olsen

We may suddenly want to put on a big rush to do the PDP-6 for automatic wiring and new small modules. Will you think about a schedule enough now so that you could tell me how long it would take before your automatic design program would be in good enough shape to contribute to this. I assume by the time we decide to do this the automatic wiring program would be done.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE August 3, 1964

SUBJECT

TO Stan Olsen
Jack Atwood
Jim Lozouski
cc: Tom Stockebrand

FROM Kenneth H. Olsen

Tom Stockebrand is making a series of chips to be shown at the WESCON Show. There will be a chip for each step in the process. The first step is the bear ceramic chip, the next one has the conductors down, the next one has the resistors down, the next one has the dialectric down, the next one has the silver conductor down, the next one has the semiconductors in place, the next one has the leads put in place, and the next one has them coated.

The final unit will have more than one coating but this is one of the tricks in the process and we don't want to let it be known. There will be many tricky operations in this thing, especially the way we make our capacitors, and it is just as well that our salesmen don't know them all because they can avoid answering questions then.

Tom may not have the final coating material but we ought to coat them with a blue material which we will probably want to use eventually. Because CTS uses a sky blue or baby blue covering on their units which will look very much like ours, we should use a darker blue - Scott Miller has the color picked out. We should perhaps order a rubber stamp so that we can rubber stamp model numbers and the name of the company on each of our small chips.

We should take these chips and generate a display board which shows each step and either has a short explanation or maybe a picture demonstrating how it's done in production or what it looks like through a magnifying glass.

We should also have a display board with a sample of each of the modules we now have in production. We probably have 40 modules and we might fill up both panels of the middle section with all the modules we have. For a few of these we're going to have to use the blue chips in order to get the point across that we use some blue chips and some with discrete components.

I'd like to know who is going to take the responsibility for following through on this to make sure it all happens and gets integrated into the system.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 3, 1964

SUBJECT

TO Jim Hastings
John Culkins
John Trebendis

FROM Kenneth H. Olsen

Sometime ago I spent almost a year on the outside of a prisoner of war camp. It's rather depressing even though one is on the outside. All of these feelings are revived when I walk through the Engineering floor with the high chicken wire fencing and all the bear wood showing. In spite of the high intensity of florescent lighting, it is dark and completely colorless.

I would like to see you try to remove as much of the chicken wire as possible and to brighten up some of the walls with some of our normal blue wall paint.

Now that we're planning to have a full-time stock clerk and to have John Trebendis supervise the Engineering stockroom, I think it would be a good idea to move the stockroom. In its present place, it contributes to the prisoner of war camp appearance and also limits the generous open space feeling which we should have. We save the corridor space on the north end of the floor so that we can move large things out that should be brought back, but if we move the stockroom up against that wall, we could still have it as a corridor even though it would not be in a straight line between the two doorways. If we turn the responsibility of this over to John Trebendis, it would be a good idea to also allow him to lay out a new stockroom.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 3, 1964

SUBJECT

TO John Trebendis
cc: Maynard Sandler

FROM Kenneth H. Olsen

When you take over the responsibility for the new Engineering stockroom, I suggest that you propose a new room for it. If this is off against one of the blank walls, it would not cut up the room as badly as the present one does and it might be easier to keep under control. If you lay it out, I would like you to consider the possibility of eventually stocking all of the DEC-owned modules for the Engineering Department and maybe eventually stocking all the test equipment. I get the feeling that our present Test Equipment Headquarters does a good job of maintaining the equipment but they don't have the attitudes which make a stockroom. They take pride in the equipment and the stockroom takes pride in keeping the equipment nicely on shelves so that they can distribute it efficiently and effectively to customers. There's also a lot of equipment which we buy which we should consider test equipment. The test equipment people tend to only want to consider the material test equipment which is of the high technical electronic nature.

Maynard Sandler is afraid that if we stock the test equipment on the floor below, the module testing people will not get good service but I am sure you could work that out. The test equipment would have to be maintained under regular basis by the Test Equipment Headquarters people but a little system would make that work out very easily.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 3, 1964

SUBJECT

TO Bob Hughes

FROM Kenneth H. Olsen

I'd like to see, sometime, a written procedure for quality control of the gold plated contacts which both Quality Control and Manufacturing will agree on. When you come to an agreement, will you send a copy of the procedure to me.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE August 3, 1964

SUBJECT

TO Harlan Anderson
Win Hindle
Dick Best

FROM Kenneth H. Olsen

Our engineering programs in the immediate future are fairly well laid out and we are all enthusiastic about them but I think it's time now for us to look at those areas which we want to be strong in a year from now. The one area which I think is going to pay off well in that time will be automated design. We have given Chuck Stein some freedom in this area but I don't think that it will be enough to make it a key product for us. I think he will do a good job in designing logic and circuits and will sell several computers as a result but we should consider a program to do this more extensively.

One time we thought of hiring Dr. Larry Roberts from Lincoln Laboratory but he was not interested. Now that we have a PDP-6 with the possibility of a large amount of memory, we might be able to offer him an interesting opportunity to do automated design with a decent size computer.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 3, 1964

SUBJECT

TO Dick Best
cc: Bob Hughes

FROM Kenneth H. Olsen

The meetings we have been having for the last couple Monday mornings discussing our plans for going into the semiconductor manufacturing business, have been very worthwhile. They have done a lot toward educating ourselves and also in firming up our plans in this area. I'd like to have you continue these meetings while I am away because I think it is very important.

Bob Hughes is getting ready to make a complete proposal for going into this business. It will include equipment, schedule, and plans for devices. I think that the continuation of these meetings will help Bob in this proposal because he will be able to sense the attitude and desires of the company during the proposal and he will be less likely to deviate too far from what we would like to go into.

The schedule I have in mind is to try to have diodes that we can use within four months and transistors within a year. Making transistors will not make any significant contribution to our manufacturing cost because we use relatively few. Diodes, however, will make a tremendous difference. The transistors seem to be so much more critical, both in manufacture and in those factors which cause degeneration and time, that I would like to postpone our manufacture of them until we are very confident of our results in making diodes.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 3, 1964

SUBJECT

TO Dick Best
cc: Gordon Bell

FROM Kenneth H. Olsen

I think it would be a good idea to continue work on our new cabling system. I think it will be significantly more economical and as we get into a less expensive computer like the 6A or when we want to lower the cost of the 6 significantly, this will make a big contribution. We should do this reasonably soon because people in the field will want to tie machines they buy now into a common buss system with machines which we will be making later on.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 3, 1964

SUBJECT

TO Ken Fitzgerald

FROM Kenneth H. Olsen

We now seem to get regular visits from our own personnel in the gold plating and automatic etching facility. Will you get some signs for us which are not offensive but which would say "Authorized Personnel Only." In addition, will you set up so we can lock the gates at night so people understand that we expect them not to be in there at night. You might use combination locks and write the combination on the wall so that all the people who should get in can see it. Even those who might figure out what the combination is at least know that they are doing wrong when they walk through it.

Another possibility would be to use a padlock and hasp and remove the pin in the hinge of the hasp and replace it with a nail so that it could be just lifted off when the door is to be opened. The only purpose of the lock is to define this area as off limits.

If it is easy to do, you look into the possibility of having a photo electric alarm system that would send a beam down the full length of the fence so that we can tell if anyone did pass through at night. The gong going off would sure discourage anyone.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE August 3, 1964

SUBJECT

TO Roger Melanson
George Gerelds

FROM Kenneth H. Olsen

When we first decided to make our new small line of modules, we were going to use heavy lines with big lands to make production easy. As we started to stuff a lot of components into the modules, we found that we needed small lines. I would suggest that now we use big lines and big lands except in those areas where they won't fit and we should cut down our reject rate.

Ken Olsen

KHO:ech

Roger: You made a good presentation on your personnel needs the other day.

Ken

INTEROFFICE MEMORANDUM

DATE July 31, 1964

SUBJECT

TO Ken Fitzgerald

FROM Kenneth H. Olsen

There's one more conveyor which we need for our gold plating line and that's the device that takes the gold plating rack from the end of the line and returns it to the front part of the line. The present racks detract from the efficient look of the system but also I think that they would be much more awkward than a conveyor.

A conveyor using gravity and no holders would be ideal. It should be high enough so that it doesn't hit people's head or detract from the view of the whole system.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE July 31, 1964

SUBJECT Notes on Production of Cera-circuits

TO Jack Smith
cc: Tom Stockebrand
Phil Backholm
Loren Prentice

FROM Kenneth H. Olsen

My goal of having us going through the production of cera-circuits immediately is to have us learn the production problems as soon as possible. A good part of the problem in this process is the material handling and if we tried to define all the processes before we get experience, we will probably add so many safety factors that it will be an impractical system.

I don't want us to set a production goal but rather say that we should develop the capability which is most convenient. There are four screenings and three of four firings. We can do this with one screen and one oven or we could have one screen and one oven for each operation.

The steps as I see them now are as follows:

1. Screen and fire the gold-platinum conductors.
2. Screen and fire the resistors.
3. Screen and fire the glass dialectric.
4. Screen and fire the silver top plate of the capacitors.

If the systems are set automatically, firing them may not be worth separating because the furnace might just be the back end of the conveyor leading from the silk screen because the front is our critical and the chips go through them very quickly.

One of the questions is how do we temporarily store the chips in process. After they have been fired, they can be readily carried around in the basket. Centra-lab dumps in a basket after the screening is dried and later on they fire them in a large kiln. Storing them temporarily on a conveyor belt has the advantage of their keeping their orientation and before they are fired they are protected from abrasion.

One possibility would be to do all the screenings, except the resistor, at the same rate at which they are fired so that it is a continuous process and after the firing they can be dumped in boxes for temporary storage. The operator would then take them out of the box and orient them as they go into the silk screen machine. It seems unlikely, however, that we'll ever get a kiln that will fire resistors as fast as we would like to silk screen them. In this case, we do need some temporary storage. We could either store them in a basket like Centra-lab or we can work out a conveyor that will keep them all flat. The square feet of the conveyor necessary to store 20 or more thousand units is not very large but the logic of it is very difficult and might be impractical. We could find out from our present screenings as to whether the resistor material tends to be damaged when they are stored in a box.

Tom says that he now expects to put the semiconductors down into the wet silver paint before it is fired. When we do this, I think we will have a long linear indexing table which will have six stations which will automatically put the semiconductors down into the silver paint. Because we will be handling these units automatically, I would suggest that we also silk screen the silver ink at one of the indexing stations. This means that the paint will definitely be wet just before the semiconductors are put down. We should take this into account because it will mean that we would not buy a separate silk screen machine for this but build one of our own on top of this indexing station.

Another decision we have to make is whether we like our present silk screen machine or not. It is plenty fast enough and if we put an air cylinder on the drive, the operator is then free to inspect and orient the chips before they put them in the machine.

When we get a schedule on the wire inserting machine, we may want to consider a very simple jig for installing the wires by hand. We could even trim them by hand but we do need an arbor press-like device to squash them into place.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE July 31, 1964

SUBJECT

TO Loren Prentice
Ken Fitzgerald
Dick Richardson

FROM Kenneth H. Olsen

In the July 1964 copy of "Industrial Design," there is an article on "Finishes" from page 37 to 45. There's a particular section on finishing a computer. This tells about Univac's experience but I think it might bear on our own.

I am attaching the magazine to Loren's memo and he can pass it along to Ken and Dick.

Ken Olsen

KHO:ech

WU1 PD INTL STOCKHOLM VIA RCA 28 1416

LT DIGITAL EQUIPMENT

MAYNARD MASS

ATTENTION KEN OLSEN CABLE T R L LANE RECEIVED STOCKHOLM

TYXXX TUESDAY WILL CONTACT VARDA

TELARES

CLR

RWU1

July 27, 1964

Telegram to Bob Lane
cc: Harlan Anderson
Stan Olsen
Nick Mazzarese

Mr. Varda is very upset because of a rumor that DEC is considering merger with Bunker-Ramo. This is foolishness. I never heard the rumor before and would never consider it. Please acknowledge your receipt of this telegram.

Ken Olsen

Telare AB
Industrigatan 4
Stockholm K, Sweden

INTEROFFICE MEMORANDUM

DATE July 2, 1964

SUBJECT

TO Tom Stockebrand
cc: Bob Hughes

FROM Kenneth H. Olsen

I just visited the Fairchild transistor plant in Portland and it's interesting to observe that this company which is famous for being so old and forward looking is doing everything manually and in a rather old-fashioned way.

After looking at their movie and observing all the steps in potting transistors, I again am wondering if we shouldn't just use diodes to start with and, after we get that down, work on transistors. There are so very many steps involved that I can't imagine us getting them all to work in any reasonably short period of time.

Your idea of keeping on a disk for all the final test and inspection is very good. Much of the trouble they go to here is in orienting the dice after they have been broken away from the disk. If you could fashion the disk down to a flexible steel plate with a low temperature solder, or some other conductive cement, we could do all the testing and inspecting while they are in that shape and then pick them off with automatic equipment. When we make our own transistors, or if we have them made to our specifications, we should have them made on centers for which we can easily get a lead screw.

I did not ask detailed questions but in looking at their testing procedures, I have concluded that many of the transistors I saw the yield was less than 50%. Some of the disks they were probing and marking the yield was no more than a third. This would make transistors very expensive if they bought them by the disk.

The nailhead bond has one operation and they leave the wires dangling. Then, as a separate operation, they spot weld those leads onto the header. The bottom electrode of the spot welder makes contact to the header lead either above or below the header and the small wires spot welding the plate. They'd like to do both operations at one time but so far have not been successful.

They have put a draft shield around their nailhead bonder because the slightest draft can upset their bonding. They also heat their capillaring because they find that this makes a better bond.

Before they put the dice on the header, they spread them out on a brass plate with the appropriate number of gold preforms and the girl then lifts off a preform and then a dice. The headers are placed in a four position rotary table so that they are up to temperature before the dice are smeared into place. There is also a glass of nitrogen at each position to prevent oxidation during the high temperature.

They scribe the bottom side of the disk because it is softer. This would be very difficult to do if we used your idea of fastening them to a steel plate. In order to locate them, they have to fasten them to a glass plate so they can see the underside. I forgot to ask them what kind of wax they used for placing them on the glass plate. They position them by hand with a small Ungar soldering iron with a face the size of a disk. They are referenced to two sides of the glass plate and the glass plate is then put in a scribing machine.

We could probably cut them apart or groove them quite deeply with a white abrasive drill. This way we will probably get a lower reject due to scribing problems and we could then cut through the top. In this way, the disk would not have to be placed down as firmly as it would be placed down if we spread it into a diamond sewing machine.

The first operation they perform is a lapping operation where they lap the disks down to very thin thickness. This is particularly important to transistors to have saturation characteristics like the ones they use. If we buy equipment, we should remember to buy one to do this operation.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE July 1, 1964

SUBJECT

TO Frank Kalwell

FROM Kenneth H. Olsen

When we moved the cardboard boxes and the display equipment out of building 5, we left a rather elaborate audio recording system which we had developed for our displays. Will you make sure that this, and anything else which was left over from the display business, be put in storage in building 12.

Ken

KHO:ech

INTEROFFICE MEMORANDUM

DATE July 1, 1964

SUBJECT Space Advertising

TO Sales Newsletter

FROM Kenneth H. Olsen

We ran rather extensive and expensive ads on the PDP-5 for a short period of time as an experiment to see how worthwhile it was. Since then we've asked our sales offices if they have noticed any response from these ads and have gotten no answer so I tentatively conclude that it is not worthwhile and I proposed to Jack Atwood that we eliminate this activity from now on.

If anyone has any positive information on the results of this advertising, please pass it on to Jack Atwood because it might influence our final decision on space advertising.

KHO:ech

INTEROFFICE MEMORANDUM

DATE July 1, 1964

SUBJECT Subjects for the Computer Guidance Committee

TO Gordon Bell
Members of Computer Guidance Committee

FROM Kenneth H. Olsen

Now that the Computer Guidance Committee has a very wide and extensive membership, I think we should plan carefully what items get brought up there. Many items have very narrow interest and we tie up people for long periods of time for things in which they are uninterested or in which they cannot contribute. I suggest that we try to get as much of the work done, for which there is a very narrow range of interest, in subcommittees or small groups. This would then free the Committee for those items for which there is general interest or for which it is important to be coordinated between many departments.

I am afraid that we tend to save very weighty subjects for the Committee and that the apparently easy decisions get made by default. However, many of these more-or-less easy decisions are the ones that need to be coordinated between departments. Anytime we change standards, start a new program or a new product, I think this ought to be coordinated between departments and the Committee is a very useful vehicle to do it.

KHO:ech

INTEROFFICE MEMORANDUM

DATE June 25, 1964

SUBJECT Pin Inserting Machine

TO Phil Backholm

FROM Kenneth H. Olsen

Here are some thoughts on how we might make the pin inserting machine. I suggest that we use the same machine for inserting the pins, fluxing the solder, and cleaning. This means that the operator of the syntron would only have to insert the part once for all these operations. The units will have to be exceedingly well cleaned afterwards so there probably needs to be several cleaning stations. The thing is that the whole chip will be covered with flux and oil so it will also be good to have those go through the cleaning station before they are reloaded. Because of the nature of the operation, I would think that a large indexing table would be the best base for this machine.

The eight pins could be inserted at one time, or they could be inserted one at a time. One at a time has the advantage of being a lot easier to work on if each unit breaks down.

We can buy a foaming fluxing station from several companies but, because the unit we're covering is so small, we may want to make one ourselves. The wire solder machine will probably be the small unit from Holis Engineering in Nashua, New Hampshire - it costs about $640. As soon as you're sure what we're going to do, we ought to put one on order. The cleaning station should probably first be an ultrasonic cleaner to get rid of the messy flux and then an ultrasonic cleaner to make sure the units are perfectly clean.

It seems to me that the most difficult problem in this whole unit is figuring out a way of handling the chips after they have the wires on them. This is going to be one of the key problems because we're going to have to store large numbers of them and we want to do it easily and as automatic as possible.

There are many ways we could insert the pins but I think the easiest way would be to feed from a spool of tin plated copper wire. The hole is designed to take #22 wire. I would first push the wire up through the chip approximately 1/2 an inch. At the top of the throw I would have a cutter which would trim off the end, squash the end, and then nick the wire about 3/16 of an inch from the end. The feed mechanism would then withdraw the wire so that the squashed end is bearing on the top of the chip. At this point I would have a light pressure on the wire gripper so that the wire will slip through the jaws of the feed mechanism for approximately 3/16 of an inch and then the jaws would get very tight and as the wires continue to be withdrawn, part of the crimp would be wedged tightly into the hole to support the wire and then, as the wires continue to be withdrawn, it will break at the point where it is nicked and the operation is completed. Because the wire is liable to slip somewhat, it will have the length necessary to form the pin in the next chip.

Ken Olsen

INTEROFFICE MEMORANDUM

DATE June 24, 1964

SUBJECT Company Picnic

TO Bob Lassen
Win Hindle
Maynard Sandler

FROM Ken Olsen

This is a note to remind you that a year ago at the Company picnic we decided that we were going to limit the number of guests each employee was going to bring. Each year the picnic is growing much faster than the number of employees. Some people bring all their relatives and several of their neighbors. I think we ought to state the policy well before the picnic and perhaps we also should have the same policy hold for the Christmas party.

The policy which I would suggest is that an employee can bring all members of his immediate family; i.e., his wife (or her husband) and all of their own children. If they have no children, I think employees should be limited to only one or possibly two guests.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE June 24, 1964

SUBJECT Layout of Top Floor of Building 5

TO Maynard Sandler
Loren Prentice
Cy Kendrick
Jack Smith
Ken Fitzgerald

FROM Kenneth H. Olsen

The top floor of Building 5 is already becoming a tourist attraction and it is important that we get it in good shape as soon as possible. In addition, I would like to clear the other side for other manufacturing equipment. I suggest that we continue the low railing the full length of the building but that we board off the first five bays on each side with 6' partitions. On one side we'll use four bays for Cabinet Shop storage and we'll also include those inventory cabinets which are now in the open part of Building 5. In addition, we'll store skids and those cabinets which are obsolete but are worth saving.

On the other side, we'll board off five bays, of which the first three will be part of the Carpenter Shop, and then the next two will be storage for surplus electronic equipment. We'll have to get rid of some of the stuff we are now storing but with two bays there's plenty of room to store all of the things which we may want to use in the future. I believe there's room for storage on the floor below for surplus production equipment but, if not, we ought to make plans for the top floor right now.

We'll put signs on the gates and the low fence saying "For Authorized Personnel Only" and we'll put a padlock on the gates which will be locked at night. In addition, I would like to see us have an electric eye set up which will sound an alarm if someone goes through that area at night. The excuse will be to protect the gold but I don't want people in there fooling around after hours.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE June 24, 1964

SUBJECT Steps in Cermet Production

TO Tom Stockebrand
Bob Hughes
Loren Prentice
Phil Backholm
Maynard Sandler

FROM Kenneth H. Olsen

I am very pleased with the way that cermet units are developing. I am now ready to see us start working on the automatic mechanical devices which will be needed to go into production. Here are the steps in production as I see them:

1. Clean substrates, screen resistors, dry, and fire.
2. Screen silver conductors, place dies and capacitors in wet ink, dry, and fire. I see this as an automatic linear indexing table fed from a syntron feeder. At the first stop, the unit is screened and then in each of the following steps, the diode or transistor dice are placed in the wet ink with an automatic feed mechanism. The unit is then put on a conveyor belt which feeds the furnace.
3. In the next step, the pins are placed in the unit and soldered and cleaned. I see this as a rotary indexing table which automatically feeds the pins from coils of wire and then fluxes the unit, passes it over the solder machine and then several stages of cleaning. We can do this by installing all the wires at one time or we could do one wire at a time at eight different stations. We may want to have several stations of ultrasonic and/or vapor degreasing in order to be sure we get all the flux off.
4. The next step is welding leads to the diodes and transistors.
5. The next step is potting. For a long time this could be done completely manually but eventually we may want to do it automatically. We will put a single small dot of flexible silicone on each semiconductor and pot the whole unit in reasonably firm resin.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE June 18, 1964

SUBJECT Power Supply

TO Dick Best
cc: Mort Ruderman
Burt Scudney

FROM Kenneth Olsen

If we offer a complete kit for LINC users, we should also offer a power supply which will do the job. The power supply they are now using includes all the voltages but it is very large and I believe it is impossible to get at to service. They are getting it from Northern Electric for $1,000. I think we could build a special one, (or make it up from our present ones) to accomplish this job in a lot less space and offer it for $1,000. Wes Clarke didn't know or wouldn't tell me what the current requirements were but their ratings on the outside of the supply are:

+ 18 volts, 1.5 amperes
- 18 volts, 10 amperes
- 15 volts, 28 amperes
+ 10 volts, 2.5 amperes
+ 10 volts, marginal checking 2.5 amperes
- 15 volts, marginal checking 3 amperes.

In addition, there is a -3 volt supply built in but it is not labeled on the outside. The plus and minus 18 volts are used in the memory and in the analog circuits and are well regulated.

Ken Olsen

dec INTEROFFICE MEMORANDUM

DATE June 18, 1964

SUBJECT Semiconductor Chips

TO Bob Hughes
Tom Stockebrand
Henry Crouse

FROM Kenneth H. Olsen

I believe that the availability of semiconductor chips at a reasonable price is going to be the biggest delay in our manufacture of small units. I suggest that we immediately, with all haste, write a specification for the two types of diodes we use and the transistor we want. Then we should go through the complete list of all semiconductor manufacturers and telephone each one to ask them if they're interested in manufacturing these chips for us, either singly or in wafers. Then we can send a specification to those who are interested -- I wouldn't send them wholesale to every manufacturer in the country. We perhaps should even ask them if they've had any experience and skills in high speed PNP defused units.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE June 16, 1964

SUBJECT Company Picnic at Camp Ararat

TO Bob Lassen

FROM Ken Olsen

We had a Sunday School picnic at Camp Ararat last Saturday and it came so close to being catastrophic that I feel I should warn you about a few things.

The 84 year old caretaker and his wife have retired and are no longer there. They are now replaced by a single fella who is a retired carpenter. If you Anglicize his Armenian name, it would come out Hero (in Armenia it has a few more letters added on to it.)

I would suggest that we contact him fairly soon to make sure we have a reservation and that things are working out well for our Company picnic. The day before our Sunday School picnic, I visited the Camp and found out that our name was not on the list at all. Because of the change of personnel, the name never got transferred even though he had a deposit already.

This man is very good and is fixing up all the little details in the place. I think in a year or two he will have it fairly well rebuilt.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE June 16, 1964

SUBJECT

TO Phil Backholm

FROM Ken Olsen

I'd like some modules with good looking cases on them in the next few days so that we can take pictures of them. Will you develop an attractive shape for these and then mold up some. I think the way to do this would be to cut one out of illuminum and perhaps engrave the name of the Company on the top with our engraving tool and then make a mold out of some of the Dow RTV plastic which we have. We can then cast a few dozen of these out of quick setting epoxy resin.

I'd like to see models of the caps before we mold any more because I'm disappointed with our design of the last one. If we space them up away from each other a little more, they would look quite a bit better.

On our standardized layout for blue chips, it would be a good idea to leave room for a jumper across the bottom of the board, as near the compacts as practical, for a jumper to tie the ground together from one side of the board to the other.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE June 16, 1964

SUBJECT

TO Ken Fitzgerald

FROM Ken Olsen

Here are my ideas on an automatic board washer. I think we can make it up out of standard Sears, Roebuck clothes wringers. We have two small electric motor driven wringers in our shipping department which we can study, and I've ordered a manual one from Sears. I would suggest that we drive each wringer from a slo-syn synchronous motor to avoid chains and belts, and that we drive the two power brushes from induction motors, one for each brush. I would start off with two pair of rollers to support the board during the first part of brushing. This would then be followed by two power brushes, probably 3" in diameter, and then two more rollers to support the board during the last half of the brushing. Between these last two brushes, or in another step, the board can be sprayed with water to rinse off the cleaning material.

Most people use a scouring powder to scour the boards but if we could use a material which is completely solvent in the washing solution, we can avoid the problems of building up the scouring powder within the machine. Partitions within the machine can be used to separate the solutions from each other and the chemical cleaning solution can be used over continuously. It should probably be filtered to take out the particles of glass which we are tyring to remove.

The board can then go onto a conveyor belt where it could be dried and delivered to the silk screening machine. It would also be possible to dry the board and then coat it with a protective coating if we think this is a good idea. You could probably put the protective coating on with another Sears wringer.

The Sears wringers have the advantage of coming complete with bearings and pressure springs. The power brushes will be running at a much higher speed and so they probably could not use wooden bearings. They probably should be on long shafts so the bearings run outside the machine.

Enclosed is a note I sent to Henry Crouse requesting information on power brushes.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE June 16, 1964

SUBJECT

TO Henry Crouse

FROM Ken Olsen

I would like to have us build an automatic board washer for cleaning the copper clad boards before they are silk screened. We'd like to clean the copper and would also like to clean out all the dust that comes from cutting and twin punching. In Catalog No. 220 of Osborne Manufacturing Company in Cleveland, Ohio, on page 46 in their tampico brushes, no. 2705 appears that they might make a good brush for this. These are 3" outside diameter with a half inch arbor hole and a face of 3/8 of an inch. Sixteen of these stacked together would make a 6 inch brush which would clean our new boards which are approximately 5 $\frac{1}{2}$" wide.

Will you call Osborne, or Butts and Ordway who distribute their products, and ask them if this would be a good brush for this application and ask them what speed they should be operated at. According to the price list, they cost 82 cents a piece and come in standard packages of 36.

Ken Olsen

KHO:ech

cc: Ken Fitzgerald

INTEROFFICE MEMORANDUM

DATE June 10, 1964

SUBJECT Engineering Department Stockroom

TO Dick Best
Jim Hastings
Bob Hughes

FROM Kenneth H. Olsen

We have been quite wasteful in materials in the Engineering Department. I think our engineering activities are now big enough where we can justify running a stockroom for the Engineering Department. If we do this, then the engineers will be more respectful of the parts and the man who is running the stockroom can, as one of his duties, be sure that unused materials are returned to the stockroom.

If we have a man in the stockroom, this would also make it very worthwhile to distribute DEC's own modules through this stockroom. He could use Quality Control to make sure the modules are in good shape but being a professional stockroom clerk, we can expect him to be more interested in effective use of DEC's modules than the present Test Equipment Headquarters personnel.

We could further use the stock clerk man in distributing test equipment. It would still be the application of the Quality Control people to maintain and calibrate test equipment but a professional stock clerk would make its distribution more business-like.

These are my suggestions for consideration.

Ken Olsen

INTEROFFICE MEMORANDUM

DATE May 25, 1964

SUBJECT

TO Win Hindle
Harlan Anderson
Dick Mills
Maynard Sandler

FROM Ken Olsen

We have tried to minimize the value of our finished goods inventory and so all those items which could be justifiably assigned to other accounts we eliminated from manufacturing cost. We have now gotten to the point where this is causing quite a bit of confusion within the Company. There are certain Quality Control functions, and the work of several engineers, which are charged toward development engineering but truly are a manufacturing function. That engineering work which does not develop new products but just maintains the old one and keeps usable parts available cannot be justified to be called development engineering.

Two things result from this. It looks like we do more development engineering than what we should from a sales volume and it makes the mark up on modules look much higher than it really is. I think that we have to do one of two things. We can reassign these costs and add them to manufacturing and then suffer the consequences of a high inventory. This might be a good time to do it if we want to make this adjustment. The second alternative is to keep the accounts completely separated so that we can add them together to get the date and the form which we desire.

This will lower our apparent expenditures in engineering. However, I propose that we should add in the cost of purchasing to the engineering and the manufacturing account. This will probably add $75,000 to the engineering account and $25,000 to the manufacturing account. We might also divide up the costs of running the Personnel Department.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE May 21, 1964

SUBJECT Periodicals - per your memo of April 23rd

TO Jean Wick FROM Elsa Holmes

Thank you for sending me the Library distribution list of periodicals you have been sending Ken Olsen. I'm sure it will prove to be a big help in eliminating duplicates from crossing his desk - and in saving me from being blamed for it.

Listed below are the periodicals we no longer want to receive. I have kept the original copy you sent me so that I may check even further to catch duplicates.

Architectural Record
Bell Laboratories Record
Bell System Technical Journal
California Management Review
Communication and Electronics
Dun's Review
Business Automation
Electronic Design
German American Trade News
Harvard Business Review
Industrial Marketing
Journal of Applied Physics
Management Review
New England Purchaser
New Englander
Newsweek
The Office
Physics Today
Journal of Medical Electronics
Plant Engineering
Power
R.C.A. Review
Undersea Technology
IRE Transactions on:
- Communication and Electronics
- Product Engineering and Production
- Reliability and Quality Control

Jean, please note that I initial all Ken's magazines (KHO) before sending them up to you. That way, you can tell that he has already seen them and you won't have to send them down to him.

D E C CHGO

DIGITAL MAYNARD

MSG. O. M-1587

TO TOM QUINN

FROM ELSA HOLMES

PLS SEND KEN OLSEN'S RAINCOUTXX RAIN COAT TO THE MAYNARD OFFICE.

~~XMMAX&X~~

HANKS

END OR GA PLS

WILLXXXX WILL DO

ENDEND

INTEROFFICE MEMORANDUM

DATE May 15, 1964

SUBJECT Computer Profits

TO Stan Olsen
Dick Hennessee

FROM Kenneth H. Olsen

cc: Harlan Anderson
Win Hindle
Jon Feidman
Dick Best

I have been working hard to lower the manufacturing cost of the computers and I think that we can make a significant improvement in this area. In trying to develop a goal, I find that I cannot develop a consistent set of figures which will allow us to make 10% profit after taxes. Each of the costs of manufacturing are selling computers by themselves and seem to get reasonable percentage but when all the percentages are added up, they don't leave much of a profit - at least a positive profit.

From my memory, the percentages of sales price which we have signed are as follows:

37	%	manufacturing cost
24	%	discount
20	%	foreign office operation
6	%	local office operation
7.5	%	field service
10	%	technical publications
25	%	engineering
15	%	administration
23	%	profit
159.5		total

From these figures, I can't see where I can make the difference by simply lowering manufacturing cost.

Indeed, not all of these figures are applicable in all sales, but I think that some of all these percentages show that they have been fixed independently of each other and no one has taken an over-all view.

I'd like to have Stan and Nick work out a proposed set of percentages which will leave 20% for profit and a reasonable amount for the other activities. We'll then get together and talk them out and make a final policy.

There are several possible conclusions that may come out of this. One is that we may not be able to afford foreign offices. Maybe we have to raise the prices on our computers. It might even be impossible to stay in the computer business. SDS is making about 30% profit on lower prices and so I think it is at least theoretically possible to stay in the computer business but I don't believe SDS has the other costs which we are incurring.

Ken Olsen

KHO:eeh

INTEROFFICE MEMORANDUM

DATE May 15, 1964

SUBJECT

TO Stan Olsen

FROM Kenneth H. Olsen

cc: Jack Atwood
Howie Painter

I came to the conclusion that the period of expanding technology and mushrooming markets has come to an end in our industry. I think it is, therefore, important that we reconsider all the plans and expenditures of the Company and, in particular, our policy on trade shows. I think it is no longer necessary to send engineers regularly to trade shows because there is getting to be less and less new things shown at these shows. But even more significant, I think we should very carefully consider our list of trade shows that we will attend. I propose that we drastically cut down on these trade shows and that we make a policy to regularly attend only a certain small number each year.

We will still want to experiment with new fields and I think these will be well worthwhile but we should consider them as experiments or as introductions to the field and nothing more.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE May 14, 1964

SUBJECT New Security Committee

TO Engineering Newsletter and Sales Newsletter

FROM Kenneth H. Olsen

Loren Prentice has done a good job as Security Officer in the Company, but it is unfair to have one man try to make all the decisions on security and mediate all the problems. Because there are several areas of the Company which have interests in how we lock doors and what doors we lock, I feel it is important that we set up a Committee. This Committee will meet only as needed and will have the obligation of worrying about the logistics of our security measures. Loren Prentice will be the Chairman and the Committee will consist of Maynard Sandler, Bob Lassen, Bob Beckman, and Dick Mills.

INTEROFFICE MEMORANDUM

DATE May 14, 1964

SUBJECT

TO Stan Olsen

FROM Ken Olsen

cc: Frank Kalwell
Dick Mills
Maynard Sandler

It is my impression that now the packaging is done on modules as a Sales expense. In addition, we throw in a dollar's worth of lugs on some empty units. For many reasons, I think that all this should be included under the cost of goods sold.

If my understanding is correct, I think it would be a good idea to work this out with Maynard and Dick Mills. If my understanding is wrong, great, just throw the memo away.

Ken

KHO:ech

INTEROFFICE MEMORANDUM

DATE May 14, 1964

SUBJECT Junk on the Top Floor of Building 5

TO Jack Atwood
Stan Olsen
Bob Savell
Bill Long
Jim Hastings
Cy Kendrick
Henry Crouse
John Trebendis
Jack Smith
Bob Hughes
Frank Kalwell
Bob Lassen
Loren Prentice
Ken Fitzgerald

FROM Kenneth H. Olsen

We're going to need most of the north half of the top floor of Building 5 for the production equipment and I want to clean off the junk which we now have there. We have developed very careless habits in using the dead storage area. When people don't want to decide whether something should be thrown away or not, they just leave it in the middle of the floor and feel that their responsibility is over. Also, when people don't want to return things to the stockroom area where they should be returned, they feel that if they leave it in the middle of the floor there will be some nut throwing it away. The result is a pile of junk which is almost impossible to take care of.

Here is a list of a few of the things that I've seen up there which I would like to have the following individuals take care of. When these are done, we can more readily see what we should do with the rest.

Jack Atwood will take down the table he used for packaging, put away the conveyor system, throw away or store the easels which we once built, and search out all the boxes of literature distributed here and there on the floor and do something with them.

Stan Olsen will look over the tremendous amount of display equipment we have and throw out that which we will never use again and make sure the rest of it is kept neat. After that is in good shape, we will then move it from the top floor of Building 5 to another storage area which we have not as yet found.

Bob Savell or Bill Long will find the cathode ray tubes and other display equipment and either throw them away or give them to John Trebendis to store if they are worth keeping and inventory or obsolete inventory.

Jim Hastings will find all the pink library shelves and keep them in good storage. There are a number of them spread in several places on the top floor and they are quite attractive and very expensive. Jim will also arrange for an engineering

dead storage on the engineering floor. For now, engineers and technicians will have to return the parts they don't use to the Stockroom. We will also increase the size of our Model Shop stockroom so we can keep all valuable used equipment like motors, connectors and relays. This is invaluable to have a supply of these items. We now have a tremendous collection spread around the top floor which, if they are filed away nicely, will be a very useful contribution to the engineering stock.

Cy Kendrick is collecting the unused production equipment and keeping it neatly in one area. He should also include the used chemical processing tanks which are on the top floor. We'll find room on the floor below in the production area for all this equipment. He will also get rid of the empty ferric cloride barrels and the various cans and boxes of chemicals which are laying around on the floor.

Henry Crouse will pick up the Pronto files and other miscellaneous pieces of stationery supplies.

John Trebendis will take care of the miscellaneous shelving and also the barrels of floor cleaning.

Jack Smith will keep all the electronic assemblies which are worth keeping and will make sure that the others get dismantled and the parts salvaged. He will also store the old PDP-1 console and the typewriter table. We may end up using these control centers for our new automatic processing.

Bob Hughes is having Test Equipment Headquarters go over all the obsolete modules which are spread around to see which ones can be salvaged for Test Equipment Headquarters usage.

Frank Kalwell is getting rid of all the obsolete cardboard boxes and when he gets the cardboard storage in a neat form we'll then find another place for it to be stored. Specialized shipping devices such as padded envelopes and mailing boxes perhaps should be stored in our Mail Room or in our Shipping Department. The Shipping Department has an extra large obsolete store room which could be used for part of this.

Bob Lassen is collecting the picnic supplies and the Christmas party supplies in fish boxes and will then find a permanent place for them.

Loren Prentice or Ken Fitzgerald is going to get rid of all the lumber which we will not use. He will store the windows and window weights in the attic of Building 4. The obsolete and deteriorated tweed paint we'll get rid of and if we are not going to use the mechanism which feeds the large degreaser, he will salvage the drive mechanism and get rid of the rest. There are a lot of oven parts and air-conditioner parts, an old dumb waiter, a sink, and a lot of florescent lamps which may not be worth repairing which he will also take care of.

KHO:ech

Ken Olsen

INTEROFFICE MEMORANDUM

DATE May 14, 1964

SUBJECT

TO Cy Kendrick
cc: Loren Prentice
Henry Crouse

FROM Kenneth H. Olsen

We now have the power supplies built and assembled in racks and also the polarity switching device all ready for the electroplating. These have 10 ampere rating so we'll probably need two of them for gold and nickel plating but I made 10 so that we'll have enough and some spares. They must be mounted in blue cabinets. The one item which we don't have is the ampere hour meter so that we can keep track of the usage of our nickel and gold. I am enclosing literature which describes these but it will take a little time to read through to figure out what we need and I'm not sure that we were told by the man from Selrex what we should have. I don't think he offered one of those in his quote. I think it would be worthwhile for you to read this literature and maybe you can figure out what we need; if not, call him directly and ask him what we should do. The delivery is several weeks. I don't think we want the clever one which automatically turns off the equipment after a certain number of ampere hours of plating. I think we want the one that simply keeps track of the ampere hours so we can keep track of the amount of gold which is gone from the meter.

Ken Olsen

KHO:ech

dec MEMO

DATE June 2, 1964

TO Mrs. Anne Staples

FROM Kenneth H. Olsen

Ann:

I would like to take this opportunity to personally thank you, and those who assisted, for the fine luncheons you have prepared for the Administrative offices. Your cooperation is certainly appreciated.

INTEROFFICE MEMORANDUM

DATE April 21, 1964

SUBJECT Reminder

TO Sales Newsletter

FROM Kenneth H. Olsen

Periodically, we have to remind people of the significance of the Company letterhead. All letters written with the Company letterhead imply that they are written with the backing of the Company. It is, therefore, important that only Company business be written on a Company letterhead. Because all letters on the Company letterhead imply a certain responsibility, we insist that copies of all letters written on the Company letterhead be filed in the master letter file.

K. H. Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE March 30, 1964

SUBJECT

TO Tom Stockebrand

FROM Kenneth H. Olsen

Unless an emergency comes up, I am not planning to give you a project and tell you it is what you have to do. I would like to see you find your own project which you are so enthusiastic about and which you can see very clearly in your mind that it will work out very easily and quickly, and then have you propose it, sell it, and wind it up.

Here's one more possibility. The stepping type tape recorder has created quite a few problems for people but it might be possible for us to make a very simple one for Micro Tape use. Here's the approach I would take. I'd use a fairly large capstan which might be covered with rubber and ground to be sure it is true. I'd have the tape in contact with a large portion of this and have the head bear right on the tape as it goes around the capstan. In this way, there should be no stretching of the tape because there will be several inches in contact with the capstan.

I would then drive the capstan by friction from a slo-syn stepping motor. These are very simple and they claim they can get up to 600 steps per second and there are 200 steps per revolution.

Ken Olsen

KHO:ech

5/4/64

INTEROFFICE MEMORANDUM

DATE June 20, 1961

SUBJECT Notes on Picnic at Camp Ararat

TO Picnic Committee

FROM Kenneth H. Olsen

I have just completed a Sunday School picnic at Camp Ararat and have a number of ideas fresh in my mind which we should consider for the company picnic. We have had Sunday School picnics in many places and have looked far and wide for good places, but it is now quite commonly agreed that Camp Ararat is the best place we have found. DEC is fortunate to have the place so very close.

Swimming

Because swimming is available at Camp Ararat, the Committee must decide on a policy of no swimming, swimming between certain hours with lifeguard, or swimming all the time (still with lifeguard). Some of the neighborhood boys go swimming there and we have to be careful that we don't automatically invite them to partake in all the rest of the features of the picnic.

Poison Ivy

There is quite a bit of poison ivy at various places in the Camp. We could, early in the summer, request them to spray this or we could buy a sprayer and send one of our own people over. The cost of a sprayer from Sears Roebuck is approximately $8.00 and the material would cost about $2.00, and it might be simpler and surer if we just do this ourselves. If we buy a sprayer and do this, we should be very careful to label it because after it is once used with a weed killer, such as Dupont's Ammate, the sprayer is good for no other use and will kill plants if it is used for an insecticide. If we did get this sprayer, it would be good to use it around the plant because we do have poison ivy growing on our parking areas.

Games

My kids analyzed last year's DEC picnic with the following statement, "The food was great but the games were better at the Sunday School picnic." This I think is a very valid judgment and we should organize our picnic in the same detail that goes into a Sunday School picnic. We have to have things organized for almost every age group, particularly for each of the children's groups. We have a large number of young children in the company. We should somehow find out what other age groups are coming. Perhaps a questionnaire sent out ahead of time would give us this number.

I am sure that most of the kids will be in grammar school and under. There is very little we can do with the kids under three, but from three to the end of grammar school we can have a fairly long session of real good games if we have people spend the time to organize them.

Prizes are a little awkward for this age group because you like to start games one right after the other. One can buy quite a few prizes for very little money in the 5 & 10, but an alternative is to buy first, second, and maybe third prize ribbons from either a farm co-operative or one of the badge stores in Boston. We should do this well in advance if we are going to buy the ribbons. If we should divide the young kids into three age groups - preschoolers, primaries (first, second, and third graders), and juniors (fourth, fifth, and sixth graders). The older kids will take part in games such as volleyball, horseshoes, softball, etc.

Here is a list of the common picnic games, and as we get suggestions for more we should add them on to the list.

1. Ordinary foot races.

2. Balloon races, where each contestant pushes a balloon in front of him with his foot.

3. Peanut races, where the contestant pushes a peanut ahead of him with his nose.

4. Sack races, where each contestant is inside a sack and jumps forward.

5. Three-legged race, where contestants are paired off and have their inside legs tied or taped together.

6. Wheel barrel race, where contestants are paired off and one acts as a walking wheel barrel and the other one holds up his legs.

7. Cracker eating contest, where each contestant is given three unsalted Uneda biscuits. The one that can eat three biscuits, have his mouth empty, and whistles first is the winner. This is a riotous game because it looks so easy but it takes surprisingly long to eat three unsalted biscuits even though they are small.

8. Ping pong ball blowing, where the contestants are divided into two teams, one on each side of a level table. A ping pong ball is left in the middle and each team tries to blow the ball off the other side of the table.

9. Baby bottle contest, where soda pop bottles are capped with nipples and each contestant tries to empty the bottle first. An alternative to this is to put warm water in the bottle. This is an exceedingly slow race.

10. Pie eating contest, where each contestant is given a slice of blueberry pie and has to eat it without his hands. There should be colored film in a camera nearby for this one.

11. Nail hammering contest, where each contestant is given a hammer and four nails and the one that puts his four nails into a block of wood first is the winner. It is interesting to do this with women and children and then give aluminum nails to men and, much to their dismay, it is almost impossible to get them in straight.

12. Clothespin pinning race, where men see who can put twelve clothespins on a line first.

13. Taffy pulling, where taffy is cooked and then pulled by a large crowd. This is most interesting when you are allowed only one hand and, therefore, you have to pull it with a partner.

Adult games are in some ways more difficult, but most adults like softball. We should try to have one for the girls. The taffy pull is a game which everyone can take part in. We had a scavenger hunt at our Sunday School picnic and the teams were broken up between adults and children, and this went very well. I can get a copy of this if anyone is interested.

We should have committees for each of the operations for the picnic. There should be one for the food, one for the games, and one for the clean-up. Each committee should have a chairman who feels completely responsible for this. The game committee should have many of the teams selected ahead of time, particularly for things as softball.

Food

The caretaker at Camp Ararat supplies soda pop at a very reasonable price and, because it is there, it is very convenient. He also obtains ice which is very handy. Some of the kids will devour numerous numbers of pop and, if we want to control it for economy or health's sake, we should figure out how ahead of time. The only practical way that I can think of is to specify just what time pop will be available.

Brochure

The brochure that we put out last year was very good and having the teams on it ahead of time did spark enthusiasm for the softball games. We can get a better map this year by copying one directly from the survey maps which Dick Mills has on file.

Kenneth H. Olsen

cc: Personnel Office, Jack Atwood, Stan Olsen, Dick Mills

INTEROFFICE MEMORANDUM

DATE May 6, 1964

SUBJECT DEC Supply Equipment

TO Jack Atwood
cc: Stan Olsen
Burt Scudney

FROM Kenneth H. Olsen

I would like to see some rough artist sketches on a brochure that would convince a customer that we supply all the equipment necessary to make a system. We have cabinets with fans, with front doors and without front doors, with blank panels and power supplies, indicator panels, aerosol spray paint, power control panels, and a lot more. It's just so easy to build systems when you get all the parts from DEC, and they are all normally kept in stock.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE May 6, 1964

SUBJECT Computer Mailing List

TO Dave Packer
cc: Win Hindle

FROM Kenneth H. Olsen

Three or four years ago, we had our mailing list on IBM cards and for one mailing we ran it through the Prototype PDP-1 computer and produced a selected mailing list. Since then, I don't think we've gotten any use of the computer as far as the mailing list is concerned. We always seem to be on the verge of it but we never quite do it. Will you look into this for me and let me know what the problems are and what we should do to get full use of a computer. So often our sales people want selected mailing lists but it's just impossible to get them. I think we're also using a large amount of man power in the Advertising Department because we don't have the computer.

Two years ago, we made a pitch to General Radio to sell a PDP-4 computer. We told them that it would do their scientific calculations with FORTRAN, their business calculations with BUS-PAK, and would take care of their large mailing list. Their mailing list is so large and so expensive that it could just about justify a computer in itself. However, we are in a very weak position until we do our own mailing lists.

There is a small, but worthwhile, market in address list maintenance. People are now doing this with computers but they use very large and very expensive computers. We might be able to do it with a PDP-5 and Micro Tape. We can even go into the address list business ourselves if someone was interested. Not only are there getting to be more and more specialized small publications but organizations like churches and clubs need these type services.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE May 5, 1964

SUBJECT

TO Tom Stockebrand
cc: Loren Prentice

FROM Kenneth H. Olsen

I like your idea of welding leads to the ceramic base instead of soldering them. It would be nice to avoid all solder on the chip. The chip would be much neater and a lot easier to inspect.

However, we can still weld the leads on by using our presently designed ceramic blocks. In fact, it would be easier to weld than it would be to crimp and solder. We could simply stick the wire through the hole, cut it, bend it over and weld it flat against a land. The wire would then be L shaped. We could include a strain relief loop at the top before the weld but this would probably be filled with glass or plastic and would no longer be a strain relief.

The ultrasonic welder which we have bought from Axion Company includes a Sono-weld machine. You might check the Axion literature to find out what model and the correct spelling of the name of the unit and then talk to the local salesman to see if he feels that we could weld copper wire onto gold-ceramic. We may have to gold plate the wire which would raise its price significantly but we use so little of it that it probably wouldn't make any difference.

It might be a good idea to talk to the salesmen from the different woven belt manufacturers so that we can develop some feeling for the problems of high temperature conveyor belts.

We also have to think about the problem of ultrasonically cleaning these units. We ought to clean them before we silk screen them so that the dust will not fill the screens, and then we have to clean them after the resistors have been adjusted. We may also have to clean them if we have any solder flecks left on them.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

COMPANY CONFIDENTIAL

DATE April 28, 1964

SUBJECT Production Steps

TO Bob Hughes
Tom Stockebrand

FROM Kenneth H. Olsen

Here is a list of the steps involved in producing our new logic units. We may want to mold our own ceramic blocks but for now we'll assume we buy them purchased.

1. Ultrasonically clean ceramic blocks.
2. Silk screen conductors (Dupont 7553 material), rest at room temperature for 15 minutes, dry at 110° C for 15 minutes, fire at 1750° F for 5 minutes.
3. Silk screen capacitor dialectric material, dry, fire.
4. Silk screen top capacitor plate, dry, fire.
5. Silk screen resistor material (Dupont 7D800 material), rest for 15 minutes at room temperature, dry at 110° C for 15 minutes, fire for 1 hour with a maximum temperature of 1400° F.
6. Adjust resistors with White sandblast unit and test capacitors.
7. Place pins.
8. Solder complete unit.
9. Ultrasonically clean.
10. Solder diode and transistor dice in place and solder in capacitor discs.
11. Ultrasonically weld leads to diodes, transistors and capacitor discs.
12. Test
13. Dip in very thin epoxy resin for best protection.
14. Dip in thixo tropic.
15. Test unit.

There are several devices which we have to develop in materials which we'll have to find. We have to find a dealectric material which probably will have a high titanium dioxide content with which we can make our capacitors. This is probably available from some manufacturers and, if not, we can get some consulting from the MIT Ceramics Department.

We have to find the best epoxy resins for protecting this unit mechanically and from moisture. Emerson and Cummings are one of the biggest of the organizations doing this work and they are nearby. They can also recommend machines for dipping or molding these units.

We need to build an automatic lead inserting machine and solder dipping and cleaning. Because of high production, this has to be very much automated. For awhile we can put the leads in by hand until we learn all the problems.

Affiliated Industries makes an automatic inspection device for dice. This will put them in place so that an operator can inspect them with a microscope to make sure they are useable. A test probe is probably also available so they can be tested in this position. They then make a device which has the same feed mechanism but has a transfer arm which will put them in place on the ceramic block. These units cost about $1100 each.

We can probably ultrasonically weld the leads onto our diodes and maybe onto our transistors. As soon as we're sure they can be welded to our diodes, we ought to buy one of the machines so that we can get going with this. Most of the transistors we buy have a nail head bonder which can weld to a circle 1 1/2 to 2 times the diameter of the wire. The ultrasonic welder is much nicer in many ways but it needs a rectangle 1 1/2 x 3 times the diameter of the wire. One mil gold wire seems about the minimum diameter we can use. The nail head bonder is usually only used between gold and illuminum but the ultrasonic welder will weld many materials to each other, including glass to metal.

It would be nice if we had a glass type glaze which we can put over the completed unit for our final waterproof protection. Any glass that could be fired below 1000° F would not change the resistor values.

We've ordered an experimental silk screen machine which will be delivered in about two weeks. Meanwhile, we have their prototype which we can experiment with. Before this is delivered, I would like to know whether we should order the new unit with ejector pins and conveyor belt. If this main unit works at all well, we want to do small production on it, and this small conveyor belt will be almost a necessity. This machine is also made by Associated Manufacturing Co., which made most of the handling equipment for the IBM new line and it's their automatic screeners which are making the discapacitors at Sprague.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE April 28, 1964

SUBJECT Electronic Components Conference

TO Tom Stockebrand
Bob Hughes

FROM Kenneth H. Olsen

There is an Electronic Components Conference in Washington on May 5, 6 and 7. In Session II on Tuesday afternoon, there are a number of papers that sound a little bit like what we want to do. I think they are talking about vacuum depositing films but some of these things might be of interest to us.

In Session IIIA on Wednesday morning, the first paper is on "glazed resistors" by people from IBM which is exactly of the operation we are carrying on. The rest of the Session is close to the things we want to do.

Session IVA on Wednesday is on "capacitors" and a few of the items might be of the capacity which we are interested in. We might call Lindy Division of Union Carbide and ask them what their new ML-1 capacitor dialectric material is so that we'll know before the paper is presented.

Thursday's papers don't seem to be worthwhile but we might ask Electromotive Manufacturing for a copy of their paper on the life performance history of minute-man design dipped micro capacitors.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE April 24, 1964

SUBJECT Tunnel Kiln

TO Henry Crouse
Bob Hughes

FROM Kenneth H. Olsen

I think it would be wrong for us to buy a large high production tunnel kiln at this time but I suggest that we, first of all, look carefully to see what is surplus. We can check with all the machinery firms and all surplus places in different parts of the country and, if we don't find one, we can then see what is a standard stock item of a manufacturer. In this way, we can gain experience and do small production immediately. Our methods of loading and other automation techniques will develop as we get more experience. We may, later on, find we want very wide and short belts or very narrow and very long belts.

If we should ever go to 1750° Fahrenheit, at least in the center section, it should have a very fine mesh belt or a belt which can be replaced by a very fine mesh. The belt should be at least 6 inches wide and 6 to 12 feet long.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE April 24, 1964

SUBJECT

TO Bob Hughes

FROM Kenneth H. Olsen

There are two ways we can make capacitors -- we can either silk screen a dialectric down on top of a conductor and put another conductor on top of it, or we could cement or solder in discapacitors. The way to get discapacitors is to buy the plates from American Lava Company and silk screen our own electrodes on them. This would be the safest as a starter.

Will you get some samples of their type material and have a standard disc about 3/16 of an inch diameter which I think is the one we should use. They should be willing to send us samples of this material and various dialectric constants.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE April 22, 1964

SUBJECT

TO Stan Olsen

FROM Kenneth H. Olsen

I suggest that you put a note in the Sales Newsletter requesting all contributors not to make detailed lists of their sales prospects because this Newsletter does get wide distribution and it may accidentally get into competitors hands at some time.

The reprints of our publicity which are placed in the rear of this are interesting but I would suggest that you look into the cost of this and maybe you won't want to continue it. I would guess that it takes quite a few of Jack Atwood's girls and there's quite a few dollars involved in reproducing these. If Jack Atwood keeps one scrapbook of all publicity which he would allow people to see once in awhile, this would be enough.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE April 21, 1964

SUBJECT

TO Frank Kalwell
cc: Jack Atwood

FROM Kenneth H. Olsen

I just overheard a discussion between two Beatle fans. One is stuffing the ballot box in a WBZ popularity contest between the Beatles and a contender to the throne. This girl finds it very easy to stuff the ballot box because her father takes all the family mail to MIT where it goes through the MIT mail system and postage is automatically put on. This makes me worry about postage meter policies within DEC.

Will you check into it and find out what our present policies are on putting company postage on letters. Then set up a written policy and post it on the wall near the postage meter. The company policy is -- only mail that has DEC's letterhead or return address gets company postage and all exceptions will have to get permission from yourself.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE April 21, 1964

SUBJECT

TO Paul Greene

FROM Kenneth H. Olsen

In walking past the Power Supply Assembly Area, I notice you have many cardboard boxes holding the small parts. Sometime ago we had special racks for holding small parts that the girls used in assemblying modules. I hope we took care of these and have them stored away somewhere. It might be a good idea if you find them and use them to make a neater area for your work benches. Your benches are in the first area which visitors see and it is important that they look neat.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE April 21, 1964

SUBJECT Reminder

TO Engineering Newsletter

FROM Kenneth H. Olsen

Periodically, we have to remind people of the significance of the Company letterhead. All letters written with the Company letterhead imply that they are written with the backing of the Company. It is, therefore, important that only Company business be written on a Company letterhead. Because all letters on the Company letterhead imply a certain responsibility, we insist that copies of all letters written on the Company letterhead be filed in the master letter file.

K. H. Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE April 21, 1964

SUBJECT

TO Bob Hughes
Jack Smith
cc: Ken Fitzgerald

FROM Kenneth H. Olsen

I always try to encourage people to take responsibility and do things on their own and so it is with some caution that I criticize when people have gone ahead and done something on their own. However, the transistor area has become several times larger than the one originally agreed to and it will cost much more. We originally proposed to put it in the power supply test area, of which we already had two of the four walls built. This new area is, for some reason, being built out of plywood with double walls and is insulated. It is a very large area and an exceedingly expensive room so I think we should have discussed it ahead of time. The temperature difference between the inside and the outside of the room is so small that I think the single plaster board wall would have been sufficient.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE April 21, 1964

SUBJECT

TO Loren Prentice

FROM Kenneth H. Olsen

I have finally concluded that it is probably too much to ask one man to take all the responsibility for security policies. There are so many different people who have different needs and desires in a security policy and so I suggest that we set up a committee that will represent most of the interests of the different parts of the Company. The committee that I would suggest would be you as Chairman, Bob Beckman, Jack Atwood, Don White, Cy Kendrick, and maybe Ed Harwood. This committee is a little larger than what I would like to have but it doesn't have to meet very often.

If you think it is a good idea, I will send out a memo announcing the committee.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE April 21, 1964

SUBJECT

TO Bob Hughes

FROM Kenneth H. Olsen

Here are a few things which would be a good idea to look into. It would be good to check with Emerson and Cummings to see what epoxy resins they suggest for potting semiconductors.

The Frenchtown Porcelain Company in Frenchtown, New Jersey, claims that they offer a broad range of aluminas and beryllia. They also do metalizing. They are represented locally by Anderson Goode Associates, 1357 Washington St., West Newton 65, Massachusetts.

Another company is Saxonburg Ceramics, Inc., 200 Second Avenue, Saxonburg, Pennsylvania.

Another company is Carborundum, Latrobe Plant, Refactories Division, Department EM-2C, Carborundum Company, Latrobe, Pennsylvania. These are people who advertise in the "Electronic Engineers Masters" catalog. Carborundum says that boron nitride is easily machinable. We may develop a process in which we want to machine the ceramic.

You might want to send a letter to the whole list of people who are listed in the product index of this book and ask them if they would supply pieces of 3/8" x 1" x 1/16" thick. There are about 50 people in the list. I think Gulton Industries, Inc., 212 Durham Avenue, Metuchen, New Jersey makes the blanks for many discapacitors.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE April 21, 1964

SUBJECT Questions to Ask Dupont Man

TO Bob Hughes

FROM Kenneth H. Olsen

We have to develop a good relationship with the man from Dupont because he's the one who can solve most of our problems for us. When he first visits us, we want to ask him the following questions:

1. First of all, we have to know what base material he recommends.
2. We have to ask him what the real advantages are of gold conductors as compared to silver. Their brochure says that silver bubbles when it is printed underneath a resistor material but they say that this does no harm. If the cost is not prohibitive, we'll probably want gold anyway. We would like to know what kind of welding he would recommend to put leads on this gold. I don't think that we can use ultrasonic welding because the dots in our diodes are too small so we want to know if he thinks we can weld with the conventional wedge welder to gold on ceramic.
3. We'd like to know what techniques people use to make capacitors. I would think that they would, or someone else would, sell a ceramic paint which would be used as a dialectric in making a capacitor.
4. We'd also like to know the technique people use in using a White dental drill for adjusting the capacitors. Perhaps we should call on the White dental man because he would know.

My present thoughts are to apply the conductors in stripes on the backside and over the top with banding wheels. It would be good to hear his suggestions on where to get good banding wheels for this application.

I would like to know if we can dip the whole mechanism in molten solder safely without it bothering the printed resistors. If so, we'd like to know what kind of solder and what kind of flux to use.

I'd like to know if we could fire the conductors and the resistors by putting them into molten metal because this would control the temperature very carefully. It might also do the soldering at the same time. This is probably a crazy idea and he never heard of it before. We'd also like to know what protecting materials he can recommend.

We ought to tell him that Sprague thinks his material is no good and ask him what he thinks about that.

KHO:ech

Ken Olsen

dec INTEROFFICE MEMORANDUM

DATE April 21, 1964

SUBJECT Lost Multimeters

TO Test Equipment Committee Members FROM Kenneth H. Olsen

I was shocked to find out that we have lost $700 worth of multimeters. I thought that the Test Equipment Committee was not only ordering equipment but also looking out for the test equipment we now have. This is a very serious matter and it brings up concern for other possible lost equipment. I want the Test Equipment Committee to meet immediately and to prepare a written report as to how this happened and what they propose to do so that it will not happen again. I would like to have this done for the Works Committee which will meet Tuesday, April 28th. At that time, I am going to propose that we call in a professional detective agency to study thievery within DEC. It might be unpleasant but they will find the stolen equipment. We have to do this because if we show a lenient attitude at this time, then the situation will become worse.

I never knew that it was the policy of the Test Equipment Committee to loan out test equipment for personal use. If the Committee is going to allow this, they should take the responsibility to be sure that the equipment is checked out and checked in. We should never allow people to take their own equipment home but they should check out a particular piece in the Test Equipment Headquarters and bring it back the very next day.

In the immediate future, we should have an inventory in all test equipment once every month and later on we can do it less often. Every piece of test equipment should be signed out to a particular person and he should be able to tell where it is at the inventory.

I suggest that we have a secretary go through all the sign out lists and find those who have signed out meters during the period in which we have lost these meters and ask the people when they returned those meters. I also suggest that we check with each individual who has a meter signed out and ask him where that meter is.

Kenneth H. Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE April 16, 1964

SUBJECT

TO Bob Hughes
cc: George Gerelds
Dick Best

FROM Kenneth H. Olsen

George Gerelds is now experimenting with some very thin, flexible copper clad material. At the IRE Show, the manufacturer of this material had an automatic processing machine which turned out rolls of circuitry. If we had this made on a plastic base which could be laminated, we could then very readily make multi-layered circuitry.

We would first punch locating holes on each sheet, then silk screen the circuit and match it in the usual way. The one at the Show was made with photo resistance that was all done ahead of time and kept in a roll. The fact that it's kept in a roll makes the automatic processing easier. We would then punch away those areas which would cover the place we want to make a solder connection to and underneath layer. We would then stack them up on locating pins and laminate them.

It would be interesting to note if we could take one of these thin layers and laminate it to our present copper clad board.

Will you check into it and find out what is involved in laminating this material? Phil Backholm has already checked into cements for laminating most of these to tie copper to plastic material.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE April 16, 1964

SUBJECT

TO Tom Stockebrand

FROM Kenneth H. Olsen

cc: Dick Best

If you have the chance, here's a little research project I would like to have you spend a short period of time on for me. According to the literature, there's a tremendous amount of interest now in display devices which can be used to interrogate operating computing systems. These have to be inexpensive because they use large numbers of them and they have to be buffered because they can't take computer time to keep them going. The way most of them now work, I believe, is to have a television scan and store the information serially on a drum or an ultrasonic delay line. This is very easy to use because Conrac Company, which is part of Giannini Controls Corporation - one of American Research and Development Corporation's companies - makes a 10 megacycle tv monitor for just a few hundred dollars. With the addition of a drum, I think we have a working system. However, it's not immediately obvious how you get the information under the drum so that it will generate characters during the scan.

This would be of interest because of the large need for this type display but also because it might be useful in some of our remote display devices which we are often interested in.

Ken Olsen

INTEROFFICE MEMORANDUM

DATE April 15, 1964

SUBJECT

TO Engineering Newsletter

FROM Kenneth H. Olsen

We plan to do all drilling and parts insertion by computer control in the new line of modules. In order to do this, we're going to have to make some severe limitations in our layouts. The closer that we can meet these limitations in our first layouts of the circuits, the easier it will be to make the changes later.

1. All layouts should strictly follow the 0.1 inch grid. In special cases, we will allow holes to be drilled on 0.05 centers. This is necessary because cera-circuits have the leads on 0.15 inch centers.

2. All jumpers, all diodes, and all resistors will be put on the same machine and so they will all have leads on 0.4 inch centers. When longer jumpers are needed, they will be made up of several standard jumpers.

3. All components should be placed crossways on the boards.

4. All slow diodes will be placed in the same direction on the boards. It would be good to have all diodes in the same direction but I don't think this will be practical.

Automation is only practical when we concentrate on a small number of units. We'll have to develop a completely different attitude on generating new units.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE April 13, 1964

SUBJECT Department of Commerce Trade Show in Stockholm

TO Stan Olsen
cc: Harlan Anderson
Jack Atwood
Howie Painter

FROM Kenneth H. Olsen

On Monday, April 13th, I received a call from Mr. Robert Kan of the U. S. Department of Commerce, Office of International Trade Promotion, Washington, D. C., zip code 20230, phone number AC 202, 967-2618. They would like us to exhibit in the Stockholm Trade Fair on October 2 - 8. He is going to send us some literature after it is printed on this Show but would like to reserve a space for us right away. I told him that we would check with our reps and our own sales people and let him know immediately.

The Department fabricates the booths and they do the advertising and maintenance of the pavilion as part of the cost of the booth. We pay the freight over but they will pay the freight back and anything which is not sold or left with the representatives. They take care of the freight from the dock to the pavilion.

The charge is $200, plus $2 a square foot. However, when they convert from meters to feet, they have it work out in the customer's favor. A 3 x 4 meter booth, which is about 130 square feet, they figure it as being 100 square feet and the total charge is $400. Two booth spaces would come to $600.

This Fair is open only to the trade and last year they had 60,000 in attendance. The people in the U. S. booth sold a million dollars worth of equipment off the floor.

Let's decide this week what we're going to do and then let them know.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE April 9, 1964

SUBJECT Storage Area on Top Floor of Building 5

TO Loren Prentice
cc: Cy Kendrick
Jack Smith
John Trebendis
Frank Kalwell
Dom Inferrera
Ep Tuomi
Eddie Mayall

FROM Kenneth H. Olsen

We have trouble keeping the storage area on top of Building 5 in decent order. I want to have it broken down into several fenced-in areas and have people directly responsible for the specified areas. I think we can do this with chicken wire or snow fence and we don't have to build a 2 x 4 frame in order to accomplish it, except maybe for the gates. If we have the walls 5 or 6 feet high, people can indeed break into them but I don't think breaking in is our problem, it's just that people show no respect for things that are spread all over the floor.

Cy Kendrick will have an area in which he will keep obsolete or unused production equipment such as the tumbling barrel, wire strippers, and eyelet machines.

In Jack Smith's area, we'll keep the pieces of In/Out equipment which are worth keeping but are no longer used and the wired panels which we want to save.

John Trebendis will have an area for keeping obsolete stock.

Frank Kalwell will have a large area in which he will keep his cardboard boxes and other packing materials. .When it's fenced in, he'll have no excuse for allowing them to be knocked on the floor or to become oily because they're spread around.

Dom Inferrera should have an area in which to keep his fans and other pieces of equipment.

Ep Tuomi will have an area in which he will keep lumber.

Eddie Mayall needs more storage space and, in addition, I'd like to make it his responsibility to collect and keep in order all the old, obsolete, unused but worth keeping cabinets and cabinet-like devices which are now spread around the top floor.

We should leave some expansion space and maybe George Brown should have an area.

KHO:ech

Ken Olsen

INTEROFFICE MEMORANDUM

DATE April 8, 1964

SUBJECT Wire Wound Machine

TO Ken Fitzgerald

FROM Ken Olsen

It is not practical to jumper many terminals in a row together with wire wrap or with the amp machine. Most people buy a stamping which is about 20 inches long and has a rectangular hole for each pin in it. They then drop this over all the lugs and solder them. You can look at the IBM units and see how beautifully they solder them. I would like to know how they do this. After our difficulty in obtaining five solder lugs in a row, I am reluctant to send out to have this thing punched. The alternative is to make a machine which puts loops every half inch in ordinary tin buss wire. There is one little trick in making this to avoid shorting to the in-between terminals. The direction of the loops has to alternate.

There are probably many ways of doing this but the simplest that I can think of is to take two slow syn motors which rotate slowly and which stop instantly. These then can be indexed and reversed with cam contacts. One motor has a face plate on it with six or so pins with a half inch between them. The second motor has an arm which holds the wire and wraps it around each pin. After each wrap, a switch is closed and the ready motor stops and the motor with the face plate indexes to the next pin where the switch contact stops it and starts the wrapping motor again. The little catcher will peel off the wound wire from the face plate. The face plate need only have two pins but with more than that it is easier to peel off the finished wire.

Because the wrapping motor alternates direction, I don't think there is any problem in developing a twist in the wire. We may want to count 32 loops and cut it off or we may want to reel the finished wire on a reel and cut it off as we use it.

We may want to build a rough model to try out the idea but it is important that the finished unit look attractice and businesslike. It may even be worthwhile re-doing our wire taping machine in order to show off our automation to visitors. This might look nice if we built a base with the face plate motor enclosed and just the face plate showing and the wrapping motor suspended above it. We might also paint this some bright colors.

Ken Olsen

INTEROFFICE MEMORANDUM

DATE April 8, 1964

SUBJECT Power Wiring

TO Dick Best
cc: Phil Backholm

FROM Kenneth Olsen

Here is a neat way to put power wiring and bypass on the new module mounting panels. If we have one terminal bath tub capacitor on each side of the sockets with slot-type terminals, we could run -15 up one side and +10 up the other and run our buss in a straight line vertically through all the mounting panels. Our wires which jumper all sockets together could then go right over to this bypass capacitor. We then have to face the question of whether we encourage paralleling -15 power supplies to get greater capability.

Ken Olsen

INTEROFFICE MEMORANDUM

DATE April 8, 1964

SUBJECT Benches for Gold Plating Tanks

TO Loren Prentice
cc: Ken Fitzgerald
Cy Kendrick

FROM Kenneth H. Olsen

I don't think that we'll be able to build our benches for the gold plating tanks until we receive the tanks. However, I do suggest that we design them ahead of time and have all the materials available and schedule the people so that as soon as the tanks are in we can build them up immediately and get them into service. We may build a false floor first and have that leveled and ready before we receive the tanks.

It is important that this facility be a show place. It is very important to impress our visitors with the fact that we are automated and well-equipped and that we're going to be in business for a long time.

I'd like to see the sides covered with white, unscored melamine pre-finished masonite hardboard. These come in 4 x 8 sheets and I think the tables are going to be about 24" high and so these would work out quite nicely. We could also cover the sides with formica or even flexible plastic laminate which comes in rolls of any length we would want.

I would suggest that we make tables with 2 x 4s and cover the top with 3/4" waterproof plywood. This plywood should overhang the table and the tank should overhang the plywood. This plywood should be well painted with spar varnish or chemical resistant paint. There should be a gap between this overhang plywood top and the masonite sides so that there would be ventilation within the enclosed counter. The power conduit in the fresh water pipe could be under the overhang on one side and the drain pipe can be under the overhang on the other. All this piping should be painted to look neat and attractive. The pipe could be within the counter but it would be very awkward to keep it clean and neat. The cove molding should be rubber or plastic and the false floor which should extend on each side of the tank should be covered with light colored tile.

This should then result in the only sanitary plating facilities outside of IBM.

Will you find two racks bolted together in which we can put the power supplies. These can be the old fashioned kind we used to use for systems and computers or they can be two of the newer kinds. They don't have to be very good but they have to have sides and back doors. Then paint them our standard colors and I'll have the power supplies painted the same.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE April 8, 1964

SUBJECT

TO George Gerelds FROM Kenneth H. Olsen

cc: Dick Best, Bob Hughes and Cy Kendrick

We have decided that from now on we will mount diodes on 0.4 inch centers except the same machine will do both diodes and resistors. We may also buy capacitors in the same centers. This makes possible for clever use of one machine to put in all components when it is computer controlled.

We will also make a machine which would put bear wires on tape and so it will also be important to make all jumpers on 0.4 inch centers. When we have longer to go it will be worthwhile putting in more than one jumper to make up for the longer distance.

Ken Olsen

dec INTEROFFICE MEMORANDUM

DATE April 7, 1964

SUBJECT Laboratory Modules

TO George Gerelds
cc: Dan White
Roger Melanson

FROM Kenneth Olsen

We would like to develop a replacement for our present laboratory modules that will use the new small modules as a base. One way to do this would be to buff every other socket which would leave room for a diagram with the contents of the adjacent socket. We could then use inexpensive amp clips over the standard wire wrap terminals. We may want to shorten these terminals somewhat so that they would be more convenient to use.

In order to make this practical, we have to lay out the modules so that all the terminals of one element are grouped together. For example, if we have five inverters, the terminals from each inverter should be grouped together and there should be no cross leads between inverters. On flip-flops, it would be nice if they are brought out in some orderly way.

If we can take this in account during our layout, it would make adopting a system like this much easier later on.

Ken Olsen

INTEROFFICE MEMORANDUM

DATE April 7, 1964

SUBJECT Ground Wires

TO Loren Prentice

FROM Kenneth Olsen

We have to figure out a way to tie ground wires into the bars of the mounting panel. The simplest way I can think of would be to drill a hole and drive wire terminals into them and wire wrap to these for ground. We would probably buy the same wire that Amphenol or Sylvania buys and cut them to single, straight lengths and make a driving tool which would drive them into place.

If this doesn't work, we'll probably have to drill and tap holes and put solder lugs in which is not very desirable.

Ken Olsen

INTEROFFICE MEMORANDUM

DATE April 7, 1964

SUBJECT Paper Tape Control Tables

TO Cy Kendrick

FROM Kenneth Olsen

I am thinking about paper tape control tables that would work underneath component inserting machines. In this case, a regular United Shoe Machinery machine would probably work out quite well. Will you find out for me what the price is for United Shoe inserting machine on 4/10 centers without the pantograph table.

Ken Olsen

INTEROFFICE MEMORANDUM

DATE April 7, 1964

SUBJECT

TO Bob Hughes

FROM Kenneth Olsen

cc: Dick Best
Don White
Russ Doane
Burt Scudney

I left a sample kit of Dupont's conductive paint in your office. Enclosed in this box is a collection of literature describing their conductive cement and resistive paints. With these materials, we can silk screen our own cera circuits and cement on the semiconductors. These materials have been in my office for a year or two and so they might be a little old and the literature a little obsolete. I think that this is the type material that Tektronix uses in their terminal strips.

There are many steps and many problems in making a cera circuit in production quantities which contain semiconductors. I suggest that we assume that lead welding machines are available and go ahead and try to identify many of the other problems before we continue too far in this project. We should also decide how we're going to use these and what ways we will tie them into boards.

IBM has a 250,000 square foot building for making their equivalent to the cera circuit. They are buying the ceramic chip with resistors and conductors screened on them on from Chicago Telephone Supply. If it takes this much space to assemble them afterward, I can't help but believe that there are more problems than a lead welder and a ruby laser welding machine.

I would like to see a general idea of how we can use these things and some estimate of the cost and what the program would involve to get into it. I believe that the transistor manufacturers will soon make units that can be soldered to chips as easily as IBM does. Let's ask them.

Amphenol is developing a special ceramic which has all the features one would want for this type work. This is now quite secret but they promised to let us know about it and it might be worth looking into.

Ken Olsen

INTEROFFICE MEMORANDUM

DATE April 6, 1964

SUBJECT

TO Alan Kotok

FROM Kenneth H. Olsen

cc: Members of Computer Guidance Committee
Bob Savell
Don Smith
Scott Miller

As Chief Engineer in charge of Console Design, it is my studied opinion that you have not presented sufficient argument to change from Type 33 to Type 35 Teletypes in the PDP-6.

I have complete confidence in Gordon Bell in almost all areas except console design. He is just too susceptible to reasonable argument to be trusted with this responsibility. In order to get a project done, one cannot be reasonable. I therefore claim the title of Chief Console Designer for myself.

It is not that I do not think highly of Gordon's ideas. The present design has the best of Gordon's ideas in it. My only function is to make sure that the design doesn't get changed every month. No one person proposes to change the console more than once every six months but there are approximately twenty people who propose changes every six months -- they are all good ideas, and they are all reasonable, and they all have very sound technical reasons for these changes. Of course, they never count the cost or the implications throughout the rest of the company.

As Chief Console Engineer, I cannot claim that this is the optimum design or even that it has any of my own ideas in it, but it was delivered on time and it is a relatively small part of the development cost of the machine.

The fact that somebody ordered some Type 35 Teletypes doesn't automatically mean that we're going to use them on the PDP-6 and make all of the console changes necessary to include them, nor does it mean that we have changed the policy and that all our programming will be dependent on the features that these larger Teletypes have.

Chief Engineer in Charge of Console Design

KHO:ech

Not sent

INTEROFFICE MEMORANDUM

DATE April 2, 1964

SUBJECT

TO Members of the Methods Committee
cc: Burt Scudney
Stan Olsen
Henry Crouse

FROM Kenneth H. Olsen

The Sales Department has been pressuring us to make the board material in the new modules out of glass base material. I don't think there's any engineering reason for doing this but I am afraid that they might be right and that we may eventually be forced by competition into doing this. Sooner or later the competition will make the same type module we have and the obvious thing for them to do is to go to glass base material so they have one feature which we wouldn't have. If we went to glass now, it would avoid the possibility to be forced into it a year from now.

Burt Scudney has been persistently suggesting that we have a plastic handle on each module. He has gotten very little sympathy from me until we got the latest quote for the planking dies at $19,000. I think our original handle is attractive because of its simplicity and I don't think people will cut their fingers even with glass base material but for $19,000 I am enthusiastic about considering a handle. A handle would give us several advantages -- it would separate the modules so that they will not short against each other and it also gives an opportunity to color code and perhaps put the company name in the module on the back surface. Molding a handle out of thermo plastic material should cost almost nothing and so this is not really a factor.

There are several constraints on a handle. I believe it should not cover the whole back of the unit so that we can blow air in from the back if we desire. It should be very lightweight to save material and also to avoid the need for supporting a large weight on the end. On the models Burt has made, he has sanded the corners of the board round. It will probably be cheaper to leave rough edges and have the handle cover the back edges of the board all the way to the corners.

If we decide to go to a plastic handle in which we may want to put the model number and the name of the company, we may want to buy a small injection molding machine so that we can mold units as we need them with a change of model numbers. This would mean a die which we could set different model numbers at our convenience.

Going to the handle would really pay off if we can eliminate the large complex and expensive dies. One approach would be to make four modules in a row instead of the present plan for eight in two rows. Four in a row would have many of the advantages we gain with the present eight and would simplify some processes. It would make an even more handy unit to handle and four identical boards are in line. When we have eight, we're going to have to run it through the plating process twice, we're going to have to put it through most parts inserting processes twice in order to reorient it and, in general, I believe there's very little gained by eight in the block.

We could buy, or do ourselves, sheared rectangular blanks of the approximate size that we use. We would then punch the holes for the handles, which would then be the locating holes for each module. Then the boards would be screened, etched, resist coated, plated, drilled, inserted, and dipped. The boards could then be tested in a group of four. As a last operation, the modules would be separated from each other by hand indexing through a single step die. The die would be located by the holes for the handles. We now have a notch on each side of the board but if we eliminated the notch on one side and made it deeper on the other, we could then make this a very simple die and very inexpensive.

Let's talk about this in our Friday meeting of the Methods Committee.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE April 1, 1964

SUBJECT Notes on Power Control Panels

TO Engineering Newsletter

FROM Kenneth H. Olsen

When we first got in the computer business, time was very important and we were willing to buy the most conservative and most expensive solution to a problem to avoid the time necessary to investigate the problem thoroughly. Now the costs are very important and it is worth spending time in doing more thorough investigations. The power control panel on which we have tended to standardize, now contributes almost $1,000 to the price of a system. This is too much money to be spent for such a simple operation. I have looked into the power control panels and have the following suggestions to make.

One of the most expensive items are the wave filters. I suggest that, instead, we use dual .1 capacitors in bath tub cans with tab terminals. These serve both as filtering and as terminals for our quick disconnect connectors. On the input, there is probably enough inductance in the power wire to make a good filter, and within the automatic circuit breaker, there's enough inductance to make a filter with respect to the output.

I propose that, in general, we continue to use two pole circuit breakers and use the terminals on the circuit breakers as input terminals to the panel. The input filter capacitor could be mounted below this and wired to these terminals. We have a large number of magnetic circuit breakers in the reject stockroom and I suggest that we look over this stock and figure out ways of using them. We might buy tie bars so that we can use single pole circuit breakers and make up two pole units.

For simple power control panels without timing circuits, I suggest that we use a single pole Ebert 35 amp mercury contactor. I further suggest that we drive this with 15 volts with a 15 ohm series resistor in the panel. This would take approximately .225 amps. It is a lot less expensive to take this current from one of the 15 volt power supplies than it would be to add another relay to drive the circuit breaker as we're now doing. The price of the power control panel should then be less than $50.00 as compared to the $250.00 we are now paying.

For the power control panel which has time delays but which drive less than 10 amps, I suggest that we use the simple pneumatic snap action delay contactor which costs about $7.00 each. These are available with delay after energizing or delay after release. For those which draw more than 10 amps, I suggest we put an Ebert mercury 35 amp contactor in.

Kenneth H. Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE March 30, 1964

SUBJECT

TO Bob Hughes

FROM Kenneth H. Olsen

At the IEEE Show, I noticed Fansteel solid tantalum capacitors which were molded with plastic that look like they're made to be inserted in etched boards. If their prices are competitive, these might be much more businesslike looking than the ones which we are presently using.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE March 30, 1964

SUBJECT

TO Chuck Stein

FROM Ken Olsen

On page 100 of the March 23rd issue of "Electronics" magazine, there is an article describing the work that United Aircraft is doing using our PDP-1 and the design of micro logic circuits.

Ken

KHO:ech

INTEROFFICE MEMORANDUM

DATE March 30, 1964

SUBJECT

TO George Gerelds

FROM Kenneth H. Olsen

Here is another way I would like to have you try to solder the wire wrap terminals. Try the #22 wire to one terminal of transformer and firmly connect the other terminal to the wire wrap terminal being soldered. The small area where the terminal and the wire make contact might get hot and melt the solder.

If the system works, we could make a device which will clip over a whole row of terminals and with a stepping relay heat them one at a time and the operator can feed the solder by hand.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE March 30, 1964

SUBJECT

TO Harlan Anderson
Nick Mazzarese
Arthur Hall

FROM Kenneth H. Olsen

On Page 27 of the March 23rd "Electronics" Magazine, there is an announcement that Fitchburg Paper is taking out their IBM 1710 and that they are no longer going to use computers in their process. They blame it all on programming problems and they mention no other alternatives.

Ken Olsen

dec INTEROFFICE MEMORANDUM

DATE March 30, 1964

SUBJECT

TO Bob Hughes

FROM Kenneth H. Olsen

On page 28 of the March 23rd "Electronics" magazine, they tell about the Hughes glass pellet diodes. Each diode is pill box shaped, only 60 mils in diameter and 30 mils high. They appear to be solid glass with silicon embedded inside. If the price of these is very low, they might be useful for us to look into.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE March 30, 1964

SUBJECT

TO Phil Backholm
cc: Loren Prentice

FROM Kenneth H. Olsen

I think we should make an exact model of each of the modules in the shape in which we are proposing having the dies made. I think we should round off the very end of the handle more than it is in the drawings which you gave me.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE March 30, 1964

SUBJECT

TO Chuck Stein
cc: Phil Backholm
Roger Melanson

FROM Kenneth H. Olsen

I think that we will want to use a tape control machine for drilling, embossing, and inserting parts in the new modules. Roger Melanson has laid out a standardized grid for these modules so that we will make them all the same with parts on tenth inch centers. Will you work out an arrangement with Roger so that we can figure out a consistent way of naming each coordinate. We may want to use octal numbers in each coordinate because they will be easier to build equipment for. We are now planning to build four types of modules. The standard one is about 2 1/4" X 4 1/2". The double size is two of these. The eight times size is approximately 10" X 11".

We don't want to admit this to anyone but there is also, I am sure, the possibility of double width boards which are also double length or about 5" wide by 9" deep.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE March 23, 1964

SUBJECT

TO Ed de Castro
cc: Dick Best
Arthur Hall
George Gerelds

FROM Kenneth H. Olsen

I have laid out for George Gerelds a very simple and inexpensive variable supply which can be used for module checking. It uses a very small variac type 110 volts, which costs a little over $5 and followed by a filament transformer which costs between $1 and $2 and two cilicon rectifiers and a full wave rectifier and a capacitor meter. It is quite lightweight and should be about as inexpensive so that we can make it.

One other possibility which we might consider would be to put one of our lightweight regulating transformers in here and follow it with one of the new, small high-frequency variacs which only cost about $8 or $9 and this way we end up with a better power supply. This would give us one other interesting possibility which would be to use this for the normal +10 supply in the computer or else, on the same panel, build a fixed +10 supply. We then could eliminate one of the power supply panels which we now have in the PDP-5. From looking at it, it appears to me that we have a combination -15 and +10 and an addition of dual -15 of which we are only using half.

The power control panel which I am proposing is a significant supplication over the ones we're now using. We'll use two 10 amp filters going in and four 10 amp filters going out. We'll use a relay which is both time delay and also which will carry 10 amps and so we eliminate all relays. The Controls Company of America type 701-212 has a delay in turning on but turns off quickly. This will drive the memory power supply. The type 701-112 comes on quickly but has a delay in turning off. These units have adjustable delays and we can set them for what we want. These units will cost less than $9 each, as compared to $35 for the exit time delay relays and 20 some odd dollars for the contactors we are now using. I am guessing that the unit driving the memory power supply will have enough delay in dropping out that it would tolerate the same line drop-out that our present 829 units have.

This time delay relay has only a single pull double throw contact and so it will only disconnect the line from one side of each transformer primary. I feel that for the PDP-5, this will be quite sufficient.

Although the 10 amp reading is not sufficient to drive all peripheral equipment which can be added later on, I do feel that the simplification and saving in this would more than justify adding a separate contactor to any large peripheral equipment which might be added.

In those applications where we want a contactor which is slow reacting so that it will not turn off during short intervals of power break, we should consider the ebert mercury plunger relays which are supposedly very high quality power contactors but we have never had success in them because they are slow reacting.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE March 23, 1964

SUBJECT PDP-5 Memory

TO Jim McKalip
cc: Dick Best
Ed de Castro
George Gerelds

FROM Kenneth H. Olsen

One of the problems with the PDP-5 is that, in spite of its small size, it is very heavy. It is also more expensive than it has to be and we are always afraid that some competitor is going to prove to us how inexpensive it can be made.

When you are looking into the ways of improving the PDP-5 memory, will you look at the power supply and see if it wouldn't be possible to eliminate the big, heavy, and expensive transformer. We originally put a regulated transformer in there in order to cut down the range of regulation which is necessary, but now that this supply is using so little power, we could use the range to take into account not only variations of load but also variations in line voltage. We could buy a conventional lightweight transformer which would get us a basic supply. As I remember this, it is a shunt regulated supply and if you carefully go over it, we might be able to also cut down on the current in the shunt regulator. The regulator transistors run quite hot in this unit.

While looking at the power supply, will you look into the possibility of having the supply turn on slowly so that we can eliminate the need for the time delay turning on the memory power supply.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE March 23, 1964

SUBJECT

TO Ron Wilson

FROM Kenneth H. Olsen

cc: Harlan Anderson
Dick Best
Stan Olsen
Nick Mazzarese
Gordon Bell
Jim McKalip

We are well underway on the PDP-6 project but we have not outlined on paper the goals or the characteristics of this machine and I get the feeling that different people are heading in different directions; therefore, I will outline the goals of this machine as I see them - not as an edict but more as a summary of the discussions that I have been in. These comments have no finality but they can be a basis from which we can deviate.

We want three things from this project. We want the fastest computer, the least expensive computer, and we want it as soon as possible. We would all like to have one goal as paramount so that we can sacrifice everything else toward this end. However, life is never that simple and in this project we want all three. In fixing the speed, we have to know at what point there is a significant increase in cost. If the memory stack price goes up significantly for speeds above 1.2 micro seconds, it is obvious that we will fix the speed at 1.2.

To the outside, this machine will look just like a PDP-4. All PDP-4 programs will run with the exception of those in which the increased speed will make a difference. We will not use a memory buss system.

We will plan to use the new, small modules until we find that it will slow down the project. I feel that in the near future we will consider all other modules obsolete and it would be a shame to continue their use in our own products which we expect a long life for. It now looks like the standard line of small modules will be a new line of two megacycle circuits and a repackaging of our present ten megacycle line in the new package. Both of these should work out very well in the PDP-7.

With the new modules, we have 18 contacts per module. A double size module will have 36 and a quad size will have 72. This means that we should be able to make quad size modules which do not need connectors on the back. Connectors on the back have been a clever way out of a problem but they are quite far from satisfactory and not completely businesslike. There is a possibility that for speed sake we may want register lines along the back but I would only admit to this after careful consideration of other ways.

INTEROFFICE MEMORANDUM

DATE March 16, 1964

SUBJECT Notes on the Lincoln Elementary School Science Fair

TO Stan Olsen
cc: Jack Atwood
Nick Mazzarese
Bob Beckman

FROM Kenneth H. Olsen

Our demonstration at the Lincoln Science Fair worked out quite well and I think it was profitable. There's a rather high density of potential customers within the parents which attend this show and it is also worthwhile to experiment with the ability of children to pick up on computers.

However, there are a number of things which we did wrong -- most of these were my fault. We should have lined up the place ahead of time and made sure we had plenty of space to run the machine so that it would show off well and so that we could take care of a large number of on-lookers. We should have installed a machine early to make sure that it ran well. We should have lined up the math teachers ahead of time and given them a short lecture on the computer and then left it with them for a week so that they could do some experimenting with it and with their children. We never did get a sign and so we didn't get full advantage of the machine. However, we did have a long paragraph typed out describing the machine, where it has been used, and what it will do. This was stored in the computer and was typed out and was reasonably effective. However, it was too long a demonstration and so we taped a copy of this on the machine.

A simple typing out routine is very effective because people always come to read what is being punched out of a teletype machine. I think we should polish these programs and maybe arrange it so that we can store more than one message in the machine and select them at will. I think it would be a good idea to have this at the IRE Show because the pulse-height analyzer is not easy to describe, particularly its relationship to the PDP-5 computer. We did very well in having the elementary school kids demonstrate the machine. I left two twelve year old kids with a machine all Saturday morning and they were able to run it and, even though the memory got garbled several times, they were able to go through and examine each register and re-write those that were garbled and then get the program back on the air. The program had a bug in it. It would get into a loop after the power was turned on if the flag was not set. The girls learned to start the program part way along in order to get it out of the loop. I was very pleased with the success at teaching the kids the simple approach to the computer and would like to think out a system of teaching grownups the same thing by approaching it in an easy way.

A few square messages, like the Gettysburg Address, went over like a lead balloon but when they learned to type in comments about the Beetles the whole Fair was buzzing about this wonderful machine.

We should polish our techniques for carrying this small, simple machine around in our company truck or a station wagon so that it can be done with very little effort. We should also have a simple box to take all the packing material. At this Fair, we spread the packing around on the stage and it didn't show off very well.

I was pleased that I was able to do some simple programming right from the PDP-5 manual. If we print it again, I think that we should include the cia instruction in the chart of instructions in the back. We should also try to make the instruction list in the flier easy to use during programming. We should also explain how our RIM and BIN tapes are punched.

Ken Olsen

KHO:ech

3/12/64
KHO

Keyboard to Memory Program

```
0200    7200          cla
0201    1217          tad     start
0202    3010          dca     z 10
0203    6031  look,   ksf
0204    5203          jmp     look
0205    6036          krb
0206    6041  free,   tsf
0207    5206          jmp     free
0210    6046          tls
0211    3410          dca     1 10
0212    5203          jmp     look
0217    0240  start,  0240
```

3/16/64
KHO

Memory to Keyboard Program

0217	6042	
0220	7200	
0221	1217	
0222	3011	
0223	7200	
0224	1411	
0225	6041	
0226	5225	
0227	6046	
0230	7200	
0231	1011	
0232	7041	
0233	1010	
0234	7440	
0235	5223	
0236	7402	stops
	5220	(repeats)

DRAFT

This is the PDP-5 computer. This is probably the world's smallest and least expensive truly general purpose computer. It will do almost all the operations of the very large general computers but because of its limited equipment it has to do some operations in several steps and therefore it is slower than the giants. However, it is still very fast. It will do 47,000 additions per second. This digital computer is very new but it is already used in a large number of different applications. There is one right now on the U.S. Coast Guard Cutter, "Evergreen", doing oceanographic calculations in the North Atlantic. There is one tied to an atomic power plant to control the reactor and there are several used to collect atomic radiation data. It is expected that one of the useful applications for this computer will be in teaching. It is a real computer that does useful work and it has the characteristics of a large computer. Because of its realtively low price, several high schools have concluded that it is now practical to teach computing with a real computer.

The secret to the power of a digital computer lies in the fact that a list of instructions or a program can be quickly and easily placed in the machine. With each new set of instructions, a computer will do a different job. The program for the storing of this typewritten message took about ten instructions. The program to type it out also took about another twelve instructions. Instructions are normally read in on punch paper tape but in this case they are read in as a binary number on toggle switches by seventh grade girls.

There are three key operations which a computer can perform. First, it can store information such as the program performed, data, or miscellaneous information such as this message. Secondly, it can perform simple mathematic operations. Complex mathematical operations can be performed by using a number of simple operations. Thirdly, the machine can make decisions. Decisions are put in the mathematical form so that the machine can make the decision on a mathematical basis. For example, in order to know when to stop typing this message, the computer takes the number of characters typed during the type-in operation and subtracts one from it every time a character is typed out. It then checks each time to see if the difference is negative. When it is negative, the machine halts. Without this little check the machine would continue to type out what was left over in memory from previous work and meaningless characters would be produced after the typewritten message is done.

All information before it is

~~In order to handle information, it~~ is converted automatically to binary numbers. Each of these alphabetic characters is assigned a ~~particular~~ number code when it is typed in, ~~and~~ the same number chooses ~~reflects~~ the right character when it is typed out. In order to process information, from an atomic pile, all the important characteristics of the pile are converted to voltages. There is a converter built into this machine which converts those voltages into binary numbers to be processed. ~~If desired, the final result of the calculations can be converted back to voltages by this machine~~s.

3/16/67
LXLO

Notes on Program for Reading Typewriter into Memory

This computer handles all information in form of binary numbers. Binary numbers are very hard to talk about because they take so many zeros and ones to express a simple word. Decimal numbers would be convenient because we are so used to them but it is exceedingly difficult to convert from binary to decimal and back again without the use of the computer and we are not going to show programs here sophisticated enough to use the computer for conversion. Instead, we will assign each group of three lights a value from zero to seven which would be the same as the decimal value of those three binary digits. However, we will not allow numbers to go beyond the seven to avoid carries problems and we will call this an octal representation of the binary number.

There are 4,000 memory locations or addresses where words can be stored in this computer. A binary representation for 4,000 is a role of twelve 1's. The octal representation for 4,000 is 7777.

The accumulator is the place in the computer where the word being worked on is temporarily stored. If we request an add instruction, the number in the memory address identified with the add instruction is then added to the present contents of the accumulator. If we request a store instruction, the contents of the accumulator are deposited in the memory location identified by the address with the store instruction.

The first step in writing this program is to arbitrarily pick a memory location in which we want to start storing this information. In this case, we picked location address 0300 and deposited it in location 0 to 9. The instruction is in the following form:

The four numbers are the octal representation of the instruction and the address and the three lower case numbers are the numeric representation of the instruction. The actual program now starts with an instruction to clear the accumulator so that we can put in new information and then we could retrieve from memory with an added instruction the address at which we wanted to start storing the data. We then deposit this in memory location 0010

There is a flag in the typewriter which is raised whenever there is information to be read into the computer. The next step in the program is to look and see if this flag is raised. If it is not, then it goes to the next instruction which says jump back to the last instruction. This loop goes on and on until a flag is raised. When the flag is raised, this instruction will skip the next one and go onto the instruction which says type the character which is an accumulator. Because the keyboard and the typewriter are completely separated the typewriter would not otherwise show it as being typed into the keyboard.

You know how the first character in the accumulator you then store this in the memory location store it in register 0010 following instruction. The lower case i shows that there should be a one in the deferred bit which is the fourth bit from the left. Everytime we call on the register 0010 with the type in one it adds one to this so that the next time we use it, it will store in the next memory register. We are then ready to go to the next character and we may do this by jumping back to the instruction which looks for a flag which says there is a character in the keyboard.

The typing out program is very much the same except that we first retrieve information from the memory and then go into one of these small loops which looks for a flag saying that these typewriters are available for information. We then subtract the number of steps that have been performed from the number of steps in the type in operation and when this answer is negative, we stop the program because we have typed up everything .

INTEROFFICE MEMORANDUM

DATE March 13, 1964

SUBJECT Scheduling and Maintaining Conference Rooms in Building 12

TO All Secretaries

FROM Administration Department

Scheduling and reserving the conference rooms on the first floor in Building 12 will be done by Joan Cowles, Ext. 462. Joan is now located on the same floor to the right of the conference rooms in the Program Library.

The secretary to the person heading a conference scheduled in the conference room has the responsibility of serving coffee and cleaning the room before and after the meeting. She may use the coffee supplies and equipment in the executive kitchen near the conference rooms and may call upon the Administration Department's secretaries for assistance when necessary.

dec MEMO

DATE March 13, 1964

TO Scott Miller

FROM Kenneth H. Olsen

cc: Ed Harwood
Nick Mazzarese

I notice that we're still putting white doors on the PDP-1. I suggest that we skip this and make all blue doors from now on. If we're going to make more PDP-1's, we ought to consider putting the wing table on them.

Ken

KHO:ech

dec MEMO

DATE March 12, 1964

TO Harlan Anderson FROM Kenneth H. Olsen

We should make an appointment for dinner with Bob Everett. The General is not available the 17th, and 22nd of March or April 1, 2, 3, 4, 7, 8, and 9. He is leaving for Europe the 14th of April and the early part of next week his floors will not be dry.

Ken

INTEROFFICE MEMORANDUM

DATE March 13, 1964

SUBJECT Property Labels

TO Dick Mills

FROM Kenneth H. Olsen

cc: Nick Mazzarese
Ed Harwood

I suppose that property labels are a good idea but they are not the most important thing that we have in life and I would like to suggest that we no longer put property labels in the very center of our computer console, such as we have on the PDP-5 and the PDP-1 on the first floor of Building 12. It seriously distracts from the looks of the machine and it is not important to look at that every day. Once a year supposedly somebody finds the property label and it could be almost anywhere but it doesn't have to be looked at all day, every day.

There's another serious disadvantage in doing this in that it completely ruins the saleability of that machine. We would like to sell a number of the machines that we have in the house now before the end of this fiscal year but if they have property labels put in places where they cannot be removed this may seriously limit our ability to sell them.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE March 6, 1964

SUBJECT

TO Loren Prentice

FROM Kenneth H. Olsen

I think that the PDP-1 and PDP-5, and maybe the PDP-4, would look a lot more attractive with a gullwinged table cantilevered from the machine. Will you look into the possibility of doing this on all future machines and make sure that Nick Mazzarese comes to a decision. We are going to re-do some machines that have been in the field and sell them as new. If we put on a new table like this, it would help make them look new.

Ken

KHO:ech

cc: Nick Mazzarese

dec INTEROFFICE MEMORANDUM

DATE March 6, 1964

SUBJECT

TO Dick Mills

FROM Kenneth H. Olsen

I met Norbert G. Leroy from Morgan Guaranty. He is now running their investment operation in Paris and has offered to give us an introduction to their bank in London. I said for sure that we would appreciate this but I would like to have you now look into the question of which bank we should use. I'm quite sure that Morgan would be a good one because they are an American bank but still very sensitive to what is going on in Europe.

Ken Olsen

KHO:ech

INTEROFFICE MEMORANDUM

DATE March 6, 1964

SUBJECT

TO Loren Prentice
Scott Miller

FROM Kenneth H. Olsen

cc: Gordon Bell

While sitting at the American Research Stockholders Meeting and for several hours having a chance to look at nothing but the PDP-6 on the stage, it became quite obvious that the micro tape cabinet does not fit in with the rest of the PDP-6. We have developed a very neat way of packaging the machine and the illuminum indicator panels across the top develop a very pleasant consistency. However, the black micro tape storage bin in the middle seems to be an afterthought. I think it is necessary that we re-do the micro tape for the PDP-6 so that we maintain this consistency.

Ken

KHO:ech

INTEROFFICE MEMORANDUM

DATE March 4, 1964

SUBJECT

TO Loren Prentice

FROM Kenneth H. Olsen

Things seem to be fitting together very nicely for our new module line. I would like to present the program to the Module Guidance Committee Meeting tomorrow. Will you make a list of the large projects involved in this and a schedule for them. This should include the socket, the mounting panel, the dies for punching the board, and the milling machine. We should also itemize the other things we would like to accomplish, such as punching all holes and embossing lands for the transistors. We should also add a schedule for the gold plating which Cy Kendrick can help on.

Ken

KHO:ech

INTEROFFICE MEMORANDUM

DATE February 26, 1964

SUBJECT

TO Cy Kendrick

FROM Kenneth H. Olsen

cc: Loren Prentice
Ken Fitzgerald
Phil Backholm
Henry Crouse

Here is my understanding as to the gold plating system for which we are requesting bids. We will request two bids -- one which will include an immersion gold plating before the electro gold plating and one without. Before we place the order, we will decide whether we would like the immersion gold in the system or not.

We'll have all the tanks made deep enough to plate a full board but the gold plating tank will have a false bottom in it so that there's only enough gold solution to plate the edge.

The system will be large enough to plate one edge on 1,000 full-size boards per 7-hour day. This means that we will only do 500 boards per day and if you want to increase production, we then go to another shift or silk screen resist on the whole board and gold plate both edges simultaneously.

If we immersion gold plate the whole board, the production would be even less than 500 per day. Starting off at a reduced production rate making it expandable to a larger rate is a desirable way of doing it because I don't think we will have large production for some time. As we gain experience, we may want to change the system and it would be good not to have too large an investment.

We should get this quotation back as soon as possible so that we can get the order in.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE February 26, 1964

SUBJECT Future Memory Testing Business

TO Pat Greene

FROM Kenneth H. Olsen

cc: Works Committee
Jon Fadiman
Jim Hastings
Don White

After reading your memo on the situation of the memory testing business, it is my suggestion that we make the bold decision to immediately and completely get out of the memory test business. I think we should continue to offer the current driver modules which we now have as they are now, but that we do no future work on them. I then suggest that you trim your organization down to a very small number of truly competent and enthusiastic people and that you then go out after new markets and then build up the crew and keep only people who will keep the group technically competent to always have a secure position in the market place.

This is not an arbitrary order, but it is my suggestion as to what you might do. However, if you do want to stay in the memory business, I think that you're going to have to figure out how to catch up technically and where you're going to get the personnel necessary.

I think that we often tend to be so polite and thoughtful of individuals that we do not boldly take care of incompetence when it becomes obvious. The result is that we have lost our position in the memory test business. We may also have lost our computer business because we have not been able to deliver certain key items in workable form during the last year. I hope that we haven't lost the computer business completely but I'm quite sure that we have lost it in certain areas and we now have to look to new markets which have not had experience with our poor promises during the last year. It may seem cruel to remove an incompetent engineer from a project but, if one procrastinates, it is only postponing the day because the market place will eventually take the whole product line off the market and maybe even remove the company. This apparent thoughtfulness on our part is really only postponing the day of reckoning and probably makes it more severe when it shows up.

Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE February 18, 1964

SUBJECT

TO Loren Prentice
Cy Kendrick
Phil Backholm

FROM Ken Olsen

Here is a list of the steps involved in our new module production. We'll buy sheered stock which is somewhat over size in all demensions. The steps then are:

1. Punch locating hole
2. Wash
3. Screen and dry
4. Etch, strip, and clean
5. Plate the contacts with copper, nickel and gold
6. Emersion plate whole unit with gold
7. Silk screen solder resist
8. Mill contacts
9. Emboss stand-offs for transistors
10. Punch slots
11. Punch component holes
12. Insert parts
13. Wave solder and wash
14. Touch-up
15. Ultrasonically clean
16. Punch to separate units
17. Test
18. Final inspection and inspector stamp
19. Package for warehousing

We decided that the inspection stamp should include a number which would be the number of the week, then a hyphen with the last digit of the year. For example, 7 - 4 would be the 7th week of 1964. The shape of the stamp could identify the actual inspector. We might punch out 1/8 inch rectangular slots early in the process and then punch out the dumbbell shaped holes and the guide slots as a last operation to separate the units. This would make it easier to do the final punching with the parts installed.

We also ought to consider running the contacts down the center of the unit. We would then have to silk screen on a plating resist which would cover everything but the contacts but then we would do all of our plating on one pass instead of two. IBM puts plating resist on even though they have the contacts on the outside of the board so that they can plate both sets of contacts at one time. We then would have simpler milling because it would take only two sets of millers going down the middle rather than four sets on the outside.

The special machines which we have to develop are:

1. the edge miller
2. the plating setup
3. the washing machine
4. the component hole punching
5. the dyes for punching locating holes, punching slots, and punching dumbbell holes
6. we also have to develop vacuum formed packing system which might be used for warehousing and for shipping.

There are probably several vapor de-greasers involved in this system but they may not need ultrasonic cleaning and they might not be very small.

If the plating is manual for a time, the etching probably should be also for awhile.

Ken Olsen

KHO:ech

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Ken Olsen

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE February 13, 1964

SUBJECT Notes on Advertising "Digital's New Small Modules"

TO Stan Olsen
Jack Atwood
Harlan Anderson

FROM Ken Olsen

Here are some ideas that you might use in selling our new line of modules. First of all, we should have magazine articles planted to come out about the time of making the announcements. These should push the large investment we have made to make low price modules the same quality that we have been doing for years. This should quote pictures of our new automated etched wiring line, our large punch presses, our automatic inserting machine, the automated soldering line, and then the computerized testing. If we add up the total cost of this line, it would probably be close between a quarter and a half million dollars.

I think, just as we come out with these, we should have a supply of units in clear plastic which we can send out to everyone we would like to impress, along with a blurb.

I propose that we make a real selling pitch out of offering to repair all modules at any time for $2.00 each with 48 hours service, return postage paid.

The other big pitch we should make is that modules cost between $6.00 and $12.00 each.

Ken

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE February 12, 1964

SUBJECT

TO Win Hindle

FROM Ken Olsen

Many companies have a policy on the reception of honoraria. John Hancock Life Insurance Company people have to return to the company any honoraria they receive from giving lectures. However, any directors fees they receive can be kept. I think it might be a good idea to state a policy somewhere so that we would be consistent when this question does come up.

This did come up once when Ben Gurley was asked by American Research to study their investment in Digitek. They offered to give him $100 (which I think was a mistake on their part) which put Ben in a somewhat embarrassing position. We told Ben to keep it that time but next time to turn it down. That was just a method of delaying making the decision which I think we ought to make before we are faced with it again.

You might look through the different books we have and see what policies are standard. It doesn't make much difference what the policy is as long as we have one.

Ken

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE February 12, 1964

SUBJECT Notes on Small Modules

TO Phil Backholm

FROM Ken Olsen

We should ask Amphenol how many insertions their gold dot contact will tolerate. Burroughs told us that their contacts will only tolerate 50 or so insertions.

Ken

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE February 11, 1964

SUBJECT

TO Elsa Newman

FROM Ken Olsen

cc: Stan Olsen
Jack Atwood
Bob Beckman

I've only heard favorable comments on the Art Exhibit but I must tell you that I was quite displeased to find out that you arranged for the news release to be put in the local papers without going through Jack Atwood. Sometimes it appears that the channels that we arrange and the red tape involved seem to slow down efforts to a discouraging degree but it is absolutely intolerable for employees to place news releases without going through the correct channels. Complete chaos will result if many more people do this on their own.

I assume that the February 15th tea party was arranged with your supervisor with the personnel committee.

Ken Olsen

KHO:ech

dec MEMO

DATE February 4, 1964

TO Mrs. Jean Warren

FROM Ken Olsen

Dear Jean:

I want to thank you for sending along the information on the GMR "Dig." This is something which we probably should be interested in, however, it has been sitting on my desk for two weeks now and I have finally concluded that we have started so many new projects that I am sure that, even though it sounds very good, we will not get around to looking at one more for sometime.

We would like to hear how they make out and how the project develops, even though, for now, we are not in a position to show interest in it.

Sincerely yours,

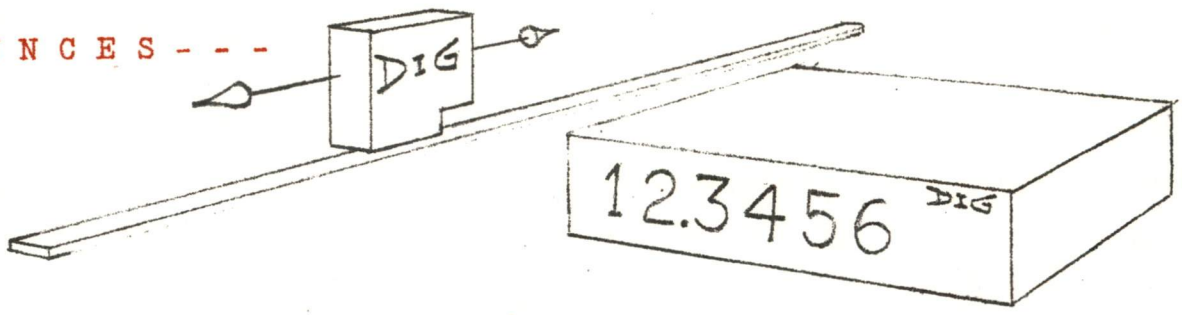
Kenneth H. Olsen

KHO:ech

New brochure is in the works but wasn't available right now.

GMR INCORPORATED
1786 SHATTUCK AVENUE • THORNWALL 3-~~0846~~ 7286 • BERKELEY 9, CALIFORNIA

ANNOUNCES - - -



- - - "DIG", a new linear measuring principle, featuring:

* Fifty-Millionths (or One Micron) Accuracy
* Decimal Display with Optional BCD Readout
* Direct Reading
* Range up to 39 Inches
* No Sliding Contact, Torque, or Drag
* All Solid-State Electronics
* Built-In Calibration Mode
* Non-Critical Mounting
* Calibration Unaffected by Power Interruption or Fast Traverse
* Two or More Measuring Axes From One Console
* Optional Digital Zeroing

A precisely calibrated glass scale is optically scanned by a compact photodetecting head. A unique pulse-train generator provides a digital count exactly proportional to the displacement of the scan from the measuring axis. Detection of a scale graduation gates the pulse-train, giving an exact digital interpolation of the distance. Simultaneously, the reference scale graduations are digitally identified by an integrally mounted coarse encoder. The complete measurement is electronically processed for decimal display and BCD readout.

APPLICATIONS

Parts Inspection * Machine Tool Automation * Micropositioning
Microcircuitry * Photogrammetry

digital equipment corporation
MAYNARD, MASSACHUSETTS
LOS ANGELES 45, CALIFORNIA*

15 January 1964

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

Dear Mr. Olsen:

Greetings from sunny California. I have a small tale to unfold, which I hope may capture your interest. A business acquaintance of my husband's (Paul is a Sr. Mfg. Research and Development engineer at Northrop-Norair) has formed a small company, as a side venture, in the San Francisco Bay area, to develop an optical scanning device. It seems possible, to me, that this device might be a useful and profitable thing for DEC to investigate -- would it be a good computer option? Since my esteemed boss, Ted Johnson, is not available to discuss this with, it seems best to send this inquiry directly to you, because you will know immediately whether there is a potential here or not.

There is a brief description enclosed for you to look over. The development has reached the point now where they are ready to scale up to produce and market the device, and they are in need of backing. If you'd care to know anything more about this gadget, or the men who are responsible for it's development, Andrew Marshall, the acquaintance mentioned above, has a strong engineering background and is a successful sales manager for a company which does considerable business with Northrop Corporation. He is going to be in the East next week and if you would be interested in seeing him, I'm sure a meeting could be arranged.

Hopefully, this letter does not prove to be a sheer waste of your time. My interest in the progress of DEC is entirely genuine and I would certainly be gratified if you felt this warranted a close look.

Sincerely yours,

Jean Warren

Jean W. Warren
Secretary

JW

*8820 Sepulveda Boulevard ORchard 0-0690

K H Olsen

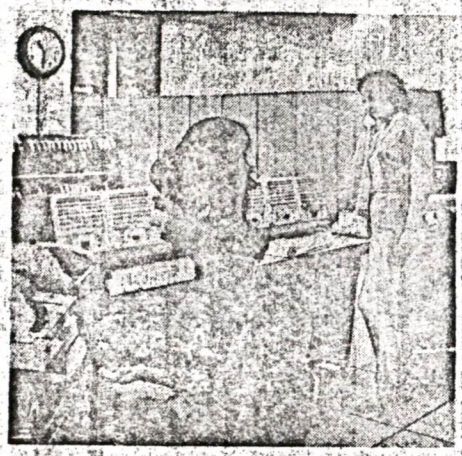
New System Speeds EA Communications

It's not enough in this Jet Age just to have faster flight equipment and speedier reservations systems; airlines must speed up their entire communications networks, else things will get out of hand.

Eastern Air Lines has now met this challenge with the installation of an electronic message routing system which it said "thinks like a computer but acts like a traffic cop."

It's called the ITT 7300 Automatic Data Exchange (ADX) System and it functions as the nerve-center for 77,000 miles of leased telegraph lines and over-water shortwave radio circuits that comprise EAL's entire communications network.

Despite its small size, Eastern's ADX System has a 24-hour capacity for moving 45,000 operational, traffic and administrative teletype messages, up to 7,500,000 words. It can provide simultaneous contacts with 80 stations across



ATTRACTIVE GIRLS (unidentified in company-provided caption), demonstrate use of Eastern's new ADX automatic switching system.

EAL's system that links 96 airports serving 113 cities of the U.S. and ties in international stations in Canada, Mexico and Puerto Rico.

It also links EAL's executive offices in New York with its jet maintenance and overhaul base in MIA, its new electronic res center in Charlotte, and its centralized reservations offices.

INTEROFFICE MEMORANDUM

DATE January 16, 1964

SUBJECT Computerizing Pert for DEC

TO Jim Hastings

FROM Kenneth H. Olsen

For immediate problems, there is so much to be gained by applying pert type technique to simple projects that for awile we can make tremendous improvements without using a computer. However, for the next step, computers will be very useful and I suggest that we should consider studying computer project now. I don't think that we can afford to burden our present programmers with this project, but we should consider hiring MIT students or Peter Sampson to do this type job. This is the type job which they are challenged by and they might make a real contribution. I would be willing to have them start even before we have the job defined because it will be worth the cost to help to find the problem. We probably should use both the oscilloscope and the line printer. The oscilloscope would make it possible to have the man design the pert system and interact with the computer and modify the plans on line. The light panel will probably be very useful in this. The line printer would then probably be the best way to end up with a hard copy for reference. This would have significant propaganda value and thought we might sell these machines simply for scheduling. A pert that we use should be readily updated without much work or thought on the part of the operator. We might have every engineer stand in front of the oscilloscope with a light pen once every two weeks to update the pert and then the machine might take care of all the rest.

The pert should total the work loads for each of the service organizations and all the engineers. This would be a great way for predicting the work load and equalizing the work load for the drafting department and other services.

There is one problem which I've never heard any neat solution to and that's the way of updating the schedules and still identifying the original schedule. If people update their schedule every week, they are always on time but we have to have a way of showing where they are and what the newest estimates are and still show what the original estimates are.

Ken

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE January 14, 1964

SUBJECT

TO Ken Fitzgerald

FROM Ken Olsen ✓

We need a buzzer or chime for calling the waitress in the French Restaurant. We kept delaying in doing this because we felt we would do it ourselves, but if we have Bernie Joyce do a quick job, it would be much cheaper, probably, than having one of our own technicians think about it and do it in a somewhat tedious and careful way. I would like to have you pass this note on to Bernie and have him wire in a buzzer if he thinks he can do it quickly and cheaply.

Three push buttons would be sufficient. The wire should run from the restaurant along the wall to the first push button between the two windows. It should then run under the air conditioner and over the closet door and approximately in the center of the wall between the air conditioner and the heater. The wire should then run under the heater, and the last push button should be in the center of the wall which has the clothes closet doors in it. A small pleasant chime is probably best for calling the waitress. We should work out with the chef as to where it should be located.

Ken

KHO:ech

INTEROFFICE MEMORANDUM

DATE January 14, 1964

SUBJECT

TO Dick Mills

FROM Ken Olsen

We are now a lot larger than we were when we first bought the micro film machine. Will you check into it and make sure that we are micro filming all the documents which should be micro filmed, and also, will you consider whether or not we should buy more machines. This was rather a large investment for us when we bought it but at this time it probably is not.

Ken

KHO:ech

dec INTEROFFICE MEMORANDUM

DATE January 13, 1964

SUBJECT

TO Harlan Anderson
Gordon Bell

FROM Ken Olsen

Here are a few notes on the visit that Bob Lane and I made to ITT. The proposal is due February 21, 1964 and an invitation to bid will be sent out in April to those who are technically qualified. There will be no prices on the February bid but prices in April will be on all the variations which people make technical bids on in February. The contract will probably be issued in June and the first system will be delivered in 18 months and will stay in the shop of the contractor. The next system will be delivered 27 months after the contract issue and then the others will be delivered 2 month intervals after that. The contract will be issued strictly on price and so the game is to bid the minimum system which will technically do the job.

The peak information rate for one center will be 70,000 bits per second for 200 line system for a 12 second period. The system must be able to tolerate the average rate of 58,000 bits per second for sustained 24 hour period. Although they are only talking about 200 line system maximum, the repitition rates are so high that the ADX system is far from filling the job.

They must have immediate access to all information for a 24 hour period which means 30 IBM tapes if the maximum rate is sustained for a 24 hour period. We should consider a bulk tape storage system something like Tom Stockebrand made at MIT. This system doesn't have to have the same reliability one needs in making a wiring list because it is only carrying communication type information.

I think the system will need 45,000 to 65,000 words of core memory and an additional large drum or disk.

This system must pass military specs. There will have to be military inspectors during the assembly. They are considering sending one of their control people to watch the assembly of the system. There will be added cost in doing this and they are thinking of paying for that separate from the normal bid. I am not as afraid of this as I might have been sometime before because I don't think we are careful about reliability as we should be.

We should tell them that we will be able to offer Silicon circuits after a certain date because I think this might be important to their bid.

It is obvious that our drafting room cannot meet the military specifications for drafting so I think they will draw them all over again.

To: Harlan Anderson
Gordon Bell

We should be prepared to discuss our quality and design policies. We should also be able to discuss the component derating and circuit derating.

We promised to send them the price of 2 & 4K memory and a 2 - 3 microsecond speed. We also promised to send them preliminary prices this week.

The contract insists on our having a pert scheduling system so it will be important that we are set up to give pert type information to ITT. I don't think that we will have to have pert scheduling system for our part.

Ken Olsen

KHO:ech

cc: Bob Lane
Nick Mazzarese