

dec**INTEROFFICE
MEMORANDUM**DATE **December 29, 1960**

SUBJECT

TO **Harlan Anderson**FROM **Kenneth H. Olsen**

Mr. R. W. Hughes, John Ackley, and Leo Murphy visited us on Wednesday morning, December 29, to discuss the application of a PDP-1 to a message switching center.

After the meeting, I sent them to American Research to meet Bill Congleton and other people there. Bill Elfers is a very close friend of the president of IT&T, Harold Geneen. I suggested that Bill do a little name dropping because we may want to use any influence we have when Hughes and company make their pitch to their management for this project.

IT&T is planning to make a decision about February 1 as to the program. If it goes through, most likely they would want a prototype machine delivered in six months and production machines starting a year later at a rate of a duplex computer every month or two. I said we could deliver the production machines in about eight months after receipt of order.

They are particularly interested in the multiple sequence but would need about 256 inputs. John Ackley suggested that the four flip-flops which we have at each input should be tied to the external equipment supplied by IT&T.

They would want complete trouble shooting manuals and instructional information and would also like to have a man in residence for several months. Our Logic Book, of course, is a big step in the direction of educational material.

They are going to send a specification and proposal to us in the next day or two, and I said that within a few days after we receive it we will send back a price and quote. It may take a few telephone calls before we reach common agreement on this, but we should act on it very quickly.

They consider this information proprietary and would like us to keep it confidential so that other people in IT&T will not be disturbed by this project and so that their potential competitors will not know about it.

We promised to send them some figures of reliability - either measured or estimated. We also said that included in the package would be maintenance programs, checkout programs, and utility programs.

We also promised to send them a recommended list of spare parts for duplex center and a list of necessary test equipment.

Kenneth H. Olsen

cc: Ben Gurley
IT&T File



INTEROFFICE MEMORANDUM

DATE **December 23, 1960**

SUBJECT

TO **Stan Olsen
Wally Weeton
Jon Fadiman**

FROM **Kenneth H. Olsen**

Mr. Richard Vyska of Raytheon Research Laboratory in Sudbury is coming to visit us on Tuesday right after lunch, on December 27. I told him that we have been planning to exploit the techniques that we learned in making production memory testers into the areas of diodes, transistors, and resistors and, therefore, very much interested in his problem. He doesn't have enough of the details to really allow us to make real judgment, but it will be interesting to hear him. He wants to put approximately 100 diodes into a test chamber and one by one plot their current and voltage characteristics. He plans to record this information on that PR-100 tape unit and then play it back through an X-1 plotter which they will have independent. I would rather see him have an inexpensive X-1 plotter and plot it right on the spot, and perhaps generate a paper tape which he can put into a typewriter to tabulate the points.

It might even be easier for them to go directly on punched paper tape and then put it into a special XY plotter which we could turn out for them for very little money.

One of the important characteristics here are the programmable power supply which may have to put out over one thousand amps in measuring the four way conduction of a power diode.

Kenneth H. Olsen



INTEROFFICE MEMORANDUM

DATE December 23, 1960

SUBJECT

TO Loren Prentice

FROM Kenneth H. Olsen

Sorreys-Johnson Company in Beverly, Massachusetts, has run into trouble in getting their products into production. Unfortunately, they bought quite a bit of equipment before they discovered, and so are now trying to sell some of it. They had a brand new and never used Mini-Jet molding machine which cost \$3,600 they already sold for \$2,400. The other equipment which they have not sold as yet is a clausing 19 inch lathe which cost them \$1,900, a Westbury vertical miller which cost them \$2,800, a home-made oven the parts of which cost \$1,300, and a five horsepower air compressor which cost \$500. These prices probably include accessories. I have no idea what would be a fair price to ask them, but if you are interested in any of these things, I recommend that you call them directly.

Kenneth H. Olsen

DEC INTEROFFICE
MEMORANDUM

DATE 12/22/60

SUBJECT Re: Scope for CDC 160 at N.S.A.

TO Ken Olsen

FROM Gordon Bell

The following plug-in units described on the attached schematic are required to connect our oscilloscope to a CDC 160.

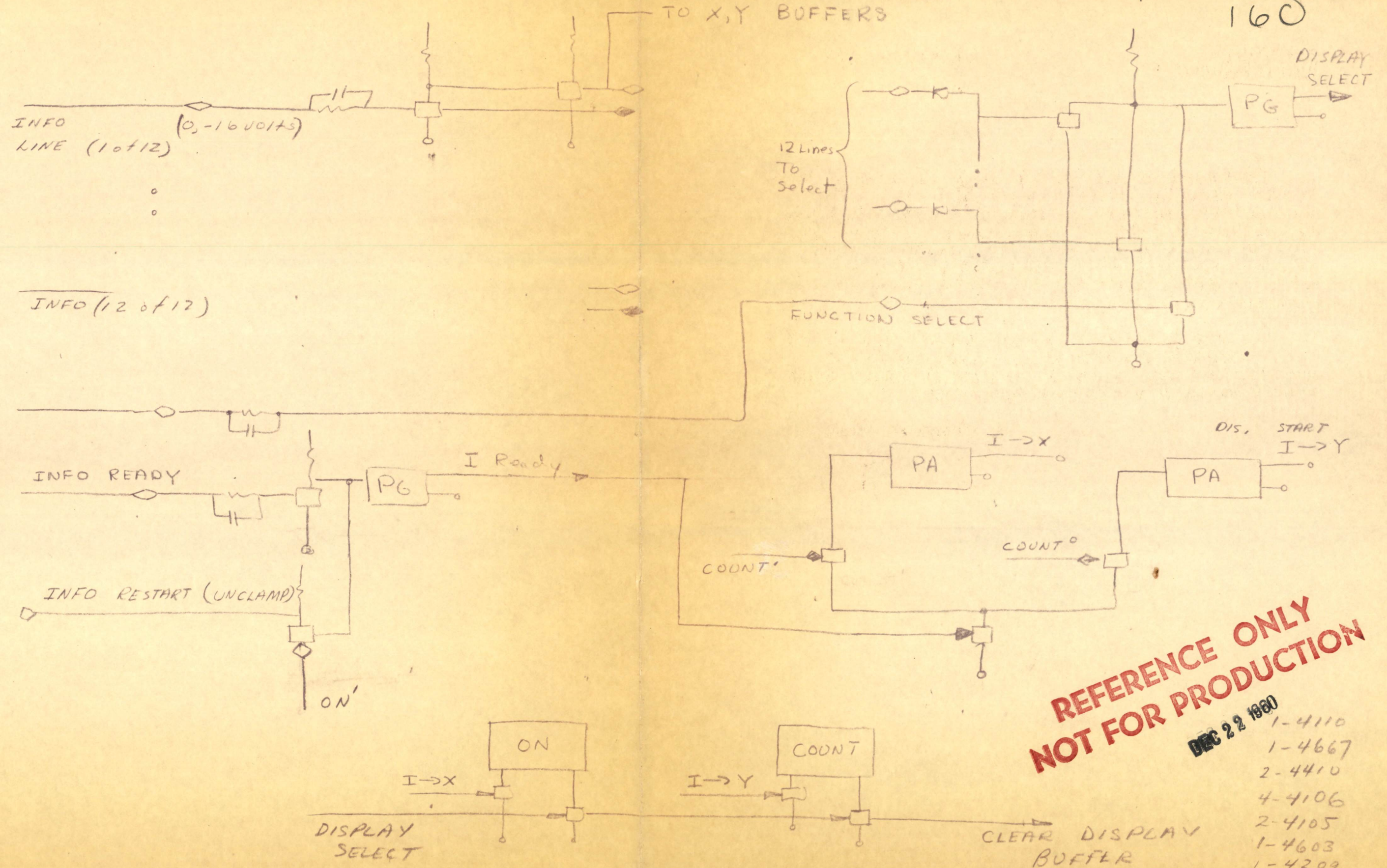
| <u>UNITS</u> | <u>COST</u> |
|--------------|---------------|
| 1 - 4110 | \$43.00 |
| 2 - 4105 | 88.00 |
| 1 - 4603 | 59.00 |
| 1 - 4209 | 79.00 |
| 2 - 4410 | 198.00 |
| 1 - 4667 | 70.00 |
| 4 - 4106 | <u>294.00</u> |
| | \$831.00 |

The equipment would use the standard scope and plug-ins as described in print D-159.

Program for Displaying Data Using a PDP-1 Output Oscilloscope with the CDC - 160 Computer

| Location | Contents | Comments |
|----------|----------------------|---------------------------------|
| 1000 | 7506 | , Select Register for selection |
| 1001 | 7306 | , Block Transfer Command |
| 1002 | 1012 | , End address + 1 of Data |
| 1003 | | |
| 1004 | | |
| 1005 | | |
| → 1006 | [Select Code 12bits] | , |
| → 1007 | 1010 | , STARTING ADDRESS of DATA |
| 1010 | X | , co-ordinates of point |
| 1011 | Y | , |

DISPLAY FOR CDC 160



**REFERENCE ONLY
NOT FOR PRODUCTION**

DEC 22 1960

- 1-4110
- 1-4667
- 2-4410
- 4-4106
- 2-4105
- 1-4603
- 1-4209



INTEROFFICE MEMORANDUM

DATE **December 22, 1960**

SUBJECT

TO **Ben Gurley
Harlan Anderson**

FROM **Kenneth H. Olsen**

Bob Hughes, of ITT Computer Group, is going to visit us next Wednesday, December 29, at about nine in the morning with John Acme, and maybe some others, to discuss the purchase of production quantities of our computers. They are interested in a prototype in about six months and, in a year, production quantities of about one a month. I gather that these machines are pretty much like what we are doing now.

His name is Robert W. Hughes, and according to the I.R.E. Directory his address is Paramus, New Jersey, and after his name it has the initials VP which I would guess means he is a vice president of ITT.

Kenneth H. Olsen



INTEROFFICE MEMORANDUM

DATE **December 22, 1960**

SUBJECT

TO **Maynard Sandler
Stanley Olsen
Harlan Anderson**

FROM **Kenneth H. Olsen**

I received a call from a mechanical engineer at Bendix Systems in Ann Arbor requesting more information on our Building Blocks. The results of their survey apparently boiled down to us and one other company. In a week or so we will receive a formal request to bid, at which time we will give exact delivery dates. The schedule is something like this: The purchase order will be given about the first of February, and they will want delivery on most of the units by the first of March, and all of them by the fifteenth of March. There will be 1000 flip-flops, 2000 gates, which I think means approximately 3000 plug-in units, but it might be 4000 or 5000. I told him that this was approximately what we can do, but we would have to look at the final list before we can quote exactly.

Kenneth H. Olsen



INTEROFFICE MEMORANDUM

DATE **December 21, 1960**

SUBJECT

TO **Jack Atwood**

FROM **Kenneth Olsen**

I think we should remove all Iron Curtain countries from our normal mailing list. Those which request specific information, we should send it to them; but we should not send freely all information unless it is specifically requested.

We should be very careful to have Mr. Karasz accurately on our mailing list. His address, as I get it, should be:

Dr. Ander Karasz, librarian
M. T. A.
Szamitastechnikai Kozpontja
Konyvtara
Budapest V, Nador u. 7.
HUNGARY

Kenneth Olsen



INTEROFFICE MEMORANDUM

DATE December 16, 1960

SUBJECT

TO Stanley Olsen

FROM Kenneth Olsen

HRB Singer was a good customer at one time. I wonder if our reps have contacted them lately to see what activity there is there. We should also find out how happy they were with the units that they bought.

Singer, in Bridgeport, is also active in the electronics business and, as you know, they built a beautiful new plant and are using the space from the old building as parking lots now.

Singer Sewing Machine is in an unusual position because they are overwhelmed with capital but no new products. They are a company which we may do good business with as they find products to go into.

Kenneth Olsen



INTEROFFICE MEMORANDUM

DATE December 16, 1960

SUBJECT

TO Jack Atwood

FROM Kenneth Olsen

Our oscilloscope and light pen deserve news releases that should make the front sections of most magazines because of their unusual interest. We may want to play them as separate items or together, but I am sure if we do it right we should make the front section.

Kenneth Olsen

REC MEMO

DATE December 9, 1960

TO Personnel Department FROM Kenneth Olsen

Whenever we give an offer to someone at M.I.T. as a result of our interview, please be sure to send a copy of the letter to the Placement Department at M.I.T.

Kenneth Olsen

**ed
c** **MEMO**DATE December 9, 1960TO Stanley Olsen/Harlan Anderson/Helen LeBlanc FROM Kenneth Olsen

For our statement of what we are looking for in the interviews which come up next spring at M.I.T., I would like to have us consider offering summer employment and limiting our interviews to those who have cumulative grades above 3.5. We also should perhaps consider doing this at Tufts University.

Kenneth Olsen

MEMO

DATE December 9, 1960

TO Harlan Anderson/Stan Olsen/
Helen LeBlanc FROM Kenneth Olsen

M.I.T. has an Alumni Placement Bureau which we should use when we are looking for senior type people.

Kenneth Olsen

dec MEMODATE December 9, 1960TO Ben Gurley and Dick BestFROM Kenneth Olsen

We have an appointment with Doug Hogan at 8:30 on December 19. They are interested in a display unit for their machine. I believe one of you two should be on hand for that discussion.

Kenneth Olsen



INTEROFFICE MEMORANDUM

DATE December 9, 1960

SUBJECT

TO Jack Atwood

FROM Kenneth Olsen

When interviewing, several people told me they weren't able to find any literature on DEC in the Placement Office library. I went to check and, indeed, there were a half dozen booklets of all our literature but they were sort of dingy with the name of the company away down at the bottom of the cover, so that the name didn't show up when they were placed in the rack. What I think we should do is make covers which are a little more bright, perhaps white with lettering somewhat like our shipping crates, and the lettering should be at the very top with the word DIGITAL standing out. We also have to make posters which should be letter size and should really look more like letters, but the heading of these should really stand out and it should be a large DIGITAL because that is a magic word nowadays. This bulletin should be turned out fairly soon and it should list our next appointment date and should also invite people to call TW 3-1779 for an earlier appointment or for questions. I have some samples of bulletins that other people have put up. I think we should say or imply we want only the most creative and hard working type people. We also should give an idea that we are basically M.I.T. people and very competent, etc.

Kenneth H. Olsen

dec**INTEROFFICE
MEMORANDUM**DATE **December 7, 1960**SUBJECT **Engineering Overhead**TO **Henry Crouse
Maynard Sandler
Loren Prentice
Dick Best
Bob Hughes**FROM **Kenneth H. Olsen**

We are going to have to start a fairly strict policy of assigning account numbers to all purchases. Last month we had the shocking situation of having \$6,802.20 worth of operating supplies for engineering. These were largely small items like ten transistors from DeMambro. In order to do this, we are going to have to assign some new account numbers. I propose we open an account number for the Test Equipment headquarters and an account number for Drafting and an account number for the Carpenter Shop.

In addition, we should also be sure that all units signed out from finished inventory should be assigned to an account number and not general overhead. Last month we assigned \$3,329 worth of finished inventory to overhead. If we expect people to take their own personal accounting seriously, we are going to have to separate out the overhead to items which are truly meaningful to them. We probably should also open an account number for engineering parts. We should then have people assign their labor to test equipment, maintaining parts inventory, etc.

Kenneth H. Olsencc: **Jim Myers**

K. Olsen

de INTEROFFICE
MEMORANDUM

DATE December 6, 1960

SUBJECT

TO All Staff Members

FROM Kenneth H. Olsen

Now that our IBM punched card machines are here, we are in a position to generate the details of accounting which were outlined in Memorandum No. 1088, dated May 13, 1960.

A Cost Committee has been formed to determine the overall program and systems which will enable us to best measure and interpret the condition and progress of the company.

The committee will be:

- Chairman - Maynard Sandler
- Tabulating Procedures - Bob Dill and Fred MacLean
- Accounting - Alma Pontz
- Sales - Stanley Olsen
- Engineering - Dick Best
- Systems - Loren Prentice

Maynard Sandler will have final authority and responsibility for the programming and scheduling of the card machines and will mediate any conflicts between departments on the use of these machines.

Some of you will be called on to help the committee. I ask all of you to give of your time and your interest so that the accounting phases of our endeavor will truly reflect the worth and prestige of our company.

Kenneth H. Olsen

MEMODATE November 30, 1960TO George Gerelds/Jack Smith FROM Kenneth H. Olsen

There are certain places where we use Tinnerman nuts in our power supplies which make the whole units look somewhat cheap. I believe that the vertical diode plate is one of these. I propose that from now on we use Lamson & Sessions nuts in the bottom of these diode plates. If this involves modification of the holes, I think we should initiate a change.

Kenneth H. Olsen

November 30, 1960

Power Supply Modification

**Maynard Sanlier
Dick Best
Henry Crouse
Roger Halanson**

Kenneth H. Olsen

In looking over our power supply with a view of making it have the appearance of a quality unit, we concluded that the AMP nylon covered splice in the AC input is one of the cheap looking parts of the system. I think we have a very nice way to get rid of this splice that will also improve the quality of the unit.

When we put the capacitor across the input, we were not sure whether it should be across the primary of the transformer or across the switch because both seemed to do good. My proposal now is that we buy a dual .1 mfd, 1000 volt capacitor which will have three terminals that would then eliminate the need for a splice. This capacitor will probably be somewhat larger in size, but I think the cost will be negligibly different.

I propose that Henry Crouse immediately get prices on the new type capacitor and samples if possible, and that we then go ahead and buy a batch. When we have the dimensions, we can punch our chassis so that they can take either the old type or the new type so that there will be no problem during the transition. Roger Halanson can take care of adding the hole to the drawing.

We now use 1000 volt capacitors because we do not know what the transient voltage is during the turn-off of a power supply. If it is difficult to get these capacitors in 1000 volts, we might consider 600 volt capacitors.

Kenneth H. Olsen

MEMO

DATE November 28, 1960

TO Henry Crouse

FROM Kenneth Olsen

Please call Puringtan and ask for price and delivery on a rotary switch equivalent to Centralab part number PA-1040, which is a nine position progressively shorting switch.

You received samples of another rotary switch from Ill. Please ask them for prices, also.



INTEROFFICE MEMORANDUM

DATE **November 28, 1960**

SUBJECT

TO **Loren Prentice**

FROM **Kenneth H. Olsen**

Our computer cabinets, I feel, have very good design. The more fancy designs may look good for a season, but become obsolete very quickly. However, our cabinets are flimsy and in some ways do look cheap. I think the doors have to have a hat section inside so that they will not flex, and we need a better hinge.

We are ordering these in large enough quantities now so that we can afford to do something special. I would rather not get involved in the redesign of these cabinets, but would like to have people come in and make suggestions as to how they would make the cabinets and then give us a quote. I think we should ask the present cabinet manufacturer what he would do, then in addition there are a few sheet metal outfits in the area who are very aggressive and make cabinets. There is one particularly in Waltham who exhibits at the I.R.E. shows; then there is one in New Jersey which makes the stock line of cabinets but mainly does special, high quality work. They have a local rep who I think we should call in to give us a quote on the kind of cabinets we want.

I would like to leave this with you to contact these people and tell them what we want.

Kenneth H. Olsen

MEMODATE November 28, 1960TO Dick Best/Wally Weston/
Jon FadimanFROM Kenneth Olsen

I have concluded that the lamp bulbs and sockets we get from Sylvania are too cheap looking to be used in the systems, and so I recommend that from now on we go back to the old Dialco lamps which make the systems look like they were indeed instruments and not like television sets or automobiles.

Kenneth Olsen



INTEROFFICE MEMORANDUM

DATE **November 23, 1960**

SUBJECT

TO **Jack Atwood
Barbera Stephenson**

FROM **Kenneth H. Olsen**

With the next mailing to our sales representatives, I would suggest that we remind them of the tracing paper we have available. In fact, it might be good to remind them periodically, like once a month, about this. We might send them a few sheets in our mailing tubes to be sure they are duly impressed with them.

I would like to have us consider mailing these sales bulletins to everyone in the company at their home address. It costs us very little after we once printed them up. For those mailed to the company, we should have a little folder about three inches wide and four inches high which we slip over the top saying something to the effect that we are sure you are interested in what is going on at Digital, and so we are sending you a copy of the bulletin which we are mailing out to all our sales representatives. These little folders we can use each time, and we can use them to send other things to our people.

Kenneth H. Olsen

MEMODATE November 22, 1960TO Roger MelansonFROM Kenneth Olsen

Here is a part number to file until you make the parts list up for the new transistorized current sources. The rotary switch is somewhat tricky and it is very important to keep the part numbers straight. It is Centralab switch No. PA-1040. It is the only switch in the current drivers.

Kenneth Olsen

cc: Dick Best

MEMODATE November 22, 1960TO Bob HughesFROM Kenneth Olsen

All our power supplies should be tolerant of short circuits. There is a possibility that we forgot the design for this when we laid out our 10 volt power supply, but I think that it would be a good idea for you to check now to be sure that the series resistors, the diodes, and the transformer will tolerate a short circuit. If they do not, there are things we may be able to do. I would like to have you check on it and let me know what your conclusions are. If these will not tolerate a short circuit, we will have to fuse the unit.

Kenneth H. Olsen



INTEROFFICE MEMORANDUM

DATE **November 22, 1960**

SUBJECT

TO **Henry Crouse**

FROM **Kenneth H. Olsen**

There is an aluminum extrusion company in Boston whose name is Trim-Alloy, or their product's name is Trim-Alloy. Please call them and see if they have an extrusion which is approximately 3/4 inch round with longitudinal ridges or grooves or serrations. We are considering making knobs from this stock. We have a catalog of theirs, but I was not able to find this shape in the catalog. We would be interested in the price of this stock in a material which it would be best for screw machine use. If they do not have dies this shape, we would be interested in the approximate price of a special die.

Kenneth H. Olsen

November 18, 1960

Ben Gurley
Dick Best
Stan Olsen
Bob Hughes

Kenneth Olsen

Engineered Electronics and Computer Controls use a transistor driven indicator made by Transistor Electronics Corporation in Minneapolis, Minnesota. This unit is about one-half inch in diameter and one and one-half inches long and screws into a panel very much like a Dialco lamp socket except that it has a transistor built in which drives the lamp. I propose that we consider these as part of our product line and that we charge exactly the same price the competition does.

I think we should insist on them using our standard lamp bulb with -15 volts supply and a circuit roughly like ours. I am sure that with that quantity they would make them exactly like we want them. We may even find them economical to use in our own computer because we would be able to bypass the indicator driver plug-in units.

I would suggest that we use these only without resistors. For the flip-flops which need series resistors, we could have the customers put them on the back panel wiring.

If these don't work out for the computer, I propose that we buy the Cartridge Lite from TEC for our computer. These are 327 lamp bulbs mounted in clear plastic with pins coming out the bottom. They will make bulk sockets that would take our whole computer panel full of lights and I think solve our computer lamp problem very nicely.

I have asked Bordevieck for samples and prices on their plastic enclosed lamps, and we do have some literature on their other series. They are represented by Bordevieck Engineering Sales Co. in Braintree, Massachusetts. The telephone is Victor 3-0845.

The mounting which we would need for our computer is what they call their SLA series strip light assembly. We should request their catalog sheet on TEC-LITE SLA series strip light assemblies.

Kenneth H. Olsen

COPY



INTEROFFICE MEMORANDUM

DATE **November 18, 1960**

SUBJECT **Power Supplies for
Transistorized Current Sources**

TO **Dick Best
Bob Hughes**

FROM **Kenneth Olsen**

I propose that in the power supplies for the transistorized current sources we do not have a terminal strip in the back for adding additional voltage supplies, but we put a socket instead. A plug would have built-in jumpers for cases where additional voltages are not needed and when people need more voltage they will use this plug to connect to the additional power supplies.

I would suggest that we internally put a resistor where the external jumper would normally be so that when the plug or jumper is removed, the power supplies will tend to stay at approximately their appropriate voltages rather than to float around at random.

The neatest receptacle and plug that I have seen so far is the Cannon Morpho series. I have asked Henry Crouse to get samples and prices on these. These have crimped insertable contacts which are normally good but are a little bit difficult to perform the jumping operation.

The Morpho series has two types of crimp connectors. One type you do not have the strip that has inflation piercing contacts and the other type we do have to strip. I recommend that we get the stripping kind.

The smallest Morpho connector has 12 pins, but because the pins are insertable we only have to put in the seven we need, or we can parallel connectors for safety's sake.

Kenneth H. Olsen



INTEROFFICE MEMORANDUM

DATE **November 18, 1960**

SUBJECT

TO **Jon Fadiman**

FROM **Kenneth Olsen**

Ryan Electric Company, who manufactures the buzzers we use in our alarms in our memory testers also makes an AC buzzer which I think we should look into for our future use. This is a much nicer buzzer because it doesn't have any contacts but is simply a coil which vibrates an armature at the 60 cycle rate.

Kenneth H. Olsen

ed
MEMO

DATE November 18, 1960

TO Henry Crouse FROM Kenneth Olsen

Please call Cannon Electric Co., Salem, Mass., and find out the price and delivery on their Morpho series plugs and socket #NH1R-12 and #NH1T-12.

Kenneth Olsen

dec**INTEROFFICE
MEMORANDUM**DATE **November 15, 1960**

SUBJECT

TO **Henry Crouse**FROM **Kenneth Olsen**

We are considering buying five to ten more dictating machines. In general, I think we would like the Stenorette except that the secretaries complain that it is often difficult to understand. Often, backspacing will destroy the first portion of the dictation. The portable machines have been completely unsatisfactory, although I suspect it is because we don't know how to use the machines.

I would like to have you contact the Stenorette representative and tell him that we will buy some more of their machines if they will answer the above complaints and if they will give us complete instructional material and circuit schematics for both the portable and the office type machines. If they will not do this, we will be forced to go to someone else's machine, which will probably be the IBM machine.

There are obvious advantages to us if we standardize on these machines, but if we can't get the information we need from them, I feel we will be forced to do so. The situation with the portable machine is ridiculous. Nobody knows what the knobs are or what they are supposed to do; and if they can't give us anything written, they are a disreputable outfit and we can't afford to do business with them.

Kenneth Olsen

November 14, 1960

Stanley Olsen
Dick Best
Harlan Anderson

Kenneth H. Olsen

Jim Ricketts called today, in the afternoon of November 14. He gave me a list of the items which they plan to order and have since placed the order.

He requested, and I told him that we would mail in by Tuesday, November 15, a simplified list of incoming tests which they should make. This should be the high and low limits on pulse amplitudes and level amplitudes, which should probably be enough.

They need a printer, and I suggested that they look into CMC's, and he was very pleased with the results. They have been promised two week delivery on a machine which would operate on -2 volts for print and will not print on -1 volt. The input is 47 K. Jim says that these machines are available to operate on -1/2 volt input.

Jim Ricketts' phone number at AC Spark Plug is South 2-7000, extension 656, Milwaukee, Wisconsin.

Kenneth H. Olsen



INTEROFFICE MEMORANDUM

DATE **November 14, 1960**

SUBJECT

TO **Dick Best**

FROM **Kenneth Olsen**

I interviewed Arthur T. Campbell at Tufts University last week and was very pleased with his background and his interest in the company. His grades are very high and he is No. 18 out of a class of 150 engineering students. He is quiet, but very much interested in things and is taking a course in economics which includes management economics. I invited him to come out and visit us at his convenience but told him to call either myself or you to set up the appointment. I told him to come at a time which would be most worth while with respect to making his job decision.

Kenneth Olsen

MEMODATE November 8, 1960TO Reception DeskFROM K. H. Olsen

When either Kenneth Olsen, Harlan Anderson, or Stanley Olsen are out of the building, all telephone calls for them will be directed to their secretaries. The secretary will answer the phone by saying, "Mr. _____'s office," explain that Mr. _____ is out of town and when he will return and ask if there is any message.

It is the secretary's responsibility to inform the switchboard when her boss will be out of the building.

cc: B. Charnock
E. Parker
J. Veo



INTEROFFICE MEMORANDUM

SUBJECT **Allison Division of
General Motors Corporation**

DATE **November 8, 1960**

TO **Dick Best**

FROM **Kenneth Olsen**

Enclosed is a copy of a letter which we received via Air Mail Special Delivery from General Motors. They would like to have a preliminary quotation by November 20. They must be working very hard out there if they plan to open their bids on a Sunday. We should look into this rather quickly so that we can tell them no, we will not be in a position to bid, or we can assign people to do a systematic estimate of the cost. The problem is relatively straightforward, and I think it is simply a long counter with outputs that can be tied to the 7090. I am concerned about two factors: (1) the different route of finding out how to tie to the 7090, and (2) if other people have products of a design which would be much less expensive than ours.

If we have the time to look into this, I am sure that it will be worth while because we will undoubtedly need something like this for our own computer; and if we have the product available, we can advertise it and perhaps install it in all of the 7090's which are delivered.

Kenneth Olsen



INTEROFFICE MEMORANDUM

DATE **November 7, 1960**

SUBJECT **Sign for NEREM Booth**

TO **Jack Atwood**

FROM **Kenneth H. Olsen**

We have to make five signs for the NEREM 20 foot booth. There are five sections of the booth and we will put a separate sign on each one. The left-hand section will have a superimposed sign which will be approximately one-half inch larger in each dimension than that section of the booth and which is made of pumpkin color formica. This section will have the name and address of the company. The dimensions of this sign are 49 by 18-3/4 inches. One possibility would be to have the word DIGITAL in 6 or 9 inch Tempar letters and then EQUIPMENT CORPORATION in 3 inch Tempar letters. They may now have 4 or 4½ inch Tempar letters which might fit better with a 9 inch Tempar; however, they are not listed in the catalog. I think we could put MAYNARD, MASSACHUSETTS in 1½ inch Tempar letters in the lower right-hand corner.

The other four signs are 46 by 17 inches and are walnut plywood. This walnut plywood will be oiled and so we have to test it to be sure that the cement we use will work on the oil. We have shortened the wording for the other sections so we can use fairly large letters. We will have to do some estimating to see how large letters we can use. We could get away with 6 inch Tempar, but we may have to go to 4½ inch Kabel, but I am not sure that I like the Kabel letters because they look like 1930ish.

The wording on these other four sections should be as follows: HI-SPEED COMPUTERS, TEST EQUIPMENT, BUILDING BLOCKS, and DIGITAL SYSTEMS.

Kenneth H. Olsen

MEMODATE November 4, 1960TO Stan OlsenFROM Ken Olsen

Mr. Gill Withen, of the Purchasing Department at Datamatic, called Jim Myers while you were away and asked if they could have a blanket discount because they buy so much from us. We have not answered as yet, but Andy thinks you should call and tell him that because of the standard policy that we cannot do this.

Ken Olsen

MEMO

DATE November 4, 1960

TO George Gerelds FROM Kenneth Olsen

Please make up a small Lamicoid label with the following wording "Light Pen Test Stand."

Kenneth H. Olsen

November 4, 1960

Stan Olsen
Jim Myers
Maynard Sandler

Kenneth H. Olsen ✓

Jim Ricketts, who used to work at Lincoln Laboratory and is now at A C Spark Plug, called to inquire about delivery on our 500 KC line. He claims we have been competing with Delco, but even though their individual prices are less when they considered loading capabilities of our circuits, we come out less expensive in the long run. He feels he needs one week delivery, however, and I assured him that we could do this if he really needed it. I said we would send out the mounting panels immediately, and before he needed the plug-in units we would have them there.

He expects to initiate the order on Monday, but couldn't say when it would come through. His design is not completely frozen but the units that he feels he will need are as follows:

3 - 4213
12 - 4209
6 - 4151
30 - 4105
69 - 4201 (this may be 42 - 4201)
4 - 4215
8 - 1669

Power supplies and mounting panels.

This unit is to go with an Optisyn shaft encoder and is largely shaft counters, time counters, and buffer registers.

Kenneth H. Olsen

100**INTEROFFICE
MEMORANDUM**DATE **November 4, 1960**

SUBJECT

TO **Harlan Anderson
Ben Gurley
Gordon Bell
Stan Olsen**FROM **Kenneth H. Olsen**

Thursday, November 3, a request for quotation came in from Convair, in Fort Worth, Texas, on the Programmed Data Processor. We want to be sure that this gets our intense attention so that we can get the quote out on time.

Kenneth H. Olsen

100**INTEROFFICE
MEMORANDUM**DATE **November 3, 1960**

SUBJECT

TO **Jack Atwood**FROM **Kenneth H. Olsen**

Andy and I picked out Christmas cards that we would like for the company. They are made by Velvetone Screen Prints, 108 Davis Street, San Francisco, California. The model numbers which we are interested in are 6076 for Andy's use, 6064 for Kenneth Olsen's use, 6063 for Stan Olsen's use, and 6067 for the use of other people. If you find a way of buying these inexpensively, I am interested in 6065 for my personal use. Most of these we will have the company name printed on and the individuals will sign their own name to them.

Kenneth H. Olsen

iced MEMODATE November 3, 1960TO Maynard SandlerFROM Kenneth H. Olsen

During the NEREM Show, there is going to be an evening discussion session at the Commonwealth Armory titled, "Small Lot and Specialty Production Problems" which might be worth while for you and Jack Smith to attend.

Kenneth H. Olsen

100**INTEROFFICE
MEMORANDUM**DATE **November 3, 1960**

SUBJECT

TO **Dick Best**FROM **Kenneth H. Olsen**

There are a number of interesting papers at the NEREM Show this year, and I think we should encourage some of our men to go to them. I think we should make the requirement that people write a short report on the sessions for the Bi-Weekly so that what they learn will get spread around a little bit and so that they will take them a little bit seriously.

Session 19 on circuits has a paper by IBM on transformer logic circuitry which I think is the general technique we use in our complementing circuits. The Thursday session on transistors, Nos. 29, 35, and 36 are also interesting.

Kenneth H. Olsen

100**INTEROFFICE
MEMORANDUM**DATE **November 3, 1960**

SUBJECT

TO **George Gerelds**FROM **Kenneth H. Olsen**

During the NEREM Show, there are two interesting sessions on reliability which you might be interested in attending. The first one is in the morning and it is Session 15 titled, "Component Reliability." The second one is a discussion at night at 7:30 titled "Reliability Form." There is also one Wednesday afternoon, but it doesn't sound quite so interesting, titled "Reliability Systems Problems." You probably would like to see the show anyway and you might be able to take in one or all of these sessions.

Kenneth H. Olsen

000**INTEROFFICE
MEMORANDUM**DATE **November 1, 1960**

SUBJECT

TO **Maynard Sandler**FROM **Kenneth H. Olsen**

Our lease with Maynard Industries promises to keep our plant warm during working hours of Monday through Friday. The building has been warm every weekend that we wanted it because Raytheon has requested it. However, we should check each weekend we are going to work overtime to be sure that Raytheon will keep the heat on and, if they don't, we should decide whether it is worth the heating bill to come in on Saturday. When Raytheon heats their plant, they also pay for heating ours, and the opposite will also be true. We have to pay for heating all of Raytheon's space when we want ours heated.

Kenneth H. Olsencc: **Stanley Olsen**

MEMODATE October 24, 1960TO KHOFROM KHO

I promised to talk to the Student I.R.E. Group at Tufts University on Wednesday, November 9, at 7:30 P. M. for approximately one hour. I am to arrive at 5:30 at the "E" Building on College Avenue and have dinner with the students. Dave O'Brien, the technician we had during the summer, will meet me there. About half the students are seniors, and half are juniors.

DEC**INTEROFFICE
MEMORANDUM**DATE **October 24, 1960**

SUBJECT

TO **Wally Weston
Jon Padinan
Dick Best**FROM **Kenneth Olsen**

I spoke to Frank Vinyl this afternoon, Monday, October 24, to find out which areas we have been weak in filling the needs of SEA. My conclusion has been that we have become a little too hard-nosed in dealing with these customers. They feel that our human engineering has been poor and we have not been willing to make changes to satisfy the customer. They have also had some complaints in the quality of our work, such as switches which turn in position and possibly short out. They feel that it is difficult to reach some controls and that we have refused to consider re-layout. The layout of our inputs to the sense amplifier also seems to be poor because they pick up noise. His understanding is that our answer to this is to move the wires around until the signals are good and then tape them in place.

Rese is offering a point strobe which Frank feels is very important, and because he didn't have it he had difficulty filling the specifications of one of his customers. Rese offers four strobe pulses which are completely variable.

The sense amplifier as Rese is offering has 20 megacycle band pass with two strobes and better than 10 megacycle with four strobes. Frank feels that this is important for fast switching cores.

Our sense amplifier is claimed to be good to 1 per cent of full scale, but Rese claims $\pm 1/2$ per cent full scale on 1 to 100 millivolts and 1 per cent full scale over 100 millivolts.

Rese's current calibrator is good to ± 1 per cent of full scale and no meter is needed.

Frank said our price is all right and it was not a factor. We were \$1,300 higher than Rese, but if other things were equal this would not have been a factor.

Frank also said he suffered from lack of faith in giving the order to Rese because he included a \$100 a day penalty clause with Rese that he didn't feel was necessary with us, and also had a provision to visit Rese at the option of RCA. Frank also said that he would like to have had our quality and he likes to work with us, but felt that because his engineers wanted this Rese equipment he felt he had no choice.

Kenneth H. Olsen

0001**INTEROFFICE
MEMORANDUM**DATE **October 21, 1960**

SUBJECT

TO **Loren Prentice**FROM **Kenneth H. Olsen**

The small sign alongside our front door that gives the complete name of the company is very important, but it is starting to rust and look rather poor. I would like to have you make up a more substantial looking sign at approximately the same size that we can use as a replacement. I think it should be made out of 1/8" or 3/16" aluminum with rather carefully beveled or rounded edges. Four corner holes should be drilled to match the mortar so we can set in with good looking screws. After that, we should very carefully chromi-coat it and white prime it. Then we will send it to the sign painter who will put the final white enamel on and paint the sign. I think we would do best in mounting it ourselves, and then we will be sure that it is mounted securely and straight.

Kenneth H. Olsen

COO**INTEROFFICE
MEMORANDUM**DATE **October 21, 1960**

SUBJECT

TO **Gordon Bell
Barbera Stephenson**FROM **Kenneth H. Olsen**

I was a little disappointed in the photographs we got from the response averaging on PDP-1. I expected to see a signal, then a time base for a while, then a response, and then some more time base. This is what one normally thinks of for an evoked response.

Dan Geisler, however, is quite happy with the results because they are the sort of thing he was looking for in his thesis. He put his clicks as fast as possible so that he could get as many averages in during a reasonably short period of time. For this reason, the responses almost overlapped the next click. I think it's too late to record more responses at a slower click rate, but we may be able to improve the ones we have. If it is practical, I would like to have us run the averaging program over again and modify it to obtain photographs which would mean more to a casual observer. I would like to see a photograph of the pulse that drives the earphone. This should be the first in the column of photographs. I would like to have two or three cycles to really show we are getting this response each time we get a click, and then I would like to have about four photographs with different amount of averaging. These would be much more meaningful if we could arrange the programs so that periodically we could photograph a true average so that we can avoid the rather complicated explanation of automatic scaling.

I asked Dan to write a page or two on the experiment and told him that from that we would generate a brochure which we would then mail to him to get his final approval.

With the recordings we have, it might be possible for Barbera to run some more experiments for her thesis in which she uses different precision in the analog to digital converter. She might also enter into a discussion on this question of summing, scaling, and true averages.

Kenneth H. Olsen

DEC**INTEROFFICE
MEMORANDUM**DATE **October 18, 1960**

SUBJECT

TO **Stanley Olsen**FROM **Kenneth Olsen**

From the latest Underwater Engineering magazine, there is a note saying that in the \$1.1 billion military construction bill passed by Congress, the Underwater Sound Laboratory at New London received \$4.4 million for construction of development and test facilities. The Naval Missile Center got \$338,000 and the Fleet Sonar School at Key West got \$1.1 million for training facilities. Some of these may need test equipment, particularly the one at New London.

Kenneth Olsen

000**INTEROFFICE
MEMORANDUM**DATE **October 18, 1960**

SUBJECT

TO **Loren Prentice**FROM **Kenneth H. Olsen**

From the small amount of cost figures we have got from our machine shop, I think we should carefully consider the possibility of removing all staff from this operation. The type projects which we have been giving to the machine shop are such that we can subcontract. Job shop machining is very competitive at the moment. If we need a machine set up, we can always have people from other departments use them in an emergency; but it might be for the good of the company not to have full-time machinists. I would like to see a study which proves economic feasibility of maintaining a machine shop here.

Kenneth H. Olsencc: **S. C. Olsen**

DEC

INTEROFFICE MEMORANDUM

DATE **October 18, 1960**

SUBJECT

TO **Harlan Anderson/Alma Pontz** FROM **Kenneth H. Olsen**

Mr. Dewey from Shawnut Bank visited us on Friday, October 14, to introduce the man who will be taking over our account. They have changed their organization somewhat, and I neglected to find out exactly what the organization will be, but the man who will have contact with us now is Lincoln E. Barber, Jr. His title is Loan Officer, but I'm not quite sure what that means.

Mr. Barber is very pleasant and much more interested and enthusiastic about what is going on than any other banker we have met. He is interested in all the processes and seems to have a good feeling for what is going on.

They gave me a copy of their statement of condition dated September 30, 1960, which does outline their organization. The loan officers come under the Commercial and Correspondent Banking Division.

I told them about our interest in foreign sales and they are going to have their Foreign Department contact me. Apparently, one does foreign business through one's own bank who works through correspondent banks in other countries.

They have some interesting people on their Board of Directors; they include Frederick Blackhall of Taft-Peirce Manufacturing Company, J. Hugh Bolton of Whitten Machine Works, Charles C. Carey of General Radio, Georges Doriot of AR&D, and Harold Geneen, president of IT&T, and Mr. Robert Jenney of Jenney Manufacturing Company.

Kenneth H. Olsen

October 17, 1960

PDP-1B Accounting

Harlan Anderson
Ben Gurley
Gordon Bell
Alma Ponts

Kenneth H. Olsen

I would like to call a meeting this week to discuss the accounting procedure for PDP-1B. When we first proposed building the machine with our own money we estimated it would cost \$35,000, but I have the impression it costs quite a bit more than that by now. Part of this added cost is that we have done more design work than we had expected, and part of it probably is due to the fact that we were overly optimistic.

The question I would like to discuss is whether or not we should take all the design costs for PDP-1B and apply them to computer development. This would mean that the working process for PDP-1B would be cut down significantly which would make a significant cut in our profits this month, but it would increase the engineering account for PDP-1 development and it would make the PDP-1B job look somewhat better planned than what it does now.

We also have to discuss the question of pricing our PDP's to whether we should cut the cost somewhere or raise the price.

Kenneth H. Olsen

October 17, 1960

Bolt, Beranek & Newman Visit 10/13

Harlan Anderson
Benjamin Gurley
Gordon Bell

Kenneth Olsen

Ed Fredkin, Licklider, and a couple other people from Bolt, Beranek & Newman came out Thursday, October 13, to discuss the addition of the drum to their PDP-1. They first looked over the computer and were very critical. Some thought the table should be higher, some thought it should be lower. They didn't like the way the lights were located and each one was sure that things were different than what he understood or what he thought they should have been. This upset me so much I almost told them to take their purchase order and go home, but I think I maintained a civil tongue even though my color might have changed during this session.

When we talked about adding a drum to this system, I told them it would have to be on much more formal arrangements so that there would be a complete understanding as to what we were delivering.

They would like this drum as soon as possible and, therefore, would not like to stretch the drum art. They are mostly interested in proving the feasibility of multiple inputs to the drum.

We concluded that it would be necessary to have an 1800 r.p.m. drum. This gives about 8 microseconds per cycle which appears slow, but we may need it in order to synchronize comfortably with the memory timing. We can always drive the motors from a higher frequency source. It seems that it would be best to have 4036 words around, which would be in their 10 inch drum. The largest 10 inch drum has 420 tracks which would give 22 fields at 19 bits, or 20 or 21 if we would like to have a large number of spare tracks.

They would like to have parity on the drum and the only way this seems possible is to add parity to memory and assume that any drum failures would be caught as the information goes in and out to memory.

The sequence they are interested in would have an executive field which would take part in every interchange. This would simplify the cost of our problem because the executive field would be completely isolated from the rest. When a new customer wants to call on the computer, the executive field is read in in the executive program, decides how and what the next customer will take over, then this executive field is swapped with the new customer's field.

According to the Bryant literature, an 1800 r.p.m. drum should have an average bearing life of nine and one-half years. We should get about 30 millivolts signal out from the head on the return to saturation recording. Optimum write current for half the coil appears to be between 100 and 150 ma.

I can think of four types of recording. The early IBM method was return to ZERO where a positive flux pulse was a ONE, and a negative flux pulse was a ZERO. The output voltage for a ONE looked like a half sine wave with positive first and the ZERO looked like a sine wave going negative first. If these signals were integrated, a ONE would be a positive pulse and the ZERO would be a negative pulse.

The return to bias method is somewhat the same, but one doesn't have to worry about finding a ZERO flux level to return to. In this method the material is always saturated in one state as long as there is a ZERO and the flux is switched all the way to the positive state when there is a ONE. This means that there is a signal every time there is a ONE and no signal when there is a ZERO.

The nonreturn to ZERO method approximately doubles the density because it uses half the flux changes. In this case, every flux change is considered a ONE and no flux change is considered a ZERO. This is a little more complicated because one has to know the previous history in order to know whether to record positively or negatively for ONE.

The Manchester system has a number of advantages because it puts out a positive signal for ONE and a negative signal for ZERO. The difficulty is that you won't have to set up the state which allows the positive or negative flux change half a cycle before the change is made. This might be particularly difficult in a system like BBN wants because we will not know the state which we want to set up until we want to do the actual recording.

Kenneth Olsen

MEMODATE October 7, 1960TO Jack AtwoodFROM Kenneth Olsen

It would be very convenient for those of us who travel if we have a company identification card. I think we should print up a few hundred cards and give them out to the people who travel. I'm not sure what should be on them, maybe a fingerprint and definitely the Land Camera photograph.

Kenneth Olsen

COO**INTEROFFICE
MEMORANDUM**DATE **October 7, 1960**

SUBJECT

TO **Ben Gurley**FROM **Kenneth Olsen**

Ed Fredkin from BBN called to tell us that they are ready to go ahead with the drum for their PDP-1. They would like as many fields as possible and would like to be able to interchange memory and drum as quickly as possible. I told him that we requested the loan of the drum from Bryant so that we will start work on the drum immediately. He is coming out to visit us next Thursday morning, October 13, to discuss the logical details of the problem.

The 3600 r.p.m. drum has a cycle time of 4 microseconds, which seems too fast for our memory; and the 1800 r.p.m. drum has a cycle time of 8 microseconds, which seems slower than necessary. Our tentative plans are to buy an 1800 r.p.m. drum, but to be sure that we have the ability to drive it from an 85 cycle oscillator which would give us about a $5\frac{1}{2}$ microsecond time.

Ken Olsencc: **Gordon Bell**
Harlan Anderson

000**INTEROFFICE
MEMORANDUM**DATE **October 7, 1960**

SUBJECT

TO **Stanley Olsen**FROM **Kenneth Olsen**

Friday morning, October 7, I got a call from John Lauder from Bendix Systems in Ann Arbor, Michigan, to set up an appointment to visit us to help in their evaluations of building blocks. They would like to visit us Wednesday morning, October 12, and I told them that this would be fine. You should be sure to schedule people to see him, maybe Barbera and Dick Best if I am going to be tied up with the FAA. I understand this is a big project and we should be very helpful. The conclusions they develop in this survey may also influence other projects that Bendix takes on. John Lauder and Harry Kimel will be the people coming.

Their Purchasing Department will call today to work out the details of borrowing equipment. We should be ready to receive this call.

Kenneth Olsencc: **Barbera Stephenson**

October 7, 1960

Dick Best
Ben Gurley
Harlan Anderson
Stan Olsen

Kenneth H. Olsen

On Tuesday, October 4, I visited Bryant Computer Products in Walled Lake, Michigan, to discuss their products and the ways in which we could co-operate. Some of their customers are apparently not happy with their circuits and would like to have us make the circuits for them. We, of course, would like this because it would open a whole new market, and the people who are now using our circuits anyway would like to have a consistent line of packaging. Bryant is planning to develop electronic capability, but that really shouldn't limit our enthusiasm for a line of drum products now.

In addition, we should have capability for putting drums into our computers. Ed Fredkin of BBN is insisting on us putting a drum on the PDP-1 we are getting ready to deliver. He would like to interchange the contents with the drum to multiply its memory capability by a tremendous factor.

They have four standard drum sizes now - 5 inch, 7½ inch, 10 inch, and 18½ inch. They usually record at about 130 bits per inch and so get 2024 pulses per track on the 5 inch drum and 7540 on the 18½ inch drum. The one we are most interested in is the 10 inch on which they get 4048 because that is the size of our memory field. These drums have an integral motor and they offer a variety of speeds. This means that our circuits will have to tolerate a wide range of amplitudes and frequencies. Those motors that run very fast from 6000 to 24,000 use 400 cycle motors.

All their measurements on heads are assuming a return to bias type recording. They were not able to tell me which type recording they recommend, but this might be one for the considering. They record with one microsecond pulses when they collect their data. From their graphs I figure they get about 45 millivolts

signal across their center taped head at 130 pulses per inch when running at 130 KC rate. This means for the lowest surface speed, which comes out to be 92 KC, the signal would be about 30 millivolts. For the highest speed, which would come out to be 800 KC, the output would be better than one-quarter of a volt; but this repetition rate is so high that I am sure there would be other problems. We may want to limit our circuits to the speeds available from 60 cycle motors.

The drum which Bolt, Beranek & Newman would like to have us use on the computer would be a 10 inch running at 3600 r.p.m. In this case, the pulse rate would be 204 KC which would give us about 75 millivolts out. However, the cycle time would be 4.06 microseconds which is fast for a memory. If we drove the synchronous motor from an alternator that put out 50 cycles, the cycle time would then be 4.89 microseconds per bit. We might buy an alternator that would put out somewhat less than 50 cycles. Forty cycles would give us 6.1 microseconds per bit.

Bryant is in a brand new, one story, modern type building in Walled Lake. They have their research and development and sales offices there, but the drums are made in Vermont and probably will continue to do so. The office space is only about half full at Walled Lake and the research and development area is pretty thin with people and equipment, but EX-CELL-O is a very aggressive company. They have their hands in many fields now and they most likely will expand this facility. The building is within a group of three new buildings in diverse companies, all owned by EX-CELL-O Corporation. It will be eventually an industrial park which will consist of EX-CELL-O owned companies.

They are working on high density drums which in a year or so will obsolete everything that they now have. I requested that they keep us up to date on what they are doing in this line.

Kenneth H. Olsen

cc: Bi-Weekly

000**INTEROFFICE
MEMORANDUM**DATE **October 6, 1960**

SUBJECT

TO **Ben Gurley**FROM **Kenneth Olsen**

Henry Crouse contacted Mr. Arthur Andrews, at CBS in Newburyport, Massachusetts. They are doing ultra-high resolution cathode ray tube work there. Their resolution is almost unbelievable, and although it is probably more than what we are interested in now, I think we should go out and visit them and find out what the state of the art is. They have a five inch tube with a focus coil and magnetic deflection coil running the full length of the tube, which costs about \$800 for the tube and \$700 for the coil mechanism which has resolution of about 3,000 lines to the inch, or about 12,000 across a four inch square. They have been working on Mini-Card system and their competitors.

Arthur Andrews sounds very competent, and I think he might be a good man to work with.

Kenneth Olsen

cc: **Henry Crouse**

October 6, 1960

Stanley Olsen

Kenneth Olsen

On Tuesday afternoon, October 4, I visited Bendix Systems Laboratory in Ann Arbor, Michigan. They are located about a mile outside of Ann Arbor on Route 14 on the way to Detroit. The people I visited are in a separate building behind the main building, which is approached by going past the main building on Route 14, turning right on the next street, and going down about a quarter of a mile. This other building seems to contain their metal shop and the mock-ups for human engineering of aircraft systems.

John Lauder contacted me by telephone the week before. I met with him and his boss, who is Mr. Harry Kimel.

Bendix Systems is the prime contractor for an active satellite communications system. The logical designers layed out the system and the requirements, and these two people have the job of studying available building blocks for building the system. They do not as yet understand what the application is and so, of course, we are very much limited in talking with them. They do have money assigned for travel, and they plan to take advantage of it next week or the week after and come to this area. They definitely plan to visit Lincoln Laboratory to find out about the 50 megacycle circuitry. I, of course, insisted that they visit us. They will also visit CCC.

I told them that because they do not have high frequency oscilloscopes they will not be able to analyze high frequency building blocks, and so it is very important for them to visit us. We should be ready to demonstrate our 10 megacycle line to them when they arrive because that was the main excuse in having them come here.

They have two general applications, one is for circuitry that would run from 2 KC to 3 megacycles. This is somewhat

conventional and we will be competitive with several other people. I suppose the other people will be Sprague, Harvey-Wells, and above all, Packard-Bell.

The other application is for a shift register which will operate at 19 megacycles. They probably will subcontract this whole subassembly because no one has building blocks that will run at that speed. I suggested that they consider using two 10 megacycle shift registers and alternate between the two, or else use delay lines. They are not clear as to how this will be used, but the general idea is to shift pulses into this shift register and compare them, and when there is coincidence between the pattern in the shift register and another register, something will happen. I, of course, told them that we are the most capable people in high speed business, and we could readily make a shift register that would do this if they needed 19 MC.

They would like to borrow equipment to make evaluation for their lower speed job and they would like enough to make a standardized logical setup so that they can make a direct comparison. They will also check the loading characteristics of the units to make sure that the manufacturers are not too optimistic. The standard setup which they would like to make with each manufacturer's units consists of a variable clock that will go from 2 MC to 3 megacycles, a counter of three or more digits, and a check register of the same number of digits. The counter will count the clock pulses until a predetermined count is obtained, at which time the contents of the counter will be read into the check register. On the next pulse, the counter contents will be compared with the register contents and if they are the same, the counter and the register will be cleared and the cycle will start over again. The comparison can be done two ways, either by complementing the register twice and checking for zeros, or by making an AND circuit to compare the two registers. This latter way is more expensive, but because we probably can make an exclusive OR cheaper than other people, it might be a good system to use. We will have to be careful to make sure the control of the system is simple because it will be a significant part of the cost.

I suggest that Barbera Stephenson sketch out the logical design for this and collect the equipment and send it out to them.

If we have one available, it would be nice to send out a 1906 so that they can modify and change things quickly and easily.

Kenneth H. Olsen

cc: Barbara W. Stephenson
Bendix Systems - Sales File

COPY

ced**INTEROFFICE
MEMORANDUM**DATE **October 3, 1960**SUBJECT **Magnetic Display Circuits**TO **Don White**FROM **Kenneth H. Olsen**

We would like to make the circuitry and power supply for the 16 inch display scope as small as possible. One obvious way to do this is to combine the power supplies because 749's are now almost empty boxes. In order to do this, we should first make a measurement as to the current needs for the circuits and the availability from a 749 power supply.

It would be possible to make the equivalent to two 749 supplies in one box, but we should be very sure that this will supply enough current when the line voltage is low and we should also determine whether it is necessary to have the filter choke in the supply or not.

If two 749 supplies are marginal in their current capabilities, we might put a third transformer in or we might drive the transformer from a line regulator type which will also drive the high voltage power supply. This would, of course, mean that the 749 type transformers will always have a constant input voltage and, therefore, would not have to worry about low line voltage. It is very important that we take into account the problem of low line voltage because our last oscilloscope ran into trouble when we didn't have full voltage.

If it turns out that we can get by with two 749 supplies in one package and they don't need filter chokes, we might have the capacity in one of the transformers to drive the high voltage power supply which we might include in the same box.

Kenneth H. Olsencc: **Ben Gurley**

COO**INTEROFFICE
MEMORANDUM**

SUBJECT Light Pen Production Techniques
DATE October 3, 1960
TO Ben Gurley/Loren Prentice
FROM Kenneth H. Olsen

I propose that we sell light pen barrels as part of the lens assembly. This way I think we can make them readily interchangeable with the electronic portion. Of course, if we produce enough of the electronic portion it won't cost very much to make them either.

I propose that we make a generous quantity of cases and have them polished and anodized and stocked. They will, however, be longer than necessary and then after the lens is cemented in place we can measure with a jig where they should be cut off.

The jig would be used in a dark room and would consist of an illuminated translucent disk the size of a photocell that would be wired in a plug which just fits inside the shell and it will be adjusted in depth until it projects the desired pattern on a screen in front of the lens. There will be a marker on the outside of this plug that will show exactly where the shell should be cut off. It will then be mounted in the collet of the lathe cut off and the screw hole drilled in a separate jig.

The measuring jig should have a V block for holding the shell in a fixed position and the means for setting the screen at a predetermined distance in front of the lens.

This is, of course, dependent on making the electronic assemblies all with the same dimension from the back to the photocell. We can line the photocell up with a ruler and then cement it in place when it is in the right position.

Kenneth H. Olsen

ced**INTEROFFICE
MEMORANDUM**

FILE

DATE September 30, 1960

SUBJECT

TO Ben Gurley

FROM Kenneth Olsen

Bruce McCormack, from the University of Illinois, at Urbana, Illinois, called on Thursday, September 29, at three o'clock. His phone number is EMpire 7-6611, extension 3721. He is interested in a high precision scope like we offered to Fernbach at the University of California. I told him the speed response would be 30 to 40 microseconds, which disappointed him somewhat because he would like to have one microsecond. However, they have two systems they will build. The first one will go in the Illiac, and the 40 microseconds is reasonable. But the next one they want to work in one microsecond is to go in their new computer. I forgot to ask him when the new computer would be working.

I told him that we would call him back on Friday or Monday to give answers to the following questions:

1. What would the range of currents from our amplifier be?
2. Will it drive a Raytheon high precision storage tube?
3. Will we take a contract and develop a one microsecond display, and what time schedule do we need? This one microsecond doesn't have to be from corner to corner but can be for short distance. This would mean, of course, a switch hooked up in the difference amplifier circuitry that will tell when the thing is ready to intensify and would end up with a completely asynchronous system, but he would be happy with this.
4. What would the price be for a 1024 line box with a flip-flop register?
5. What would it cost for dynamic focus?

He said that CBS makes a high precision electrostatic focus and electrostatic deflection tube.

I told him that if we couldn't satisfy his needs, there is a possibility he could work with Image Instruments Co.

The one part of this high precision tube which I have forgotten was the 20,000 or 30,000 volt power supply. I don't know how we are going to do this. We better figure it out soon. He asked how long it would take to deliver one of these systems, and I told him the electronics were just like the 16 inch tubes so it only takes us six to eight weeks.

From the University of Illinois, at Urbana, Illinois, called on Thursday, September 29, at three o'clock. His phone number is 244-7000, or home **Ken Olsen** is a laboratory in a high resolution scope. He is advised to contact at the University of California. I told him that good expense would be cc: **Harlan Anderson**, which is the opposite. He said that he would like to have our microscopes. However, they have two systems they will build. The microscope will go to the Illinois, and the other microscope will be available. But the next day he went to work in the lab and he did go in the day's schedule. I expect to meet him via the new expense you are working.

I told him that we would not have it on Friday or Saturday or give him a list of existing quantities.

1. That you, the manager of the lab, you are a good person.
2. That the microscope is a high precision tube.
3. That the microscope is a high precision tube.
4. That the microscope is a high precision tube.
5. That the microscope is a high precision tube.
6. That the microscope is a high precision tube.
7. That the microscope is a high precision tube.
8. That the microscope is a high precision tube.
9. That the microscope is a high precision tube.
10. That the microscope is a high precision tube.

I expect to meet him via the new expense you are working.

MEMODATE September 28, 1960TO Stan OlsenFROM Ken Olsen

Here are the specs. on the luggage we saw at Macy's. The 21" companion was \$17.49 and the attache case was \$22.49. This was called "Macy's Super," I believe. The woman's name was Sylvia Waltman in the Luggage Department. The phone number is OX 5-4400, extension 2073.

Ken Olsen

100**INTEROFFICE
MEMORANDUM**DATE **September 28, 1960**

SUBJECT

TO **Henry Crouse**FROM **Kenneth Olsen**

Our company security has become extremely lax. The weakest link is the large number of keys we have available. We will change our policy now so that a few people have keys to the company, and others who are planning to come in will borrow a key. We will now have to change our locks so that the large number of keys we have out no longer work.

I would like to have you call in a locksmith. It will be best if he could come here and do the work, although it would be possible for us to deliver all cartridges to him. We should also call back, at that time, all the keys. It might be possible for him to modify the locks in a minor way so that he can use the keys we already have, if that would make any significant saving. We would like to have two types of keys. The lock on the carpenter's shop and the lock on the tool crib should be one key, and only about four people should have those. The lock on the front door, the side door, the door between the second and first floor, and the doors to the exits of Building 3 should be another.

While he is here, we would like to have him take the locks on the green cabinets opposite the milling machine and key them all alike so that we will need only one key.

Kenneth Olsencc: **Stanley Olsen**

September 28, 1960

Ben Gurley

Ken Olsen

Andy's friend from Electronic Associates called on Monday during the I.S.A. Show to give us a tip on a computer application in Canada. The Sperry Company in Canada is making a war game simulator for the Canadian Navy for which they need a computer with this cathode ray display output. They have now pretty much committed themselves to a Packard-Bell computer, and Electronic Associates would like very much to have someone else's computer so they would be in a competitive position to bid on the digital to analog conversion. Of course, our big advantage would be that we could supply both the display and the computer and the digital to analog conversion. The man in charge of the project is Dr. F. R. Terrier, and the man second in charge is J. Grandpre. The purchasing agent's name is Ken Tinker.

Ken Olsen

cc: H. E. Anderson
S. C. Olsen

100**INTEROFFICE
MEMORANDUM**DATE **September 28, 1960**

SUBJECT

TO **Stanley Olsen** FROM **Kenneth Olsen**

Mr. John Lauder, from Bendix Systems, in Ann Arbor, Michigan, called at 10:30 on Wednesday, September 28. They are working on a Signal Corp satellite communication problem which will need several thousand digital modules.

They have two needs - one is for units which will go between 2.4 KC and 3 megacycles, and the other is for a shift register that will shift at 19 megacycles. I, of course, told him that our 5 megacycle line would do the first job very nicely and that we have made our 10 megacycle line work at 25 megacycles in the laboratory.

They would like to borrow equipment to try out to make an evaluation. I told him this was, of course, very readily done and we would be glad to do it.

He wanted to know who else made high speed packages, and I told him about Computer Control's 16 megacycle dynamic logic.

I told him that we would call later in the week to make an appointment to go out and see him. I think it should be one of the senior people, because, with some trickery, we can most likely get rid of the need for 19 megacycles. It is going to take a real sales pitch to let him know that our packages are best. At the same time, we should stop at Bryant Computer in Detroit. The Bendix phone number in Ann Arbor is Normandy 5-7766, extension 260.

Kenneth Olsencc: **H. E. Anderson**

000**INTEROFFICE
MEMORANDUM**DATE **September 28, 1960**

SUBJECT

TO **Reminder File - 10/28/60** FROM **K. H. Olsen**

At the Navy demonstration at the Instrument Society Show in New York in September, LCDR V. A. Prather, MC, U. S. N. at Bethesda, Maryland, demonstrated the electroencephalograph and electrocardiograph for telemetering of medical information. It would be a good idea to send him a letter telling him about our art work when we have something on paper.

They used very simple, three transistor amplifiers for both the electrocardiograph and their electroencephalographic work.

K. H. Olsen

September 26, 1960

Jon Fadiman
Wally Weeton
Dick Best

Kenneth Olsen

Tudor Finch, from Bell Labs at Murray Hill, called on September 23, to remind us that papers for the Solid State Conference have to be in by the middle of October in order to be accepted.

He was also interested in memory exercisers. They are very heavily in the storage business, both for small memories of a few hundred words to tens of thousands of words. Their bit length varies from about 10 to 100 bits. Some of their memories are fixed information types which only have to be read and checked. Their speed range is from 3 to 15 microseconds. I assured him that this is just the business that we were in and that we would love to talk to him. I told him that Jon Fadiman would be in Whippany next Thursday and that at that time he could stop over at Murray Hill. He said that it would take at least a half a day to discuss the situation. The two men who we should contact are Jim H. Vogelsong (extension 4219) and D. H. McPherson (extension 2021). Their phone number is Crestview 3-6000. They will need one or two exercisers, and we should be sure that we get the business. They already have exercisers made by Rese using our equipment and they are happy with our equipment. I am sure the competition in this will be Rese.

Kenneth Olsen

000**INTEROFFICE
MEMORANDUM**DATE **September 22, 1960**

SUBJECT

TO **Gordon Bell/Ben Gurley**FROM **Kenneth Olsen**

David Caldwell called from M.I.T. to say that the two people from their Physics Department who are interested in the PDP-3 will be out to see us at ten o'clock on Monday, September 26. I will not be here and I don't think Anderson will be either, so you people should be ready to greet them. I would recommend that Gordon Bell take the bulk of responsibility for this, but you can play it by ear as you go. If my office is free, you might have coffee there as you get started.

If for some reason or other we have to change the meeting, David Caldwell's extension at M.I.T. is 4287.

Ken Olsen

COO**MEMO**DATE September 21, 1960TO Henry CrouseFROM Ken Olsen

Some time ago, Loren Prentice ordered draw-like containers for storing nails and pipe fittings in the tool crib. These are plain iron and about 10" wide, 7" high, and about 15" deep. They have an open front so that he can remove the parts without pulling the draw out. Would you try to find out where we got them from and how much they cost, because I would like to order another group for the woodworking shop. When you find them and the prices, will you type out a requisition for me for a quantity of 18. When you find the price I may want to cut down the number.

Ken Olsen

**id
ec** **MEMO**DATE September 14, 1960TO Stan OlsenFROM Ken Olsen

Our new "how to do" Logic Book should be out by the end of next week. Will you be sure that we have a release sent out to all the magazines offering this for free. You might try getting suggestions from Van Cleef as to some enthusiastic words to put this in.

It would be nice if you or Jack Brown sent a letter to each of the educational groups that have bought our Building Blocks. Send them a copy of the temporary edition, tell them that the new edition will be out in a couple of weeks, and tell them that you will send them all that they want.

Ken Olsen

MEMO

DATE September 14, 1960

TO Henry Crouse FROM Kenneth Olsen

Please find those taper pin sockets which are compatible with our normal blue Amphenol sockets and give the price and delivery to Harlan Anderson.

Kenneth Olsen

MEMO

DATE September 15, 1960

TO Earlan Anderson FROM Kenneth Olsen

Please be sure to follow through on the taper pin sockets for the mounting panels.

Kenneth Olsen

cc: Stanley Olsen

000**INTEROFFICE
MEMORANDUM**DATE **September 14, 1960**

SUBJECT

TO **Gordon Bell**FROM **Kenneth Olsen**

I'm still planning to make a light pen myself, but in case I'm holding up things let me tell you what my thoughts are. The body of the panel will be an aluminum tube which we can select from the Whitehead Metal Products catalog. We spin the end over so that it is fountain pen shape with a hole big enough for the lens. The lens should be plexiglass or lucite to fit reasonably snug inside this tube and then cement it in place. A solid aluminum end should be machined and drilled and tapped to take the Microdot connector. The inside of this machine plug should be slotted to take 1/16 inch phenolic or glass base board. All the parts should be cemented to this board and hand soldered. The whole thing could be potted or dipped, or perhaps even terminals mounted.

We have an assortment of CTC miniature terminals in the sample shelves on the third floor. Some of these terminals might fit well on this strip.

I think we should machine out of bakelite a round piece to be cemented to the phenolic strip, drilled and slotted to have a snug fit on the photocell so that it can be moved for focusing.

Kenneth Olsen

September 2, 1960

American Sitina Corporation

Harlan Anderson

Kenneth Olsen

Mr. John B. Simmons, of American Sitina Corporation, in Dedham, Massachusetts, called today and wanted an appointment to discuss an electronic problem they had. I invited him out and we talked for a while but it seemed obvious to me that the switching problem is relatively simple if they can work out the chemical problems on their end.

John Simmons is president of the corporation, and I think he has only one or two other people working for him. One of these is a physical chemist who is apparently quite good. They have been doing consulting on the application of porcelain to steel, but apparently their relationship with their customer has collapsed. They are now looking for proprietary items. They are in need of capital to develop their ideas but I'm not sure how much concrete plans they have to offer a supplier of capital. Simmons knows American Research and General Doriot, but apparently is not too enthusiastic about them. We will ask American Research for a Dun & Bradstreet on them.

The project they are now interested in is a coordinate selection display or coordinate selected photosensitive devices. I told him this was an old idea with a lot of people working on it and that the switching problem may be expensive but it is relatively straightforward. I said that after he developed his device a little further and can tell us the voltages and power impedances necessary we could tell him what the switching problem is, but there is no point in going into it now until he can tell us more about their device. He seemed a little confused as to whether they want a photosensitive or display device. I think I convinced him he was working with the wrong thing and should go ahead and solve his own problem before he tries to solve the display.

They may change the name of the company, so we may hear from them again under a different name.

Kenneth Olsen

cc: Jack Brown

000**INTEROFFICE
MEMORANDUM**DATE **August 16, 1960**SUBJECT **Memory Temperature Control**TO **Ben Gurley**FROM **Kenneth Olsen**

Ruge & DeForrest Co. was the company that developed the strain gauge. They sold out their interest to Baldwin-Lima-Hamilton, but Ruge started Arthur C. Ruge Associates, Inc., Hudson, New Hampshire, and uses the same techniques for temperature control. They are apparently doing very well and supply real service in showing people how to use their equipment. A salesman stopped by last week and I couldn't think of any places where we use temperature control, but when they sent the literature in, I realized that we have a very important one in the memory. Their catalogue should be in the catalogue file and I recommend you look at it. They call their units RDF Stickons. I think this means because you stick the sensing elements on. They may be better than what we are using now; and if you are interested, I am sure the salesman will come down and be very helpful.

Kenneth Olsen

000**INTEROFFICE
MEMORANDUM**

DATE August 10, 1960

SUBJECT

TO Harlan Anderson FROM Kenneth Olsen

Jim Ricketts of AC Spark Plug called at about ten minutes to four and talked for well over three-quarters of an hour. He had a lot of interesting problems but the reason he was calling was they need a special signal generator which is in effect an excuse for buying DEC equipment except that we may lose it because we can't compete in building generators. I told him that when you go to the ACM Conference in Milwaukee you would give him a ring. I think it would be well worth while to go over and see them and see what you can do about selling them standard equipment. Their problem is that they can only spend money on devices which cost over \$500 and if they buy DEC equipment the unit cost is less than that.

The signal generator they want should put out pulses, square waves, pulse bursts, and triangular waveforms. They don't have reasonable or complete specs worked out as yet, however. The amplitude should be ± 32 volts maximum with minimum amplitude of .05 volts. Frequency should go from one-tenth of a cycle to 10 KC at 2%, although they don't know what they mean by 2%. The overshoot on the impulses should be less than 5% in the amplitude and the pulse width should be 1 microsecond to 10 milliseconds. There should be a sync. pulse which can be delayed 0 to 100%. It should be externally triggerable with 3 volt pulses. They didn't specify the impedance, but it should drive 100 mils.

The burst generator should yield up to 64 pulses for the duration of one microsecond to a tenth of a second and the pulses should be 10 microsecond to 1 second in length.

Kenneth Olsen

DEC**INTEROFFICE
MEMORANDUM**DATE **August 16, 1960**

SUBJECT

TO **Stan Olsen**FROM **Ken Olsen**

I think we should go ahead and tile the Ladies' Room on the second floor. This room is used very much and it is important to be able to keep it in nice shape. We have enough facilities on the third and first floors to take care of people while it is being fixed up. Maybe we should have the plumbers lift the bowls while the floor is being laid. We can jack up the stalls during installation without removing them, I believe.

Soon, I think we should tile all the office area on the first floor, and it is not too early to start making plans for this. My thought is to cover all the area north of the Advertising office but including Jack Atwood's office. I think we should remove all the partitions and use them for flooring and then make up the office partitions which include Atwood's and Brown's offices using painted partitions which are four or five feet high, the upper sixteen inches of which are glass. There are wonderful possibilities for being clever in making these partitions.

Ken Olsen

COO**MEMO**DATE August 15, 1960TO Jack AtwoodFROM Kenneth Olsen

I promised Jack Brown that we would send out photocopies of the Logic Book so he could have them for his session next Sunday with the tech reps. We should particularly have copies of the rules section. I suggest you wait as long as you can and then Air Mail Special Delivery them out.

Kenneth Olsen

000**INTEROFFICE
MEMORANDUM**DATE **August 11, 1960**

SUBJECT

TO **Jack Atwood**FROM **Kenneth Olsen**

I think we are all agreed on this subject, but just to be sure I would like to let you know that as a general policy I don't want ads on PDP because anything other than a full-page ad in a very dignified magazine will lower the dignity of our machine. It's sort of like Ford Motor Company advertising in the classified section of a newspaper. We're all for publicity because often we don't directly take the responsibility for what happens there.

Kenneth Olsen

000**INTEROFFICE
MEMORANDUM**DATE **August 11, 1960**

SUBJECT

TO **Harlan Anderson**FROM **Kenneth Olsen**

Ed Bobbigan called today at three o'clock in the afternoon, Wednesday, August 10. He says everything should be straightened out at Philco to pay our bill now. Mr. Bairmeister (this is Ed Bobbigan's guess at the spelling of his name) was supposed to call you on Tuesday, but if he has not the thing to do is to send a new invoice to Philco, G & I Division, 4700 Wissahickon Avenue, Philadelphia, Pennsylvania, and the bill will be paid immediately.

Ed said they had an argument about \$20 shipping costs because it was supposed to be shipped prepaid, but they have agreed to ship it less the \$20 and argue later. This story doesn't seem to jibe with the story that they misplaced the invoice. If they didn't like the \$20 they should have brought it up earlier.

Kenneth Olsen

August 10, 1960

International Electric Display Award

Harlan Anderson

Kenneth Olsen

Norm Raver called back again at 4:00 P.M. on August 9. I agreed to come down and visit them at 9:00 A.M. on Thursday, August 11. Their tentative plans, which are Company Confidential, are to buy two small machines like the 1620. The only input will be paper tape but it must have the facility to drive the display. There will be six display boards which may for the first task consist only of incandescent lamps with relays that have holding contacts. The first display is the 8' by 15' geographic display with the main communication routes and the status of each. There probably will only be four conditions on each route. They would like to use color but they are not sure how.

There will also be two 8' by 8' alphanumeric displays, one other geographic display and three specific circuits, such as the president circuit, etc. Some displays will have to be updated within 15 seconds.

They are working on a five month schedule and so are in a wild hurry. They think they have found someone to do the display but would like us to do the electronics, maybe.

Dick Palmer, who used to work at Lincoln Laboratory, is Raver's boss. If we can't get Raver, we should call up Palmer.

Kenneth Olsen

000**INTEROFFICE
MEMORANDUM**DATE **August 10, 1960**

SUBJECT

TO

Harlan Anderson

FROM

Kenneth Olsen

This is my itinerary so far for the end of this week. Wednesday night I will drive down to Connecticut and very early Thursday morning I'll drive to New Jersey and meet Raver at I.E.C. I should be there at 9:00 to 9:30. As yet, I have nothing scheduled for the afternoon. I hope I don't spend too many hours at I.E.C. but they are grossly inefficient and can't tell how long it will take.

Friday morning I will be at Columbia University.

Kenneth Olsen

COO**INTEROFFICE
MEMORANDUM**

SUBJECT **Columbia University
Underwater Defense System**

DATE **August 10, 1960**

TO **Harlan Anderson**

FROM **Kenneth Olsen**

I called Julie Wolf today, August 9, and set up a visit for Friday morning. They are still interested and wondered why we hadn't contacted them earlier. Their address is Columbia University, Hudson Laboratories, 145 Palisades Street, Dobbs Ferry, New York, P. O. Box 239. The phone number is OWens 3-8500.

The way to get there from Connecticut is to come down the Hutchinson River Turnpike and get off at (Arsley) Avenue which has signs pointing to Dobbs Ferry. At about one-half mile or one mile at the second red light, turn right for two blocks to Palisades Street, and turn right again, and there's Columbia University Laboratories.

Kenneth Olsen

COO**INTEROFFICE
MEMORANDUM**

SUBJECT **Defense Communications
Agency Display Computer**

DATE **August 10, 1960**

TO **Harlan Anderson**

FROM **Kenneth Olsen**

Mr. Norman Raver of I.E.C. called today, August 9, at 10:00 A.M. to ask us to visit them to discuss the possibility of supplying a computer with display capability for a project they are bidding to the Defense Communication Agency.

They want the information in a day or two because they have to turn the proposal in in four weeks, spend the next week and a half in writing the proposal, and two weeks for management approval and art work.

I told him I would call him back and let him know when I could go down to see him. They are in Paramus, New Jersey, which is about fifteen miles north of Newark. He suggests we take Route 4 from the George Washington Bridge to Route 17, where you turn north. I.E.C. is about a mile from the intersection, but on the wrong side of the parkway so one has to continue to the next intersection and make a U turn and back-track about a half mile.

His number is COfax 2-6800, extension 519 or 227. Dick Palmer, who is formerly of IBM and Lincoln Laboratory, is working with him.

They would like an 8 ft. by 15 ft. display which shows the status of all communication lines. Geography doesn't change very often but it has to be possible to modify it. Numerical displays may be all that they need.

Kenneth Olsen

000**INTEROFFICE
MEMORANDUM**

DATE August 10, 1960

SUBJECT

TO K. H. Olsen

FROM K. H. Olsen

We promised for the Board of Directors a schedule of growth which should include a schedule for obtaining new people. We should spend our time searching for new people and coaxing our present senior people to find people for themselves. We should be able to plot out graphically the growth of projects as we obtain new people.

They suggest the possibility that we might get only four to one yield on new people. For every four people we take on we may be able to keep only one. Each project engineer should give a sales estimate and there should be some penalty for misguessing.

There probably should only be one subject for each meeting, such as, Future Plans. It was also suggested that we have project engineers report to the Board of Directors.

K. H. Olsen

cc: Reminder File - August 30, 1960

000**INTEROFFICE
MEMORANDUM**DATE **August 10, 1960**

SUBJECT

TO **Jack Atwood**FROM **Kenneth Olsen**

Please make up the following sign "Environmental Test Chamber". It should be 2½ inches by 28 inches. White cardboard with wick pen letters would be fine. I plan to fasten it to our environmental test chamber on the third floor so that it will show off better. This chamber will be a good show-off piece for any facilities brochures we make and will also be an obvious thing to show visitors when we take them through.

For the next Bi-Weekly, which I think comes out this Thursday, we should be sure to get a report from all the new engineers and all the summer engineers. Last time we got Bi-Weeklies from the people who get Bi-Weeklies, but it is even more important to get them from the people whose work we don't normally follow. It is also healthy for the young engineers to have to write a report. We should also get one from Barbera Stephenson.

You might, in the note you send to people requesting Bi-Weeklies, suggest what we want from them. It's not a justification for their time and should not explain what they did each minute but should only present the developments and problems which are of interest to the organization.

Kenneth Olsen

REC MEMODATE August 9, 1960TO Loren PrenticeFROM Kenneth Olsen

We now have a Braman, Dow & Company catalogue of plumbing supplies. They have on page 314 of their catalogue a "general water hammer silencer." These units are 6" high and have $\frac{1}{2}$ " thread on their Model 40. Their Model 3 has 1" pipe thread and it is 10" high and is quite a bit bigger.

Kenneth Olsen

DEC**INTEROFFICE
MEMORANDUM**DATE **August 4, 1960**

SUBJECT

TO **Stan Olsen**FROM **Ken Olsen**

I suggest that we have a patch panel on the output of our audio system which consists of several rows of telephone type jacks. We could obtain ready-made patch-cords rather readily, I believe. The outputs of each audio amplifier and the inputs to each distribution line should come into this patch panel. This way we can redistribute audio amplifiers when there is a failure. The input should also go through the patch panel so that we can modify inputs at our convenience. It would also be convenient to have a radio nearby so that when desired we can tie the radio into the system.

Ken Olsen

doc**INTEROFFICE
MEMORANDUM**

DATE August 4, 1960

SUBJECT

TO Stan Olsen

FROM Ken Olsen

George Lord would like to have a print box. He suggests two separate timers, one for short exposures and one for long exposures; but I think we should use different size lamps for slow material and fast material and optimize the exposure out to a length where we can have fine control, such as 30 seconds or so.

He would like to have a bank of lights with frosted glass to diffuse it, but I think this is just the opposite from what you should have. We would be most happy with an arc lamp for our bright work and a small point source for our contact printing of high speed paper. The next best is a 500 or 1000 watt lamp bulb for the bright work and a small filamentary type lamp bulb for the contact work. Next time we have the carpenter in we should have him make this box. I don't see the need for plate glass, which is of course very expensive and if it breaks you lose quite a bit of money. For this I think plain, ordinary window glass which is reasonably clear would do.

I already bought the extra timer that can go on this, and I think we should mount it permanently on the side so it takes no patching when the thing is going to be used. There should be the switch which changes between the small light source and the bright one.

Ken Olsen

COO**INTEROFFICE
MEMORANDUM**

DATE August 4, 1960

SUBJECT

TO Stan Olsen

FROM Ken Olsen

We have a very weak link in our production planning and inventory management in that we do not tie sales forecast into our planning. When one has a traditional organization chart, it is rather obvious who has responsibility to make the sales prediction and who plans production and then who manages the inventory. We don't have an organization which is set up to do this, and I can't see the need for setting one up; but I think you are the obvious one to take the responsibility for working out the predictions. Engineering has a pretty good idea as to what business they are going to get and you can guess as good as anyone else what Building Block sales will be.

We have to work up a system which will automatically plan our production and inventory control after someone predicts the sales. In a spiral bound collection of articles from Steel Magazine, dated May 13, 1957, there are some suggestions on inventory management. If you read this I am sure you will get some ideas as to how to set up this system.

I think the result of this should be a manual very much like our Purchasing Manual. I think it would be good experience for you if you work it out, although Maynard, I am sure, would be willing to do most of the work if you didn't have time. Our sales procedure is documented now by Henry, but I would like to have it put in more finished form and put in a little booklet like our Purchasing Manual. After you have the production planning and inventory management documented, we might bind them all into one book.

One suggestion we should consider is elimination of purchase requisitions for production parts. It seems to me that we are typing the same information twice - once in production and once in purchasing. Approval of these orders is strictly a formality and we could have the purchase order typed

in production. We might even have a special purchase order made up for production parts. It could leave extra carbon copies for the production department if necessary and they could have its own series of numbers. Some of the blanks could be preprinted, in fact.

There is some red tape we can save in producing purchase orders. Ozalid claims they have a system which eliminates all clerical work by the use of an Ozalid blueprint machine. People also have systems which use ditto reproducing machines and Friden has a paper tape system. I think all the systems reproduce the common part of all production orders and all the operator has to do is to type in the quantity. Of course, when we have an IBM card setup we could simply have a card for each vendor and a card for each part and then a quantity card when these three cards are put together the line printer would print up the purchase order.

It might be a good idea if you wrote a letter to Ozalid and to the appropriate people who make ditto-type papers to see what their systems are. We could probably use them in the Sales Department also to eliminate some of their paper work.

If the Purchasing Department used punched card systems, the cards might automatically be used to develop a follow-up list that would each day list all purchase orders that should be checked on.

Advertising is, of course, the area which has the most clerical work and which is done with the least efficiency. I have no suggestions as to what we should do there but we might farm the whole problem out to Aid and not have a group of bored looking girls in that area.

Ken Olsen

ced**INTEROFFICE
MEMORANDUM**

DATE August 2, 1960

SUBJECT

TO Marlan Anderson/Ben Gurley

FROM Kenneth Olsen

Ed Fredkin called today and asked us to bid on a very large memory. This is for a company confidential project they are working on which would give them one of the largest computing facilities in the world. I think they have read the Stretch literature and think they can make one that is better for a fraction of the money.

They'll need a computer like our PDP-3 but with extra features which might involve complete redesign. They'll need two limit registers which will trap the program if they try to use memory outside the limits. They also need a relocation register which adds the number to all addresses so the program can be moved around easily. They want floating point arithmetic, parity check, real in-out registers, and a few new instructions. They'd also like to tie into phone lines.

The biggest part of the machine is the core memory. They would like to have four quotes from us and it should be in the form of a letter before August 8. They would like bids on 130 and 260, 36 bit words of memory and the most efficient size modules. They would like the same size memories bid in 4000 word modules which are completely independent with their own timing circuits and power supplies. They would be willing to take 5 microsecond memories but would just love 2 microsecond memories. Ben Gurley thinks we could approach 2 microseconds if we didn't saturate our transistors and if we used somewhat faster transistors. If we outlawed using the same word of memory in succession we probably would not be bothered with several problems.

He feels quite sure that they will order this system from somebody and they will contact General Ceramics, RCA, CDC, and Telemeter Magnetics.

They expect to get the order within two or three months and would like to have hardware in about a year. I mentioned that we couldn't rent a machine like this and he felt they probably could buy it. Of course, an ordinary lease would be the same as buying as far as we're concerned.

Kenneth Olsen

000**INTEROFFICE
MEMORANDUM**

DATE August 1, 1960

SUBJECT Library Inventory

TO All Staff Members

FROM Kenneth H. Olsen

We have invested a lot of time and money in making a good company library. During the first week of August we are requesting that all library books be returned to the library for inventory. In general, we would like to have all books returned to the library as soon as they are no longer needed; and if books are being used continuously, please fill out a purchase requisition for that book and we will order another copy so that the library will always have one.

Kenneth H. Olsen

ed **MEMO**

DATE August 1, 1960

TO Jack Atwood

FROM Kenneth Olsen

Every time the Bi-Weekly is printed up we should have the girls request a list of new books from the library so that it can be included in the Bi-Weekly.

Kenneth Olsen

000**INTEROFFICE
MEMORANDUM**

DATE August 1, 1960

SUBJECT

TO Henry Crouse

FROM Kenneth H. Olsen

We have invested a lot of time and money in our library and we have to be sure that it is used effectively. I am sending out a request that people return all outstanding books to the library so we can inventory them. If there are books that are being used continuously by individuals, we will order new ones so that we always have one in the library.

In addition, I would like you to have a list mimeographed and distributed of all library books. This, of course, should be brought up to date periodically. It should be arranged as the books are on the library shelves, but when it is brought up to date it can be simply added onto at the end under New Additions.

The girl should also give a list to Jack Atwood's group of all new books each time the Bi-Weekly is printed.

Kenneth H. Olsen

COO**INTEROFFICE
MEMORANDUM**DATE **July 29, 1960**

SUBJECT

TO **Henry Crouse**FROM **Kenneth Olsen**

Will you call RCA and get approximate prices on the following memories: 16 x 16 x 18 stack using slow low drive 50 and 80-mil cores. Same size with 3050 cores slow and same size at 5030 cores with about 1.2 microsecond switching time. In addition, we would like to know what the price is on aperture plates wired up for 18 digits. They come 16 x 16 and would take 18 plates, I believe. Don't ask for a firm quote because we would like to get an approximate price before we decide what we want to do and then we will ask for a firm quote.

Kenneth Olsen

**INTEROFFICE
MEMORANDUM**

DATE **July 29, 1960**
SUBJECT **Visit of Mr. E. M. Glaser,
Johns Hopkins School of Medicine**
TO **File** FROM **Kenneth H. Olsen**

Mr. Edmund M. Glaser visited today, July 29, to discuss the problem of processing medical data. He is visiting M.I.T. for a short period of time to find out what they are doing here. He is an electrical engineer who has been with Johns Hopkins for several years doing research and, I believe he has a Doctor's degree, although he didn't sign his name that way. His address is: Department of Physiology, Johns Hopkins School of Medicine, 725 North Wolf Street, Baltimore 5, Maryland. He is very interested in ARC type machines because it will do some of the things they want, but his immediate interest is in processing data which is not evoked, or at least not evoked from a specific incident of time. He would like to know the time distance between pulses on a particular newve when certain activities are going on. He would then like to have a plot of number of particular time intervals as a function of a time interval. With some modification, we could do this with an ARC computer, I think.

Kenneth H. Olsen

000**INTEROFFICE
MEMORANDUM**

July 29, 1960

DATE

SUBJECT **New Security Regulations**TO **Earlan Anderson
Stanley Olsen
Maynard Sandler**FROM **Kenneth H. Olsen**

1. Everyone entering or leaving the plant after 5:30 P.M., or Saturdays or holidays, must sign in and sign out each time they enter or leave the plant. The sign-out book shall be on a table near the door.
2. We'll change the lock on all doors and have new keys issued to a very small number of people.
3. We'll have each floor well illuminated at night.
4. We'll lecture each technician that when they are working overtime at night they should be unusually careful about security and about wandering in areas other than that in which they are working.
5. We'll have a janitor working from 7:00 A.M. until 4:00 P.M. and from 3:00 P.M. until 11:00 P.M. who will answer the doorbell when people working odd hours arrive for work. He will only let in those who are qualified for work.

Kenneth H. Olsen

**INTEROFFICE
MEMORANDUM**DATE **July 29, 1960**

SUBJECT

TO **Stan Olsen**FROM **Ken Olsen**

Here's a list of jobs for the electrician:

1. The lamps over the conversion coating baths were installed wrong. There should be one over bath 1, another over bath 3, and another over bath 5; but instead they are over baths 3, 4, and 5. I suggest that we extend the pipe and add a lamp over bath 1 and then rearrange the wiring so that the appropriate lamps are lit.
2. Let's add an outlet to the box over bath 4 and let this drive the solenoid valve.
3. Bring power to the lights over the Digital sign in the front. The lamp in your office we may want to move over to the southern part of the window in order to make the lighting symmetrical. I'd be after the present light bulbs rather than being more tricky.
4. Let's add the timer in series to the lights for the Digital sign.
5. Put the teletype machine on a night circuit.
6. Two strings of floors of lights should be left on each night on the night light circuit. They should be the string nearest the front wall and the string next to the string nearest the back wall of the building. One light string should be on the drafting room and another in the storage area on the night circuit. We perhaps should have two strings of lights in the machine shop.

Ken Olsen

000**INTEROFFICE
MEMORANDUM**DATE **July 28, 1960**

SUBJECT

TO **Ben Gurley/Ed Harwood**FROM **Ken Olsen**

Dan Geisler called today to say that he is all set up with his experiments at Bolt, Beranek & Newman on averaging electroencephalographic responses. Next Tuesday evening, which would be August 2, he plans to record responses from his subject. We promised that we would set up our analog-digital converter for them before they needed it. I told them that on Tuesday one of our people, probably Ed Harwood, would go down and show them how to use it. When we go, or if we don't go, we should call Ed Fredkin because he is the one who will be running the machine. Dan Geisler will be working in the recording laboratory and won't get involved in the computer during the day.

If we are unable to make this trip, please let me know.

I think it would be good to bring the land camera along so that Dan Geisler can photograph the subject he is getting responses from. This is important for the brochure we hope to make out of his work.

Ken Olsen

DEC**INTEROFFICE
MEMORANDUM**DATE **July 26, 1960**

SUBJECT

TO **Jack Atwood**FROM **Kenneth H. Olsen**

Dick Best and I have some suggestions for standard policies on written text. We suggest that in text the word ZERO, ONE, AND, and OR always be capitalized. We also recommend that these words be put in quotes the first time they are used and no quotes after that. All new and unusual words should be in quotes the first time they are used.

The word flip-flop should not be capitalized and it should be assumed to be a commonly understood word. It should be hyphenated, however.

We recommend that Figure be capitalized and spelled out at all times.

Kenneth H. Olsen

DEC**INTEROFFICE
MEMORANDUM**

DATE July 26, 1960

SUBJECT

TO Jack Smith

FROM Kenneth H. Olsen

We have sent away, some time ago, for bids on banana plugs to replace the General Radio ones. The price we got from E. F. Johnson & Company in February 24, 1959, was for \$6.54 per 100 if we bought 5000 at the time. Their standard plug used nickel silver springs, but they bid, at our request, on beryllium copper springs.

I think we also requested bids on the rivet type, but I can't find that in the file. We sent letters out on the rivet type to several people and so we should be careful next time we send out bids not to antagonize them because we never did follow through on it. I think the first time we asked for a simple rivet-on head like we want to use on our etched board units, and the second time it had a solder lug on it.

The companies that we should ask for the next time would include Uncite and General Radio, but I don't think General Radio would build them for us.

Kenneth H. Olsen

cc: Maynard Sandler

digital | EQUIPMENT CORPORATION

MAYNARD, MASSACHUSETTS

TO: DEC Telephone Operators
FROM: Kenneth H. Olsen
DATE: July 22, 1960
SUBJECT: Incoming Calls

We always want to give our customers, both new and old, the impression that we are ready and anxious to be of service to them. As yours is the first and sometimes the only voice that our customer will hear, we believe that the following suggestions will be a big help in leaving the customer with this impression:

1. If the caller does not give his name, always ask, "MAY I TELL HIM WHO'S CALLING?" This sounds a little better than some of the other phrases that telephone operators use, and does not give the impression that whether the person is in or out will depend on just who the caller is.
2. Always feel free to interrupt anyone in a meeting, unless he has given you explicit instructions that he is not to be disturbed. If this is the case, tell the caller that Mr. Blank is in a meeting, and, "Would you like me to interrupt him?" Unless the call is an urgent one, the caller will probably not wish to interrupt the meeting and will either leave a message or speak to someone else.

#

id ec MEMODATE July 22, 1960TO Stan Olsen FROM Ken Olsen

Mr. Alexander Stevens, of 17 July Road, Sudbury, wrote a letter requesting for a position in our Marketing Department. I passed the letter on to Jack Brown, but I thought you might want to look at it. He is 28 years old and has had no experience in this field, but I think it might be worth while talking with him.

Ken Olsen

DEC**INTEROFFICE
MEMORANDUM**

SUBJECT Notes on Diagrams for
 Logic Book

TO Dick Best
 Barbera Stephenson

DATE July 22, 1960

FROM Kenneth H. Olsen

There are a number of inconsistencies in the diagrams we have proposed for the Logic Book, and we are going to have to be very careful to eliminate them.

We titled some drawings and did not title others. I propose that we put titles on no drawings because the explanation for each drawing is always in the paragraph following.

Sometimes we use dots for showing connections and other times we do not. In order to be consistent with our normal logic drawings, I propose that we use small black dots for connections.

We shall consistently use our large black circle for -15 volts .

In the first few figures we label inputs and outputs, but after that I feel it is unnecessary. It is obvious to people that the open arrow going outward is the output, and only where it is necessary will we label input.

We have to be very careful that our logic is hooked up correctly.

In the text, consistency is also very important. We will always capitalize the words ONE, ZERO, AND, and OR when used in the logical sense. The first time they are used in a booklet we will put quotes around them. In fact, we will put quotes around all new words the first time they are used in the text.

Kenneth H. Olsen

MEMODATE July 21, 1960TO Earlan Anderson FROM Kenneth Olsen

Bob Slater finally arranged the visit with the vice president of Remington Rand. He will be here on July 28 at 10:00 A. M. Slater asked him what his interests were and he said in buying our Building Blocks and considering our computer. His name is William J. Suchor and he is coordinator of engineering and product planning.

Kenneth Olsen

MEMODATE July 21, 1960TO Henry CrouseFROM Kenneth Olsen

We should have a fairly large number of dictionaries available for anybody who needs them. We may even want to force them on people who should need them. About two years ago we investigated different dictionaries and their prices, but I don't remember what our conclusions were and where we documented the results. Will you see if we have any record of this and, if not, investigate the prices of different dictionaries. Our prejudices are toward the Merriam-Webster Collegiate Dictionary.

Kenneth Olsen

000**INTEROFFICE
MEMORANDUM**

SUBJECT **New Additions to Leasehold
Improvement Accounts**

DATE **July 18, 1960**

TO **Alma Pontz**

FROM **Kenneth H. Olsen**

There's a danger that when we remove leasehold improvements and replace them with something else we may add both the old and the new leasehold improvements to our accounts. Because we do not have a careful itemization of each item on the leasehold improvements, I suggest that in general when we replace walls or partitions and electrical work that we simply write the new work off as maintenance.

The carpenters are now removing partitions and replacing them with benches. The value is somewhat the same and I suggest we call that maintenance.

The carpenters will move and rearrange partitions on the first floor, but I think they will add nothing to the over-all value. However, in addition, they will make a finished conference room with a plywood floor. This will be in addition to the value of the first floor leasehold improvements.

The electricians are wiring a new systems test area on the third floor like they did about a year ago. This is not really adding to the value of the plant from our point of view because we will no longer be able to use it.

Kenneth H. Olsen

DEC 11 1960**INTEROFFICE
MEMORANDUM**DATE **July 18, 1960**

SUBJECT

TO **Jack Brown**FROM **Kenneth Olsen**

Wayne Brobeck, one of our directors, suggested that our local reps get in touch with C.E.I.R. which I think is a well known correspondence course school. We might be able to supply them with pictures and some of our own way of doing things for the correspondence course.

He also suggested they contact Jansky and Bailey who are also in Washington. They may be two lawyers or two congressmen.

He also suggested that we contact Atlantic Research Corporation, although I have no idea what he had in mind.

Kenneth Olsen

ed **MEMO**

DATE July 12, 1960

TO Bob Hughes FROM Kenneth H. Olsen

Enclosed is a sample relay from Wheelock Signals, Inc., which looks as if it might be a good unit to put in our relay test equipment unit. It's small enough that it would also go in the System Building Blocks. I think it would be a good idea to test it and see how it would work, and if it looks good, we might get the price on it.

Ken Olsen

cc: Dick Best

Line
the job

MILITARY APPROVED COMPONENTS

MILITARY APPROVAL

December 22, 1960

Allen Bradley

Resistors
Potentiometers

MIL-R-11C
MIL-R-94B

Electro-Motive

Dip Mica Capacitors

MIL-C-5A and 5B

Sprague

2N393
150D Tantalum Capacitors

MIL-S-19500/77A Sig."C"
MIL-C-26655A, CS-12 and 13

MA45/MA27 DO NOT MEET MIL SPEC.

Philco

No transistors meet MIL Spec. as we purchase them—2N393 would cost an additional (\$0.30) to meet MIL approval.

RCA

Doesn't think so—2N412 etc. commercial type.

Cornell-Dubilier

Electrolytic type meets MIL-C-62 where applicable.
Paper in oil meets CP-63.
Paper tube MIL-C-25A will give C/C where applicable.

Westinghouse

320A/320D/3101/ NOT

Mallory

Aluminum Electrolytics meets portion of MIL-C-62A where applicable.

MILITARY APPROVAL

Motorola

2N167 NO

General Electric

2N167 NO

Automation Components

Disc ceramics - do not meet MIL Spec., but can give certificate of compliance if necessary.

Ohmite

OMC 514 diode meets MIL-S-19500B, dated 6/30/59.

General Transistor

Does Not Meet MIL Spec.

Texas Instrument

Does Not (2N711) Meet Spec.

Clevite

Does Not Meet Spec.

de INTEROFFICE
MEMORANDUM

DATE December 16, 1960

SUBJECT FINISHING SPU HANDLE ON DRAWING B-4701

TO Kenneth Olsen

FROM Loren Prentice

Proposal to be submitted to Kenneth Olsen - later to be submitted to different machine tool builders.

Material is 6063P4 1/16 x 1/2 x 1/2 extruded angle Alcoa die #1312. Parts to be finished are 17.862" in length with 3 #~~14~~30 diameter punched holes and two cut-outs, all as shown on our Drawing B-4701. The operation is to belt sand both out surfaces of the angle to a brush-like finish. Belts currently being used for this are aluminum oxide 120 grit. Proposal is to ask three companies to submit bids to build a special machine for producing this finish.

Curtis Machine Division, 13 East 2nd Street, Jamestown, New York

Engelberg Huller Inc., 831 West Fayette Street, Syracuse 4, New York which is a division of the Sunstrand Company, formely the Porter Cable Company.

Eastern Machine Screw Corporation, 60 Barkeley Street, New Haven 6, Connecticut

The following is a description of the machine that we think would produce the desired results. However, we are open to suggestions from any of the three above named companies. The proposed machine is to be as follows:

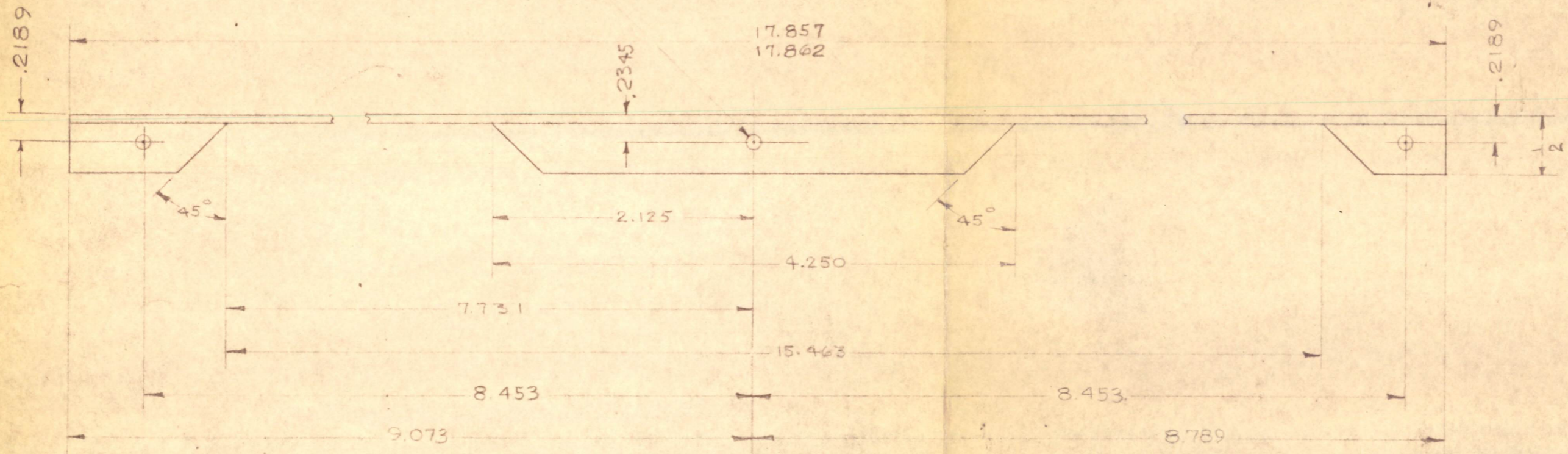
1. A two head sanding machine with heads set at 90° of each other and staggered to provide the proper clearances.
2. Transport parts under the heads by special rubber belt without flights or cleats if possible.
3. Back up rolls opposite each sanding head to take the thrust especially when the interrupted cuts are passing under the belt.
4. Hold down or approach the rollers to hold the work to prevent tipping or buffing of the ends.
5. Adjustable under platen to support the section of the rubber belt to be polished or lined with teflon to prevent undue wear on the under side of the belt.

6. Heads to be movable up or down in relation to the platen adjustment.
7. The transport belt to have variable speed 2 to 30 feet per minute.
8. Each head to be provided with tracking and tension devices.
9. Belt size to range from 1" to 2" wide times 54" to 72" in length. Any standard belt length readily available as a standard item.
10. Provision to be made for spray coolant water mixed with oil or other type on the belt and work piece. Water guards over the belt and provision to catch all over spray and return to pump.
11. All bearings to be properly sealed to prevent water damage.
12. Transport belt to be long enough to provide loading and unloading without damage to parts or danger to operator.
13. Parts are to be finished in one pass at a rate of 10' to 30' per minute.

B-4701

MATERIAL → 90° ANGLE ALUMINUM 1/2 x 1/2 x 1/16
TOL → ± .005 - SCALE - FULL SIZE
REF DWG → A-00056-2

.130 DIA → 3-HOLES

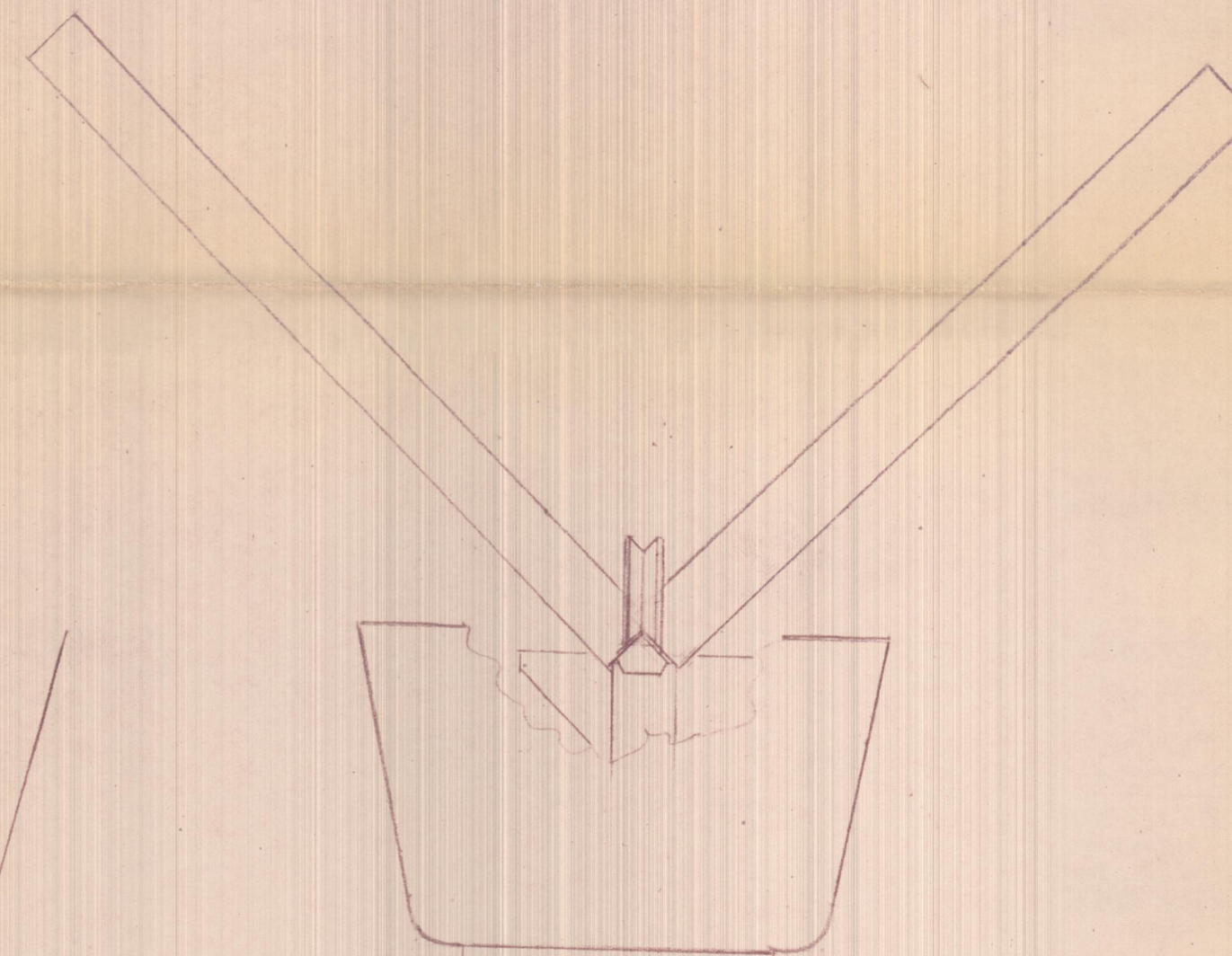
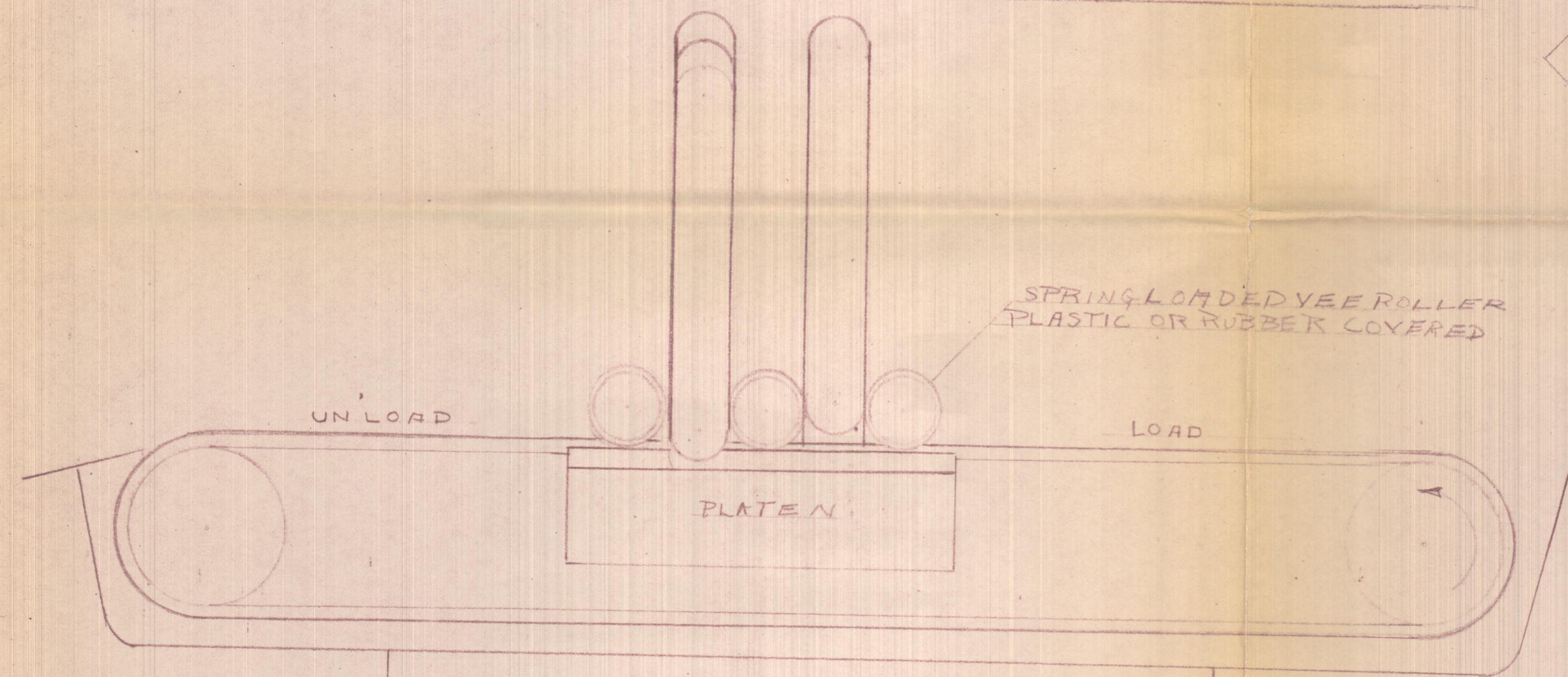
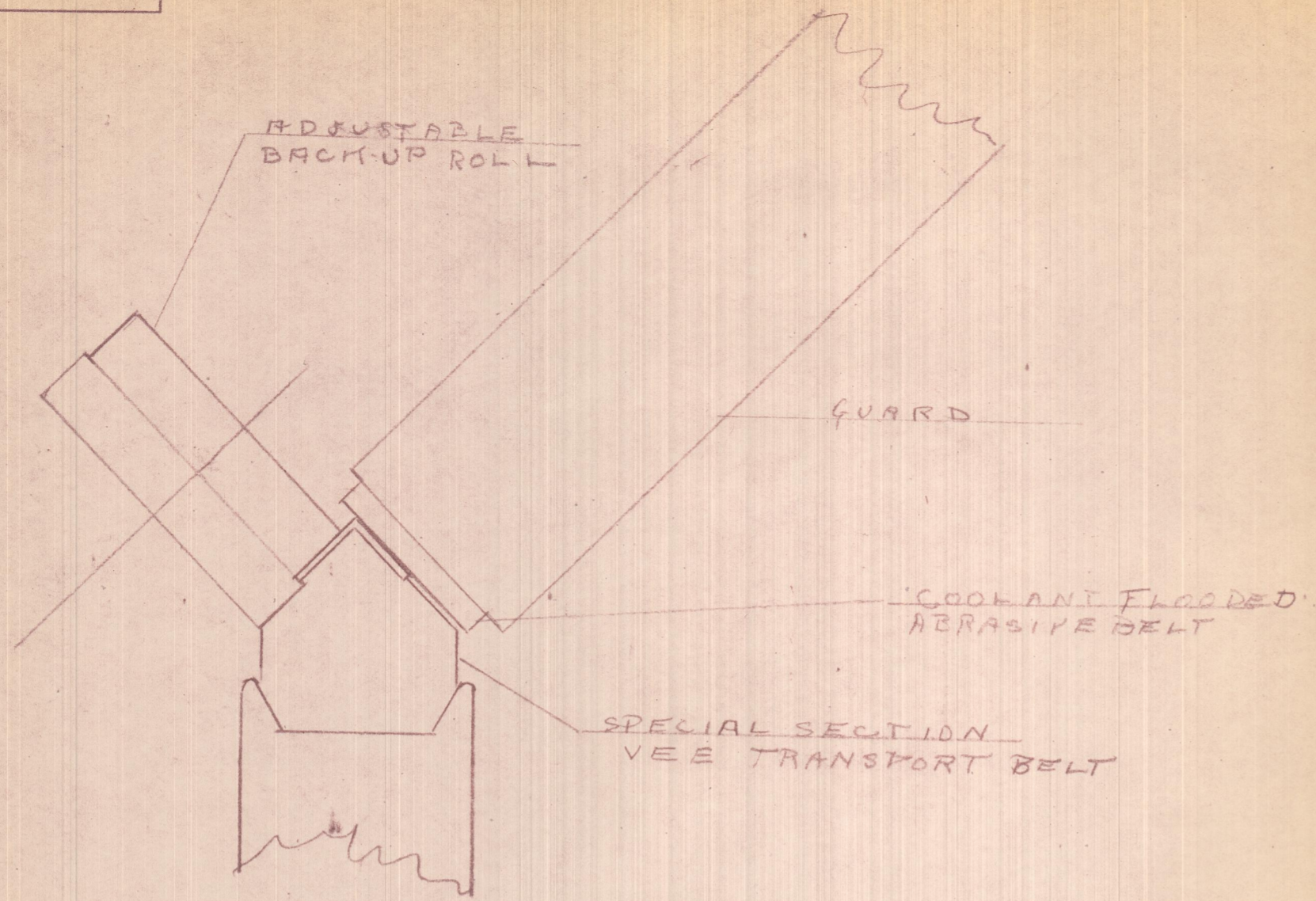


ISSUED
DATE DEC 5 1960

| | | | | | | | |
|--------|---------|---------|----------|-------------------------------|--------|--------|---|
| 1551-A | ch. no. | Changes | exper. | drawn | SPU | HANDLE | M |
| | | | product | 4-9-59 MELANSON checked | | | |
| | app. | other | engineer | digital equipment corporation | B-4701 | | |

MAYNARD, MASSACHUSETTS

CUT HERE
GUARANTEED - 12-57



ISSUED
DATE DEC 16 1960

| | | | | |
|--|---------------------|------------------|----------------|---------------|
| Unless otherwise specified: Grinding-irrespective of the direction of the Lay-Dimensions are in inches-Tolerances on: | | COLOR _____ | DRAWN _____ | DATE _____ |
| Fractions ± 1/4 | Decimal ± .005 | Angles ± 1/2° | Microinches ✓ | CLASS I _____ |
| | | CLASS II _____ | CHECKED _____ | DATE _____ |
| | | CLASS III _____ | APPROVED _____ | DATE _____ |
| MATERIAL _____ | PRIMER _____ | PRODUCTION _____ | DATE _____ | FOR _____ |
| HARD _____ | FINISH _____ | OTHER _____ | DATE _____ | |
| SURF. TREAT. _____ | CHROMICOATING _____ | | | |

digital equipment corporation
MAYNARD, MASSACHUSETTS

TITLE SKETCH PROPOSED FINISHING MACHINE

| | | | |
|------------|--------------------------|------|------|
| CHANGE NO. | DESCRIPTION | DATE | APP. |
| | | | |
| REVISIONS | | | |
| ASSBY NO. | DRWG. NO. <u>C-00600</u> | | |
| SCALE | SHEET | OF | |

December 2, 1960

Electric Boat

Stan Olsen

HEA

Al Cross from Eltron called today to say that a Mr. Ron Brunell of Electric Boat in Connecticut would like to visit us on Wednesday, December 7. You spoke to him extensively at NEREM, I believe. He is interested in three things. The first of these is building blocks, where his initial application would probably involve several thousand building blocks which later on might be repeated many times. Mr. Brunell is apparently quite sold on using DEC equipment. In connection with the building blocks, he will want to have some discussion and data if possible on reliability, and would also like to have information about personnel resumes of the key people at DEC. He will also probably want to talk us into repackaging the units, but Al's feeling is that it is a subject for discussion.

The second subject that he wants to talk about is PDP-1. He has an application where he thinks he would like to use two PDP-1's, and we should schedule a demonstration for him. PDP-1 will be running by the time he's here, I'm sure. If not, he said he will be in New York and will see it there.

The third thing that he wants to talk about is magnetic core storage. He has an application for a unit which has five million cores and another with 15,000 cores.

If for any reason we can't meet with him, be sure to let Al Cross know immediately. An alternate date would be December 21 as far as Mr. Brunell is concerned. He is most interested in doing it as soon as possible, however. I have asked Dick Best to be in on this meeting, too.

#

CC: Dick Best
Ken Olsen ✓

DEC INTEROFFICE
MEMORANDUM

DATE December 2, 1960

SUBJECT Taper Pin Connectors

TO K. Olsen

FROM T. Johnson

We have been buying 15-20,000 Amphenol male connectors per year. I would estimate that $1/3 - 1/2$ of future female receptacles would be taper pins and arbitrarily pick 10,000 taper pin connectors as a reasonable sales figure for the coming year. I used 5,000 as the initial order for comparative purposes. (Also, Amphenol's quote starts at 5,000 units as a guaranteed volume.)

I ran a check on selected portions of PDP control to get some feeling for the number of logical connections to a point. In two samples of roughly 60 mtg. panels and 1100 pins each, the following % figures resulted:

| | |
|------------------|---------|
| Unused terminals | 22, 36% |
| 1 Connection | 41, 42 |
| 2 Connections | 37, 21 |
| 3 Connections | 1, 1* |

Pertinent Observations:

1. Taper pin 2-connections/pin is sufficient with our logic.
2. There are unused terminals for dummy connections.
3. More multiple connections would result from cross-wiring between chassis mtg. panels, but this can be minimized.

With respect to the ground problem, it is desirable to increase the inter-panel grounding, so that taper pin vertical connections to a bus running along the upper border of the mtg. panel would be desirable rather than a bus along pin D as before. This would free one connector at D for a ground available for the other pins.

We might also consider inserting taper pins and soldering the power busses as before. 3C prewires power connections, and it would be a good feature.

*In each case, there were only 10 three terminal pts/sample.

The limitation at the ground terminal D is aggravated also by the need to terminate, tying components to D.

In any case, we need the connectors and unless we get three terminal connectors, the problem is irrelevant. We don't need three terminal connectors.

We have several options for buying connectors.

1. Garde - Present

| <u>Units</u> | <u>Price Each</u> |
|--------------|-------------------|
| 1-499 | 2.418 |
| 500-997 | 2.36 |
| 1000-2499 | 2.23 |
| 2500-5000 | 2.18 |

(with \$.18 add/connector for milling to match Amphenol)

\$10,900.00 connectors
900.00 milling
\$11,800.00/5000 units

2. Amphenol - make a Garde equivalent requiring milling

| | |
|-----------|------|
| 1-4999 | 1.97 |
| 5000-9999 | 1.73 |
| 1000- | |

\$ 8,650.00 connectors
2,950.00 mold cost- non-creditable
\$11,600.00/5000 - not including milling

3. Garde - New Connectors not requiring milling

Same price schedule as (1.)

\$2,600 mold cost- with some volume credit(not formalized.)

\$10,900
2,600
\$13,500 max/5000

4. Amphenol 2 - New connectors

\$4,000 mold cost is buried in payment schedule

| | | |
|---------------|--------|------|
| Initial order | 5,000 | 2.55 |
| | 10,000 | 2.28 |

| | | |
|----------------|--------|------|
| Ensuing orders | 5,000 | 2.15 |
| | 10,000 | 1.88 |

\$12,750.00/5000

Initial Delivery

Both would be about the same at 10 weeks. Garde might do better.

Regular Delivery

Garde has been good. Amphenol owes 4 weeks but Henry is optimistic about their general delivery situation.

Other Considerations

1. It would be desirable to have matching connectors.
2. We lose out some on volume discounts since we take away from one type of Amphenol plug and replace these with taper pins. This amounts to approximately \$.04 x the number of new connectors we sell. \$200.00/5000.

Recommendations

We should definitely have connectors not requiring milling. For an initial order the Amphenol connector is about the same as Garde and offers advantages of:

1. Match with their own plug.
2. Future greater discounts and price reductions with volume.
3. No cash outlay for mold and payments stretched out over year on initial order if necessary.

Amphenol figures that it can spread out the mold cost on making the Garde duplicate among the ready market. This accounts for the lower cost of \$2,950.00 on the Option 2. They would end up being very competitive here with questioned access to some milling service. But I would expect that other people would like the new Amphenol and we can schedule better rates in the future.

We could press for some aggregate discount.

So I recommend an initial order of 5000 new Amphenol taper pin connectors.

This memo presents my consideration of the taper pin connector problem. My conclusion is to recommend order of 5000 new Amphenol connectors.

#

R. Olsen

DEC INTEROFFICE MEMORANDUM

DATE November 29, 1960

SUBJECT Methods for Solving Noise Problems

TO List "C"

FROM Russell Doane

In the process of debugging the Burroughs Core Evaluator (lately labelled Programmable Pulse Generator 2104), I have learned some entymology herewith presented. In the course of the fumigation, one point became painfully clear: when high frequency noise and interference is possible, physical layout and wire routing are part of the circuit design, and electrical engineers with a feel for such problems that these suggestions may help to provide should be close to these phases of design.

1. Wire lengths must be minimized. Propensity for crosstalk in some cases increases at a higher power than linearly with increasing length of runs, since both series inductance and shunt capacity may increase together.
 - A. Lay out plug-in mounting panels thoughtfully.
 - B. Inter-panel wiring should be point-to-point in critical cases, instead of being cabled around the ends of panels and along the frame.
 - C. Consider using extra small switches when many of them are to be used together, so that distance between them can be minimized. A balance is needed between tight packing to shorten wires and spacing to minimize cross-talk between adjacent busses and for operating convenience.
 - D. If spare plug-in slots are available, it may be better to scatter them throughout the panel than to concentrate them at one end, so that additions will not require long wiring runs.
 - E. Use high-density mounting panels (1901) even when all the space is not needed.
2. When making cabled runs of fast signals, subdivide cables. Several 6-line striplines can be used instead of one 20 wire stripline. Large flexible spaghetti over each individual stripline can keep the cables apart to further minimize coupling. Making cables small also sometimes allows shorter runs, since the wires are not required to fan out so much at the ends of the cable.
3. Even though connecting wires are made as short as possible, don't be stingy. Put wires in parallel (minimizing mutual inductance by spacing, shielding). Where the signal drives

many loads, over a long distance, each load may significantly modify the signal, and each may warrant a private line. It may even be worthwhile to use a separate driver to drive each line, if the output impedance of the driver is significant, and adding extra driving power may, in some cases, allow more extensive use of shielding by grounding adjacent strip cable wires or by using twisted pairs.

4. 1681 power inverters have an internal diode base-to-ground to improve their turn-on speed. Consequently, any positive overshoot on a rising signal will charge the input capacitor and will likely produce a short spurious turn-on as it returns to ground. Two cases arise:
 - A. Where overshoot is due to ringing of a long input line, connect a fast diode (CTP 894) from input to ground. Keep input wire as short as possible to reduce ringing, and use damping resistance in series (like 33 ohms).
 - B. If driven from package with pulse transformer output, a diode directly to ground will cause increased ringing. Use larger series R, instead (like 100 ohms). A diode to ground might be usable if a large damping resistor isolated it from the transformer, but I haven't tried this. It is best to avoid the use of a transformer output to drive a 1681 if possible.
5. Avoid sending fast, high current signals through the same 1681 which can interfere through common ground return within unit. There is a six inch ground wire common to all three emitters.
6. Put diodes in series with P.A. inputs if noise is present at collectors of inverters or if many inverters are paralleled at P.A. input, resulting in long wire susceptible to pick-up. Pulse out tends to be narrowed by diode in series (typical 1607 output to 50 ohm load: 35-40 NS when OMC 514 diode was used). A faster diode will produce less narrowing but will also cut noise less.

DEC INTEROFFICE
MEMORANDUM

DATE November 1, 1960

SUBJECT Proposal for "Short Order" Procurement System

TO \ Kenneth Olsen
Harlan Anderson
Stanley Olsen

FROM Henry Crouse

In the interest of maintaining purchasing speed and service with lower operating costs I recommend the adoption of the following short order procurement system.

1. Duplicating the present 8½ x 11 format, a three-part serialized form of blocked NCR paper will be used.
2. Distribution of copies will be as follows:
 - a. Vendor
 - b. Accounting
 - c. Purchasing
3. Usage will be limited to maintenance, repair, operating supplies, and/or those items with low dollar value; that is, ten dollars or less.

The present cost of processing a purchase order is approximately \$10.00. Many times the cost of material ordered is not \$10.00. Also, we pick up locally items which are not recorded other than telephone conversation and a receiving report. Accounting as well as purchasing does not have a reference to use for invoice approval.

This system will generally follow the procurement manual except for an option to hand write these short orders when a demand for urgency exists.

The operating costs will be reduced as follows:

1. Cost of three-part forms is \$57.00/M, as opposed to \$80.00/M for seven-part forms.
2. Reduce the number of people involved in handling Purchase Order forms.
3. Reduce the clerical processing time.

DEC**INTEROFFICE
MEMORANDUM**

DATE October 25, 1960

SUBJECT Time Tickets

TO Kenneth H. Olsen

FROM Loren Prentice

In reply to your memo of October 18, 1960. Starting the week of October 3, 1960, Valton Greene and John Culpon are turning their time tickets in to Nancy Dawes. She is going to keep a record of the time expended on various jobs, with two objects in mind. One, to find out what the overall cost of such items as PDP-1 consoles and display units, and two, to find out if excessive times are spent on individual items.

For the two weeks ending October 14, 1960, approximately 54 hours and 45 minutes were spent on PDP-1 display. Some of the times of various items which seem to be in excess of the amount necessary are the front bezel for the display, 20¼ hours; focus coil and yoke mounting plates, 10 hours; side mounting blocks and tube retainer clamps. These are very small pieces, very simple to make, and the time on these was 10¼ hours. This is outside of the items just mentioned. This is for the display island not included in the 54 hours and 45 minutes. Twelve switch bats, 7¼ hours. Also, it should be kept in mind that these parts have all been made by the shop previously. That is, this is not the first time they were run in any instance. Four hours should be sufficient to make the switch bats, eight hours should be sufficient to make the front bezels for the display, and certainly making mounting blocks and tube retainer clamps in 10¼ hours is certainly excessive.

Several steps should be taken. One, we should do what we can to reduce the time required to make these parts by bringing it to the attention of the people involved. Secondly, we should attempt to place outside, some types of work which we have very good drawings or at least get prices on them to find out whether or not they are competitive. In the past we have found it very difficult to get the machinists to do work without prints. They seem to be able to misinterpret instructions to the point that the parts are very expensive or not well enough made or they take time themselves to make extensive sketches which is just as costly to have them make sketches as it is to have them made in the drafting room. We have in the immediate future, four, three hole dies and punches which could be used as a trial run on outside machine shop work. Also, two mounting assemblies for Telemeter Magnetics memory stacks. Drawings for the stacks exist and are being checked, and the other prints will be available in the near future.

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INTEROFFICE MEMORANDUM

file

DATE October 24, 1960

SUBJECT Memory Testers

TO Kenneth H. Olsen

FROM W. Weeton & J. Fadiman

1. CURRENT DRIVERS

- (a) Dependency between R, F, & A.
- (b) Higher drives (3 amps in some cases).
- (c) Faster rise time.
- (d) Higher back voltage.

2. CURRENT CALIBRATOR

- (a) Ringing.

3. SENSING SYSTEM

- (a) Strobe width (10 musec).
- (b) Two strobes.
- (c) 3 levels.
- (d) Sense amp band pass (30 MC).

4. HARDWARE

- (a) Smaller.
- (b) More rugged.
- (c) Larger knobs.
- (d) Jigging.

5. SCOPES

- (a) Include a display scope.

**INTEROFFICE
MEMORANDUM**

DATE October 20, 1960

SUBJECT 1514 Manual

TO ✓ K. Olsen, H. Anderson, S. Olsen, FROM Henry Van Cleef, Jr.
and R. Best

The writing of the 1514 manual is being drawn to a close, preparatory to my departure. All work has been turned over to W. Weeton, except remaining artwork which will be turned over to him by the chief draftsman. The following cost breakdown is one considered standard in many technical writing departments for a commercial manual:

| | | |
|-----------------------------------|---------------|----------|
| Model 1514 Cost: | per equipment | \$49,000 |
| Writer cost for finished manual: | | 4,000 |
| Artwork cost for finished manual: | | 1,000 |

By "finished manual" is meant the labor required to bring a manual to the point of printing. Materials are not considered, but a 100% overhead figure is included in this figure. Printing is also separate, as is collating and binding.

Model 1514, Actual cost so far:

| | | |
|--|---------|-------|
| Writer cost: | | 2,146 |
| Artwork cost based on \$2.50/hr. salary: | approx. | 500 |
| Costs required to complete (estimated): | | |
| Writer: | | 500 |
| Artwork: | | 500 |

These figures are considerably under the estimate: \$3646 vs. \$5000.

The standard estimate is figured by the same method used by Raytheon, AM&F, Lab for Electronics, and a number of other local firms, as well as Tektronix. They are compiled with a 20% over-allowance for the inefficiency of not ever having done such work here before, and could be trimmed to an estimate of \$4000 minimum for the entire manual, in a well-coordinated writing department.

I trust that these figures and the work that the money expended have provided will be of use to you in future estimation of the cost versus worth of technical writing. I would also like to mention that the 1514 manual, with less than \$1000 worth of changes, would provide a manual for either the 1512 or the 1515, providing manuals for a \$49,000, a \$7,000, and a \$42,000 piece of equipment for the sum total of less than \$5,500.

I wish to thank the management of DEC for the opportunity to try this work on their equipment, and feel that although they do not feel the work of the correct level for their market, that something of value has been gained by both sides.

cc: W. Weeton
J. Fadiman
J. Atwood

1000**INTEROFFICE
MEMORANDUM**

DATE October 4, 1960

SUBJECT

TO K. Olsen
S. Olsen
M. Sandler
G. Gerelds

FROM J. F. Smith

It has been noted that a great number of completed units are being rejected because of lifted copper. Because a unit in this stage is worth quite a bit of money, I undertook to study the problem. The results of my research form the following conclusion.

The copper is being lifted when components are being changed because they are in the circuit wrong, or not working properly. This conclusion was arrived at by looking up all the lots with lifted copper on the lot trouble sheets. In almost all cases the lot had undergone component removal and replacement.

This removal and replacement of components takes special training and experience to hold rejects to a minimum. Therefore I believe the solution to this problem is to set up a repair bench within production assembly. All units needing repair will be returned to this bench, where a girl with the necessary training and experience in component removal and replacement will repair the units.



INTEROFFICE MEMORANDUM

DATE September 20, 1960

SUBJECT DEPARTMENTAL MEETINGS

TO K. H. Olsen
H. E. Anderson

FROM J. L. Atwood

As you mentioned the other day, our Friday afternoon tea sessions seem to have become too unwieldy to be worthwhile. The most workable approach may be to split the subject matter which used to be covered at the teas into two parts - engineering and administrative. You have already held several very useful meetings of engineering staff members to discuss engineering matters. My suggestion is that you attempt regularly scheduled meetings of department heads to talk over administrative matters of interest across departmental lines.

To keep the meetings from becoming too large or consuming too many man-hours, I would recommend the use of "principals" and "alternates". Except for the first such meeting and occasionally thereafter, the alternates would attend only when the principals were unable to be there. This is a list of the people who might be involved:

| <u>Department</u> | <u>Principal</u> | <u>Alternate</u> |
|---------------------------|--|------------------|
| Executive | K. H. Olsen H. E. Anderson S. C. Olsen | |
| Electronic Engineering | R. L. Best | R. A. Hughes |
| Mechanical | L. B. Prentice | |
| Systems | W. E. Weeton | J. Fadiman |
| Computers | B. M. Gurley | G. Bell |
| Production | M. Sandler | J. F. Smith |
| Sales | J. B. Brown | J. H. Myers |
| Advertising | J. L. Atwood | A. A. Andrews |
| Accounting | A. E. Pontz | R. F. Dill |
| Purchasing | H. J. Crouse | G. Mickevich |

These are the people who have key roles in getting the engineered product from drawing board to market and who can operate to best advantage only if they are kept informed on past, present and future developments.

I would suggest that these "Departmental Meetings" be scheduled immediately after lunch every Wednesday to avoid the Monday and Friday rush and to permit rescheduling the day before or the day after when necessary. I would also suggest that Jane Veo attend the sessions to take notes on important dates and developments and that the notes be reproduced and distributed to both principals and alternates. Each principal would then have the responsibility of passing along to his alternate and other appropriate members of his department whatever details will be helpful to them in their work.

Like any other productive activity, these meetings would take time. However, I think they could be limited to a half-hour at the beginning in order to get the participants there on time and to impress them with the necessity of bringing up only matters of real importance. Later on they could be extended, if it appears profitable to do so, and several evening sessions might be planned during the year.

I feel very strongly that meetings of this type would be extremely profitable - both in improved coordination of plant-wide activities and in development of DEC's team spirit. And I think this is the time to get started - before the organization gets so large that we lose the family feeling that has helped so much to date.

COO**INTEROFFICE
MEMORANDUM**

DATE June 27, 1960

SUBJECT MEMORY SYSTEMS

TO ✓ Kenneth H. Olsen

FROM Jonathan Fadiman

1. SYSTEMS NEARLY COMPLETED

- A. Memory Tester 1515 for TMI. Due to be delivered July 8, 1960. Price - \$50,000.
- B. Memory Tester 1512C for Datamatic. Due to be delivered June 29, 1960. Price - \$35,000.

2. SYSTEMS UNDER CONSTRUCTION

- A. Automatic Core Tester 2102C for TMI. Due to be delivered August 1, 1960. Price - \$18,000.
- B. Memory Tester 1512D for General Ceramics. Due to be delivered about September 1, 1960. Price - \$35,500.

3. SYSTEMS UNDER CONSIDERATION BUT NOT YET STARTED

- A. Memory Exerciser 2202 for TMI. Promised delivery four months from receipt of order. Price - \$45,000. Probability of receiving order - 100%. There are some changes on original specification and proposal and I have to go over these to see how they will effect the price, and resubmit a proposal.
- B. Memory Exerciser 2203 for IBM. This will be an eight bit exerciser with a considerable amount of flexibility and considerably different from the 2201. Required Delivery September 1, 1960. Price - approximately \$20,000. I have to make a firm proposal on this and go over the new specifications carefully. Probability of receiving order - 90%.
- C. Automatic Core Tester for IBM. This will be considerably different from the 2102 in order to conform to IBM specifications. Probability of receiving order about 60%. Price - in the neighborhood of \$20,000. I have to go over the specifications and changes and make a proposal to IBM.
- D. Automatic Core Tester for General Ceramics. This will be quite similar to our 2102 with some modifications. Price - in the neighborhood of \$20,000. Probability of receiving order - 90%. I have to go over the specifications for this Core Tester with Wally Weeton and make a formal proposal.
- E. Core Evaluator 2104 for Electrodata Division of Burroughs Corporation. Price - \$11,125. Delivery date 60 days from receipt of order. Probability of receiving order - 100%. The logic for this has already been worked out by Dick Best.

digital equipment corporation

MAYNARD, MASSACHUSETTS

F. Coincident Current Word Address Memory similar to MT-1515 for Electrodata Division of Burroughs Corporation. Price - \$40,000 to \$50,000 depending on exact specifications. Proposal is being submitted and the specifications gone over by Wally Weeton. Probability of receiving order approximately 80%.

cc: Harlan Anderson
Richard Best
Walter Weeton

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ced**INTEROFFICE
MEMORANDUM**

DATE June 27, 1960

SUBJECT PROPOSED DIE TO BE BUILT IN THE NEXT SIX MONTHS TO A
YEAR PERIOD.

TO Kenneth H. Olsen FROM Loren Prentice

1. Dies for Top-Bottom Bracket Test Equipment

Two dies to be built. One for lancing and perforating holes and the second one for bending both ends in a single operation. These dies to be combined into a progressive die if this seems feasible to do. In each instance, a number of pieces will be given based on production of the last four months of the last year. The number of parts to be made using the above is forecast at 21,600 pieces.

2. 901 Mounting Panels

- A. Make up and put in the die set on 2-1/4 centers notching cutters to notch 2-1/4 x 1/2 inch slots in 901 end plates standard 5-1/4" panels. 1903 and 1901 end plates. This is a fairly simple punch and die to make up. The stops would have to be provided to set up the correct distances for the above mentioned panels. The die buttons for this item have been ordered and are in stock.
- B. A trimming and punching die that would trim the two sides of a 901 and simultaneously punch six 5/32 diameter holes. This hole size may be subject to change to accommodate the proper clearance for the pop rivets that we are now using. Number forecast for next year is 1800 pieces. These should probably be made up in not more than three lots of 600 pieces each.

3. P.I.U. Handles

As you know, this die has been put outside for punching and blanking out the sections for this handle. This leaves the problem of cutting off the angles to lick. This punch cut off die needs to be mounted in a die set and a spring loaded pressure pad included to prevent the angle or more correctly to hold the angles square while they are being cut. The present die leaves a break off on one end which is very time consuming to remove during the sanding operation of the handle. Forecast on P.I.U. handles - 18,000. Multiple punch for cooling holes for 721 and 749 power supplies also used on the cover of power supplies and many other items. We have tonage enough to cut 10.8 holes on each level. The punch could be made up in multiples of seven or three levels to punch the cover with a quick removal method to remove the dies for punching other sections occurring less than 21 holes. This would mean a necessity would need to be set up in the press break because of the tonage required. These holes are presently cut by

a single punch and the step along or automatic die stop which is not totally satisfactory and could be improved somewhat. 721, 740, and 749 power supplies are all the same. 721 and 749 production forecast for next year - 540 units. There are 6-5/32, 1/2" hole and a keyed 15/32 hole besides the normal notches. Forecast on this article is 600 pieces for next year.

4. 1901 Panels

Although somewhat nearly a borderline case, I think it will be possible to strike all 26 lance cuts plus 34 holes required for mounting the amphenol receptacles. Two operations would produce a complete unit requirement for next year is approximately 280 pieces. The simple punch could be made up to punch the four holes for 1901 and 1903. 4-.196 holes are required for each unit plus 2 1/4" holes. This could be done on a 10 ton press without trouble. Forecast on this item is 1200 pieces for the coming year.

5. 1903 Panels

21 lances, 21/138 holes and 4 or 5 1/8" holes plus a 3/16 diameter holes of which there are ten. Number of these pieces 720 pieces per forecast.

ced**INTEROFFICE
MEMORANDUM**

DATE February 26, 1960

SUBJECT Quality Complaint from Customer (LFE)

TO S. Olsen G. Gerelds FROM Jack Brown
K. Olsen R. Best

Laboratory for Electronics has purchased high speed test equipment from us at three time periods. The first order was in July, 1959 for evaluation. The second order (\$6000) was in December, 1959, and the third, (\$12,000) was in January, 1960. They may order much more.

History First Order

They were extremely satisfied and had no troubles with equipment until January, 1960 at which time a flip-flop developed a shorted transistor.

History Second Order

Five flip-flops and one pulse amplifier were inoperative on arrival. Three of the flip-flops had mechanical trouble, two had eyelet connections, and one front panel screw missing. One flip-flop had a shorted 2N393 and one apparently had nothing wrong. The pulse amplifier required a 393 replacement because it was double pulsing.

The units were repaired and returned at our cost. In January, 1960, Dick Best and I found that the flip-flop returned stating nothing was wrong, was in fact intermittent. Dick Best now has this unit for study.

History Third Order

After receiving our equipment they built their system and found it intermittent. They called for Dick and me to come down, and we found 3 intermittent eyelet connections and 2 intermittent wire to circuit board connections. So far as we know all of their units are now working reliably.

Conclusion

1. The majority of the troubles were mechanical. Eyelet and board connections are not as good as they should be.
2. We should be very careful in returning a unit for which we could find no trouble.
3. A great deal of bad will can be caused by having only a small number of units that do not operate reliably.
4. We are not testing in such a manner that we catch intermittent troubles.

digital equipment corporation

MAYNARD, MASSACHUSETTS

Preliminary Dope on Optisyn
A-D Shaft Pick-Off

December 21, 1959

K. H. Olsen

J. B. Brown

Life limited by bulb life \approx 10,000 - 30,000 hrs.

Inputs needed - shaft drive and 6.3 VAC for bulbs.

Outputs - 2 phase triangular wave 90° out. By using both phases, one determines direction of rotation.

Resolution - Depends on logic - 2000 pulses/rev,
1000 pulses/rev & 500 pulses/rev.

They build in lot sizes of about 10 and therefore usually have stock of 3 or 4.

To date, they have sold about 100 and have had constant improvements. Biggest problem is making and positioning the wheels.

Cost is in neighborhood of \$700 for quantities of 1. Volume discounts are significant.

Man at Dynamics Research Corp. wants to talk to us about the digital portion of systems using pick-off and is sending more detail dope.

cc: R. Best
B. Gurley

MEMODATE 12/1/59TO Ksu FROM Harry

This is a list of all the aluminum we have purchased from Edgcomb up to November 20, 1959. You requested a list for yourself and f. Prentice.

11/20/59

EDGCOMB STEEL OF NEW ENGLAND

ALUMINUM SHEETS

5052-H32 - Sheared to - Tolerance $\pm 1/64"$

| | | |
|----------------------------|-------------------|-----------|
| .032 x 36 x 96 | 9 shts. | 98# |
| .050 x 36 x 96 | 2 shts. | 34# |
| .051 x 36 x 96 | 4 shts. | 69# |
| .062 x 36 x 96 | 84 shts. | 1760# |
| .063 x 2 29/32 x 16 7/8 | 128 pcs. | 39# |
| .063 x 5 21/32 x 16 1/2 | 192 pcs. | 120# |
| .063 x 11 13/64 x 18 23/64 | 466 pcs. | 540# |
| .063 x 11 43/64 x 18 11/64 | 9 shts. | 188# |
| .063 x 15 27/64 x 26 59/64 | 390 pcs. | 900# |
| .063 x 18 23/64 x 23/31/32 | 140 pcs. | 380# |
| .063 x 36 x 96 | 61 shts. | 1250# |
| .064 x 2 29/32 x 16 7/8 | 3 shts. | 129# |
| .064 x 5 21/32 x 16 1/2 | 2 shts. | 86# |
| .064 x 5 35/64 x 18 27/64 | 24 shts. | 1028# |
| .064 x 11 13/64 x 18 23/64 | 7 shts. | 301# |
| .064 x 15 27/64 x 26 59/64 | 12 shts. | 516# |
| .064 x 18 23/64 x 23/31/32 | 20 shts. | 860# |
| .064 x 36 x 96 | 24 shts. | 512# |
| .091 x 36 x 96 | 4 shts. | 122# |
| .125 x 3 7/16 x 19 | 4 shts. | 340# |
| .125 x 5 3/16 x 10 41/64 | 117 pcs., 3 shts. | 80#, 255# |
| .125 x 5 7/32 x 19 1/32 | 3 shts. | 255# |
| .125 x 5 35/64 x 18 27/64 | 24 pcs. | 30# |
| .125 x 36 x 96 | 8 shts. | 300# |

ALUMINUM SHEETS

1100-H14

| | | |
|-------------------------|-----------------------------------|------|
| .032 x 36 x 96 | 1 sht. | 9# |
| .063 x 36 x 96 | 14 shts. | 292# |
| .064 x 36 x 96 | 17 shts. | 356# |
| .125 x 4 1/2 x 8 3/4 | 2 shts. (48 x 144) 1120 pcs. | 170# |
| .125 x 5 7/32 x 19 1/32 | 604 pcs. | 800# |
| .125 x 5 7/32 x 9 31/32 | 72 pcs. | |
| .125 x 36 x 96 | 2 shts. (Tolerance \pm 1/32) | 84# |

ALUMINUM SHEETS

3003-H14

| | | |
|----------------|---------|-----|
| .051 x 36 x 9 | 1 sht. | 18# |
| .125 x 36 x 96 | 2 shts. | 86# |

ALUMINUM RECT. TUBE (EXTRUDED)

6063-T5

| | | |
|----------------------------|--------|-------|
| 3/4 x 3/4 x .125 x 16' | 1 bar | |
| 7/8 x 1 1/4 x .125 x 16' | 1 bar | |
| 1 x 1 x .063 x 16' | 1 bar | |
| 1 x 1 x .125 x 16' | 1 bar | |
| 1 x 1 x .188 x 16' | 1 bar | |
| 1 1/2 x 1 1/2 x .125 x 16' | 1 bar | |
| 1 3/4 x 4 1/2 x .125 x 12' | 2 pcs. | |
| 1 3/4 x 4 1/2 x .125 x 21' | | 9611# |

ALUMINUM TUBE

3003-H14

| | | |
|----------------------------|-------|--|
| 3/16 O. D. x .022 Wall 12' | 1 bar | |
|----------------------------|-------|--|

| | |
|---------------------------|-------|
| 1/4 O. D. x .022 Wall 12' | 1 bar |
| 3/8 O. D. x .032 Wall 12' | 1 bar |
| 1/2 O. D. x .035 Wall 12' | 1 bar |
| 5/8 O. D. x .035 Wall 12' | 1 bar |

RECTANGLES

2024-T4 to QQ-A-268

| | |
|-----------------|--------|
| 1/8 x 1/2 x 12' | 4 bars |
| 1/8 x 3/4 x 12' | 2 bars |
| 1/8 x 5/8 x 12' | 2 bars |
| 1/8 x 1 x 12' | 2 bars |
| 1/8 x 2 x 12' | 2 bars |
| 1/4 x 1/2 x 12' | 2 bars |
| 1/4 x 3/4 x 12' | 2 bars |
| 1/4 x 1 x 12' | 2 bars |

ALUMINUM FLATS

2024-T4

| | |
|-----------|--------|
| 1/8 x 1/2 | 25# |
| 1/4 x 1/2 | 4# |
| 3/8 x 3/8 | 3 bars |

ALUMINUM PLATE

2024-T4

| | |
|----------------|--------|
| .375 x 24 x 36 | 4 pcs. |
| .500 x 24 x 24 | 6 pcs. |
| .625 x 18 x 18 | 4 pcs. |

ALUMINUM RODS

2011-T3 - Round

| | |
|-----------|---------|
| 1/8 x 12' | 11 bars |
|-----------|---------|

| | |
|-------------|---------|
| 3/16 x 12' | 1 bar |
| 1/4 x 12' | 11 bars |
| 5/16 x 12' | 1 bar |
| 3/8 x 12' | 1 bar |
| 1/2 x 12' | 6 bars |
| 5/8 x 12' | 2 bars |
| 1 x 12' | 2 bars |
| 1 1/4 x 12' | 1 bar |
| 1 1/2 x 12' | 1 bar |
| 2 x 24" | 1 pc. |
| 3 x 24" | 1 pc. |

WATER HARDENING DRILL ROD

Round

| | |
|-----------|--------|
| 1/8 x 3' | 2 pcs. |
| 1/4 x 3' | 5 pcs. |
| 5/16 x 3' | 3 pcs. |
| 3/8 x 3' | 2 pcs. |
| 7/16 x 3' | 3 pcs. |
| 1/2 x 3' | 8 pcs. |
| 9/16 x 3' | 1 pc. |
| 5/8 x 3' | 1 pc. |
| 3/4 x 3' | 3 pcs. |
| 7/8 x 3' | 2 pcs. |
| 1 x 3' | 2 pcs. |

OIL HARDENING DRILL ROD

Round

| | |
|----------|--------|
| 5/8 x 3' | 4 pcs. |
|----------|--------|

F. C. BRASS ROD

| | |
|-----------|---------|
| 1 x 12" | 1 bar |
| 3 x 12" | 1 pc. |
| 2 x 24" | 1 pc. |
| 1/8 x 12' | 1 bar |
| 1/4 x 12' | 15 bars |
| 3/8 x 12' | 1 bar |
| 1/2 x 12' | 2 bars |
| 3/4 x 12' | 1 bar |

ALUMINUM ANGLE (EXTRUDED)

6063-T5

| | |
|-------------------------------------|--------|
| 1/2 x 1/2 x 1/16 x 16' Die #1312 | 4 bars |
| 1/2 x 1/2 x 1/8 x 16' Die #79-H | 1 bar |
| 3/4 x 3/4 x 1/16 x 16' Die #472 | 1 bar |
| 3/4 x 3/4 x 1/8 x 16' Die #79-A | 1 bar |
| 1 x 1 x 1/16 x 16' Die #79-M | 2 bars |
| 1 x 1 x 1/8 x 16' Die #79-G | 1 bar |
| 1 x 1 x 1/8 x 16' Die #79-M | 1 bar |
| 1 x 1 3/16 x 16' Die #79-B | 1 bar |
| 1 1/2 x 1 1/2 x 1/8 x 16' Die #79-V | 2 bars |

HOT ROLLED ANGLES

| | |
|---------------------------|---------|
| 1/2 x 1/2 x 1/8 x 22' | 2 bars |
| 3/4 x 3/4 x 1/8 x 20' | 2 bars |
| 3/4 x 3/4 x 1/8 x 22' | 20 bars |
| 1 x 1 x 1/8 x 22' | 4 bars |
| 1 1/2 x 1 1/2 x 1/8 x 22' | 4 bars |
| 1/2 x 1/2 x 1/8 x 22' | 22 bars |

ALUMINUM TEE (EXTRUDED)

6063-T5

| | |
|----------------------------------|-------|
| 3/4 x 3/4 x 1/8 x 16' Die #18307 | 1 bar |
|----------------------------------|-------|

7/8 x 1 1/4 x 1/8 x 16' Die #7030

1 bar

COLD ROLLED SHEET

11 Ga. x 8 x 12

8 pcs.

ALUMINUM BAR

2024-T4

1/8 x 1/6

4 bars

1/8 x 1/2 x 12'

4 bars

5/16 x 5/16

10 bars

3/8 x 3/8

6 bars

C. F. BARS

C-1018 - Round

1/8 x 10-12'

30 bars

1/4 x 1/4

1 bar

1/4 x 1/2

1 bar

1/4 x 3/4

1 bar

1/4 x 1

1 bar

1/4 x 2

1 bar

1/4 x 1 1/2

1 bar

1/4 x 10-12'

1 bar

1/4 x 1/4 x 10-12'

1 bar

1/4 x 3/4 x 10-12'

9 bars

1/4 x 1 x 10-12'

2 bars

1/4 x 1 1/4 x 10-12'

1 bar

1/4 x 1 1/2 x 10-12'

2 bars

1/4 x 2 x 10-12'

1 bar

3/8 x 10-12'

1 bar

3/8 x 1/4 x 10-12'

1 bar

3/8 x 1/2 x 10-12'

1 bar

3/8 x 3/4 x 10-12'

1 bar

| | |
|----------------------|--------|
| 3/8 x 5/8 x 10-12' | 1 bar |
| 3/8 x 1 x 10-12' | 1 bar |
| 3/8 x 1 1/2 x 10-12' | 1 bar |
| 3/4 x 10-12' | 1 bar |
| 3/4 x 3/4 x 10-12' | 2 bars |
| 1/2 x 1/2 | 1 bar |
| 1/2 x 1 | 1 bar |
| 1/2 x 1 1/2 | 1 bar |
| 1/2 x 2 | 2 bars |
| 1/2 x 10-12' | 2 bars |
| 1/2 x 1 x 10-12' | 2 bars |
| 1/2 x 1 1/4 x 10-12' | 1 bar |
| 1/2 x 1 1/2 x 10-12' | 3 bars |
| 1/2 x 2 x 10-12' | 2 bars |
| 1 x 1 x 10-12' | 2 bars |
| 3/16 x 1/2 x 10-12' | 1 bar |
| 1/2 x 1/2 x 10-12' | 1 bar |

C. F. BARS

C-1213 - Round

| | |
|---------------|---------|
| 1/16 | 20 bars |
| 1/16 x 10-12' | 20 bars |

C. F. BARS

| | |
|------------------|-------|
| 1/2 x 1 1/2 x 4' | 1 pc. |
| 1/2 x 4 x 4' | 1 pc. |

dec

**INTEROFFICE
MEMORANDUM**

COMPANY CONFIDENTIAL

DATE September 19, 1959

SUBJECT

TO K. Olsen, H. Anderson,
S. Olsen, W. Weeton

FROM Maynard Sandler

Attached are status sheets for Finished Units. It is planned that we maintain a one month supply ON HAND and an additional one month supply ON ORDER (in process.)

ON ORDER lots will be processed up to mounting transistors (2N393) and will be completed only to replenish ON HAND requirements. When feasible, additional lots will be placed ON ORDER only to replenish required levels. The demands of available work capacity, however, may at times indicate issuance of lot orders in excess of levels.

COMPANY CONFIDENTIAL

STATUS

digital

EQUIPMENT CORPORATION

TEST EQUIPMENT

MAYNARD, MASSACHUSETTS

| UNIT | Ave. last 5 mos. | Ave. last 3 mos. | Desired t/cmo/stock | RATIOS | Ted 1 yr. ago | On HAND | On ORDER |
|-------|------------------|------------------|---------------------|--------|---------------|---------|----------|
| 103 | 80 | 55 | 60 | 19% | 15% | 91 | 100 |
| 110 | 45 | 34 | 40 | 12% | 12% | 104 | 40 |
| 201 | 125 | 82 | 100 | 32% | 35% | 30 | 200 |
| 302 | 40 | 23 | 30 | 9% | 10% | 20 | 60 |
| 402 | 15 | 10 | 15 | 5% | 5% | 23 | 40 |
| 410 | 25 | 16 | 20 | 6% | 5% | 41 | 40 |
| 501 | 10 | 4 | 10 | 3% | -- | 16 | 20 |
| 601 | 10 | 12 | 15 | 5% | 8% | 94 | -- |
| 650 | 10 | 9 | 10 | 3% | -- | 48 | -- |
| 666-7 | 15 | 9 | 15 | 5% | 6% | 27 | 20 |
| 701 | 20 | 8 | 15 | -- | -- | 19 | 40 |
| 801 | 5 | 1- | 2 | 1% | -- | 7 | -- |
| 901 | 40 | 30 | 35 | -- | -- | -- | 130 |

COMPANY CONFIDENTIAL

STATUS

SPU

digital

EQUIPMENT CORPORATION

MAYNARD, MASSACHUSETTS

| UNIT | Ave. Last 5 mos. | Ave. Last 3 mos. | Desired 1 mo/stock | RATIOS | On HAND | On ORDER |
|------|------------------|------------------|--------------------|--------|---------|----------|
| 1103 | 28 | --- | ---- | --- | 28 | --- |
| 1104 | 75 | 71 | 75 | 22% | 20 | 160 |
| 1110 | 45 | 56 | 50 | 15% | 71 | 20 |
| 1201 | 65 | 56 | 60 | 18% | 159 | 120 |
| 1209 | 30 | 35 | 35 | 10% | 68 | 80 |
| 1210 | 20 | 16 | 15 | 4% | 2 | 20 |
| 1211 | -- | -- | -- | --- | 20 | -- |
| 1304 | 25 | 22 | 25 | 7% | 18 | 60 |
| 1404 | 5 | 3 | 10 | 3% | 31 | 20 |
| 1410 | 20 | 22 | 25 | 7% | 49 | 20 |
| 1606 | 30 | 33 | 35 | 10% | 51 | 40 |
| 1667 | -- | 1 | ? | ? | 19 | 20 |
| 1669 | 7 | 7 | 10 | 3% | 18 | 20 |
| 1671 | -- | -- | -- | -- | 20 | -- |
| 1901 | 10 | 4 | 10 | -- | 15 | 10 |
| 1903 | 15 | 9 | 15 | -- | 5 | 40 |
| 730 | 3 | 4 | 5 | -- | 9 | 20 |
| 740 | 3 | 3 | 5 | -- | 13 | 20 |

T. Olsen

**INTEROFFICE
MEMORANDUM**

DATE 26 August 1959

SUBJECT PDP-type nomenclature

TO H. Anderson, K. Olsen

FROM T. Johnson

Might be worth while to note that there is a PDP (Peripheral Data Processing) Division of American Electronics, Inc., in Brooklyn, New York. pdp/Data Intergrators, for example, is the way they would advertise their data intergrators.

Why not select a catchy computer trade-name now? Maybe DECOMP-1, etc.

T. Olsen

**INTEROFFICE
MEMORANDUM**

DATE 26 August 1959

SUBJECT Digital Equipment Corporation, ll

TO Sales

FROM Ted Johnson

Talked with A. W. O'Sullivan, President, of new (1½ months) company in San Diego (La Jolla). Have 5 people. Strictly custom-built magnetic drums. Address, 7541 Eads, La Jolla. Glencourt 9-1724.

He said name was mistake. Did know of us. Proceeded to change the name as soon as they were incorporated. Advertised at WESCON as Digital Development Corporation. Two principles are O'Sullivan and Dick Stephenson. Both at Aeronutronics and Alvac.

Name is still too close to suit me.

DEC**INTEROFFICE
MEMORANDUM**

DATE 14 August 1959

SUBJECT RETURN AUTHORIZATION

TO H. Anderson, S. Olsen, K. Olsen,
M. Sandler, D. Best, T. Johnson,
and J. Brown FROM Walter Weeton

One of the problems which we are beginning to run into more frequently is that of the equipment being returned to us for repair or replacement. In order to control this it is necessary to develop a normal flow of this equipment. When a customer requests a RETURN AUTHORIZATION for some of his equipment, the Sales Department should be checked with and a RETURN AUTHORIZATION number associated with this particular return. The Sales Department will keep a record of these RETURN AUTHORIZATIONS. The record will include the following data: the RETURN AUTHORIZATION number, the date of the RETURN AUTHORIZATION, the company name and address, the person in the company with who this was discussed, his phone number, a list of the equipment involved, action to be taken, the date and the name of the person who has requested the RETURN AUTHORIZATION, and when the equipment arrives at the company. The date the equipment is received will also be recorded on this form. A RETURN AUTHORIZATION number then should be given to the customer and the equipment should be returned to Digital Equipment Corporation with some packing slip referencing this number. When the equipment is received at DEC, the Sales Office should be notified and the equipment should be opened and turned over to Quality Control for complete testing and repair as necessary. When this is done, Quality Control will notify the Engineering Department of the problems involved routinely and it is suggested that they do this in their weekly Quality Control report. Engineering may then take any steps necessary to insure that this trouble does not develop in any future equipment. After the equipment has been fully tested and new test data sheets are made out they should be turned over to the Sales Department for return to the customer or whatever other disposition is decided on.

RETURN AUTHORIZATION

Return Authorization No. _____ Date _____

Company Name and Address:

Person Contacted _____ Phone No. _____

Equipment Involved _____

Description of Trouble _____

Date Equipment Received _____

Serial Nos. _____

Date of Purchase _____

Comments:

Signature _____

ed
c

INTEROFFICE MEMORANDUM

DATE April 28, 1959

SUBJECT Arthur Shull

TO Ken Olsen - Harlan Anderson FROM Ted Johnson

I met with an MIT graduate student, Arthur Shull, on 24 and 25 April. He is a mechanical engineer who works under George Hatsopolous, the fellow who invented heat to electrical conversion last year, and came up with a device which is, apparently, quite efficient. Have a little company going in Cambridge.

Shull has been working for two years on a high speed printer. It reads from tape into a core memory which is then read out in the proper sequence to energize characters on a plate to print on special paper. Speed is 12,000 lines per minute. He has patent rights, and as research indicates, the patent is quite unique. The plate is fixed and paper moves under it, and from a line of 30 digits, first the a's are printed, then b's, etc. down to the number 0 to 9. He has done some of his work over at Lincoln Lab. where he heard about us, and is interested in buying some of our equipment to do the logic in his unit. I understand from Ken that there is nothing new about these ideas, although there may be some new feature in the type of paper he uses and in his method of recording. Shull has decided to go ahead on a prototype himself. I was impressed by the level of his market research and investigation. He has spent a month or a month and a half as his goal for deciding on suppliers and contractors for parts of the units. He did decide that \$15,000 to \$20,000 for the logic portion would not be prohibitive in the final cost of a volume produced herein. Letters I read indicate that \$100,000. to \$130,000 per unit would be a reasonable market price. IBM, Ampex, and others have offered to buy rights or manufacturing rights. His position is, he doesn't want to start a company, he wants the manufacturing and marketing to be handled by a technically-minded company, not bogged down in administrative detail. I think our logic is very well suited for certain parts of his unit. The comparator and parallel read out from memory, and we would have to suggest some schemes for column and character gating with our equipment on his transfer matrix and printer electrode matrix. I showed him how to do the clear-cut portions of his logics and suggested solutions on selection schemes. I don't think we should give him free ideas but I do think there are some possibilities here for sale of equipment and possible manufacture of this printer by us. Shull can be reached at M.I.T. Graduate house and would like to pay us a visit here next week. That's the first week in May. He will call me.

ed
**INTEROFFICE
MEMORANDUM**

DATE March 12, 1959

SUBJECT Customer Notification on Engineering and Product Change

TO Sales and Engineering

FROM Ted Johnson

The example of Rese's experience with our Mounting Panel change illustrates a problem which we will have with customers with whom we are actively dealing with at the time a product change of this significance is made. This indicates to me a need for consultation with approval by people responsible for maintaining contact with the customer prior to a production release. Let's do what we can to head them off before we are forced to supply a special or outmoded models.

TGJ/nd

MEMO

To: Andy and Ken

From: Ted Johnson

Subject: Eastman Kodak, Hawkeye Division

Date: January 13, 1959

I talked to Dr. John Ladd. It was decided that the remaining dollars available would be used on some other projects instead, work in different areas. The project in which we quoted has been extended. If that is approved we will probably be the ones to get the order. The other alternative seems to be the Erie Resistor 10 mc. nor logic. He think, although they haven't investigated this thoroughly, that their equipment might be cheaper and they would get 10 mc. as a bonus. He likes the ease with which you can hook our equipment together. They sent in a request for quotations to 10 different firms. If they do place the order, the type schedule will be very fluent.

The Schmidt Trigger modification they had in mind was or had to do with the above project, but they could make use of it. They will try to modify it themselves and if they have any questions, send them in. They would like to trigger from as small a level as possible, 1 or 2 volts, but would go as high as 5 volts if that was necessary.

The Test Equipment has worked out well for their applications and they are pleased with it. I get the impression that Ladd has been somewhat dampened by his supervisors who might have choked up on his freedom to make capital equipment purchases.

W.S.A.

MEMO

To: Ken Olsen

From: Ted Johnson

Subject: I.B.M. Trip

Date: January 13, 1959

Following up our discussion of the IBM trip this morning, here are the items we were going to keep in mind:

1. Up until now the 1605 is satisfactory. It will be put into greater use in the near future. They are ordering more of these units.
2. We need a maintenance sheet listing parts, part numbers and sources of supply for peculiar components. We should supply this to all present users. You mentioned that Jack Atwood would handle this.
3. There were several new product suggestions made at I.B.M. under this list:
 - a. A variable width constant voltage Pulse Generator with fast rise times. (widths from 20 to 200 millimicroseconds)
 - b. Constant current drivers.
 - c. Variable amplitude Pulse Generators.
 - d. A ring counter or packaged counter for economy with large number of Flip-Flops. Jim Kiseda thought that we should package the 100 kc. line and Test Equipment as well as System Building Blocks. This would effectively counter any substantial argument against the size of a Test Equipment layout. It would seem that extremely large set-ups of Test Equipment would mainly involve gong counters.
4. We talked about having a controlable voltage, and you said it would be easy to do with the Test Equipment and arrange for $-2\frac{1}{2}$ to -4 volts. We were to investigate the good possibility of using a 1201 and correcting it for a $-3\frac{1}{2}$ volts level as desired by IBM.

Also, you stated that it would be alright to use the $\neq 9\frac{1}{2}$ volt standard IBM voltage on the bias.

5. The range of the allowable bias voltage on $\neq 10$ which could be used for satisfactory operation with the $\neq 10 \neq$ or -2 volts.
6. We were going to find out how much it would cost to put out a Tube Pulser with higher frequency capabilities. You said this would involve going to a Philco drift with heat sink.

I have sent a memo to Dick Best outlining some of these new product developments, particularly the packaged counter.

COMPANY CONFIDENTIAL

TO: Harlan E. Anderson
Kenneth Olsen

FROM: Maynard Sandler

Date: January 19, 1960

UNIT MANUFACTURING COSTS

| UNIT | Ave. to June 30 | July Aug. Sept. | Oct. | Nov. | Dec. | Price | Mfg. Cost Sales |
|------------|-----------------------|-----------------------|--------|--------|--------|-------|-----------------------|
| 50 | ---- | ---- | 108.36 | --- | 131.27 | 196. | 61% |
| 60 | --- | ---- | 152.40 | ---- | 96.86 | 196. | 63% |
| 103 | 48.67 | 43.57 | ---- | ---- | 41.93 | 113. | 37% |
| 110 | 32.09 | 27.83 | 25.97 | --- | 25.29 | 89. | 29% |
| 201 | 56.14 | 45.58 | 47.58 | 49.71 | 47.13 | 130. | 35% |
| 202 | ---- | 49.98 | --- | --- | --- | 160. | 32% |
| 302 | 51.97 | 52.05 | --- | 48.26 | 51.69 | 147. | 34% |
| 402 | 40.68 | 38.70 | --- | 36.99 | ---- | 147. | 25% |
| 410 | 35.70 | 25.25 | 23.63 | ---- | ---- | 115. | 21% |
| 501 | 63.15 | 62.45 | ---- | ---- | ---- | 140. | 45% |
| 601 | 31.69 | 25.53 | ---- | ---- | ---- | 100. | 26% |
| 650 | 33.46 | 29.02 | ---- | ---- | ---- | 105. | 28% |
| 666 667 | 31.19 | 29.30 | ---- | ---- | 28.89 | 120. | 24% |
| 668 | 66.27 | 54.53 | ---- | ---- | ---- | 140. | 40% |
| 721 | 119.56 | 87.83 | 96.13 | 117.47 | ---- | 305. | 35% |
| 730 | ---- | 126.58 | ---- | ---- | 170.64 | 280. | 53% |
| 740 | ---- | 108.37 | ---- | ---- | ---- | 290. | 38% |
| 749 | ---- | 101.09 | 112.17 | 117.04 | 101.92 | 281. | 39% |
| 801 | ---- | 23.42 | 30.38 | ---- | ---- | 89. | 34% |
| 901 | ---- | 31.31 | ---- | ---- | ---- | 100. | 32% |

| | | | | | | | |
|------|------------------|------------------|-------|-------|-------|------|-----|
| 1103 | 44.05 | 43.91 | 43.00 | --- | 40.68 | 108. | 39% |
| 1104 | 31.29 | 30.47 | 30.57 | 31.27 | 29.56 | 89. | 34% |
| 1105 | ---- | ---- | 35.80 | 37.12 | 34.49 | 98. | 36% |
| 1110 | 25.74 | 25.13 | 25.62 | ---- | ---- | 75. | 34% |
| 1201 | 53.35 | 47.12 | 50.73 | ---- | 46.27 | 133. | 36% |
| 1202 | ---- | ---- | ---- | ---- | 51.99 | 160. | 33% |
| 1209 | 79.00 | 75.07 | ---- | ---- | 76.01 | 168. | 45% |
| 1304 | 42.27 | 48.47 | 47.68 | ---- | 46.32 | 130. | 36% |
| 1310 | ---- | ---- | ---- | 38.27 | ---- | 91. | 42% |
| 1311 | ---- | ---- | ---- | 32.08 | ---- | 78. | 41% |
| 1404 | 46.92 | 40.76 | ---- | ---- | ---- | 130. | 32% |
| 1410 | 26.24 | 20.41 | 18.87 | ---- | ---- | 105. | 19% |
| 1606 | 37.60 | 36.50 | ---- | ---- | 40.08 | 108. | 34% |
| 1607 | ---- | ---- | 56.44 | 52.84 | ---- | 130. | 41% |
| 1667 | ---- | 28.96 | ---- | 29.49 | ---- | 145. | 20% |
| 1669 | 18.02 | 20.47 | 20.15 | ---- | ---- | 58. | 34% |
| 1672 | 0--- | 56.48 | ---- | 60.73 | ---- | 120. | 49% |
| 1675 | ---- | ---- | 19.86 | ---- | ---- | 58. | 34% |
| 1954 | ---- | ---- | ---- | 10.97 | ---- | 20. | 54% |

TO: K. H. Olsen
H. E. Anderson
R. L. Best

FROM: R. A. Hughes

SUBJECT: Meeting at MITRE to Discuss SABRE
January 7, 1959

DATE: January 8, 1959

Hal Boyd, Arnold Werlin, and R. Hughes discussed the question of why Pulse Amplifiers have to drive 9 units of load. Hal Boyd stated that they didn't want the shift register cluttered up with non-logical elements like Pulse Amplifiers, and that he considered that driving the shift input line on each 3-bit shift register was driving three units of load, and that it was very convenient to drive 3 Model 1206 3-bit shift registers with one Pulse Amplifier.

A discussion followed as to what constituted 9 units of load. Hal Boyd interprets it to mean:

1. Nine set, clear or complement connections to Flip-Flops
2. Nine diode capacitor gates driving nine Flip-Flop set, clear or complement connections
3. The shift input lines to 3 Model 1206 3-bit shift registers
4. The count input of the Model 1207 three digit counter (5 loads) and 4 gates driving Flip-Flop set, clear or complement connections.

It is a SABRE requirement that the carry pulse from the 3-bit counter be capable of driving 9 loads.

Subject: Meeting at MITRE to Discuss SABRE
January 7, 1959

The circuit descriptions in the formal SABRE report state that the circuits operate up to 500 kilo-cycles. This fact was observed and not discussed. Since triggering problems in the SABRE circuits may dictate that they run at a much lower rep. rate (maybe 50 KC), I would suggest that Andy be aware of this and that he handle the liaison so that no possibility would exist of the circuits not being accepted due to PRF.

Apparently MITRE has 74 blank plug-in units which they would like to trade in against a new order of units from DEC. I told them that this dilemma would be brought to Ken's attention.

The SABRE frame has about 8 system building block mounting panels wired up and appears to be proceeding well.

I made it a point to suggest that the 115 volt AC soldering irons not be used to solder on the frames when system building blocks were plugged in due to the death of SBT's caused by leakage voltage from the iron. Hal Boyd had not been cognizant that a problem existed. (Since the SABRE frame is grounded, a problem does exist.) It probably would be advisable to inform other system building block customers (without spooking them) that the rule is to use 6 volt irons when soldering to a grounded frame.

TO: Kenneth H. Olsen
From: Bob Hughes
Date: December 31, 1958
Subject: MIT Circuits Conference at DEC

Jim Masser, Bob John, and Arnold Werlin were present. Aside from the things that we discussed, which you are up to date on, two points came up which you should be cognizant of. One is that the Pulse Amplifiers 1602 and 1604 must drive 9 loads on each output with adequate margins. Our spec. sheets say each output can drive 8 units of load. I will check into this and see what needs to be done, if anything. Another problem was that the pins in the Amphenol plugs which are used in the mounting panels were falling out - that is to say some pins had fallen out. All the fellows complained about the mounting panel being bent so that the plugs are slightly askew. The other question which they had was how they would ground the units. I will look into this.

TO: Kenneth H. Olsen
From: Bob Hughes
Date: December 31, 1958
Subject: Clock 1402

The System Building Block Clock Model No. 1402 is sensitive to variations in the -15. That is, the -15 will change the frequency of the Clock. I believe that this problem could be corrected by obtaining the collector and bias voltages for Q1 through a Zener diode which is biased by the -15 volt supply. Perhaps we should also give some consideration to doing this on our other Clocks and maybe Delays, and they will be relatively insensitive to supply voltage changes. This would enhance their stability.

Ken :

Pls. return for
your file

TO: Ken Olsen
FROM: Bob Hughes
DATE: December 17, 1958

The Diode logic unit, part of the system building blocks, has been tested and found to have a long delay time. From the start of the turn-off level going into the diode logic unit until the unit is turned off, which would be the end of the fall time of an inverter output, has been found to be 70 to 80 millimicroseconds. In prior units this time has averaged 40 to 50 millimicroseconds. This is definitely a hole storage and problem ~~inx~~switching to Sprague transistors has corrected our difficulty. As you have stated, the hole storage time may be within specifications. We will probably use these transistors in other plug in units which are not critical with regard to hole storage time, but I would suggest we borrow the MIT hole storage tester to test the units we have to see if they meet specifications or not.

TO: Ken Olsen

From: Bob Hughes

Date: December 15, 1958

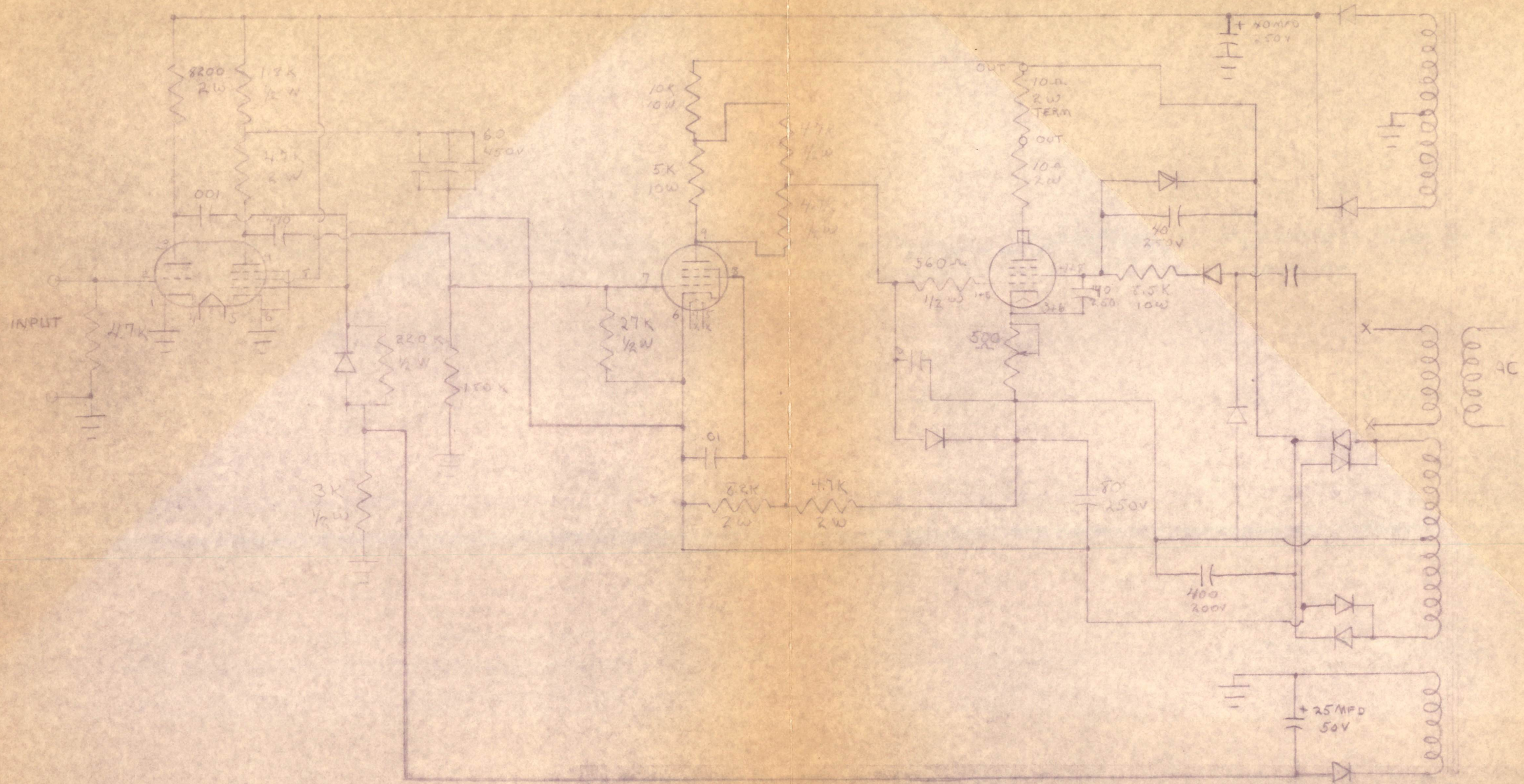
Subject: Modifications to the Core Driver

The modifications to the Core Driver are as follows:

Tube V1A's coupling capacitor has been changed from a .01 microfarad to a .001 micro farad. The capacitor which couples V1B to V2 has been changed from .01 micro farad to 470 micro micro farads. A 27K 1/2 watt resistor has been added from the grid of ~~K~~ V2 to V2's cathode to enable faster cut off of this tube. The plate load resistor of V2 is now a 15K, 10 watt resistor tapped at the 10K, 5K junction and the variable capacitor which controls the rise time has been disconnected from the plate grid circuit of V2, V3 and installed at the junction of the 10K and 5K resistors which are now the plate load for V2. The bleeder resistor 3.3K, 1/2w has been added as a bias load for the grid of V1B. An additional 200 micro farad 200 volt capacitor has been added on the output of the -150 volt supply to get rid of hum. At one time I removed the 10 ohm parasitic suppressor which was in the plate of V3, but I had to install that again to prevent oscillations. The screen of V3 which has 2 connections brought out to the tube socket now has a .01 capacitor from pin 8 to pin 4 on V3, hopefully to suppress oscillations. This screen also has a 10 ohm, 1/2 watt resistor in it which appears to reduce oscillation a little. The control grid circuit has a 39 ohm in it which at one time appeared to eliminate oscillations. Most units will not oscillate, and if they do only under certain very high currents with longer than usual rise times.

Modifications to the Core Driver (Cont'd)

In the current region we are using, it is my belief that none of the units oscillate at all, regardless of rise time. I am going to make a schematic ~~sketch~~ sketch of this unit to bring it up to date. When we have a breathing spell, I will install that transformer that you want between V1 and V2.



| | | | | | |
|---------|---------|----------|-------------------------------|------|--------|
| Changes | exper. | drawn | CORE DRIVER | 1968 | CS |
| | product | checked | | | |
| ch. no. | other | engineer | digital equipment corporation | | 800186 |
| app. | | | MAYNARD, MASSACHUSETTS | | |

CUTLERS
GUARANTEED - 12-57

Memorandum IM-1000

Copy No 1 of 10 copies

Sheet 1 of 5 sheets

To: *Ken Olsen*

From: Ted G. Johnson

Date: September 25, 1958

Approved: _____

Subject: Notes from meeting on 9/24/58 with Jim Childress and Wally Weton on RCA (Needham) Memory Tester.

Points of concern

1. Have stated 20 volts back voltage minimum on their specifications for the read and write drivers. Concerned that we understand that the DDs be able to drive their loads (max. 64 x 64) with a margin of safety. Wally concerned (I think) that 20 volts was calling it too close on the other drivers. Want to know when we want the memory.
2. Display decoder...feel that whole pattern would be too dense for surface, would like to view quadrants (desirable, but if expensive can forget it) and also be able to see the whole plane.

Comments on Block Diagram as of 9/24

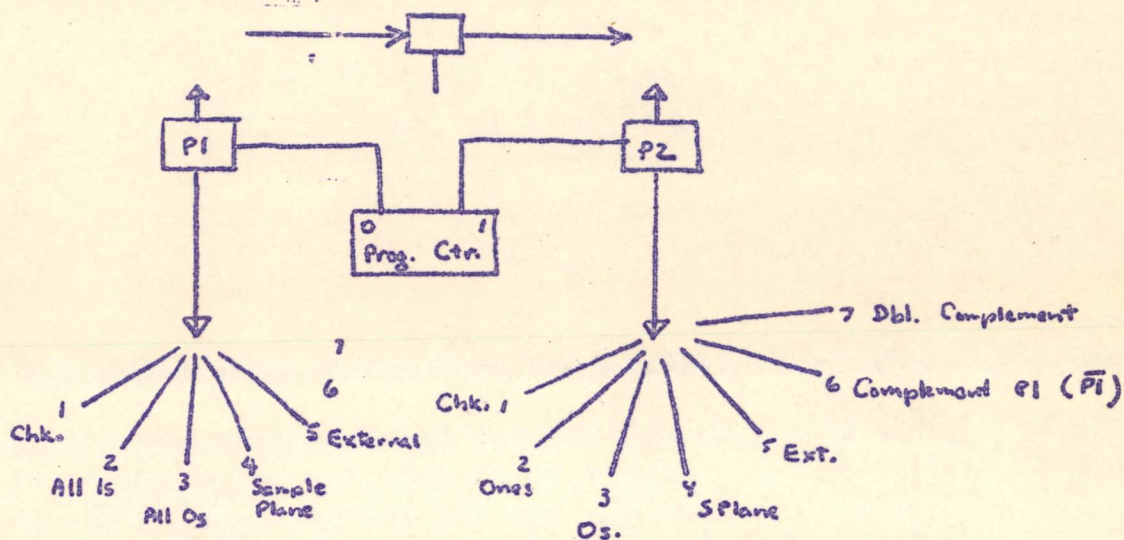
1. Jim C. would like to see the block diagram broken down into smaller blocks for wiring and switch markings.
2. Thought that might be able to do the pattern (timing) generation with serial instead of parallel delays.
3. Would like to see what extra flexibility we can provide.

Switch Requirements

They want different things than we have. But cleared up major points.

1. Don't want to test 2 planes at a time. (Single error detection)
2. The sample plane is the only plane which is required to read into the tested plane.
3. The sample plane is not in the stack, separate, with no digit driver.

4. Want to be able, on alternate cycles, to read in 2 different programs with more versatility than we offer with operational complement modes.



This flexibility provides ability to read 2 arbitrary patterns (instead of form of same pattern) where rewrite is occasioned by putting two switches to same terminal. Double Complement will not read a switch position? (Yes-- have 7 same as complement with connection to a counter (odd-even) which will depress the change address pulse.)

5. Do not require a complement read in initially. P1 doesn't need a complement. (Give it to them anyway and TELL WHY!)?

There is the basic difference that the pattern read in will not be what was in but rather what should be in according to the pattern.

PROGRAM SWITCHING

Initial Write Cycle 0

Cycle 1-3-5-7-9 etc.

Cycle 2-4-6-8-10 etc.

P1

P2

| SW. | Function | Source Connection | SW. | Function | Source Connection |
|-----|--------------|--|-----|-------------------|--|
| 1 | Checkerboard | Chkbd Gen. | 1 | Checkerboard | Chkbd Gen. |
| 2 | All Ones | -3v. level | 2 | All Ones | -3v. level |
| 3 | All Zeros | 0v. level | 3 | All Zeros | 0v. level |
| 4 | Sample Plane | From same addressed core in sample plane | 4 | Sample Plane | From same addressed core in sample plane |
| 5 | Ext. | Any external pattern source desirable | 5 | Ext. | Any external pattern source desirable |
| 6 | | | 6 | Complement | Opposite from P1 |
| | | | 7 | Double Complement | Opposite from P1 But has to suppress the chge address every other pulse |

Pattern Cycle Necessary?

To , Plane could have anything.

Read 1. Destroys core contents (clears), no sense for error

Write 1. Put in P1

chg. address

Read 2. Destructive

Write 2. Put in P1

chg. address

"
" etc.
"

→ end count →

Read 1. Read out P1:
Sense for error by comparing against P1

Write 1. Write in P2

Read 2. Read out P1:

Write in P2

"
" etc.
"

end count

Read 1₂ Read out P2:
Check for error by comparing against P2

Write 1₂ Write in P1

Read 2₂ Read out P2:

Write 2₂ Write in P1

Pattern Cycle necessary to: read in P1
suppress sense for error
clear plane initially

SWITCH TYPES

1. Program

2. Cycle Timing

3. Current and Rise Time Controls
4. Error detection circuit
 - a. vary strobe times (have knob stand out in delays?)
 - b. margin variation knob
have between error skip?
5. sync.

Keep to minimum

But optimize Flexibility

Other points

1. What is type of scope used? Want to know for pulse driving requirement.
2. Reason for using parallel delays was to avoid varying the repetition rate when varying any single delay element.