digital INTEROFFICE MEMORANDUM

DATE: July 5, 1967

SUBJECT: MOUNTING OF THE MAGNET ASSEMBLY ON LINE PRINTER

TO: Rocky Yasui
Bob Savell
Dick Best

FROM: Ken Olsen

I like the idea of making two passes at each line because of the simplifications it makes in the design of the line printer. I think we can move the whole magnet assembly rather easily by using the bar to push it into its new position.

Here is one way of mounting the magnet assembly. Let's mount it on two flat springs so that it can be pushed to either of the two positions, and then let's hold it into position by a permanent magnet. When it is pushed away from one permanent magnet, it will be held in place by the other.

At one time we talked about driving the bar with a 200 rpm Slo-syn motor. I'm afraid that will not work because the Slo-syn cannot drive an inertial load. We might drive the bar from a cable running continuously between two drums. There could be dogs fastened to this cable periodically that would drive it in one direction and pull it back in the other direction continuously.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: July 5, 1967

SUBJECT: NEW DECTAPE

TO: Roland Boisvert
Vincent Tawri

FROM: Ken Olsen

If the 200 rpm Slo-syn motor is not going to work, we shouldn't spend too much time in continued work on it. We could put a flexible coupling between it and the reel that would allow it to start, but if we go to that much trouble, it might be worth considering putting an electromagnetic clutch between the motor and reel. This would eliminate the need to drive the idling motor and its inertia load and magnetic drag. We might be able to get a magnetic clutch that has a spring loaded brake that would drag just enough when the clutch is disengaged.

Many people make magnetic clutches; Simplatrol Products Corporation in Worcester is the nearest company, and Warner Electronic Brake and Clutch Company in Beloit, Wisconsin, is the largest. They both probably have good salesmen who could help design a system.

If we have a motor which runs at approximately the right speed, we could use a motor for each reel, the shaft which is in line with the shaft of the reel, and tied together with a magnetic clutch. I don't believe we need a synchronous motor, but a low slip induction motor would be good enough.

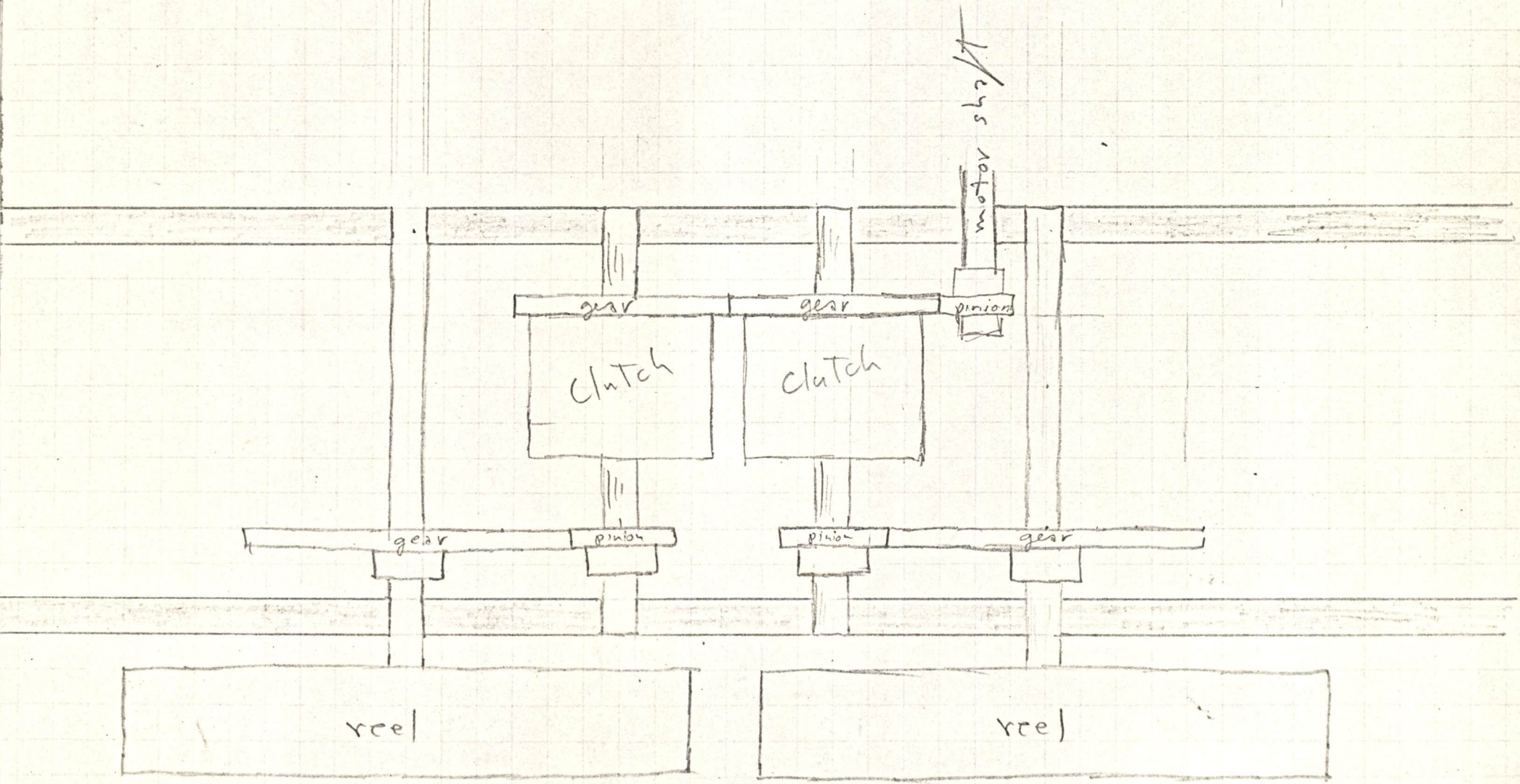
Many-pole motors are expensive and it might be cheaper to buy a four-pole induction motor and reduce the speed with gears or belts.

Enclosed is a sketch of a gear train using two clutches. The motor drives a gear tied to a disc of one clutch which in turn drives the gear of the other clutch to reverse direction. The shaft of the clutch then drives the reel shaft with a pinion and gear. We could add a spring loaded friction disc anywhere in the system to add drag to each reel. Either the gear or the pinion would have to be nylon in order to make the system quiet.

I have a book on clutches which describes research work done in Russia. I don't think Russians are ahead of us, it's just that the book I have is about Russia's clutches.

Ken

ecc



Kodak July 1967

2200

digital MEMO

DATE July 6, 1967

TO Arnaud de Vitry
European Enterprise Development
12 rue de la Paix
Paris 2, France

FROM Kenneth H. Olsen

Received your letter today. I will be out of town the week of July 17, but Harry Mann and Stan, and maybe other Executive Committee members, will be happy to visit with you on the 19th in Maynard.

digital MEMO

DATE July 7, 1967

TO Stan Olsen FROM Elsa Carlson

Information on the cruise:

Date: Friday, July 14th
Time: 9:00 a.m. - 3:00 p.m. (they would like you to be there around 8:30 a.m.)
Name of Ship: U. S. Coast & Geodetic Survey Ship Discoverer
Departure: Berth 10, Boston Army Base

If there are any other questions, or if you find you can't go, please call Mr. George Moore at 223-6237.

digital INTEROFFICE MEMORANDUM

DATE: July 10, 1967

SUBJECT: NEW MARKETING COMMITTEE

TO: Members of the Executive Committee

John Jones	Bill Landis
Ron Smart	Howie Painter
Al Devault	Mike Ford
Allen Kluchman	Pat Greene
Jack MacKeen	Bill Keyworth
Mort Ruderman	Clayton Rix
Bob Lane	Saul Dinman
Dave Cotton	

FROM: Ken Olsen

For several weeks now, the Executive Committee has been considering ways to make the Marketing Committee more effective. We feel the most important thing is to make the Committee smaller and to use the whole marketing organization to perform special tasks and studies.

We have decided to limit the Committee to just two people from each of the marketing groups and two from the Sales Department. It was with some reluctance that we decided to eliminate members of the Executive Committee from the Marketing Committee, but we felt that the number had to be small in order to be effective.

The following people are members of the new Marketing Committee, effective July 11, 1967.

John Jones, Chairman	Mort Ruderman
Ron Smart, Secretary	Bob Lane
Al Devault	Dave Cotton
Allen Kluchman	Bill Landis
Jack MacKeen	Howie Painter

We will rotate the Chairmanship every six months.

One of the primary duties of the Marketing Committee will be to review and approve the marketing plans for each of the product lines. These marketing plans will include a time schedule very much like our engineering schedules, and a formal plan which will be bound into our book of marketing plans. These schedules do not have to be reviewed as often as the engineering schedules, but every two months or every quarter they will be reviewed in the same way the engineering schedules are reviewed.

The Marketing Committee will meet in Conference Room A of Building 12 each Tuesday afternoon at 1:00. The agenda will be published ahead of time, and observers are welcome.

Ken Olsen

ecc

digital INTEROFFICE MEMORANDUM

DATE: July 10, 1967

SUBJECT: NEW ENGINEERING COMMITTEE

TO: Members of the Executive Committee

Bob Savell	Loren Prentice
Ed de Castro	Ed Harwood
Dick Best	Jack Shields
Saul Dinman	Larry Seligman
Bill Long	Lou Illingworth
Mike Ford	Al Devault
Larry Portner	Henry Crouse
Joe St. Amour	Alan Kotok
Tom Stockebrand	

FROM: Ken Olsen

For several weeks now, the Executive Committee has been considering ways to make the Engineering Committee more effective. We feel the most important thing is to make the Committee smaller and to use the whole engineering organization to perform special tasks and studies.

We have decided to limit the Committee to just two people from each of the engineering groups and two from the manufacturing group. It was with some reluctance that we decided to eliminate members of the Executive Committee from the Engineering Committee, but we felt that the number had to be small in order to be effective.

The following people are members of the new Engineering Committee, effective July 11, 1967.

Bob Savell, Chairman	Mike Ford
Ed de Castro, Secretary	Larry Portner
Dick Best	Joe St. Amour
Saul Dinman	Tom Stockebrand
Bill Long	

We will rotate the Chairmanship every six months, with Ed de Castro as Chairman after Bob Savell.

One of the primary tasks of the new Engineering Committee will be to approve the specifications and schedule for each engineering project. Our engineering scheduling system is working very well now, but we are lacking a formal specification for each project. The Committee will develop these specifications and then they will be bound into a book with the schedule. Changes in specifications will be somewhat formalized in the same way that changes in schedules are formalized.

The Engineering Committee will meet in Conference Room A of Building 12 each Tuesday morning at 8:30. The agenda will be published ahead of time, and observers are welcome.

Ken Olsen

ecc

digital INTEROFFICE MEMORANDUM

DATE: July 11, 1967

SUBJECT: LINE PRINTER

TO: Bob Savell
Rocky Yasui
Dick Best

FROM: Ken Olsen

I would suggest that Rocky now drop his work on the solenoid part of the line printer and start active work on other parts. When we have an engineer that we can put on the job, we can then carry on the work of the hammers within the plant. At that time we may want Rocky to make more models for specific experiments. At this time, however, it might be a good idea to make notes as to what experiments we would like to run on the hammers when we have the man.

One thing that Rocky could do is make a sketch of the hammers he now has which we can turn over to Pete Kaufmann for prices. I would like to know how expensive it is to butt-weld brass to soft iron and then to center-less grind them. I believe that if we grind within .0002 inches and fit them in high precision tubing with only 1,000th or 2,000th clearance with solid teflon tubing on both surfaces, the space between the tubing and the plunger will be so small that the large particles of dust which we run into with a line printer will never enter and we will not have to protect against dust. It would be nice if the two plungers were designed so that they were the same but just turned end for end. This probably would mean cutting a groove in both ends of the plunger.

If the next thing Rocky worked on were the bar and bar driver, we might have this done when we get an electrical engineer, and we would not have to simulate our experiments but use the mock-up of the actual bar.

After we have the mock-up of the bar, sprocket feed, and ribbon feed, we can probably ask Jim Jordan, our industrial designer, to start making sketches of this unit. It is good to have him involved several months before the design is frozen because it takes a while to work out the features that we want with the industrial designer.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: July 11, 1967

SUBJECT: 32K of Memory for Foxboro

TO: Dick Best
cc: Nick Mazzarese

FROM: Ken Olsen

About a year ago Nick and I visited Foxboro and were quite shocked to find out that we had stopped working (for several months) on a problem they had with 32K of memory on a PDP-8. This is still a problem, and now they want to build up 32K in their laboratory to solve the problem. This is terribly embarrassing. Will you look into what the problem is and let me know.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: July 12, 1967

SUBJECT: LINE PRINTER

TO: Pete Kaufmann
cc: Bob Savell
Rocky Yasui
Dick Best

FROM: Ken Olsen

There is one part in our line printer which we will make in large quantities, and I have asked Bob Savell to get a drawing for you so that you can get prices and suggestions from possible suppliers.

This consists of a one-eighth inch diameter bar about three inches long with a small groove cut on each end to hold a "C" washer. The bar consists of a center section about one inch long made of soft iron and two ends made of brass (or some other nonmagnetic material).

It seems to me that we could have these three pieces butt-welded together and then centerless ground to very precise tolerances (this is not unlike the butt-welding they use when making chain).

If you can find out how practical it is to have these made, it will be a help because if they are going to be expensive or difficult to make, we can design them using different techniques. We would also like to know if they can be ground to very high precision. I feel that if their diameter is held very closely and they fit into very tight tubing, the spacing would be so small that dust will not enter and then it wouldn't be necessary to put dust protection over them.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: July 12, 1967

SUBJECT:

TO: Joe St. Amour FROM: Ken Olsen

I have a drafting machine laid out on my desk which I think would make a good pointing type wire-wrap machine. If the experiment doesn't work, it can be used as a drafting machine. It is quite rugged and I think would be stable enough for this machine. It can be operated at any angle from horizontal to vertical.

I can think of two ways of mounting the motor. One would be to have a motor on each end of the cable. One would operate the horizontal motion by winding up the cable on a drum on a Slo-syn stepping motor. This could either be by having the cable go completely around the drum with a pulley on the far end or by having a Spring motor on the far end.

The vertical motion can be controlled by having a stepping motor fastened to the vertical member of the drafting machine and winding a cable on a drum there. It might be better, however, to have large, heavy motors, in which case this motor could be on the stationary part of the horizontal member. The cable will then run from the drum on the motor to a pulley on the vertical member, down to a pulley on the carriage, then up to another pulley at the top, and fixed on the far side of the horizontal member. The Spring on the hollow part of the vertical member would keep constant pressure pulling the carriage down. If these pulleys are laid out carefully, the horizontal motion would not disturb the vertical position of the carriage.

I thought I would look at this system more closely when I get back from vacation in a week and a half, but I don't know when I'll get enough time to do anything about it. If you are interested in playing with this thing, or even taking over the whole project, Joe, please feel free to go right ahead.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: July 24, 1967

SUBJECT:

TO: Mike Ford

FROM: Ken Olsen

I am looking into the possibility of making a bare minimum computer to be used as an instrument controller and data collector. This machine would have no compiler and maybe not even a minimum assembler. It would probably be 8 bits and is a bare minimum machine with no peripherals or expansion capability.

Before I look into this in any more detail, I need one reference point. Could you have an estimate prepared for me as to what would be the cost to make a PDP-8/I with no memory expansion beyond 4K allowed and with no peripherals. This would be a unit that could then fit in one hand like the competition advertises.

You can see that I'm afraid that if we go ahead and make this 8-bit machine it may not cost much less than a basic PDP-8/I if we left out all the expansion capability.

Ken

digital INTEROFFICE MEMORANDUM

DATE: August 1, 1967

SUBJECT: TAPE PLAYER FOR PDP-8

TO: Gordon Bell
cc: Dick Best
Nick Mazzarese
Mike Ford
Bob Cesari

FROM: Ken Olsen

I bought a new Ford, and splurged by having a tape player installed. This machine is really great. It is rugged, apparently reliable, and exceedingly convenient to use. I am asking our patent lawyer to look into what is involved in using this for instrumentation use.

Will you let me know how you would use one of these in a PDP-8. My thoughts are to put 8 blocks of 1,000 words on each track. The tape would run through a complete length of tape, read off the addressed block, and then stop when it gets to the end of the tape. One tape would then have 64 blocks, and it would probably take about half a minute to go through a whole tape.

I am going to talk to Dick Best about redundant recording systems that should be cheaper and more efficient than the audio recordings.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 1, 1967

SUBJECT: PDP-X

TO: John Jones
Ed de Castro

FROM: Ken Olsen

You made a good presentation on the PDP-X yesterday. I think you left people with a feeling of confidence and enthusiasm. There are several questions we want answered, and then I'm sure you will have our approval.

1. What is a critical path in your schedule? What would happen if we wanted the machine earlier than you scheduled?

2. What would it cost to do both options 1 and 2, or 3 and 4, instead of just option 2? What would it cost to do options 1, 2, and 3 all together?

3. What are the options we have in selecting memory? Would it be cheaper to have a slower memory? Are there new memory techniques that might be more practical in the next two years?

4. What are the cost goals? What would you do if we insisted on no dip in volume of profits during the transition of the PDP-9 to the X? Remember that machines keep selling much longer than we guess they will. We never seem to develop our intuition to a realistic point.

Please put your answers down on paper, but in very brief form.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 2, 1967

SUBJECT: PDP-8 at University of Mexico

TO: Jack Shields

FROM: Ken Olsen

Last week we had a man here from the Summer Institute of Linguistics in Mexico City taking a course. I asked him how they were doing with the University of Mexico PDP-8, and he said it was extremely frustrating. It seems the Type 33 never got serviced, and so they never had any idea what characters were being read into the computer.

They haven't used the machine for a while, but I asked him how he thought it was now and he didn't think it had improved any. I'm not sure what we should do about this, but I thought I would let you know that most likely the computer down there is not very effective (but maybe the customer doesn't know if it is working now or not).

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 2, 1967

SUBJECT: Protection for the Formica Counter Tops in Crating

TO: George Silva

FROM: Ken Olsen

I watched the fellas crating computers last Saturday afternoon, and was wondering if we should put some protection on the front edge of our Formica counter tops. We might just buy strips of corrugated cardboard the same width as our tables are thick and hold it on with a few pieces of tape. I notice they stand them on edge and always lay them down leaning on that front edge.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 2, 1967

SUBJECT: DECUS

TO: Angela Cossette FROM: Ken Olsen

I appreciated receiving your note on the accomplishments of DECUS. I would guess that many of our employees do not know the story behind DECUS or all that DECUS does.

I suggest that you encourage an article be put in ON-LINE where you would have a chance to brag a little.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 2, 1967

SUBJECT:

TO: Jack Shields

FROM: Ken Olsen

I was in the plant late last Saturday afternoon when a call came in from California for Field Service, and there was confusion with the guard as to how to find someone. I would suggest that you periodically, maybe every month or two, double check to make sure the guards know the correct procedure for getting someone at odd hours.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 2, 1967

SUBJECT: **LIGHTING**

TO: Al Hanson

FROM: Ken Olsen

Will you see if you can work out a system with the electrician so that all new work areas, and other areas as we rework them, will have one string of lights with a certain percentage of lights tied to one night circuit. In this way, we can turn off most of the lights on the floor and still have the floor illuminated well enough for night use. You may then want to have all the rest of the lights on one large circuit breaker so that a single switch will turn off all but the night lights.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 2, 1967

SUBJECT: TELEPHONE BOOKS

TO: Jim Myers

FROM: Ken Olsen

The telephone books stacked on the second floor of Building 12 look rather old, unused, and messy. Will you find a cabinet for them, or put them somewhere so they will look a little neater than where they are now.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 2, 1967

SUBJECT: LOCK FOR PERSONNEL DEPARTMENT

TO: Bob Lassen
Win Hindle

FROM: Ken Olsen

Do you think we should put a lock on the door to Personnel and keep it locked nights and weekends so that people won't wander in? The guard can have a key to get in for fire checks.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 2, 1967

SUBJECT: M SERIES MODULES AS PAPERWEIGHTS

TO: Stan Olsen
Henry Crouse

FROM: Ken Olsen

I suggest that we pile up some M series modules and send them off as paperweights to our key customers who have been waiting for them (like Jean Lebel in France, and those people who don't know we have integrated circuits).

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 2, 1967

SUBJECT: COMPONENTS FOR AUTOMATIC WIRE-WRAP MACHINE

TO: Joe St. Amour FROM: Ken Olsen

Setco Industries, Inc. of Cincinnati, Ohio, makes components for the building of machine tools. They have slides and cross-slides which they sell with spindles to make up special machine tools. You may want to look at these components as possible aids in making the wire-wrap machine. One thing they have, for example, is a 24" x 24" travel XY table rigged with driving motors and lead screws. This may be too expensive, too big, or too slow for what we want, but it might be interesting to look at them.

In addition, they have large welded bases on which to make machine tools. These might be a good base to have for our wire-wrap machine. They have one that is a T-section which looks like what you want for your machine. Besides being too expensive, this might also be too high for girls to use.

Their local representative is Tom Wainscott, 53 Meadowlark Lane, Long Meadow, Massachusetts 01106, telephone 413 567-0479.

Most of their equipment is very heavy for machining operations, but they might give you advice as to where to get less expensive and lighter weight units.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 7, 1967

SUBJECT: Authorized Personnel List

TO: Al Hanson FROM: Ken Olsen

Please delete Ken Gold's name from the Authorized Personnel List and add Dick Best, Elsa Carlson and Bob Collings.

Ken

ecc

PLANT SUPERVISORS

Authorized personnel list

Ken Olsen--President

Ken Gold

Stan Olsen--Vice-President

Frank Kalwell
Ray Michel
John Woodman

Saul Dinman
Al Devault
Russ Doane

George Gerelds
Jim Castano

Norm Perryman

George Wood

James Cudmore
Arthur Parks
Ed Gianetto

John Jones
Don Vonada
Dave Cotton
Ed Decastro

Ted Johnson--

Bill Farnham

Brad Towle

Jack Shields
Cliff Pitts
Ken Senior
Don Busiek
Dave Dubay
Don Zereski
Walter McKenzie
Paul Gadaire
Leo Landry

Tim McInerney

Harry Mann--Vice-President
George Lord

Elliott Hendrickson

Dean Lewis

Bob Dill
Jean Hanson
Don Summers
Ed Savage
Alma Pontz
Clayton Rix

George O'Neill

Ed Simeone

Jim Myers

Al Hanson
John Culkins

Dave Packer
Charles McHale

Nick Mazzarese--Vice-President

Al Alexanian

Allan Kluchman

Mike Ford
Howie Painter
Marve Cothran
Bill Landis

Clark Crocker

Stu Ogden

Bill Long
Dick Parks

Win Hindle--Vice-President

Mort Ruderman
Rick Clayton

Steve Mikulski
Dick Dreslinski
Frank Fortin
Jim Sullivan

Bob Lane

Pat Greene
Louis Illingsworth
Jack MacKeen
Lee Butterworth
Dick Flaherty

Larry Portner
Harvey Shepherd
Angela Cossette
Bonnie Korsman
Marue Horovitz
Evelyn Dow
Jim Murphy
Leo Gossel
Bill Segal

Bob Lassen
Jim Davis
Dave Edwards
Paul Chambers
Braydon Thayer

Bob Savell
Bob Clemets
Joel Sutton
Derrick Chin
Bob Wyman
Roland Boisvert
Phil Backholm
Frank Nardo

Pete Kaufman--

Bud Dill
Herb Millman
Bob Daigenault
Donald Lind
Murry Connoley
Barry Bornstein
Ron La Fosse
Al Jons
Don Call
Jim Dimauro
R. Hazeltine
Dave Ambruse
Iru Doucette
Al Czajkowski

Dave Kicilinski
Ron Chestna
Ed Unis

Harold Godfrey
Roger Gillette
Bob Dugas

Roger Melanson
Arnold Cook

Loren Prentice

Ed Harwood
Don Whiter
Herve Lavoie
John Trubiano
Bill Vallancourt

Cy Kendrick
Leo Reardon
Gloria Porrazzo
Galen Davis

Jack Smith
Bud Dill
Dave Kicilinski
Harold Godfrey
Jack Achilles
Vito Augello
Gloria Porrazzo

Dick Richardson
Dick Hebden
Ron Masulla
J. Rigney
Paul Stapel

Jack Achilles

Pete Kaufman-- --continued

Vito Augello
Loretta O'Rielly
Pete Shelback

Gloria Parrazzo
R. Smale
H. Patterson
E. Mariano

Tim Stockebrand
John Viscogliosi

Henry Crouse
Ed Hogan
Dick King
Paul McGaunn

digital INTEROFFICE MEMORANDUM

DATE: August 9, 1967

SUBJECT: COURTYARD BETWEEN MACHINE SHOP AND BUILDING 12

TO: Al Hanson
cc: Harry Mann

FROM: Ken Olsen

I think that when we negotiate with Maynard Industries we should encourage them to clean up the courtyard between our Machine Shop and Building 12. It is a disgrace to take visitors into that area.

As our contribution to cleaning it, we should be sure that the roadway to our loading dock is kept clear. Will you make sure that we have that regularly cleaned out. I believe all the rubbish there is really our own.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 9, 1967

SUBJECT:

TO: Al Hanson FROM: Ken Olsen

Will you put the third floor of Building 8 and 11 on a regular sweeping and rubbish removal schedule. When we don't keep that place very clean, our own people don't give it much respect and the junk collects faster and faster. This is a real fire hazard to collect so much rubbish on the floor.

In the maintenance storeroom, there are a lot of machine parts that are rusting this summer, and, if they are worth saving, we should spray them to prevent them from rusting.

I believe the fellas in the Machine Shop keep the machines in fairly good shape and do a good job at removing scrap, but I would like to suggest that you work out a schedule with them so that they thoroughly clean the floor periodically. At the same time, they should probably clean off their shelves and the machines that don't get used regularly.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 10, 1967

SUBJECT: SEMIAUTOMATIC WIRE-WRAPPING MACHINE

TO: Joe St. Amour
cc: Pete Kaufmann

FROM: Ken Olsen

I suggest that we lay out our semiautomatic wire-wrap machine so that it is rugged enough and has room enough to add more and more automatic features as we figure out how to do them. Secondly, I suggest that at the same time we develop the machine, we develop an automatic wire-stripping machine that will automatically deliver a cut and stripped piece of wire to the operator. This is very practical when we have a computer-run system.

Here is an idea that I think will give us a semiautomatic machine very quickly and inexpensively. Let's buy a Delta 16-inch radial saw without wooden table or motor and blade assembly. This is their biggest and most rugged unit, but we might get by with their portable 10-inch unit. The 16-inch saw costs $1,050 complete, and I am now getting the price for it without motor, blade and wooden table. With this we get a very rugged table on which we can build a cross-slide, and we get a rugged arm and high quality slide for the other direction. A cross-slide to put on the table should be quite easy to make, and I have included a sketch of one way that we can do it. Adding motor, gear and rack to the slide that comes with the table should be rather simple, and then we have a rugged base on which we could install a pointer or a wire-wrap tool itself.

Here is the way I would make the table. I would use a piece of 1/2 or 3/4-inch aluminum jig plate about 16 inches wide and, on our planer bed with a milling machine head, I would cut two V slots. In these V slots I would drop two 1-inch shafts. The table itself is a piece of 1/2-inch jig plate about 22" x 22" or the size of the wire-wrap panels. These run on the 1-inch shafts by a pair of single Thompson roundway bearings, No. RW16-S, and a pair of dual V-mounted roundway bearings, No. RW16-B. On a Superior Electric SLO-SYN motor (model SS400-1021), there is a gear (which we now have in stock) that drives a rack screwed to a piece of angle screwed to the movable table.

This rack and gear is arranged so that four steps in the SLO-SYN motor will move the table 1/8 of an inch. The motor is quiescently stable every four electrical steps, and so this is a good way of doing it.

The panel is very heavy and we will have to experiment to make sure that the motor can drive it fast enough. If it takes very long to traverse the width of the panel, we could always go to hydraulic control, but this would be rather a chore.

The base of this table would then be bolted right into the base of the radial saw. Another gear, rack and stepping motor would be added to the cross-arm. I don't believe this motor has to be so big because the cross-arm is relatively light.

If we want to speed up this machine to a speed faster than the stepping motor could drive it, there are a number of ways we can go. This table is a lot simpler than a normal XY table because we only need to go into increments of 1/8 of an inch, and we also have a computer.

If we make the unit just reasonably accurate, we can clamp it with a toothed clamp that will give it the final precision necessary.

If we want to make a hydraulic system, we can leave a stepping motor on as a sensing device and it could be counted by the computer. The computer could then do the servo calculations and decide if we want to turn the oil on or off. Normally this is a small analog system which gives lead or lag signals to optimize the speed and eliminate overshoot. I think the computer is fast enough to do all this. With the right program, the computer might even learn, and it may not be necessary to figure out the equations.

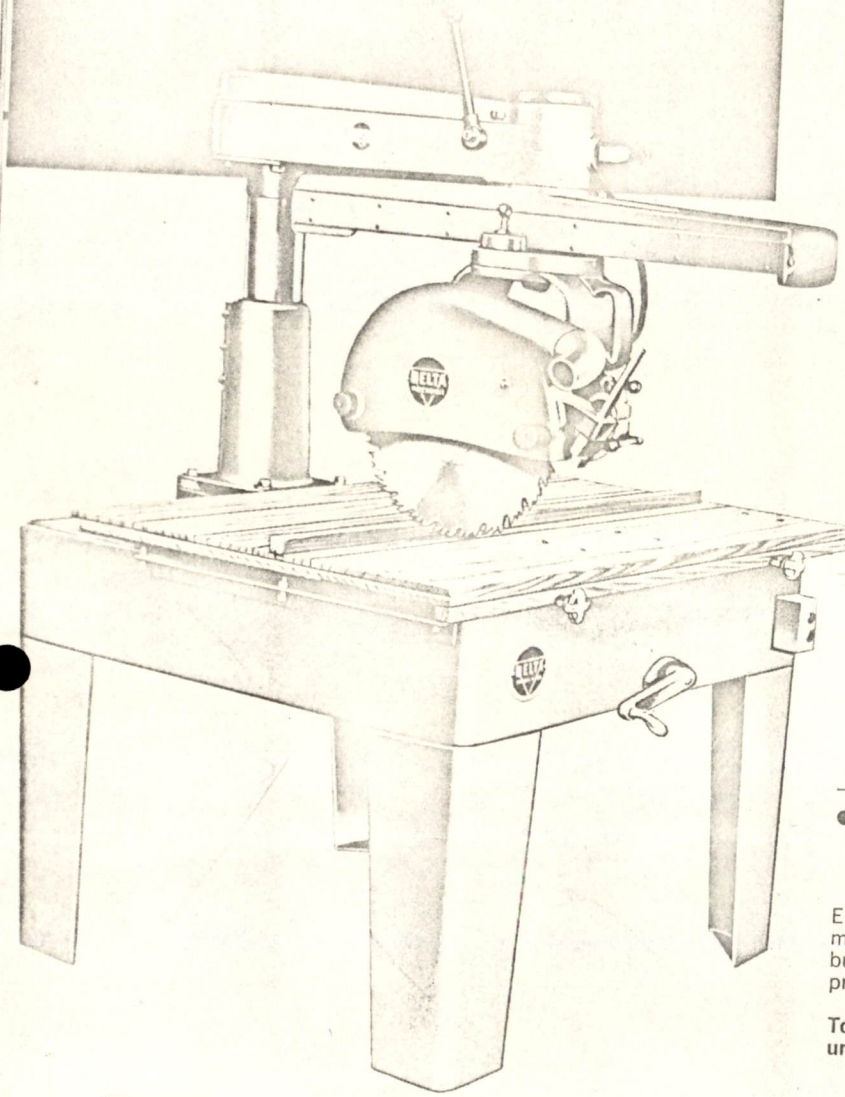
Another approach would be to use the motors for driving small distances but when there is a long distance to go and speed is important, there might be a hydraulic assist that is controlled by the computer and is turned off when the table gets close to its final position.

We have a wire-stripping machine made by Technical Devices which cuts and strips both ends of the wire simultaneously. If we add a stepping motor feed to this it would be quite easy for the computer to feed wire to the operator at calculated lengths. If this works well, it is conceivable that we could make a fully automatic wire-wrap machine. If we start off with precut and prestripped wire, and much of the complexity of the automatic head disappears, it would then operate like the AMP machine. The head would install the first wire, then lay the wire in the appropriate path, and then wrap the final end all with one head. This would be slower than the Gardner-Denver system and would allow some more freedom and a lot more simplicity.

Ken Olsen

ecc

DELTA 16"-20" radial saw



machine data

Motor Rating	3, 5 and 7½ H.P.
Crosscut capacity—1" stock	25"
Maximum rip capacity	38½"
Maximum depth of cut—16" saw	5⅛"
Maximum depth of cut—20" saw	7⅛"
Dado capacity (with 12" dado)	2 1/16" wide
Diameter saw arbor	1"
Diameter of combination saw supplied	16"
Bevel positive stops	0°, 45° and 90°
Miter positive stops	90° and 45°, R & L
Type of track	Replaceable, hardened, nickel-alloy rods
Motor Speed (full load) 60 cycles	3450 rpm
Motor Speed (full load) 50 cycles	2850 rpm
Overall Height	62"
Floor space required	37 x 37"
Wood table top	29 x 44"
Height Table Top	32"
Shipping weight (approx.)	789 lbs.

For heavy-duty production work

Now, new features, *at no extra cost*, make this saw better than ever! New Locking Device on over-arm guarantees positive clamping at any saw setting. New built-in, Precision Indexing Plunger enables operator to make quick, positive settings at most-used angle positions. New "Micro-Set" Miter Stops, that are *individually adjustable*, assure absolutely true 90° cross cuts and 45° miter cuts *for the life of the saw* (see Page 97 for illustration).

And to step up production in the shop or on the job, Delta offers you a New Chain Feed Control and a New Safety Return Attachment (for description see Page 113).

This heavy duty production model will use a 16", 18" or 20" saw blade. Built for continuous, rugged operation, it has all the "beef" and stamina needed for precision cutting in production lines, in lumberyards, shipping departments, aircraft factories, shipyards, building construction and dozens of similar operations. It's also ideal for cutting non-ferrous metals such as aluminum and brass. Saw comes with a 16" blade guard, 16" combination blade and legs.

Note: Machines are available with No. 33-543 Guard and 20" blade.

catalog listing

H.P.	Voltage	Phase	Cycles	Std. Blade	Number
3	230	1	60	16"	33-500
5	220	3	60	16"	• 33-501
5	440	3	60	16"	• 33-502
5	550	3	60	16"	33-503
5	230	1	60	16"	33-504
5	208	3	60	16"	33-505
7½	220	3	60	16"	• 33-508
7½	440	3	60	16"	• 33-509
7½	550	3	60	16"	33-510

For radial saw accessories, see Pages 112 and 113.

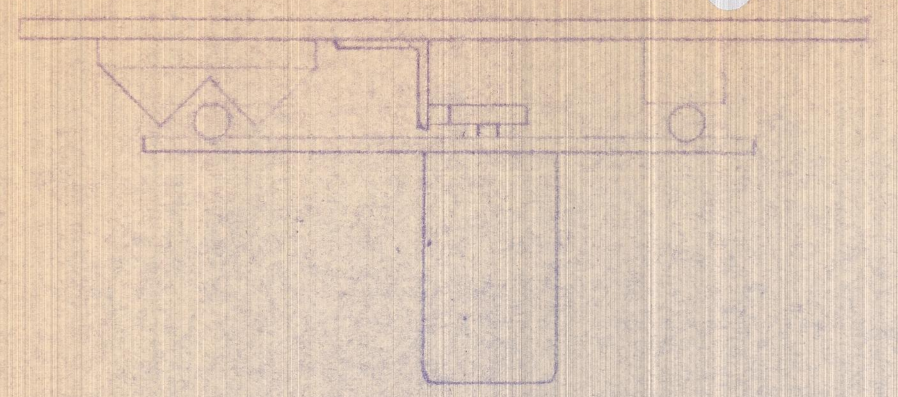
● Supplied with 220/440V motors, wired for voltage listed.

Electrical Controls—single-phase, three-phase and two-phase models are supplied with a magnetic starter and a separate push button control station. Magnetic starter provides motor overload protection.

Totally-enclosed, fan-cooled motors are furnished on all above units.

DELTA Features For Maximum Utility

- **FAMOUS DOUBLE OVERARM CONSTRUCTION**—allows full 360° rotation of the saw over center of table—gives full table capacity for **left** as well as righthand miters from 0° to 90°.
- **EXCLUSIVE NEW "MICRO-SET" MITER STOPS**—individually adjustable to guarantee exact 90° and 45° cuts **for the life of the saw.**
- **ONLY SAW WITH ALL CONTROLS IN FRONT**—every lock, lever, crank and calibrated scale is "up front" for safer, easier operation.
- **16" SAW BLADE CUTS 5⅛" DEEP**—unmatched capacity—more than any other 16" radial saw.
- **ENCLOSED LIFETIME TRACKWAYS**—glass-smooth, hardened surfaces minimize roller friction.
- **NEW "LOW-RISE" MOTOR**—powerful, direct drive, totally-enclosed, fan-cooled motor furnished in 3, 5 and 7½ H.P.



K. [illegible]
9 Aug 67

digital INTEROFFICE MEMORANDUM

DATE: August 10, 1967

SUBJECT: VERMONT RESEARCH

TO: Jack Shields
cc: Ted Johnson

FROM: Ken Olsen

I got a telephone call today from Hugh Taft, President of Vermont Research, asking if we had any negative feelings of their selling drums to put on our computers. I said that I had heard of no such feelings.

Secondly, he asked if we would be willing to sell maintenance to them on their drums that are tied to our computers. I told him I had no opinion on that offhand but would ask Jack Shields to look into it and call him back next week. If the decision is not easy to make, you should call him back anyway and give him a date on which you will make the decision.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 11, 1967

SUBJECT: AUTOMATIC WIRE-WRAP CHECKER

TO: Ed Harwood
cc: Pete Kaufmann
Bob Collings

FROM: Ken Olsen

If Don White's work continues to go as well as it has been, I think we should go ahead with the wire-wrap checker. However, will you put down on paper what our reasons are for building this. Even if they are not black and white, we must have reasons for doing it, and now is the time to put them down on paper.

I'm sure we're not building it because people sometimes put the wrong stack of paper in the Gardner-Denver machine. I'm also sure we didn't build a machine to check on the wire because the girls who do add on wires make a few mistakes. If the mistakes are made by the Gardner-Denver machine, we ought to write down now how we think the mistakes are made. If they are made by the card reader, we should put a checker on it, or maybe have two card readers reading two stacks. As you can see, I'm confused again as to why we are building it and would like it documented once and for all.

Will you then also make out a schedule for this. It should be on a regular schedule review system.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 11, 1967

SUBJECT: ANSWERING CUSTOMERS' TELEPHONE INQUIRIES

TO: Ron Smart
cc: Nick Mazzarese
Ted Johnson

FROM: Ken Olsen

In answer to your memo of today, Ron, don't take cranky customers who want to call me very seriously. I understand who the cranky ones are and will be patient.

I do, however, want to improve our system so that we do things in an optimum way. I would be happy with a policy which states that we will always return calls on status information and never give this type information offhand. This will take some very good red tape, however, to make sure all calls are returned.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 14, 1967

SUBJECT: DECREASE IN ENGINEERING EXPENSES

TO: Bob Collings

FROM: Ken Olsen

Our engineering expenses decreased from 1965 to 1966. Will you find out if this is because we have a new controller or because we had significant changes in expenses. Another thing that happened was that we did our accounting by project, and people were much more economical in their engineering expense. Before, when every club member could make decisions as to what new projects we would go into, we were much more wasteful in engineering than we are now, and that might account for the large difference in engineering. It might also be that with the new controller we charged some of our manufacturing engineering expenses to offset manufacturing.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 14, 1967

SUBJECT: THOMPSON STREET PARKING LOT

TO: Win Hindle FROM: Ken Olsen

I had tea with the girls from the Production Department on Wednesday the 9th of August. They, too, are bothered by the parking situation.

They say there is not enough space between cars.

They would like to have the gate opened on Sudbury Road at noontime so they can leave that way. They told stories about several people leaving the lot by driving right into the chain. We should first of all make the chain very conspicuous by hanging a sign from it, and then we should make it a more secure chain so that people won't get through it.

They also said there is glass in the parking lot which never gets swept up.

They say that the exit on Thompson Street is very difficult at noontime because there are cars coming out and going down which makes it hard to make a sharp righthand turn when you go up the ramp.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 14, 1967

SUBJECT: CHEAP TRANSPORT

TO: Gordon Bell

FROM: Ken Olsen
(dictated from vacation in Maine)

I couldn't get going on the project last week because everyone is on vacation.
We have made contact with a manufacturer and will buy equipment soon.

Ken

ecc

c- Mike Ford

digital INTEROFFICE MEMORANDUM

DATE: August 22, 1967

SUBJECT: DEC IN THE EDUCATIONAL FIELD

TO: Joan Fine

FROM: Ken Olsen

I am trying to develop a picture of what the Company is doing in the educational field. Will you write a paragraph or two for me outlining what you expect to cover in this field in the program you are working on.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 22, 1967

SUBJECT: TELEVUE PRODUCTIONS

TO: Harry Mann
Bob Collings
Stan Olsen

FROM: Ken Olsen

I received a call today (Tuesday, August 22, at 3:15 p.m.) from John Stewart of Televue Products, Inc., 342 Madison Avenue, New York, New York, Telephone 687-0928. They would like to have a 7-minute program on Digital to be part of Conrad Nagel's program, "New Horizons."

I almost hung up on him because he sounded like a con man, but I told him I would call him back before noon on Wednesday to tell him what we decided to do. This will involve one trip by myself to New York to be interviewed and we have to supply movie film of our operations.

Mr. Campbell of Photon has already been interviewed.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 22, 1967

SUBJECT: SEPTEMBER 12TH BOARD OF DIRECTORS' MEETING

TO: Harry Mann

FROM: Ken Olsen

Will we have any formal business to be taken care of at the September 12th Board of Directors' Meeting? There is a possibility that we may not have a quorum.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 24, 1967

SUBJECT: PRODUCTION SCHEDULE FOR INSIDE CUSTOMERS

TO: Pete Kaufmann
Stan Olsen
Nick Mezzarese
Win Hindle

FROM: Ken Olsen

As the Company gets larger, I'm afraid that we will, at times, lose respect for individuals and the projects which they take very seriously. The immediate problem I am worried about is that when we redo production schedules in order to accomplish deliveries on certain months, we do not show sufficient concern for promises production has made to people.

Will you make a proposal as to what formality we should go through to let our inside customers know when their status on the production schedule is changed, and some way in which they can present their arguments if they feel there is good reason.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 24, 1967

SUBJECT:

TO: Mike Ford

FROM: Ken Olsen

I heard that Computer Graphics of Gloucester is making a special computer for Mergenthaler. If you know anything ab out this, I would like to know. I think the planning is being done by a man named Mr. Alpert. I don't think we want to get close to this organization.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 24, 1967

SUBJECT: MODULE MARKETING PLANS

TO: Stan Olsen
Al Devault

FROM: Ken Olsen

I have heard from some people that they have lost a feeling for our marketing plan for modules, and also some concern that maybe we're spending so much time on OEM's that we're losing out in the traditional module market. I think it would be good for the Operations Committee, the Board of Directors, and yourself, if you present the marketing plan for modules to the Board of Directors' meeting on September 12th. This should cover the whole range of modules, including the educational line, and also those areas which we have not yet become fully active in.

There are those areas which we have talked about for years which we still think are good markets, but if we chart them out now maybe we will figure out how to get into them. I am on the Board of Directors of a company in New Hampshire who is struggling to design modules to drive typewriters. They know we make modules for computer-like applications, but if we really got the word across that with our modules they could drive Teletypes, I'm sure we could have them as a steady customer.

I'm convinced that every manufacturing company whose volume is over a few million dollars is in need of specialized digital equipment in the next few years, and we have got to let them know that our modules will solve their problems. Here is your opportunity to tell the Board of Directors how you are going to do it.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 24, 1967

SUBJECT: PDP-9

TO: Larry Seligman
John Jones
Stan Olsen
Ed Harwood
Jack Shields
Jack Smith
cc: Pete Kaufmann

FROM: Ken Olsen

I would like to call a meeting for Thursday, August 31st, at 1:00 p.m. to review the PDP-9. The three questions I would like discussed at that time are: 1) what did we do wrong in the PDP-9, 2) what problems do we still have to solve, and 3) how are we going to get them all solved?

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 24, 1967

SUBJECT: **PLANT SECURITY**

TO: Harry Mann
Win Hindle

FROM: Ken Olsen

A few weeks ago one of our nice employees (either a Colby or Bowdoin student) invited a stranger into the plant who interrogated a number of our people, and then on the way out was given a copy of the news release on our profits that we were going to send to the newspapers. This visitor then went to ARD and told them in detail of his experiences.

This is a frightful situation, and I think either comes under the Personnel Committee or Security. Will you two propose who should tell what to new and old employees about security.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 25, 1967

SUBJECT: LABORATORY NOTEBOOKS

TO: Stan Olsen

FROM: Ken Olsen

Will you check to make sure that the Librarian is issuing new laboratory notebooks to all engineers. Then will you set up a procedure where (once a quarter) the Librarian checks to make sure that each engineer keeps his notebook and that his serial number checks with the one in her records. The records should be kept where all filled notebooks are stored.

Let me know immediately what the situation is with regard to these. I'm afraid the Library has slipped on this, and I would like to know right away to be sure we get caught up on it. Specifically, I want to be sure that we have all laboratory notebooks when people terminate, and I don't want people keeping notes on odd scraps of paper or odd notebooks. We won't force those engineers who refuse to keep notebooks to use them, but I would like to have a record of those who refuse to keep them.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 25, 1967

SUBJECT: TU-79

TO: Nick Mazzarese
Win Hindle
Stan Olsen
Phil Backholm
Joe Sutton
Bob Savell
Mike Ford
Dick Best
John Jones

FROM: Ken Olsen

We would like to have a short review of the TU-79 on Friday afternoon, September 1, at 1:30. We have to immediately decide whether we are going to use TU-30's for the PDP-10 and the PDP-9.

The questions we have to answer are: 1) how confident are we that we can make the deliveries for the PDP-10 six months from now with the present design, 2) if so, what advantages are there in cost and reliability with the TU-79 over the TU-30, and 3) if we put this into production now, what cost savings can we make in spending more design time on the TU-79?

Please invite those people you think should be in attendance of this meeting.

Ken

ecc

cc: Pete Kaufmann
Harry Mann
Ted Johnson

digital INTEROFFICE MEMORANDUM

DATE: August 25, 1967

SUBJECT: BIG DISC

TO: Nick Mazzarese
Win Hindle
Stan Olsen
Steve Lambert
Ken Fitzgerald
Mike Ford
Dick Best
John Jones
Bob Savell

FROM: Ken Olsen

I have asked Steve Lambert to send final specifications of the new big disc to each of the product lines, along with the schedule and cost estimate broken down by products.

I would like to have a meeting on Friday, September 1, at 1:00 p.m., to make a final decision on this unit.

At that time, we should agree on how much each group pays for its development, who gets the first units, and where responsibility will be divided between the disc group and the computer groups.

Please review Steve's note carefully and invite those people you think should be in attendance of this meeting.

Ken

ecc

cc: Pete Kaufmann
Harry Mann
Ted Johnson

digital INTEROFFICE MEMORANDUM

DATE: August 25, 1967

SUBJECT: LINE PRINTER

TO: Menno Koning
cc: Bob Savell
Dick Best
Rocky Yasui

FROM: Ken Olsen

I enjoyed hearing some of your approaches to the line printer, and I am pleased to have you take the responsibility for this.

You asked what the ground rules are as far as specifications are concerned. They are quite simple. We want the very simplest machine, as soon as possible, and at a very low cost. The specifications we laid down are those of a simplest Teletype, with sprocket feed, and speed of approximately 100 lines per minute. I want you to set a schedule and price estimate for this and take responsibility for them. However, I do want to save you from the responsibility of marketing decisions that come up every time there is a possibility of increasing the capability of the machine. When there is a possibility of increasing the paper width, speed, or type font from 64 to 96 characters, I would like to have you propose, in a note, what the extra features would give us and what they would cost in time and money.

I think it would be a good idea if you generated a collection of layouts so that we can see them all laid before us and choose between them. We have decided on one approach with Rocky to use as a vehicle for developing some of the techniques, but there are obviously a large number of possible layouts. It would be good to have a collection of these in front of us continuously so that we can make a wise decision. You might want to make these layouts on all one size of tracing paper so that, even though they are in sketch form, we can have a booklet of blueprints from which to review all the layout ideas.

I am so scared of the rotating belt right now. I would like to consider in more detail the reciprocating comb. The speed of this is not very fast when you compare it with machine tools, card readers, or other equipment which is running continuously in linear motion.

One way to drive a comb would be with two half gears driving a rack in opposite directions. When one gear disengages, the other would engage in the opposite direction.

The nicer approach would be to drive a two-faced rack with one pinion. The rack could either be cut on two sides of a bar or both insides of a slotted bar. We would not only get linear horizontal motion as this ran around the pinion, but the comb would be moved vertically in a different position for each horizontal trip. This way we could avoid the need for interposers because we would get the two positions of the comb for free if we only want to use 38 hammers.

ecc

Ken

digital INTEROFFICE MEMORANDUM

DATE: August 28, 1967

SUBJECT: LINE PRINTER

TO: Menno Koning

FROM: Ken Olsen

Our original idea for the line printer was to use a standard rubber platen with sprocket feed. This would be very simple, but the teeth interfere with the type. Rocky has come up with a more elaborate system than we have seen.

You might consider going back to this because of the simplicity. We might get away with it if we wrap the paper almost completely around the top of the platen and arrange the offset sprocket so that it is exposed only on the top and there is no interference in the front.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 28, 1967

SUBJECT:

TO: Bob Collings
cc: Harvey Shepherd

FROM: Ken Olsen

Harvey Shepherd has plans for expanding and improving our tape preparation department. Will you please get a schedule from him to keep in our file of schedules.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 28, 1967

SUBJECT: **INVENTORY IN BRANCH OFFICES AND SUBSIDIARIES**
(Your memo dated August 21)

TO: Harry Mann

FROM: Ken Olsen

I'm trying, with very limited success, to have some of the Operations Committee agenda items taken care of outside the meetings. Will you see if you can work out the problem of stocking PDP-8/S's in the field offices with Mike Ford. This question might be a little more complicated because it may involve stocking finished PDP-8/S's on the shelf both here and in the offices. Let's wait until we get a proposal for stocking other finished goods in the offices before we bring it up to the Committee.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 28, 1967

SUBJECT:

TO: Larry Seligman
cc: John Jones
Stan Olsen
Bob Collings

FROM: Ken Olsen

I would like to hear more of your opinion on the analytical approach to engineering. Will you write a short note to me outlining your opinion and comparing the results of the PDP-9 to previous computers. Also please outline just what an analytical approach to engineering is.

An analytical approach should have a clear statement of goals. I would like to hear what you think these goals should be. To some people the goal is a project that will be the fastest, to some others the minimum sales cost, to some the least problems in production, others believe the goal should be least servicing in the field, and maybe even more commonly is the feeling that the machine should fill some big, artistic, emotional need that I can only describe as being the "best unit in the world." For an analytical approach, the statement, of course, should be more complex than any of these and should take into account the cost of people, equipment, parts, the cost of time, and how it effects the market.

For your sake and mine, I would like to have you develop a chart comparing the PDP-9 with the PDP-1, 4, 5, 7 and 8. Bob Collings will help you get the financial information. The columns I would like to have are: 1) dollars spent in engineering, 2) months spent in engineering, 3) time spent getting production going smoothly, 4) number of engineering changes before production was going smoothly, 5) man-hours of check-out time (maybe this should be man-hours check-out time per thousand dollars of sales price). Then I would like two columns in which Jack Smith and Jack Shields list in numerical order the machines they feel were best engineered. Please add other columns that you think might be of value.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 29, 1967

SUBJECT: SCM TYPEWRITERS

TO: Henry Crouse
cc: Harry Mann
Jim Myers

FROM: Ken Olsen

Could you send me a copy of the evaluation you made when we decided to change to the small SCM typewriter. I would like to know the savings and what the technical comparisons are. Some of the complaints I have heard which I would like to know whether they are valid or not are:

1. Is the keyboard any smaller than the standard typewriters?
2. Are carbon copies equal in quality to other machines?
3. Does the machine move around while being typed on?
4. How do our girls feel about them?
5. What is the service history compared to others?
6. Is the noise level significantly higher?

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 30, 1967

SUBJECT: MACHINE SHOP

TO: Pete Kaufmann

FROM: Ken Olsen

The machine shop is a mess. I would like to have it cleaned up immediately. I would like every machine removed if it is obsolete, or else cleaned up. I would like all old projects removed. I want every shelf and cabinet immaculate. Some of it should be painted.

All trucks, pictures, and tools should be filed in the tool crib, missing components for them replaced, and rust removed.

I want the place cleaned and painted so that we are proud to take visitors through there and men are proud to work there. I will check the place with you on Friday, September 8th.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 30, 1967

SUBJECT: TAPE PREPARATION

TO: Bob Collings

FROM: Ken Olsen

Will you add to the list of projects that should be scheduled, the development of our final tape preparation system by Harvey Shepherd. I feel this one needs scheduling more than most others. Shepherd is a programmer and probably should be used for programming.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 30, 1967

SUBJECT:

TO: Pete Kaufmann FROM: Ken Olsen

I like the idea of making a brief study to see what would be involved in doing all our own sheet metal and cabinetry work. The second study, which might be quite brief but which I would like to have right away, is what we would need to make peripherals.

I think a big part of what we need to make peripherals is a nicely laid out area for precision assembly. In addition, there may be a few specific machine tools we need, like NC Miller for making panels. I think our present shops are depressing. The morale of the man running our NC Miller was great when he was off in a white, air-conditioned room which was a showpiece. His morale was high, he kept his machine clean, and everyone was proud of it. Now he is off in a dirty, dingy corner, his machine is dirty and dingy, and I have the feeling he looks the same.

If we moved our Machine Shop over in the new General Radio space, left room between the machines so that each man had a neat, open working area for model work, we might do much more effective model making because morale would be higher. We would then have room for laying out the large, effective assembly area. We should look over the people we have in the Machine Shop to see if we have someone there who might run it with enthusiasm. It might be broken down into two sections; one person could supervise the model makers and another supervise those who are doing production jobs. There are production jobs which unskilled machine operators could do if we had somebody with a little zip in the Machine Shop.

If we did all our sheet metal forming and piercing operations in the section which is now the Machine Shop, we would then have a larger area for welding, painting, and metal preparation where the present Sheet Metal Shop is. This might be an efficient way to make cabinetry and sheet metal.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: August 31, 1967

SUBJECT:

TO: Al Hanson

FROM: Ken Olsen

The noise down here has gotten intolerable for secretaries. When you order the acoustic partitioning for the Personnel Department, will you order enough to put on top of the door wall to bring it to the ceiling.

Ken

ecc

LL

digital INTEROFFICE MEMORANDUM

DATE: August 31, 1967

SUBJECT: NOTES ON PLATED-THROUGH-HOLE MEETING

TO: George Wood
Joe St. Amour
Pete Kaufmann
Stan Olsen

FROM: Ken Olsen

Here are my notes from the meeting on August 29th on the plastic module and the plated-through-hole process (with a few extra comments).

We decided to stop work on the plastic module for a while, and to concentrate on the plated-through-hole process for G10 boards. Any spare time we have we can do experiments on the plastic module, but our main goal will be to get production quantities of G10 boards.

We will immediately start producing G10 boards in our pilot facility. When we have decided on equipment for the larger production line, we will immediately order it and put it into this pilot line, if it will help production. We will, in the next week or so, make a concentrated study of racking methods and tank layouts. When we are confident that we have a near optimum method of racking, we will go ahead and order tanks for our production facility. We will review the process to see if there are simplifications that can be made. For the initial production, and maybe for many months, we will not solder plate, but will, instead, gold plate the full board. This eliminates many steps, and we can use the same racks for gold plating that we use for copper plating. Someday, when the cost justifies it, we will add solder plating to the process.

When we come to conclusions on racking and layout process in the next few days, this should not hold up our final production system.

I like the idea of lightweight racks which hold the boards on with clips or snaps and which do not stack the boards up vertically. I have experimented a little bit and feel that a man could hold an aluminum extrusion 8 feet long which could hold 12 vertical boards and 2 feet teeth for handle. He could move this along the process on tanks which are 6 feet wide. Just to be safe, we might make the tanks 5 feet wide and the racks 5 feet, plus 2 feet for handle, or 7 feet long. The tanks would then be only somewhat more than a foot deep. If they were about 27 inches off the floor, it would be more convenient to handle these long sticks.

If we made a rack that held 20 or 30 boards on 1/2 to 1-inch centers, but only one layer thick, the tanks would then only have to be somewhat more than 6 inches deep.

We might be able to make a gross simplification of the process using these techniques. This may not be satisfactory for 100,000 boards a month, but it might do well for quite awhile. The present system involves 14 steps, in which we rack, rerack or unrack

boards. We might get by with just 3 or 4 steps.

The boards are first racked in the closely spaced rack that holds 20 or 30 boards. They go through all the cleaning and electroless plating, and then they are reracked on the plating racks with 5 across. After this they receive copper strike and the next steps up to the application of resist. At this time they are unracked, resist is applied, they are exposed, and then they are racked in the same type of plating racks that are 5 across. They are then developed, inspected, baked, and cleaned all in the same rack.

Still in the rack, they are copper plated, and then, in the same rack, the whole boards are gold plated uniformly across the whole board.

Then, still in the same racks, they are stripped of resist, etched, washed, dried, then unracked and the job is done.

This process sounds fascinatingly simple. We may never want to go to solder plating in order to save a few cents in gold.

We might get our rack to hold 20 or 30 modules from someone like Techmar who makes module cages. Some people use plastic slides, and others use stainless steel wire forms.

A list of manufacturers of cages is found in the index of the "Electronic Engineers Master."

Ken Olsen

ecc

digital INTEROFFICE MEMORANDUM

DATE: September 5, 1967

SUBJECT: ENGINEERING REPORTING SYSTEM

TO: Harry Mann

FROM: Ken Olsen

I would like to develop our engineering reporting system to include reporting on budgets. Right now some of our projects don't correlate at all with budgets because some manufacturing costs are charged to engineering. Please let me know what we have to do to make our engineering expenses match those which are in budgets.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: September 5, 1967

SUBJECT: FIELD SALES INPUTS TO MARKETING PEOPLE

TO: Tom Quinn
Bob Fronk
Ray Lindsay
Tony Liveris
Jim McEwen

FROM: Ted Johnson

Next week the Regional Managers will be discussing with marketing people, areas of additional marketing effort. Ken Olsen has requested inputs from the field to which this discussion can be related. Please provide your answers to the attached questionnaire immediately and return to me for presentation at this meeting. Call me if you have any problems in getting it in right away.

Ted

ecc

digital INTEROFFICE MEMORANDUM

DATE: September 5, 1967

SUBJECT: MARKETING INPUT FROM FIELD SALES OFFICES

TO: Regional Sales Managers

FROM: Kenneth H. Olsen

We would like to start having more input from the field sales offices to our product marketing people at Maynard. Next week we will schedule the Marketing Committee meeting with the Regional Managers to develop techniques for this input.

There are a number of marketing questions which I am thinking about on which I would like to hear comments from you. Enclosed is a questionnaire which I would like to have you fill out and mail to me for the Marketing Committee meeting next week.

Ken

ecc

September 5, 1967

Questionnaire for Regional Sales Managers:

1. What business do we lose by not being listed with GSA? Do you feel the advantages would outweigh the cost?

2. What do we have to do to get high speed paper tape readers on one-half of our present customers' computers? What do we have to do to get them on almost all of our new computer sales? How do we do the same with DECtape, display and disc?

3. How important would it be to have a very inexpensive magnetic tape cartridge system for reading in programs?

4. How useful would a $6,000 line printer be?

5. Why don't we sell more of the peripherals we now have to offer? Do our customers know about the high speed reader and punch? Do they know about our Type 34 Display, do they all know about our A/D Converters?

I would like to have you evaluate the different product lines in their services to salesmen and to the customers. Please list them in the order which you would rate them (where the first is the most favorable and the last is least favorable) in the following questions.

1. Who gives the best answers to inquiries for information?

2. Who has the least delays in fixing problems?

3. Who is the most sensitive to customers' needs and feelings (and ego)?

4. Who fixes technical problems most promptly?

I would also like to hear negative comments you have on whether some products feel they have more important things to do than technically fixing things in the field, and if some products feel their customers are all dull.

Kenneth H. Olsen

ecc

digital INTEROFFICE MEMORANDUM

DATE: September 5, 1967

SUBJECT: PROBLEMS AT FOXBORO

TO: Jack Shields
Dick Best

FROM: Ken Olsen

cc: Nick Mazzarese
Mike Ford

I have the feeling that with the pressure we have on for profit and getting things done on time, we don't show due interest in the problems we now have in the field. Will you make a list of the problems we have at Foxboro and note how long we have been working on them. Then later on let me know what we have done about them.

I would also like to hear what suggestions you have as to how we can avoid them.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: September 6, 1967

SUBJECT: PDP-9 ENGINEERING REVIEW COMMITTEE

TO: Jack Shields
Dick Best
Bob Savell
Saul Dinman
Ed de Castro
Don White

FROM: Ken Olsen

We are going to change our policy of engineering review committees. From now on, we are going to have them report first during the review and then several months after the product is in production. We would like to have the PDP-9 Engineering Review Committee be the first to start this, and so we are now asking that you make one more review. If convenient, we would like to have you report to the Operations Committee on the 25th of September on the PDP-9.

On engineering reviews of computers, we would like to broaden the scope review to include plans for peripherals, and so we would also like to hear your comments on peripheral parts of the PDP-9.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: September 7, 1967

SUBJECT: NEW APPROACH TO MODULE ADVERTISING

TO: Stan Olsen FROM: Ken Olsen

Let's try a new approach to our module advertising. Let's consider making small ads that are about 1/6 of a page. If we have a white line picture of an integrated circuit module on a solid black background with a very, very simple message, I think we would have an ad that will stand out.

This will cost about 1/6 the price of a full page, and we should be able to get six times as much coverage. We ought to do more than that if we don't change the ads.

I can only think of two messages to get across. First is that it is cheap, and second is that we make integrated circuit modules. Saying that we are cheap is hard, so maybe we ought to just say that we make them. We can get this across with a good, clear picture, and bang it over their heads every single time. We might even put it in "Life" magazine, but, above all, we should have it in every magazine that someone might read. In this case, I would have one in "Scientific American" every month.

Some of the text could be:

"Modules by Digital," Digital Equipment Corporation, Maynard, Massachusetts.

"Largest selling modules by Digital, 10 mc, 2 mc, 5 kc industrial modules," Digital Equipment Corporation, Maynard, Massachusetts."

"Most modules are Digital," Digital Equipment Corporation, Maynard, Massachusetts.

Attached are a few ads that I have cut out of magazines to show you how effective a small ad can be. In addition, there are a couple pages of line drawings of boats.

I think the second part of the marketing campaign should be to get a plastic-molded module into the hands of the senior man at each of our customers' and potential customers'. Maybe we should give one to each member that comes to the DECUS meetings.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: September 14, 1967

SUBJECT: EDUCATIONAL USES OF COMPUTERS

TO: John Holzer FROM: Ken Olsen

As part of your review of educational uses of computers, it would be interesting and useful if you would outline what the major corporations are doing in the educational field.

We know pretty much what RCA is doing because of our PDP-8 sales to them. (You'll find this out in detail by talking with the "8" people.)

Raytheon, Xerox and IBM have bought companies in the educational field and you might be able to find out their plans from reading their annual reports, or looking up magazine articles on them. There are a number of smaller companies, or combination of companies, which might be of interest.

KHO:mdo

Copy to: Vern Alden
29 Park Place
Athens, Ohio

digital INTEROFFICE MEMORANDUM

DATE: September 14, 1967

SUBJECT: DRINKING AT COMPANY AFFAIRS

TO: Win Hindle

FROM: Ken Olsen

cc: Bob Lassen
Operations Committee

There are two reasons why I like to discourage drinking at Company affairs.

First of all, I think it is exceedingly dangerous and I would hate to have the Company take on this obligation. Recently this country was terribly frightened by the death toll in Iowa, and yet we are most embarrassed to talk about the most significant cause. It is a guess that 70% of the deaths are caused by, or partly influenced by, drinking. Very few of these are caused by alcoholics but by very nice people who had just a little alcohol.

Other countries, who are more objective about this because they don't suffer from the reaction this country has to prohibition, are exceedingly strict, and no one would think of driving home after drinking.

I can't conceive of setting up a system whereby we limit the number of drinks a person can take if he is going to drive, and I feel the obligation we have to society is too serious. Even though society insists on seat belts, does it really care if people drink or not?

I feel that the majority of people feel more at ease if there is no drinking. There are always a few people who make fools of themselves and make everyone feel ill-at-ease. Most people are afraid to express this opinion - again because of our reaction after prohibition. Enclosed is a clipping which I think is interesting because it shows how people feel when they are told anonymously.

KHO:mdo

Many Americans Would Jail Drivers Who Drink, Gallup Poll Indicates

By GEORGE GALLUP

PRINCETON, N.J. — A surprising number of citizens in the United States support tougher laws governing drinking and driving.

A national sample of 1527 adults were asked if they would like to see a law—similar to those in Scandinavian countries — that would send a driver to jail if he consumes more than one drink of an alcoholic beverage.

More people (52 percent) would oppose than support (44 percent) such a law, but the number in favor is impressive in view of the radical nature of the proposal.

In fact, if the views of woman only are taken into consideration, majority opinion is found in support. A majority of persons 50 years of age and older also back the proposed law.

Sweden, Norway, Denmark and Finland all have tough laws on their books.

Penalties for drunken driving in Finland range from 3 months to 8 years of hard labor depending on the circumstances.

Police in Sweden frequently make spot checks of cars and if there is indication that the driver has been drinking he is required to take tests to establish the level of alcohol in his blood.

Normally these tests cannot be passed if the person has had more than one drink within a fairly short period of time. If a person fails these tests he can be sent to prison for up to one year.

The Swedes have such respect for these laws that party-goers either plan ahead to take a taxi or else designate a driver in their group who must refrain from drinking at the party.

While there is no evidence that these stringent regulations have reduced the total consumption of alcoholic beverages in any of these countries, they should — in theory, at least — reduce the number of accidents.

Excessive drinking is involved in nearly half of the 53,000 highway deaths in the U.S. each year, according to a survey by the National Highway Safety Agency.

Dr. William Haddon Jr., director of the agency, is quoted as saying:

"Usually, almost a flat 70 percent of single car fatal accidents in such places as California, New York, and various other major cities involve substantially elevated blood alcohol levels and at least half of them meet anybody's liberal definition of intoxication."

Gallup Poll interviewers within the last 3 weeks asked this question:

"In three or four European countries, a person who drives a car after having more than one drink of alcoholic beverage is sent to jail. Would you like to see such a law in this country, or not?"

The findings—for the nation as a whole and by sex and age:

NATIONAL

	Pct.
Yes	44
No	52
No opinion	4

MEN

Yes	38
No	58
No opinion	4

WOMEN

Yes	50
No	46
No opinion	4

21-29 YEARS

Yes	39
No	58
No opinion	3

30-49 YEARS

Yes	40
No	54
No opinion	6

50 AND OVER

Yes	50
No	47
No opinion	3

digital MEMO

DATE Sept. 15, 1967

TO Stan Olsen FROM Ken Olsen

Remember you promised to send 20 of each kind of handbook to Vern Alden.

KHO:mdo

cc: Frank Kalwell

Address: Dr. Vernon Alden
29 Park Place
Athens, Ohio

Elsa
This has been taken care of.

digital INTEROFFICE MEMORANDUM

DATE: September 21, 1967

SUBJECT: Increase Productivity of Milling Machine

TO: John Trebendis

FROM: Ken Olsen

cc: Pete Kaufmann

I'd like to see the productivity of the Digital milling machine increased by a factor of three, so that we can make all our module templates two days a week and use the other three days for other work.

Here are some suggestions as to how we might try to do this. Let's try using brass templates. Get some hard brass plates which should machine several times faster than the present ones. If they're hard enough, this may be all we need to increase the productivity.

If brass plates are not hard enough, let's try laminating brass and steel. Cement them together with epoxy and a large number of them can be pressed and cured at one time. The grooves would be in the brass and part of the hole would be in steel and therefore should wear well. If we drill the holes first, we might then be able to make wider grooves and be more tolerant of wobble as the grooves are cut. If we drill after the grooves are made, the grooves would lead the holes off center. When we're tolerant of the grooves, we can run the cutting tool much faster.

We should talk to all cutting tool suppliers to see what ideas they have and try any tools they recommend.

KHO:mdo

digital INTEROFFICE MEMORANDUM

DATE: September 25, 1967

SUBJECT: PDP-8/I PRICING

TO: Nick Mazzarese
Mike Ford

FROM: Ken Olsen

It is my suggestion that the initial pricing of the PDP-8/I not include a special OEM price, but only a quantity discount. We want the new low price to have a psychological effect on the whole world as it is first advertised. We cannot advertise the OEM price so that it will give us this effect. We also want to hold down sales for a while and encourage 8 and 8/S sales. Let's save a special OEM price until we want to use it to our advantage.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: September 26, 1967

SUBJECT: ARCHITECTURE OF 16-BIT MACHINE

TO: Larry Portner

FROM: Ken Olsen

I would like very much to hear comments and reactions from our programmers on the architecture of the 16-bit machine. If they can be jotted down on paper, they would be more useful.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: September 26, 1967

SUBJECT: PRINTING DEFECT IN OUR ANNUAL REPORT

TO: Harry Mann

FROM: Ken Olsen

The Annual Report which I received at home has a printing defect on page 14. The first copy we received of the first printing had the same defect.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: September 27, 1967

SUBJECT: Comments on PDP-X Design

TO: L. Portner FROM: W. Segal

From the programming point of view most small (word size) computers are difficult to program in one way or another. The major drawback of the PDP-X is the feature of both single- and double-word instruction formats. The compilers and assemblers will be directly affected by this property as optimization of code (i.e., reducing programmer instructions from two words to one) is possible, but extremely difficult to implement. Patching programs, either directly at the console, or via DDT will also be difficult due to this feature. Because of the variety of addressing schemes, the assembler must contain a great number of special error checks.

By providing a set of extended (more powerful) instructions it was felt that programs written on the PDP-X (Model II - the large machine) would be equivalent in size with respect to that of the same program in the PDP-9. This remains to be seen as each extended instruction requires the two-word format.

Because of the availability of multiple sets of general registers and the organization of the priority interrupt system, nearly 4% of the memory of an 8K system (Model II) and 5% of a 4K system (Model I) is reserved for hardware (as compared with .75% on the PDP-9).

The features on the PDP-X which will prove to be most useful are:

1. Multiple accumulators
2. Multiple index registers
3. Extended instructions
4. Nested priority interrupts
5. Multiple sets of general registers
6. Protection and paging features
7. Programmable interrupts
8. Interrupt inhibits

These features will be very attractive to the average user and should be a major factor in the marketability of the PDP-X.

In general it is fair to say, at least at this point in time, that the PDP-X represents a dramatic improvement in the price-performance ratio. From the point of view of software languages (FORTRAN, etc.) it should not be claimed that for a given size of memory the PDP-X can support more features than say a PDP-9. This is due to the two-word format and increased character storage (multiple accumulators and extended instructions notwithstanding).

Bill

/lr

c - Stan Olsen 10/10/67
John Jones
Ed de Castro

digital INTEROFFICE MEMORANDUM

DATE: September 26, 1967

SUBJECT: ARCHITECTURE OF 16-BIT MACHINE

TO: Larry Portner

FROM: Ken Olsen

I would like very much to hear comments and reactions from our programmers on the architecture of the 16-bit machine. If they can be jotted down on paper, they would be more useful.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: September 27, 1967

SUBJECT:

TO: Al Hanson FROM: Ken Olsen

Sometime ago I offered the air-conditioners from two of the conference rooms down here because I felt they weren't necessary and you might be able to use them elsewhere. Now I would like to request that you take them out and replace them with fans because the rooms are very unpleasant to use as conference rooms when more than just a few people are in attendance.

Let's put a fan (like the one in my back room) over the door in the corner of the two conference rooms. Then, let's replace the tiles in the far corner ceiling with grills, and let's put a grill down low alongside each door. We could then leave the fans on all the time.

If we can replace the air-conditioner in Andy's office with sheet rock so that it looks like continuous wall, I would like to put a shelf, about three inches wide with a groove on the top, the full length of the long wall.

In Conference Room A, let's put another shelf the full length of the blank wall.

If John Trebendis has any more of the bamboo drapes around, it would be nice to put them on the windows in Conference Room A. They don't have to be movable; they could be fastened permanently on each edge of the windows.

While we're putting the grills alongside the doors, I would like one in my office between the door and the draperies.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: September 27, 1967

SUBJECT: PERIPHERAL DELIVERY

TO: Win Hindle
Stan Olsen
Nick Mazzarese
cc: Harry Mann
Pete Kaufmann
Ted Johnson

FROM: Ken Olsen

I would like to get straight what is going on in peripherals and what our plans are for the future. Specifically, I would like to know if Production is late in delivering, or were the product lines wrong in their estimates.

For next Monday's Operations Committee meeting, I want each of the Group Managers to list those peripherals they have ordered in the last six months and define how many were delivered on time and how many were late. I would also like them to spell out their peripheral orders for the next twelve months.

I would also like to know what delivery times are now for each of the peripherals in their product lines and what delivery time they had planned on when they made out their production schedule.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: October 4, 1967

SUBJECT: Comments on PDP-X Architecture

TO: Ken Olsen

FROM: Larry Portner

Bill Segal is the only systems programmer who has looked at the PDP-X in enough detail to make any intelligent comments. In several weeks we will have enough experience with software design for this machine to contribute more.

The attached memo from Marv is included in PDP-X Technical Memorandum #19, indicating that Marv's comments have already had their effect upon PDP-X architecture.

My own feelings are that the machine is considerably more sophisticated than previous DEC small machines and slightly more so than contemporary competitive hardware. It contains most of those hardware features that experience indicates are useful for efficient programming and necessary to obtain high efficiency for CPU and I/O operations. The addressing structure is a trifle clumsy and will be difficult for neophyte programmers to understand, but should not be a problem for experienced programmers. Our goal in the software will be to smooth over these awkward aspects by sufficiently clever software systems, yet allow full facility to use the hardware efficiently if the user is interested in so doing.

Larry

/lr
Attachment

digital INTEROFFICE MEMORANDUM

DATE: October 4, 1967

SUBJECT: Comments on PDP-X Design

TO: Larry Portner FROM: Marv Horovitz

The following is a general description of diagnostic software goals for the PDP-X:

1. Basic Premises

   A. Diagnostic software will be primarily concerned with the problems of field maintenance and system acceptance. In-house production and checkout will use special equipment and test systems.

   B. The "hard-core" logic of the PDP-X processor represents a substantial percentage of the entire system making "module callouts" and detailed diagnosis impossible.

   C. Most of the logic in PDP-X will be inaccessible to the diagnostic processor.

2. Preliminary Conclusions

   A. Because of A, B, C above, the diagnostics will be more like exercisers (i.e., as for PDP-9). These will allow detection of errors in data paths, noise, repetition rate problems, etc., as well as validation of memories and I/O devices.

   B. Since basic timing, data paths, and instruction sequencing require the operation of a large percentage of the machine, a means will be provided to validate their operation by built-in hardware.

      1) A means will be provided for off-line cycling of main memory. This will allow "basic operation" verification as well as off-line maintenance.

      2) Basic control memory loops will be provided to test central processor registers and to cycle the fast memory.

      3) The maintenance console of the system will allow for:

         a. Single instruction execution
         b. Single memory cycle execution
         c. Control memory single step

3. Diagnostics

Because of B (above), the diagnostic programs may assume that the basic control processor is functioning and then may concentrate on the types of problems described in A (above).

Tests for 10 devices will be organizaed along the lines of current 10 diagnostics checking both the operation of the control and validating the operation of the physical data medium.

Central processor diagnostics will be written to do as many "hard computations" per unit time as is possible. They will progress from cursory instruction validation to detailed data validation.

Diagnostics will not be larger than 4K in size and will be modular so that major rework will not be required for Model I systems.

Marv

/lr

digital INTEROFFICE MEMORANDUM

DATE: October 9, 1967

SUBJECT: PC01

TO: Ken Fitzgerald

FROM: Ken Olsen

Please put down on paper your current thoughts on improvements and cost-lowering for our PC01 and a slow speed version of it. I would like to have this by Wednesday so that I can send it to the Operations Committee in their bundle of things to be read for next Monday's meeting.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: October 9, 1967

SUBJECT: CHEAP TAPE

TO: Lou Illingworth FROM: Ken Olsen

Will you please outline on paper the operation of the cheap tape. If you could have this done by Wednesday, I could then include it in the package of reports for the Operations Committee members to read for next Monday's meeting. I know it is very early, but I would like to get your tentative ideas early in the game so that we can influence it rather than wait until you have pretty much committed yourselves.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: October 10, 1967

SUBJECT: PDP-9 ENGINEERING REVIEW

TO: Stan Olsen

FROM: Ken Olsen

I was bothered by Don Vonada's report on the PDP-9 review. It didn't dawn on me until just now what bothered me. You were supposed to make the report to the Operations Committee and in terms the Committee could understand. The Operations Committee is not taking the responsibility from you on these problems.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: October 11, 1967

SUBJECT: LARGE DISC

TO: Steve Lambert
cc: Pete Kaufmann

FROM: Ken Olsen

Please prepare a plan for production of the large disc by October 25th so that we can distribute it to the Operations Committee members for discussion at the October 30 meeting. This may be just your ideas for making plans, but I would like to discuss your current thoughts on the situation.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: October 11, 1967

SUBJECT: TU79

TO: Joe Sutton
cc: Pete Kaufmann

FROM: Ken Olsen

Please prepare a plan for production of the TU79 by October 25th so that we can distribute it to the Operations Committee members for discussion at the October 30 meeting. This may be just your ideas for making plans, but I would like to discuss your current thoughts on the situation.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: October 11, 1967

SUBJECT: DECUS

TO: Larry Portner
John Jones
cc: Angela Cossette

FROM: Ken Olsen

Your report on DECUS was complete and appreciated by the Operations Committee. Because people felt they had a feeling for your message, we didn't feel the need to call you down for the discussion.

You should feel flattered by the confidence they have shown in the operation of DECUS.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: October 11, 1967

SUBJECT: LINE PRINTER

TO: Menno Koning FROM: Ken Olsen

I feel that it is time that we prepare a detailed schedule for the line printer. I would like to see you define checkpoints at which time we decide whether we should continue the project or not, or whether we should redirect it. I would also like to see points at which we make new estimates of the manufactured cost. I think we ought to itemize all the major components of the system on the schedule so that we keep them in mind.

Ken

ecc

Postpone a month

digital INTEROFFICE MEMORANDUM

DATE: October 11, 1967

SUBJECT:

TO: Howie Painter
Dave Cotton

FROM: Ken Olsen

cc: Bob Collings
Stan Olsen
Nick Mazzarese

The one gap in your marketing reports is in the area of what IBM is doing. Please find out where they're selling on their 1800's and 1130's and write a report for the Operations Committee.

Please put down on paper the best information you have by October 25th so that we can distribute it to the Committee for discussion on the 30th.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: October 19, 1967

SUBJECT: TIMEX WATCHES

TO: Irwin Jacobs

FROM: Ken Olsen

Timex Watches has a very creative and aggressive testing department. It seems to me they should be using our computers.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: October 23, 1967

SUBJECT: AUTOMATION OF ROPE MEMORIES

TO: Ed de Castro
Pete Kaufmann
Joe St. Amour
cc: Stan Olsen
Win Hindle
Nick Mazzarese

FROM: Ken Olsen

I would like to design our new rope memories so that their making can be automated. If we learn how to make them automatically and cheaply, then we will find many uses for them, I believe, besides the PDP-9, PDP-X, and character generators.

To be cheap and fast, I think they should be laid out simply on one single, double-sided board. The cores should be as close together as possible so that the wire length is short so we can get the highest speed possible.

I would suggest we use U cores, maybe in the shape that Memory Technology Company uses, and put the wire through the core in one direction or the other in order to get bipolar output. We could wind the output winding on the bottom of the U and put the U through a pair of drilled holes in the G-10 board. We could then solder the output windings on the back side of each board. I would then cement the cores in place or hold them in place with another board.

I would then crimp fine enameled wire onto the stub end of miniature glass diodes. I think a machine is available for doing this and we could mass produce wires of a standard length with a diode on each end. The other lead of each diode could be pinched a little so that it would fit snuggly into plated-through-holes.

To string a wire, an operator plugs one diode in one side of the board, and puts the wire into a vertical needle which would then thread through all the cores. When it is all threaded through, the operator then takes the diode in the far end and plugs it into a hole.

By terminating the wires in diodes this way, we can get 256 diodes quite comfortably in a 16" x 16" square with tenth inch centers. This takes then only a square of about 1.6 inches. It is probably no more difficult to replace a diode in this way of packaging than our traditional way.

If we automatically wire this, I would place the board on a stepping motor controlled XY table. These are small tables, and the size seemed to be readily available when we were looking for large tables. I think with a machine like this it would be easier to

use U-shaped cores and have exactly the same electrical result as if they were E-shaped cores.

I would then drive this with a PDP-8/S. Ed de Castro then could make up arbitrary rope memories to drive his various sundry computers, and, if he is clever enough, he can use the computer to do much of the design.

Ken Olsen

ecc

digital INTEROFFICE MEMORANDUM

DATE: October 23, 1967

SUBJECT: NEW DISPLAY

TO: Pat Greene
cc: Nicholas Pichler
Dick Best
Operations Committee

FROM: Ken Olsen

I like the sound of your proposal for a new display, but I think we should take a somewhat broader view before making commitment on a program. I suggest that you propose several different possibilities and what their cost would be, and then try them out on the Operations Committee and, even more so, on various marketing people.

Here are some of the possibilities that you might evaluate:

1. The cheapest possible display of reasonable size.
2. Electrostatic display using an expensive 19-inch Sylvania tube, or the tube Hewlett Packard uses in their display, or 16AMP7.
3. Your present approach to the 16-inch tube.
4. The present 16-inch tube, but with a TV-quality face which might cut the price of the tube better than half.
5. 12, 16, 22 and 27-inch versions of the 16-inch tube.

My suggestion for the cheap tube is to take a high production, easy to use, standard television tube. The secret I propose is to use only a small section of the face. This is an exceedingly brave thing to do because an engineer would normally go to no end and expense to avoid using every single part of the cathode ray tube. However, if we are willing to reject engineering pride, this sounds like a very practical approach. I think we can get these tubes for $15 or $20, and, because their neck size is a lot smaller than the traditional tubes, the deflection power will be low. I have a brand new Admiral TV taken apart in the Conference Room next to my office to show the design of the new cathode ray tubes and the way they make yokes nowadays. This new cathode ray tube has a steel flange which would make mounting to a panel very easy. The whole construction of the system could be just a single flat panel with a tube bolted directly to it. If we cut a round hole on the face of the plate and cover it with a vacuum-formed plastic cover that would have the desired square hole cut in it, this would eliminate all expensive formed parts and hardware.

I think you should also chart out all the components of a display system. Some of these components are independent of the overall system we are looking for.

You should review the different possibilities of power supplies. There is the Wabash supply that we now have, we have a Conrac power supply to look over, and we can study the various approaches that Tektronix has made, and also Hewlett Packard. I believe we

should have 18,000 or 20,000 volt anode potential. The yoke should also be reviewed. We should continue to look at the standard precision yoke manufacturers, but we should also contact those people who make TV yokes. If you look at the yoke on the TV set I have apart, you will see that they are quite simple. We can buy the ferrite from a number of manufacturers and wind them ourselves if we desire. This TV tube has a smaller neck than the tubes we have been using. There is also a small European tube that uses a neck only 20 millimeters in diameter.

We should also outline the different approaches to character generators. We are apparently committed to rope memory for the future, and I expect we will make them in large quantities. I therefore think we can make rope memories to generate characters for less than $100, and so I would suggest very serious consideration of this. These rope memories in computers have to be very fast and so they should not limit the character generating speed. We are definitely going to have to automate the manufacture of these, and so the more uses we find for them the cheaper they will be.

We may also want to consider designing our own tube. We may want to put a 1 1/8-inch neck on an old-fashioned, small angle tube. We could go through the catalog and find one with a relatively fat face. If we order these in quantity, they might be quite inexpensive.

I would suggest that we immediately make a test setup for cathode ray tubes. We could take the Admiral tube and check spot characteristics on a DC basis.

Ken Olsen

ecc

digital INTEROFFICE MEMORANDUM

DATE: October 24, 1967

SUBJECT: HONESTY IN PRICING

TO: Nick Mazzarese
Mike Ford
Howie Painter
John Jones

FROM: Ken Olsen

I am sincerely for honesty! I just turned down an opportunity to buy a complete set of SDS sales manuals.

I never want to mislead customers in the order they're getting or in their delivery. However, I sometimes think we mislead ourselves and our customers in the way we present our pricing.

I think we sometimes picture ourselves as knights in shining armor on white horses and being the only truly honest company telling the customer what the system will cost. I think, however, that few others see us this way, but only think our equipment is more expensive than it is.

I am embarrassed to say that I get trapped into this myself, even though a few months ago I knew the details of other people's pricing. Phillips apparently bought the 416 on price alone, and now, after their commitment, are looking into the peripheral situation.

Arnaud de Vitry, who is quite knowledgeable, feels that the CII 10010 is a 16-bit computer for $12,000. I think it really is an 8-bit computer, and would guess that for $12,000 you wouldn't get the In/Out Processor, Control Panel, or Direct Memory Access, and probably only get 4K of 8-bit memory.

We had better figure out a way to get our true price across to the world. Our salesmen are not valid sources of information on this because they only know of the customers they talk to. I worry about the customers we never talk to.

In addition, we should also get this comparison across to all our salesmen so that on the tip of their tongue they can explain what you get for $12,500 in the 8/I as compared to other machines.

By the way, it is my guess that the CII 10010 is the Sigma 1 that we have been wondering about. I think SDS hasn't made it because it is too expensive to compete with the 8 sales. However, we might want to look at it as an approach to an 8-bit computer which might be inexpensive with our manufacturing techniques.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: October 24, 1967

SUBJECT: TRADE SHOW STORAGE AREA

TO: Tim McInerney

FROM: Ken Olsen

Most people in the Company are learning responsibility for materials, but someone in your group is very disrespectful.

The trade show area is a mess. I think it is probably a good idea to save a lot of old materials that may be useful in shows again and so the area will never look immaculate, but I would hang the man if I found him who opens cartons of literature and spills out on the floor those he doesn't use, and the man who opens crates and doesn't pick up the scraps and packing material after he is done.

Please get after your people on this.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 3, 1967

SUBJECT: COMPANY STATIONERY

TO: Ted Johnson

FROM: Ken Olsen

I received a letter from Tony Liveris recently and notice that he is still using the old logo. (It is also a very poor printing job.) When do we get our field offices to standardize? I didn't even recognize it as being a letter from our Company when I first saw it.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 9, 1967

SUBJECT: NOTES ON TEA PARTY

TO: Win Hindle

FROM: Ken Olsen

We had a tea party this afternoon with the Production girls' group leaders. I would like to consider with you sometime the idea of paying for unused sick leave, the advantages of inviting guests to our Five-Year Award dinners, and the Christmas party (which might be a few weeks after Christmas).

One of the reasons that the girls want to have a Company-wide party for everyone is that they would like to eliminate the Digital connection to some of the "orgies" that people have because there is no Christmas party. The girls would like to have it known in the area that they have no connection to these parties.

Ken

ecc

c-Gloria Brazzo 12/7

digital INTEROFFICE MEMORANDUM

DATE: November 9, 1967

SUBJECT: NOTES ON TEA PARTY

TO: Harry Mann

FROM: Ken Olsen

Here are some problems that were discussed at a tea party with the Production girls' group leaders.

The guard is parking the first girls on the ramp next to the present parking lot, which makes it very dangerous at leaving time.

The ventilation is poor in the silk screening area, and the heat is turned off by about 3:00 in the afternoon so that it gets down to 50°. This is, of course, intolerable, but they worry about when it really gets cold. In spite of my request, we never got the place sufficiently heated even during the day last winter.

One girl went over the bank in the new American Can parking lot and they are afraid that there will be no protection in the new parking lot. Do we plan to have concrete blocks on the edge?

They are not happy with the exit situation, but I told them that we are going to look into this now that we are making a new parking lot and fully occupying the building. Will you please have an exit proposal prepared for the Operations Committee.

They suggested that we divide the parking lot up by shifts so that there is no confusion at exit time.

They also said that there is very poor lighting in the parking lots.

Ken

ecc

c - Gloria Porazzo 10/7

digital INTEROFFICE MEMORANDUM

DATE: November 9, 1967

SUBJECT: NOTES ON TEA PARTY

TO: Pete Kaufmann

FROM: Ken Olsen

Here are some notes taken at this afternoon's tea party with the Production girls' group leaders.

Be sure path is plowed for module delivery boy, or that a better route is developed for him.

Eliminate vapors from silk screening area, and be sure heat is supplied.

Improve lighting in parking areas.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 9, 1967

SUBJECT: MODEL BUILDING PLANNING AREA

TO: Bob Collings
Dave Packer

FROM: Ken Olsen

I would like to have you outline what you feel should be done in the model building planning area for the next two or three years, and then claim what part of it you would each like to do, what parts you would like to do together, and what parts we should give someone else to do.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 9, 1967

SUBJECT:

TO: Bob Lassen

FROM: Ken Olsen

Do we have a rule that employees need a doctor's certificate if they have used up sick days?

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 10, 1967

SUBJECT:

TO: Lou Illingworth
cc: Nick Mazzarese

FROM: Ken Olsen

Please look into the Carrousel Tape-Pak player that is used by radio stations. This holds about 30 automobile style cartridges, and is randomly selected.

The cartridges might be different than Lear-Jet cartridges; we should look at this type cartridge also.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 10, 1967

SUBJECT: ALLOCATION SYSTEM

TO: Stan Olsen
John Jones

FROM: Ken Olsen

John Long complains that, because of the allocation system, he can't sell any more PDP-9's except for delivery in 1969. Is this allocation system wise? Be sure to talk with John about this next week.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 14, 1967

SUBJECT: LINE PRINTER FOR BLOOD ANALYZER

TO: Mort Ruderman FROM: Ken Olsen

Consider using a Dian line printer crossways so that we have full width, or several times full width, sheets that are only 24 rows high. In this way, we might get a full blood report on an inexpensive Dian printer.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 17, 1967

SUBJECT: LITERATURE FOR CONSULTANTS

TO: Allen Kluchman FROM: Ken Olsen

I had a vice-president from Computer Usage visit me today to see what business they could do for us. They also do consulting and recommend equipment to other companies. I was disappointed that he knew nothing about our Company or our equipment. I think he is largely to blame for this, but I think we also have been negligent in not overwhelming all consultants with our literature.

Consultants are a particularly important source of information transfer to customers because they are often the ones that have the most influence in the decision. This man asked me for a compendium of our literature. He talked as if other manufacturers give these to all consultants as a matter of course.

Will you propose a way of attacking all consultants. This might be a compendium which we give to each consultant, or our Company catalog. We might use our local salesmen as the vehicle to deliver these, but I think we should also figure out a way of getting a mailing list that includes all consultants.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 17, 1967

SUBJECT: HEAT FOR FIRST FLOOR OF BUILDING 11

TO: Harry Mann
cc: Pete Kaufmann
Al Hanson

FROM: Ken Olsen

Before we go to great expense to heat the first floor of Building 11, let's try to eliminate the use of tri-clor. If we put storm windows on the windows and tighten the doors, the only reason we would need heat is because we are ventilating the tri-clor. If we have to put a whole new heating system in in order to use tri-clor, it makes tri-clor very expensive and we might be able to figure out a better way of doing it.

If we have to use tri-clor, we might get by by using it only in laminar flow booths like those that are left over from our semiconductor work. This way we probably would have to evacuate very little air. If we need extra heat, it might be so little that it would be better to do it electrically.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 20, 1967

SUBJECT: 5- AND 10-YEAR AWARD PINS AND TIE CLIPS

TO: Bob Lassen
cc: Win Hindle

FROM: Ken Olsen

I would like to suggest to the Personnel Committee that we keep a supply of 5- and 10-year award pins and tie clips so that if people lose them they will be able to buy them. I think that when people find out the price they will appreciate them more also.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 20, 1967

SUBJECT: CARD READER

TO: Ken FitzGerald
Menno Koning
Bob Savell
cc: Mike Ford
Nick Mazzarese

FROM: Ken Olsen

I would like to schedule a meeting in my office for Friday, December 1, at 1:00 p.m. to review possible ways of making a card reader. If this is a convenient time for you, please let Elsa know and she will schedule it.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 20, 1967

SUBJECT: PAPER TAPE READER

TO: Ken FitzGerald
cc: Nick Mazzarese
Mike Ford

FROM: Ken Olsen

I would like to have you schedule what you are going to do with the paper tape reader. If 1:30 p.m. on Friday, December 1st is a convenient time for you to have a meeting in my office, please let Elsa know and she will schedule it.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 20, 1967

SUBJECT: READ-ONLY MEMORY AND MODULE DESIGN FOR 16-BIT COMPUTER

TO: Pete Kaufmann
cc: Joe St. Amour
Win Hindle
Stan Olsen
Nick Mazzarese
Harry Mann
Ted Johnson

FROM: Ken Olsen

I would like to change the way we're doing things. In the past, engineers did electronic and mechanical design, and assumed that Manufacturing would somehow figure out how to do it. The change I want perhaps just involves a slight difference in attitude. I would like the engineers to specify what they need, give all their ideas to Manufacturing, and take part in the design; however, I would like the decision of how things are built to be the responsibility of Manufacturing.

I would like to start off by having you step in on the two new critical items which we are considering. First is the read-only memory, and second is the module design for the 16-bit computer.

I can think of a number of people who are doing read-only memory work within the Company, and I suggest you call a meeting to collect all the ideas to make sure we are not duplicating, and, above all, to make sure that we are not going into the production of several different ways of doing the same thing. Stan, Ed de Castro, Dave Brown, Lou Illingworth, George Gerelds, Tom Stockebrand, and Joe St. Amour are just a few of the names of people I know who have worked on this (in addition to an outside company we're buying some from).

The design of modules is a little difficult to organize because everyone has different ideas, but it makes it all the more important, I think, to coordinate the thinking.

If you would like to call a meeting on one subject at 3:00 and the other subject at 4:00 on Tuesday, November 28th, this would be a convenient time to hold the meetings in my office.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 20, 1967

SUBJECT: CHEAP TAPE

TO: Nick Mazzarese
cc: Lou Illingworth
Stan Olsen
Pete Kaufmann
Win Hindle
Harry Mann
Ted Johnson

FROM: Ken Olsen

It is time we made a formal proposal, with specifications and time schedule, of the cheap tape. Monday, November 27th, at 1:00 p.m., would be a good time with me to have a meeting in my office. If this is convenient for you, please let Elsa know and she will schedule the meeting for you.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 20, 1967

SUBJECT: PDP-X

TO: Stan Olsen
cc: John Jones
Ed de Castro
Nick Mazzarese
Win Hindle
Pete Kaufmann
Harry Mann
Ted Johnson

FROM: Ken Olsen

It is time that we made a formal presentation of the PDP-X with budget schedules and a list of all new developments which are involved in making this new machine. If 1:00 p.m. on Wednesday the 29th of November would be a convenient time for you, please let Elsa know and she will schedule the meeting for you.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 20, 1967

SUBJECT: CABINETRY

TO: Jim Jordan
cc: Loren Prentice
Pete Kaufmann

FROM: Ken Olsen

I would like to have us develop a standard set of cabinetry so that as each computer comes along we do not have to assume it means a completely new design. Will you prepare a presentation of our line of cabinetry that we should call DEC standard. Hopefully, this will be made up from those pieces which we now have in production without meaning going into new designs; however, it should include all sizes of cabinets that we may want to use.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 20, 1967

SUBJECT: Rocky Yasui

TO: Joe St. Amour
Menno Koning
Pete Kaufmann

FROM: Ken Olsen

The time will come when Rocky will not be working efficiently on the line printer with Menno, and I suggest that, before there is any drop in efficiency, you jump in and make sure he has production jobs to work on. I have the feeling there are dozens of things which should be done in the Company but for which we just don't have the manpower, and I would hate to see any effort not being efficiently used in other projects.

Ken

ecc

C - Bob Snell 11/21

digital INTEROFFICE MEMORANDUM

DATE: November 20, 1967

SUBJECT:

TO: Menno Koning

FROM: Ken Olsen

Enclosed is a level wind mechanism from a $2.00 bait-casting reel. Although this is a very cheap reel, I ran the screw and nut at 5,000 rpm's; it gives a very smooth linear motion. It seems to me that we could use this on our line printer.

If we drove the shaft at 3,600 rpm's, we could have nine turns for a full throw, and still have 400 motions per minute. We could put the type as close together as possible, and we might make the screw on nonlinear so that on the ends it will slow down before it reverses.

We could move the carriage on two 3/8-inch shafts. One will have the screw cut in it and a nut on it, and the other one would have two ball bushings. The type would rest on the ball bushings and be balanced by the screw nut.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 20, 1967

SUBJECT: CORES FOR READ-ONLY MEMORY

TO: Joe St. Amour
cc: Ed de Castro
Lou Illingworth
Stan Olsen

FROM: Ken Olsen

I think we have to have cores specially made for our read-only memory. The mold is not very expensive, so we might as well mold one which is most convenient for our use.

Attached is a sketch of one which I think has some features that make it convenient to use.

There is space for the output winding that will keep the turns neatly in place.

There are two bumps on the bottom that will fit into drilled holes on the etched board so that they will be located well.

A spring, which we can have made up in quantity from four-slide house, fits through the holes in the board and catches steps in the side to hold a core in place.

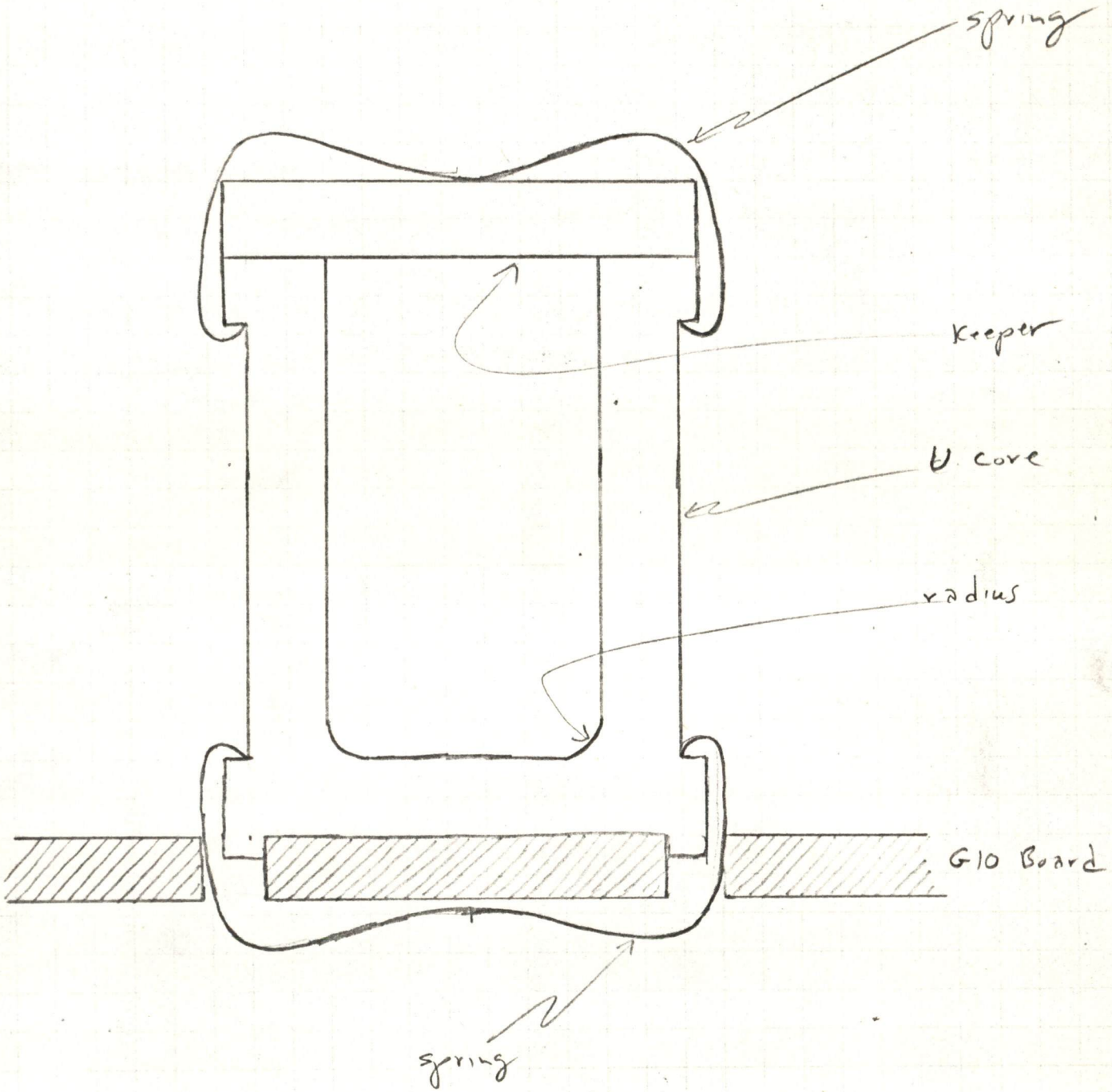
There are also steps near the top of the core so that the keeper bar will be held in place with the same simple spring.

With this technique, the board can be filled up with cores rather quickly, and the keepers can be put down in place after the cores are wound.

Ken

ecc

J. 51



K. Ok
Nov 20, 1957

digital INTEROFFICE MEMORANDUM

DATE: November 20, 1967

SUBJECT: PDP-8/I FRONT CASTING

TO: Stan Olsen FROM: Ken Olsen

If you can use the PDP-8/I front casting, the quantity might then be big enough that we should make them out of die castings. The price would then be so low that you could use them and it would help the 8/I.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 28, 1967

SUBJECT:

TO: Jim Jordan

FROM: Ken Olsen

At the FJCC, I noticed that SDS has painted the front panel of the Teletype pedestal with a distinctive color and put their trademark on it. This is very attractive, and I suggest that we consider doing it also.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 28, 1967

SUBJECT: MECHANICAL DESIGN OF THE PDP-8/I

TO: Pete Kaufmann
cc: Mike Ford
Nick Mazzarese
Loren Prentice

FROM: Ken Olsen

I was very disappointed to see the mechanical design of the PDP-8/I. This is much too expensive and complicated. There are many more pieces than are necessary. Castings aren't needed in all the locations. The indicator panel is not literally repairable, and the power supplies should be one simple assembly and not three separate pieces.

We hear stories that IBM is coming out with a very inexpensive computer. We cannot afford the luxury of building production items as if they were one-time models.

I suggest that you have an engineering review committee study the design to see what we can do to make this at absolute minimum cost. This committee perhaps should be a permanent committee, and should review those other things which we make in quantity (such as the six-foot racks).

We are now making items in the same quantity that radio and television manufacturers do. We should consider buying stampings of cadmium-plated steel like they do. I believe they buy the chasis for a whole production run at the start of production and get them for almost nothing. We should consider buying the power supply chasis for the whole PDP-8/I run at the same time, and we could buy some of the castings as steel sheet metal forms. Maybe we should hire some production-minded mechanical engineers from a production house.

Ken

eee

digital INTEROFFICE MEMORANDUM

DATE: November 29, 1967

SUBJECT: MODULE DESIGN REVIEW

TO: Stan Olsen

FROM: Ken Olsen

I suggest you have a committee review the module design, and that you make Jack Shields chairman of the committee.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 29, 1967

SUBJECT:

TO: Gerry Moore
Germany Office

FROM: Ken Olsen

What do you know about a new machine that IBM is producing in Germany to be sold in this country for very few dollars?

digital INTEROFFICE MEMORANDUM

DATE: November 29, 1967

SUBJECT: DESIGN REVIEW OF THE PDP-8/I

TO: Mike Ford
Nick Mazzarese

FROM: Ken Olsen

I have asked Pete Kaufmann to redesign the mechanical part of the PDP-8/I. It might be a good idea for us to have a thorough design review of the 8/I, and use the next few months to do a thorough redesign of other parts. We now have time to look over all of the detail logic, and we now probably have time to reconsider the decision to make the in/out capability compatible with the old peripherals.

Please set up a schedule for reviewing these possibilities.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 29, 1967

SUBJECT: PLASTIC HOLDER FOR CORES

TO: Joe St. Amour
Ed de Castro

FROM: Ken Olsen

I have been looking at the sketches for a plastic holder for the cores (all sketches should have a name and date on them). I am enthusiastic about this idea and think we should pursue it. Here are a few of my comments.

If we put a tooth or bar on the top of the plastic piece, it could hold the U-shaped core in place after it is shoved into the slot so that no spring or clip would be necessary.

In order to make the sides very thin and to make the unit inexpensive, it will be important to use a thermoplastic material. This means that it will be quite difficult to mount the pins on the side unless a very sturdy cross section is made there. Care also will have to be taken so that the plastic does not melt.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 29, 1967

SUBJECT:

TO: Bob Collings FROM: Ken Olsen

I don't always play the part of supervisor in the way I insist other people be supervised (this may be because I have gotten out of the habit). I apologize for the lack of supervision which I have shown you, for I'm afraid you are not learning the disciplines of business which you will need in the future.

We are not strict or mathematically precise in keeping track of people's time, but it is obvious to me that you should always ask permission from me when you take time off for personal use. It is also important that your secretary always know where you are when you're not in your office.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 29, 1967

SUBJECT: BOB COLLINGS' RELOCATION EXPENSES

TO: Bob Lassen
cc: Win Hindle

FROM: Ken Olsen

I approved Bob Collings' expense voucher because I assumed he worked out the details ahead of time and that my signature was just a formality. If this was not worked out ahead of time, please do not regard my signature as approval.

Here are a few comments of my thoughts on the subject:

I feel we should specifically ask the question at the time of hiring, and get an answer on paper, whether there is any obligation for shipping of personal property. It is exceedingly unbusinesslike to decide there is an obligation after someone has been employed with us for a few months.

I hope Bob worked this out with you before he made the trip because it is even more unbusinesslike to make a trip like this one and then bill the Company afterward; particularly when it was a trip home for Thanksgiving. I don't believe we authorize any trips for any purpose unless they are first approved by the man's supervisor.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 29, 1967

SUBJECT: STATUS OF ENGINEERING AND MARKETING COMMITTEES

TO: Bob Savell
John Jones

FROM: Ken Olsen

As part of your report to the Operations Committee on the status of the Engineering and Marketing Committees at the December 11th meeting, I do want you to write a short report. In this report, I would like to know how many meetings you have had during the last two months, what the attendance has been, and what the attendance of each member has been. In addition, I would like you to include a copy of each agenda and the minutes of each of these meetings so that we can have the opportunity to see what you have accomplished.

Please give seven copies of these to Elsa before 4:00 on December 6th so that she can distribute them to Operations Committee members for review before the meeting.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: November 29, 1967

SUBJECT: TELEX MESSAGE

TO: Dave Denniston
Parsippany, New Jersey Office

FROM: Ken Olsen

When you mention troubles in the field, please be specific and mention what the troubles are and how often they occur. In particular, please tell me the history of troubles at Bell Labs, the history of field service in this trouble, and the history of factory help in these troubles.

digital INTEROFFICE MEMORANDUM

DATE: December 1, 1967

SUBJECT: AUTOMATED DRAFTING

TO: Automated Drafting Steering Committee
Engineering Committee
Bill Melesky

FROM: Ken Olsen

In January, 1967, this Steering Committee was formed to guide the work of the automated drafting project. Since then, the Engineering Committee was organized with most of the same members, so, in view of this, we will dissolve the Automated Drafting Steering Committee and ask the Engineering Committee to guide the automated drafting work.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: December 1, 1967

SUBJECT: PULSE TRANSFORMERS

TO: Harry Brockington
Pete Kaufmann
Joe St. Amour

FROM: Ken Olsen

The pulse transformers molded outside look good. Be sure that the plastic doesn't effect the operation of the transformers. We never potted them originally because every time we tried the compression changed the characteristics of the cords.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: December 5, 1967

SUBJECT: RANDOM NOTES ON A NEW CABINET

TO: Pete Kaufmann
Joe St. Amour
Loren Prentice
John Trebendis

FROM: Ken Olsen

Here are some ideas that I would like to see in a new cabinet.

First, I would like to see the rectangular pipe removed because it is very expensive. I suggest we bend up simple angles from sheet metal and back them with heavy soft iron bar from the mounting holes. We could punch a large number of these in one sheet and break them very inexpensively.

We could weld them onto pans top and bottom. These welds are very important for the strength, and I suggest we weld the outsides and then weld from the inside, which would both close the corner of the pans and tie the angles to the pans.

I wouldn't tap the holes unless we get someone to tap the soft iron bars for almost nothing. The holes in the angle could be quite large, the holes in the soft iron could be drilled tap size, and we could use thread-cutting screws for everything we mount.

I suggest we make the cabinets a little wider than we did before so that the plenum doors can be 19 inches wide and still clear the single cabinet door.

If we then make the cabinet completely symmetrical, front and back, we could put equipment straight into the angles or into the plenum door. The plenum door would be the only thing we would make out of pipe, and I think we could make that out of 3/4-inch square pipe. The plenum door would use rivinuts, but I think that might be the only place we would use rivinuts in the whole cabinet.

I would break a large, heavy steel section for top and bottom to take the place of the aluminum angle that we now hang the doors on. We could turn these out in quantity, weld them in place, and not polish the leading edge for trim.

I wouldn't have a lip on the bottom of the pan. This way we could move the casters almost half an inch closer to each corner and gain some stability.

On the PDP-8/I, we could make the power supply slide out the back in the same way the computer slides out the front. We could arrange it so that the power supply has to be out the back before the computer is out the front, and in that way we can perhaps

eliminate the problem of the cabinet tipping.

I would like to see the cast angle bracket that supports the indicator panel eliminated and replaced with a sheet steel bent-up bracket with hingles. This should allow the console to be rotated for complete access and then pinned in place for normal use. The etched boards behind the panel should be redone so that they are neater looking and allow better accessibility.

I propose that we put all fans in the top of the cabinets instead of the bottom. I think this is a much more efficient way of cooling because the fans do not go along with the natural convection flow, which tends to leave uncooled pockets, but, instead, fights convection and causes more turbulence.

Another very significant advantage of blowing from the top is that the air is cleaner and we don't take the dust off the floor. It also makes the filters more accessible. We also don't have to cover up the cable holes; in fact, we can leave a fairly large hole in the bottom for the air to go out, and just run the cables through these open holes.

I suggest that we cut a rectangular hole in the top of the cabinets that is 20" x 20" or 16" x 20". In this hole we can then drop a plate which will allow us a number of variations of fans and filters. We can have one, two, three, or four fans, depending on how much air we want to flow. This is a freedom which we always desired but could never do with any gracefulness.

We can arrange these pans so that a regular furnace filter, 16" x 20" or 20" x 20", can be just dropped on the top of the cabinet, lifted off, and dropped on again for replacement. Furnace fans are available in any hardware store, and this would be the easiest possible filtering system. In this case, the fan would be hung from the top plate and would protrude about 1 1/2 inches into the panel space. This means that we have to put the fans behind the DECtape because when the DECtape is all the way to the top, it does take some of the space.

One of the variations that would not take away panel space would be to drop a pan into this rectangular hole which drops down about two inches, or just enough to clear the highest panel. In the bottom of this we would put a 1-inch filter and then put the fan over that. This means that the fan would stick out the top about 2 1/2 inches, but that would hardly be noticeable. I don't really think we ever would have to put the fan out the top because with some care we can arrange equipment so that the fan would not interfere.

It sure would make the cabinets a lot neater not to have the fans in the bottom, and it would make the whole machine look a lot easier to maintain.

We could put the leveling feet into the heavy bent-up pieces holding the door and eliminate the triangular nut which we now weld into the corner of each pan.

We should lay out the cabinet and define the slides that we will use for this equipment. Right now it seems that we design new slides for every piece of equipment. When you look at a rack, you see all different kinds of slides in all different kinds of shapes and patched on ways, depending on what the engineer had in mind when that piece of terminal equipment was designed. I would rather see us spell out the slides we're going to use when we redesign the cabinet.

I think we should plan to skip the bus system we now have in the bottom of the cabinets. This is a great idea for when we are making $100,000 computers, but it is not worthwhile for the kind we're making now.

Let's make a single door for the cabinet, like the ones we're now making on the cabinets, but let's make the U section shorter so you don't have to braze it to the cross pieces. Let's see if we can make our doors by only spot welding and not brazing.

The end panel should be simply broken up sections without any ends. We can then spot weld on an inverted hat section in the top and bottom which has a built-in hook which will hook over the top and bottom pans. A large vertical hat section can then be put in place to make the panel feel secure. We could concentrate on the design of stiffeners, and make the material as thin as possible but still have the feeling of quality.

The back door of the PDP-9 should be redesigned immediately to give it a better feel. I think that if we had a large hat section there, we could significantly cut its cost by eliminating all the fancy brazing that is on that door now and end up with a door that doesn't have such a flimsy feel to it. Right now there are a multitude of stiffeners all brazed together, but they are too narrow and too shallow. One simple, wide hat section, as deep as the door is deep, and only spot welded (and not brought close to any other member), would make brazing unnecessary.

The panel under the console of the PDP-9 is very hard to replace. This should be done so that there is a feeling of quality.

The table at the front of the computer should be carefully designed to make it sturdy and inexpensive. I would like to see us reconsider having the edges of the table done in wood grain and the surface white. This way we wouldn't have to be so fussy in trimming the front edge.

Ken Olsen

ecc

digital INTEROFFICE MEMORANDUM

DATE: December 6, 1967

SUBJECT: PAINT ON OUR CABINETS

TO: Pete Kaufmann
John Trebendis
Loren Prentice
Jim Jordan

FROM: Ken Olsen

Our Field Service complains that the paint peels off our cabinets. They feel that it is poor preparation. Please check into this.

Also, please review the results of our field experience on those painted surfaces which are scuffed by feet. Maybe we should redesign these surfaces to have them plated instead of painted.

Ken

ecc

COMPANY CONFIDENTIAL

digital INTEROFFICE MEMORANDUM

DATE: December 6, 1967

SUBJECT:

TO: Mike Ford FROM: Ken Olsen

On Monday afternoon, December 4, I met with Mr. Theodore Birnbaum, a consultant working out of 60 East 42nd Street, New York, New York 10017, telephone MUrryhill 7-4622. He is now promoting a graphics business and has asked a friend of mine, Mr. Frank Nichol, to arrange the financing for him. He did not say that what he told me was confidential, but he avoid some technical points. Therefore, please do not pass on to others what I mention here because I would like to show respect for what he told me. He is conscious that there will be a number of competitors and is dependent on having a head start.

A couple weeks ago IBM announced that they had bought the Alphanumerics video typesetting system. They call it the 2686 system. It uses a 360 computer for the processing, and then there is another small computer on the machine itself. IBM proposes to give negligible support, and they do not even plan to field-test the system.

The 2686 system will turn out 10,000 characters per second of proof quality, and 1,000 for graphics quality. Mr. Birnbaum claimed that this system is much better than the RCA system, and completely obsoletes the other photo typesetting system. In effect, it has an infinite number of fonts and an infinite number of sizes. The type can be rotated, and where there are large numbers of rotated lines, such as in graphs, they can define special fonts of rotated type.

He proposes a business which is twofold. First, they will be in a service bureau business where they will set type for people. They will first go into the direct to type business, and then when they have the software developed, they will go into the technical formula type (which is much more profitable because of the high expense of doing it by hand as it is now).

The second part of their business will be supplying terminals for the RCA systems. The RCA system apparently takes paper tape and now has only 128 codes. They propose having 256 codes and a lot more tricky things which they didn't tell me about.

They plan to manufacture and sell these terminals. I told them that I, as an individual, wasn't interested in investing, although it looks like a good business, and I told them that we, as a Company, would not, but that we, as a Company, would like to be considered for manufacturing the terminals. I also suggested that one PDP-8 might service all 20 of the terminals which he needs for his business.

As he sees it, there are really three computers involved. The first is in the terminal, even though he now has it hard wired, I believe, the second is a 360, which is processing, and the third is the one which drives the video machine.

Because of the high throughput of this IBM system, IBM does not visualize the need for a very large number of these systems, and this is why they are not proposing any significant support or field-testing the others.

Ken Olsen

ecc

digital INTEROFFICE MEMORANDUM

DATE: December 7, 1967

SUBJECT:

TO: Harry Mann

FROM: Ken Olsen

Could we fill in the cove between our new parking lot and the road to give us more access to the road?

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: December 7, 1967

SUBJECT: BERNARD CONTI

TO: Ted Johnson FROM: Ken Olsen

cc: Graydon Thayer - for reference only

569-1226

Mr. Alan Katz, Sales Consultants, Philadelphia, Pennsylvania, called me on Wednesday, December 6, when I was out of town. I returned the call at 3:00 on Thursday afternoon, December 7.

He told me that Bernard Conti, National Sales Manager of TMC, would like to work for us. Mr. Katz will send more information.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: December. 12, 1967

SUBJECT: SLIDES FOR NEW CABINET

TO: Loren Prentice

FROM: Ken Olsen

I suggest that we try to find two slides that we can standardize on for use in our new cabinet. One would be a short one, and the other long. If we get the price down low enough, we can get by with these two. If the price is very expensive, we may want a lightweight and heavyweight in each size.

Both of these should mount in the same place in the cabinet. One mounting point would be in the front surface, and the other on the side of the back column. We may want to add a special bracket to make this back mounting. The bracket could have cam and nuts on it.

The long slide would be of the traditional type; however, I think the short one could be made a lot less expensively because it will be about 24 inches long, but will only have to withdraw 12 inches. Therefore, it doesn't have to have two moving parts as the conventional one does. Instead, it can get by with one, saying that one will be half into the stationary slide even when the unit is fully extended.

Small units, such as DECtape, PC01, etc., would use the short slide. I think we can also use a short slide on the power supply of the PDP-8. The long slides would be used on the logic for the 8/I and long things, such as scopes and A-D converters.

When we design scopes and A-D converters, we may want to leave holes in the cabinet so that we can get air through the racks.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: December 12, 1967

SUBJECT: PDP-9'S AT BELL TELEPHONE LABORATORIES

TO: Paul Rawson
cc: Pete Kaufmann
Loren Prentice
Jim Jordan
Stan Olsen
Nick Mazzarese
Win Hindle

FROM: Ken Olsen

I plan to visit Bell Telephone Laboratories in New York on Wednesday to listen to their sad story about PDP-9's. After they received half a dozen or so, they are now recommending that the whole Bell Telephone System use CCC's 516 computer. They have a number of reasons for this, one of them being that our mechanical design is junky.

When I look at our PDP-9, I must agree. It is fantastically expensive and junky.

Our PDP-8/I is such atrocious mechanical design that I refuse to allow it to be manufactured.

Please let me know when you are going to be in our plant next. I would like to arrange a meeting at that time with the vice-presidents in charge of products to hear how we got into the situation, which now I would guess is going to cost us several million dollars.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: December 15, 1967

SUBJECT: LARGE-SCALE MODULES

TO: Stan Olsen
Ed de Castro
Pete Kaufmann
Joe St. Amour

FROM: Ken Olsen

I visited Bell Labs on Wednesday and had some ideas clarified on large-scale modules. They are using modules approximately 4" x 6" on which they put 54 integrated circuits. They have Augat (Attleboro, Massachusetts) plug-in contacts mounted on the boards by Augat. They have two models; one is two-sided etched boards, and the other is wire-wrap. They only wire-wrap two levels so they can make corrections easily.

If we do three things, I think I would be at ease with large-scale modules. First, I believe we have to be able to move the integrated circuits almost as easily as we do vacuum tubes in a television set. I don't think we can afford plug-in sockets, and I wouldn't trust them long-term. It is also very difficult to pull out an integrated circuit. I think we should develop a tool which will solder integrated circuits and remove them from the surface of the board. This tool would look like a pistol on which you would stick an integrated circuit, hold it up against the etched board (you would probably locate it with two holes), then, holding the trigger, after a fixed period of time the circuit would be soldered on the surface. To remove it, you hold the tool on top of the circuit, pull the trigger, and it simply removes it. I think this also gives us freedom in circuit layout because we don't have contacts going on both sides of the board for each integrated circuit connection.

A second thing I would like to have us develop is a simple way of adding a third or fourth layer of circuitry. I think the way of the 1620 is much too expensive, and it doesn't give them all the freedom one should have. Multilayered boards are too expensive. I suggest we set up one of our component-inserting machines to insert the fixed length, insulated jumpers. If our integrated circuits are on 0.8-inch centers, we could make the jumpers on the center. This would then give the layout man complete freedom to put these jumpers anywhere he wants, and I believe we could make the layout a relatively simple job. You could then use them both for power, ground, and single wires.

The third item which I think we should have is a standard etched board with wire-wrap terminals and maybe a plug-in socket for development. This way we could often debug the integrated circuit for the module before we go to all the trouble of laying it out. This means that we should then have enough space between the modules to take the wire-wrap terminals.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: December 20, 1967

SUBJECT: MECHANICAL DESIGN OF THE PDP-8/I

TO: Mike Ford
Loren Prentice

FROM: Ken Olsen

cc: Nick Mazzarese
Stan Olsen
Win Hindle
Pete Kaufmann
Jack Smith

We are having another meeting on Friday, December 22, at 12:00 noon, to further discuss the mechanical design of the PDP-8/I. I would like to suggest that we have this meeting over on the Production floor, and that we set up a rack-mounted PDP-8 next to a rack-mounted PDP-8/I for comparison. I have forgotten all of the wonderful things that we accomplished by the new mechanical design, so I would like to start off the meeting by reviewing them.

I have been in the plant tonight studying the 8/I, and, after staring at it for awhile, I went over to look at an 8 -- I went to three or four and thought each one was incomplete because they were so neat and clean.

I am terrified by the thought that we started off to improve the 8, and that we made a list of good intentions but lost them all long ago and ended up with a hodgepodge. It is tremendously more expensive than the 8, and has none of the craftsman-like look which has made the 8 so popular.

When we had our meeting last week, I couldn't prove anything that was done wrong on the 8/I; however, when I compare it with the 8, I have the feeling that we could have made the 8/I in exactly the same packaging, put it in the lower half of the cabinet, and would have been much better off than we are now with the 8/I.

It is late, dark, and lonely in the plant now and I may be just depressed, but comparing the 8/I with the 8 doesn't help my morale.

I would like to have the engineer that laid out the control panel tell us what advantages it has over the 8 control panel, how much money we are going to save by doing it this way, and how much easier it is going to be to service.

I would like to have the power supply designer tell us how this power supply design is cheaper and easier to work on than the 8 one.

I would like the one who laid out the wires between units to tell us how much better this type wiring is than wiring we have on the 8.

I would like to know how these switches are better than the 8, and how we save money on making this type bezel.

I would also like to know how much money we saved by doing it all in one piece instead of breaking the same amount of equipment into two pieces like we did in the 8. Indeed, we saved cabling, but the main argument I hear is that it is easier to test all in one unit. Surely, once we cable two together they are no more difficult to test, and someday we might be able to sell only one wing when people need a simple computer.

Ken Olsen

ecc

digital INTEROFFICE MEMORANDUM

DATE: December 21, 1967

SUBJECT: XEROX DUPLICATING MACHINES

TO: Jim Myers
cc: Harry Mann

FROM: Ken Olsen

Will you fill me in on the theory behind the Xerox machines. Every time I go by a Xerox machine, there is a long line of girls waiting to use it.

Do we pay by the sheet or by the machine? If we pay by the sheet, we probably should have more machines.

Or, do we have the theory that if we have to wait in line for machines that we use less and it will save money?

Do we still keep the machines locked after 5:00 p.m. like I instituted several months ago? Is the log checked regularly?

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: December 22, 1967

SUBJECT: OUTSIDE DOOR ON FIRST FLOOR OF BUILDING 5

TO: Al Hanson FROM: Ken Olsen

I came in the first floor of Building 5 (alongside the dam) by using my master key, and was quite surprised to find out how flimsy that door is. The guard said that people come through there by just jiggling the door. I suggest that we make the door more secure and fasten the stationary part to the floor with a slide.

Ken

ecc

digital INTEROFFICE MEMORANDUM

DATE: December 29, 1967

SUBJECT: NEW IDEAS ON BUDGETS

TO: Operations Committee FROM: Ken Olsen

Here are some ideas I would like to have us consider in our budgeting. I would like to see the allocated projects entered into each of the product line budgets only once. This way, the product line people don't have to go to each of the services and bicker about each of the components of each allocated project, but, instead, have to go only to the allocated project people and argue with them over their total budget. The total mechanical engineering listed there will only be the total of the mechanical engineering for the product line projects, and the item listed "allocated engineering" will include some mechanical engineering. We can then publish an operating statement compared to budget for each of the projects, and the allocated projects will then be operating with budgetary control. When a product line manager looks over his statement, he will see how drafting, mechanical engineering, etc. are used in his project, and will not be confused with what is happening in the allocated projects.

Secondly, I would like to change the attitude with which we approach these. We accept the budget at the beginning of the year, or start a project during the year, with a budget. When budgeting is changed, I would like to have the man responsible for that budget come hat in hand and request the change in budget. The way we do now, we go with hat in hand and try meekly and apologetically to talk the person out of being quite so generous in his new, ambitious budget.

When we start an annual budget, and maybe we should start doing it immediately, I would like to see us set aside a kitty for new projects. As new projects are approved, we will keep tally of this kitty so that we will all have some feeling as to how it is being used. Right now we approve or disapprove projects with very little feeling for how it influences the budget. I could have a corner of my blackboard set aside on which we could post the balance of the kitty. We would then all know how much is left for the rest of the year, and it would influence how we decide on new projects.

We might also set aside another kitty that would be the difference between the corporate budget and the sum of the product lines. When product lines aren't doing quite what they promised, we could subtract from this kitty and see how that kitty is standing up.

Ken

ecc