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COMPANY CONFIDENTIAL

dec BIWEEKLY REPORT

COPY NUMBER

DATE August 28, 1964

## MECHANICAL ENGINEERING

L. Prentice

| | | |
|---|---|---|
| P 00001 | General Engineering, Building Layout | 20% |
| P 00008 | Security | 10% |
| D 01291 | 18-36 Series Modules | 15% |
| P 00036 | Mechanical Engineering Adm. | 40% |
| P 00034 | Machine Shop Adm. | 15% |

Bob Beckman's customer relations area, building #3, 4th floor has been completed. Four new offices have been completed for Ed Harwood, Building #5, 5th floor. An addition has been made to the welding shop in building #4, 4th floor. Estimates have been received for additional electrical services to building #3, 4th floor. Estimates have been made and passed on to Bob Beckman for additional toilets in building #3, 4th floor.

D 01304 Component Development

A trip was made to Salem, Massachusetts to review the condition of a 30' process oven for possible use on this project.

D 01291 18-36 Series Modules

Inquiries have been made as to the possible use of a Precise spindle for use on Nashoba Engineering Company's four spindle drilling machine to be used on this project. We have a quotation from Russel T. Gilman Inc. for the slides mechanisms, air oil actuators for $475.00 each. This information has been passed on to Nashoba Engineering Company and a call was made on them during the past week. We are hoping that the vice president of the Precise Manufacturing Company who makes the spindle, would call on Nashoba Engineering and that we could have a professional indication of the appropriateness of this spindle for this particular application. At the present time, it seems that this would add approximately $1,600.00 to the cost of this machine. The spindles are approximately 1/2 horse power as apposed to 1/8 horse power to the older spindles and have a top range speed of 45,000 RPM as against 14,000 RPM for the Electro-Mechano spindles normally furnished with the Nashoba Engineering Company's four spindle machine.

P 00034 Machine Shop Adm.

Two trips were made this past week to look at planers which could be converted to planer millers to be used in the machine shop. We had an advisement from Wigglesworth Machinery Company that they have several planers in the plant at Beverly. We plan to investigate these before estimating what the cost of purchase of various components would be to put one of these machines in operation. This is a conversion of approximately a 6' x 18" planer to a milling machine. The primary use of this machine would be to permit us to finish long pieces on material such as the trim strips for PDP-6, PDP-7, 340 Display, development work on vacuum columns for magnetic tape machines. The machine that we looked at yesterday has a table that is approximately 7' x 19" and the largest piece that could go under the cross head would be 24" x 24"

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DATE August 28, 1964

## QUALITY CONTROLS

K. Doering

The die for the first punching operation of the small modules had been reworked, inspected, and accepted. After the next production run, we will make sure that punches have not been damaged again (this is due to misalignment between punch and die). The die for the second punching operation was inspected after the first major production run. Parts and die were OK.

Sylvania is in the works of taking care of the mislocation of the gold dot on the terminals of the 144 pin connector. This problem causes the goldplating of the module to chip off and also makes it very difficult to insert the module.

We have received Sylvania's tool inspection report. The corrections necessary should be completed by September 4.

J. Cudmore

| | |
|---|---|
| Semiconductor Development | 50% |
| Automatic Module Tester | 30% |
| Production TestpProblems | 20% |

The AMT's new relay matrix has been checked out on line; but the programmable burst generator's sync logic has to be modified to allow a constant sync delay regardless of clock frequency.

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July 31, 1964
DATE

SALES

G. Rice

During recent contacts with a number of customers who either have or have on order Type 340 Displays, I have found a considerable amount of dissatisfaction. The dissatisfaction stems from the lack of programming support which comes with the display. Customers would like to see a manual on how to use the 340 with some programming techniques. It seems that we are returning to the days of offering good hardware, but lacking in instructional material (PDP-1 1960). Maybe we should try some program instruction techniques to teach people about our equipment.

Speaking of the PDP-1, two customers have mentioned to me that BBN has expressed definite dissatisfaction with their PDP-1 Software. In fact BBN told me that if they had a chance to make the decision over again they would not pick a PDP. Part of this problem is ours, since some people at BBN didn't even know PDP-4 had Fortran and others were surprised to learn that we now are offering a PDP-7. In a round about way I have brought up another point, advertising. In the past month I have met at least a dozen computer prospects that didn't even know we offer a PDP-7 and several that never heard of a PDP-6. I have also run into people who thought the PDP-5 could only handle 4K of memory and had no automatic multiply divide. People at Foxboro have told me that many of their instrument and control engineers have never even heard of DEC and one reason is our Control Engineering Ads go right over their heads. We should permote successful applications with our equipment; not that our machine has a 6 μsec cycle time, rather a PDP-5 is controlling a reactor with pictures and facts. Maybe in Datamation we should permote 6μsec cycle times and not multiparameter analysis. Maybe a few ads printing out successful PDP-6 sales would be due about now. This company has been successful so let's tell people so.

dec BIWEEKLY REPORT

COPY NUMBER

DATE July 31, 1964


## QUALITY CONTROL

K. Doering

Something very nice happened during the past 2 weeks: A production drill jig was submitted for inspection and was found to be acceptable! The dies for the 18 - 36 pin modules will hopefully be accepted, too, within the next few days pending some changes in the engineering specifications.

The inspection of solder joints on systems is working successfully with inspection time down by a considerable margin. This is due mainly to improved workmanship.



DF633 DIGITAL EQUIPMENT CORPORATION · MAYNARD, MASSACHUSETTS

COMPANY CONFIDENTIAL

# BIWEEKLY REPORT

COPY NUMBER 2

DATE July 17, 1964

## MECHANICAL ENGINEERING

K. FitzGerald

| | |
|---|---|
| EN 01178 | 20% |
| EN 01288 | 80% |

Most of the time for the past four week period has been spent in chasing down the small bugs in the automatic module line. Most of these bugs have now been eliminated and the machine should be in operation by the end of this week.

The prints for the PDP-6 are 95% done. All that remains to be cleared up is the drawings which will be necessary for the new hinged panel arrangement which covers the indicator light panel above the console. We are presently working on the new modules of this arrangement and this would be cleaned up in another week to ten days.

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DATE



## QUALITY CONTROL

J. Cudmore

The Monroe 16 Column Line Printer was given up as a poor risk and returned to Monroe.

The first lots of B104, B105, and B117 were tested on the Automatic Module Tester.

Logic and hardware necessary to measure +10 and -15 current requirements of modules on the AMT has been designed and is being built. This will guarantee that minute solder shorts on bias voltages will be detected.

K. Doering

Rejection rates on 2894's from Fairchild have gone down; their delivery up.

The die for the first punching operation of the 18-36 pin modules has had some chipped punches, which the vendor repaired. The die is now being tried out on another production run. If no further chipping occurs, and parts come out within tolerances, the die will be released for continuous use. The original engineering specs. for the equipment, which we used for an inspection, are not valid any more. The punch die had to be manufactured somewhat different in order to allow for the peculiar reaction of the glass epoxy material to be punched.

The die for the second punching operation will go through the same procedure.

For both dies we will use the "part" tolerances exclusively.

dec BIWEEKLY REPORT

COPY NUMBER 2

DATE July 7, 1964

## ENGINEERING

A. Hall

Foxboro now has their hands full with 7 computer systems in-house. The Dow computer was delivered some months ago and is well along in being integrated with the Foxboro interface equipment. On June 12 we shipped Foxboro the PDP-4 for the ISA show and another PDP-4 for Wheeling Steel. On June 17 we delivered a PDP-5 to Foxboro, Mass. for the Research Dept. Another PDP-5 (for Penn Dixie Cement Co.) was delivered on June 23. Two days later we delivered a PDP-5 to be used in an Esso refinery and a PDP-4 which will control a power station in Puerto Rico.

The latter six computers were delivered and accepted under some fairly disadvantageous conditions. Because Saul Dinman is now at the Research Dept. he no longer is accepting computers. This meant that a whole new group of people had to be taught which acceptance tests were significant and which were superfluous. Adding to the confusion was the requirement that the modules in the Puerto Rico computer be moisture and fungus-proofed.

Foxboro will shortly purchase another PDP-4 to be used in a continuous brass casting process for the Chase Brass Co. It will almost certainly be ordered with (for later use) a Data Communication System and Microtape. Foxboro has used neither of these items before and is evincing considerable interest, particularly in the possibilities of the 630.

There is some question about the direction Foxboro will take in the future. According to Saul Dinman there are two basic approaches being considered. One is that Foxboro will design and manufacture a Digital Control unit which will, under the supervision of a computer, do that portion of process control which can be characterized by "maintaining the status quo." Anticipatory control, the alteration of the Digital Controller's set points according to (changing) desired product output ratios, economic factors, environmental conditions, etc. would fall under the title "Plant Management" and would be handled by a general purpose digital computer.

The other approach is to find new and more efficient means to use a digital computer to perform all phases of process control. I understand that the Research Dept. will be using the PDP-5 for this purpose. There always exists the suspicion that Foxboro may learn from the PDP-5 and then design their own computer. This suspicion is heightened by their recent advertisement for a computer design engineer. While they may build their own computer in the future, I think DEC will get their business for a few more years.

Foxboro is currently renting 3 buildings in Natick but it seems very likely that they will move eventually into a new building to be erected in Foxboro.

dec BIWEEKLY REPORT

COPY NUMBER

DATE July 7, 1964



With the latest group of Foxboro computers out of the way I will be working on a system to make the Wire List operation part of the regular drafting procedure. Among the problems necessary to accomplish this are:

1. Finding programming time to alter the present program to handle drawing number revision.
2. Training of personnel to use the system properly.
3. Finding some means to get on-call key-punch and computer time for Drafting so that they can process new drawings and Change orders without delay.

This last week (ending Sun., June 28) the PDP-4 Service Center computer approached the saturation point. It was in use for 112 hours excluding maintenance time (which came to only 6 hours). The major users are Dave Fellows, J. M. Quinn (tape editing, listing and assembly), C. Stein (wire wrap) and outside users.

It is expected that Accounting will start to use the computer in a short while, Wire List time requirements will go up and the time required for editing, etc. tapes will probably increase. Use by outsiders will probably continue at about the same rate or, if we accumulate more local computer buyers, it will incrase.

A decision will have to be made shortly on whether we will limit the time a person or department may use the computer in one day, week, etc., rule out outside users or get another computer.

dec BIWEEKLY REPORT

COPY NUMBER

DATE July 7, 1964



## MECHANICAL ENGINEERING

L. Prentice

| | | |
|---|---|---|
| P0001 | Building Layout | 25% |
| P0008 | Security | 5% |
| P0036 | Mechanical Engineering Adm. | 50% |
| 1304 | | 20% |

Two of the five 5-ton air conditioners for building #4 have been installed and are operating and one should be installed today leaving two more to be installed next week. The air conditioners for Bob Beckman's area and the IBM tab room have been received and should be installed over the next two week period. The storage areas as outlined in Ken Olsen's memo of some few weeks ago have been implemented and these are complete or nearly complete. These are the storage areas on the top of building #5.

Two summer students have been added to our work force. One is a carpenter helper working with Ep Tuomi and one has been added to the sheet metal shop to facilitate moving finished goods to inspection and to stock and return. We hope the additional personnel will help complete these jobs in less time and give more satisfaction in service.

The conveyor line for the small module line at the top floor of building #5 has reached the trial stage and some defects are beginning to show up. These should be corrected over the next couple of weeks. The sprockets are unsatisfactory as guides for the chain sprockets, the etching solution seems to be slower than recommended by the company using it. This will have to be investigated and the line either slowed down to take care of this or the etching tanks lengthened.

Design of the washing machine and prototype model are underway. This is to be completed and tested within the next week. A router has been ordered from H & M Manufacturing Company, San Carlos, California and should be in the house during the next week. A work holder must be designed and built to hold the boards for this router. These can be made up and this should be in operation because we are dropping behind, we are not able to mill these fast enough to keep up with production at the present time.

dec BIWEEKLY REPORT

COPY NUMBER 2

DATE June 23, 1964

## ADMINISTRATION

### H. Crouse

We have published a list of vendors and their schedule of vacations for the convenience of all concerned.

Sylvania Electric Products of Warren, Pennsylvania are well underway with the tooling of our new connector block. We are trying to get 500 units by the 1st. of August. It looks like the third week in August for delivery right now on the initial shipment. Efforts are underway to get them to ship the units as soon as possible.

### Dick King

The first carbide die for the first punching operation on the new small module board has been received from Jaquith Carbide Division of Pratt and Whitney Co., Inc. This die has been checked out by Quality Control and is now in use in the Production Department. The die for the second punching operation is due for delivery on June 24, 1964.

All tanks and peripheral equipment for the gold plating of the new boards have been received from the Sel-Rex Corporation and are being installed and readied for production on the top floor of Building 5.

A one cavity mold has been made by Kirk Molding for the new plastic handles for the module board. We have received 1000 pieces of each of the four colors selected and another another 1000 of each are due within the week. At that time we will have a decision on a multicavity mold to meet our production requirements. We also will maintain the single cavity mold as a back up for our production mold.

### D. Kuyamjian

Teletype Corporation has advised the following lead times for their equipment:

| | | |
|---|---|---|
| Model 28 | Printer | 4-6 months |
| Model 33 | Printer | 4 months |
| Model 35 | Printer | 5 months |
| BRPE -11 | Punch | 3-4 months |

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Our open orders for this equipment is scheduled:

| | |
|---|---|
| Model 28 | 3 August; 2 October |
| Model 33 | 39 June; 22 July; 12 August; 12 September |
| BRPE 11 | 3 June; 3 July; 2 August; 4/mo. September and November |

The 18 bit memory stacks on order are schedule for delivery two per week beginning June 22 for a total of ten pieces. The twenty-five 12 bit stacks will be delivered eight in August and September and nine in October.

Two blanket orders have been placed with Vermont Research Corp., the first for ten 10" memory drums with 320 track capacity. Three are scheduled for delivery in June, one in August and one in September. Typically, only a six week lead time is required for delivery of these drums.

The second order is for five 20" drums with 896 track capacity. A partially implemented drum has been released for September delivery. Additional drums will be scheduled after our evaluation of the prototype. Lead time on the additional drums is expected to run ten weeks.

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## MECHANICAL ENGINEERING

L. Prentice

| | |
|---|---|
| EN 1305 Mechanical Eng. Administration | 55% |
| EN 1252 Security | 10% |
| EN1254 Machine Shop Administration | 5% |
| EN 1000 Building Layout | 30% |

All of our projected help has arrived with the exception of William Baker the Machinist who has declined his job offer and refused employment. We are still three to four people short in the shops and almost no response has been had to ads for the kind of people we wish to employ. These are mostly sheet metal mechanics.

### EN 1252 Security

A new memo has been issued for removal of property from the buildings and the instrument sign-out logs have been removed from the guard stations. I would like to point out here that the guards have been asked to accost anyone who is removing any package or parcel to ascertain whether or not they have the proper clearance for its removal. This is not meant in any way to be embarrassing and no way impinge on anyones integrity. If you do not know the proper procedures for removal of property, contact your supervisor. He has a copy of the memo. The receptionist will perform the same duty during the day hours when the guards are not in attendance.

### EN 1000 Plant Layout

Bids have been received for the air conditioner and a contrcat let for a five ton air conditioner and sheet metal installation to New England Engineering Corporation, Everett, Massachusetts for the customer relations area. Frank Kalwell has been able to move his materials storage from top floor of building #5, to 3rd floor of fourth floor, depending on where you start the floors from in building #4. The show materials are planned to be moved on Tuesday, June 23. I would like to remind all people to whom we have sent a memo in relation to their material on the top floor of building #5, that it must be removed. Most people only have a token amount there but these must be removed. The only remaining storage areas that will be allowed on the top floor of building #5 are lumber for Ep Tuomi's use and general maintenance and the cabinets that are used by the cabinet shop, Ed Mayall. Ep Tuomi and Ed Mayall will be responsible for these areas.

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EN 1288 Production Line for 18 & 36 Pin Modules

This installation is on the top floor of building #5, and consists of silk screening, drying, etching, washing operations, plating operations, resist and quite possibly, eventually solder operations and some die cutting operations on the board. The progress on this will be reported more fully by Ken FitzGerald.

Ken FitzGerald

| | |
|---|---|
| EN 1178 | 10% |
| EN 1288 | 90% |

I'm afraid I have been extremely lax in the past few months in contributing to this bi-weekly report and I take this opportunity to apologize to all other contributers who have managed to keep the publication alive.

Most of my time during this period has been spent on designing the equipment for the automated production line for our new small module and getting the equipment for the gold plating operation built and installed. The gold plating system is now operational and all that remains to be done is to work out the final solution adjustments in order to be able to gold plate for production. The representatives from the Sel-Rex Corporation from whom we purchased the equipment, have been working with us and will be back on Monday to give the operator more information and get us into full production.

The equipment for automating small board production is all in place and about 60% operational. The automatic silk screen machine is in position and as soon as the new silk screen frames arrive, screening on the new boards will begin in the clean room. The remainder of the equipment is to do the following operations:

(1) bake dry the resist, (2) etch, (3) wash, (4) resist strip, (5) clean and brighten copper, (6) wash, (7) coat with a tarnish preventer, (8) wash, (9) dry and (10) unload.

All of these operations will be carried out on a chain conveyor and be unloaded automatically at the end. The chain conveyor is in place and the carrying flights for the boards are on order. They should be delivered the next week. Once these flights are in, we will run boards through all of the previous listed stages.

When the boards come off the first conveyor line, they will go back to the clean room for solder resist. The new board is not going to have soldered lines and therefore a resist must be coated over the entire board except in the area of lands and contacts. This solder resist will be applied in the clean room, sent out on another conveyor to bake dry, transfer to a third conveyor which will transfer them to the start of the gold plating line. The operator of the gold plating line will attach boards to the gold plating racks and carry them through the 22 steps of gold plating.

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DATE June 23, 1964



The work remaining to be done on the top floor is as follows:

1. Build fence to separate aisle from working area
2. Build a laboratory type bench for analyzation and control of the solvents and solutions used in the whole operation
3. Build a screen preparation room behind and to the side of the present clean room.
4. Design and build preparatory board washing machine so that the boards going into the clean room will be clean and free of all chaff and dust.

Eventually the etch machine, which is presently being used downstairs, will be moved up to the room behind the clean room for standby purposes.

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## QUALITY CONTROL

### Jim Cudmore

The program to test the B series modules presently available has been completed and the models of these units have been checked on the AMT.

The etched board layout for the new relay matrix for the AMT has been completed and sent out to be photographed. The additional logic necessary to drive the matrix has been designed and is being wired.

The Monroe printer has not passed its acceptance test yet. On June 17 the Monroe representative brought out a new printer for testing.

### Klaus Doering

The rivets for the 18-36 pin module model handles have not come in yet. Therefore, for the time being, the model shop uses a different kind in order to get the handles on. They will be replaced as soon as the correct ones arrive.

The die for the first punching operation of the same modules has been received. A first piece inspection was performed, and a preliminary lot of boards punched. The die itself will now be inspected - we are only waiting for the drawings.

On recent lots of Fairchild's 2894's we have found $V_{CE}$ SAT being the bulk of 9-16% rejection rates on two lots and $V_{BE}$ accounting for most of the 11-26% rejects on two other lots.

A new test setup for relay/delays and for inductors above 200 μh is in the works.

The Test Equipment service dept. signs out and repairs dictaphones. At the end of every fiscal year we have quite a time to locate them, because people swap them without having their name taken off the list and replaced. Please contact Bill Titelbaum in case of changes, enabling him to keep track of this equipment.

Our equipment calibration system has been organized and documented (in the Q.C. manual) in a way to comply with both applicable military standards (MIL-Q-9858A and MIL-C-45662A).

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Standards and some other equipment which cannot be calibrated at DEC are due to be sent to an outside laboratory during the next month.

The mechanical inspection department is now calibrating mechanical measuring equipment for the shops and tool crib on a regular basis. The only exceptions are those pieces owned by the employees, however, they will be included starting next week.

A complete check list for systems assembly inspection is in the works aiding in a better coverage of items to be checked. It should become effective by the end of this month.

COMPANY CONFIDENTIAL

dec BIWEEKLY REPORT

COPY NUMBER 2

DATE June 5, 1964

## MECHANICAL ENGINEERING

L. Prentice

| | |
|---|---|
| EN 1254 | 50% |
| EN 1000 Building Layout | 50% |

### EN 1288 Production line for small module boards

This project has dropped behind in the last two weeks due to the fact that we have pulled away the people who were working on it to make various personnel moves around the company and to build and install equipment. This was mainly caused by the necessity of getting the PDP-6 installed in building #12 and the air conditioner installed in that area.

We have also, during this time, transferred the Mechanical Engineering Department from the fourth floor of building #3 to the third floor of building #4. This consumed everybodies time for approximately one day this week and it will be another week before the power outlets and additional lighting are installed in the offices in this area.

We have acquired a new secretary, Leona Germann, who will primarily assist Dick Richardson in posting and job reporting but will also be able to handle purchase requisitions and expediting as well as some clerical work and filing for the rest of this section of the organization.

New offices and space have been provided for our summer students and permanent personnel who are reporting June 8th and 15th.

### EN 1000 Building Layout

In addition to the work mentioned above in the drafting room and mechanical engineering sections in building #4, a new layout has been made of Bob Beckmans area and orders will be released shortly for work in his area, building #3, 4th floor, also some additional space for Tom Stockebrand in an adjacent area on the same floor.

Approximately 5,000 square feet will be available on the 4th floor of building #5 in which we intend to house the show materials and the paper and cardboard stock for Frank Kalwell. These will be available sometime in the next two weeks.

I am very disappointed in the lack of interest in the biweekly as such. The last biweekly, this office contributed approximately 75% of the material and we feel sort of alone in this. If more enthusiasm cannot be generated for the biweekly, I believe it should be dropped. It has been largely superceded by "Engineering News" and the "Sales Newsletter."

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dec BIWEEKLY REPORT

COPY NUMBER

DATE June 5, 1964

## QUALITY CONTROL

K. Doering

The Metal Etching Company in Long Island, New York, was having difficulties in regard to quality and delivery. A one-day visit proved to be successful as a considerable amount of the backlog will be shipped to us during this week. The milling operation was the bottleneck in their system. We did not see their stud assembly operation, as it is proprietary. The plant facilities were quite extensive, though crowded. They had gone through a major organizational change which had contributed to their - hopefully - temporary difficulties. The place was very busy; but they did not seem to know when a particular job was finished.

J. Cudmore

The Monroe 16 column line printer is still in trouble. All logic problems seem to have been fixed but print wavyness still exists. Monroe hopes to correct this problem by next week.

George Gerelds is modifying the adapter to allow the Band R Series modules to be plugged into the Module Tester. The first version had no guides and a certain amount of trial and error had to be used to get the module plugged in.

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dec BIWEEKLY REPORT

COPY NUMBER 2

DATE May 22, 1964

## ADMINISTRATION

J. Myers

### Checkout and Installation EN numbers

On all computer orders involving a central processor and one or more pieces of optional equipment, a separate EN number will be issued to cover checkout time of the system as a whole.

When only a central processor is ordered the EN number covering the computer may be used for checkout time.

In all cases a single EN number will be issued for installation of the computer and any peripheral equipment.



DF633 DIGITAL EQUIPMENT CORPORATION · MAYNARD, MASSACHUSETTS

dec BIWEEKLY REPORT

COPY NUMBER

DATE May 22, 1964


## MECHANICAL ENGINEERING

L. Prentice

| | |
|---|---|
| EN 1252 | 20% |
| EN 1291 | 30% |
| EN 1304 | 30% |
| EN 1000 | 20 |

### EN 1252 - Security

The first meeting of the Security Committee has been held. The committee consists of L.B. Prentice - Chairman, Maynard Sandler, Richard Mills, Bob Lassen and Bob Beckman. The purpose of this committee will be to act on company policy concerning security matters and we will meet as needed.

The primary concern was the problem of the door at the foot of the stairs in Building #12. I believe this has been resolved satisfactorily. The proper equipment for this door has been ordered, was received, May 21 and will be installed as soon as possible. This will allow people who are on the floors above the first floor to exit through the door without a key. We urge you to be sure that the door is closed as you exit through it.

### New Personnel

Richard Richardson who has been working with Ken FitzGerald will assume full responsibility for the operation of the shops Monday, June 1. All work requisitions and any information of instructions pertaining to the work will be his responsibility after that date. He has had a number of years of experience in charge of production control and as a shop supervisor over a 50 man shopand as a tool and fixture designer. We expect him to be very active in this later field as soon as he is well acquainted with hisprimary function, that of shop supervision.

Dave Nevala will join the group full time on or about June 15 as a Mechanical Engineer. Richard Clemente, Mechanical Technician graduating from Wentworth Institute has approximately five years previous service with Raytheon Company in electronic production and outside contractor vending and will join the company approximately June 8. William Hinds who worked as a summer student last year in the machine shop is graduating from Waltham Trade School and will join the machine shop group approximately June 8 as a machinist. William Baker, machinist, formerly with Cambridge Research Center and the US Air Force will join the machine shop group June 29. Summer personnel that are joining this group are Carl Ebner starting date 6/15/64 will work with Dom Inferrara. Engineering students starting their senior year next year will be joining the group as assistants to our mechanical engineers Allan Clemow, Northeastern University 6/1/64 and David Harris, Worcester Polytech, June 8/64. Mr. William Hinds has accepted a job pending physical examination as a sheet metal worker. He has considerable experience and hopefully he can join us May 25.

dec BIWEEKLY REPORT

COPY NUMBER

DATE May 22, 1964



## EN 1291 18-36 pin modules

Work is underway to deliver enough boards for Derrick Chin and Ron Wilson for both boards and mounting panels to satisfy their immediate development needs. These are hand made and necessarily very expensive. Work is underway complete in the production line top floor of building #5. Most of this work is being done under the EN 1288 number. Early next week should see the set-up or at least the start of the set-up of the gold plating equipment and most if not all of the etching and tin plate equipment. If our suppliers maintain their dates of delivery, this equipment should be ready for operation shortly after June 1. Dies have been ordered from the Jaquith Company, Lynn, Massachusetts for cutting out the boards and these should be in here for tryout the end of the week ending May 29.

## EN 1000

Building Layout - Work is nearly complete for rehousing of the programmers in building #12, 1st floor and the moving of PDP-6 to that area. Orders have been placed for air conditioning and installation is scheduled for next week. Surveys are underway to provide additional storage areas in buildings #3 and #4 and the housing of mechanical engineering department on the fourth floor of building #4. This later area should be ready for occupancy approximately June 1.

dec BIWEEKLY REPORT

COPY NUMBER

DATE May 22, 1964


## QUALITY CONTROL

### J. Cudmore

Bill Walton, a Northeastern Co-op student, is performing an acceptance test on the Munroe (Holley) 16 column line printer. This printer has a one year guarantee. The test proceeded for about six hours before failing. The problem is in the printer electronics and not mechanics. The test will be resumed after the trouble has been fixed by Munroe.

A 5 buss relay matrix has been designed for the module tester. This matrix will use a new very small Wheelock read relay. This matrix should allow switching of all DEC type signals with reasonable fidelity. The additional flexibility of the 5 busses will allow more sophisticated modules to be tested.

### K. Doering

We are considering the purchase of a comparator. In the past there has been a need for one several times. As the expense is in the $2000. area - we are looking at used equipment for much less. We would like to find out who else might have use for this instrument to get maximum utilization. Anyone who could use the services of a comparator, please contact Dick Gaboury in mechanical inspection.

Test and equipment sign out procedures have been approved by the works committee and will go into effect next week when the printing of the necessary sign-out slips will be completed.

A list of any missing test or inspection equipment is being published monthly.

dec BIWEEKLY REPORT

COPY NUMBER 2

DATE May 8, 1964

## ADMINISTRATION

### D. King

The subcontracting of sheet metal parts and wiring has decreased this past month. Orders for silk screening, etching of panels, and finishing have been quite numerous. Our ten-day lead time on silk screened panels has been holding true on most orders, but the etched panels are still requiring from four- to eight-week delivery. We are attempting to locate a second source on etched panels. The four latest prospects I have contacted on etched panels have refused to quote due to our high quality standards on panels. At the present, I am awaiting quotes and samples from two more potential etching houses.

The following is the disposition of orders I have handled pertaining to the new module board. The gold plating equipment from the Sel-Rex Corp. has started to arrive and is scheduled to be delivered completely by May 13. We placed an order for two punch and die sets with Jaquith Carbide Division of Pratt and Whitney Co., Inc. due for delivery by July 1, 1964. We have received quotes on the plastic module handle from five vendors. These quotes are now being evaluated, and the initial order will be placed within the week. Quotes from three vendors have been received pertaining to the castings required for these boards and are being evaluated now. An order will be placed shortly.

### P. McGaunn

Amphenol Corporation has given us assurance that they have overcome their delivery problems on the 22-pin male connectors. The delivery problems were caused by their moving of plant facilities from Fairlawn, New Jersey to Chicago, Illinois. Normal delivery should resume by May 15. We hope to change the tool to conform to the .040 thousands board shortly. The final print will be here May 12 for approval.

The first lot of printed circuit boards for our new small module has arrived from New England Laminates of Connecticut.

We recently ordered a No. 14L1-A air-operated, wire-wrapping tool and a No. 14B1-A electric-wire- wrapping tool for Ron Wilson's PDP-7. The Gardner Denver Corporation is supplying this equipment at $130 a tool.

Ron Wilson is also evaluating a Gardner Denver Corporation automatic bussing tool for future applications.

### B. Farnham

The transfer from germanium to silicon semiconductors has generated its share of delivery problems; however, with the exception of the DEC 2894, we have been able to keep enough

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DATE

B. Farnham (cont.)

units coming in the door. The 2894 at this writing looks as if it will improve considerably during May. While Fairchild has been our principal source for these units, we have recently placed an order with Motorola, which should also help alleviate the delivery problem.

Our new rendition of the D-664, the D664-4, which is supplied by National Transistor, has at times caused us some concern in respect to delivery; but in no way has it been as severe as the 2894 problem, and it looks as if National will be able to meet our delivery schedules.

We are presently trying to build up a stock of our standard Amphenol connector No. 900-309 before we switch over to a modification of the same connector, which will have to be manufactured in a new mold.

D. Kuyamjian

The three Anelex 300-line-per-minute Line Printers, on order since February, are scheduled for delivery as follows:

| | | | | |
|---|---|---|---|---|
| one | FIODEC | character set | - | May 22, 1964 |
| one | ASCII | character set | - | June 5, 1964 |
| one | ASCII | character set | - | June 26, 1964 |

Two more Printers were ordered this week, both with ASCII character sets, for delivery in August. One is a 50-cycle unit. Unit price on this equipment is $15,500.

Two Burroughs Card Readers were also ordered this week, one the standard B-122 200-card-per-minute reader, and the other an 800-card-per-minute reader. They are priced respectively $6025 and $11,900. June delivery has been requested, but not yet confirmed by the vendor.

Purchasing is currently pricing all standard stockroom items for Cost Control. The up-to-date prices, together with a forecast of our annual usage for next year, will determine the new standard cost prices.

The IBM Tape Transport Model 729 which has been in our Mag Tape group for the past several months on a rental basis will be returned to IBM June 1, 1964.

An order for 12-bit Memory Stacks has been placed with Electronic Memories, Inc. Five are scheduled for June delivery.

Teletype has indicated that kits will be furnished on a no-charge basis for purposes of updating all Model 33 ASR Page Printers purchased before their fall revisions. We have fifteen units that will be affected. Jack Shields will make arrangements concerning these units.

All standard peripheral equipment and memory stacks are being delivered as scheduled with no exceptions other than the addition of the Electronic Memories stacks.

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## QUALITY CONTROL

### K. Doering

Recently the need came up to make physical solder joint standards in addition to the written and pictorial ones. Particular attention was given to setting of limits for "excess solder," as this factor generally contributes to the majority of solder joint rejects. These standards have been approved by Dick Best. They will be reviewed periodically.

Quality Control standards for the EN 1291 connector have been written, and a visit to the vendor's plant is planned for the very near future.

This past week we could accept and release a new drill jig to production (PJ-1).

Test and inspection equipment sign-out procedures have been written and will be presented to the committees involved during the coming week.

### J. Cudmore

The Munroe 16 column line printer which was ordered last July for the Automatic Module Tester was received this week. It is presently being checked out.

Hardware to extend the capabilities of the AMT is being designed.

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COPY NUMBER 2

DATE April 28, 1964

## ADMINISTRATION

### R. Dill

**Petty Cash Withdrawals**

There has been confusion about the necessary information which must be on petty cash slips which has resulted in delay when making a withdrawal. If the rules below are followed, it will make your withdrawal more prompt.

If you are entertaining, please state on the petty cash slip the persons and their firms. This is necessary for Federal Tax regulations for your protection and Digital's.

When submitting a slip for mileage, state the date of the visit and the firm along with the number of miles.

Petty cash slips must be written in ink and signed by the person withdrawing along with a supervisor's signature for approval. Pencil is not acceptable.

### B. Garvin

**Labor Hours Reporting on Weekly Job Tickets**

We are experiencing a steady rate of delinquency from certain parties reporting hours worked by job numbers. We expect job tickets to be turned into the payroll section each week by Monday noon, and anticipate out-of-towners can mail job tickets since mail delivery is available.

We like to honor your special requests for cost reports, however our reporting of costs can only be as timely as yours is to us. Lack of input results in lack of output.

### D. Kuyamjian

A firm committment with Anelex Corporation this week for three 300-line-per-minute Line Printers complete with buffers. These will be of Anelex's Series 5 group of printers.

Two of the printers, scheduled for delivery May 15, 1964, will have the standard FIODEC character set; the third printer, with the ASCII character set, is scheduled for delivery June 26, 1964. The printers are priced at $17,000.00 each.

An order was placed with Trygon Electronics for six of the 60-volt, 5-amp power supply which was evaluated a few weeks ago by Larry White. They will be used in the Type 30 Display. These supplies are $405.00 each.

John Jones has ordered Tektronix's new storage scope, Type RM564. Tektronix anticipates delivery in August; however, Purchasing will expedite the order as much as possible.



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D. Kuyamjian (cont.)

The 16-column Monroe Line Printer finally arrived and is now in Jim Cudmore's area.

All major components, such as stacks, transports, readers, punches, and computeriters are being delivered according to schedule with no delays anticipated.

The Tektronix scopes and the Soroban Keyboards ordered for the Line have been rescheduled one per month. We have two of each piece of equipment now and will receive one piece each per month through August 1964.

P. McGaunn

Our yearly blanket requirement for computer grade electrolytic capacitors has arrived again. All quotes received indicate the price will be under $4.00 for the first time. The market for this item is very competitive at this moment.

Disc Ceramic capacitors continue to be a problem as delivery schedules have not been held by our vendors. I expect a substantial quantity to be in the house by May 8 to eliminate the immediate problem.

All initial work has been complete and price quotes received in regard to our new requirement for glass epoxy boards. Seven vendors have expressed a desire to be a future supplier in this area. Samples of all vendors' materials are being evaluated by George Gereld's group.

The first shipment of the BR56 cera circuit has been received and is now in test.

Major metal film resistor manufacturers are now preparing a proposal to supply our entire metal film requirement under a yearly bulk contract. More on this later.

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## MECHANICAL ENGINEERING

L. Prentice

| | |
|---|---|
| EN 1252 Security | 20% |
| EN 1291 18-36 Pin Modules | 50% |
| EN 1048 MG Set | 5% |
| EN 2445 Special 340 Display | 5% |
| EN 1000 Primarily Personnel Work | 20% |

### EN 1252 Security

New locks have been installed on the New England Regional Office in Building #10. Also people from this group were responsible for moving the shelving and general clean-up of the area prior to painting and initiating the work orders for the electrical contractors.

### EN 1291 18-36 Pin Modules

The air conditioning is being installed in the white room. The plumber is completing work on a sprinkler system and new sketches have been prepared for the ovens and conveyor system. Most, if not all, of the parts have been received for the automatic or semi-automatic silk screen machines. Work is going forward, but slowly, to clear the rest of that quarter of Building #5 so that the machinery can be installed for this production line. The initial production order for the connectors has been placed and we hope to place orders for the dies this coming week.

### EN 2445 340 Special Display

The ball integrater has engaged my attention. I have worked out some details with Tom Stockebrand. These have been turned over to Ron Cajolet who is finishing the design. We have also called on Scott Miller to assist in preliminary plans and layout for the typewriter and switch parts of the console. These will be ready for drafting next Monday. At the present time, it looks as if this project is on schedule and can be kept on schedule.

### EN 1000 General Engineering

Most of the work during this period has been with the Personnel Department trying to fill our personnel requirements. Presently we expect to have three summer students; two will work in engineering, and one with Dominic Inferrara, plus a typist, one mechanical technician, and one mechanical engineer. This essentially means doubling the work force in Engineering for the summer months. Furniture and facilities will have to be procured for these new personnel.

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SALES

G. Rice

Urgent Plea from Northeast Sales Office

We need to know when anyone makes a sales contact in the New England or upstate New York area, the area we cover. We've been out knocking on doors only to discover that some other DEC person was there a few days earlier.

We are trying to coordinate the sales effort in this region and would appreciate feedback including any potential leads.

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DATE April 10, 1964

## ADMINISTRATION

R. Dill

### New Policy on Travel Advances

Starting April 8th, all travel advances must be settled before any new advances will be made. This will facilitate the processing of any amounts due to you as well as keeping our records more current. If you have any advances outstanding, be sure to settle promptly to avoid delay when you need your next advance.

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## SYSTEMS

P. O'Malley

In special systems we recently put together a small tester to investigate how well the Toko thin film memory met its company specifications and also to demonstrate at the recent Intermag Conference the new 68 and 58 drivers along with the SCR switches, and associated DEC modules.

The results obtained from driving two digit lines per bit were quite good and generally compared with what Toko predicted. There was no data taken on single digit line operation and no logic to disturb the memory was included. I learned at the show that thin film is disturbed on adjacent lines and this operation would be required in a full scale tester.

There are a number of companies investigating this Toko memory such as Burroughs, Honeywell and General Electric, and in each case the people working with the memory have advanced to a one bit cross section of the memory with no one scanning the memory. It should be pointed out that the main object in systems was to test our equipment and their specifications, whereas the other companies are specifically testing the memory and I am sure their data on the memory is more thorough.

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## MECHANICAL ENGINEERING

L. Prentice

| | |
|---|---|
| EN 1252 Security | 20% |
| EN 1291 18-36 pin modules | 50% |
| EN 1000 General Engineering & Plant Eng. | 30% |

### EN 1252 Security

A new regulation bulletin has been issued in regard to badges and security. This is an updating of a previous memo issued October 18, 1963. An "all employees" memo has been gotten out in regard to parking on the ramps on building #5 off Thompson Street.

Several of the guards' keys have been relocated because of partition and use of building changes during the last several months. This is a continuing program to encourage or in some cases, to force the guard to walk through new areas that are considered hazardous. In spite of all the bulletins issued on the use of soldering irons and the notification to supervisors, there has been a steady increase in the number of hot irons left on by personnel in the buildings. It is planned to take further steps to eliminate this. This should be decreasing not an increasing hazard.

### EN 1291 18-36 pin modules

Plans for a new production area for this board have been gone over. Changes have been made in in the type of board and type of dies needed for it. Conferences have been held with the people producing the receptacle and producing the dies for this unit. Unfortunately not much conclusive action has been taken.

The white room is approximately 75% complete requiring as yet, a floor, painting and air conditioning. Reworked parts for the semi-automatic silk screen machine have been sent out for plating.

### EN 1000 General Engineering & Plant Layout

Plans are underway to clear the Thompson Street side of the top floor building #5 as a production area. The other half of the floor will be sub divided for storage and the first run of this has been made by Frank Kalwell. Purchasing is obtaining prices for fencing to fence off these areas and to make individuals responsible for each area. It is hoped in this way, that we can consolidate the dead storage area and it can be kept under somewhat more business like manner.

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L. Prentice (cont.)

The following items are in a planning stage:

A new flexowriter room on third floor of Building #5
Ventilation plans for PDP-6 computer room, building #5
Renovation of the new office for New England Sales
Expanded areas for Drafting
Expanding the area for mechanical engineering in the third floor of building #3
Expanding the welding area of the sheet metal shop, building #4 and several minor items too numerous to mention.

The PDP-8 has reached the full mock-up stage and has been photographed. Summer students have been reviewed and the need for them at the present time, looks like we could use at least two. These have been contacted and presumably will accept jobs with us for the summer. We are considering a third former summer student for a full time employee's position. The first two students will probably be working directly with engineers and should somewhat relieve our mechanical engineers with some of the burdens they now have so they can perform essential services.

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## QUALITY CONTROL

### J. Cudmore

I have spent many hours interviewing Wentworth technicians and am frankly disappointed in this year's class.

A module has been designed to program the 100% zone on the 567 digital sampling scope used in the automatic module tester. This module will allow the amplitude of a pulse to be measured by incrementing the 100% market until a maximum reading is obtained.

A programmable burst generator has been designed and will also be incorporated in the system.

### U. Skowronek

I have finally edited a revised version of DEC's transistor wall chart of which presently several copies are being made by the Drafting Department. These will be distributed to engineers.

The 1751, a new operational amplifier has finally left the drafting board, where it spent the last two weeks, mainly because I was working on a change of the circuit. The tester has been built, the test procedures and specs have been written and it should be ready for production at least by Monday.

### K. Doering

Test Equipment Service has started to compile on a regular basis a list of lost or missing equipment. It will be a reminder for those who might have misplaced equipment and it helps to determine the dollar value of losses.

During the past two weeks I spent considerable time to follow through on the installation of a new inspection drawing system for all DEC drill jigs. These inspection drawings are rather unique, as they are very simple to understand. They contain only information in regard to the function of the fixtures and do not show any dimensions; only letters instead, which makes them independent of drawing changes. They list, however, the tolerances assigned to the dimensions. These tolerances were established together with engineering. No inspection drawing is valid without engineering and Q.C. approval - this way the tolerances assigned to jig dimensions are not guesswork or memory anymore. The inspectors have something to go by and can make clear decisions - and those affected can understand them. The fixtures are on a calibration schedule. An index similar to that of the paint and finishing stds., listing the jig and its status will be issued regularly to those involved, particularly to the shop where rework will be done. Particular thanks to Loren Prentice whose contribution to this project made it possible to complete in a minimum of time.

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## SALES

J. Burley

Activity for the DCO is as follows:

Naval Research Lab, Washington

Investigating possibility of PDP-6 for research tool.

Howard Research Corporation, Arlington

Investigating PDP-6 as possible research/business tool.

Comress, Inc., Washington

Evaluating PDP-6 for Government Agency.

Auerbach Corporation

Investigating PDP-6 for client

NASA-Huntsville

Order for two PDP-5's expected any moment.

University of Maryland, Baltimore

Looking at PDP-5 or a LINC.

U.S. Weather Bureau, Washington

Format Converter from mag tape to microfilm and vice versa. Approximately a year away.

DuPont Company, Wilmington

Several activities here, most recent is use of PDP-5 in control system. This looks extremely promising.

National Bureau of Standards, Washington

Funding for purchase of '5 or "similar system" being requested.

Johns Hopkins Hospital, Baltimore

Use of PDP-5 as on-line data aquisition system of test data on patients.

Applied Physics Laboratory, Howard County

$125,000.00 PDP-5 system looks weak because they prefer leasing.

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J. Burley (cont.)

Westinghouse Air Arm, Baltimore

They are bidding a PDP-5 on Government Contract which was originally bid with more costly equipment. We are in a very good position if Westinghouse gets contract.

Office of Navy Comptroller, Arlington, Va.

One of the many inquiries resulting from Letterwriting Demonstration. This would be a business application.

National Institute of Health, Program Service Section, Bethesda

Another business application resulting from Letterwriting Demonstration.

Civil Service Commission, Washington

Ditto N.I.H.

NAVCOR, Philadelphia

Module Tester interest.

National Center for Science Research

Interest in PDP-6 and PDP-5, we don't know the details yet.

Philco Corporation, Philadelphia

Module Tester interest.

Farrington Manufacturing Company, Springfield, Va.

Possible OEM customer for interface with their scanning equipment.

David Taylor Model Basin, Washington

This one is on shaky legs as a result of their needing higher speeds than we can presently match with A-D/Computer equipment.

Thiokol Chemical Corporation, Brunswick, Georgia

Awaiting word on management budget.

NASA-Goddard Space Flight Center

PDP-5 interest but no specific application as yet.

Naval Ordnance Lab, White Oak, Maryland

Still hinges on budget in general purpose control application. Another application was stirred up by John Jones in the nuclear field.

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J. Burley (cont.)

NSA, Fort Meade, Maryland

Another lead caused by Letterwriting Demonstration. The only known fact yet is that it is similar to the letterwriting application. There are some other interested parties at NSA on PDP-5, PDP-4 and Type 340 Display.

Computer Systems, Inc., Richmond, Virginia

Another similar application to Applied Dynamics. Computer Systems is pricing some of their systems on the basis of PDP-5 as the digital controller.

Veterans Administration, Washington

Possible application for PDP-4 though this is just beginning.

University of Maryland

A very slim chance on nuclear application.

Naval Weapons Lab, Dahlgren, Va.

Possible time-sharing application for a PDP-4 if it can do the job, PDP-1 possibility otherwise. We probably are the strongest contender so far in this system.

Department of the Navy, Washington

An interesting RFQ on TWX Switching System. It's in the works at the moment.

Bowman Gray School of Medicine, Winston Salem, North Carolina

Module possibilities here for expanding the output of their LINC.

Rabinow Engineering Company, Maryland

Interest in the PDP-5 for interfacing with a graphical reader system similar to Farrington.

Applied Physics Laboratory, Maryland

Interest in silicon version of 4000 Series. This is for shipboard application and should be one of the more active product areas at APL for the future. However, our not having a line now pretty much eliminates us from consideration.

National Institute of Health, Bethesda

Mort Ruderman and I are working with various administration people at NIH attempting to get some sort of support or committment from them on five PDP-8's.

Liggett & Meyers Tobacco Company

Interest in PDP-5 for pulse height analyzer application.

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J. Burley (cont.)

NASA-Goddard Space Flight Center

Interest in A-D Converters.

Eastern Pennsylvania Psychiatric Institute

Weak interest in modules and A-D converters.

University of Maryland

Interest in modules.

U.S. Coast Guard

Thanks to work done by Dave they are buying some modules.

National Institute of Health

Modules and A-D Converters.

General Electric, Valley Forge, Pa.

A-D- Converter interest.

U.S. Army Infantry Human Research Unit, Ft. Benning, Ga.

Interest in PDP-5 and modules for psychological studies.

General Motors, Warren, Michigan

Interest in hybrid applications.

U.S. Securities and Exchange, Washington

More letterwriting interest.

University of Alabama

Module interest for instrumenting breathing analyzer.

U.S. Navy Bureau of Ships

Interest in PDP-6 and data processing and control work.

Naval Oceanographic Office

A large requirement for 5 megacycle modules reported some months ago has been set back due to re-budgeting. They hope to be able to purchase this summer in the new fiscal year.

RCA Service Company, Atlantic City

Small module application.

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J. Burley (cont.)

I.B.M., Bethesda

Interest in 20 megacycle logic.

Vitro Laboratories, Silver Spring, Md.

Interest in logic kit and subsequent expansion of digital capabilities.

Litton Industries

Same interest in interfacing Type 30 with 160-A.

NASA-Langley

PHA interest.

Westinghouse Air Arm, Baltimore

Module interest.

The assistance given me recently by Fred Gould and Ed de Castro, hopefully will start paying off soon. Fred is planning another trip to this area during the week of April 13th to follow up leads generated by the IEEE Show.

I have heard many very favorable comments on Barbera's A-D Brochure and would like to record my congratulations here. I think this is probably one of the most significant contributions we have made to the industry in some time. I'm sure there are others who contributed to the manual, but it seems that a big share of the applications work done by DEC can be traced back to Barbera.

I am anxious to hear any progress reports regarding the "traveling PDP-5." I understand one is being readied for installation in a trailer for traveling about the country.

I again vote for a dynamic display of modules at the Spring Joint Computer Conference. This will be the only showing in the D.C. territory of modules to be made this year and therefore, should be dynamic enough to get some interest generated.

I would expect that we should encounter more interest in higher accuracy A-D Converters. We haven't as yet seriously offered anything above eleven bits but I should think that there would be requirements for up to fourteen bit conversions at slower speeds. It might be interesting to consider using a read relay switching type converter in an application of this type. This would be a good application for the 4290.

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## COMPUTERS

A. Hall

Foxboro appears to be picking up their selling pace somewhat. Dow Chemical will be getting a PDP-4 which was delivered to Foxboro about a month ago. They have on current order a PDP-5 for an Esso refinery on the island of Aruba. The most recent order is a PDP-4 which they will take to the ISA Show and for which they almost certainly have a near customer. They should in a week or so, receive an order from the Penn-Dixie Cement Co. for a system involving a PDP-5 and in a month or so may receive an order from Puerto Rico for a PDP-4.

Their computer system sales people have been moved to the Natick plant and their new sales manager seems to be pushing fairly hard. Foxboro has taken over a building adjacent to their first one and has moved their Production and Purchasing departments in.

Cold testing of a PDP-5 revealed a wiring error that had not previously been detected, lowered performance enough so that a cold solder joint caused failure of operation and changed memory current readings. Once the necessary corrections had been made the computer ran satisfactorily for 10 hours at temperatures between 36 and 40.

Heat and humidity testing caused the memory currents to change enough to that backwards wiring of the memory thermistors was discovered. Further testing revealed enough problems so that J. McKalip is doing some rework on PDP-5 memory. It was also discovered that the computer would not read in a program when under heat and humidity (even though the program would run if it was in memory). The input mixer modules are suspected.

Revelation of problems by temperature testing in a computer thought to be checked out and ready, leads one to wonder what might be found in other equipment if it were so tested.

Barbera Stephenson has a requirement for a temperature-controlled area for A-D checkout.

All computers for Foxboro must be temperature cycled before acceptance and the first of each new piece of equipment must be cold and humidity tested as well.

The PDP-6 Prototype has revealed how vulnerable a computer can be to heat.

If Barbera Stephenson will need a temperature-controlled room anyway and if heat, cold and humidity testing is so effective in testing, it would be a good idea to combine the two requirements in one temperature variable and controllable room.



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A. Hall (cont.)

I will investigate the price and availability of such equipment. So that all the information about environmental problems and testing requirements can be centralized, would any one in Maynard or the field offices having requirements, problems or ideas concerning equipment environment or testing please send them to Arthur Hall.

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## MECHANICAL ENGINEERING

L. Prentice

| | | |
|---|---|---|
| EN 1252 | Security | 15% |
| EN 1291 | 18-36 Pin Modules | 60% |
| EN 1136 | 555 Tape Machine | 10% |
| EN 1196 | 570 Tape Unit | 5% |

### EN 1252 Security

One new key station has been added in Dick Mills area and all the key stations now have been transferred to boxes and a new security system has been put in force in the first floor of building #12 and locks have been procured and installed for the accounting area, top floor, building #5.

### EN 1291 18-36 Pin Modules

This system is still in the planning stage however, more and more of it will become reality in the next two weeks. We expect to have quotations on the major section of the dies complete by today. Layout of the production line should be complete this following week. Layout has been approved by the insurance company for the clean room on the top floor of building #5 for the sprinkler system and quotes have been received for the air conditioning, humidity control, and precipitron cleaning for this room. These last items are all the responsibility of Ken FitzGerald.

### EN 1136 555 Tape Unit

The work here consists of up dating some drawings. Most of this work is being done by Dave Nevala particularly on the desk console model of the 555 Tape Unit. Drawings for this should be ready within the next two days so that a first or pilot model can be made. Primarily these changes have to do with the addition of two cooling fans to the present cabinet and a tryout to see if this proposed system will work.

### EN 1196 570 Tape Transports

As previously reported, we now have eight of these units in house undergoing testing and rewiring. The first of these two units is ready to be released to the production people for completion or addition of our logic having passed both mechanical and electrical inspection. I would like to remind everyone that this project started approximately one year ago and it will still be several weeks before we can deliver the first machine to a customer. This is a sort of reminder that a project of this magnitude takes approximately one year.

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L. Prentice (cont.)

The motor generator set, 10 horse power, is to be converted to a variable frequency generator to provide frequencies from approximately 45 to 65 cycles by the addition of the variable speed pulley to the 10 horse power motor. Orders and drawings have been released to Reliance Electric Company for this item today. Approximately, the cost is $200.00. This should be in house and installed in approximately three weeks.

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## QUALITY CONTROLS

J. Cudmore

All decoder modules have been added to the Automatic Module Tester Program.

CTS of Berne has submitted sample "Cera" circuits and the first units look very good.

K. Doering

Manford Doucette has joined the mechanical inspection group as an inspector. This should enable us to give faster service on assembly and solder joint inspections.

The Special Systems dept. supplied us with a test instrument and test procedure for the SW1250 SCR. Now we are able to do all the tests on this item in one place. Before that, we shared the job with Special Systems.

The test procedure will be modified to make it adaptable to production testing.

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## SALES

S. Mikulski

Convening dates for future programming and maintenance courses are as follows:

**PDP-1 Maintenance Course**

April 6 (2 wks.)
May 11 (2 wks.)

**PDP-1 Programming Course**

May 25

**PDP-4 Maintenance Course**

April 27 (2 wks.)

**PDP-4 Programming Course**

May 11

**PDP-5 Maintenance Course**

April 21 (April 20 - Holiday)

**PDP-5 Programming Course**

April 27
June 1

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## ADMINISTRATION

D. Kuyamjian

For the past two weeks Larry White has been evaluating three 0-60vdc 5 amp power supplies for the Type 30 and Type 340 Displays. The units, which were manufactured by Perkin Electronics, Kepco and Trygon, were compared with the NJE SY-60-6 supply we are now using. The purpose of the tests was to determine if there is a lower priced and better performing supply than the NJE available.

The Trygon supply proved to have the best regulation and stability, particularly during heat test, and also superior recovery time. Anyone interested in the actual data taken during these tests should contact Larry White.

Trygon's price of $390.00 ea., although competitive with NJE's a $440.00 and Kepco's of $615.00, is still substantially higher than Perkin's of $315.00. Nevertheless, a decision was made to specify Trygon for future requirements because of its stability and fast recovery time. Although NJE came in at the eleventh hour with a bid of $340.00, our past experience with their EQR series points up reliability problems in the field with their equipment.

A prototype of Solid/State Controls time delay/power controller will be delivered in April for evaluation by Arthur Hall. Prototypes of similar devices will be received from Westinghouse Life Instrument, A. W. Haydon, and Magnecraft.

Bids on two motor/generator sets for Arthur Hall are being received. One is a 60 cycle to 50 cycle converter. 1 KUA with stabilities of ±1/2 cps and 2% of voltage. The other is a 3.5 KUA variable frequency/variable voltage generator: 45-55 cps, 1/2 cps steps; 105V - 125V and 207V - 253V.

The four Teletype Model 35 Printers, two each ASR and KSR have been received.

Anyone with a requirement for Teletype Model 33 Printers should contact Jack Smith as production is handling distribution of these machines. They will attempt to keep a limited amount of these machines on hand over and above their own requirements.

The twelve Tape Transports on order from Potter for ITT will be delivered in April 1964.

Five Tape Transports from Midwestern Instruments were received this month, and three more are due for shipment this week. The balance of the order has not been scheduled.

An order for thirty 4K18B Memory Stacks was placed with Ferroxcube for delivery: 10 - March, 20 - April.

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D. Kuyamjian (cont.)

All other major components are being delivered according to previously established schedules with the exception of the BRPE-11 Punch. Delivery of the punches has been stepped up to two per month beginning this month.

P. McGaunn

The purchase specification manuals have been silk screened. Effort to arrive at a means of publishing the completed manual have been started. We should have our first volume ready for issue in about 30 days. We hope to give all sections and engineers a copy in the very near future.

Erie Resistor continues to plague us on delivery of their disc ceramics capacitors. Because of our size requirements suitable substitutes are hard to find.

Technitrol Inc. of Philadelphia Pa, our source on standard delay lines, is now working on the ITT delay line. Our previous vendor could not hold the maximum height we had to have for the line to fit on the printed circuit board.

D. King

The sales manager from Metal Etching Corp. was in to visit me last week. We discussed the poor deliveries we have been getting on our etched panels. The following is the best delivery we can expect from them. The first time around on a panel delivery will be 6-8 weeks from the time they receive the order. After the original art work is made up on the initial order, delivery thereafter will be 4 weeks.

In my last biweekly I may have sounded the praises of the T. J. Edwards Company prematurely. The first order of six panels was rejected. Klaus Doering and I have since paid a visit to T. J. Edwards and Klaus explained exactly what we expected as quality standards at DEC. I feel Edwards can be salvaged as an accepted vendor and help solve some of our delivery problems on etched panels. They are located in Boston and will give 2-3 week deliveries on all orders.

Boston Precision Parts, the vendor now fabricating our standard computer cabinets, has just purchased and installed a $100,000.00 Wiedematic A-15 Tape-Operated turret punch press. If anyone has an interest in seeing this machine in operation, individually or as a group, arrangements can be made through my office.

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## COMPUTERS

D. Chin

Copies of the manual describing the Type 370 Light Pen are now available. A program has been written for checking the operation of the pen with a Type 30 Display controlled by a PDP-1. Copies of the writeup and the program may be obtained from the Program Library. Another program has been written for the pen when operated with a Type 340 Display and PDP-4. This program with writeup should be available shortly.

There is now available a Type 372 Camera Mount designed to be used with a Fairchild/Dumont Type 450A camera for recording points on DEC Types 30 and 340 displays. A magnification ratio of 0.27 enables all points on the 9 3/8 x 9 7/8 inch square raster of the display to be recorded within the 2.85 x 3.75 usable area of 3 1/4 x 4 1/4 Polaroid roll film. A spring loaded slide covers a viewing port through which the raster to be photographed may be viewed before the camera shutter is triggered.

The Camera Mount is connected to the front bezel of the display by two brackets which fit over mounting studs on the bezel. This "left-off" arrangement provides ease of connection. For displays in the field without the mounting studs, the two bolts near the top of the bezel are unscrewed and the mounting studs screwed into place. Some early models of the Type 30 Display may not have the holes drilled in the right position. This may be corrected by slotting of screw holes on the Camera Mount itself.

The Type 450A camera has an adjustable focal length feature which provides for fine focus. For the most economical arrangement, the 450A camera consists of a Type 4500A camera housing, a Type 4513 114 mm. f/4.5 lens, and a Type 4520A 3 1/4 x 4 1/2 Polaroid roll film holder. Cost of all three items is $560 from Dumont. The mount itself extends 16" from the bezel of the display and weighs 11 1/2 pounds. With the camera connected, the distance is 28" and the total weight is 23 1/2 pounds.

Although it has not been tried, a Type 4520B 4 x 5 Polaroid film pack holder could be used in place of the 4520A 3 1/4 x 4-1/2 roll film holder since there is only a 1/4" difference between the film plane locations of the two types of holders. There is no difference in price between the two types.

Use of a 35 mm. camera with the mount has not been investigated. It is worthwhile to note, however, that the 35 mm Robot camera offered by Dumont for use with the 450A camera is of fixed focus and will not work with the Type 372 mount.

Earliest delivery of the Type 372 Camera Mount is late April. After that time delivery is 6 weeks after receipt of order. Cost of the mount itself is $778.

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D. Chin (cont.)

A brochure describing the mount should be available by late March.

For those who are unaware of the work we have done in remote displays, it may be of interest to them that it is possible to drive a remote display up to a thousand feet away by means of a Type 30 or 340 Display. This remote display has been given the Type No. 343. Availability may be delayed by certain required modules which are not yet designed. A report describing the technical operation of the Type 343 remote display may be obtained from Lydia Lowe in Engineering.

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## MECHANICAL ENGINEERING

L. Prentice

| | |
|---|---|
| EN 1291 | 50% |
| EN 1000 | 10% |
| EN 1252 | 10% |
| EN 1196 | 30% |

### EN 1291

Phil Backholm has been principally involved in this project along with Ken FitzGerald and I have spent considerable time on it myself. We are contacting vendors in hopes of getting quotes on all the equipment needed for this project. An attempt has been made to get quotations and set up a time table, a schedule chart, so that individual responsibility can be assigned and time table maintained to get this project underway. Several meetings and informal meetings have been held to discuss the type of equipment and the processes to be used. More information is being received from vendors daily and as drawings become available for the various parts of the system these are being released for quotations.

### EN 1000

Considerable time has been spent interviewing perspective people for employment as we have four vacancies in the sheet metal shop and we need a foreman for the machine shop. Mr. David Nevala who has been with us as a Northeastern Co-operative student has accepted a position as Mechanical Engineer to start approximately June 15th. We are still looking for a shop supervisor and tool designer and considerable time has been spent during this past two week period trying to procure people for all of these positions. Mr. Jack Donahue has joined the machine shop as an apprentice machinist and Mr. Lamon is transferring from silk screen to sheet metal which will help matters there a great deal.

### EN 1252 - Security

Memos will be shortly issued regarding the new lock system to be used in building #12. If you use this entrance after hours, will you contact your supervisor for information regarding the new arrangement.

### EN 1196 - 570 Tape Units

Six units have been received from Midwestern Instruments during the past two week period. These have undergone mechanical inspection and are about to receive electrical check-out. As soon as electrical checkout is complete, we will proceed to assemble these units; the doors, panels, soundproofing, etc., and two of the units will have new bottom pans welded. This means stripping the entire unit and repackaging it after the cabinet has been retrofitted

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L. Prentice (cont.)

and brought up to date. All of these units received some shipping damage due to the fact that Midwestern Instruments neglected to reship the units on the pallets on which they were shipped. Strong protests have been made to midwestern instruments and we do not expect to receive any further units without the pallets in place.

K. FitzGerald

| | |
|---|---|
| EN 1254 Supervision | 35% |
| EN 1178 PDP-6 | 35% |
| EN 1288 Automated board production line | 20% |
| EN 1000 | 10% |

One of the first things to be constructed on the automatic board production line will be a clean room for the silk screening operation. Preliminary investigations have shown that a clean room must be sprinklered with its own system. This means that the location for the clean room will have to be decided upon so that future expansion will not require the moving of the room. The clean room itself will be used exclusively for the silk screening of boards and panels with no other operations which are presently in the silk screen department being performed in the room. This is primarily for the purpose of preventing blotches or voids in our printed circuits due to dust adhering to the screens or the freshly printed boards.

The PDP-6 prototype has been experiencing heat difficulties since it first went on the air. Most of these heat difficulties we believe were caused by improperly wired mounting panels which prevented the air form passing out through the mounting panels and past the modules. Many solutions were proposed but the final solution was mounting a bank of 12 muffin fans on the plenum door directly behind the offending quadruple boards in the arithmetic processor section. This has reduced the heat build up in this particular section and looks like it is the solution for this machine, however, this should not be considered as the answer for any other machine with a heat problem.

In order to accurately check the heat conditions in this unit, the Bristol chart type, temperature recorder was utilized and for the first time we have accurate readings of the air drawn into the machine, the ambient temperature in the machine, and the temperature of the particular offending modules in the arithmetic processor section.

While the recorder was operating in the room, it was suggested that we put a thermocouple on one of the #6227 modules in the core memory section. It was interesting to note that after 2 1/2 hours of operation, the temperature on that module went to 115° while the ambient temperature in the machine was approximately 90° F. One other interesting fact that we

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K. FitzGerald (cont.)

discovered in this temperature recorder was that the temperature in our "trouble hot spots" of the arithmetic processor went from 85° to 97° F. in 25 minutes due to the back plenum being open. As soon as the door was closed the temperature dropped to 88° in about 25 minutes. This substantiates the claim that you cannot cool a machine with the machine door open.

A construction requisition for the PDP-6 has been received and construction on the major parts has been started. Drafting has been working on the indicator panels for this machine and they should be cleaned up this week. Due to the large number of changes on these panels, drafting has not been able to get the silk screen mats completed in time to order the panels for delivery before check-out time. This means that the machine will have to be checked out with dummy panels that have only been chromicoated and silk screened. The final panels will be installed after check out.

I recently visited Worcester Technical High School in order to evaluate a program being offered to some of the people in the sheet metal shop. After the visitation, Paul Chambers and myself both agreed that this particular program was not of particular value to the company but that we should perhaps outline a course that would be of value to the company and request that this school supply such a course and teacher for it. The school has agreed that they would be interested in trying something of this type and as soon as time is available, I will attempt to write a curriculum for this course and submit it to the school.

After performing a few simple heat tests on the PDP-6 prototype I feel that we should perhaps go into a more extensive program of heat testing some of our equipment in view to making further improvements and changes in our present design in order to be more assured that our present system and all future systems will have adequate cooling capacity. With this thought in mind, Ron Cajolet has ordered parts to convert one of our two standard temperature recording machines to a more useful range of -50° to +150° F. The present machine which we are using on the PDP-6 prototype has a range of 0° to 400° F.

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## QUALITY CONTROL

### J. Cudmore

I have spent some time examining the 4220 problem – see Engineering News for report.

I have been investigating the complaints of our chief user of classroom modules, Capt. Enslow of West Point. The results indicate insufficient grounding of 901C mounting panels. We shall remedy this problem immediately.

I am still learning the programming used in the Automatic Module Tester.

### K. Doering

Together with Dick King, I had a chance to visit three vendors during the past two weeks, one of them a prospective one. These visits proved to be of value. We found that Industrial Wire and Cable in Everett, who assemble and wire power supplies for us, have difficulties in getting the correct parts from our stock room. Further investigation showed that the parts lists are supposedly not up-to-date. Our stock room people make their own. Following this incident I picked one power supply (as a start) and will check the parts list in order to remove possible errors.

E. T. Edwards in Boston does etching and anodizing of panels for us. The first job they did for us was rejected. This proved again that jobs of this kind need a lot of additional oral interpretation in spite of detailed written standards. We decided to have source inspection performed to catch errors in the earliest possible stage.

Densal Inc. is in the same line of business. They are an excellent outfit, but they can and will only etch panels of .093 max. thickness. Ours are .125. Loren Prentice will investigate if there is any possibility to modify our panels as vendors for this type of work are hard to find.

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## SALES

D. Denniston, NYO

We have always tried to impress upon the people in the home office to keep us informed, not only of the letter contact with customers in our area, but also of the visits to customers in our area. Field Service certainly deserves a special star for always keeping us informed of their visits to our area, the problems which have been reported to them, and how they have remedied them. We certainly appreciate it.

Sales for the month of February were very good both in modules and computers. The total for module sales has boosted our aggregate total for 1964 way over the total for 1963.

The NYO has also added three new customers for 1964 -- Lake Automation Labs, Union Carbide, and Columbia University -- with module, computer, and module orders respectively.

We have been making a concerted effort to make people aware of DEC and to contact what we believe to be "potential" customers. Because it is near to impossible to call and/or visit these people, we have been doing a mailing of a small brochure-type listing of "Selected Brochures" with reply cards attabhed. We have two books from which we are collecting names -- Directory of Industrial Research Laboratories in New York State and Industrial Research Laboratories of the United States. It is possible to obtain a state directory by writing to your Chamber of Commerce; however, if anyone wishes to borrow our copy of the Industrial Research Laboratories of the United States, when we are finished with it, please let us know.

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## MECHANICAL ENGINEERING

L. Prentice

| | | |
|---|---|---|
| EN 1252 | | 10% |
| EN 1291 | | 30% |
| EN 1292 | PDP-8 | 30% |
| EN 1196 | 270 Tape | 10% |
| EN 1282 | PDP-7 | 20% |

### EN 1291

A trip was made to the Sudbury plant Raytheon to view their wire wrap operation, this is a Gardner-Denver machine handling approximately a 19" square plate. They are presently handling only Malco type boards both in the flat punched 2S aluminum sheet and die cast aluminum plate. As I had never seen this operation, I was very much impressed by its versatility, the importance of good programming and the neatness of the completed work.

We have had conversations with several vendors who are to supply either parts or services for this project.

### EN 1292 - PDP-8

This project is a primary responsibility of Dave Nevala, a Northeastern student who is working for us. He is doing the mechanical design and Scott Miller is doing the appearance design. The first unit will be constructed entirely the way the linc unit is being constructed with no deviations and will be two cabinet set up using a PDP-6 type wing table. The two cabinets will be reversed and the plenum doors removed and the logic and panels, power supplies, etc. will be bolted directly to the cabinet. This configuration is to be modified considerably on future units. As Dave took a three day honeymoon in New York, which we don't begrudge him, there has been some delay in getting out the details of this unit but the cabinets can be ordered today, the table and panels were ordered last Monday and I believe we should be able to make these cabinets ready for assembly on March 16th as per the original schedule.

### EN 1196

We have worked out, I believe, all the details, for mechanical inspection on the first units which are expected to arrive sometime between this Friday and next Tuesday from Midwestern Instrument Co. These will be mechanically and electrically inspected. They will be removed from the cabinets, the cabinets will be retrofitted, brought up to date by the addition of a new bottom pan and units reinstalled and this I believe is to take no more then four days for each unit. This includes disassembly, retrofit to the cabinet and repainting and reinstallation. Approximately one day for each operation. Phil Backholm is still carrying on investigations, designed to give us better cooling and better noise levels from this cabinet and machine assembly.

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L. Prentice (cont.)

We have ordered today, a renovation of one of the Bristol recorders so that it will have a range of -20° to +150° F. to make possible better surveys of the inside of computer cabinets. By this method we believe we can take sufficient readings to give us a good indication of what is going on in the computer cabinets, mag tape assemblies, in any enclosed area. These recorders will handle up to 12 thermocouples. If this recorder proves to be successful, we will have a second one retrofitted as soon as possible and will be available for heat checks of almost any nature. We welcome comments on the ranges that various people believe to be necessary in their operations.

EN 1282 - PDP-7

First prototype cabinets of this are ready now for the mounting of electrical components. Not all the details of trim or panels are complete.

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## QUALITY CONTROL

### U. Skowronek

Besides the usual routine jobs, I designed a D-C differential amplifier, one model of which is presently being used as an operational amplifier by Barbera Stephenson in one of her A-D systems. Although the amplifier was designed, because she had a need for one, I hope that once I will have completely specified it, it might become useful for other people too. Here is a rough idea of what it does: The bandpass is 141 KC; the gain bandwidth product is 10 mc, dc-gain is 10,000. The amplifier has a maximum output voltage of 20V peak-to-peak and can operate in the presence of common mode voltages between +10v and -10 volts. Right now, I am working on the design of some DC to DC converters with regulated output voltages. One of the possible applications of the converters would be the supply of power to A-D packages that require regulated voltages.

### J. Cudmore

Due to popular demand I have attempted to re-write the wiring color code standards. A copy of the preliminary second version can be obtained from me or Don White. Interested parties should obtain a copy and have their say now.

A timing relay and a power contactor are presently being tested for Arthur Hall. This has led to an investigation of the transient input requirements of our power supplies.

I am now learning the programming of the Auto Module Tester. A Ripley fan was placed on life test this week.

### K. Doering

We have started recently to check certain models of DEC products before they leave drafting. We felt that errors could be detected in an earlier stage and taken care of without writing ECO's, which usually involve a lot of time and paper work.

This sytem seems to work out very well. The first few times when the inspector checked models before the drawings were signed off, some annoying discrepancies were eliminated.

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## SALES

### J. Shields

The basic logic class ended today with a final exam. I hope to have the grades and standings out to personnel by early next week. The class lasted a total of nine weeks and I'm quite pleased with the results so far, even though I may be a bit premature.

All of our 16K memories have been installed and accepted and are working well. The only remaining 16K field installation is at AECL, and this hybrid type system (the old 4K and new 16K with PDP-6 control logic) will be handled by Steve Mikulski.

The PDP-5's to date, have been quite reliable - this also includes the ASR-33. We hope to nail down ASR-33 problems with good preventive maintenance procedures. We are presently working on these procedures with Bob Savell and hope to have them shortly.

### B. Oakley

The past few months have shown a slight decrease in our previous sales forecasts for modules. Computer sales have been more severely affected by the decrease in general industry demands. The apparent reason for this is the cancellation of a number of government contracts in this area in the past few months.

New modules and new module accessory equipment constitute the most significant sales aides which we can use effectively. The company is moving very fast now in new developments and often the Los Angeles office outruns its supply line--literature. Our Xerox copy machine saves us many times! A new modules catalog will help us immensely, saving us much time supplying information verbally. A typical customer comment is, "We have all the current information, but we can't figure out how to keep it in order."

The L.A. office has a small group of customers to whom more than half of our sales are made. They are frequencly referred to as the "Big Three," because we have had them for some time and the future looks good for continued sales to them. They are:

Edgerton, Germeshausen & Grier -- Las Vegas, Nevada.
An increased effort in systems building will result in some large quantity module sales in the next few months. These people maintain a large stock pile of our system modules for quickie projects, and spare parts for many existing systems. We have a good possibility of selling them a computer for data reduction this year.

Holloman AFB, Alamogordo, New Mexico
Dr. Gschwind, of Systems, is anticipating a very large system this year. It will require many

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Bob Oakley (cont.)

system modules, including VHF modules. During the past few years, DEC has been the sole-source supplier of modules to the very active, competent group. For the first time, to our knowledge, they are investigating other vendors. During a recent visit I met the 3C's salesman coming out of Dr. Gschwind's office. Our position is still very good, and continued high quality along with a little additional service from us will keep this very good customer.

Their PDP-1, used for film scanning, is operating to everyone's satisfaction. More computers will be required for an increasing work load here. Hopefully, we will sell them another PDP this year.

Jet Propulsion Laboratory, Pasadena, California

JPL is currently our largest module customer. However, the future isn't quite as rosy as it is with the other two. Many systems are being contracted out. Some of the engineering groups are becoming saturated with DEC modules. There are other areas at JPL where we have a high potential but they are currently using 3C's modules.

The four PDP-4's at JPL have an outstandingly excellent record, while the two PDP-1's have had some periodic problems. Some of these problems are beyond our control. The PDP-1/Astrodata Wind Tunnel System is beginning to be operational. We are getting some very good publicity from this system.

JPL is not immune to contract cancellations, and some of the forecast PDP-5 sales have fallen through as a result. We are about to get an order for the first PDP-5 from JPL. It will be used in the Space Flight Operations Facility (SFOF) System, to check out the system peripheral equipment directly and through the system multiplexer.

There are approximately twenty other active customers and some good future customer possibilities. Listed below are a few of the more interesting items.

Denver Research Institute -- Denver, Colorado

Use large quantities of modules for systems built by the Institute and by contractors for the Institute. They have some systems under consideration for which we expect some good module orders this year.

General Dynamics, Pomona, California

We expect very little in module sales this year, even though we have sold them large quantities in the past. Several project cancellations have resulted in having entire systems put into bonded storage. Only a few DEC modules are found in laboratories which were previously dominated by hundreds of modules now in storage. At the present time, one to two hundred engineers and technicians are being laid off each week. This has been going on for months and no relief is in sight. Needless to say, the morale at G. D. is low. Even though all these

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Bob Oakley (cont.)

problems exist, some work does continue. We have a very good chance of selling a PDP-4 for a check-out system.

California State Colleges

We have been working with the Engineering Departments at the two State Colleges in Los Angeles County. These schools have been going through a transition to becoming first class, academically. Past favoritisms have been towards the California University, which, incidentally, are very good customers, particularly in the San Francisco and Bay areas. We have had laboratory modules demonstration kits in use at the State Colleges periodically. Many people are interested in modules for academic purposes and prospects look good for the future, including PDP-5's.

System Development Corporation, Santa Monica, California

The PDP-1 installation has helped module sales, but not to our full expectations. They also have suffered contract losses and for the first time, have had lay-offs. The president of the company resigned a few months ago, which has had further bad effects. We are hoping that SDC will be back on our list of high volume customers in the near future.

Space Technology Laboratories, Redondo Beach, California.

We shouldn't say much about STL, because the situation is embarrasing. They are five minutes from the office and the largest prospective customer for both modules and computers. Our attempts to sell have met with resistance, but we are making small gains. The most recent sale had unfortunate complications. An unrequested incoming inspection report showed defects for every item shipped. This is still in the process of being straightened out and we are hopeful that we can double or triple our sales here in the coming year.

Thompson, Ramo, Wooldrige, Canoga Park, California

Has recently been renamed "Bunker-Ramo," because of a corporate merger with Martin, Marietta. Several possibilities for PDP-5's and modules. A current application for an automatic module tester is in the RFQ stages. The system appears interesting and the possibility of selling the DEC approach to this type of problem is very high.

U.S. Naval Electronics Lab., San Diego, California

Continuing research projects at USNEL should bring in some good orders this year. The newly hired people will require applications assistance and DEC's increasingly good modules delivery seems to be making a favorable impression.

University of Southern California, Los Angeles

Our first sale at USC, made recently, was a sizeable one. A selection of laboratory and systems modules will be used for a research project this year and then turned over to the Electrical Engineering Department Lab as a training aid for engineering students and graduate projects.

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Bob Oakley (cont.)

University of Colorado, Boulder, Colorado
The cyclotron projects are beginning to shape up and requirements for equipment being established. We hope to sell modules and a PDP-5 PHA or G.P. data system.

U.S. Naval Ordnance Test Station, Pasadena, California
DEC has had many previous dealings with USNOTS. We are about to make our first module sale here soon. Prospects for computer sales are about as low as they could be here (long time employees of DEC probably know why).

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## ADMINISTRATION

### Purchasing

P. McGaunn

CTS Corporation of Elkhart, Indiana is supplying a sample lot of our standard cera circuits in hopes of becoming a second source of supply to us for our future needs. The evaluation samples will be here around March 2. Burt Scudney and Jim Cudmore will do the evaluation work on these.

I am checking various capacitor manufacturers to see if they possibly can make a 125,000 or 250,000 mfd capacitor at 125 volts with low leakage. Emile Chevrier and Don White are trying to find an acceptable unit to design into future equipment.

D. Kuyamjian

Ramsey Engineering, the manufacturer of core handlers for use with our core testers, has advised us of a new core chute for use with their core handlers.

In the past a hard coat anodized aluminum chute was used. The new chute, with an insert of non-magnetic carbide, has a life of five to six times that of the old chute.

Shipment of the four Teletype 35 Page Printers originally due for delivery in January, is now scheduled for March. A specific date has not been determined.

An order was placed this week with Potter Instrument Co. for twelve M906 II Tape Transports, seven of which are 50 cycle. Delivery is scheduled to begin in April.

Purchasing effort has begun on the six Line Computers. The Soroban FK-2 Keyboards and the Tektronix RM561A Oscilliscopes are on order for delivery to begin in March, one unit every two weeks.

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## MECHANICAL ENGINEERING

L. Prentice

| | | |
|---|---|---|
| EN 1252 | Security | 15% |
| EN 1000 | Building Layout | 35% |
| EN 1291 | 1836 Pin Modules | 30% |
| EN 1292 | PDP-8 | 20% |

### EN 1000 - Building layout and relocation

Building #12 display area for Bob Beckman is now about 95% complete. There is painting and some finishing to be done and about one more day for the plumbers. The carpentry is almost complete.

Display area for PDP-6 building #5, 3rd floor. An estimate was made for Gordon Bell to put in a ceiling over this area. The cost of this was approximately $1,510.00. This includes the cost of raising the present partitions 18", relocation and additional lighting fixtures, and installation of a 24" x 24" sectional plastic ceiling. This has not been approved. The painting has been done, some of the floor is being layed and all of the materials needed for completing this job have been received and should be in place by this week. If Bernie Joyce completes electrical services, this area should be ready for occupancy by February 17th or 18th.

Projects not yet complete are Foyer for our building #5 entrance and a clean room on the top floor of building #5, an enlargement of the welding shop in building #4, two additional offices for accounting on top floor of building #5.

### EN1292 - PDP-8

I spent several hours in meetings and with various people trying to figure out, and it seems clear now, what the format for this machine will be. I hope to visit with several suppliers within the next few days as a preliminary survey of outside vendors who can produce parts for this particular machine. A prototype cabinet should be in the shop by the end of next week.

### EN 1136 - Micro Tape 555

We are still doing some work with Don Vonada on the 555 Micro Tape, particularly to ascertain the flatness required for proper alignment of the head with the tape guide.

### EN 1000

New machinery for the sheet metal shop. We have purchased, from Hall, Inc. in Worcester, a large 125 KVA Spotwelder capable of spotwelding aluminum. This is a large machine weighing approximately 8,000 pounds and was delivered here last Monday, has been put in

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L. Prentice (cont.)

place and connected to a new 440 volt service that we have procured from Boston Edison. This required setting a pole and a new transformer and bringing in a new service to the building. Our other heliarc welders will also be put on this 440 volt service. There should be a considerable savings in cost of electric current with this set up. However, there is approximately a $700.00 charge for reconnecting this equipment to the 440 volt service and it will take some years to recover this in service charges, but it also means that we will have approximately 100 to 200 amps with 220 volt service that will now be available for use in building #4, as we had almost exhausted this supply. We hope to have this welder in operation this coming week. The plumbing will be connected to this machine on Saturday, February 15th and we have to arrange for Mr. Hall to be there and check the machine over before we use it. It will probably be Tuesday or Wednesday before we can put it on the production line.

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## QUALITY CONTROL

K. Doering

This week we had to send an inspector to BB&N, where he performed an electrical and mechanical assembly inspection successfully. This system had been sent out previously without the necessary assurance of quality.

Drill fixtures will be made of steel rather than of aluminum in the future, because studies showed considerable dimension variation due to temperature changes. Steel has half the temperature expansion factor of aluminum. This will solve some of the problems on fixtures. The agreement was reached with Loren Prentice.

Standards for anodizing have been made up recently. Copies have been issued, but if somebody needs more, he may please contact our secretary.

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## ADMINISTRATION

F. Kalwell

Jack Smith recently verified that the indicator lights submitted for evaluation which will replace our present T.E.C. indicator have a slight difference in length between the T.E.C. light, so future orders will be placed with either Drake, Dialco or Eldema. These lights will have black barrels and a white translucent lens rated at 28 volts, .04 amps. The difference in price for the new type will be $.47/each as opposed to our old price for the T.E.C. LAMP of $.76/each.

Engineering has recently approved Electric Indicator Company, "Elinco" to supply our requirements for torque motors used on the 555. An order was placed for 100 motors for delivery of 50 by March 15, 1964 and 50 by April 15, 1964. The new price on these motors is $37.55 as opposed to our old price on Eastern Air Device motors of $46.75.

A blanket order was placed with Bourns, Inc. for our annual requirement of 20K wirewound trimmer potentiometers (200L-1-203). Bourns agrees to stock 200 pcs. at all times for immediate release. The new price is $3.71 as opposed to an old price of $4.00.

Recently a blanket order was placed to Daystrom on the Series 510 wirewound trimmer potentiometers. The values ordered are as follows: 10, 40, 60, 100 and 150 ohms.

An order was placed for 50 Howard Industries "Cyclohm" muffin fans to be used on the 555 unit. This unit has a five year guarantee, requires no lubricating and out-performs the present units on life test which are Pamotor's, Rotron's and IMC Magnetics. The cost of this unit with a rear grill is $8.25/each in quantities of 50 pieces.

Amphenol-Borg is presently manufacturing hybrid circuits and plans to quote us on our F150 and CR330's in production quantities and also prototype quantities.

As of January 20, 1964, Paul McGaunn will assume my Purchasing responsibilities, so if any questions arise contact Paul at ext. 282. I'll be working in Modules Sales coordinating the shipping of modules, power supplies, etc.

D. Kuyamjian

Quotations were received from our paper tape Punch and Reader vendors for equipment handling Teletypesetter Paper Tape which is a six level tape with advance feed hole.

| | |
|---|---|
| Punch (BRPE-18) | $713.90 |
| Reader (2500 modified) | $799.80 |

This information was forwarded by Sales to Kie Corporation who is apparently interested in newspaper application of the equipment.

We are presently awaiting quotations from Associated Testing Labs, Blue M Engineering and Standard Cabinet for a small 50 cycle temperature chamber. We received a quotation of $3020.00 from Associated some time ago, however, since their chamber wall thickness caused

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D. Kuyamjian (cont.)

the exterior dimensions to exceed our space requirements, we have asked them to re-quote an a modified version.

Of the seventeen relay manufacturers to whom we sent requests for bids on the power controller time delay relay, (PDP-6) two have submitted bids and two are drafting bids. So far the Westinghouse bid looks the most promising, an we hope to have a prototype of their relay fy March. A. W. Haydon proposed an attractive package also, but their price is almost double our goal. Their representative is working to reduce the price to something competitive.

We have two slots for FIO-DEC Flexowriters reserved in anticipation of an order from Kessler Air Force Base. Friden has a policy of allowing their customers to reserve slots for ten days without committment. At the end of that period either an order is placed or the slots are relinquished. In this case, Friden is able to extend the time period to February 15. If we choose to place an order at that time, delivery can be made in April.

Arrangements are being made to return to the manufacturer 376 parts that were removed from Teletype BRPE-11 Punches and Model 28 Printers. These are all items that we do not use, but which Teletype could not remove from the machines without delaying delivery. Most of the parts should earn credit less a 25% restocking charge. Teletype's Incoming Inspection will determine the parts acceptable.

Monroe Calculating Machine Co. has advised us that the 16 Column Line Printer that Holley is building is scheduled for shipment the end of February. Monroe's forecast ability has yet to prove reliable so I have reservations concerning this new shipping date. However, I have communicated our dissatisfaction with the handling of this job to both Monroe and Holley and expect a renewed effort on their part to get this machine to us.

Production of the Holley 120 Column Line Printer has been halted pending evaluation of the comparable Anelex machine which we will have in our possession during February. This step has been taken due to the difficulties that are still plaguing the Holley printer we have here now.

Production of the Soroban Computeriters (PDP-1) has also been stopped, and cancellation of the remainder of the order, fifteen units, is imminent. Delivery of the Model 3500 Reader, also for PDP-1 has been slowed to one per month.

In the area of Teletype Page Printers, with the exception of the Model 28, the picture is a bit different. We are due to receive four Model 35's the end of this month, two each KSR and ASR; our present order for Model 33 ASR's stands at twenty-five pieces with delivery beginning in February at the rate of five per month. Two Model 32 KSR Printers have been ordered for delivery in early March.

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P. McGaunn

We have purchased a quantity of 2000 pcs. of the Aerovox .0022 mfd at 100 volts disc ceramic, 855 series capacitor in lieu of the lengthy delivery encountered from Erie. Quality Control has approved Aerovox as a second source on this item.

We have purchased a 60 volt, 5 amp power supply from Perkins Electronics which we hope will result in a substantial savings on our yearly power supply requirement. At present we are purchasing the NJE type SY-60-6 which the Perkins supply is equivalent to with one added feature - the Perkins supply has a built in overvoltage protector. Our basic interest lays in the fact that Perkins is quoting their supply to us at a $100.00 saving less than NJE. The evaluation work on this project is being done by Larry White. We expect to have the Perkins power supply in the house by February 10.

The problems encountered with the Wheelock relays in the 555 tape unit have been resolved. Wheelock representatives visited us on Thursday, January 16 and discussed our trouble with Don Vonada. They agreed to select the reed relays that we buy from them at no extra cost. Previous orders were coming through with assorted reeds in them. This problem should not come up again when we start receiving the selected relays.

Don Vonada has taken action to write an up-to-date specification as an inspection guide for all forthcoming relay orders.

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## ENGINEERING

T. Stockebrand

| | | |
|---|---|---|
| EN 2612 | AECL 550 | 40% |
| EN 2609 | Meade 550 | 30% |
| EN 1158 | Prod Eng | 5% |
| EN 1285 | Microtape PDP-5 | 10% |
| EN 1237 | Solid State Microtape | 5% |
| EN 1151 | Advanced Tapes | 5% |

The AECL Micro Tape is ready for shipment on the next bus to Canada. It works quite well after having had fans added to cool it off and some termination problems straightened out to eliminate noise. Fort Meade has still some noise troubles - Don Murphy found static electricity to be the biggest culprit. A pair of visits to Kie Corporation were made to correct the same problems in advance of trouble at that site and to get their second control tuned up. Don Vonada and John Streeter proved themselves very capable by getting #2 working single (double) handed.

Change again - Requests for microtape literature should be directed to Nan Bickford in Advertising, who will issue a standard set: Len's Paper, production checkout procedure, PDP-4 Program Writeups, PDP-1 Writeups, and sections of the Maintainance Manual as it develops. Soon two sections will be available: a "construction set" and a "users set" of literature.

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## QUALITY CONTROL

### J. Cudmore

I have started an evaluation of SDA-7 samples from Motorola. This unit may replace the 2N2804 (TIX-621) and should maintain a better VBE match at elevated power levels because of a lower thermal resistivity substrate. This may permit slight modifications to the 1570 to result in a higher bandpass.

A new elapsed time meter (Sessions) has been placed on test as was an IMC Boxer fan.

### K. Doering

We had an almost 40% rejection rate on some 2000 pieces of paper tape. The manufacturer came in and told us that by some accident, our order was run according to very loose commercial tolerances, which caused approximately 20% of the rejects being too wide or too narrow. They could correct this at the manufacturer's. The rest of the rejections was wrinkled tape (due to manufacturer's improper packing methods) and missing blue lead on the tape. They did not accept these rejections, the latter, because we did not specify so on the order and the fomer because they did not have control over it - and if we insisted they would rather not sell us any more tape.

The tape width is specified 1 inch ±.005. They want us to reconsider this tolerance and accept ±.007. Bob Savell, who sat in on the discussion, will run some tests and let us know if this wider tolerance is acceptable. The manufacturer suggested to use rolled, rather than folded tape, which would eliminate the existing problems.

I invite any suggestions or complaints on this tape, because this would be the best time to incorporate them into the specifications. Also, if somebody thinks and can prove that the tolerances to be are too loose (or tight?) please, let me know.

This Paper Tape Manufacturer is our only supplier and purchasing assured us that they cannot find a second one.

This week a system was shipped to the Central Institute for the Deaf, which had an intermediate inspection. I do not know whether it was ever reworked, as Q.C. has not seen it since.

### A. Parks

Module Repair  Crystal Clocks  First Lot  Finished Goods Sampling

We ordered and received from the N.J.E. Corp. enough transistors and spare parts to put all their power supplies that we had here back in operation. These have now been returned to stock. We also have enough transistors and parts to take care of any others that may be destroyed in checking out computers.



DF633  DIGITAL EQUIPMENT CORPORATION · MAYNARD, MASSACHUSETTS

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A. Parks (cont.)

First lots consisted of the 4552, the 1250 and also the 1570. We have the 4227 coming now. Tom Karpowski is still working with Russ Doane on the 6205's for PDP-6.

We had about 25 crystal clocks of different frequencies and no troubles were experienced here.

Our heaviest repairs from customers seem to be from M.I.T., and we have been able, lately, to get these out almost within two days after we receive them.

A. D'Errico

The following have been tested during the past two weeks:

| Type | Amount | Mfr. | %Reject |
|---|---|---|---|
| 2N3009 | 100 | Fairchild | 0 |
| SDA-6 | 800 | Fairchild | 0.27 |
| DEC-2219 | 650 | Motorola | 1.6 |
| 2N2801 | 46 | Motorola | 2.1 |
| NS3033-3 | 220 | Nat. Trans. | 2.2 |
| SW1250-3 | 805 | North American | 2.8 |
| MD-94 | 839 | Philco | 13.5 |
| GA212 | 3500 | Texas Inst. | 0.3 |
| S1188A | 304 | Texas Inst. | 0 |
| 2N1304 | 5000 | Texas Inst. | 0.6 |
| 2N1998 | 30 | Texas Inst. | 6.6 |
| DEC-1305 | 6250 | Texas Inst. | 0.7 |
| 2N744 | 38 | Texas Inst. | 2.6 |
| | | Diodes | |
| D-662-1 | 33820 | Clevite | 0.1 |
| D664 | 6000 | Gen. Elect. | 0 |
| 1N429 | 200 | Hoffman | 0.5 |
| 1N748 | 130 | Motorola | 0 |
| 1N1217 | 250 | Motorola | 0.4 |
| 1N429 | 25 | Motorola | 0 |
| D664 | 5705 | Nat. Trans. | 0 |
| D-007-3 | 11198 | Nat. Trans. | 0.3 |
| D-003-2 | 27592 | Nat. Trans. | 0 |
| D-003 | 18000 | Sylvania | 0.08 |
| D-007-3 | 1480 | Transitron | 0.7 |

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B. Titelbaum

A new system of collecting multimeters for calibration purposes is now being used. Instead of collecting individual meters as was done in the past, the meters in an entire department are being collected at one time. This is proving to be more efficient and cuts the calibration time down.

We are having considerable trouble finding meters which people misplace or borrow from someone else and forget to inform the person when they have taken the meter.

In the last two weeks we have received CT-2/P6041 Current probes for the 580 series scope, a high voltage probe for the multimeters to read up to 10KV.

A log adapter for the Tektronix Type 0 plug-in unit, it essentially converts the type "0" from a linear to a logarithmic amplifier.

J. Trubiano

In the past two weeks this test equipment has been calibrated:

| Type | Model | Quantity |
|---|---|---|
| Tektronix Oscilloscope | 543/543A | 8 |
| " " | 581A | 1 |
| " " | 551 | 1 |
| " " | 585 | 1 |
| Tektronix Plug-in unit | 82 | 2 |
| H/P Oscilloscope | 175A | 3 |
| H/P Plug-in Unit | 1750A | 2 |
| H/P Delayed generator Plug-in Unit | 1781A/1781B | 2 |

During the last two weeks we received a Hewlett-Packard four channel vertical amplifier plug-in unit Model 1754A. The amplifier has a bandwidth of 40 mc and permits observation of up to four signals simultaneously. The waveforms can be superimposed, each channel of the plug-in unit has a rise time of 9 nanoseconds and a maximum vertical sensitivity of 50 millivolts per centimeter of deflection.

We also received the Boonton sensitive D.C. meter.

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## SALES

S. Mikulski

Reliability data for DEC computers is presently being calculated through a program (CRAFT) which analyzes field service reports. The program has a lot of potential, and in the near future will be generating some very interesting results. The initial routines for handling field service reports are written for reliability calculations as they not only debug the system concept but also produce useful results.

These results have been checked, corrected and rechecked to the extent that these published figures are accurate indications of reliability.

Eventually, easily interpreted figures on reliability will be generated and reported periodically.

Summary

PDP-4 Reliability

Central Processor only - all installations
Installations considered = 9
Total machine hours = 18,106
Inclusive dates of data - 6/1/62 to 9/30/63
Total failures = 28

$$\% \text{ Uptime} = \frac{\Sigma \text{maintenance time}}{\Sigma \text{operating hrs.} - \Sigma \text{maint. time}} \times 100 = 98.056\%$$

Mean time between failures = 647 hrs. (operating)

Excluding Memory Failures -

% Uptime = 98.698
Mean time between failures = 1207

This indicates that about half of all CP failures are in memory.

Equipment at an installation can easily be isolated and data reduced on it separately as shown below:

PDP-4 Teleprinter keyboard - all installations
Installations considered = 9
Total machine hours = 18,106
Inclusive dates of data - 6/1/62 to 9/30/63
Total failures = 4
% Uptime = 99.846%
Mean time between failures = 4527 hrs. (operating)

PDP-1 Reliability

Central Processor - all installations
Installations considered = 26
Total machine hours = 97,743

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S. Mikulski (cont.)

Inclusive dates of data = 11/19/60 to 10/28/63
Total failures = 127
% Uptime = 96.048%
Mean time between failures = 770

Excluding memory failure again nearly doubles the MTBF
Total failures = 63
% Uptime = 96.788
Mean time between failures = 1551 hrs. (operating)

Example of all mag tapes on PDP-1's
Installations = 30
Total machine hours = 100,378
% Uptime = 97.37%
Mean time between failures = 2713 hrs. (operating)

I might add that no attempt will be made now to examine, in detail, the calculating methods. Briefly, the program utilizes as much data as it has regardless of the mask limitations the operator implies (eg., dates, installation, types of equipment etc.). It might use an hour meter reading for a mag tape failure when calculating a punch failure solely because the mag tape failure time is more recent. It ignores such failures as bulbs, as they do not interfere with processor operation. It uses double precision arithmetic and is a complete decimal routine for ease of interpreting.

These are but a few features which will be explained in detail in the formal CRAFT Report.

Other capabilities of the program at present are: Equipment listing, mailing lists, and maintenance contract computations.

The data handling routines are completed and auxiliary programs can be written to make even further use of the data.

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## ADMINISTRATION

D. Kuyamjian

We are presently awaiting a Perkin Electronics power supply for evaluation. There is a good possibility that this supply will replace the NJE SY60-6-D1264 which we are buying at present. Providing the Perkin's supply is suitable, a savings in the area of $150.00 per unit will result.

Teletype Corporation has notified us that during the months of March and April, the Model 33 ASR will be available only with push-button controls on the call unit rather than the rotary dial which is currently being supplied with these printers.

A large order from the Bell System will completely occupy Teletype's production of the rotary dial version of the 33 ASR for those months.

The push-button control will add $30.00 to the cost of each unit, and will affect a total of twenty units, ten each to be delivered in March and April.

By May 1964, the 33 ASR will be offered without the call unit at a price of $582.00.

Outstanding orders are scheduled for delivery:

| | |
|---|---|
| February | - 15 |
| March | - 10 |
| April | - 10 |
| May | - 10 |
| June | - 10 |

All other Peripheral Equipment and Memory Stacks are being delivered as scheduled.

RE: Arthur Hall's advertisement in the January 30th issue of Engineering News for an AC or DC modified contactor for delay on pull-in or drop-out. Details of same is available from Purchasing for 15¢ (no stamps either). Remember - Purchasing can always get it for you cheaper!

B. Farnham

It hardly seems that it has been a month since I made my transition from the Sale Department to the Purchasing Department, where I have found the work most interesting and in sufficient volume to keep me well occupied.

The first problem that I have encountered is that of ensuring delivery of the D-662 rectifiers from Clevite. This particular unit is consumed by Digital Equipment Corporation at the rate of approximately 48,000 per month. We would like to keep about 25,000 units in stock for contingencies; however, we are presently on a hand to mouth basis getting small amounts of two or three thousand about three times a week, so the result is that we are always scrambling.

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B. Farnham (cont.)

Clevite, whose semiconductor program has recently slowed up, is now in the process of going back to two shifts and while our delivery will remain at the present basis for the next three to four weeks, it should be cleared up during March.

Fairchild Semiconductor, who supplies us with the DEC-2894 and DEC-3009's, which are transistors that we anticipate a high usage in, is another vendor that takes consistent prodding to ensure the maintenance of delivery schedules. We do not anticipate any significant problems on delivery with this vendor and the prospects for a normal delivery pattern looks good once we aclimatize ourselves to each other.

If anyone has a problem with delivery on an order, I am here for that purpose, and will be glad to assist. Ext. 220

D. Glazier

The report and survey on cost of rental typewriters and adding machines disclosed some very interesting figure and utilization information. The works committee checked over this information and approved the purchase of all presently rented adding machines and the purchasing of several new IBM electric typewriters. All rented Model B IBM typewriters and rented manual typewriters shall be returned and replaced with down-graded IBM model C's.

This standardization program offers many advantages. It will mean greater flexibility of paper flow because of one type style, uniformity of typewritten documents, quality material will be produced because of better equipment, interchange of typing and one maintenance agreement.

The planned up-grading and replacement program insures 1.) no tremendous expense in any one year because of over aged equipment, 2.) prevention of excessive and costly down time, and 3.) maximum tradein value.

The survey was prepared with four prime objectives in mind.

1. Achievement of maximum proficiency
2. Elimination of costly rentals
3. Advantages of standardization
4. A planned replacement program

All four objectives have been reached successfully.

A large amount of various tools were purchased from Maynard Supply for use in technicians' and Field Service men's tool boxes. The order should be in the plant by February 14.

Paper Mfg. Co., the suppliers of our fanfold paper tape, has informed us that they can no longer hold width tolerances of +.005 and -.003. They claim the tolerance can be held to a minimum of ±.007. Bob Savell is now exploring the possibilities of our being able to accept a .014" spread.

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D. Glazier (cont.)

Klaus Doering has received a sample of Raytheon Marking Ink. Tests to evaluate its ability to withstand a tricholorethylene bath will be performed.

Loren Prentice and I are now working on a contract for periodical inspection of fire extinguishers. A six month or yearly check on each extinguisher would insure us of dependable equipment.

Price quotes from two companies have been received on dynasert machines. Possibilities of purchasing two insertion machines is being thought over. One will be the .400 resistor head, the other a .600 diode head. Quotes were received from United Shoe Machine and Universal Instrument.

D. King

The first casting of the door for the 555 Micro Tape unit from Boston Pattern Works has been received and inspected. This door is a tremendous improvement over the first two orders that were placed with a local foundry, and we are sure that this change in vendors will eliminate the heavy reject due to appearance rate we had on the past orders for this part.

Our vendor in New York who fabricates and etches our panels has slipped badly on delivery the past few months. We had agreed to four week deliveries, but the past few orders have stretched to eight and ten weeks. In the meantime we have given work to a vendor in Boston The first order was excellent on both quality and delivery. This vendor has two more orders at the present time. If these orders are of equal quality and the delivery dates are met, we will have eliminated a problem.

Duplicon Company, Inc. is in the process of fabricating sample panels of our logic cover out of the following materials. Lexan, Royalite, Polystyrene, Polyethylene and Cellulose-Acetate-Butyrate. These panels are to be delivered February 10 for evaluation and comparison to sheet metal panels. Russ Doane will have these samples and I am sure anyone with an interest in them can check them out through Russ.

P. McGaunn

I am looking for a second source on our crystal requirements. The long deliveries on crystals has caused the sales department to quote longer deliveries on crystal clocks to customers merely because of the lead time in securing the desired crystal. It looks like the Clark Crystal Company of Marlboro and the Piezo Crystal Company of Carlisle, Pennsylvania are our best tentative sources at the moment. I plan to buy a few at selected frequencies for evaluation. Further progress will be reported at a later date.

Purchases for the next run of Micro Tape 555 units have been completed with no anticipated delivery problems of any of the required items.

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P. McGaunn (cont.)

I have purchased a quantity of read-out devices for engineering evaluation. Russ Doane is the engineer with the prospective application.

We are experiencing delivery problems with Cornell-Dubilier on supplying our requirement on a dual .1 mfd at 1000 volts for use in our power supplies. Our special lug needs seemed to be the cause of the delay. Cornell-Dubilier expects to ship all our back orders by February 5. In order to insure that similar problems don't occur in the future, we have asked various capacitor manufacturers to quote on this unit for future requirements.

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## SYSTEMS

### E. deCastro

Several days ago I received PDP-5-12. This machine will be used to develop new options and to test new features to be incorporated into the central processor. So far we have tested a modification to allow the paper tape reader to be stopped under program control and installed the new power control 829 and marginal check supply 734B. Both of these features will shortly be available in production machines. New options to be checked out include "Automatic Multiply & Divide #153" and "Micro Tape control #552." The multiply and divide is presently in the final stages of drafting. I expect to complete the design of the Micro Tape control sometime next week. We also intend to attempt to increase the speed of the machine somewhat.

PDP-5 certainly has not yet lived up to its sales expectations. We have not sold a single machine this year and in fact have received only 2 purchase orders in the past 3 1/2 months. I realize that there are several other orders imminent but even if these are included the picture is not overly encouraging. We have a myriad of interest prospects but for some reason or another, just don't seem to be able to convert them to customers. Maybe our initial enthusiasm has died out or maybe there are some problems with the machine, options or software which make it unbesireable to to a certain class of customer. I would appreciate hearing any comments or ideas that anyone might have to improve the sales appeal of PDP-5.

### L. Prentice

| | | |
|---|---|---|
| EN 1252 | Security | 15% |
| EN 1000 | Building Layout and Relocation | 50% |
| EN 1196 | 570 Tape Unit | 10% |
| EN 1185 | Module Development | 10% |
| EN 1136 | 555 Micro Tape | 15% |

#### EN 1000 - Building Layout and Relocation

I have been actively engaged in securing lumber supplies and help for the relocation of the accounting department from building #12 to building #5 in the renovation of the first floor of building #12 and the development of a new display area, 3rd floor, building #5. The first section of this, that is the move of the accounting department to the top floor of building #5, went with exceptional smoothness and I wish to give credit to all those persons who helped in this move. I think it was one of the smoothest transitions I have seen within this company.

#### EN 1196 - 570 Micro Tape

We have experienced considerable difficulty this past week do to the fact that apparently Midwestern Instruments Company reworked the base plate of the machine and did not make any check of what had happened to the mounting surfaces after filling and possible welding some holes that exsited in this aluminum casting. This appears to have caused considerable

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L. Prentice (cont.)

distortion to the plate and considerable hours have gone into finding what the difficulty is and correcting it. We still have minor problems with the doors, the front door, the door seals and the cooling. The sound level has been reduced appreciably with the addition of a muffler to to the vane type air compressor and seemingly most of the problems with this have been solved. However, they remain to be put into practice and the material and the techniques for their application have to be proven.

## EN 1185 - Module Development

We are still spending some time with drafting and outside vendors and arriving at details of design for the .040" boards. These should be able to be finalized and decisions be made on them as early as tomorrow.

## EN 1136 - 555 Micro Tape

Detail changes in the fan mounting to cool the Micro Tape and investigation of the flatness for the mounting plate and the need therefore have been under investigation. These investigation. These investigations are still under way and considerable work remains to be done, records kept of inspections and some coordinating of all this data with Don Vonada to arrive at what the tolerances of flatness needs to be for the Micro Tape base plate. The front door has been placed with another foundry. I made a trip there some time ago with Dick King and discussed with them the problems of the casting. They have since reworked our pattern and have poured two castings, one which seems to be very favorable and they seem to have the capability of producing these now. These were inspected by Ken FitzGerald and Klaus Doering yesterday and it is agreed that the quality is much superior to what we have been receiving in the past. We hope this concludes the problem with this front door casting.

## EN 1198 - PDP-5 Sales

We have been asked to produce a dolly to be used in moving the 555 tape unit easily about school or college corridors and to assist in loading and unloading into our panel truck. The parts for this have been ordered and the design work is underway. Only a small amount of time has been spent on design at this point. We have successfully shipped one of these machines to Washington in a wooden crate very closely simulating the dolly we hope to use as a permanent piece of moving gear.

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## QUALITY CONTROL

### J. Cudmore

I am presently involved in the generation of data sheets for all the 50 cps power supplies. Engineering has proposed that we build all 50 cps supplies with the input taps set for 230 volts. This will protect the power supply from an input voltage that exceeds the tape setting. (Providing the input is less than 230 volts.) The other primary taps will be measured with respect to one of the input wires to guarantee that all taps are correct. Our literature should specify that these supplies will be set for 230 volts.

Several of the more complex modules use very complicated testers and as a result require extensive test time. The tests performed on these units are being reviewed and the tester will be redesigned and simplified if at all possible.

### U. Skowronek

For the past months we have had correlation difficulties with Technitrol, Inc., our supplier of delay lines. Representatives of this firm have now agreed to test delay lines in an actual 1310 and 6310 circuit, before shipping them to us.

I finally submitted my suggestions for changing the 1572 difference amplifier to Engineering and a change notice was issued. The new version of the circuit will have switching transition times of around 200 nanoseconds.

### K. Doering

New marginal check forms have been made up and will be available within the next two weeks.

The mechanical inspection group is understaffed and work is piling up. A considerable amount of work will have to be put out on overtime. We have had a request for two inspectors for more than 11 months, but have seen very few prospects.

People who have to have work inspected, will, therefore, be asked to plan well ahead of time and give fair delivery requirements. There should be some work that is not "rush-rush."

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## SALES

J. Jones

The PDP-5 was shown as a pulse height analyzer at the American Physical Society meeting in New York City. It was well received and at least two sales are expected to result from the show.

One sale should be to Argonne Labs. They have suggested a set of programs which will make the analyzer aspect of the system vastly more useful. We have agreed to write these programs to get the order. This will keep me out of trouble for the next 8 weeks, and it is hoped that these programs will considerably enhance our ability to sell these units.

A quote has been sent to Oak Ridge for a PDP-4 to be used for time-of-flight work. The request for quotation was a "thinly disguised" version of our PDP-4 manual. It's nice to get one of those every now and then.

file

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## ADMINISTRATION

### F. Kalwell

Jack Smith recently verified that the indicator lights submitted for evaluation which will replace our present T.E.C. indicator have a slight difference in length between the T.E.C. light, so future orders will be placed with either Drake, Dialco or Eldema. These lights will have black barrels and a white translucent lens rated at 28 volts, .04 amps. The difference in price for the new type will be $.47/each as opposed to our old price for the T.E.C. LAMP of $.76/each.

Engineering has recently approved Electric Indicator Company, "Elinco" to supply our requirements for torque motors used on the 555. An order was placed for 100 motors for delivery of 50 by March 15, 1964 and 50 by April 15, 1964. The new price on these motors is $37.55 as opposed to our old price on Eastern Air Device motors of $46.75.

A blanket order was placed with Bourns, Inc. for our annual requirement of 20K wirewound trimmer potentiometers (200L-1-203). Bourns agrees to stock 200 pcs. at all times for immediate release. The new price is $3.71 as opposed to an old price of $4.00.

Recently a blanket order was placed to Daystrom on the Series 510 wirewound trimmer potentiometers. The values ordered are as follows: 10, 40, 60, 100 and 150 ohms.

An order was placed for 50 Howard Industries "Cyclohm" muffin fans to be used on the 555 unit. This unit has a five year guarantee, requires no lubricating and out-performs the present units on life test which are Pamotor's, Rotron's and IMC Magnetics. The cost of this unit with a rear grill is $8.25/each in quantities of 50 pieces.

Amphenol-Borg is presently manufacturing hybrid circuits and plans to quote us on our F150 and CR330's in production quantities and also prototype quantities.

As of January 20, 1964, Paul McGaunn will assume my Purchasing responsibilities, so if any questions arise contact Paul at ext. 282. I'll be working in Modules Sales coordinating the shipping of modules, power supplies, etc.

### D. Kuyamjian

Quotations were received from our paper tape Punch and Reader vendors for equipment handling Teletypesetter Paper Tape which is a six level tape with advance feed hole.

| | |
|---|---|
| Punch (BRPE-18) | $713.90 |
| Reader (2500 modified) | $799.80 |

This information was forwarded by Sales to Kie Corporation who is apparently interested in newspaper application of the equipment.

We are presently awaiting quotations from Associated Testing Labs, Blue M Engineering and Standard Cabinet for a small 50 cycle temperature chamber. We received a quotation of $3020.00 from Associated some time ago, however, since their chamber wall thickness caused

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D. Kuyamjian (cont.)

the exterior dimensions to exceed our space requirements, we have asked them to re-quote an a modified version.

Of the seventeen relay manufacturers to whom we sent requests for bids on the power controller time delay relay, (PDP-6) two have submitted bids and two are drafting bids. So far the Westinghouse bid looks the most promising, an we hope to have a prototype of their relay fy March. A. W. Haydon proposed an attractive package also, but their price is almost double our goal. Their representative is working to reduce the price to something competitive.

We have two slots for FIO-DEC Flexowriters reserved in anticipation of an order from Kessler Air Force Base. Friden has a policy of allowing their customers to reserve slots for ten days without commitment. At the end of that period either an order is placed or the slots are relinquished. In this case, Friden is able to extend the time period to February 15. If we choose to place an order at that time, delivery can be made in April.

Arrangements are being made to return to the manufacturer 376 parts that were removed from Teletype BRPE-11 Punches and Model 28 Printers. These are all items that we do not use, but which Teletype could not remove from the machines without delaying delivery. Most of the parts should earn credit less a 25% restocking charge. Teletype's Incoming Inspection will determine the parts acceptable.

Monroe Calculating Machine Co. has advised us that the 16 Column Line Printer that Holley is building is scheduled for shipment the end of February. Monroe's forecast ability has yet to prove reliable so I have reservations concerning this new shipping date. However, I have communicated our dissatisfaction with the handling of this job to both Monroe and Holley and expect a renewed effort on their part to get this machine to us.

Production of the Holley 120 Column Line Printer has been halted pending evaluation of the comparable Anelex machine which we will have in our possession during February. This step has been taken due to the difficulties that are still plaguing the Holley printer we have here now.

Production of the Soroban Computeriters (PDP-1) has also been stopped, and cancellation of the remainder of the order, fifteen units, is imminent. Delivery of the Model 3500 Reader, also for PDP-1 has been slowed to one per month.

In the area of Teletype Page Printers, with the exception of the Model 28, the picture is a bit different. We are due to receive four Model 35's the end of this month, two each KSR and ASR; our present order for Model 33 ASR's stands at twenty-five pieces with delivery beginning in February at the rate of five per month. Two Model 32 KSR Printers have been ordered for delivery in early March.

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P. McGaunn

We have purchased a quantity of 2000 pcs. of the Aerovox .0022 mfd at 100 volts disc ceramic, 855 series capacitor in lieu of the lengthy delivery encountered from Erie. Quality Control has approved Aerovox as a second source on this item.

We have purchased a 60 volt, 5 amp power supply from Perkins Electronics which we hope will result in a substantial savings on our yearly power supply requirement. At present we are purchasing the NJE type SY-60-6 which the Perkins supply is equivalent to with one added feature - the Perkins supply has a built in overvoltage protector. Our basic interest lays in the fact that Perkins is quoting their supply to us at a $100.00 saving less than NJE. The evaluation work on this project is being done by Larry White. We expect to have the Perkins power supply in the house by February 10.

The problems encountered with the Wheelock relays in the 555 tape unit have been resolved. Wheelock representatives visited us on Thursday, January 16 and discussed our trouble with Don Vonada. They agreed to select the reed relays that we buy from them at no extra cost. Previous orders were coming through with assorted reeds in them. This problem should not come up again when we start receiving the selected relays.

Don Vonada has taken action to write an up-to-date specification as an inspection guide for all forthcoming relay orders.



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## ENGINEERING

T. Stockebrand

| | | |
|---|---|---|
| EN 2612 | AECL 550 | 40% |
| EN 2609 | Meade 550 | 30% |
| EN 1158 | Prod Eng | 5% |
| EN 1285 | Microtape PDP-5 | 10% |
| EN 1237 | Solid State Microtape | 5% |
| EN 1151 | Advanced Tapes | 5% |

The AECL Micro Tape is ready for shipment on the next bus to Canada. It works quite well after having had fans added to cool it off and some termination problems straightened out to eliminate noise. Fort Meade has still some noise troubles - Don Murphy found static electricity to be the biggest culprit. A pair of visits to Kie Corporation were made to correct the same problems in advance of trouble at that site and to get their second control tuned up. Don Vonada and John Streeter proved themselves very capable by getting #2 working single (double) handed.

Change again - Requests for microtape literature should be directed to Nan Bickford in Advertising, who will issue a standard set: Len's Paper, production checkout procedure, PDP-4 Program Writeups, PDP-1 Writeups, and sections of the Maintainance Manual as it develops. Soon two sections will be available: a "construction set" and a "users set" of literature.

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## QUALITY CONTROL

### J. Cudmore

I have started an evaluation of SDA-7 samples from Motorola. This unit may replace the 2N2804 (TIX-621) and should maintain a better VBE match at elevated power levels because of a lower thermal resistivity substrate. This may permit slight modifications to the 1570 to result in a higher bandpass.

A new elapsed time meter (Sessions) has been placed on test as was an IMC Boxer fan.

### K. Doering

We had an almost 40% rejection rate on some 2000 pieces of paper tape. The manufacturer came in and told us that by some accident, our order was run according to very loose commercial tolerances, which caused approximately 20% of the rejects being too wide or too narrow. They could correct this at the manufacturer's. The rest of the rejections was wrinkled tape (due to manufacturer's improper packing methods) and missing blue lead on the tape. They did not accept these rejections, the latter, because we did not specify so on the order and the fomer because they did not have control over it - and if we insisted they would rather not sell us any more tape.

The tape width is specified 1 inch ±.005. They want us to reconsider this tolerance and accept ±.007. Bob Savell, who sat in on the discussion, will run some tests and let us know if this wider tolerance is acceptable. The manufacturer suggested to use rolled, rather than folded tape, which would eliminate the existing problems.

I invite any suggestions or complaints on this tape, because this would be the best time to incorporate them into the specifications. Also, if somebody thinks and can prove that the tolerances to be are too loose (or tight?) please, let me know.

This Paper Tape Manufacturer is our only supplier and purchasing assured us that they cannot find a second one.

This week a system was shipped to the Central Institute for the Deaf, which had an intermediate inspection. I do not know whether it was ever reworked, as Q.C. has not seen it since.

### A. Parks

Module Repair Crystal Clocks First Lot Finished Goods Sampling

We ordered and received from the N.J.E. Corp. enough transistors and spare parts to put all their power supplies that we had here back in operation. These have now been returned to stock. We also have enough transistors and parts to take care of any others that may be destroyed in checking out computers.

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A. Parks (cont.)

First lots consisted of the 4552, the 1250 and also the 1570. We have the 4227 coming now. Tom Karpowski is still working with Russ Doane on the 6205's for PDP-6.

We had about 25 crystal clocks of different frequencies and no troubles were experienced here.

Our heaviest repairs from customers seem to be from M.I.T., and we have been able, lately, to get these out almost within two days after we receive them.

A. D'Errico

The following have been tested during the past two weeks:

| Type | Amount | Mfr. | %Reject |
|---|---|---|---|
| 2N3009 | 100 | Fairchild | 0 |
| SDA-6 | 800 | Fairchild | 0.27 |
| DEC-2219 | 650 | Motorola | 1.6 |
| 2N2801 | 46 | Motorola | 2.1 |
| NS3033-3 | 220 | Nat. Trans. | 2.2 |
| SW1250-3 | 805 | North American | 2.8 |
| MD-94 | 839 | Philco | 13.5 |
| GA212 | 3500 | Texas Inst. | 0.3 |
| S1188A | 304 | Texas Inst. | 0 |
| 2N1304 | 5000 | Texas Inst. | 0.6 |
| 2N1998 | 30 | Texas Inst. | 6.6 |
| DEC-1305 | 6250 | Texas Inst. | 0.7 |
| 2N744 | 38 | Texas Inst. | 2.6 |
| | | Diodes | |
| D-662-1 | 33820 | Clevite | 0.1 |
| D664 | 6000 | Gen. Elect. | 0 |
| 1N429 | 200 | Hoffman | 0.5 |
| 1N748 | 130 | Motorola | 0 |
| 1N1217 | 250 | Motorola | 0.4 |
| 1N429 | 25 | Motorola | 0 |
| D664 | 5705 | Nat. Trans. | 0 |
| D-007-3 | 11198 | Nat. Trans. | 0.3 |
| D-003-2 | 27592 | Nat. Trans. | 0 |
| D-003 | 18000 | Sylvania | 0.08 |
| D-007-3 | 1480 | Transitron | 0.7 |

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B. Titelbaum

A new system of collecting multimeters for calibration purposes is now being used. Instead of collecting individual meters as was done in the past, the meters in an entire department are being collected at one time. This is proving to be more efficient and cuts the calibration time down.

We are having considerable trouble finding meters which people misplace or borrow from someone else and forget to inform the person when they have taken the meter.

In the last two weeks we have received CT-2/P6041 Current probes for the 580 series scope, a high voltage probe for the multimeters to read up to 10KV.

A log adapter for the Tektronix Type 0 plug-in unit, it essentially converts the type "0" from a linear to a logarithmic amplifier.

J. Trubiano

In the past two weeks this test equipment has been calibrated:

| Type | Model | Quantity |
|---|---|---|
| Tektronix Oscilloscope | 543/543A | 8 |
| " " | 581A | 1 |
| " " | 551 | 1 |
| " " | 585 | 1 |
| Tektronix Plug-in unit | 82 | 2 |
| H/P Oscilloscope | 175A | 3 |
| H/P Plug-in Unit | 1750A | 2 |
| H/P Delayed generator Plug-in Unit | 1781A/1781B | 2 |

During the last two weeks we received a Hewlett-Packard four channel vertical amplifier plug-in unit Model 1754A. The amplifier has a bandwidth of 40 mc and permits observation of up to four signals simultaneously. The waveforms can be superimposed, each channel of the plug-in unit has a rise time of 9 nanoseconds and a maximum vertical sensitivity of 50 millivolts per centimeter of deflection.

We also received the Boonton sensitive D.C. meter.

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## SALES

S. Mikulski

Reliability data for DEC computers is presently being calculated through a program (CRAFT) which analyzes field service reports. The program has a lot of potential, and in the near future will be generating some very interesting results. The initial routines for handling field service reports are written for reliability calculations as they not only debug the system concept but also produce useful results.

These results have been checked, corrected and rechecked to the extent that these published figures are accurate indications of reliability.

Eventually, easily interpreted figures on reliability will be generated and reported periodically.

Summary

PDP-4 Reliability

Central Processor only - all installations
Installations considered = 9
Total machine hours = 18,106
Inclusive dates of data - 6/1/62 to 9/30/63
Total failures = 28

$$\% \text{ Uptime} = \frac{\Sigma \text{maintenance time}}{\Sigma \text{operating hrs.} - \Sigma \text{maint. time}} \times 100 = 98.056\%$$

Mean time between failures = 647 hrs. (operating)

Excluding Memory Failures -

% Uptime = 98.698
Mean time between failures = 1207

This indicates that about half of all CP failures are in memory.

Equipment at an installation can easily be isolated and data reduced on it separately as shown below:

PDP-4 Teleprinter keyboard - all installations
Installations considered = 9
Total machine hours = 18,106
Inclusive dates of data - 6/1/62 to 9/30/63
Total failures = 4
% Uptime = 99.846%
Mean time between failures = 4527 hrs. (operating)

PDP-1 Reliability

Central Processor - all installations
Installations considered = 26
Total machine hours = 97,743

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S. Mikulski (cont.)

Inclusive dates of data = 11/19/60 to 10/28/63
Total failures = 127
% Uptime = 96.048%
Mean time between failures = 770

Excluding memory failure again nearly doubles the MTBF
Total failures = 63
% Uptime = 96.788
Mean time between failures = 1551 hrs. (operating)

Example of all mag tapes on PDP-1's
Installations = 30
Total machine hours = 100,378
% Uptime = 97.37%
Mean time between failures = 2713 hrs. (operating)

I might add that no attempt will be made now to examine, in detail, the calculating methods. Briefly, the program utilizes as much data as it has regardless of the mask limitations the operator implies (eg., dates, installation, types of equipment etc.). It might use an hour meter reading for a mag tape failure when calculating a punch failure solely because the mag tape failure time is more recent. It ignores such failures as bulbs, as they do not interfere with processor operation. It uses double precision arithmetic and is a complete decimal routine for ease of interpreting.

These are but a few features which will be explained in detail in the formal CRAFT Report.

Other capabilities of the program at present are: Equipment listing, mailing lists, and maintenance contract computations.

The data handling routines are completed and auxiliary programs can be written to make even further use of the data.



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## SYSTEMS

### D. Tringale

During the past two weeks we have been working on a variety of projects.

One of the projects has been the evaluation of the Tokyo Radio NDRO thin film memory. The one main problem encounted was finding an output signal, because there was so much noise coupling from the word drive lines to the digit drive lines. We solved this problem by isolating the digit drive current from ground by transformer coupling thus having the digit lines in the plane floating all the time. Thus any capacitance from the word drive to the digit drive is attenuated by the capacitance of the digit drive line to ground. In addition to this we transformer coupled the digit line into our sense amplifier. The end result was a 16 mv signal (2 bit worth) with a word drive of 150 ns 600 ma, and less than 2 mv noise. Switching times of less than 20 ns were achieved with peak outputs of 36 mv. This was with a word drive of 40 ns, 600 ma, and digit drive held at 50 ma, 100 ns.

We are also doing development work on current drivers. One of the things we have tried is switching the output transistors. By switching the collectors we were able to vary the current amplitude and also reduce the output capacitance of the drivers. The next thing we will be trying will be switching both the bases and collectors of the output transistors. This will allow us to reduce the output capacitance and at the same time increase the rise time of the current pulse at lower currents.

In the past two weeks we have been doing work on the pulse transformers used in the read-write switch 1990 and a new SCR readwrite switch. We are trying to reduce the capacitance coupling between primary and secondary of this transformer. We found that the capacitance can be greatly reduced by coating the core with a plastic material which has a low dielectric constant. The size of the core material has been increased in cross sectional area so as to reduce the number of turns required on the transformer.

This week we received a reply from Kanagawa, Hitachi asking for specific specifications on a newly designed memory tester which is composed of a program generator, temperature controlled oven, and 3 drive stations. In this system we are proposing to use the new SCR and reed relay read-write switch.

### L. Butterworth

The modification to the Memory Tester 1516E at RCA, Needham was completed last week by Pete Januskiewicz. The sensing system was completely revamped, added to, and moved directly behind the sense plugs. Z addressing was increased to 128 for addition of 2 racks of logic. We are now awaiting new 1807 reed relay modules to install in this modification. Evaluation of the 1807 will be made for the first time in a complete system.

The Memory Exerciser 2214 for Hitachi has almost been completed by Ted Kauppi. We are waiting for a special Deltron power supply, 778A power supplies and a new bus driver module,

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L. Butterworth

type 1693. Checkout time is being cut down by these delays, as the shipping date of Jan. 24 draws near. This is a large system and we need at least three weeks checkout.

The Memory Exerciser 2215 for checking PDP-6 memories will be under construction by Monday the 6th.

The Memory Exerciser 2216 for PDP-5 is still in the design stage, with about 3/4 design being done.

I am working on a bid for MIT which seems to be a straight forward system. It is called a Digital Correlator and uses 10 mc logic. Although the system is small a very large volume of modules will be used, for instance: one channel requires (26) 6201, (2) 6603, (7) 6106, (2) 1150, (2) 1410.

The bid is for 50 to 100 channels.

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K. FitzGerald

| | |
|---|---|
| EN 1253 | 20% |
| EN 1254 | 60% |
| EN 1178 | 10% |
| EN 1097 | 10% |

The greatest percentage of my time has been spent on the tape controlled milling machine. Since the sequence read-out and the turret depth stop have been installed, we have had to readjust our method of controlling the depth and cleaning up of all the programs to see that the sequence is accurate. In order to more readily switch over from one job to another, we have added a dial indicator to the column of the machine so that the table height, in relation to the spindle, can be accurately located within .005" simply by turning the crank and reading the indicator. This will allow us to program the machine, calculate the advance of the quil, determine the length of the tool, and specify the amount of fast approach to the work that is required only once and then be able to repeat this whole set-up at any other time to switch from one program to another in only about 30 minutes. This is an improvement in the required set-up time of about 100%.

The PDP-6 has been experiencing heat difficulties recently which, I feel, cannot be completely analyzed until such time as the machine is completely assembled with all end panels in place. As long as one end panel is off, it is impossible to obtain any pressure in the system, therefore, all of the fans in the bottom simply exhaust their air out through the area of least resistance which is the open end. Once the ends are closed up, the air which the fans are pushing into the cabinet can only escape through the front of the machine, past the modules and out between the plugs. However, it was also noted that on many of the mounting panels, the wiring is so tight and compact between the plugs that it will be next to impossible to get an appreciable air flow past the particular modules next to those plugs. Additional fans will not alleviate this condition at all. There is one area under the front console of the PDP-6 where there is a definite air leak and a new baffle must be designed and installed. This will be done when the PDP-6 group is ready to have the unit completely assembled.

There has been very little progress made on the equipment for automating the modules, silk screening, & etching areas. I visited Sanders Associates in Nashua today and inspected their module screening and etching area which seems to be a pretty efficient operation, although it could be more efficient by eliminating special holding fixtures for each phase of their operation and incorporating one fixture which could be used from silk screening all the way through the finished etched and solder plated board. I am in hopes to be able to spend some time in the next two or three weeks designing the machinery for drying, etching, and tin plating the boards which will be incorporated into the equipment we already have.

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## MECHANICAL ENGINEERING

L. Prentice

| | |
|---|---|
| EN 1252 Security | 20% |
| EN 1096 | 10% |
| EN 1136 Micro Tape | 20% |
| EN 2609 | 5% |
| EN 2791 | 5% |
| EN 1185 Module Provisions | 20% |
| EN 1000 | 15% |
| Meetings with various committees | 5% |

### EN 1196 570 Tape Transport

Nine cabinets have been delivered to Midwestern Instruments, Tulsa, Oklahoma. One cabinet is in the process of up-dating and the one transport that is available has been transferred to the latest design cabinet. This is not completely finished but is set up and will be operable today so it can be put on line as soon as the wiring can be finished. Things still to be done are; a door latch or lock, a spring detent to hold or secure the sliding door at the bottom position, more complete testing for soundproofing and to make sure adequate cooling exists for the unit. These should be well cared for by the time the units are returned from Tulsa so that a minimum time can elapse before these units are ready for sale.

### EN 1185 Mechanical Development of Modules

Have been confined almost entirely into writing change order to up-date the standard module line.

### EN 2609 Fort Meade Micro Tape

I believe all the parts have been delivered to Production to complete this unit.

### EN 2791 PDP-5-10

This unit with drawings for installation, has been completed. All parts, modifications, etc. have been delivered to production.

### Etched front panel for all machines.

We are experiencing unprecedented delays in obtaining, from our vendor who has performed in the past reasonably well, the etched panels for the PDP-6 modifications to PDP-1 new panels for PDP-5 etc. All of these panels are several weeks overdue from the vendor.

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QUALITY CONTROL

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J. Cudmore

Superior Electric Company makes a low voltage 60 cps variac. Samples of these units have been tested for use in the 730 and 734 power supplies. These power supplies presently use a 400 cps higher voltage unit. The use of these smaller variacs will greatly simplify the mechanical complexity of the 730 P.S. The samples and modified 730 have been turned over to Russ Doane for action.

Vitramon makes a "bounceless" switch. The first sample received did bounce when operated under certain conditions. They then supplied us with a breadboard of a new version. This switch does not appear to have any bounce. If this switch can be made in production quantities they would have many uses.

K. Doering

Mechanical inspection is in the works of checking out a new wire wrap tail connector from Amphenol (22 contacts). Results should be out by Monday, next week.

A standard for the tightening and assembly of stud mounted semiconductors will be issued today with special attention to the torque requirements. Interested persons who may not receive a copy, please contact our secretary.

John Trubiano

In the past two weeks, this test equipment has been calibrated:

| Type | Model | Quantity |
|---|---|---|
| H/P Oscilloscope | 175A | 3 |
| H/P Plug-in unit | 1750A | 3 |
| Tektronix Oscilloscope | 543/543A | 5 |
| Tektronix Plug-in unit | CA | 5 |
| Tektronix Plug-in unit | Z | 1 |
| Tektronix Plug-in unit | E | 1 |

A. D'Errico

| Type | P.O.# | Am't Rec. | Mfg. | % Rejects |
|---|---|---|---|---|
| SDA-4 | 25648 | 16 | Fairchild | 0 |
| 2N2714 | 27383 | 300 | General Electric | 0 |
| 2F2506 | 29673 | 72 | Motorola | 2.7 |
| SF2507 | 29673 | 130 | Motorola | 3.0 |
| 2N2904 | 29884 | 1600 | Motorola | 0.2 |
| MM999 | 28992 | 8 | Motorola | 12.5 |
| SW12503 | 28393 | 203 | North American | .0 |

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A. D'Errico (cont.)

| | | | | |
|---|---|---|---|---|
| MA-90 | 25681 | 13,945 | Philco | 0.6 |
| 2N1754 | 23352 | 5010 | Philco | 1.5 |
| 2N656 | 30833 | 10 | Texas Inst. | .0 |
| 2N1998 | 31356 | 25 | Texas Inst. | 0 |
| 2N1998 | 30566 | 9 | Texas Inst. | 0 |
| T1796 | 29670 | 218 | Texas Inst. | 1.3 |
| 2N1309 | 27298 | 1000 | Texas Inst. | 0.7 |
| 2N1908 | 31535 | 33 | Texas Inst. | 3.0 |

Diodes

| | | | | |
|---|---|---|---|---|
| D-662 | 24225 | 11,307 | Clevite | 0.5 |
| 1/4M8.225 | 30468 | 71 | Motorola | 0 |
| 1/4M8.25 | 30468 | 30 | Motorola | 0 |
| 1/424A25 | 30899 | 20 | Motorola | 0 |
| 1N748 | 30994B | 30 | Motorola | 0 |
| D-664-3 | 28931 | 6,000 | Nat. Trans. | 0 |
| D-003 | 27677 | 32,204 | Sylvania | .47 |

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## SALES

J. Burley

This being the last opportunity of the year to enter a Biweekly I though I had best enter some results and reflections. First the status of customer interest in my expansive (and sometimes expensive) territory.

NASA - Huntsville: Very strong interest in purchasing two PDP-5's. I would say there is better than a 50% chance to get both orders. Appl: test stand instrumentation. (Price of PDP-5 is big factor.)

NASA - Goddard: Interest in two or more PDP-5's for gathering and formatting slow telemetered data. This one is better than 50%. (Price of PDP-5 as well as Mr. Green's regard for DEC equipment are selling factors.)

Budd Electronics - a newcustomer in the module end. We're helping them build a flying spot scanner. (Not sure why they came to us).

NSA Ft. Meade: They want a PDP-4 with special 340 and I/O equipment for communicating with existing CDC 1604. Bob Savell is the force behind this one. (The salesman here is probably the PDP-1 at NSA.)

Westinghouse - Pittsburgh: No new significant orders but they now have estimated their module requirements for this year to be above $100,000. This is above and beyond their computer needs. They will also be ordering a $25,000 special I/O system for their 4th PDP-5 to be delivered March 1st. (This is providing Ed de Castro can learn to get by on 2 hours sleep a night.) Westinghouse is very proud of their "house" PDP-5 and have shown in an open house already. For those unaware, we now have our own Pittsburgh Office. Ray Lindsay is the Brass Hat there and will be servicing Westinghouse. Lots o' luck, Ray.

NASA - Goddard: A PDP-4 is under consideration here for a data gathering application. I can't evaluate the poss on this one yet.

University of Michigan: George Rice has been instrumental in selling just about everything we make to these people. Their every application seems suited to DEC machines. Some are now being considered.

Sun Oil Co. - Beaumont, Texas: This is about the most exciting application being considered at the moment in my area. I reported the details on this earlier and Nick has some info on file. The exciting facet is that a PDP-1 (large) is the heart of the system. The industry is non-renegotiable and the application is endless in number of potential customers. It's sort of a PEPR system but for the petroleum industry in that if we can get it to work for Sun (assuming we get an order) then all other companies will jump on the program. John Koudela is working up a proposal and says the -1 can easily do the job.

Western Electric - No. Carolina: The Burlington plant has recd contracts for commencing work on Nike-X. I am assured that buckets full of 30 mc logic will be needed once they get started. To refresh everyone's memory hundreds and hundreds of modules were used on

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their other Nike projects of the system modules. (I don't have the figures but it was in six figures.)

APL - Silver Spring: Not the customer they used to be but there is hope they will still buy an occasional $25,000 worth.

Naval Ordnance Lab - Silver Spring: An application here for a PDP-5 to be used as a general purpose test stand signal handler, formatter, etc. (Price is the big consideration and the I/O section should sell the machine.)

DuPont - Wilmington and all over: This is a good example of the investment often necessary to sell a big commercial customer. This all started over a year ago and still not one single sale to them. It looks, however, like we will start being rewarded for our efforts by some orders. There are several applications under consideration, the majority of which will be testing and data handling, possibly some control later on. Just about everyone at DEC has at one time or another been involved with DuPont's Ed Yetter so just about everyone knows about them. He's a good booster for us. Allen Titcomb has the details on their latest ideas.

Fischer & Porter - Penn: Long ago we made our first contact with these people on a tip from Dave and now it looks as though some inroads may be made. They are quoting our equipment on some contractural work. They did, however, order a DDP-24 a few months ago. They have expressed some concern over its delay and the like lately. George Rice has the details on this company.

Thiokol - Georgia: An application for a data handler and test programmer. Our low cost on the PDP-5 has tempted them to order it rather than a $15,000 test sequencer which would have limited capability. They must get management approval, however, before buying the -5. This is renegotiable.

NASA - Houston: That long awaited order for $65,000 worth of 10 mc equipment is "right around the corner" according the Schoonmaker Co., who in turn were told this by NASA. This should be a big benefit to us at Houston - if the project goes successfully, that is.

Misc: Other agencies and companies around the area are at some point of interest in our products whether PDP-5 or modules. Primarily, however, it seems to be mostly PDP-5 now. There are so many applications for this machine that were never associated with computers merely because computers cost too much. The -5 has just broken into areas never invaded by high speed machines before. Module sales are sketchy and not too good. No doubt much of it is due to my putting most of my effort on computers. In a territory that encompasses one third of the nation's population one sort of goes where the biggest vacuum exists, where the loudest customer dwells. I do very little of what might be termed creative selling, or even aggressive selling. There simply are too many customers with questions to be answered that there remains no time for selling, (save of course, the obvious "selling" one does when answering questions for prospects.) For these reasons I don't feel I can push my territory appreciably one way or the other. My big module customers haven't bought much lately so I've lost a lot of momentum. I'll be putting more effort on modules (as promised about two months ago.)

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J. Burley (cont.)

I still think we need a low cost version of our lab modules, one in kit form if that is the only answer. A kit could be inexpensively assembled by a university for training and research. By kit I mean only that mechanical part of the system, not the modules, which would be the system type.

I hope to have my module quoting program ready for the PDP-5 shortly after the first of the year, the idea being to type in a list and quantity of modules and the -5 prepares a priced quotation based on past sales to the particular customer. A later feature to be added would be for the -5 to punch out a five-level tape in TWX format for transmission to Maynard for getting delivery info and for keeping production informed.

As soon as the Module Guidance Comm. comes up with firm decisions on which modules to add to the line and which to drop, if any, I would like to get a copy of the report. It is not at all uncommon to help customers design systems that won't be purchased for six months or more. Knowledge of the forthcoming modules helps in making good economical designs. The prelim sheets put out by Velma are extremely helpful.

At the last sales meeting we discussed starting a sales dept. newsletter. If Stan is interested in the project I volunteer for those jobs that can be done out of town.

My main gripe this time is once again communications. I know everyone is tired of hearing this but then I am tired of not getting answers to letters, TWX's, etc. Frankly, the worst offenders are those higher up the management ladder, not engineers, etc. or secys.

Any work that can be done to compress some of our literature will be most appreciated. I feel obligated to take along almost all of our current literature that covers tech data on trips that involve several customers. My bag weighs close to 20 lbs. a composite brochure covering options might cut down some of the mass. The new module catalog with fewer blank pages hopefully would be lighter, also. We have a lot of individual pieces of literature that prompt their being lost easily. We should all appreciate the quality, however, of of our literature. A Packard-Bell man once told me that if their literature was as good they could set the world on fire. (With that much paper he's probably right.) It is excellent and we should all appreciate it. (Just send us some.)

Contributed to Biweekly Report of December 20.