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## ADMINISTRATION

### H. Crouse

There is now available for everyone a formal system for obtaining price and delivery information from vendors. The system can be used as a media for defining problems and design requirements to potential vendors.

Although difficult to replace the speed of a telephone call, it is impossible to retrieve all unrecorded information. To this end the below form and system was developed.

### Richard Mills

### Accounting PDP-4

The Accounting Department is continuing with its plans to convert all of its installations being done by the IBM equipment to the PDP-4 as soon as possible, with a tenative final rollover date of September 30, 1963. The PDP-4 equipment on the first floor of Building #12 has been assigned to Bob Beckman for control of scheduling and maintenance with the schedule being prepared around fixed committments of the Accounting Department. The equipment is currently down for a complete tuning and will be ready to turn over to us for use on July 1, 1963. Fred MacLean has written six programs and is looking forward to getting started on the PDP-4. We have made an estimate of the additional volume which will be coming our way, due to programs we now have in operation and it shows a 115% increase in card volume, which required ordering certain perpherial items to go along with the PDP-4. Due to this planning, we expect to be in a position to handle the increased volume as it phases in.

### Auditors

Our fiscal year end of June 30, 1963 is rolling along again, and you will see people from Lybrand, Ross Bros. & Montgomery, our auditors, going thru the plant and know that you will give them every cooperation possible. Our inventories will be taken the last week in June and we will be using IBM cards to do this for the first time, which will greatly increase the speed of calculation. Inventory instructions will be out this week.

### Dick King

Sub-contracting continues to be very busy, as it has been for the last month. At the present time we have seven jobs at sheet metal vendors, three jobs at machine shops, plus our usual load of silk screening and finishing. We have two vendors assembling boards, one vendor drilling boards and three vendors wiring. Other lines of work being done outside are etching and engraving, pattern making, foundry work and our implosion shields.

After checking with most of our vendors we find that the majority will have no plant shutdown for vacation. This eases the worry of our vendors meeting our delivery requirements for July and August.

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D. Kuyamjian

Two more Model 33 Printers with tape reader and perforator have been ordered from Teletype and are scheduled to arrive August 7, 1963.

The Monroe 16 column line printer purchased for Ken Wakeen will be shipped the first week in July.

Complete purchase specifications are currently being written for all standard in/out major components. This will insure receiving the equipment exactly as we use it.

## Delivery of Standard Equipment

The model 2500 Readers from Digitronics are being delivered according to schedule. Two were received this past week and Digitronics has confirmed that the balance will be delivered according to our required schedule of two per month - July through October. Although Digitronics missed delivery of the two Model 3500 Readers in June, they will be able to deliver three each in July and August to bring us up to schedule. The balance of the Model 3500's will be shipped two per month continuing through October.

Soroban Engineering, Inc. is meeting delivery of the computeriters with no problem - two each July and August, three September, two per month October through January.

Teletype will be shipping three BRPE-11 Punches by June 30, 1963 and will complete the present order for punches with three in July and three in August. The remainingtwo Model 28 Printers on open order will be shipped in July.

Seven 18 bit memory stacks with new hardware are to be delivered by Ferroxcube during the next two months. In addition eight will be supplied with the old style hardware.

D. Glazier

The 555 Magnetic Tape, reels, inserts and boxes presently being worked on by Minnesota Mining and Manufacturing Company should be ready for shipment Monday, June 24th.

Equipment and supplies that were ordered under the "subject to cancellation if not received and billed for by June 28th" stipulation are being expedited to our fullest extent. The deadline for placement of these orders is Monday, June 24th.

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## ENGINEERING

### K. Wakeen

Al Falco and Russ Winslow have joined the Production Engineering Department.

Al will carry onthe engineering effort on the Automatic Module Tester with the primary objective of providing production with the capability of testing the balance of the modules for which the system was designed.

Russ is providing the much-needed programming for production testing.

This department has been involved in an effort to encourage sales of module testers and other devices which are computor controlled. We are working in conjunction with the special systems division on an interim basis. It is planned that Special Systems will eventually take over this function.

The following contacts have been made to potential buyers of our Automatic Module Tester.

Burroughs, Electrodata
Burroughs, Tireman
Burroughs, Plymouth
Texas Instruments
Fairchild Semiconductor

The field personnel concerned have been contacted and are informed about all dealings with customers.

The following contacts are being made by field personnel to lay the groundwork for future negotiations.

North Electric
Dura Business Machines
Burroughs, Paoli

A quotation for an Automatic Temperature Coefficient Resistor Tester was sent to Weston Instruments last week.

### A. Falco

In the short time that I have been in the Production Engineering Department, I have spent my time learning the proper operation of the Automatic Module Tester and preparing said system to check out units on loan to us from Burroughs of Plymouth, Michigan.

While becoming familiar with the Automatic Module Tester, I am writing a manual which will be used to explain the features, uses, and explanation of said system.

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A. Falco (cont.)

In order to check out the units on loan from Burroughs, special circuits and logic had to be added to our system due to the method of testing and voltage levels used by Burroughs.

We are presently checking out said logic and circuitry.

R. Doane

| | |
|---|---|
| Test Equipment | 30% |
| VHF Burst Generator | 20% |
| 8401 | 20% |
| Miscellaneous | 30% |

The burst generator is ready to fire up. Module modifications for it are done, and the control panel has been wired. The 8201 tester to match it is finished.

The principal "miscellaneous" activity has been the testing and refinement of the 10Mc-to-1Mc decade counter module suggested by Ollie Judd for nuclear counting people. David Casosent, a summer student, got the model to count up to 10Mc module 10 (1,2,4,8 code) and module 16, with voltage margins, without loading. The aim was to allow readout to indicator lights and perhaps one ordinary inverter at each stage. However, several days ago I learned that Don White is working with another summer student to build a 10Mc 4215; this would lead to a module with much greater overall utility, so the simple counter has been dropped.

The 8401 layout is nearly complete, but the inclusion of logic sections along with the multivibrator requires the use of commercial 50Ω 10 nanosecond delay lines, since even on the double-length board there is not enough room for two stripline delays.

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## MECHANICAL ENGINEERING

L. Prentice

I regret to say that I have not contributed to the biweekly for several weeks. I will try to recap a few of the things that have happened during that period.

First a trip to Tulsa, Oklahoma in regard to the use of Midwest Instrument's M3000 tape unit. This was fully reported on by Roland Boisvert. Their production facilities, while very meager, can be expanded and would have to be considerably to meet our demands. They have extremely competent people in both production and particularly in finishing methods. We talked at length with the man in charge of both these departments.

We have a new mechanical engineer, Mr. Philip Backholm who has a background in electromechanical construction and recently was with Kerfott. He is to direct the mechanical effort towards producing a new cabinet for the M3000 tape unit. The preliminary sketches for this cabinet are now far enough along so that, starting next week, we should be able to start the steel construction for the cabinet of the M3000. This is a major effort to repackage the M3000 tape unit into a cabinet and console configuration that will be compatible with the design of the PDP-4, PDP-5, and PDP-6.

Console design for the PDP-6 is the primary responsibility of Ken FitzGerald. There has been a hold on this console for approximately one week to find out if some firm decision can be made regarding either a magnetic or electrostatic display which is a part of this console and whether or not this can be a separable unit to facilitate construction and testing of both the PDP-6 and the new display unit. Bits and pieces of the PDP-6 are taking shape. Double size module and four times module have had some preliminary work done on them and considerable time has been spent on the cabling for the memory unit by Ron Cajolet. Two or three mock-ups have been made and different configurations sketched up to accommodate the maze of coaxial cable necessary for this new type of extended memory. Scott Miller has been on vacation this past week however, in the weeks previous to this time, an extensive program has been carried on with Van Dyke Associates on preliminary design of the PDP-6 console, the PDP-5 dual cabinet model and the cabinet model of the 30 Display. Two modified models of the light pen have been redelivered to Bob Savell and Derick Chin for assembly and most of the details and styling have been decided on to improve the appearance of the light pen. These are seconday in nature and can be implemented by change orders to the existing drawings. Some work remains to be done on the 555 Tape Units. These are minor changes to implement production and quite possibly a new electronic chassis to accommodate considerable change comtemplated now in that part of the system.

Ken FitzGerald

| | |
|---|---|
| EN 1000 Shop Administration | 25% |
| EN 1000 Design Engineering Show and general engineering. | 15% |

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K. FitzGerald (cont.)

| | |
|---|---|
| EN 1178 PDP-6 | 30% |
| 100-4322 & 100-4529 Micro Tape | 15% |
| EN 1208 DEC Paper tape reader | 15% |

This biweekly covers the past six weeks.

## Design Engineering Show

At the Design Engineering Show, I located a new "rivnut" made by Standard Pressed Steel that could replace all of our present rivnuts. This new rivnut is headless which means we would no longer have the problem of interference between meeting pieces and also eliminate the need of allowing gaps to build-up between meeting surfaces. Samples of this new rivnut are on order.

Also on display was a "Percussive Stud Welder" which could eliminate many of the problems which we are now experiencing. I also talked to some people about the possibility of vacuum forming our computer doors and end panels in a plastic material but most of them felt that we should consider a heat forming and laminating method instead. I have the name of four companies that could do this for us and I will contact them as soon as time permits.

After reading pastbiweekly reports where many people commented about the Spring Joint Computer Conference, I feel I should make some comments about the Design Engineering Show. First of all, our booth was attractive and well attended, however, the PDP-4 did not seem to draw much interest from the mechanical people attending this show since, for the first three days it simply typed out the keyboard and for the last two days it was only typing test points. For a show that is base primarily on mechanics, this type of thing does not hold much interest for a man with a mechanical background. I feel the booth would have been much more impressive if the PDP-4 were doing some type of control work on items such as an automatic drafting machine, XY Axis Plotter, tape control drilling machine, circuit layouts on a display, or any other animated function.

## PDP-6

The appearance design for PDP-6 has been frozen and mechanical assembly design is still up in the air. The reason for this being that at this writing, no decision has been reached yet, wether the display will use magnetic deflection or electrostatic. Once this decision is made, we will go back on the drawing board and finish up the mechanical design, assembly, and detail prints necessary for a first production run. The final drawings will be made in drafting later on.

## Micro Tape

Two weeks were spent working very closely with the people in the machine shop and mechanical inspection in order to mechanically fabricate and complete ten micro tape decks. Quite a bit of difficulty was experienced in making and inspection of jigs and fixtures necessary for this work. However, the job was completed and the units are ready for final assembly. The only hold up has been in receiving motors and other hardware from our vendors. Due to the problems with these jigs and fixtures, the prints have been changed which should help to make this unit a little bit easier to build without sacrificing any of the necessary accuracy.

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K. FitzGerald (cont.)

DEC Paper Tape Reader

The past two weeks have been spent assembling the mechanical parts for a paper tape reader utilizing a stepping motor for drive and eventually we hope to be able to use our own design for light source and sensitive reading surfaces. If this unit works out as visualized, it could very well mean that the paper tape reader could be mounted on the same panel where the present paper tape punch is located and take 1/3 less space then the present reader. I have been working with Bob Savell on this and we are just about ready to start making mechanical tests of the tape moving mechanism.

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## PRODUCTION

M. Sandler

June 30 marks the close of our current fiscal year. We plan to take physical inventory on Saturday, the 29th.

We will close down all stockrooms for issue Friday, June 28. Please anticipate your weekend needs prior to 5:00 P.M. Friday.

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## QUALITY CONTROLS

R. Winslow

### Production Engineering Programming

My first week has been devoted to orientation mostly. I have been familiarizing myself with Len Hantman's original program for the module tester in preparation for making the modifications necessary to the testing of Burrough's modules. Eventually, we will have a "skeleton" program which can be quickly adapted to the testing of modules in any format. A separate program will be developed for in-plant production testing. Concurrent with these activities, I am in the process of compiling a programming section to be appended to the manual for the Module Tester.

J. Cudmore

During the past two weeks we have experienced some difficulty with the Teradyne T-130 transistor tester. Units that were obviously good would fail VCE tests. These transistors were 2N744's, is 370 mc. It was found that these devices were oscillating during the VCE test mode. A representative of Teradyne made a simple change and the equipment is now functioning properly.

We have just received a Hafstrom Thompson model 600 W Temperature Test chamber. This unit uses less $CO_2$ than the larger Delta Design; but has the same temperature range. This chamber went into use upon arrival.

The first lot of the 1704 precision power supply has finally made it through test. The units performed as well as was expected except for the temperature coefficient. The poor temp. coeff. has been traced to zener diode used for the reference. The diode was specified as .005%/°C. The voltage variation curve is very non-linear and looks like a half-moon. As a result, the temp. coeff. is determined in a unique manner that did not agree with our understanding of T.C. The problem has now been resolved.

Klaus Doering

Solder workmanship standards went through the first print and first revision. We have made up actual solder joints according to the pictures and have started to have them photographed in advertising.

Dick King and I visited Boston Precision Co. in Boston, a prospective vendor of ours for sheetmetal and machine work. The place with approximately 60 people was rather impressive. They have total Quality Control and very good machinery equipment in their place. For their punch work, they use presses ("Wiedeman") that work on the pantograph principle similar to our Dynasert machine.

The company's O. C. program allows for much more complex jobs than they are now doing. Some orders have been placed with them following our visit.

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Klaus Doering (cont.)

I think that Purchasing has done a very good job in selecting capable vendors and making them aware of our standards requirements before they receive orders. With the cooperation of Purchasing, we are now getting a fine vendor control and relationship.

Dick Gaboury

A comparison between our shop and vendors from June 6, 1963 to June 20, 1963, gave the following results:

| Digital | Vendors |
|---|---|
| 89 jobs received | 20 jobs received |
| 2807 parts received | 1900 parts received |
| 195 parts rejected | 9 parts rejected. |

These figures are based on sheet metal parts, paint and finishes.

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## ADMINISTRATION

### Purchasing

D. Kuyamjian

In the past few weeks we have experienced delivery problems with Teletype equipment, particularly the BRPE-11 Punches. This was due principly to an engineering hold Teletype placed on the production of their punches. It seems there has been an excessive amount of tape breakage in the field and redesign in the tape reel area was necessary.

Since DEC does not use the tape reels that are causing all the trouble, we have had no problems with tape breakage. A telephone conversation between Bob Savell and one of the engineers responsible for the hold resulted in a waiver for six of DEC's units to be shipped immediately.

We purchased three of Teletype's new model 33 Printers equipped with dial phones for PDP-6; another with tape perforator and reader is expected in mid June.

At this time delivery is relatively palatable, but in the near future it is expected to jump to three months, perhaps more.

Unfortunately it will be several months before a 50 cycle unit will be made available. At present, Teletype's European customers are forced to convert the equipment themselves.

The Adage equipment, both the Bidirectional Data Link for Minneapolis Honeywell and the A-D Convertor for CRC, have had several delays. The Adage people were here this week to assure delivery of June 12 for the Data Link and June 15 for the A-D system.

The Holley printer, in similar checkout straits, will be delivered the week of June 10, 1963.

A new committment will be made this week to Soroban Engineering Inc. for twenty-five Computer-writers. Deliveries are scheduled during the period of September 1963 through September 1964.

### Dave Glazier

Harry Davies Molding Co., has assured us we will no longer have the problem of the 1910-C knobs cracking. In previous shipments the knobs were being supplied with an 8/32 set screw as the standard part. A manufacturing change has been made and all due shipments will come through with a 6/32 set screw. The damaged material we have received may be returned for full credit.

The Magnetic Tape project for the 555 Magnetic Tape Units is now underway. One thousand reels, inserts, and boxes were shipped to 3M Co. for the mounting of the #489 tape on reels, and insertion into the boxes. 3M can apparently supply us with tape in this manner less expensively than selling us the tape on their own reels. The cost per 3600 feet of Magnetic Tape on their reels is $69.38 per roll. The cost for mounting this tape on our reels and inserting the reels into boxes is $60.03 (per 3600') a unit price of $4.35 per reel (260' per reel). Delivery should be made in 4 to 5 weeks.

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Frank Kalwell

The following tube manuals have been recently ordered and will be available for reference either in Purchasing or in the Library.

"Sylvania Technical Tube Manual"
"Sylvania Engineering Data Sheets" (5 Volume Set)
"Amperex Condensed Tube Manuals" (3 Volume Set)
"GE Receiving Tube Types" (2 Volume Set)
"GE Five Star & Special Purpose Types" (One Volume)
"Tung-Sol Electron Tube Technical Data Books" (3 Volume Set)
"RCA Tube Manuals" (5 Volume Set)
"Westinghouse Entertainment, Receiving & TV Picture Tube Manual"
"Westinghouse Military & Industrial Tubes & Devices Manual"
"Avnet Tube Manuals" (6 Volume Set of tubes manufactured by the M.O. Valve Ltd. of England.)

Dick King

On May 31, Jack Smith and I visited Pastoriza Electronics to check progress on our 728 Power Supplies and Tape Control 510 Wiring. The work thus far was very acceptable and it appears as if Pastoriza will meet our delivery requests.

At this writing there are a number of orders being filled by sub-contracting vendors. This includes sheet metal work, wiring, board assembly, silk screening, castings and finishing.

Elasco Inc. has done a good deal of wiring in the past for Digital. They recently sent us a quote on Board Assembly that was very attractive. Elasco is now assembling 100 of our 4106 Boards so that we can determine the quality of their work. If this order is satisfactory, I feel Elasco will be a fine vendor for future board work, as well as a top wiring vendor.

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## ENGINEERING

B. Scudney

| | |
|---|---|
| EN1148 | 40% |
| EN1178 | 60% |

The circuitry for the PDP-6 Flip-Flop Memory has been designed and a model is now being laid out be G. Gerelds. The package will be double length and double height and will contain a total of 24 bits of storage with associated read in and read out gates. The 24 bits are arranged as 3 adjacent bits of 8 separate words. A 36 bit, 16 word memory will therefore require 24 of these packages.

A cable driver circuit for the PDP-6 memory buss system has been designed and has been turned over to G. Gerelds. This circuit is capable of driving two 93 ohm coax cables in parallel. The cable driver package will contain 18 of these circuits and will be a double length module with two connectors at the handle end for connection to the cables.

Two new teletype modules have been designed. These modules are for use with the 8 bit teletype code and are the 4706 Incoming Line Unit and 4707 Teletype Transmitter. Connector wiring for these modules is similar to the wiring for the 4702 and 4703 5 bit teletype modules thus allowing for system expansion with a minimum of rewiring. A production release has been started on the 4706 module and the 4707 will be released very shortly.

Several improvements have been made in the 4702 and 4703 5 bit teletype modules and will be included in the 4706 and 4707 8 bit units. The 4702 Incoming Line Unit will have jumpers on the etched board that will allow the user to select either assertion or negation output signal polarity. Dummy outputs have been provided on three pins so that the 5 bit and 8 bit Incoming Line Units can be directly interchanged. The 4703 Teletype Transmitter will contain a line driver that is capable of driving the line relay directly. Either output polarity can be obtained by moving a jumper on the etched board.

An order has been placed for two new CERA circuits; F 27 and B 27. The F 27 circuit is similar to the F 150 circuit except that a 27 pf capacitor is used in place of the 150 pf capacitor. The B 27 circuit contains the resistors and capacitor required for an inverter input network. The resistor values are 3K and 68K. The capacitor value is 27 pf.

Arch Martin and Jack Driscoll of Sprague Electric were here on June 6th to discuss our requirements for these new CERA circuits. They have informed us that Sprague would like some idea of our CERA circuit requirements for the next year. The purpose of this is to allow Sprague to reserve a correct portion of their production facilities for our units. Arch Martin indicated that the CERA circuit has become so popular that Sprague cannot meet the demand even with expanded manufacturing facilities. Thus we may not be able to get delivery of these units if they do not reserve space for us.

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## SYSTEMS

E. de Castro

Construction of the PDP-5 prototype was completed Wednesday and checkout has been started. Checkout is somewhat complicated by the fact that the Memory Exerciser has not yet been modified to test memories using the new selection system. Thus the memory must be tested in the machine and represents one more unknown to be contended with. Dan Wardimon is working on the exerciser and I expect that it will be ready in time to test the first production machine.

The Computer Guidance Committee decided at a meeting last Wednesday, that a complete programming system would be written as soon as possible for PDP-5. This will include Fortran, a symbolic assembler, a debugging program, various utility programs such as multiply and a complete set of maintenance routines. The maintenance programs were written by Leo Gossel and were finished several days ago. John Koudela will write the assembler and Allan Kotok the utility programs. Fortran and the bugging routine require a major effort and will be done by a member of Dit Morse's group, hopefully a new programmer that Dit is attempting to hire.

The following is a list of options which will initially be offered for PDP-5.

Analog to Digital Converter
Micro-Tape
Type 57 Magnetic Tape Control
Type 300 Display
Type 34 Display
High Speed Paper Tape Reader
High Speed Paper Tape Punch
Data Channel

Micro-Tape and a 4K memory are a must for Fortran programming.

We expect to receive a purchase order very soon from Raytheon Co., Bedford for a Probability Distribution Analyzer which is a small system in the amount of $9,300. We are also awaiting a purchase order for a PDP-5 from Princeton University.

Pat Greene

Work is now progressing on the Chalk River Job for AECL. Permission has been given to us by them to use our own balanced multiplexer which is under development. The original quote specified Addage equipment.

A purchase order for a Spark Chamber Reader for the University of Chicago has been received. The logic diagrams are finished in Drafting and the wiring diagrams are on their way. A new procedure is being tried to eliminate wiring diagrams. Wiring schedules will be made from the logic diagrams and then punched on IBM cards. On those cards remain a permanent record of the wiring. I volunteered the University of Chicago job as a "guinea pig" for the introduction of the system. Roger Melanson and his people are working out a system that will incorporate wiring changes into the system.

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Pat Greene (cont.)

A meeting was held with Fred Gould and some people from Keesler Air Force Base to discuss possible Memory Buffer and Typewriter Buffer business. Chances look good for the sale of four Memory Buffers plus 2 Typewriter Buffers to Keesler and one Memory Buffer plus one Typewriter Buffer to the FAA; Fred has done business with the FAA before. The machines will be built in Systems.

Several quotes were sent out to various customers, i.e.

1. Bell Labs. - Transfluxer Readout
2. NASA
3. Univ. of Michigan - Buffer Chamber Control
4. Columbia University - RF Gating System
5. E.I. DuPont - Sequence Control
6. Pickard & Burns - Digital Clock
7. Silverman Assoc. - Card Punch Control

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## COMPUTERS

### A. Blumenthal

EN1016 Memory Development 100%

Final design of the Type 135 (PDP-4) Memory has been completed except for the pin assignments on the new sense amplifiers. The wiring layout is done except for those connectors and the order placed with production. We hope to equip every PDP-4 with this memory beginning with #21 which is scheduled to come out of production on July 22. The selection scheme for this memory has been changed, at the expense of a couple of 1987 modules, to be the same as that for the PDP-1 memory under design. This makes it possible to use the type of stock for both computers as compared to the original scheme which required one type for PDP-1 and two others for the PDP-4 (one for each of the two 4K segments).

The tests made on the PDP-1 breadboard have revealed two significant facts. First the 4 by 16 (per axis) selection scheme which gives the greatest economy in read-write switches gives an extremely poor signal to noise ratio because of the capacitive currents flowing on 30 half selected lines at the start of the read pulse. We, therefore, will use an 8 by 8 scheme which gives a satisfactory S/N ratio.

Second, we find that interconnecting the sense windings of 4 stocks yields an unusable S/N ratio because of ringing, unbalance to ground, and attenuation of the signal. A sense amplifier having 4 gatable input channels seems to be the best solution to the problem and such an amplifier is now under design.

The inhibit system, which also requires field selection, is now undergoing its first tests.

We hope to have the layout for the PDP-1 Memory complete by July 15 so that production can start on the first unit and a debugged system operating by the end of August.

### E. Harwood

We have a peak load condition in the Checkout Area at this time with ten computers under test. We have ten men assigned to Checkout at this time so we will be unable to start work on another machine until we ship some of these. Before the first of July, we plan to ship five PDP-4's and two PDP-1's. This means around the end of June and the beginning of July, we will have practically our whole group out doing field installations.

At the present time, it looks like the NSA computer will be at least one month late and a new projected delivery date is July 15th.

Due to the delay in getting the Addage equipment for the Honeywell Link System, this project has fallen a little behind sehedule. The Addage people have promised that they will deliver the equipment on Wednesday, June 12th. If the system is completely operational when they deliver it, we

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E. Harwood (cont.)

still have a fair chance of getting this out by the end of June.

In order to cut down the rework required on the PDP-4 tables, we have made up half a dozen wooden tables to be used in the Checkout Group while we're testing out the systems. This means we will draw the tables fresh from stock as the machine is about to go out the door. This should save considerable time and money on retouching up the tables.

We have finally had a chance to turn the fans on in our area and have noticed that they do a pretty good job of keeping the area up there in a liveable condition. There is a decided improvement with the air changing every three minutes, so it looks like it won't be too uncomfortable up there during the hot summer months of July & August.

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## QUALITY CONTROL

### Klaus Doering

The solder standards have been drawn up and approved by engineering and production. They are now in advertising to be reprinted on a proper format.

The whole mechnaical inspection crew has been trained to do solder joint inspection, thus taking quite a burden of work from Russ Winslow who had to do this on his own. The load assembly inspections has still been increasing considerably. The inspectors have done quite some overtime over the past 4-6 weeks, in order to keep up with the most urgent work. Production control gives a priority list to us so that the most needed items will be taken care of first. The rest we will catch up with as fast as possible.

In anticipation of the increasing amount of work, we decided three months ago to hire two inspectors. We got one, but the second one seems hard to get, especially as we want to select carefully.

I would like to let anybody know who has work to be inspected which is needed within a certain time - to contact me or Dick Gaboury - so we will know about it and prevent holding up things.

Dick King and I visited Pastorisa Inc. in Boston recently, a vendor who makes power supplies and wires mounting panels for us. We had a chance to introduce our solder standards to them before the order was placed. This visit pertained especially to the acceptance of solder joints on mounting panels. Their work was exceptionally good. Their soldering is done entirely by men.

We had some customer complaints on back pnaels of lab. modules. Finished goods room reinspection revealed that there were approximately 30 modules that did not go through mechanical inspection. This incident shows again that established inspection procedures should be followed in order to prevent unnecessary rejects.

### J. Cudmore

During the past two weeks the following high density F.F.'s have gone through first lot test, 4220, 4221, 4222, and 4225. The biggest headache in testing these units is the necessity to change jumpers. A great deal of trouble shooting resulted in finding a poor jumper clip connection more often than not. The lot sizes were small on the 4222 and 4225's limiting the amount of data to be gathered. The FF were compatible with all existing units as far as noise rejection and speed considerations. The first lot of the 4659. DEC to 7090 Transmission Line was tested and operated satisfactorily.

### D. Gaboury

During the past two weeks, the Mechanical Insp. Dept. has had the following Final and Intermediate Electrical and Mech., Inspections.

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D. Gaboury (cont.)

| Electrical | | Mechanical | |
|---|---|---|---|
| Final | Intermediate | Final | Intermediate |
| PDP-4-13 | PDP-4 | | JPL PDP-4 |
| | Mag Tape Control 67 | | Mag Tape 50 |
| | Mag Tape 50 | | Mag Tape 51-50 |
| | PDP-4-20 | | |
| | PDP-4-18 | | |
| | PDP-4B-11 | | |
| | PDP-1C-30 | | |
| | Mag Tape 5051 Control | | |
| | PDP-4B-16 | | |
| | PDP-4B-13 | | |

A comparison between our shop and vendors for the weeks of May 27 and June 3 gave the following results:

| DEC Shop | | Vendors | |
|---|---|---|---|
| Total Pcs. rec'd. | 2626 | Total pcs. rec'd | 3553 |
| Total amt. of jobs | 48 | Total amt. of jobs | 23 |
| Total rejects | 427 | Total rejects | 27 |

These figures are based on sheet metal parts, paint and finishes.

J. DiMauro

Semiconductors tested since last report:

| Type | Mfgr. | Units Tested | %Rejects |
|---|---|---|---|
| GA212 | Texas Instrument | 1360 | 1.9 |
| MA90 | Philco | 2384 | .25 |
| SW1250-3 | No. Am. Elect. | 191 | 10 |
| 2N1204 | Philco | 500 | 3.2 |
| 2N1309 | Texas Inst. | 5000 | 2.4 |
| GA439 | Texas Inst. | 2110 | 4.9 |
| 2N1754 | Philco | 20000 | .77 |
| 1N429 | Motorola | 50 | 0.0 |
| 1N748 | Motorola | 50 | 0.0 |
| 1N764 | Transitron | 140 | 0.0 |
| D001 | Clevite | 40874 | 1.0 |
| D007 | National Transistor | 125 | 1.0 |
| D662 | Clevite | 35026 | 0.3 |

All the capacitors that we have received since last biweekly report have been tested and put into stock.

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## SALES

### Bill Farnham

On June 5, 1963, we received a call from Mr. Kosmala at the M.I.T. Instrumentation Laboratory. He made the following comments concerning a $3,000.00 Lab Module order that we delivered on May 29, 1963.

a. Seven of the fifty-one modules shipped did not have handles on the casings.

b. Three Model 3201's had the retaining screw, which holds the card into the metal housing, missing.

c. One model 3101 had the sockets on the chocolate block out of alignment, thus making it impossible to plug the unit into a mounting panel.

The corrective action taken by Sales was to:

a. Replace the defective equipment on the same day we received the complaint.

b. Notify Quality Control and Production of the discrepancy.

Mr. Kosmala's parting comment was, "I hope these modules are better electrically then they are mechanically."

In addition, the Sales Department was not aware that Lab Modules had been modified to include handles. Somewhere there was a breakdown in disseminating this information, and this can and does cause embarrassment, especially where it is the customer who brings it to your attention.

It also makes it extremely hard for the Shipping Department, if some of the units have handles and some do not. There is no way of telling this, since the units are packaged before they come into stock.

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## ADMINISTRATION

### R. King

We have sub-contracting extensively in the last few weeks. Besides the V.A. assembling some of our boards, Electro-Labs is presently completing an order of boards which called for drilling and tin immersion. We are presently using three sheet metal houses. Donnelly on cabinets and plenum doors and Prelco Corporation and Omnicraft on smaller panels. Wiring jobs out of the house are PDP-1 and PDP-4 to Elasco, Inc. and an order for 728 power supplies to Pastroiza Electronics, Inc.

We recently have used Modern Electroplating for our anodized parts. They have replaced Aluminum Anodizing Corporation of America as prime vendor. This has brought a great reduction in rejected material. Besides Modern Electroplating we have two sheet metal houses qualified to do our iriditing - Prelco Corporation and Boston Precision Parts. Of course we are still using Precision Screen for our silk screening and Metal Etching Corporation of Long Island, New York on our etched panels. Industrial Wire and Cable is working on read and write cables along with our 50 conductor cables.

Last week I attended the Design Show in New York. I was mainly interested in talking to companies such as Stimpson, United Shoe, Kaylock, Shakeproof, Bristol and Tinnermann. I also requested the lastest literature from Alcoa and many other companies.

### F. Kalwell

We have contracted with Taylor Fibre and Nelco Corp. for our yearly requirement of (G-10) glass epoxy printed circuit boards. The new size of the board is 4.343 +000 - .015 x 6 7/16' long x 1/16" thick. The previous size of our board was 4 5/16 x 6 7/16 x 1/16 a difference on the width dimension of .0305". The price is $0.49 per board as opposed to the previous $0.55.

We have also contracted with Cornell Dubilier to supply our yearly requirement of 35,000 mfd electrolytic computer grade capacitors. The price has decreased from 4.52 to 4.15 each.

Final samples have been submitted on a new banana pin used on our patch cords. Klaus Doering and Loren Prentice are evaluating this pin to be sure it is acceptable.

On the lastest shipment of Sprague F-150 Hybrid Circuits we have encountered a rejection of 55 units due to the capacitance being out of tolerance. Sprague Electric has been notified of the problems.

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## ENGINEERING

R. Doane

| | |
|---|---|
| VHF | 50% |
| PDP-6 | 30% |
| Misc. | 20% |

A breadboard version of a low-power, limited fan-in, simplified standardizing 40 nsec pulse amplifier worked OK, so George Gerelds has layed out a printed board containing six, and soon a model can be tested. A similar circuit for 70 nsec outputs with built-in feedback for stretching 40 nsec pulses has also been designed and layed out with six on a board. Both circuits have half-normal prf capability; that is, 40 nsec up to 5 Mc, and 70 nsec up to 2 1/2 Mc. Pulse-width in each circuit depends as strongly on one of the resistance values as it does on transformer inductance, so optimum adjustment of the center of the production distribution will be much easier than it was with the standard circuits. These circuits are tailored to the needs of PDP-6, especially for use with the new six-delay-line module.

Two preliminary designs of bus-driving 100 nsec blocking oscillators to be squeezed 18 to a double-length board for PDP-6 are now on a breadboard, ready for test.

### VHF Progress

1. Tested models for the 8201 Flip-Flop and 8103 Logic Module are in production. Due to our large backlog, production modules will probably be a long time in coming, particularly since their priority is lower than customer back-orders.

2. Test data sheets are ready for these two modules, and testers have been designed. Means for making low distortion connections between burst generator and testers have been thought out, including provisions for performing temperature tests: the entire tester will be in the oven, and a new oven door has been ordered so it can be modified to let the handle end of the module stick out and to extend the shafts of tester switches, so complete data can be taken in the oven as conveniently as out of it. A template has been made for standardizing the location of switch shafts on all VHF testers and the special oven door, so any tester can be accomodated.

3. The logic wiring for the VHF burst generator has been done for some time. Recently the mechanical construction has been completed for connection to testers. The testers will be two double-sided boards back-to-back, plugging into the burst generator directly for normal tests, and via co-axial cables for temperature tests. Four thumbscrews hold the tester in place when modules under test are plugged in and pulled out. Amplitude and pulse width controls for all pulses have been incorporated in the burst generator control panel.

4. Three modules are in progress of design:

   a. 8110 is two six-input gates similar in logic function to the 1110. It is required in the burst generator. The first model works OK as a general-purpose gate, but is being improved as a high-fidelity pulse amplifier for generating accurate burst generator output pulses.

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R. Doane (cont.)

b. 8401 is a variable clock. The improved model is being debugged. Its use in the burst generator is not essential, but would be desireable if it can be finished in time.

c. The glass delay line module now works acceptably for single pulses. While an imporved layout and model are in process, a tester will be designed and built to allow testing for prf sensitivity and noise on the burst generator. To fully test this module, however, will probably require a specialized pattern generator.

B. Stephenson

## NSA System

The interconnecting equipment for NSA is about ready to start checkout. We have completed all the logic diagrams and the wiring has been done on all of the panels except one. A large part of the interpanel wiring has been done and the drafts of the manuals have been turned over to the technical writers. The new modules have been our biggest problem and we now have most of these. Many of these were started a long time ago but hit a stop at one stage or another along the way. These included the Type 6102 Inverter, 4219 Quintuple Flip-Flop, Types 4678 and 4679 Level Amplifiers, Types 1574 and 1576 Ladder Networks, the 1578 Multiplexer Switch and the Type 1572A which is a variation on our 1572 for use in systems where the capacitive load presented by the input is of a large degree of importance.

## COMPUTER A-D OPTIONS

The Computer Guidance Committee approved four general A to D options which we want to have for the computers. The first is the Model 138 General Purpose A to D converter. This will convert up to 11 bits at varying speeds depending upon the number of bits and desired accuracy. The price of this unit is $5,000 and Bob Maxcy has some general specs on the system. (The specs on the system are extremely conservative and I have a prototype on the bench now which I hope to test out so that perhaps we can give some better specs at a later date. Certainly there is no problem in meeting the specs that we have put on the unit now.) The next option is the Model 139 General Purpose Multiplexer Control. This Multiplexer Control will handle up to 64 channels of multiplexer inputs, with either individual addressing or cycling. If the cyclic mode is chosen, the multiplexer will automatically return to Channel 0 after the last channel has been sampled. This option sells for $3,600. The multiplexer switches themseleves are available in groups of four and sell for $425 per group.

The next option is the Model 140 High Speed ADC. This is the 10 bit 6 microsecond unit which we developed for NSA. It has not yet been priced out. With this will be a high speed Multiplexer Control, Type 141, which also has not been priced out.

## FOR MODULE CUSTOMERS

For module customers who are interested in building their own A to D circuits, we now have a variety of new circuits available and I have written a memo to sales describing these units and a couple of

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B. Stephenson (cont.)

memos on testing converters and techniques for obtaining high speed or high accuracy. There is also one describing the high speed method used for the NSA system.

## PROSPECTIVE CUSTOMERS

We have received quite a few inquiries recently for ADC's and hybrid computation. Most of these have been people who have already surveyed the market and determined what they wanted. However, a few of these are prospects for us. These include four - Raytheon wants and A to D to A converter system to tie various devices onto a PDP-1. I gave them a price for our standard A to D option and multiplexer and am now in the process of figuring a price for a D to A system for them. Pratt & Whitney Aircraft Company in Florida is just beginning to look into a hybrid computer system and are interested in buying both a digital computer and interconnecting equipment. I sent them some information on interconnecting equipment and Bob Maxcy sent them some information on the PDP-1. Babcock and Wilcox in Lynchburg, Virginia are interested in an interconnecting system and possibly a small digital computer, although they already have two. I doubt if we will be able to sell them a computer but I think we may be able to sell them some modules and possibly one of our high speed A to D's. The University of Washington wants to buy a PDP-1 and they want four channels of D to A on this. Bob Maxcy is handling this and I gave him the price information on this D to A. Also I talked with Mr. Schelderoff out at ASCRC. They are presently buying an Adage converter to hook onto the PDP-1 as we had suggested to them earlier. They are also interested in purchasing a high speed A to D in the Fall so I talked to them about our high speed unit.

L. Hantman

## Spring Joint Computer Conference

### I. MICRO-TAPE

Besides the obvious fact that the micro-tape was not working for the Show, two main comments can be made. First, the micro-tape arrived in pretty bad shape. The front panel was nicked and scratched and the entire cabinet had an overall dirty appearance both inside and out. (In fact, it looked so bad that it was not even displayed for part of the first day). The second comment is that the micro-tape literature arrived late and was grossly inaccurate both technically and typographically.

Interest was good though not as high as I had anticipated, probably because the unit was not operating. Comments ranged from "great," "a break-through," and "handy" to "cute" and "expensive." Many were interested in the drives without the control, and some even in drives without the read-write electronics.

### II. INCREMENTAL SCOPE

The scope seems to have made a tremendous impression, and a great deal of interest was shown in using it for both graphical input and output. An even greater impact could have been made had a light pen

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L. Hantman (cont.)

been available and programmed. Most people were literally amazed at the "painted" effect of the circuit diagram which was used in the demonstration, and it was all we could do to emphasize that it was a point by point display, and not a line or vector drawing scope. Some insisted that it was a projection or memorizing device, and a few even thought we were projecting slides.

From a demonstration standpoint certain difficulties should be noted. Since a normal 30-G scope was also being demonstrated, it was difficult to allocate time fairly between the two displays, and the necessity for loading new programs each time someone wanted to see one or the other scopes, was time consuming and awkward. Future incremental scopes should be compatible with the 30-G so both could be used simultaneously.

I feel that the demonstration of the scope accomplished four important things as follows:

A. It showed that DEC can make a high speed flicker-free display per se.

B. It indicated that DEC is interested in a graphical approach to computers.

C. It provided a great deal of "feed-back" by pointing up fields of use by potential users. Some of the areas mentioned included data retrieval, circuit simulation, stress analysis, mapping and engineering drawing.

D. It pointed out that the display need not be used on a PDP-4 since it was explained that the one at the Show actually was being attached to a 7090.

Burroughs, CDC and IBM seemed especially interested in the display.

## III. MODULE TESTER

Only a minimum of my time was spent in demonstrating the tester as Ken Wakeen and Don Zereski did almost all of the demonstrations. The tester behaved perfectly throughout the Show and definite contacts were made with Burroughs, Fairchild and Texas Instruments. The former two are sending some of their modules to us for inclusion in the program, and if the tests can be made, prospects look bright. Texas Instrument micro-modules are already being tested with the existing program.

## IV. OVERALL IMPRESSIONS

Judging by the reactions of the crowd, DEC had one of the most interesting exhibits at the Show. All of us noticed people constantly returning to the booth again and again, bringing friends and some of their supervisory personnel and explaining the virtues of our equipment to them without our saying a word. Many people seemed aware of the new products even before they got to the booth, and knew exactly what it was they wanted to see and have explained. Almost everyone seemed to know something about the PDP-1 or the PDP-4. My own impression is that DEC scored heavily in that, almost everything being demonstrated was a new innovation in the field. Some of the more flattering comments were - "DEC sure has brought flexibility and power to the small computer user," "DEC still insists on giving the

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L. Hantman (cont.)

most computer for the dollar," (with a reference to the C.W. Adams Handbook), and, "What a wonderful way DEC uses color in the design of its equipment."

K. Wakeen

Exhibits - Our exhibit was by far the best attended and had more to offer in active demonstrations than any of the others.

The displays and microtape generated a lot of activity from both old and prospective customers; and judging from the interest shown, these demonstrations were successful.

The Automatic Module Tester was of primary concern to me. The reactions we received were, without exception, most encouraging. After several demonstrations to Burrough Personnel at all levels, we connected with a vice president who was so enthusiastic that he arranged for Don Zereski and myself to make a trip to the Plymouth facility. We met Friday morning with the production manager, Q.C. manager, and several production engineers to discuss the tester and its possible application in their plant. They showed a strong interest, and we agreed to test two Burrough's modules, a dual FF and a 25 input logic element. These will be ready for Burrough's scrutiny within the next two weeks.

Fairchild showed enough interest to send two men to our plant today. They too will provide us with modules for purpose of demonstrating our ability to test them.

Texas Instrument Type SN512 was tested at the show and they also will send representatives to visit our facilities.

Others showing enough interest to warrant follow-up are:

Burroughs - Tireman division, general manager, engineering manager, process analyst, and others.

Burroughs - Paoli, Pa., advanced development laboratories.
Lockheed Missels & Systems - Research Specialists Eng., Sunnyvale, Calif.
Electrodata Division - Staff engineer, Pasedena, Calif.
North Electric - Senior Engineer, Gallion, Ohio
Dura Business Machines - Engineering, Madison, Michigan

The interest shown by these people and others (newspaper and technical publications people) gave me the distinct impression that we have a marketable product which is complete in its ability to perform production testing or Q.C. type data-logging and which is flexible and easy to use. It is also an expensive system and we may be well advised to go to the PDP-5, a less expensive tester, and provide options for those who need pulse analysis and delay measurements and other special measurements.

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Don Zereski

The booth was one of the most interesting at the exhibit but we had just too much in a small area. We had just about enough room to open the doors on our cabinets to show interested people the hardware in our machines. In order to display the hardware in the automatic modules tester we had to take the back off completely.

The equipment that we exhibited was demonstrated very well. The incremental scope was interesting to many people because they could see what was going on. The automatic mod. tester was interesting to those with a technical back ground. Many people were interested in its Flexability. Some manufacturers were interested in testing individual components which we could not demonstrate at the time.

The automatic module tester ran without failure. We did have trouble with the ac buss bar on the PDP-4 and the tape reader, with the automatic mod. tester. The sales PDP-4 with the 8K memory was dropping bits.

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## SYSTEMS

Pat Greene

Having been my first Show in which I was on the inside looking out, the Spring Joint Computer Conference was indeed an interesting experience. I am convinced that any exhibitor who displays hardware at a show of this nature will reap more dividends if the technique of animation is employed. No matter how sophisticated a piece of machinery may be, if it is displayed in a dormant or semi-dormant fashion, it just does not focus the spectators attention to it. Ken Wakeen's Module Tester is a good example of this; many people were curious as to what was going on because the device was indeed animated and creating interest.

I did visit other displays in the show and found that the largest percentage of them employed the routine uninteresting type of display. It almost gave one the impression that " We are here only because competitors are here and not because we think we can do a service for our potential customers."

Some of the other exhibitors employed the "soft-sell" in the merchandising of their product. As an example, I overheard the G. E. Pitch Man ask a high school girl what were some of the features she would like to have in a computer if she were going to buy one. This left me cold! Carnival type "booking" was extremely popular at the show. It was employed by Burroughs, G. E., Philco, and several other smaller exhibitors. DEC did do a limited amount of their type of advertising. Len Hantman did a fine job in this respect.

I talked with Dick Pandolphi of Potter Instruments and his reaction to the show was one of disappointment. He said that he had only talked to three customers up to that time. (This was the afternoon of the second day of the show.) His 25' exhibit was void of customers at the time. Tom Lucus (Sales Manager) of Burroughs, Ferrite Division in Philadelphia had the same comment.

I tried several times to talk to Cris Snyder of Indiana General at the show but I could never seem to time it right. Since returning from the show, Dave Denniston referred me to an inquiry from Indiana General for Semi-Automatic and Automatic Core Testers.

A lunch meeting was held with representatives of the Foxboro Co. to pursue further the possibility of using PDP-5 for process control work. Gardner Henry was interested to find out how much it would cost "speeding-up" the multiply time and also increasing the memory size. We promised that we would be in touch with more answers to his questions.

Our own equipment I thought, was well displayed. Every effort was made by DEC to answer any and all questions that were presented by our customers. For myself, I have found from the SJCC that "show-biz" is quite different from the impression that one gets when he is onethe spectators and not an exhibitor. I do feel however, that a specialized show of this variety is perhaps more valuable than a general electronics show in which the whole industry is displayed. I am not inferring inferring that the generalized show is not valuable.

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Pat Greene (cont.)

It is interesting to note that people approach the exhibitors at a show like this to seek employment opportunities. I was approached by two; one being a college student from Mass. going to school in Michigan and the other a Technicain who has 5 years experience and wants to change jobs. The Technician's qualifications will be referred to personnel for study.



DF633 DIGITAL EQUIPMENT CORPORATION · MAYNARD, MASSACHUSETTS

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## COMPUTERS

A. Hall

### Foxboro

The Foxboro (Service Center) 32K word drum has been installed and is working properly. At the same time we installed thermostats at the top of each frame (per Foxboro spec.) wired in the new #825 power control (which will help the computer ignore any power failure of less than 50 msec.) changed all exterior parts of the tape unit to Veldura Gray and wired in a modification which seems to have cured a turn-off noise problem which was altering memory (if turn-off occurred while the program was running.)

The U.S. Steel computer is due to undergo a 24 hr. acceptance test starting at 4:00 p.m. Thursday, May 23. If all goes well it will be delivered the following Monday, (about a month before the promised date). The 64K word drum will be checked out on the Engineering computer. It will be shipped in about a month.

Foxboro appears confident that their long-term prospects for the PDP-4 (and, possibly, the PDP-5) are good however, there seems to be little likelihood of an immediate order.

### Notes on the SJCC

Our booth was very well located and compared well in design and utility to the best at the show.

At first glance it would seem that the great number of people we have tending the booth would crowd out spectators but the reverse seems to be true. A crowd attracts a crowd.

Persons responsible for informing the public about our display equipment should know:

1) Who besides DEC makes displays and what (if any) are the advantages of our displays over the those of our competitors.
2) What are the primary technical features of the display(s) on display.
3) What is the advantage of an incremental display over a regular display.
4) Why would any one ever buy and use a display.

There is increasing evidence of interest in computers by persons in the field of automatically controlled machine tools. Two persons from Ford Motor Co. were interested in the possibility of using a computer to prepare 1", 8-level paper tape which would in turn be used to control machine tools. The computer would optimize the speed of manufacturing any part by considering the advantages and limitations of the particular tape-controlled machine tool used to manufacture that part and then punch the tape to make it. Of course the computer can be used to consider the assignments (to part-manufacturing) of all the available tape-controlled equipment, parcel out assignments on the basis of pertinent criteria (time, cost, machine wear, etc.) and then punch the tapes. Perhaps we should be approaching machine tool manufacturers with these tantilizing prospects.

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A. Hall (cont.)

A high proportion of the persons I spoke to at the show seemed to be people not familiar with computer equipment but who were looking for ideas on what computers could do for them. Handing a person of this sort a pamphlet of technical specifications might do more harm than good. One glance at the unfamiliar jargon of computer technology may be enough to convince him that the field is too complicated for him to consider using computers. It will probably be said that this is just the type of person to whom we do not want to sell a computer. However, it may very well be that if this person brings the advantages of a computer to the attention of management, management may decide that it is worth while to acquire competent technical help to investigate the application. Within closely-knit vocations such as machine design, automobile production, medicine, etc. the advantages of having the first computer application may be tremendous. It should be well worth our while to get the names of persons inquiring about such applications and to follow up a week later with a phone call which would reintroduce the subject while the man is amongst colleagues with whom he may discuss the matter.

Bob Savell

During the past week I attended the SJCC, and arrived a day early expecting to pay a visit to Holley Computer Products in the mroning and do some work I brought with me in the afternoon. Instead I spent the day troubleshooting minor problems on the display equipment and helping to tune up half the memory in the Sales PDP-4. Most of these problems could have been eliminated had the entire system been connected and run prior to shipment using the demonstration programs that we wanted to use at the show. Slowdown of the correction of memory problems was caused by not having any spare 1538 sense amplifier modules. Correction of one display trouble was made more difficult because no 4606 spares were available.

I believe that most of the above problems could be eliminated by making one person technically responsible for the entire exhibit. As it stands now each of the four to six people responsible for various segments of the exhibit is assumed to be holding up his end as far as spares, programs, pre-show test etc. is concerned.

The show schedule should insure that <u>at all times</u> there is someone in the booth qualified to discuss in <u>detail</u> the <u>operation</u>, <u>application</u>, and <u>programming</u> of every device on display.

We had the best location we have ever had for our booth, just inside the front door. Interest at my end of the booth in the Incremental Display, Symbol Generator, display equipment in general, and in the Automatic Module Tester was very high. I think it is safe to say we out-drew the CDC exhibit across the aisle at least 3 or 4 to 1.

People were very impressed with the Incremental Display capability. In general people talked to seem to want lots of information flicker-free-test as well as lines. They are not very knowledgeable about light pens, so don't really care whether the display is analog or digital. Hopefully we are educating them about the pens by stressing their use at all our exhibits.

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Bob Savell (cont.)

The show provided an opportunity to discuss display requirements with a number of seriously interested prospects.

The other exhibits were somewhat less elaborate and there seemed to be less exhibitors than at the fall show in Philddelphia, however I believe it was a worthwhile show.

Digitronics exhibited an improved paper tape spooler Model 6070 using a proportional servo of some kind that they won't described, but that works very nicely. There are no damping adjustments on the motors which is one of the weak points of their present Model 4566. In all the combinations tried it was impossible to give the tape a hard enough shock to break it. Price is $1450 to $1500.

Photocircuits has made many improvements over the past two years on their reader spooler combination Other than their Ferranti-like 60 cps unit they do not have any unit at present that will read fan-fold tape. They promise one in the 1500-2000 region by October - but that is what they said last year.

Teletype had their new Model 33 and 35 there. The 33 does have some drawbacks over the 35 ($T500) such as no tab or backspace and apparently a few other differences that should be looked into. The man in the booth was not too sure about the differences. He said that althought the machine has been described as a 2 hour a day machine that really there is no limit to the number of hours per day. As a sidelight we found that the coding keyboard is available separately at a price that Teletype seemed somewhat apoligetic about -- $35!

Data Systems Inc. has been advertising a new paper tape reader, Model 3000, which uses a stepping motor and looks fairly interesting, $1000 to $1400. They are not prepared to deliver any unless they can get someone to guarantee to buy 100 units. They were not exhibiting this unit and time did not permit my visiting the plant.

Soroban had the handler for thier new 400 cpm serial card punch there and running. It is a product of their two top mechanical engineers and looks very good. The punch head was not running. Prices are 16K for first system and 12K thereafter. This includes no electronics. The complete console including card handling and electronics is 35K.

Ferranti showed amount for high resolution CRT's, yokes, and focus coils that is fairly inexpensive. It is not as flexible as ours, but probably would serve the purpose. It's cost will be compared with our unit. In addition, I talked to them about various high resolution high accuracy CRT problems. I am impressed with their overall knowledge and their work on all phases of these problems where others are working either only on CRT's or only on coils.

Ferranti and NCR both exhibited paper tape readers in the $2500 region that were designed more for table top than rack mounted. They both demonstrated well, but then so do all readers, even those that have caused us many problems. They will be considered further.

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S. Piner (cont.)

I also did a good job of just looking. I was quite impressed by some of the equipment, mainly the Soroban card punch, the CDC card reader, the Cal-comp plotter and the Holly line printer.

I think this show provided an excellent opportunity to catch up on the latest the industry has to offer. I even touched a B-5000.

N. Mazzarese

Why did you attend the trade show? To sell

How many papers did you attend? Were they worth while? One panel, "Computers in Medicine." One paper, "Telemetry Data Acquisition."

Did you discover worthwhile technical information? Competitive info on Teletype interface gear, CDC, Data Systems.

Did you make worthwhile sales contacts? Yes. Ganadair; Bell Labs (D. Weller); Stanford.

Should we exhibit in this Trade Show next year? Yes

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## QUALITY CONTROL

Jim Cudmore

EN1073 100%

In the past two weeks approximately ten new test data sheets have been generated. The cooperation from the Engineering Dept. has been very good and some of these sheets have been generated in record time. It is unfortunate that the person responsible for most of this work, Ebon Remond, is leaving at the end of the month. If anyone knows of a good technical typist, please give me a call.

Dave Adams has just completed building an exerciser for the unbuffered FF's. This device consists of two registers which may be loaded with toggle switches or counted up or down. The information in these registers is then loaded into the register type FF under test and its contents checked. The pulses generated may be of either polarity and continuously varied in amplitude. The levels may also be varied, the upper level from 0V to 1.5V and the lower level from -2.5V to -4.0V. The Exerciser may be set to stop on an error and the contents of the registers can be examined to determine the cause of failure. Sync selection and Error Overide controls are also provided to permit observation of the error conditions. The purpose of this project was to provide us with a piece of equipment that would detect the intermittent and random errors that are sometimes reported with returned modules. This device will also be used to evaluate new modules that may have hidden problems.

K. Doering

We are catching up with the reinspection of solder joints of all machines on the floor. Dave Clark from the mechanical inspection force has been trained to do solder joint inspection, which has enabled us to catch up rather well. There is agreement between production, C.C. and Engineering about the solder standards. Constant reviews will be necessary in the future to keep reminded and everybody up to date on the quality requirements. We have experienced, in the past, that if this is not done over and over, the quality tends to relax.

Through suggestions from the inspectors, we have made up forms for solder joint inspection that represents the mounting panel with all joints pictorially. Any possible rejections will be written into the corresponding space with a code number. The decoder spelling out the rejection reasons is on the same form. Writing time has been cut down and possible rejected joints can be found more readily.

Trim strips and parts that make up the end panel frames have shown considerable rejection rates due to rough handling. This occurs usually in the process of shipping to the anodizing place in Boston. The parts are only wrapped in paper and are not really protected. We have agreed with purchasing that these parts can only be shipped to the vendor in the proper boxes. Orders have been placed with the carpenter shop to have these containers made up. We are sure to get rid of the unnecessary rejections this way.

Our paint jobs seem to indicate a decrease in quality. A vendor of ours claims and has proved that climatical changes do not flatten the texture of his paint jobs.

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Dave Dubay

Test Equipment Headquarters

The following equipment has been calibrated since May 10th.

| Description | Type | No Calibrated |
|---|---|---|
| Oscilloscope | 543/543A | 10 |
| Oscilloscope | 541A | 1 |
| Oscilloscope | 545A | 1 |
| Oscilloscope | 551 | 1 |
| Oscilloscope | 567 | 1 |
| Curve Tracer | 575 | 2 |
| Plug-in Unit | CA | 14 |
| Plug-in Unit | D | 1 |
| Plug-in Unit | G | 1 |
| Plug-in Unit | H | 2 |
| Plug-in Unit | K | 2 |
| Plug-in Unit | L | 3 |
| Plug-in Unit | O | 1 |
| Plug-in Unit | R | 1 |
| Plug-in Unit | S | 1 |
| Plug-in Unit | Z | 1 |
| Plug-in Unit | 3S76 | 1 |
| Plug-in Unit | 3T77 | 1 |
| Plug-in Unit | 6R1 | 1 |
| Time Mark Gen. | 180A | 1 |
| Current Probe | P6016 | 7 |
| D.C. MA Meter | 428B | 1 |
| Multimeter | 630NA | 10 |

We received a set of resistance and capacitance standards and all bridges here have been checked against these standards. The results show that all of those bridges are within tolerance.

Jim DiMauro

Semiconductors tested (May 10) last report.

| Type | Mfr. | Units Tested | %Reject |
|---|---|---|---|
| FSP-24 | Fairchild | 10 | 0 |
| GA212 | Texas Instrument | 1200 | 0.8 |
| MA90 | Philco | 1719 | 0.6 |
| MA90 | Sprague | 3000 | 0.6 |

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Jim DiMauro (cont.)

| | | | |
|---|---|---|---|
| SDA1 | General Electric | 70 | 12.8 |
| SDA-1 | Texas Instrument | 147 | 0.68 |
| SP-390 | Texas Instrument | 300 | 0.0 |
| SW1250-3 | North American Elect. | 286 | 0.0 |
| S1188A | Texas Instrument | 10 | 20. |
| T1796 | Philco | 17 | 0 |
| 2N1184 | R.C.A. | 60 | 1.6 |
| 2N1304 | Texas Instrument | 1000 | 0 |
| 2N1494 | Philco | 181 | 4.4 |
| 2N1754 | Philco | 12763 | 3.1 |
| 2N2099 | Sprague | 250 | 2.4 |
| GA439 | Texas Instrument | 2500 | 0.7 |
| TIX621 | Texas Instrument | 6 | 0 |
| 1N1220 | Motorola | 500 | 0 |
| 1N1315 | Hoffman | 25 | 0 |
| 1N2970B | Motorola | 100 | 0 |
| D001 | Transitron Corp. | 34350 | 1.2 |
| D003 | Clevite | 1748 | 3.7 |
| D007 | National Transistor | 3830 | 0.5 |
| D664 | Continental Device Corp. | 15073 | .26 |

Since the last biweekly report, 75,308 capacitors have been tested.

Semiconductors Tested Since last report:

| Type | Mfr. | Units Tested | %Reject |
|---|---|---|---|
| MA90 | Philco | 993 | 0.0 |
| SW1250-3 | North American Elect. | 1008 | 26.7 |
| S1188A | Texas Instrument | 35 | 5.7 |
| 2N1304 | Texas Instrument | 1200 | 1.0 |
| 2N1305 | Texas Instrument | 16,000 | 0.8 |
| 2N1309 | Texas Instrument | 1500 | 2.9 |
| 1/4M8.2Z5 | Motorola | 13 | 0 |
| 1N429 | Motorola | 60 | 0 |
| 1N469 | Hoffman | 20 | 0 |
| 1N762 | Transitron | 30 | 0 |
| SZ50031 | Motorola | 8 | 0 |
| D001 | Transitron | 11,470 | 1.7 |
| *D001 | Transitron | 600 | 0 |
| *D001 | Clevite | 1,000 | 0 |
| D003 | Clevite | 2,252 | 0.71 |

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Jim DiMauro (cont.)

| | | | |
|---|---|---|---|
| D007 | National Transistor | 2197 | 3.1 |
| D662 | Clevite | 31,574 | .39 |
| D664 | Continental Device | 8,630 | .58 |
| G6-100 | International Diode Corp. | 50 | 0 |
| 1N1217 | General Electric | 450 | 0 |
| 1N1217 | Motorola | 250 | 0 |

* Indicates Sample Test.

8,958 Capacitors were also tested since last report.

Our Contronix diode Tester has been sent back to Contronix for repair. We should have it back by the 27th or 28th of this month, according to their representative.

Russ Winslow

Electrical Inspection

| Unit | Customer | Inspection |
|---|---|---|
| PDP-1 | Stanford Univ. | Final |
| PDP-1 | M.I.T. | Final |
| PDP-1 | D.E.C. | Intermediate |
| PDP-4 | J.P.L. | Final |
| 2113 Core Tester | Burroughs | Intermediate & Final |
| 2110 Core Tester | Burroughs | Intermediate & Final |
| 30G Display | D.E.C. | Intermediate |
| 30G Display | Stanford | Final |
| 30A Display | DEC | Intermediate & Final |
| 2318 Data Reader | Harvard | Final |

R. Winslow

Electrical Inspections since last report

| Unit | Customer | Inspection |
|---|---|---|
| PDP-4 | DEC | Final |
| PDP-4 | Adams | Final |
| PDP-4 | Foxboro | Final |
| PDP-4 | J.P.L. | Intermediate |
| Display 30H | OAL | 2 panel special |
| Display 30G | DEC | Intermediate |
| 1516 Memory Tester | Siemens & Halske | Final |
| 1516 Memory Tester | Riki (T.D.K.) | Intermediate & Final |
| 3371.1 Tel. Type Rec. & Trans. | Adams | Intermediate & Final |

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## SALES

S. Mikulski

### Customer Relations

A system of data handling and reducing is evolving from the customer relations dept. It is referred to here as CRAFT. (Customer Relations Automatic File Tracer). The primary purpose of the CRAFT system is to record, on magnetic tape, all of the data needed about each customer; e.g.; names, addresses, useful figures about an installation, and all of the field service reports.

At the present time the programming effort requires both the PDP-1 for data reduction and the PDP-4 for initial storing of data. Routines have been completed which allow a user to list equipment at any installation obtaining items such as installation date, warrantee date, serial no. of equipment, etc. The routines for reliability figures on a particular installation or class of equipment are being written at the present time.

A large delay in the operational system is the re-writing of all of the maintenance reports on punched cards to be entered into the system. This will take the better part of the next month or two.

An example of the type of data that will be available in the reliability routine is as follows:

Reliability data

*EN no. (fill this in) (name of customer)

Installation data (XX/XX/XX)

*from (date to date)

Total failures (XXXX)

Date of last failure (XXX)

Avg time between failures (XX) operating hrs.
(XX) calander hrs.
(XX) calander days

Approximate usage time (XXX) hrs./day

* The operator merely indicates the customer's EN no. and then fills in the dates for the period he wants to check. The rest of the printing is done by the computer. When the system is working in its final form we can start producting some reliability figures which might prove more interesting than anticipated.

The system can be used for complete installations or for a class of equipment. Flexibility and ease of operation is the prime objective of the entire system.

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R. Wilson

Following are the dates, of the PDP-1 and PDP-4 Familiarization and Maintenance Courses, for the next six months.

| PDP-1 | PDP-4 |
|---|---|
| August 12 to 23 | July 22 to August 2 |
| October 7 to 18 | September 2 to 13 |
| December 2 to 13 | November 4 to 15 |

A. Titcomb

Currently I am involved in varying degrees, with several projects.

The second PDP-4 for JPL is still being readied for shipment. As is typical for such undertakings, time casually wasted early in the project is extremely difficult to makeup late in the game. The JPL special I/O equipment involves six mounting panels and an above average amount of wiring. Production has done well to complete a large amount of this in a short time however, a considerable amount remains. JPL requires 20 - 4659 modules and once again Production has been forced to expedite all phases of construction and test in order to meet our schedule.

JPL may order another such system and therefore, a test procedure is being developed which should be usable by all concerned.

The software brochure PDP-4, which has recently come back from the printers, was written for the SJCC. I visited the programming department to gather information and called on Stu Grover. He gave the material presented a good editing and presented same to Dit Morse for comments etc.

I am doing a lot of corresponding with various interested parties concerning Micro Tape. In general people wish to use Micro Tape with everything but a PDP. I feel the response has been very good, so good that we have problems. Assuming we wish to supply conversions, interfaces, etc. we have decided to investigate supplying a control for the IBM1620. Gathering enough information to enable designing such a unit will, in my opion, be the problem.

Fred Gould

As this was my first "pure" computer show, I have no real guide lines to gauge the show by. But my impression was the following: The technical level of visitors at our booth was high (with the exception of Thursday when High School students comprised approximately 50 - 60% of the gate).

Our displays, passing the test of actively doing something interesting and at the same time useful were in my honest opinion, the best at the show. Our location, of course, contributed greatly to our success.

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Fred Gould (cont.)

Interest at our booth was nearly always the highest of any display at the show. In my estimation the next highest attraction was the B5000 Display. Their booth was continuously crowded, the crowd comprised of 50 - 75% of Burrough's Employees (by actual count on several occasions).

The approach used by the Burrough's people (commonly called "Side-Show" approach) hurt them more than anything. Their "Barkers" assumed the audience knew absolutely nothing and this tended to insult the semi-captive audience.

What I personally gained from attending the show can be summed up in three area's:

1. A new awareness of the competition
2. A sharpening of sales technique
3. A closer personal bond between fellow employees

R. Beckman

Report on Show

I was rather disappointed by this years Spring Joint Computer Conference. I spent one day at the show with the sole purpose of seeing the exhibits. I was particularly interested in seeing what SDS would have, and they weren't even there.

Since I was there to see other people's exhibits I didn't pay much attention to ours. There seemed to be quite a bit of interest in what we had to show and our booth was always well populated. It's a good thing we put the company name up high because from a distance our booth always seemed to be a solid row of people's backs. On closer examination it turned out that about 50% of those backs worked for DEC. Maybe this is justified on some sort of "Duck Decoy" principle, but I doubt it. It doesn't take a really large booth crew to handle demonstrations and answer questions, and the people not on booth duty and there just for the exhibits should spend little or no time in our own booth.

If there was anything really new or startling at any of the exhibits, I managed to miss it. Again, it was pretty obvious that operating type exhibits draw the most interest. There were several "formal" type operating demonstrations (GE, Burroughs, etc.) and for the most part, I think they fell pretty flat. I am convinced that our informal type of demonstration where people can get in and play with things themselves if they want to is much more effective.

I went in on an exhibitors guest ticket and got a badge with no company name on it. I don't know if this made any difference or not, but I felt more at ease and pushed in where I might not have otherwise. As a result, I wound up holding the meter for a GE technician while he frantically tried to find their trouble before their next scheduled demonstration. He didn't find the trouble but they had

Bob Beckman (cont.)

the demonstration anyeay and faked around the problem. I also spent about an hour and a half almost literally inside various sections of Burroughs B-5000. Some of the things I saw make me feel awful sorry for whoever is going to have to maintain that system. Of course, the same comment applies to some of our systems. Another "high" point for me was finally seeing a DDP-19 in the flesh. I managed to poke around inside it for a while too, but I'm already familiar with the way CCC builds things and didn't see anything unexpected. The machine had been borrowed from a customer in the area and I don't know how long it has been in operation, but it didn't look like anyone was using it too much. The machine was awfully awkward from the users standpoint. The reader is out of reach of the console and has no provision for handling tape. I guess you're expected to run tape from one waste paper basket to another one. There is no really adequate provision for paper for the typewriter, and you would have a hard time getting a long program listing out of it.

Although I was rather disappointed with the overall show, I feel that the time I spent there was well worth it. I gathered more information about how other people do things and I collected literature about computers and devices that, once it is absorbed, will help me to evaluate our own equipment and procedures.

H. Painter

SJCC - Detroit

Judging by the interest in PDP-5, PDP-6, the Module Tester, FORTRAN, Type 330 Incremental Display and the PDP-4, plus the constant crowds around the booth, the exhibit was successful from our point of view.

As seems to be the custom at the large shows, however, the booth tended to be overcrowded with our own people. (This also applies to the Design Engineering Show in New York.)

When a prospective customer comes up to the booth and sees a crowd, he will generally walk away and may come back later (we hope).

As far as SJCC was concerned, 6 to 8 people were assigned to duty at all times, which seemed an optimum number, considering the amount of equipment we had on hand and were introducing, and the size of the booth. On occasion there were up to 15 DEC people in the booth. Too many!

For those assigned to 4 hours of booth duty, this doesn't mean an easy day. The rest of the time is available to you to see what competitors are doing in their booths, find out what new products are available, and to attend technical sessions.

Those not assigned to booth duty should stay away from the booth as much as possible. However, you should periodically check back with those at the booth to see if anyone (i.e., a customer) was looking for you, or if you can perhaps answer a customer's question.

If we all follow these simple rules, we will eliminate the DEC-crowding of the booth and be able to do a more effective job at the trade shows.

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Ken Senior

The SJCC was smaller than I expected that it would be. I was surprised that some of the computer manufacturers did not have a booth.

Our exhibit drew quite a crowd most of the time. The two displays and the module tester seemed to draw the most attention, while the PDP-4's attraction was secondary. Most people did not know an application for the light pen. Many people were interested in literature about the PDP-5 and PDP-6. Our exhibit always drew more people when someone used the microphone to describe the action or the device being demonstrated.

There was a lot of machinery operating on line. The booths that drew the most attention were the ones that had somebody lecturing with a microphone. Also, machines that used a false floor had a built-in stage from which to work.

This being my first computer conference, it was quite an education to see:

1. The way the show was set up physically.
2. The various products demonstrated.
3. The different salesmen's techniques.

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## TECHNICAL PUBLICATIONS

### Advertising and Public Relations

Jack Atwood

Public Relations - This has been a neglected area the past two weeks, as most of our effort was concentrated on show materials. The Beacon Industrial Review ad and write-up are about ready to go, and we are back on the production of the "current" issue of ON LINE. We are also giving Bob Lassen a hand with advertising for computer technician interviews on Saturday, June 8.

Product Publicity - The current crop of releases are getting very good acceptance on the part of trade publication editors. We haven't made any front covers lately, but several items - particularly the Micro Tape release - have been featured in the new product sections. The Spring Joint Computer Conference press kits were the best editorial aids available in the press room at Detroit, and I expect that the Electronic News coverage this week will be followed by even more comprehensive (and accurate) write-ups in other books with later closing dates.

Mailings - The girls are doing the final merging of changes and additions to the general mailing list preparatory to putting it on mag tape. Somehow, after so many false alarms, they still believe that this wonderful thing might come to pass. It's probably nine parts hope and one part belief. The mailing list had grown from 6,716 in April 1960 to 15,052 by last April, and this April it reached 22,907. Manipulating this amount of information by hand or with tabulating machinery is slow, costly and hardly inspirational.

We have tried to lighten the burden somewhat by installing a new "automatic" inquiry handling system. The system enables the girls to mail appropriate literature in answer to both initial inquiries and respondent inquiries by checking the coding on the mailing labels against two mailing guides. By constatnly updating the guides, we can be sure we are sending out the latest and most complete information in the prospect's area of interest.

During the first four months of the year, we processed a total of 5,301 inquiries - 4,053 of these are direct inquiries and the balance reader inquiries from trade publications. The monthly totals were 1,339 in January, 958 in February, 1,396 in March, and 1,608 in April.

The January-February mailing produced a total of 1,784 inquiries during this period. This was approximately an 8.5% return on the mailing. The second highest inquiry producer was the IEEE show with a total of 817, and the third highest, the March-April mailing with 640 inquiries. An application note mention in Electronic Design had produced 190 inquiries by May 1, and mentions of the Logic Kit and PDP-4 in Datamation had brought in 153 and 131 inquiries respectively.

Shows - The Spring Joint involved the usual last-minute turmoil, partly because much of the publications effort was centered on machines and systems which were still in rather nebulous condition and partly because we didn't manage to get enough of a head start on the exhibit. One nice thing about show literature: it gets an awful lot of things decided. If you don't mind a little blood on your brochures, that is.

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Jack Atwood (cont.)

The show itself surprised me. The attendance was greater than I had expected in Detroit, and the exhibitor effort was less. I continue to be impressed by the clean, uncluttered exhibits (like Data Products Corporation and Bryant Computer Products), by the handsome and informative literature from the West Coast firms (like Librascope and General Dynamics-San Diego), and by the honest-to-goodness enthusiasm of some booth personnel (like Charlie West of Soroban).

I remain unimpressed by crowd-pleaser demonstrations (like General Electric's and Burroughs), by the general run of literature, and by the contribution made by most female booth personnel (like the Janes in the Datamation booth and Dames at Bell Telephone). Equipment styling seems to be improving year by year, with more firms swinging to the functional (or Digital) approach. Also more exhibitors are learning how to stage their exhibits (and I mean "stage" in both senses). Finally, there seem to be more meaningful demonstrations. I was particularly interested, from a selfish point of view, in watching the Holley Printer and the Soroban Card Reader in and out of action.

My impression of our own booth was mixed. The showing of equipment was impressive, the booth personnel were alert and knowledgeable, the demonstrations were absorbing, the crowd was interested, and the literature looked good. However, the booth itself left much to be desired, the exhibit was crowded, there were far too many Digital people standing elbow-to-elbow across the front, and there was too much literature in too many places. And it was disappointing to find Micro Tape again a silent partner to the activities. We could and should do much, much better.

Literature - Several new items made their bows at the Computer Conference. The PDP-6 brochure was far and away the most difficult to put together, since so many details of the mabhine design were decided or designated one by one as the text was written and rewritten sentence by sentence. The PDP-5 brochure also had to await a few final decisions, and the PDP-4 Programming System folder was only settled on at the last minute. Only the Module Tester folder went through production in a routine and orderly fashion.

The big push now will be to get the PDP-1 short form manual back to press with the necessary revisions, to rennovate the PDP-4 brochure, to complete the computer option bulletins, to get the final Micro Tape brochure in print, to fill in the missing numbers in the high-density moduel bulletins, to lay the groundwork for the next edition of the module catalog, and to produce a couple of brochures on the Memory Tester 1521 and special systems in general.

Technical Information

Stu Grover

Although equipment manuals are needed ever more critically as the spring rools on, it is pretty hard to ignore the Spring Joint Computer Conference.

Bob Clark joined the technical writing group on Monday, May 20, giving us 50% more creative capacity in the manuals department. Bob has been in and around digital equipment for about four years,

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Stu Grover (cont.)

most recently writing on the Minuteman command system at Boeing. He will tackle the manual for the Line Printer Type 64 as a starter. Bob Buyer gave the Memory Tester 1525A manual to Helene for production and started manuals for the Data Control Type 131 and Mag Tape Control Type 510. Currently there are seven manuals scheduled for publication before the end of June. Twelve more are on the books.

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## ADMINISTRATION

### D. Glazier

### Trichlorethylene

The proposal of changing to bulk storage of Tri. is progressing smoothly. Two systems have been proposed at this time.

General Chemical Corp. will furnish and install storage tanks tapped to the degreaser with springs and gate valves. Storage tanks will be equipped with vent alarm, vent dryer, gauge and check valves to insure quality control. Guaranteed metered delivery and temperature readings of 100% Du Pont solvent. The cost of Tri. to remain at $.1225 per pound delivered.

### Typewriter Maintenance

A maintenance agreement contract has been suggested by IBM. During the past year per call service for IBM typewriters amounted to $563.25 for labor, and $344.77 for parts, making a total of $908.02.

Under the IBM contract the cost would be $35.00 per year for Standards and $39.50 for Executives, less 5% discount. The total cost would be $1002.72.

In addition, only one purchase order is necessary, which reduces considerably a clerical problem.

Three times a year each typewriter covered by the contract would be power cleaned and lubricated. All parts will be covered, with exception of the platen. Travel expense, and labor for all calls during normal working hours shall also be covered.

### F. Kalwell

I've recently returned to Good-All, 10 mylar, .39 mfd, 10 volt, 10% capacitors because they were shorted in our modules.

Good-All made the following comments:

1. If these capacitors are poured from one box to another, or onto a tray, the short ends may puncture the case.
2. After examining the units it seems that the punctures in the capacitors have constant spacing indicating that a sharp edge pierced the unit.

The present capacitor we are using has a height of .458 which suggests the modules are stacked causing the thin mylar wrap to puncture. Samples of a shorter unit (.358 in height) are being submitted for QC approval which should prevent the case from being punctured by the solder joint beneath the module.

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F. Kalwell (cont.)

Our requirements for metal film resistors has increased during the past few months. Four standard Mil temperature coefficients are in existence at the present time. Because many special resistors with special temperature coefficients are manufactured for DEC, deciphering the coding on these units has been a problem. All future orders for special metal film resistors will have the temperature coefficient spelled out on the resistors including the value, tolerance, and wattage as well as the week and year manufactured. The marking will be impervious to our trichlorethylene bath.

Most of the components for the tape deck 555 units are being delivered on time with most of the parts now in production stockroom. The 20 magnetic tape heads and 40 torque motors are due to be delivered by May 30, 1963.

Engineering and Quality Control have approved usage of a .01 mfd disc ceramic capacitor (-20% +30%) 50 VDC unit in most of our applications. This unit will be used in all our modules with the exception of: 51, 52, 53, 61, 62, 63, 780, 1569, 1705, 1973, 1989, 4682, 4688, and 1803 which will use a .01 mfd (-0% ±100%) 500 VDC units.

The United Shoe Machinery Corporation's pantograph position table which adapts to our dynasert machine is being shipped early according to U.S.M.C. The anticipated delivery date on this machine is the week of May 13, 1963, and not the previously quoted date of June 15, 1963.

R. King

The latest order of 1000 tape reels for the 555 has been received and is now in the inspection department. Other mechanical parts for the 555 being done by outside vendors are progressing at a satisfactory rate.

I had occasion this week to visit the Veteran's Hospital in Bedford, Massachusetts. There are now four patients assembling our boards and two patients being trained. These patients are presently assembling boards for DEC at a rate of 200 per week.

We are in the process of placing an order for 100 cabient frames. Donnelly Mfg. Company has recently submitted a quote for $100.00 per cabinet. This is $10.00 less per cabinet than previous orders, giving DEC a $1000.00 savings on this order.

The scrap aluminum and steel is now being picked up every Wednesday morning at building 5. The sheet metal shop delivers their scrap to building 5 every Friday afternoon. Any other department who may accumulate aluminum, steel or solder scrap should follow this procedure, so that our receiving personnel has time to weigh this material and have it ready for Wednesday pickups.

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## ENGINEERING

E. Chevrier

### Multiplexer

A Multiplexer Switch (1578) will soon be offered for sale (Barbara Stevenson is our first customer for the A-D converter). The first model has been made and is now under test. Tentative spec. as follows.

| | |
|---|---|
| "ON" Resistance | 50 Ω max. |
| "OFF" Resistance | 50 meg. |
| OFF set voltage | 250 μv |
| leakage | 2 namp at +10V or -10V |
| Max. Rep. Rate | 250 KC |

Although a 250 μv. offset voltage is specified above, a 50 μv. offset can be made available.

The 1578 has 4 switch per board and may be driven by standard DEC current.

More detail will be available in the literature to be released soon.

### Differential Multiplexer

Tom Stockebrand wants a differential Multiplexer for very low level sampling 100 MV fullscale. A circuit has been designed and is now being made by George Gereld.

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## SYSTEMS

Pat Greene

Jon Fadiman left last week for Europe to assist Guenter in the opening of our Munich Office. He has several stops to make while he is over there; one of them being Siemens to install a 1516 Memory Tester which is due to be shipped on May 15. Work is progressing quite well on another 1516 which is due to be shipped on the same date. However, we are encountering some difficulty in obtaining SW1250 SCR's to make enough 1990 Modules to finish the machine.

DC-12 which is now officially called PDP-5, is nearing completion. The first model of a new tripple flip-flop for the new controller has been checked out and found to be satisfactory by connecting a minimum of errors. Ed de Castro has been working hard to get PDP-5 ready for the Spring Joint Computer Conference. The chances are 1 in 4 that it might make an appearance at Detroit.

A.P.O. has been received from the A.E.C. of Canada for the Chalk River Project. It involves 2 computers, PDP-4 and PDP-5, with a low level multiplexer, Type 24 Drum System, Incremental Display and other computer options. This will be the first PDP-5 that has been sold. Delivery date of the system is November 1, 1963.

Bids have been sent out for Special Systems to the E. I. Du Pont Co. for a Sequence Controller ($8,400.), Pickard and Burns, Digital Clock ($39,000. 1st prototype). The University of Chicago, Spark Chamber Reader ($39,000.), University of Michigan ($7,680.) Silverman Assoc., Card Punch ($20,000.), Hycon Mfg. Co. for a DC-12 Computer, ($28,700).

Bids will be sent out in the next week for a Drum Checkout System for the Frankford Arsenal, a Programmed Batch Controller for E. I. Du Pont.

Some cleanup work has to be done on the Ferroxcube 1521B to clean up several problems they are having. It is expected that his matter will be settled in a week or so.

After several lengthy discussions with Engineering Circuit people, we have decided to build our own level multiplexer for the Chalk River Job.

Tom Stokebrand and Emile Chevrier have been working out the problems associated with the operational amps and intergrated choppers respectively. The full input range for 8 bit encoding will be 50 ma, i.e.; 200 nonoamps per quantum step. Single ended multiplexing is now being done and the Chalk River Job requires a differential system.

Our systems group is also working on 1521 Memory Tester to be delivered to Burroughs on June 15.

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R. Tringale

A complete lot of 1990 Read Write Switches have been thoroughly tested in the 1990 Module Tester. This 1990 switch has replaced the 1986 which had two characteristic problems. One problem with the 1986 was its inability to shut off when deselected and also its forward recovery. The shut off problem has been solved in the 1990 by a discharge path for the silicon controlled rectifier. The removing of this stored charge in the SCR is the only reliable way of turning off an SCR. Forward recovery is the ability of the SCR to remain at a reasonably low impedance when going from a low holding current of one hundred mils to 1 Amp at 100 ns rise time.

The specifications for the SW1250-3 was sent out to all SCR manufacturers and the only present supplier is North American Electronics in Lynn. Two SCR Testers have been built to test the three most critical specifications at the SCR. They are the turn on gate - Pulse to fire, the next being the Forward Recovery, and the last being the turn-off time. One Tester has been sent to North American Electronics, the other tester is for our own use. Since SCR's are just a whole lot of specifications it has been necessary to check every SCR for these critical characteristics. We have been testing SCR's up in the systems area now for 3 weeks. The leakage tests are being made by Jim di Mauro in Test.

All the testing has been fruitful because the 1990 has worked very well in the 1516J. In the system it was possible to achieve rise times of 40 to 50 ns through a switch out to a shorted output plug with an 800 ma current pulse. In the past this was impossible because the old read write switches would not respond fast enough. Another important factor responsible for the improved rise time is the improved wiring scheme of the drive system.

The turn-off time of the Read Write switches is now controllable and it allows for a faster cycle time in the system.

Two other modules were designed for the drive system. They are the 4704 and 4705. The 4704 is a series deselect switch which removes holding current from the Read Write switches and remains ata high impedance during the deselect period. The other module, the 4705, is a deselect current driver which is used to remove stored charge in the SCR's during the deselect period.

The checkout for the 1516J has been completed and the system should be delivered to Siemens on time. The 1516I logic is almost completely checked and this system is just waiting for Read Write Switches.

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## COMPUTERS

EN1016 A. Blumenthal

The Type 135 Memory (8K for PDP-4) Prototype has been thoroughly tested off-line and is now been tested on the PDP-4. Performance data have shown that the AC coupled sense amplifiers leave much to be desired. The available DC amplifiers however, occupy 1 module per bit, and to use them will require the addition of a Mounting Panel. To avoid this we are designing a DC amplifier that can be packaged 2 bits per module. We hope to make it possible to eliminate the balance and slice pots so that setup time for the memory will be reduced by many hours.

A. Hall

The Foxboro Company took delivery of their first serial drum a few days ago. The computer on which the drum will be run was shipped some weeks before. The drum was checked out on the Foxboro- U.S. steel computer which itself will have a drum. The second drum was damaged, apparently in shipment, and had to be returned for repair. It will be shipped back to us in a few weeks. Foxboro has requested early delivery of the U.S. Steel computer and so the drum for that computer will be checked out on the Engineering PDP-4.

With two of the five computers on the current Foxboro order delivered or ready to deliver Foxboro faces the problem of either cancelling the remaining three before their cancellation privileges expire (7/27/63, 8/1/63 & 9/29/63), leaving the orders in force on the prospect of receiving contracts or actually getting the contracts.

While the prospective Fitchburg Paper contract negotiations drag on and on the prognosis is optimistic. We had hoped to have definite word on this job more than a month ago however, IBM is fighting tooth and nail to keep their 1710 at Fitchburg and management vacillates between Foxboro and IBM leaning towards whoever talks to them last.

General Foxboro prospects look fairly good. They are working on more than 50 promising proposals both within and without the U.S. They are contemplating a move by the Natick (computer) division to a larger building if they get just a few more process control contracts.

Foxboro seems quite pleased with our equipment and with its deliver. There has been only one (apparent) case of our failure to meet their specifications and this is presently being investigated. Their calculations show that the MTBF of our computer is only about 350 hrs. but they feel that this is less than the true figure because much of the time recorded was during the early use of the six computers sampled. They keenly feel the competition from the SDS 910. Most of their requests for changes to the computer specifications and guarantee have been to meet this competition. The requests have been specifically 1) to increase our ambient temperature guarantee 2) to widen our AC voltage margins 3) to provide operator console, door and drum-write locks 4) to provide temperature sensing 5) to protect the computer against brief (50 msec) power failures and 6) to restart the computer if power returns following a failure.

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A. Hall (cont.)

Foxboro is contemplating the addition of an Arithmetic Unit and 4K more memory to their Service Center and are very interested in the Microtape both for their own use and to quote on systems. They are taking a long, hard look at the DC-12, thinking that they may us it for their small controller.

If Foxboro should sell a control system in Europe or if we sell a computer in Europe, checkout should be prepared to have available a 220 V, 50 cycle power system which can drive a large PDP-1 system. Also before quoting these systems we should know what the addition cost and delivery would be for the requisite 220V, 50 cycle power supply transformers, reader, punch & teleprinter motors, elapsed time meters, power relays, filters,etc.

Successive plans for the actual layout of the new Engineering area on the third floor of building 5 have been through the mill and have emerged successively less scathed Office and bench space and location has been pretty well decided and will be built a bit at a time to check the wisdom of the layout and to make room for the coming summer students. Installation of ventilating fans and the neccessary lighting will be done as soon as possible. Hopefully the first offices will be ready for occupancy in about a month. Drafting, the Moduel Shops, Engineering Stockroom, Library, IO Development and the Engineering computer will be moved over as time and convenience dictate.

Since approval of the project by the Works Committee, Engineering has acquired a PDP-4 to be used for development work. It is presently located on the top floor of Building 5 and is being run on a two shift basis testing the incremental display and the new PDP-4C memory.

The bare bones of PDP-6 organization are becoming evident. Meetings have been held recently to determine project priorities and to explore detailed module and memory configuration. A drafting numbering system (similar to PDP-4) and Engineering Change system has been devised to eliminate some of the difficulties we have encountered on previous computers. A slightly more detailed Job Analysis system will be used to permit what is hoped will be the first really complete analysis of the time and money required to develop and manufacture a computer. Sales and Advertising are cooperating in this effort as is, of course, Accounting.

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## MECHANICAL ENGINEERING

### L. Prentice

| | |
|---|---|
| EN1000 | 50% |
| EN1136 | 25% |
| EN1177 | 25% |

### Microtape 555

Drawings remaining for production releases are as follows:

Chassis Weldment
Desk Model Housing
Tape Storage Unit
Cabinet modifications providing for the use of three 555 units in a single DEC cabinet.

At least two of these should be realeased this week.

### Light Pen

Plastic parts for the lens retainer of the light pen have been received from Norman Jones Company. These, as yet, have not been tried out.

### Factory Relocation

A final proposal has been submitted for a floor plan of the reception area and plans and sketches were forwarded to Maynard Sandler and Ken Wakeen for the automatic module tester area. Relocation of the cabinet shop to the top floor of building #5 is about 50% complete and work has started on the relocation of Bob Beckman's area at the west end of Building #5.

### Midwestern Instruments Tape Unit

A meeting was held with representatives from Midwestern Instrument Company, Tulsa, Oklahoma on Wednesday, May 8th. While final details were not discussed at this meeting, a general feeling of the problems existing to both, was discussed. It is our feeling that, if the unit is satisfactory when returned to us on May 21st and we accept this transport to be offered for sale in the coming months, the first five units would be put into cabinets of our manufacture and industrial styling and the problem of documentations, drawings, etc., of this cabinet could then be turned over to Midwestern Instruments for production in their own shops. These people toured our shop and after telling us what their production delays and production control problems were, I believe they were very impressed with the short time in which we were able to run out completely new designs such as the module tester, the incremental display, and even our computers. While they were somewhat reluctant to accept our explaination that their cabinet was inadequate, I believe, after they saw what we are using and building, they came to the same conclusion. I believe most any company, and I know we ourselves are reluctant to accept changes from other companies who buy our products because it represents a real extra cost to us and I think these people felt the same way about adapting

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L. Prentice (cont.)

their transport to our cabinetry. The primary reasons that we are reluctant to accept their cabinetry are the following:

First, the material the cabinet is made of is heliarc aluminum extrusions and while these start out being reasonably strong, once they are welded the material in the vacinity of the weld becomes annealed and is very soft and will not stand undue local stressing and, while apparently some thought was given to putting the machine on casters, they admitted that they had never tried this. We believe that the cabinet itself would not stand the rough treatment it would have being pushed around on casters over floors that are similar to ours here in the factory. The method used to remove the skin members from the cabinet is very slow and difficult and the fasteners used are easily broken. There is no provision for putting in the amount of logic that we would like nor is there room enough or accessibility enough to the vacuum columns. They seem to be well enough impressed by artist sketches of the cabinetry we proposed. We also told them we had found that controls placed below the tape units were bypassed by the operators. We do not know what human behavior causes this but we have seen it happen on Ampex and also on early Potter units where people would pay no attention to statis lighting that appears below the transport.

K. FitzGerald

| | |
|---|---|
| EN1000 | 5% |
| EN1178 | 95% |

The past two weeks have been spent assembling the PDP-6 prototype console. It was necessary to have this unit ready for photographs Monday, May 13th and for awhile, it looked as if it was impossible but due to the fine cooperation of the shop personnel, silk screen department, Scott Miller and Roger Melanson, we made the deadline. The pictures will be taken on schedule.

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## SALES

D. Denniston

The new hi-density modules have stimulated a number of people in this area. Several orders are now being worked up.

The NEVIS Labs of Columbia University has been shaken slightly by the fantastic number of modules used in the Hough-Powell Device (Flying Spot Digitizer). I saw the diagrams for the first time at Columbia and was quite amazed at the wasteful ways in which they have used our modules. Since this machine really just grew and was never fully designed or built by any one person, it is really no wonder. Columbia feels a complete re-design of the logic is called for. I certainly agree. We have an excellent chance of landing this order, but 3-C is also being considered.

We have had a number of requests for more info on the Micro Tape. I hope added information is in the works. Several people would like to use Micro Tape as a portion of a special system and interface data would be especially useful.

The usual January-February module sales slump has hit again this year, but March we bounced back with better than $42,000.00 worth of module orders, followed by more than $55,000 in April, as compared with just over $16,000.00 in February. I have noticed that delivery time has increased ever so slightly in the last few weeks and hope that our needs have not been forecast from January-February sales.

The hi-density flip-flops have created quite a bit of interest, but a number of the people that have inquired are somewhat dismayed that these modules are not yet available.

We have promised some pictures of our classroom modules, etc., to West Point for use in their training publications at the IEEE show. They are still waiting and are somewhat disturbed. Who was it that promised Capt. Enslow pictures, Jack? After all the trouble they have had with modules and mounting panels, I really think we owe them something.

Might I suggest that it is advantageous to call us through the DEC switchboard since this would make it possible to have the call transferred to another party. Also, several times people have called here while I was already on the other line to Maynard.

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## TECHNICAL PUBLICATIONS

### Advertising & Public Relations

Jack Atwood

Public Relations - Plant and product photomurals for all offices are being completed, and a few more colored slides have been taken. A progress story and an advertisement are just about ready for the Beacon's "Annual Industrial Review." The paste-up of the employee handbook is 90% done, and type and photos are being readied for the next ON LINE.

Space Advertising - The May issue of COMPUTER DESIGN, with our 1 megacycle modules ad, has just arrived. This issue will get extra circulation through give-away copies at the Spring Joint Computer Conference. We will be very interested to see how this publication pulls. It's a little too early to get any real indication of the response to our PDP-4 ad in the April DATAMATION.

Product Publicity - This same issue of COMPUTER DESIGN gives the Micro Tape excellent editorial coverage in the new products section. Our recent product and literature releases are beginning to pop up all over the place, and the flow of reader inquiries is most encouraging. A reasonably comprehensive press list is being prepared for the SJCC, covering the PDP-6, PDP-5, Module Tester, Incremental Display, 1 Megacycle Modules, Micro Tape, and Fortran for PDP-4.

Mailings - The next general mailing should start on its way during the SJCC. The envelopes are ready, but there are a couple of additional mailing pieces we would like to include. Meanwhile we have just introduced a new inquiry handling system, complete with new cover letters, reply forms and mailing guides. We hope the system will further speed the processing of all types of inquiries and reduce the amount of handwork at all points.

Shows - As usual, we are in a turmoil over the Computer Conference. The last minute rush to pin down information for show literature and the eleventh hour efforts to complete the display arrangements is keeping us all on our toes. For this particular conference, we have the Design Engineering in New York running concurrently with the Detroit event. Now for the SJCC will be a redesigned header for the 40-foot booth, a literature rack, and a "listening post" where attendees can stop to hear recorded sales pitches on the gear we are showing.

Literature - A second printing of 2500 Laboratory Module Handbooks is in the binding now. The first run of 1000 copies went like hot cakes. Other new in-plant print jobs include bulletins on the Type 23 Drum System, Type 132 Clock Multiplexer, Type 133 Data Interrupt Multiplexer, and the PDP-1 installation manual is finally on the press, and the draft version of the A/D handbook is being reprinted to accommodate the large number of requests generated by the last mailing.

In the works for the show are PDP-6 and PDP-5 brochures, Module Tester folder, PDP Software brochure, Instrumental Scope handout, and Micro Tape bulletin. Coming along shortly is the Module Selection Guide on flip-flops.

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Jack Atwood (cont.)

General - Three concrete recommendations came out of a meeting last week with our major "customers" for technical manuals: (1) that the level of detail in text and figures should stop short of pin-connections, (2) that reasonably complete circuit descriptions should be prepackaged for inclusion in the manuals, and (3) that more demanding standards for engineering drawings would reduce the amount of technical illustration required to produce a usable manual. If followed, these recommendations should help to speed our manual deliveries. We also expect to get more immediate help in this direction from a third technical writer, who will join us in about a week.

## Graphic Arts

Helene Shebak

This past week, the company's Mailing Department moved from the top floor of Building 12 to the top floor in Building 3 near the old cafeteria. This is going to give us more working space in our direct mail section, and by the looks of our schedule, we're going to need every inch of it. Nan Bickford and her group have just finished the 2212 Memory Tester manual and this week will start to assemble and bind 2500 copies of the Lab Module handbook, as well as the 1516H Memory Tester manual.

The work load in the camera section has been extremely heavy these past two weeks. Aside from the every day photographing (equipment, manuals, slides, forms, etc.), I received 34 jobs from Roger Melanson and 20 from George Gereids. The 34 jobs from Roger were for negatives and positives on production circuit boards, panels and labels, and the 20 from George were for negatives and positives on experimental circuit boards. We also screen all of these circuit boards for George. One of our lab technicians, Barbara Currin, left us on Friday to move to Chicago. So, with one pair of hands missing temporarily, please bear with us.

Typing on the 1521 Memory Tester manual will be started this week. The typing on the 2010 Memory Exerciser manual and the CRT 30C manual is almost finished. Typing on the Mag Tape 50-51-52 manual has been finished with the exception of the maintenance chapter. I expect to receive this from Bill English sometime this week. Printing of the text on this manual has been started. The final changes on the drawings are about ready and, as soon as they are, I will have them printed. MAINDEC 14 and the changes on MAINDEC 43 are completed and are in the camera section. These two manuals should be ready in about a week.

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## ENGINEERING

R. Melanson

The 4206 Triple Flip-Flop is designed to fit on one and one half standard glass board with a 22 pin amphenol plug on both ends of the Module. There are a total of 18 transistors and 239 components in the unit. To my knowledge this has been the hardest printed circuit lay-out to date.

The initial design layout was started with the intentions of using 6 Cera Circuits #FX for the Flip-Flop Section and 12 #CRX for the Capacitor-Diode-Gate Section. The plane was to mount all components horizontally so that the etch, going to pins on both front and rear, would be short. This layout did not work because of too many components for the width of the board. Additional trouble arose when using the Cera Circuits for the Capacitor-Diode-Gate Section. Bus connections seemed impossible to make so the decision was made to re-vert back to regular components. This enabled tapes to be woven through the components and make the necessary connections.

The present layout has the Flip-Flop Section mounted vertically along the top of the board with 6 Cera Circuits. The Capacitor-Diode-Gate Section is mounted vertically at the bot-tom of the board with one section mounted horizontally at the back of the board. No Cera Circuits were used for the Capacitor-Diode-Gate Section.

Most of the time spent on the present layout was on the connecting tape from the components on the front of the board to the connector on the back and vise-versa. Another time con-sumer was connecting the Flip-Flop Section to the Capacitor-Diode-Gate Section. The Lay-out should be released from Drafting on April 29.

The first Saturday interview held on April 6, 1963, was a success, for we interviewed a good cross section of experience that hadn't been responding during the normal work week.

The caliber of people graduating from technical schools this year has been the best since I've been here at Digital. Personel has sent out letters to three people - one accepting, one re-jecting, and one still unheard from to date.

Roger Williams, who left us last September to attend Georgia Tech. is returning on a full time basis.

Gordon Graham has been promoted to a Mechanical Section Leader's position. His many years of experience in mechanical design will be a tremendous asset to the section. This type of experience was lacking in the past so that the inexperience draftsman was hampered somewhat when in need of technical guidence.

Because of an overload in the electrical section and the back log of checking hampering our output. I decided to make a temporary change in the Electrical Section Leader's Position.



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R. Melanson (cont.)

Arthur Vartanian has been moved to a full time checker and Al Yurkstas has taken over as Section Leader. Al gained valuable experience from Gordon while working on the PDP-4. His experience has enabled our electrical section to function more efficiently technically, His knowledge has also made a mark difference with our new trainees.

The current projects in progress or awaiting drafting are the following:

1. DC-12
2. JPL-TPS
3. NSA
4. Line Printer Type 64
5. Tape Control 510
6. Micro Tape Control 550
7. Micro Tape 555
8. Diode Memory Stack

R. Doane

| | |
|---|---|
| 72 Calibrator Dwell Control | 12% |
| Test Equipment Committee | 20% |
| VHF Module Tester | 30% |
| Miscellaneous | 38% |

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## SYSTEMS

### E. de Castro

Construction of the DC-12 prototype is somewhat behind schedule. This is primarily due to difficulty encountered in laying out the board for the 4206. This new module is 1 1/2 times the normal length and has a 22 pin amphenol connector at both ends. It contains one bit of MA, MB & AC along with all of the necessary gating. Wiring diagrams for the machine were held up until the 4206 layout was sufficiently complete to pin letters. I am still hoping to have it ready in time for the Spring Joint Computer Conference but there is at best no time to spare. I have received the panel and all of the cabinet parts and expect that the wiring diagrams will be ready to go to production by the end of the week.

### Pat Greene

The University of Chicago has called me this week to let me know the status of the quotation I have sent to them. It seems that we will get a P.O. as soon as the necessary "red tape" is cut to get the money from the A.E.C.

A bid is presently being prepared for Du Pont for a General Purpose-Sequence Controller. It is not involved enough to warrant the use of a DC-12 so it will be bid as a special system. The bid is expected to go out on the first of the week.

Work is progressing on the two 1516's,we now have on the Special Systems floor. Both machines are due about the same time and with a little bit of luck they may be ready on time.

Since the last Biweekly, several systems have been delivered. A 2110D and a 2113L Core Tester have been delivered to Burroughs Corporation. Delivery has been made on the 2318 Spark Chamber Reader to Harvard University. Immediately upon delivery, Harvard bought $1,300. worth of modules to provide display features on the reader.

A small frequency divider system was delivered to EGG of Boston. It will be the first of a number of these devices to be delivered in the future.

Ed de Castro is making the final details available to Drafting for the production of DC-12. The cabinet has arrived and Ken Peirce has collected a good portion of the hardware for the assembly. Lee Butterworth and Paul O'Malley have been checking out the logic on the 1516's. Most of the modules for them are available so a good deal of checkout can be done. Lee has also been working with Barbera Stephenson and Don Murphy on the NASA project.

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## MECHANICAL ENGINEERING

Ken FitzGerald

| | |
|---|---|
| EN 1000 | 90% |
| EN 1178 | 10% |

I skipped the last two biweekly reports because most of the information which I had to report on was repetitious of many previous reports; namely, status of the shops. Most of my time during that period had been spent on supervision and administration of the shops and therefore not very interesting reading. However, during that period, we had an opportunity to purchase a very large punching machine for the sheet metal shop at a pretty good price. Before asking for this machine however, we ran some cost comparisons on comparable machines and discovered that we would be much better off to buy a similar type machine but made by a different company with a different approach to fabrication. As a result of our study we requested and received permission to purchase this machine. It is due to arrive at our plant on April 25th. We hope to have it in full operation by the first week in May. The machine is made by the Wales Strippitt Co. of Akron, New York for slightly more than $8,000.00. This machine should enable us to give much better service on production items like standard power supply chassis, plenum door power supply chassis, standard panels that are used with any degree of frequency and all other units that have a fairly high yearly volume, and a large quantity of punched holes.

## SHOPS

The carpenter shop has just completed installing partitions on the top floor of Building #5 for Ed Harwood's check out group and it might be interesting to note that 252 feet of hollow core flush door partitioning was used at a cost of $3.91 per foot, including labor of carpenters, janitors and material. Speed of erection was 6.3 feet per hour. Also on the agenda of the carpenter shop is removing of the offices and partitions of the customer service area in Building #4 and rebuilding them in Building #5; the construction of a new mail room in Building #3; the moving of the cabinet assembly shop from the fourth floor in Building #5 to the fifth floor, and construction of the office and drafting space on the third floor of Building #5, and construction of the automatic module test room, Building #5, fourth floor.

Scott Miller turned over all of his sketches and design control drawings for PDP-6 to me on April 26th and I have started the mechanical design for this unit. The drafting department has loaned Dick Reilly to me to help with the sketches so that the prototype unit can be built with a minimum of delay. It has been requested that the console be ready for photographs for the brochure which is to be printed commencing May 13th. This is a very tight schedule as it allows only sixteen working days for design and fabrication of the completed console.

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L. Prentice

| | |
|---|---|
| EN 1000 | 50% |
| EN 1136 | 25% |
| EN 1177 | 12% |
| Building Layout | 13% |

## MICROTAPE 555

The second meeting was held with Tom Stockebrand , Henry Crouse, Jack Smith in regards to the purchased items for 555 tape units and the majority of these orders have been now written. Drawings have been released for the base plate guides and guide assemblies for the 555 tape units. Drawings have also been released for the two control panels that go with the microtape units. The chassis proper is now in checking and the welded chassis assembly should be ready by Monday, April 29th. Maynard Pattern has promised the matchplate pattern for the cast aluminum door for the 555 tape unit to be delivered to the foundry by Monday, April 29th. It was found necessary to change the dimensions on the tape hub because of the use of Eastern Air Devices motors. We have been in daily communication with them in regards to specifications for the motor. I believe these are now complete and the first motors will be delivered approximately June 1st. As soon as it becomes evident that a second order of ten units is going to be necessary, a match plate should be started for this tape reel hub. This puts approximately twelve to fourteen of these units on a match plate and production is much faster and the quality of the casting can be improved.

## LIGHT PEN

Parts have been received from anodizing and reshipped to Ezra Leboff Co. for engraving. These parts should be on hand next week.

## FACTORY LAYOUT

We have now established normal security precautions in the third floor of Building #5 and we have doors leading into the area from both ends of the area. It was agreed yesterday to build a trial section on this floor to prove out location of benches, office space, etc. The computer check out area is now virtually complete. Electricians should finish wiring today and tommorrow and work was started yesterday on Bob Beckman's area at the western end, top floor, Building #5.

Several proposals have been reviewed for the reception area and no plan has been evolved which provides for proper security and proper utility for this area. This item is still under study. Other areas where relocation is planned are: the cabinet shop moved to top floor, Building #5, opposite the carpenter shop; extension of the sheet metal shop in the area now occupied by Bob Beckman. Orders for plumbing and lighting for these areas will be written as soon as possible.

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L. Prentice (cont.)

## 36 BIT COMPUTER

Preliminary plans for the console for the 36 Bit Computer have been turned over to Kenneth FitzGerald for reduction to details and fabrication. Dick Reilly has been recruited from drafting to assist Ken FitzGerald in this work. First sections should be welded together today. The present schedule is to at least have a photograph of the mock up completed by May 13th. This will consist of a console and three cabinets, together with end panels and indicator panels.

## MIDWESTERN INSTRUMENTS TAPE UNIT

This unit was received Monday, April 22nd and approximately two hours was spent by myself and Roland Boisvert stripping the unit of its outer covering and inspecting the mechanical assembly of the unit. The main frame of this unit is constructed of Heli-arc welded aluminum extrusions.

There are a number of mechanical details which need our attention for better use of the unit and more satisfactory customer acceptance. Our greatest job will be the redesign of a new cabinet to house the unit along the lines of our present cabinet; more logical layout of the control functions and provision for housing our logic. This would provide a stronger cabinet, more positive identification with our product line and easier accessiblity for field service. We also intend to purchase what we believe is a more reliable air pump unit and put it on test in the near future. Scott Miller will start work almost immediately on artist's conception of what this cabinetry will consist of. This probably will have at least several evolutions before the first cabinet is made. The first cabinet or perhaps the first two cabinets will be produced in the months of May and June.

Scott Miller

| | |
|---|---|
| EN 1157 | 5% |
| EN 1177 | 5% |
| EN 1178 | 90% |

The construction of the first model of the DC-12 is almost complete. The drawings are being reviewed and minor corrections will be made and then signed off for production.

The logo for the automatic module tester is ordered and will be delivered in plenty of time to make the S.J.C.C. Identification plates are being designed for all peripheral equipment. A basic format for all equipment will be used and adopted for the particular use. The result will be a family resemblance to the peripheral equipment.

A design for the PDP-6 has been decided upon. Last week the industrial design consultant and I worked out the many of the details on the first go around. Design control drawings

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Scott Miller (cont.)

have been turned over to Ken FitzGerald to be converted to working drawings and a first working model. The model will be used for publicity photographs at S.J.C.C. Designs of control and indicator panels have yet to be completed. This computer console will have a display, microtape, paper tape reader and punch, and a line printer in it. The complexity and diversity of equipment has made it very difficult to achieve a uncluttered look. However, a compromise of forms I believe has been achieved and with correct color selection the computer design will be of the quality that is expected of a DEC product.



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## QUALITY CONTROL

### Jim Cudmore

| | |
|---|---|
| Interviewing | 75% |
| Q.C. | 25% |

I have spent the better part of the past two weeks interviewing technicians. Most of the applicants will graduate from Wentworth in June. Several of these people seem to be very good prospects.

I spent one day at North American Electronics with Dick Tringale. The initial shipment of SW1250-3's from these people failed incoming inspection badly. Approximately 50% of the units failed on 2 special tests. The rejection rate was so high because of improper outgoing tests at their plant. We supplied them with the equipment necessary to perform these tests properly and this difficulty should now be eliminated.

### K. Doering

The amount of assembly inspections has increased recently. A new man has taken over the electrical part of this work. Due to customer complaints (JPL) reinspection of solder joints on several machines had become necessary, creating a considerable amount of rework. Interpretation of solder standards is very much up to judgment and there was some disagreement between production and quality control. This has raised the necessity of pictorial solder standards. We have been able to purchase some booklets with good photographs of these and are in the process of having them summarized on one large piece of cardboard. We hope that they will be publicized by next week.

### Jim DiMauro

Semiconductors tested since last report:

| Type | Manufacturer | Units Tested | % Rejected |
|---|---|---|---|
| GA212 | Texas Instruments | 4000 | 1.7% |
| MA89 | Philco | 2700 | 6.1 |
| MA90 | Philco | 14904 | 1.1 |
| MA90 | Sprague | 3000 | 0.4 |
| MD94 | Philco | 1607 | 2.6 |
| MD95 | Philco | 329 | 13.6 |
| SDA-1 | Texas Instrument | 61 | 1.6 |
| SDA-1 | General Electric | 301 | 14.3 |
| SW1250-3 | North American Elect. | 374 | 1.9 |
| 2N167 | Texas Instrument | 50 | 4.0 |
| 2N457-A | Texas Instrument | 15 | 0.0 |

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Jim DiMauro (cont.)

| | | | |
|---|---|---|---|
| 2N656 | Texas Instrument | 20 | 0.0% |
| 2N1184B | R.C.A. | 350 | 20.5 |
| 2N1204 | Philco | 500 | 11.4 |
| 2N1305 | Sprague | 10000 | 0.5 |
| 2N1309 | Texas Instruments | 2100 | 1.6 |
| 2N1494 | Philco | 19 | 1.0 |
| 2N1754 | Philco | 11237 | 3.1 |
| 2N2099 | Sprague | 250 | 100. |
| 2N2218 | Motorola | 50 | 0.0 |
| D001 | Clevite | 49303 | 2.1 |
| * D001 | Clevite | 675 | 0.3 |
| D007 | National Transistor | 1288 | 0.5 |
| D662 | Clevite | 419 | 0.0 |
| D664 | Continental Device | 13127 | 0.25 |
| 1N469 | Hoffman | 40 | 0.0 |
| 1N1217 | General Electric | 1050 | .18 |
| 1N1220 | Westinghouse | 300 | 1.3 |
| 1N3005A | Motorola | 20 | 0.0 |
| 1N3208 | Motorola | 1400 | 0.5 |
| SZ50031 | Motorola | 42 | 0.0 |

* Indicates Sample Tested.

D. Adams

Since the last report, there have been 1300 modules tested automatically. The breakdown of time per tester is as follows:

DC A Tester .....10.0 hrs.
DC B Tester .....12.5 hrs.
Diode Tester ..... 1.75 hrs.
AC Tester .....12.25 hrs.

Total No. of hours .....36.5 hrs.
Average No. of Modules per hr.....35 modules

D. Dubay

Test Equipment Service

| Description | Type | No. Calibrated |
|---|---|---|
| Oscilloscope | 543/543A | 8 |
| Oscilloscope | 581 | 1 |

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D. Dubay (cont.)

| | | |
|---|---|---|
| Oscilloscope | 567 | 1 |
| Oscilloscope | 185A | 1 |
| Preamp | CA | 8 |
| Preamp | D | 1 |
| Preamp | 80 | 1 |
| Preamp | 81 | 1 |
| Preamp | 82 | 1 |
| Preamp | 84 | 1 |
| Preamp | 187B | 1 |
| Sampling Unit | 3S76 | 1 |
| Sampline Unit | 3T77 | 1 |
| Sampling Unit | 6R1 | 1 |
| Meter | 980 | 5 |
| Meter | 630NA | 17 |
| Meter | 630NA-RM | 21 |

The E.S.I. Model 270 capacitance bridge was sent to Acton Labs for recalibration. They calibrated it to within 0.1% accuracy with equipment traceable to N.B.S.

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## SALES

Howard Painter

**Trade Shows Coming:**

Spring Joint Computer Conference
May 21-23, Cobo Hall, Detroit, Mich.
Products on display:
PDP-4, CRT 30G, Module Tester, DC-12, Modules.

Design Engineering Show
May 20-24, Coliseum, New York City.
Products on display:
Modules & PDP-4 (maybe).

Biweekly readers might be interested in the following costs (some are approximate since all figures not complete) which are involved in a major trade show such as the recent IEEE exhibit in New York:

| | | |
|---|---|---|
| 1. | Hotel | $1,330.00 |
| 2. | Exhibit Services (electricity, phone, labor, etc.) | 400.00 |
| 3. | Shipping | 800.00 |
| 4. | Booth space rental | 1,100.00 |
| 5. | Air fares (estimated) | 650.00 |
| 6. | Booth modifications & repair (est.) | 200.00 |
| | Grand Total | $4,480.00 |

\+ Man Hours 500 hours - conservative estimate.

If you use your imagination, you might come up with a multiplier, which includes not only salary but all overhead expenses, for the man hours to arrive at a dollar figure.

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## TECHNICAL PUBLICATIONS 1:

### Advertising and Public Relations

Jack Atwood

Public Relations: The major effort here is on the employee handbook (proofs around May 3), the employee publication (May issue around May 15), film slides of Maynard plant and product lines (being accumulated slowly but surely), and personnel publicity (as an aid to new hiring).

Promotional Advertising: Two current ads are two-color, full-page insertions in the April DATAMATION (PDP-4) and the May computer DESIGN (1 mc. modules).

Promotional Publicity: "Accomplishment of the Month" was the running of mailing labels for eight releases on the PDP-4 using the mailing list program. Coded tab cards similar to the mailing list cards have been prepared on all publications, radio stations and TV outlets likely to run our releases, and each addressee has been qualified as to interest. The computer selects and prints labels for the media in the appropriate categories whose editors have an interest in the subject of each release. The print-out on the labels also shows which publications should be sent regular-sized photos and which should receive print sized for one-to-one reproduction on automatic engraving apparatus.

Publicity in connection with the shows has included MICRO Tape, PDP-4, and the 1 mc. Modules for IEEE; semiautomatic core testing for the Conference on Non-Linear Magnetics; 1 mc. Modules for SWIRECO, and medical applications of the PDP-4 for the Conference on Electronics in Biology and Medicine. These together with releases on new technical literature, are beginning to show up in the trade publications and are producing a steady flow of inquiries. MICRO Tape, for example, was featured as "New Product of the Week" in MISSILES AND ROCKETS. Current release subjects include the PDP-4 for the Design Engineering Show, the module tester and DC-12 for the Spring Joint and the new sales offices. Also being serviced are many buyer's guide inquiry forms.

Trade Shows: The exhibits at the magnetics and medical conferences were apparently quite successful. The promotion for the Magnetics Show included a mailing, hotel newspaper hangers, invitations in the conference rooms, and posters around the hotel. This helped to produce a steady flow of visitors in the demonstration suite and a number of very likely sales leads.

Promotional Literature: The SJCC literature push, with three weeks to go, is intended to produce new brochures on the PDP-6, DC-12 and PDP software by show time. Also due is a handout piece on the module tester and a revision of the PDP-4 brochure. There is an immediate need for a detailed MICRO Tape brochure and for bulletins on the 1 mc. Modules to answer the large number of inquiries produced by the last mailing.

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Jack Atwood (cont.)

Recently completed was a folder on the MT1S21 for the CNLM exhibit and a revised price list. An initial run of Laboratory Module Handbboks has been printed, bound and distributed and the Module Selection Chart on flip-flops is ready for typesetting. Other projects in process include more product bulletins on the Newer Modules, more module application notes, a PEPR summary, and bulletins on the 510 Tape Control and 131 Data Control.

Promotional Mailings: The latest general mailing indicates (1) a high level of interest in MICRO Tape and the 1 mc. Modules and (2) a very clean mailing list. The undeliverables from this mailing were far below previous totals. Special mailings have been made for the magnetics conference and Goddard Space Flight Center. Special mailings are in process for the Design Engineering Show, Spring Joint, Bells Labs, and Brookhaven. Hopefully we will be able to increase the number of special mailings substantially when we get the list on tape for PDP-4 processing.

Sales Aids: Two projects of particular interest just completed were a computer proposal to LRL, which we helped George Rice produce, and a series of projecturals in color on the PDP-6 for Gordon Bell.

Technical Information: In addition to what Stu Grover has to say below, it is worth mentioning that we intend to help break the manual bottleneck, not only by adding new personnel but also by establishing basic standards for manuals. There is obviously a happy medium between no manual at all and manuals so comprehensive that they require months of preparation - whether handled inside or outside the plant. It should be possible for us to agree on specifications which will enable project engineers, Drafting and Tech. Pubs. to work as a team in producing adequate documentation in a reasonable period of time.

Graphic Arts: Supplementing Helene's report on activities in this area, I would like to mention that the noteworthy accomplishments of recent works include the publication of the Lab Module Handbook and the 1962 DECUS Proceedings. The noteworthy challenge of the moment is getting out 102 different test data sheets, which arrived all at once last week.

Equipment: Several new pieces of photographic equipment, including a larger copy camera, have been purchased. We have also ordered a larger press, a better paper cutter and an adequate folder. The end result we hope to obtain is greater dollar value in our departmental products and services.

Professional Improvement: Our Wednesday noon "seminars," at which attendance is strictly voluntary, seem to be proving quite worthwhile. The half-hour from 12:30 to 1:00 is usually devoted to a movie on a subject bearing on our work - industrial photography, printing, color, paper, corporate identity, computers, memory devices, etc. The film programs are now being supplemented with talks by Digital personnel on our product lines and by exhibits and demonstrations provided by some of our suppliers.

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Jack Atwood (cont.)

Vacations: Our vacation schedule has been setup in such a way that we should be able to render at least 80% normal service in all sectionsthroughout the summer. Since we can't seem to satisfy all of our customers all of the time, that may not be considered entirely satisfactory. However, we will do our best.

Stu Grover

Technical Information

Being my first entry on Technical Information in the Biweekly, this report attempts to summarize the overall picture of publications planned or in various stages of preparation, in addition to work current in the biweekly period.

There are 21 manuals either in preparation or definitely planned for publication. Most of them are for input-output equipment, notably the family of CRTs and our Mag Tape equipment. Memory systems make up the smaller group. In nearly every case, these manuals have been promised to past or future cutomers. Paul Barber and Bob Buyer work full time on equipment manuals, I help get out program manuals of the F-45 Type. Outside help comes from Bill English (whose racently reformed group is called Vericon, for some reason unknown to me). During the spring it became pretty obvious that these forces were hardly holding their own against the fecundity of our creative engineers, and we began interviewing for a third full-time technical manual writer.

During the last two weeks, Bob brought the manual for the 1521A Memory Tester to about the 80% point. Paul is working on the CRT 31 and 31A concurrently and is more than half done. His writeup of the CRT 30C is being approved now.

Bill English submitted the next to last chapter of the Type 50, 51, 52 Manual for typing. He is also rewriting a manual for the 1516 Memory Tester. Fred Gould and Bob Buyer made some changes in the 2010 Memory Buffer Manual and submitted it for production.

Helene Shebak

Graphic Arts

The past couple of weeks have been busier than ever, if this is possible, in the Graphic Art and Mailing Sections of our department.

We have recently installed a new Brown-Cadette camera that has an image area of 19" x 23". The size of this image area will permit us to handle the large experimental circuit boards "in house." At times, we have had a delay of 2 to 3 days when we had to depend on an outside vendor to photograph them for us.

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Helene Shebak (cont.)

Heavy work loads in both the silk screening and printing sections has made it necessary for larger quarters, a new and larger press and requisitions for additional personnel.

As part of our advertising program, we have been successful in making a general mailing to the 23,000 names on our mailing list once a month.

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## ADMINISTRATION

### H. Crouse

We are fullfilling our memory stack requirements for the next several months with a commitement to Ferroxcube Corporation for twenty 4096 x 18 stacks. Ferroxcube intends to have on hand four completed stacks within the next six to eight weeks, these four stacks are beyond the scheduled units and can be considered our inventory with Ferroxcube carrying the cost burden. The price of a stack in quantities of twenty is $2510.; in quantities of fifty $2440.00.

To indicate the relative state of the core memory industry the price of the first memory stack 4096 x 19 Digital Equipment Corporation purchased from RCA was $6210.00.

Paul McGaunn has joined our group to follow up on open orders. He has experience in the electronics industry working for Adage Inc. and Power Sources in their Purchasing Department.

### Frank Kalwell

I returned the following material for credit which was in the inventory surplus stockroom.

37 North Electric Connectors for a total of $120.81
3322 ft. of Surprenant non-irradiated 20 conductor ribbon cable for a total of $744.13.
7 7500 Series Multi-switches (Switchcraft) for a total of $52.92.
225 cans of name tag activator for a total of $90.00.

Total credit received $1007.86

Presently I'm obtaining quotations on all material going into the 555 Tape Unit and trying to cut lead times. It seems the only problem lies in delivery on the tape heads and torque motors. The majority of the components going into this unit varies in delivery from stock to 4 weeks.

Sprague has assured us that their .01 GMV disc ceramic capacitors will be uniform in the future. Past problems have been flaking at the top of the capacitor and the overall diameter being too large. New suppliers are being evaluated for this capacitor.

### Dick King

The secondorder for 1000 tape reels for the 555 has been placed with F. J. Kirk Molding Co. The color of these reels will be formica grey #956. I have received a quote for the labels that go on these reels. I am now waiting on a decision from Scott Miller for quantity and various colors desired before placing this order.

A purchase order has been placed with Maynard Pattern for an aluminum match plate to replace our wooden pattern of the door for the 555. This will be a permanent pattern and will allow us more accuracy on our castings.

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Dick King (cont.)

We have been looking for a vendor who can supply us with stressed relieved and strectcher leveled sheets of aluminum base plate for the 555. Edgecomb Steel seems to be our best source at this time. Other vendors do not stock enough quantity for us to choose from or do not stock 3/8" width at all.

I have been talking to vendors who may be able to help us with our silk screening and etching of panels. At present we have only one accepted vendor in each line. This has created problems in the silk screening because they need 10 day lead time - something which we can not always live with. This 10 day lead time is also required on rejected panels, meaning that we sometimes wait 3 weeks for an order to be completed. Our panels require much more lead time to be etched, because a panel must be sent to us for approval after fabrication, before the etching process is begun. Another acceptable vendor in each line, I'm sure will help us in delivery, especially with rush or emergency work. Vendors who may be able to help us with both screening and etching are Eastern Process Company, Abbey Etched Products, and Apahouser Corporation.

David Glazier

The usage of trichlorethelyne has increased to ten (10) barrels (660 lbs. per barrel) every six (6) weeks. Price per barrel has decreased five (5) dollars, an overall saving of fifty (50) dollars per lot.

Proposals have been made in regard to the use of trichlorethelyne in bulk form. This understandably would mean a cost savings, use of one vendor, and stationary equipment. The elimination of moving barrels would also save time. However, our greatest disadvantage is the weight capacity of the floors. Estimated wiight would be between 6,600 and 10,000 lbs.

New materials and methods of packaging our power supplies are being tested. Lelanite Corp. suggests extra amounts of horsehair added to needed portions of the package. This would mean a price increase of 10 - 15%. If improvement warrants this increase, we should have no future probelms with front panels being damaged in transit.

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## ENGINEERING

Len Hantman

| | |
|---|---|
| 1157 PDP-4 Automatic Module Tester | 75% |
| 1136 DEC Microtape | 25% |

I. Major work on the module tester during the past two weeks has been devoted to adding new modules to those being tested, and to "cleaning-up" the programming for demonstration and production purposes. Extraneous messages have been eliminated, thus allowing complete testing of a module causing no rejects in 3 to 6 seconds. As of April 12, 1963 the following modules can be tested for load tests, lower level tests, VCE tests, and rise and fall time tests:

| Inverters | Diodes | Negative Diode NOR |
|---|---|---|
| 1103 | 1110 4113 | 4112 |
| 1104 | 1111 4115 | 4114 |
| 1105 | 1113 4117 | |
| 4102 | 1115 | |
| 4105 | 1117 | |
| 4106 | 4110 | |
| | 4111 | |

Additionally certain test modules can be tested to guarantee the reliability of the tester itself.

The programming has been done in subroutine form in such a manner, that adding the testing of the last 13 new modules required less than 1 hour of additional programming. If a similar ratio holds up for additional modules it would appear that a fairly reasonable system has been arrived at.

II. The work on micro-tape during this period has consisted of attempting to create computer programs for possible determination of the mark track for the micro-tape. The computer managed to work out some usable combinations for marks for simple mark tracks as the following MDDG$\overline{M}\overline{M}$ (where M=word, D=data, G=guard, $\overline{M}$=reverse mark slots respectively). No easy method for computing tracks with a greater variety of marks has been developed. The basic problem is to develop a mark track such that, as the tape slides over the head, no series of marks can appear which are within two bits of looking like the original marks, except when looking at an original mark itself.

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R. Doane

| | |
|---|---|
| Glass Delay Line Circuits | 40% |
| Other VHF Modules | 30% |
| 72 Current Calibrator | 10% |
| 10Mc to 1Mc Decade Counter | 6% |
| Miscellaneous | 14% |

The 72 Calibrator has had poor dwell control performance. The improved circuit provides for adjustment over the range from a reference-to-signal ratio of 4 to 1 to a ratio of 1 to 4, with less chance for the chopper to bang up at one extreme or the other.

A 10 Mc to 1 Mc decade counter is being layed out at the suggestion of Oliver Judd, our northwestern representative. It will also be convertable to ordinary binary counting. BCD 1248 readout in some form will be provided.

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## SYSTEMS

### E. de Castro

During the past few weeks we have made considerable progress on the design of the small computer. The block schematics are now complete and wiring diagrams will be started as soon as the layout of the 4206 is completed. The basic machine requires about 100 modules and will be packaged in 5 mounting panels including the memory stacks. The control panel and all other mechanical parts have been released for production. If all goes well I expect to have the prototype operational in time for the "Spring Joint Computer Conference" in May.

The machine has been tentatively named the "Digital Controller 12" (DC-12). Specifications are now available from the library as Permanent Memorandum #1159. It will be available with 1024 words of memory, priced at $24,000. and with 4096 words of memory, priced at $27,000.

### P. Greene

Mr. Richard Miller and Mr. Jurgin Bounin from the Univ. of Chicago have visited us recently to discuss equipment that is identical to the one being conducted at Harvard. However, the method for collecting data is quite difficult and it required a completely new system. After clarification of some points, a system was proposed for a price of $26,800. (approx. the same as the Harvard job). It appears that they want to do business with us much in the same way Harvard did. In as much as the funds are being provided by the A.E.C. three bids must be sent out, etc. Our chances of getting the job look excellent at the moment.

No word has been received on two bids for the E.I. Dupont Corp. I might point out however that bidding on jobs of the process-control nature puts us in competition with people like Drexal Dynamics. It may turn out to be difficult to compete with "electro-mechanical" system with an "all electronic system." It remains to be seen.

Special Systems people have had a meeting with personnel of the computer and sales area to discuss the future of DC-12. It was agreed at the meeting that Sales would explore the computer market for such a machine and that Special Systems would continue to develop the machine with an eye toward process control and other applications.

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## COMPUTERS

### E. Harwood

The checkout area is getting crowded again. We currently have five PDP-1's and five PDP-4's under checkout. We are also building a special system for Honeywell which is on the fourth floor of Building 5. Four of the PDP-1's and three of the PDP-4's have been committed to customers. One of the PDP-1's under checkout is due to go to CRC this week. We are not shipping the display and lite pen at this time and the A/D converter will follow sometime in May. The PDP-4 for JPL is due to go out sometime about the 14th of April. Another PDP-4 with a 57 Type Tape Control is due to go out to JPL sometime in May.

Another of these PDP-1's, the NSA System, is a very large system which has, beside the computer, three bays of equipment which Jon Fadiman and Barbara Stephanson are building; and also the new Data Control and Mag. Tape Control which Roland Boisvert is designing. We have just looked over the schedule on this system and the over-all schedule has slipped by about two weeks. All the people involved seem to feel that we still will be able to meet the delivery date of June 15th.

Anyone wandering up on the fifth floor of Building 5 will see a lot of building activity going on. We are fixing up our permanent checkout area which we hope will be ready by May 1.

### A. Blumenthal

The Type 135 Memory for PDP-4 came out of production on Monday, April 8, 1963. It was made fully operational for 4K registers by Thursday, April 11, 1963.

After fixing a few little mechanical details on the diode units we will be ready to try the full 8K.

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## MECHANICAL ENGINEERING

L. Prentice

| | |
|---|---|
| EN 1000 | 50% |
| EN 1136 | 25% |
| EN 1184 | 12% |
| EN 1177 | 13% |

### MICRO TAPE 555

A meeting was held with Tom Stockebrand and Henry Crouse to discuss the more pertinent and most pressing problems in regard to purchases for quantity production of micro tape 555. The most important thing is generating specifications for the motor and the heads. The head specifications have been gone over at least twice and they should be in fairly good shape. The motor specifications are really almost nonexistant and have to be most carefully specified. These are the most important items in cost accounting for slightly more than half the cost of the unit. Design changes under way are the cast aluminum door which has been completed and released to the pattern maker. The meeting was held this week with the people of Meade Foundry in Bedford to discuss the changes and advisability of the use of a metal pattern and orders for the pattern have been issued to Maynard Pattern. He agrees to deliver this pattern April 29th. Nearly ready for production release are the two types of control panels, one for the desk model and one for the cabinet model.

Changing of the motor necessitates some change in the machine drawing for the tape hub. I believe we can make 40 of these from a hand pattern now in the hands of Marvin Foundry. A most economical method would be to make up a match plate with 12 of these patterns on a single plate. The quality of the casting would be improved and the cost would be reduced. It now seems possible that we can complete all design changes by the end of next week. Two desk type enclosures have been completed by the shops and are ready for assembly to house the two tape units that were in the cabinet that went to the IEEE Show.

### LIGHT PEN

Mechanic parts for the light pen have been completed and delivered to inspection and another unit has been furnished to Derick Chin for assembly. Possible changes to the plastic parts were discussed with the Norman Jones Company today. They will submit proposals tomorrow on two plastic pieces that are part of the ligh pen assembly.

### FACTORY LAYOUT

There has been nearly a weeks delay getting lumber and doors to start work on the check-out area and also we have been under negotiation with Bradley Sun to place a door on the center landing of building #5 between floors #2 and #3. These have been completed and we will proceed to do this as soon as possible. This, together with a similar door on the western end of the building, will isolate us from Bradley and give us the best security in building #5 we have had to date.

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L. Prentice (cont.)

Plans for Bob Beckmans area have one small revision to be completed. We should be able to proceed on this as soon as the computer check-out area has been completed.

## DISPLAY 31

The Meade Foundry people who were here yesterday, were contacted by Ron Cajolet and patterns and castings were discussed for most of the mechanical parts for the Display 31. Our estimates show that we can save the pattern cost on stock and machine time on the first set of castings for the Display 31. Aluminum stock for this unit now costs us approximately $200.00. Scott Miller has been continuing to work on the layout for the 36-bit computer, particularly the console and display unit, and two separate proposals have been worked on this past week. Fire and security locks for the third floor, Building #5, have been placed on order and should be here early next week.

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## QUALITY CONTROL

### Klaus Doering

Some organizational changes have been made during the past two weeks: Bob Grey (in process and assembly inspection) was transferred to Bob Savell; Russ Winslow took over his job. Jim Dimauro is now in charge of semiconductor test.

The cast iron surface plate (72" x 42") was bought, inspected and accepted.

The Contronics diode recovery tester is not performing satisfactorily. Different troubles have been experienced during the past two weeks. Repairs took quite a long time and delayed production testing. Russ Winslow has made up a list of all difficulties and we will possibly have to send the equipment back to the manufacturer for some time.

Inspection procedures for subassemblies have been updated in accordance with M. Sandler. Every assembly, formerly electrically and mechanically inspected by production, goes now through Q.C. mechanical inspection, as mechanical errors in the past have caused the major part of finished goods rejections or customer complaints.

### Dick Gaboury

During the past two weeks the mechanical inspection department has had the following final and intermediate inspections:

| Intermediate | Final |
|---|---|
| DEC - PDP-4 | CRC - PDP-1 |
| Foxboro - PDP-4 | J.P.L. - PDP-4 |
| Harvard University - Data Reader 2318 | National Cash Register |
| | 2115 Thin film tester |

A comparison between our shop and vendors for the weeks of 3-28-63 and 4-11-63 gave the following results:

| Digital | Vendors |
|---|---|
| Received 2357 | Received 4267 |
| Rejected 69 | Rejected 277 |
| 64 different lots | 15 different lots |

These figures are based on sheet metal parts, paint and finishes.

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Dave Dubay

The following equipment has been calibrated since April 1st.

| Description | Type | No. Calibrated |
|---|---|---|
| Oscilloscope | 543/543A | 16 |
| Oscilloscope | 555 | 1 |
| Oscilloscope | 581 | 1 |
| Preamplifier | CA | 18 |
| Preamplifier | E | 1 |
| Preamplifier | K | 1 |
| Preamp. | R | 1 |
| Preamp. | Z | 1 |
| Preamp. | L | 1 |
| Preamp. | H | 1 |
| Preamp. | D | 2 |
| Preamp. | M | 1 |
| Meter | 980 | 13 |
| Meter | 630 NA | 16 |
| Preamp. | 81 | 1 |
| Preamp. | 82 | 1 |
| Preamp. | 80 | 1 |

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## SALES

### G. Rice

On an application drawing I made for a potential customer this past week I reduced the cost by one third by using some modules designed many months ago. The problem is these modules have not been released to the public. One example is the 1803 Relay Module developed for Foxboro-Nabisco last July and still unknown by almost all our customers, potential customers and even by some people within the company. A lot of engineering time and talent went into this module development and others too. There are close to 30 modules developed and working yet unknown to almost everyone outside the company.

There has been considerable computer activity recently with both Princeton and Yale about to obtain PDP-1's for their nuclear physics interest. There is a good chance of selling a PDP-1 to the University of Michigan for both the Department of Psychology and Physics use. Harvard also has expressed its desire to obtain a PDP-4 for its Dept. of Psychology and is showing definite interest for another computer to be used by its nuclear physics people.

With all the interest shown, especially by Physics people, in the PDP-1 it would be ashame for this company to concentrate all its efforts on new machines. Especially when we are not sure what kind of a non-rental non-renegotiable market there is for the proposed equipment. There are at least a dozen Universities which have expressed an interest in the PDP-1 either for next year purchase or even later. That is an awful good potential for the PDP-1, but if some newer machine should ever break into the physics field the PDP-1 will have a tough time. With the use of our new circuits and our memory knowledge we should be able to make both the PDP-1 and the PDP-4 more attractive from a hardware point of view and the software of course is already there. It has become my feeling that the users group and the CRT displays are our two most powerful sales tools at the present time.

One of our competitors is working hard on obtaining reliability or MTBF figures. It is my feeling that when these figures become available they will be quite impressive and we will be forced to either give comparable figures or nothing. If we are going to compete in the control field we should start now in gathering good reliability figures which are of prime importance to control people. I am sure our computers will come out an equal or better than our competitors, but unless we have figures we will never be able to show it, and of course, if its not true we should know it and do something about it.

### A. Titcomb

Jet Propulsion Laboratory has provided us with a P.O.# for two PDP-4's. The first machine will be shipped April 19 and the second May 15.

The first machine features Extended Arithmetic Element Type 18. In order to provide the speed required, the 4203 modules are being replaced with 4207's. The 4203's presently in the machine have been modified but are not intended for customer use. The necessary cooperation of all parites is requested in order that their replacement may be accomplished.

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A. Titcomb (cont.)

The second machine requires special in-out equipment, special paint, and our first production 57 Tape Control. Once again, meeting schedule will depend on the cooperation of all concerned.

In addition to the JPL job, John Koudela and I are in the throes of providing some sales literature about programming. The purpose is to point out, the completeness of our programming library and the ease of programming our machines. The literature will be suitable for distribution at a show. Programming examples which demonstrate our superiority are being sought. More on this later.

Bob Oakley

The latest product developments, particularly the new 1 mc Flip-flops, have stimulated a great deal of new and renewed interest in our modules for this office. It appears that to maintain this interest and to assist sales, we should have detailed literature available as soon as possible. (Preferably module catalog supplementary pages). The Teletype Receiver 4702 and Teletype Transmitter 4703 are excellent additions to the module line and should be of significant value to those customers requiring transmissions on single pair lines. I expect to see a great deal of action with modules for systems using Teletype cards specifically because of its cost advantages. However, some of the people interested in Teletype Modules have questioned the double length and would greatly prefer a double width (2 connector) module. This is especially true with those customers who build commercial equipment and desire high physical packing density with a standard DEC Mounting Panel.

PDP-4 interest is increasing in this area. With the new software developments by Dit Morse and gang, the new pricing and the features of the PDP-4, it looks as though the competition is greatly reduced and sales should be better than ever on the West Coast.



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## TECHNICAL PUBLICATIONS

Jack Atwood

We have set up three sections within our department to help expedite work in process. I will be keeping close track of the advertising and public relations jobs, Stu Grover will be following the technical information projects, and Helene Shebak will be chief expediter on all in-house graphic arts service (photography, printing, binding, etc.). The people in the department have been distributed among the three sections according to their basic job functions. However, we will all continue to switch back and forthe from one type of project to another as the work load dictates.



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## ADMINISTRATION

### Fred Mac Lean

Payroll, which was our prime objective, was run off last week. The estimate of time-saving is quite awesome. With a payroll of 450 approximately, manually it would take five clerks, two and one half to three days from the time the Time Cards are authorized with the clerical functions of checking hours, authorizing sick leave and posting hours worked, it now takes two clerks one day, to one and one half days. The IBM Data Processing equipment we now have takes approximately 4-1/2 hours, from the time we receive the time cards, punching, calculating, printing payroll registers, printing the checks and updating earnings cards.... with the PDP-4, the time still has to be punched, with calculations and a printed register, it takes nine minutes. With additional check writing feature, an estimated 15 - 20 minutes, machine and man hours consumed.

The Sales Analysis program is just about completed. This program entails an analysis of Module Sales by Module Number, classified as to renegotiable or nonrenegotiable status. We also, as a subsidiary to this report, give an analysis of catalog catagory, speed line and series designation of each Module. We are also running a customer analysis of Module Sales by Sales Area (State - Code) for our Sales Manager and District Salesmen. The former analysis will be run on a monthly basis and the latter quarterly.

### Ed Simeone

#### Standard Cost

The Cost Accounting Department is well into the second phase of establishing a standard cost system for Modules. The Production Department has supplied us with the standard labor hours for each of the nine operations that are required in producing a Module. It was necessaryto do this for each Module as the labor varied, depending on the components, etc. in the Module.

We are now extending these labor hours by a standard labor rate. This will give us the total standard labor cost per Module, which added to the standard raw material cost, represents 50% of the elements of cost.

The third phase will be establishing a standard cost for each manufactured part used in a Module. This will include any item that is made in the Production area and is ultimately used in the Module, such as handles, boards and plugs. To arrive at a standard cost, we will be required to determine the standard material, labor and overhead for each item. This, in turn, will become the standard cost that will be applied to the Module.

The fourth phase will be establishing a standard overhead rate. It will be necessary to forecast expenditures for items of expense in arriving at this rate. This is important because this rate should be calculated to approximate the actual expenses at the time the Module is manufactured.

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ENGINEERING

R. Doane

| | |
|---|---|
| VHF Modules, miscellaneous | 30% |
| Transistor thermal resistances | 35% |
| IRE Show | 22% |
| Other miscellaneous | 13% |

Revised layouts for VHF modules are done, and printed board models are being made. A burst generator for VHF testing made from VHF modules which is logically similar to the 5 Mc Type 2309 has been designed and is being wired. Transistors to be used for the first lot of VHF production are being tested as a prelude to writing accurate specifications for future purchases. All parts or production are now on hand.

A tester and thermal test jig for measuring thermal resistances in TO-18 transistors, both PNP and NPN, is in operation. Though cumbersome, these tests have been simplified enough to allow about 4 measurements per hour of junction-to-case thermal resistance, with expected errors of less than ±10%. While the principal motivation for doing this work was to investigate junction temperatures in VHF modules, it seemed worthwhile to investigate the thermal resistances for several common types, to get a feeling for margins and tolerances, and just for plain curiousity.

| Transistor Type | Number Measured | Typical °C/watt Junct.-Case | Typical Margin | Typical °C/watt Junct.-Ambient | Typical Margin |
|---|---|---|---|---|---|
| 2N744 | 1 | 106 | +42% | 356 | +40% |
| 2N709 | 5 | 100 | +100% | 350 | +43% |
| 2N2475 | 5 | 100 | +100% | 362 | +61% |
| 2N2368 | 4 | 100 | +45% | 356 | +11% |
| 2N994 | 5 | 175 | -29% | 450 | -17% |
| MD 93 | 4 | 500 | +100% | 750 | +67% |
| 2N711A | 3 | 150 | +67% | 400 | +20% |

Since so few samples were measured, these data should not be taken too seriously. However, a few observations (not entirely based on the data shown) may be valuable:

1. It seems likely that failure of the 2N994 to meet the thermal resistance specifications published for it had some influence in G.E.'s discontinuance of that type.

2. Improved thermal specification of one device over another (2N2368 over 2N709 and 2N2475) may not show up in actual performance.

3. Perhaps roughly half the heat leaving a TO-18 transistor goes by way of the leads, when no heat sink is used.

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R. Doane (cont.)

4. Some types have dramatic margins, especially for junction-to-case (case-to-ambient in free air by these tests and from manufacturer's specs. is taken to be a constant 250°C/watt for TO-18).

5. Distributions were narrow (typically ±8% to ±16%).

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## MECHANICAL ENGINEERING

Loren Prentice

| | |
|---|---|
| EN 1000 | 50% |
| EN 1136 | 25% |
| EN 1184 | 25% |

## MICROTAPE 555

Three units were gotten ready for the IRE Show and shipped Thursday, March 14th. There are still some design changes to be made on this. These will be discussed at a meeting with Tom Stockebrand today at 9:30. Jack Smith has been made aware of some of the problems involved in production and there is still more liaison that has to be carried on with production so that these tape units can be made on a regular basis.

## LIGHT PEN

A first version of the variable field light pen has been released to the shops. Three units are being built. Two of these will be finished, that is, chrome plated and black treated and engraved and one single unit will be released as soon as possible to Bob Savell for complete electronic assembly. Outside vendors have been contacted in regard to making a plastic strain relief that is a part of this assembly. John Ward of MIT was contacted in regard to a source for the engraving of the barrel of this light pen. They are very interested in this development and want to be kept informed of its progress.

## FACTORY LAYOUT

Proposed layouts have been submitted for a new computer checkout area. These have been approved and work orders have been written to implement this section. Currently under consideration are Bob Beckmans area and security measures for the third floor of building #5. Drafting has completed the floor plan of building #5, third floor as it now exists. This is for evaluation rehabilitation of this floor and for conversion to our uses.

A display 31 has been completed and shipped to MIT. Replacement mountings have been completed by the Machine Shop and are now ready for electronic assembly. These are of a much better quality then we have been able to produce previously. Ron Cajolet is in the process of reducing all drafting on this unit to castings where possible to improve the production costs on the display 31.

Numerous proposals have been sketched up on the console and display unit for the 36-bit computer and three wooden and pace board mock-ups have been built. Each has been discarded in turn. Styling and utility are paramount in this effort and it seems never the twain shall meet.

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Loren Prentice (cont.)

Scott Miller is also making an investigation to find a better finish for the satin black panels that are now used in the top of PDP-4's . The present finish shows finger marks rather badly and is easily marked although it is difficult to scratch. It can be cleaned very readily with soap and water and does not deteriorate under such treatment. We would very much like to provide a finish here which satisfies the appearance requirements and is still not subject to damage from handling.

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## PRODUCTION

J. Smith

Labeling for our machines has been a problem for quite some time. We have tried many different type labels without too much success. We are now using a metal type label which is both unattractive and has a tendency to peel. A new label has been found which I feel will solve most of our problems. Lettering on this label is printed on a transparent backing which gives a silk screen effect. The backing also seems to have superior adhering ability. Samples of these labels have been put on a machine presently undergoing construction. I have contacted many people who I feel would be interested and have received only favorable comments. Anyone interested will find the labels on Machine #41 (900)-7742). It is my suggestion that we standardize on this type of label for our present and future labeling needs.

## QUALITY CONTROL

### Klaus Doering

Drawings for the classroom modules are completed now. A first piece sample is in the works and after Q.C. approval, the items will be released for production.

Lelanite Corp. supplied us with an improved type of shock absorber (horsehair) for the protection of shipped parts (power supplies, etc.) We did some drop tests that did not show a significant improvement over the previously used design. At the time I do not think that the recorded increase of protection justifies the expense for the new shock absorber (at least 60% price increase) plus the change to a larger carton. We therefore will try to find something better.

An inspection procedure for the mechanical assembly inspection of systems has been sent to the people concerned to give them a better idea of what we are checking for and where the critical areas are.

A part of our time is being devoted to the writing of the Q.C. manual.

We have purchased a resistance bridge from General Radio (from 0.1 ohm to 100K ohm) that has been put into use in incoming inspection.

### R. Grey

**Electrical Inspections**

| | | |
|---|---|---|
| PDP-4 | Stock | Intermediate |
| Display 30A | Stock | Intermediate |
| Mag Tape 50 | Stock | Intermediate |
| Precision Display 31B | Lincoln Labs (MIT) | Intermediate and final |
| Thin Film Tester 2115 | National Cash Register | Intermediate and final |
| PDP-4 | Foxboro | Intermediate |
| Display 30H (Logic only) | BB & N | Intermediate |
| PDP-4 | Stock | Intermediate |

The Pamotor Fan under life test has passed 5000 hours without failure. The two Gold Seal Muffin Fans having failed at 4000 hrs, were oiled, and have been operating for an additional 1000 hours.

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Russ Winslow

Semiconductors tested since last report.

| Type | Manufacturer | Units Tested | % Reject |
|---|---|---|---|
| FSP-24 | Fairchild | 10 | 0.0 |
| GA212 | Texas Instrument | 1000 | 4.2 |
| GA439 | Texas Instrument | 3000 | 2.3 |
| SDA-1 | Texas Instrument | 250 | 0.4 |
| SW1250 | Transitron | 405 | 4.9 |
| T-1796 | Philco | 353 | 18.0 |
| 2N656 | Texas Instrument | 4 | 0.0 |
| 2N711A | Texas Instrument | 1000 | 1.2 |
| 2N1184 | R.C.A. | 35 | 2.8 |
| 2N1184B | R.C.A. | 55 | 0.0 |
| 2N1304 | Texas Instrument | 1500 | 1.6 |
| 2N2099 | Sprague | 600 | 0.5 |
| D001 | Clevite | 25000 | 0.22 |
| D001 | Transitron | 45000 | 0.25* |
| D003 | Clevite | 4000 | 2.75 |
| D007 | National Transistor | 7862 | 0.25* |
| D007 | National Transistor | 760 | 0.0 |
| D662 | Clevite | 47502 | 1.5 |
| D662 | Clevite | 11079 | 0.25* |
| 1N748A | Motorola | 10 | 10.0 |
| 1N964A | Motorola | 42 | 0.0 |
| 1N1220 | Westinghouse | 100 | 3.0 |
| 1N3208 | Motorola | 100 | 0.0 |

* On the basis of sample testing.

We have recently received and put into operation a 100 megacycle and gain bandwidth test set; Dynatran Electronic Corp. model 1818A. This device will enable us to test for $F_t$ and $h_{fe}$ at the industry standard of 100 MC. Transistors, Types 2N2475 and 2N994, are presently being evaluated.

After several minor breakdowns, the Contronics AC diode tester seems to be performing well, although slowly. The slow rate of test is being somewhat overcome by sample testing wherever possible. Diode reels failing sample inspection are retested 100% where the need for the units in question is great.

29,451 capacitors were tested since the last report.

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Dick Gaboury

During the past two weeks the mechanical inspection department has had the following final and intermediate inspections.

| Intermediate | Final |
|---|---|
| DEC CRT Display | Lincoln Labs Ultra Precision Display 31B |
| DEC ITT Mag Tape Control 52 | |
| DEC PDP-4 | |
| DEC CRT Display 30D | |
| DEC ITT 3 Bay Mag. Tape 50 | |
| Lincoln Labs - Ultra Precision Display 31B | |
| National Cash Register - Thin Film Tester 2115 | |
| NSA Optional Equip. For NSA | |

A comparison between our shop and vendors for the last two weeks gave the following results:

| Vendor | Shop |
|---|---|
| Pcs. received - 4276 | Pcs. received - 2081 |
| Pcs. rejected - 164 | Pcs. rejected - 176 |
| No. of different jobs - 14 | No. of different jobs - 118 |

These figures are based on sheet metal parts, paint and finishes.

D. Adams

During the last 4 weeks, 1893 units have been tested automatically. The testers were used as follows:

| | |
|---|---|
| DC A Tester | 25.25 hrs. |
| DC B Tester | 13.50 hrs. |
| Diode Tester | 8.00 hrs. |
| AC Tester | 26.00 hrs. |
| Total No. of hrs. | 72.75 |

Average of 26 units/hr. tested.

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## SALES

Bob Oakley

Module sales in this area have been declining of late. In my opinion this can be attributed to three factors. 1. Even though this area has perhaps the largest potential, it also contains the greatest competition. Garage type operations of module manufacturers are popping up all over. This does not readily affect us but does create confusion in the minds of potential customers. 2. The "all silicon" fad is a problem with customers who believe environments of excessive heat to be a serious consideration. 3. Several of our customers, who formerly used our modules in large quantities, are either building their own modules or are being forced to use modules manufactured by a sister company, i.e., General Motors Defence Labs buy Delco modules.

These problems can be overcome in most of our area when we have the opportunity to present opposing arguments. Most people eventually realize that "all Silicon" elements are primarily an excellent sales pitch, and that the product is not substantially improved by their use. Buying modules from a company with very good quality control and experience in manufacturing, service and applications is less expensive in the long run. Furthermore, most in-house modules being built have so many hidden costs that many companies are losing money by producing their own and merely require someone to point this out to them. Those companies being forced to buy sister company products are reluctant to do so and, in some cases, are attempting to find an escape clause.

Laboratory module demonstration kits are still one of our greatest sales aids. Another valuable aid would be to have more well-documented application notes, for which there is an increasing demand.

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## ADMINISTRATION

R. Mills

## ACCOUNTING DEPARTMENT

The Accounting Department has accomplished several significant goals in the past few months, three of which are reported on below ..... Cost Center Reporting ..... Budgets ..... and the Standard Cost System. Our future plans, which are well formed, and substantially implemented at this point, are to convert our IBM Tabulating operations to the PDP-4 by July 1, 1963, which is the beginning of our next fiscal year. Fred Mac Lean is working with the Programming Group with our Flow-charts and the Bus/Pac of Dit Morses to accomplish the changeover. We are actively seeking a business programmer to work with Fred Mac Lean in order that the operation of the Computer Center and the Business Programming may continue unhalted.

The Cost Center Reporting has phased in smoothly with the enthusiastic response of the Cost Center Managers contributing substantially to the value of the entire system. The Standard Cost System proceeds on schedule with a final result of overall, less work and more control, which are our goals. Our Budgeting Operating will encompass all items on the Profit and Loss Statement from Sales to Net Income and all Balance Sheet items from Cash to Net Worth. In order to do a good Budgeting job, the basic assumptions made in the beginning as to production levels, price changes, additions to new product lines, etc. must be well considered, because if not, the results are of no value. It is important to note, the DEC's attitude toward budgeting is not the traditional one of having a department manager prepare his budget and when he exceeds the budget by a few dollars to be chastised to the extend, that for the next year, he puts in enough extra so that he never gets into this position and this in turn forces the man to spend every dollar that he has requested in his budget in order that he will not be cut down in the next year. DEC's attitude is just the reverse, as we are preparing these budgets as guidelines in forecasting what cash we are going to need, what facilities we are going to need, what people we are going to need of all skills and what product lines we are going to need to supplement and add to our current lines. We do expect, of course, that the Cost Center Managers, to the very best of their ability, will estimate what their operating budgets will be for their departments from a list of assumptions which will be provided for them at the time they are requested to make out their budgets. Variances from the budget will be reported each month with quarterly detailed variance analysis being made. We contemplate a minimum figure, not yet set, below which no variance reporting will be made.

R. Dill

## BUDGETS

**Period:** The budgeted period will be from May 1963 through April 1964.

**Objective:** To have each Cost Center Manager submit his budget for approval before March 23, 1963.

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R. Dill (cont.)

Progress to Date: We have put together a sales package for an eighteen month period so that the managers responsible for making the sales forecast would have a working base for their projections. In addition, we have collected the history of our expenses for eighteen months to arrive at control figures to be used by the Cost Center Manager when making his budget.

I am in the process of putting together a package for each manager which will give him a basis for projecting each expense element in his budget.

The Cost Center Managers are in receipt of the budget reporting sheet, which has a list of each expense element so that all managers are aware of the expenses their centers are incurring. So that each manager will know who the other managers are, the following Cost Center list has been sent around to each Cost Center Manager:

Cost Center List

| | |
|---|---|
| Silk Screening | M. Sandler |
| Module Assembly | M. Sandler |
| Final Test | M. Sandler |
| Sheet Metal | L. Prentice |
| Maintenance | J. Culkins |
| Sub System Computer Assembly | J. Smith |
| Production Control | M. Sandler |
| Quality Control | R. Hughes |
| Model Shop | G. Gerelds |
| Home Office Sales | S. Olsen |
| F. Sales - Calif. | S. Olsen |
| F. Sales - Wash. | S. Olsen |
| F. Sales - New Jersey | S. Olsen |
| Gen. Administration | R. Mills |
| Purchasing | H. Crouse |
| Personnel | R. Lassen |
| Tech. Publications | J. Atwood |
| Modules Engineering | R. Best |
| Systems | J. Fadiman |
| Computers Engineering | G. Bell |
| Drafting | R. Melanson |
| Machine Shop | L. Prentice |
| Test Equipment | R. Hughes |
| PDP-4 | G. Bell |
| PDP-1 | N. Mazzarese |
| In-Out | R. Savell |

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R. Dill

Cost Center List (cont.)

Mag. Tape Systems — R. Boisvert
Programming Group — G. Bell (H. Morse)
PDP-N — A. Blumenthal
F. Sales - Germany — G. Huewe

Fred Mac Lean

## COST CENTER REPORTING

The first phase of cost center reporting is well under way. The Cost Center Managers have been receiving departmental expense elements listings from the Tabulating Department. An enthusiastic and inquisitive reception towards these reports by the managers, has led to a more detailed breakdown of the expense charges. Labor Distribution and Operating Supply Expenses seem to be the areas of interest to the managers.

Direct Labor:
Direct Labor is obtained from the daily Job Ticket. The Job Ticket is punched, per job and operation number into a labor ticket for summarization into direct labor jobs. The Cost Center of each employee, as well as the date worked, is also punched into each Labor card.

Indirect Labor:
The major portion of indirect labor is contained in clerical, supervisory and administrative labor, as well as En 1000 and Mfg. 100 0-0.

Operating Supplies:
These expenses are originated from the vouchers we receive from vendors, the vouchers are matched against the purchase orders. The pruchase order contains the expense account number, the requisitioners badge or clock number and home Cost Center designation. This information is punched into a tab card for analysis at the close of the accounting period.

All of the above expenses, as well as the other charges have been converted from the source documents into punched cards in detail and summarized by Cost Center monthly, and updated for year to date expense charges.

## PDP-4

The Accounting and Tabulating Departments have for many months been working on arrangements for applications (Business) on our PDP-4. We hope that by July, we will be rolling full time on our own computer with a card based business system.

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Fred Mac Lean (cont.)

The Programming Department has been working with us on basic programming and machine operations. I have been flow-charting various business problems and constructing programs, for simple business operations.

Some of the applications which are being written are:

Sales Analysis
Payroll
Accounts Payable
Direct Mailing List
Job and Operation Number Analysis
Budget Reports
Manufacturing Parts Explosions
Manufacturing Inventory Control

Ed Simeone

## STANDARD COST SYSTEM

The Cost Accounting Department is in the process of preparing and installing a Standard Cost System. Currently, we are concerned only with establishing a standard cost for Modules.

Since the first of January, all materials purchased that will ultimately be used in a Module have been charged to the Raw Materials Inventory Account at a standard cost. This standard is based on the unit cost of a given quantity of materials necessary to maintain a certain level of production. The differences between the invoice cost and the standard cost is charged off to a variance expense account.

The next phase is establishing a standard cost system is determining a standard labor cost for each operation in the production of a module. These standards are being prepared by the Production Department and are based on historical data supplied by the Tabulating Department.

The final step will be the determination of a standard overhead rate. We are currently compiling historical data that will be used in establishing this rate.

The advantages of this type of accounting are considerable. Similar types of materials in inventory will have a standard value rather than a different cost for each lot purchased. It will not be necessary to maintain a very detailed "first in, first out," inventory record. Valuing the physical inventory will be simplified. Most important, cost comparison from one period to another will be more meaningful because we will have analyzed and written off fluctuations from standard in the cost of raw materials, changes in labor rates and departmental overhead costs in the period of manufacture, rather than defer them in inventory.

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Ed Simeone (cont.)

Engineering will find it extremely useful in that the estimated cost of a Module determined today will be based on the same unit costs that will ultimately be charged against this product when it is actually being manufactured. Differences between estimated and actual cost can be analyzed more easily.

The target date for completing this installation is the end of the current fiscal year. I feel confident that this can be accomplished with the cooperation of all concerned.

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## ENGINEERING

T. Stockebrand

| | |
|---|---|
| EN 1172 Analog Module Line | 10% |
| EN 1136 Micro Tape | 80% |
| EN 1156 Curve Drawing Display | 10% |

The first samples were shipped to Mark Connelly at M.I.T. They were a summing amplifier (two per card), an integrater, a 1/4 square multiplier network, and a series shunt switch. These four plus about four more will comprise a small line of what I like to call "meter accuracy" analog gear. Eventually, we will be able to provide our own operational amplifier rather than depending on others but for now we plug Nexus Company's amps into our cards. About April 1, we should be able to quote in the summer on parts of our analog systems. It has a plug in resistor board subasssembly which contains the feedback resistors, summing resistors and a trimpot for each amplifier on the card. Thus the same module can be used for several applications. The first use will probably be sealing and offsetting into and out of our D-A and A-D Converters. The settling time of these amplifiers is about 100 μsec to .1% and the output is buffered (which can be strapped out) to drive about 20 ma at ±10 volts. The analog modules should always be grouped in a particular mounting panel wired for the purpose with special attention to grounding and which contains a ±15V analog type (hi precision) power supply. We have been using Philbricks PR-150 which installs neatly in our mounting panels. As time goes on, the integrators and other modules will be introduced. One big item is, of course, a multiplexer. Emile is working on that. See Roger Gagne for details on all of the above.

As of this writting, we are frantically trying to make the IEEE Show. Progress has been slow because the sales machines reader mostly hasn't been working. Specific bugs in the system include tape tension flutter due to extreme cogging in the Amphenol-Borg Motors we have been using. The non-geared Elinco's have solved the problem but they run the tape too fast to allow high density recording with the primitive control (info comes too fast then). The readers still do not have enough gain at the low speed but at the higher speed (80 ips) they perform well. Working Software, and solid operation predjudices of mine may yet cause us to delay introduction till May.

Thanks to Len Hantman and Roger Gagne, I returned from Vacation, in sunny Puerto Rico, to find the "simple memory disgorger" almost built though my outline for building had been only the sketch. It uses a continuous series of Data Breaks to pour words from memory into a Shift Register which shifts them Bitwise to the incremental scope for display. It can therefore dump a 4K memory full of Bit increments on the scope face in 32 milliseconds. Its first use is to debug the incremental scope. Len Hantman feels that it would make a good option for sale.

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Jon Fadiman

During the past two weeks much of my time has been taken up with training Mr. Yamamoto, the Engineer sent here from TDK, Tokyo, Japan for the use of Automatic Core Tester 2113. He received a thorough education in the logic and electronics of the machine in spite of the fact that his English was a bit limited making the going rather difficult and slow. The 2113 was then shipped out to TDK Thursday. The two Memory Testers 1516, one for TDK, and one for Siemens are under construction, and most of the front panels have already been received. The logic is now being wired up in production.

The HarvardSpark Chamber Reader job has been almost completely checked out and will be ready fordelivery shortly. Construction is almost completed on the Thin Film Tester 2115 for National Cash Register and we will make our delivery date of March 28, on this machine.

The Core Testers 2113L and 2110D are also being wired up for Burroughs Corp.

We are proceeding on the various block diagrams necessary for the NSA job. There are many small pieces to be fitted together and Lee Butterworth is undertaking the job of doing the various logical block diagrams. It has been decided that we will use our own A to D Converter as well as our own 32 channel multiplexer in as much as both of these machines which were originally ordered from Raytheon do not work.

We are working on a small 12-bit program controller which will be a small computer to be used by the Special Systems group as a building block in certain systems which can more readily be done by a store program machine than by a wired program machine. Ed de Castro is doing the basic work on this system based upon some of the ideas of Gordon Bell and Al Kotok. We are building a prototype which we have tentatively scheduled to be ready about May 1.

Many of you probably have already met Mr. Gunter Huewe who is our Engineer in our Munich Office in Germany. He is here for a months work with our Systems, Computers and Modules, and to learn all about them so that we can go into the European market in a big way. Any help which any of you Engineers can give to Gunter in explaining about our circuits, philosophy and our methods of system and computer design, will be greatly appreciated.

Ed de Castro

The machine formally known as the PDP-5 is going to be renamed. The new name has not been decided on yet and suggestions will certainly be appreciated. We want to keep the price of this machine low and therefore do not want to become committed to writing assemblers or compilers. It was felt that another machine in the PDP series might carry with it the idea that a program library would be provided.



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Ed de Castro (cont.)

Last Monday, 2 of the people from the Atomic Energy Commission of Canada were here at the plant for further discussions of their reactor monitoring system. Chances of getting this job look extremely good at this time. The portion formerly bid as a special system will probably be implemented using the small computer.

P. Greene

The second quotation for the E.I. Du Pont Company will be finished today. This job will consist of a 36 channel sequence controller for the control of pump motors in flow processes. Again it looks as if this would be a natural for the new general purpose controller that is under development, however, since no price is available at this time the system will be quoted as a special system.

An inquiry was refferred to me from a Mr. Dove of Langley Field, Va. for a simple read out system for a 240 bit transfluxer system. He has requested that I submit a quotation in 5 days for such a system. Paul O'Malley is pricing out the components and it should be finalized by the first of the week.

The Harvard Spark Chamber Reader is on the floor and the power is on. The usual sum of small problems is appearing but it looks as if the machine will be delivered early. Doug Miller is presently conducting noise tests on the Cyclotron Floor to see if the common-mode rejection of our 1552 is adequate, 48 of these modules are used in the system.

Another Mr. Miller and a Mr. Bounin from the Univ. of Chicago is coming to DEC on Tuesday to talk with me about another similar Spark Chamber Reader. It will be different in the output because it will work into a computer directly (MANIAC III) instead of writing a mag tape. We plan to present him with a quotation after he defines his needs more clearly.

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## COMPUTERS

A. Blumenthal

Preliminary tests made to determine the type of cores to be used in the PDP-3, 36-bit, 16K memory have indicated that is perfectly feasible to use 30-mil-cores having a switching time of .4 microseconds even though the driving system may not be capable of operating the cores close to their maximum speed capability. Current rise time equal to several times the maximum switching speed of the cores will still produce output amplitudes in the order of 40 to 60 millivolts. Also the use of 30-mil-cores make for a smaller memory stack and simplify the problem of mounting diode modules on the stacks. On this basis we have placed an order for a $64^2$, 36-bit stack using these cores. The stack is due to arrive on May 17, 1963.

The layout has been completed for the bread-board for the 16K, PDP-1 memory and production has begun wiring. It should be completed around the 1st of April. This system alleviates the problems of driving the inductance of the 16K memory by driving in 4K segments. Still under design is the inhibit field switching system.

A memory for PDP-4 which can be produced with greatly reduce cost, is presently being laid out. We hope to make it operational by April 14.

An attempt was made on the part of Packard Bell to correct the problems present in United Aircrafts analog to Digital equipment. The reference supply was redesigned to keep the oven switching transients from getting into the reference output. A new Multiverter was assembled at the factory using the modified power supply and thoroughly tested. They neglected, however, to equip it with a sample and hold circuit. When the unit was installed in United Aircraft's PDP-1, the original sample and hold was transferred to the new unit and it was found that the switching noise was getting through the sample and hold circuit. Bust. They also provided a whole new set of Multiplexer cards to correct the resolution problem present in the originals. This performed satisfactorily and were left installed. The oven noise will require further attention.

The work of the Drawing Standards Committee has reached a plateau where we are prepared to recommend a package of format rules and symbols. This is presently been documented.

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## MECHANICAL ENGINEERING

### Loren Prentice

| | | |
|---|---|---|
| EN 1000 | General Engineering | 30% |
| EN 1136 | Dec 555 Tape Unit | 40% |
| EN 1184 | Variable field light pen | 10% |
| EN 1097 | Module development | 20% |

It seems quite obvious from several reports and inquiries that have been made to this office, that not very many people in the company understand the method of correction errors or faults in the mechanical equipment. As the size of the company grows, the difficulty administration communication increases by some nonlinear function, hence, it is necessary to restate the method for the correction of faults and errors and most particularly about the mal-function of mechanical parts. These deviations should be reported to quality control; if the part or parts are not inspected by them, then to the production area supervisor where the parts are produced. If no action for correction is forthcoming from these people and it seems desirable or necessary for a design change to cover the problem, any technician or engineer may make out a mechanical change notice obtainable from Judy French in Building #3. Fill in the pertinent information and give or mail back to Judy. The originator of the change order must be able to defend its necessity and if it is one of major importance, he should report same to his immediate supervisor. The economics of making change orders is not to be taken lightly. The time and costs of rework to goods in progress or goods in stock is not insignificant and the necessity or justification for early phasing in of the change should be noted on the mechanical change order. Those changes causing customer dissatisfaction or definite degradation to the quality of our product necessarily have the highest priority. Those justified by substantial savings in manufacturing costs and so on down the line in that order. During the last six months, we have processed approximately 175 mechanical change notices. Many are necessary due to new finishes or new fasteners. These are necessary just to keep abreast of new developments in these fields and result in changes to dozens of prints, usually of a minor nature. Dozens of small annoyances such as door catches and small pieces of hardware have not been brought up to standard because we do not have man power available to do these things. Some of these petty annoyances have to be suffered with for long periods, all out of proportion to the time required, to study and find a better product for replacement.

### Ken FitzGerald

| | | |
|---|---|---|
| EN 1000 | Shops Administration | 80% |
| EN 1097 | Modules Construction Development | 20% |

The shop load at the present time is extremely heavy in both the cabinet assembly and the sheet metal shops. This is primarily due to the lack of personnel and the fact that most of the jobs of the past two weeks have had delivery requirements of four and five days.

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Ken FitzGerald (cont.)

On Thursday, March 14th, I attended an auction sale in Manchester, New Hampshire and was able to bid on five explosion proof, florescent light fixtures which we intend to use in the paint booth, a tester for a spot weld machine and a new sheet metal shearing and forming machine. This machine should be a great help to us in the fabrication of computer cabinets, end panels, mag tape doors, filter and fan housings, and any other of our sheet metal products that require a cut out in the center of a sheet without any means of reaching it from an edge.

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## PRODUCTION

J. Smith

All requests for delivery quote information on standard type displays and Mag. Tape units should be directed to Production (Jack Smith). Bob Savell will supply information on special display units. Roland Boisvert on special Mag. Tape units.

M. Sandler

The following memorandum is the basic philosophy guiding the committee studying advancements and transfers within the company:

### Employment vs. Opportunity Security

Many people believe that an employee is most interested in employment security. All people whose personal economy is based on a "job" are, of course, concerned with security of that job. The usual understanding of job or employment security is freedom from worry about arbitrary discharge, freedom from worry about lay-offs, freedom from worry about injury or illness. The list of usual interpretations of the concept of employment security goes on and on.

The good employee, the young and dynamic worker, however, is concerned about opportunity security. The good, ambitious worker wants to be certain that his performance and his development will provide him with opportunity to advance in job.

Employment security is most often regulated by law and practice - opportunity security is provided through understanding and policy. It is most important that we firmly understand the lines and levels of advancement within the company if we are to make the good, ambitious, developing employee realize that we understand his need for security of opportunity. We must be constantly alert to develop people to fill the opportunities we have here at Digital. If we are good teachers, if we are good supervisors, if we have the faith and confidence of our employees in our desire to advance them, then our own people are the best people to ddvance to new opportunity tunity.

The accompanying opportunity Outline is a basis for indicating opportunities for advancement within the company. The outline seeks to answer the questions:

If I do well in my job, where can I go?

Is my present job the end or is there advancement open to me?

If I wish to specialize, what are the available fields of interest in the company?

The outline does not set up wage levels, although it may well be used to establish wage levels. The outline is not a job classification chart, although it may well be used to establish such classifications.

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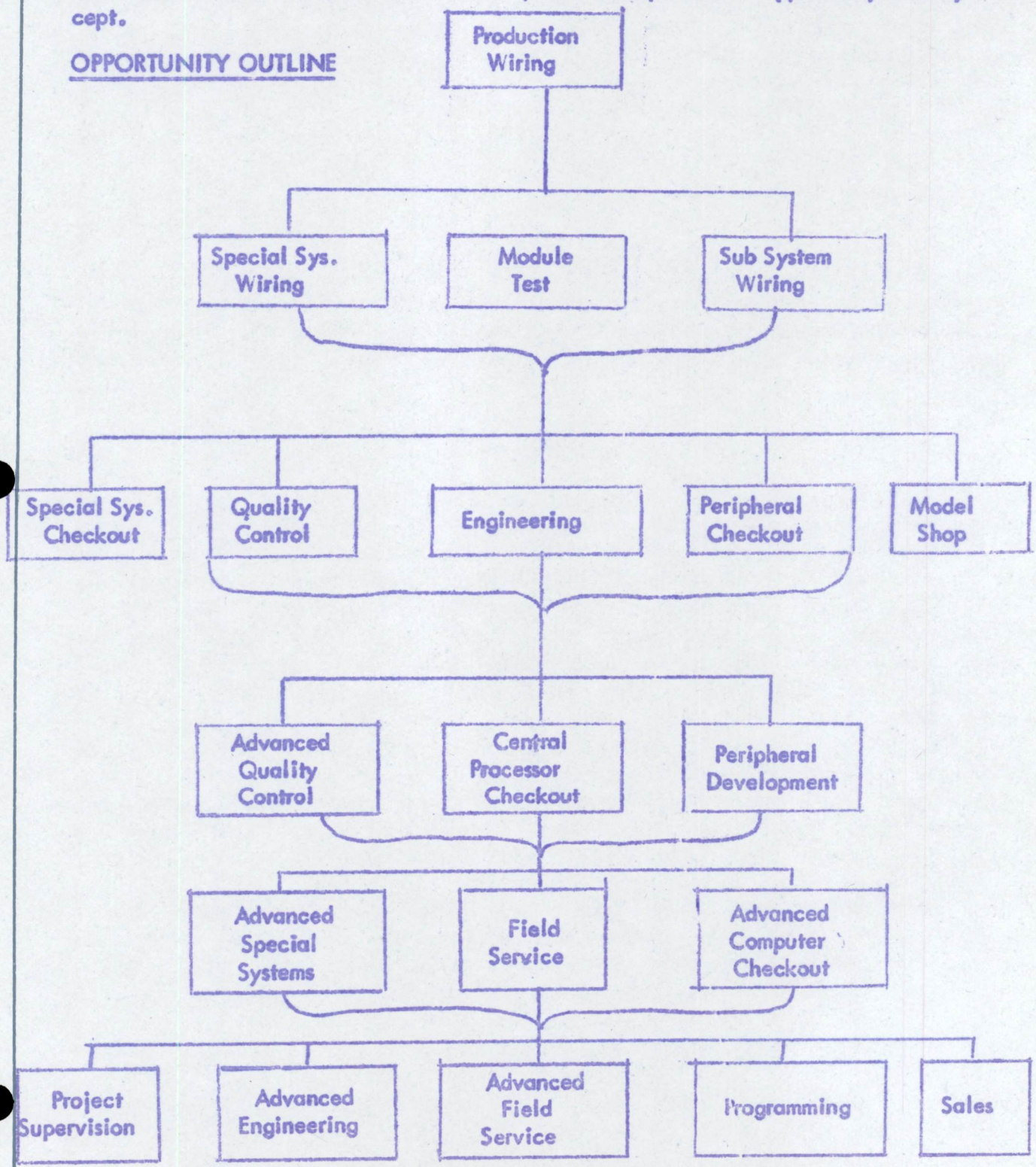
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M. Sandler (cont.)

Wages and classifications, which are part of the employment security concept, are secondary to levels and fields of endeavor and interest, which are part of the opportunity security concept.

OPPORTUNITY OUTLINE



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QUALITY CONTROL DATE

Jim Cudmore

I have spent some time in the past two weeks reviewing our return module reports. One item that seems to cause a fair amount of trouble is a delay line. These units are returned and no trouble is found. It turns out that the test conditions are vastly different from the actual operating conditions. The units are tested with a 330 ohm resistor to -3V or about 9 ma. When driving a PA input (eg 1607) the current required is about 40 ma (pulse). The transfer characteristics never cross unity gain when using the longest delay in a 1311 driving a 1607 input. This situation explains the problem of returned delay lines.

Further tests shall be made to determine the optimum test methods and if any circuit revisions are necessary.

We have just received a transformer tester from the model shop, designed by Russ Doane. This tester will measure turns, ratios, and also indicate winding polarity. The inductance will still have to measured on the LC meter to determine if the correct core material has been used. It will not be necessary to measure all the windings since the turns ratio is now known to be correct.

K. Doering

The 22 contact connectors from Amphenol have gone through different assembly tests. In one specific case, they were assembled to the 1901 mounting panels. Due to some incorrectable errors in the mold, we thought that a certain error would result in further difficulties in plugging the system modules into these panels. Eighteen mounting panels were assembled and tested, and the modules could be plugged in with ease. On the basis of these results, we accepted the connector, though the distance between mounting pins was undersize. The fact that Mech. Engineering had designed and built an assembly jig for the mounting panels was quite a help for this evaluation and will also be a help for further production runs. This jig assures the necessary space for easy plug-in of modules and protects from using two LH or RH side plate retainers for one panel which gave us difficulties formerly.

The Contronic diode recovery tester is too slow for production testing with our present methods. It looks as if the best use for it is mainly in automatic sampling testing for which we still have some accessory equipment missing.

I was in Worcester, with MACKENZIE Machinery Co., to look at a used cast iron sufface plate (72" x 42" x 13" high). It looked very good, and as the price is $350., we sincerely consider buying it as our present one is already almost too small. The same plate new, cost $1,600.

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D. Dubay

**Test Equipment Service**

**The following equipment has been calibrated in the last two weeks:**

| Description | Type | No. Calibrated |
|---|---|---|
| Oscilloscope | 543/543A | 9 |
| Oscilloscope | 545 | 1 |
| Oscilloscope | 551 | 1 |
| Oscilloscope | 555 | 1 |
| Oscilloscope | 541 | 1 |
| Curve Tracer | 575 | 2 |
| Plug-in Unit | CA | 15 |
| Preamplifier | Z | 1 |
| Preamplifier | M | 2 |
| Preamplifier | S | 2 |
| V.T.V.M. | 412A | 1 |
| L.C. Meter | 130 | 4 |
| Meter | 630NA-RM | 22 |

Russ Winslow

**Semiconductors tested since the last report:**

| Type | Manufacturer | Units Tested | % Reject |
|---|---|---|---|
| GA-439 (4JX1C741) | Texas Instruments | 400 | 2 |
| SP-390 | Texas Instruments | 200 | 1 |
| T-1796 | Philco | 130 | 15 |
| 2N656 | Texas Instruments | 30 | 0 |
| 2N711A | Texas Instruments | 1000 | 0.9 |
| 2N1184B | R.C.A. | 170 | 1.2 |
| 2N1309 | Texas Instruments | 700 | 2.3 |
| 2N1754 | Philco | 1400 | 1.1 |
| 2N2100 | Sprague | 300 | 2.7 |
| 2N2218 | Motorola | 50 | 2 |
| D001 | Clevite | 25000 | 2.1 |
| D003 | Clevite | 2000 | 0.3 |
| D007 | National Transistor | 2000 | 14 |
| D662 | Clevite | 10000 | 0.33 |
| 1N964A | Motorola | 58 | 0 |
| 1N1217 | General Electric | 2 | 0 |

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D. Gaboury

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During the past two weeks, Mechanical Inspection has had the following final and intermediate inspections:

| Final | Intermediate |
|---|---|
| DEC CRT Display 30 A | DEC PDP-4 |
| DEC Mag Tape Unit 50 | DEC MAG Tape |
| U.C. Memory Buffer | DEC CRT Display |
| T.D.K. Rikie Core Tester 2113 K | DEC PDP-4 |
| Western Electric - Memory Exerciser 2212 | |

A comparison between our shop and vendors for the time Feb. 28 to March 14, gave the following results:

| Digital | Vendors |
|---|---|
| 687 pcs. | 3326 pcs. |
| 88 different jobs | 27 different jobs |
| 59 rejects | 20 rejects |

These figures are based on sheet metal work, paint and finishes.

R. Grey

Electrical Inspections

| | | |
|---|---|---|
| Memory Buffer 2010 | Univ. of Conn. | Final |
| Mag. Tape 50 | DEC | Intermediate & Final |
| Display 30G | DEC | Final |
| Memory Exerciser 2212 | Western Electric | Final |
| PDP-1 | DEC | Intermediate |
| Core Tester 2113K | TDK-Rikei Co. | Final |
| Memories & Optional Equip. | NSA | Intermediate |
| Display 30D | DEC | Intermediate |

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## SALES

Dave Denniston

We will be moving to 1259 Route #46 in Parsippany, New Jersey on April 22nd. Our new phone numbers will be 201 + 335-0710 and 335-0711. Our new TWX number is not assigned as yet.

Modules orders in this area have declined substantially within the last couple of months, but both Brookhaven and Western Electric in Allentown are now compiling fairly substantial orders. Also of interest is the fact that Dr. Dan Tycko of Columbia University will almost certainly begin building a Hough-Powell device (Flying Spot Digitizer) in the very near future.

Although the force required to extract Lab modules from 901 mounting panels has been greatly reduced, several people have suggested that we should make it even easier to interchange these units especially when the mounting panels are full. One of these suggestions came from Dr. Kang at the Pennsylvania-Princeton Accelerator (Princeton University). He has a Logic Kit on loan for evaulation. Klaus Doering recently mentioned to me that there will eventually be a pin inserted through the front portion of the module cases, just below the top. I feel that this would be a most worthwhile addition since it will make these units even easier to use.

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ENGINEERING

R. Doane

| | |
|---|---|
| VHF Modules | 40% |
| Level Amplifier | 10% |
| Test Equipment | 10% |
| Solid State Circuits Conference | 30% |
| Miscellaneous | 10% |

The revising of the VHF layouts to incorporate the latest circuit modifications and mechanical changes is complete in rough form, ready for drafting. I expect that no further changes will be made before the first production run.

A level amplifier with 10 ma base drive to the output transistors and heavy overdrive during switching proved to be capable of total transition times of about a quarter microsecond, which is as fast as the present, less accurate circuit. A revised circuit is being built, capable of convenient trade-off between speed and accuracy (expected range: 1 ma to 10 ma drive to output stage; offset voltage 200 microvolts to 1.5 millivolts; output resistance, 6 ohms to 1ohm; total transition times, 100 nanoseconds to 400 nanoseconds.)

Electronics for Draftsmen is a noontime (12:30 to 1:00) introduction to the aspects of electronics that are important features of layout problems. It is intended to lead to easier communication between engineers and draftsmen, and to give draftsmen a better understanding of the projects to which they contribute. We have met for one week (except Thursday) and will continue for one more week, with possibly one or two days added on if necessary.

I attended the 1963 Internation Solid State Circuits Conference in Philadelphia for three days. I will try to summarize the main impressions I got.

First, in contrast with presentations on the same topics one and two years ago, I felt that this year's papers showed much increased maturity in several areas:

Nanoaecond switching circuits
Integrated circuits
Tunnel diode circuits

The emphasis seems to have shifted from proving the potential to solving the problem in all three. Three subjects on which less such maturity was evident are:

Copper-and-Ferrite logic
Field effect transistor circuits
Statistical circuit design



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R. Doane (cont.)

Remarkable new results and ideas were presented on all of these, but the waters are still muddy.

The library has a copy of the '63 ISSCC digest of technical papers, and Don White and I both will be happy to descuss what we saw and heard in more detail with anyone. In particular, there was a great deal of activity centering around conversion between digital and analogue modes, some of it immediate interest to us in our work. The quest for accuracy seemed to be well developed, while efforts to speed up the conversion process showed more "blue sky." After attending an evening session and listening to a panel of 'experts' discuss A-D and D-A problems, I came away convienced that we can make some significant contributions here.

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## SYSTEMS

Jon Fadiman

Two weeks ago I spent about two weeks in Europe attending the International Components Show in Paris, going to our office in Munich, and visiting Siemens in Munich. Interest at the Paris show was somewhat mild as most French Engineers have a "do it yourself" attitude toward circuit design. They would rather design and build their own flip-flops each time they need one rather than buy them already made. There is also competition from the very low cost Philips plug-in units ($5.00 flip-flops) even though these are very slow circuits, very difficult to use and very low operating margins. Never the less, the show served to put our name before the French engineering public and was a very important introduction for our plan of European operations. We had a good looking booth which we later sent to the Munich office and a display of plug-in units. We gave away about 50 catalogs and later sent 350 more catalogs to people who requested them. One customer in France, Jean Lebel has already sent us an order resulting from this show. After the show I visited the Compagnie Bull in Paris who are definitely interested in both a Memory Exerciser and a Memory Tester. Nothing will happen on this for about three months I don't expect but their interest was very real and I feel that my visit there was well worth while. I also visited the College de France where I talked with M. Bloch about building a Hoff Powell system. He would like us to make a bid on the electronics for the Hoff Powell system which we would build as an entire system. He is also interested in buying a PDP-1 Computer to go along with it. I then went down to Munich and visited Siemens in order to finish all the details for buying their Memory Tester 1516. While I was there they gave me the final purchase order for this machine; $56,000. order. I also visited our Munich office which is now being well setup by our Secretary there, Miss Liselotte Siebert. I feel that the opening of that office was was an important factor in our obtaining the Siemens order and I expect that the European operation will grow quite rapidly as soon as Guenter Huewe, our Engineer in Germany, begins work with us. He will start in the office probably on May 1.

At the moment the Systems Division has about 11 systems under construction at the present time in various stages of design all the way from initial design through final checkout. The Core Tester 2113K for TDK has been completed and final checkout has also been completed. The Engineer from Japan will be here next week to learn about the machine and perform acceptance tests. We should ship this machine to Japan about March 13. We are also building the Memory Tester 1516I for TDK for delivery toward the end of May. In parallel with this we are building the 1516J for Siemens in Munich for delivery on May 15. These 1516's are being completely repackaged in a 3 bay system using the new 1986 read-write switches. All front panel designs have been completed and we will start building panels next week. We are also trying to work out some of the problems of the 1986 read-write switches and Dick Tringale is spending some time on this problem.

The Core Tester 2115 for NCR is now being wired and we expect to deliver this system on time at the end of March.

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Jon Fadiman (cont.)

Checkout is being completed today on the Memory Buffer 2010 for the Univ. of Conn. We will probably ship this system next Tuesday. The Memory Buffer Trailer for the Navy was shipped out Feb. 28, 1963.

Other jobs are the Spark Chamber Reader which Pat Greene has designed and which is now under construction. Delivery is scheduled for the end of April. Also there are the four systems due for Buffoughs Corp. which Dick Whipple has written about. In addition we are doing considerable amount of work for the NSA project. Lee Butterworth is doing the basic logical design for all of the special equipment that is required for this job. Our schedule for this plan for the design to be completed by March 22, the construction to be completed by April 26 and the system ready to be fully checked out and ready to be tied into the Computer on May 17.

New Business for the Systems area involves several interesting jobs. Two of them are process control jobs for Dupont. One of them is the Code Conversion job for RCA International Communications and one of them is a job for Princeton Univ. Pat Greene and Ed de Castro have been working on these jobs. It looks as if a small computer might be very useful in jobs of this type, and Gordon Bell and Al Kotok have come up with a design for a very simple 12-bit computer 7 microsecond cycle time which would fit in one bay. The idea is that the Systems Group would have the responsibility for the final design and construction of this computer and would use it as a building block for the bid of certain Special Systems. Present plans are for the Systems Group to construct a prototype of this computer and bid it on jobs for which it is well suited. All of the final decisions for this computer have not yet been made.

Dick Whipple

As usual, there has been a great deal of activity in the Special Systems area. At the moment we have 11 systems in progress that will be delivered over the next sixteen (16) weeks.* Three of the systems in progress, and a fourth due in 6 months, are new orders received from Burroughs Corp. in Philadelphia. They apparently became tired of buying cores from other vendors to put into their computer memory stocks. The decision was made to set up a complete ferrite core facility. Their first step was to hire probably the best core man in the business, namely Joe Seko for RCA and their next step was to see us about setting up a complete line of test equipment. Consequently they purchased 1 Semi-Automatic Core Tester, Model CT2110 to be used essentially for development purposes, 2 Automatic Core Testers, Model CT2113 to be used for production testing of cores, and 1 Plane and Stack Tester, Model MT1521. They purchased the Programmable MT1531 instead of the fixed program MT1516 so that it could also be available for development purposes and a wider variety of production testing than the MT1516. Incidently, they presently have a MT1516 that will handle the majority of normal plane and stack testing. I amsure they are looking over the potential market but it should be quite a while before they satisfy their own needs before looking for new customers.

If anyone would like to see what I consider our best designed and packaged system they should drop by to look at the Memory Buffer, Model MB2010 that should be leaving before Wednesday, March 6, 1963.

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Dick Whipple (cont.)

Of course, all of our systems look great but that one is a real eye catcher.

* One nice thing about having a variety of systems with varying delivery dates is that by proper scheduling, our 10 technicians can easily handle the work load plus more. Actually it is not only a nice thing but a necessity when you consider how our group must operate, i.e. Having many open proposals and not knowing when how many purchase orders might come in.

E. de Castro

Plans for the PDP-5 have been taking shape quite well during the past two weeks. It has been decided that the machine will be built by Special Systems and designed to be used primarily as a general purpose control element. I anticipate that most applications will require that it be used in conjunction with additional DEC logic to satisfy a particular customers needs. The PDP-5 will be a 12-bit parallel machine with a memory cycle time of 7 μsec and memory options of 512, 1024 and 4096 words. It will have only three live registers in the central processor: accumulator, memory buffer and memory address register. The program counter will be kept in a core register. I expect the price of this machine to be between $20,000. and $30,000. depending on memory size.

Last Monday and Tuesday, Pat Greene and I visited the Accelerator Lab at Princeton Univ. and Dupont in Wilmington. The people at Princeton are quite interested in the PDP-5 to be used in a bubble chamber data reduction system. They had planned to rent an IBM 1620 to perform this function. However, the purchase price of the PDP-5 is significantly less than the 2 year rental cost of the 1620 and the input-output flexibility will provide additional savings over the 1620.

The Dupont systems are all for process control work. The engineering facility at Wilmington procures equipment for 90 plants throughout the country so they certainly could develop into a rather large customer. At the moment we are preparing quotes on two systems for them. One will be bid with a PDP-5. The other is entirely a special system worth around $40,000. The people at Dupont felt that the PDP-5 could be quite useful to them for future projects and promised to send us another request for quote in the very near future.

Pat Greene

Both Dupont and Princeton Univ. have been visited this week for further information on their recent inquiries. Much work has been put into the preparation of two quotations for the Dupont "Sequence Controller" and "Multiplexer Sampled Data Pressure Control System." After talking with the people at Dupont it was obvious that the "Sequence Controller" was of high priority. Ed de Castro and myself have sent a written proposal to the interested parties for this machine. In reality the machine is two machines that are the same except that the capacity of one is smaller. A combination price was presented for both machines.

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Pat Greene (cont.)

Meetings were held this week concerning the so called PDP-5. It looks as if it will be a Special Systems product to be engineered and developed by the Special Systems group. More information will be forthcoming in the near future. If the development goes as scheduled it looks as if Princeton Univ. will be the first market for such a machine.

Lee Butterworth

The first Memory Exerciser 2212 has been installed temporarily at Bell Telephone Labs. in Holmdel, N.J. The system is being tested before being sent to Western Electric, Hawthorne Works in Chicago.

The second Memory Exerciser is completely checked out and ready to go. However, I feel I would rather keep the second system here until Bell Labs. has completely checked out the first system. If there are any changes involved they can be made here very easily. Also an installation trip to Chicago may not be necessary under these conditions. This is the first system of this type sent to Bell Labs. Their previous machines had been supplied by Reese.

Our Memory Exerciser seemed to make a very favorable impression on Bell Labs. There is a prospect of more business here in this field.

With the Memory Exerciser mainly out of the way, I am now involved in the special equipment for the NSA job.

Block schematics of the D to A Converter are being drawn up by Drafting and construction of this portion should not be difficult.

The remaining Buffer and mixers are designed and should be ready for Drafting the week of the 4th.

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## COMPUTERS

Arthur Hall

The Foxboro-Nabisco computer is in Norwood awaiting shipment to Chicago for installation. It has been tied in with Foxboro equipment which simulates the sensors being installed at Nabisco. The process control display board is about twice the size of our largest engineering show display booth.

The A-D equipment on this computer has not been as stable as desired and so Ron Wilson of Customer Relations is planning to make some changes.

The first computer of those ordered on the new contract with Foxboro, their Service Center computer, has been delivered and after some weeks of work is now functioning correctly. A catalog of the troubles includes lack of complete documentation, bad 50-conductor cable, weak transistor in MA decoder, missing diode in reader logic and power difficulty caused by misleading color codes.

The new operator console card panel designed by Scott Miller has been installed on the Foxboro Service Center computer and the DEC Prototype. The new end panel includes a Console Disable Switch which can prevent the console keys from affecting the computer's operation if so desired.

The Foxboro - U.S. Steel PDP-4 is due for delivery in early June with the 64K drum to follow later in the month. Another order is immenent.

This computer and all others on the contract will be equipped to allow the computer to continue operating if the AC should be interrupted for up to 50 msec. That this can be done is largely due to the #825 Power Control devised by Dick Best and perfected by Don White. This power control is similar in function to the #813 except that energy storage in the unit keeps the contactors closed for at least 200 msec. after AC power is removed from the input. The #825 is available for general use.

An AC Power Color Code has been approved and issued. Extra copies may be obtained from Arthur Hall.

PDP-1 and PDP-4 have been tested at Acton Labs for radiation output, both conducted and radiated from 14KC to 1 KMC and for susceptibility to radiation over the same range. The test followed the general outline of MIL-I-26600 (USAF). Both PDP-4 and 1 passed this spec. as far as susceptibility to radiation was concerned, PDP-4 flunked on conducted radiation output and both computers flunked on radiated output. The results of these tests will be published in memo form shortly and the exact test parameters and results can be obtained from Arthur Hall.

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R. Maxcy

I attended a briefing for EDP equipment manufacturer's which was held at Hanscom Field this week. The purpose of this briefing was to describe a new method of procuring all new EDP equipment for all branches of the Air Force. The procurement center will be the Electronic System Division at Hanscom Field and will be headed by Colonel McCloy.

Any department of the AF which believes it has a need for data automation (either business or scientific) must send a request to AF Headquarters Washington, D.C. If Washington believes a genuine need for automation exists, it issues a project directive and forwards the request to Colonel McCloy at Hanscom Field. From this directive, Colonel McCloy and his staff notify the originator (user) of the specific limits that must be adhered to in making his final request.

The request must not be oriented to a specific manufacturer's equipment so as to leave Colonel McCloy and his staff objective in writing a proposal in selecting the equipment. A recorded question and answer session followed.

Colonel McCloy was quite adamant about severing the link between the user and the manufacturer. He feels his staff will be experienced in the selection of EDP equipment and will not become emotionally committed to a manufacturer.

Colonel McCloy's staff (numbering 45) is being recruited from civilians who have had some EDP experience. They will undergo a three week training plan in the objective selection of equipment.

Many of the manufacturers present professed some degree of annoyance at this new plan and questions were answered by Brigadier General Grossmith from AF Headquarters Washington, D.C. who repeatedly stated that "Headquarters believes that this is the best plan to service the interest of the AF."

Steve Lambert

In November 1962, a quote over the telephone was given to Jet Propulsion Labs including a PDP-4 and a New Magnetic Tape Control. At this time it was stated that the New Control would "work much better than the Type 52 Magnetic Tape Control." Of course, the device had not been designed yet but a price tag ($16,500) was mentioned. The control received its name (Type 57) during the phone call.

For the rest of November, I began collecting thoughts for the 57 control. In December, the logic for the Magnetic Tape Control Type 57 was conceived. Originally the control was to utilize 3 mounting panels. But as the control became a reality, 4 mounting panels were required to move the control logic.

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Steve Lambert (cont.)

At least one statement from the original phone call remained true. The 57 control does more than the 52 control at practically half price. This was important to the potential customer and a headache to me. As a matter of fact all Magnetic Tape Controls result in a throbbing pain at and above the neck line. Logic design is reasonbly easy until a time function is brought into the picture.

My approach to the 57 control design, was to produce flow charts showing each function and its associated timing. Then memorize all functions and timing (approximately 20 critical time relationships). The next step was to produce preliminary drawings showing major registers and control logic. After the major logic was defined, the timing logic was put on the drawings. This was accomplished during the month of December. By the end of the month the control looked 90% finished.

However, sob, the next step was to minimize the logic. During the month of January, Drafting couldn't understand why I was making so many modes on drawings. After many meetings, arguments, depressing thoughts etc., it was evident that by adding gates here and there and removing others, the 57 control could have features that would make it much more attractive to a potential customer.

January provided to be a bad month for the 57 control. During one of the meetings, which lasted almost a week, the suggestion was made to discontinue the 57 because of the number of tape controls already exsisting. However, it was finially decided that the control had potential.

February has been different. The 57 control is now in production and should be finished by February 22. The preliminary programming manual (rough draft) was submitted February 7 and is now being prepared for printing. This is the first time to my knowledge that a manual has been produced before the prototype. I have used a slightly different approach to writing this manual in hope that programmers can visualize the programming concept more easily.

A new approach is being tested in writing the maintainence manual for the control. I dislike the maintainence manuals written on the PDP-1 and PDP-4. I like the philosophy that "a picture is worth a thousand words." The PDP-1 and 4 maintainence manuals have too many words and not enough charts and pictures. There is to much redundency. A maintainence manual should only describe the maintainence of logic.

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## MECHANICAL ENGINEERING

Ken FitzGerald

| | |
|---|---|
| EN 1000 | 60% |
| EN 1023 | 20% |
| EN 1097 | 10% |
| EN 1136 | 10% |

On Thursday, February 28th, the engineering tool crib located in building #3 adjacent to the stairs going to the shops and engineering in building #4 started issuing tool boxes to electronics technicians. It started with technicians working in the model shop as we felt they were the ones that probably had more need for a varied amount of tools than any of the other technicians currently working in engineering. Ten complete tool boxes were available for issue and the excess tools collected from present boxes were immediately sorted out and put into stock in order to be able to reissue. At the present time it looks as if we will be able to service approximately 50% of the engineering technicians located in building #4 before we run out of tools with which to work. A reorder will be placed in order to continue this program with the technicians and also be able to issue tools to the engineers as well. However, during the past couple of months, I have had requests for tools from engineers where most of them have expressed the desire not to be laden down with such a complete assortment of tools but more on the line of a small tool box with small diagonal cutters, needle nose pliers, a couple of screw drivers, and some wire strippers. I would appreciate hearing more on this matter from the engineers themselves.

The jig for assembling 1914 mounting panels was completed and tried out here in mechanical engineering and then given to quality control so that they might use it for assembling some mounting panels on a production type basis to evaluate whether the new plugs with the threaded stud, which were reported on in the last biweekly by Klaus Doering as being undersized, would still be acceptable. The small amount of work that we did on the jig here before turning it over to quality control seemed to indicate that the undersized plugs wouldn't cause too much difficulty if the mounting panel were assembled on the jig. Also, it was discovered that it was possible to reassemble a reject mounting panel, which I had here in my office because it was to small and have it put back into production as a completed and o.k. unit. This seems to point up the fact that many of the problems we have had in the past with mounting panels which were not the right size, could have been caused by our method of assembly.

We still have not been able to find a suitable stroke sanding machine for the sheet metal shop and we are presently making design sketches so that we might price out the cost of building one ourselves. We located a used machine and it looked to be a little bit too much used and not worth spending much time or money on. A new machine of this type is in the neighborhood of $1,900.00 and a priliminary guess as to what it would cost us to build it, provided we are clever, is approximately 6 or 7 hundred.

The shop situation has not gotten any better during the past two week period. We are extremely busy due to being short handed and the urgency of certain items that have to be completed in order to go to the show or the ARD annual meeting.

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Ken FitzGerald (cont.)

We had another problem with paint during this past two week period. A brand new batch of 25 gallons had to be sent back to the manufacturer and a new batch made up due to minute particles of a foreign matter in the paint which caused the surface to have the appearance of coarse sand paper. While I am on the subject of paint, I would like to try to present more information on our paint problems so that everybody will understand why it seems that we are "always running out of paint."

1. The paint which we are using is manufactured by Raffi & Swanson Company in Wilmington, Massachusetts and they will not guarantee more then a 30 day shelf life on any of their paints of this type.

2. The actual useable life of this paint is then decreased to 25 days due to the time used in transporting the paint to our plant.

3. There have been times, due to extreme temperature conditions, when this paint did not last as long as 20 days.

4. The average rate of consumption is approximately 10 gallons per week. However, there have been times when we have used as much as 25 gallons in a week and as little as two. This is entirely dependent upon the production needs and cannot be controlled.

5. It takes approximately two weeks under normal conditions to place an order for paint and receive it on our platform.

Loren Prentice

| | |
|---|---|
| EN 1136 555 Tape Unit | 50% |
| 31 Display | 10% |
| Module Development | 20% |
| General Administration | 20% |

Minneapolis Honeywell Apollo Simulator is approximately two to three weeks behind schedule.

31 Display

Some difficulty is being experienced getting materials. Otherwise, this project is on schedule and seems to be going well.

TAPE UNITS 555

With a little bit of luck, these may all be squeezed through before the deadline. There is no obvious default at this time. As different projects are formulated, the work load on the mechanical

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Loren Prentice (cont.)

engineering department becomes larger and scheduling of the jobs is necessary. We will try to publish the job assignments at least on the monthly basis. This memo has gotten out to all engineers, purchasing department, and administrative department. The ten bit computer has had preliminary work done on the appearance of the cabinet. This has been completed by Scott Miller for submission to the parties involved. A sample module and mounting panel have been made for the 24-bit computer and the industrial design consultant has made a preliminary study of a console for the 24-bit computer. The 24 - 36bit computer should occupy our attention for the coming weeks to quite a great extent.

On Wednesday, February 27th, a trip was made to Western Electric's North Andover plant and a short tour was taken, most particularly of the printed circuit production area. A separate report has been made to interested parties pertaining to this trip.

Scott Miller

| | |
|---|---|
| EN 1062 | 7% |
| EN 1136 | 20% |
| EN 1177 | 20% |
| EN 1178 | 50% |
| EN 1184 | 3% |

Since the first of the year the design load has increased significantly. The hiring of the Van Dyck Associates as consultants seems to have focused more attention on the design effort.

The "new look" PDP-4 is now in production and the first model has been installed on PDP-4 #1. The Foxboro machine is practically the same with the exception of base color. The name PDP-4 and Digital Equipment Corporation do not appear on the operator control end panel. The JPL's machines are of a completely different color scheme but all else remains standard.

Design on the DEC Tape 555 unit is complete. The possible exception is the package for reels of tape. There is a great deal of confusion on my part as to when the first packages are due and who is doing what on this project. The limits of responsibility are very hazy and could very well delay the delivery of the finished box. This package could be our best effort in the packaging field and I believe that Digitals entry into the magnetic tape field is just cause for a fresh approach in packaging as is the product.

The PDP-5 (10 bit computer) appearance design is complete and is ready for drafting when the go-ahead is given. This computer is a departure from our previous computer designs because of cost limitations and basic concepts.

The PDP-3 (36 bit) design direction has been chosen and because this is our most ambitious computer effort, the design will reflect this attitude. The operator console end will be given the de-lux treatment that the PDP-1 lacks. The console end becomes intentional instead of a hung-on

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Scott Miller (cont.)

after thought. A cardboard study model will be completed by March 6th and it now looks as though the first sheet metal model will be ready by the middle of April. Much work remains in the area of operational ease and a study of table arrangement and work areas, as this is required by the complexity of the machine.

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## QUALITY CONTROL

K. Doering

We have been rejecting lots of SW1250's due to failures on forward voltage drop (4 to 10%) (Spec = Vf 2.4). It was found that we did not know whether we have to test this specification instantaneously or after some seconds of current flow. Dick Tringale is investigating what our requirements are.

Interpretation of quality standards on wiring jobs to production people.

On February 21, we had Hazel Patterson's girls called together around a computer to interpret our quality standards on solder joints and wiring works. We pointed out bad solder jobs as well as good ones and gave them the reasons. I think through these demonstrations, we can explain our standards much better than by only writing them down. We intend to do this more frequently.

The 22 contact plug from Amphenol is undergoing an assembly test. Two cavities of the mold were responsible for the worst pieces on account of the dimensions between mounting pins. As Amphenol is already in a position where they claim remedies at the mold would be hurting, we agreed that we would try out the plugs of the two worst cavities. We are going to assemble 25 mounting panels and if the system modules plug into these panels without difficulties, we will accept the Amphenol product.

The Contronics diode recovery tester has been accepted and put into use in Semiconductor test.

On Wednesday, Feb. 27, representatives from engineering, production, and Q.C. visited Western Electric at North Andover, Mass. We were particularly interested in their printed circuit board production department.

From the Q.C. point of view, we did not have much of a chance to learn anything as the tour was a rather short one (30 min.). Their inspection system was like ours; the production inspectors report to production; the roving and final inspectors to Q.C. They had a 20 hour environmental test on their printed circuit boards. We were not shown any inspection stations nor procedures.

In spite of that we did get some ideas in regards to silk screening, punching, drilling, and soldering.

R. Grey

Electrical Inspections

| | | |
|---|---|---|
| PDP-4 | DEC | Intermediate |
| Remote Typewriter & Table | CRC | Final |

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R. Grey (cont.)

| | | |
|---|---|---|
| Mag. Tape 50 | Lincoln Labs | Intermediate and Final |
| Mag. Tape Control 52 | Stock | Intermediate |
| Display 30G | DEC | Final |
| Memory Exerciser | Western Electric | Intermediate |
| Memory Buffer 2010 | Univ. of Conn. | Intermediate |
| Core Tester 2113K | TDK-Rikei Co. | Intermediate |
| Mag. Tape 50 | Lincoln Lab. | Intermediate |
| Memory Buffer Trailer | Navy | Intermediate & Final |

The Gold Seal Muffin fans that failed on life test after 4000 hours returned to normal operation after oiling and since then have been under heat test for 225 hours.

D. Gaboury

Dave Glazier and I went to Worcester to the United Machinery Co. to look at a used bench center, This is going to be used for checking the concentricity on the new mag. tape reel. The centers looked fair, so we took it on a trial basis for three days to be inspected. The inspection department found, although the center was very old, it was accurate. It was accepted. For $14.00 we bought new center pieces, as the old ones looked rather worn. The price was $49.00 compared to $250. to $300. for a new set.

During the past two weeks, mechanical inspection has had the following final and intermediate inspections:

Intermediate

C.R.C. - Remote Typewriter & Table
D.E.C. - PDP-1
D.E.C. - Mag. Tape Unit 50
Lincoln Labs - Mag. Tape Unit 50
TDK Rikie Co. Core Tester 2113K
USN - Navy Buffer
Western Electric - Memory Exerciser

Final

C.R.C. - Remote Typewriter & Table
D.E.C. - PDP-4
Lincoln Labs. PDP-1
" " Mag. Tape 50
" " Mag. Tape 51
Raytheon - PDP-1

A comparison between our shop and vendors for the time Feb. 14, to Feb. 28, gave the following results:

Digital

1053 pcs. recd. at 15 diff. jobs

Vendors

3194 recd. at 6 diff. jobs.

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D. Gaboury (cont.)

11 rejected 1.% rejects 15 rejected .5% rejects

These figures are based on sheet metal work, paint, and finishes.

D. L. Adams

EN 1098 100%

During the last two weeks, 1055 modules were tested automatically. The Automatic testers were used as follows:

| | |
|---|---|
| DC A Tester | 12.25 hr. |
| DC B Tester | 5.0 hr. |
| Diode Tester | 2.0 hr. |
| AC Tester | 8.75 hr. |
| Total No. of Hours | 28.0 |

No. of Modules per hr. 37-1/2

D. Dubay

Test Equipment Service

The following equipment has been calibrated since Feb. 14th.

| Description | Type | No. Calibrated |
|---|---|---|
| Oscilloscope | 543/543A | 13 |
| Oscilloscope | 545A | 2 |
| Oscilloscope | 551 | 1 |
| Preamplifier | CA | 17 |
| Preamplifier | K | 3 |
| Preamplifier | L | 2 |
| Preamplifier | D | 1 |
| Preamplifier | H | 1 |
| Power Supply | Harrison Labs. 800B | 1 |

We received the following equipment last week.

Tektronix Type 567 oscilloscope
Tektronix Type 3S76 Dual trace sampling unit

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D. Dubay (cont.)

Tektronix Type 3T77 sampling sweep unit
Tektronix Type 6R1 Digital Unit

Much of our time for the past two weeks has been spent repairing our stock of DEC Modules.

R. Winslow

Semi-conductors Tested Since Last Report

| Type | Manufacturer | Units Tested | % Reject |
|---|---|---|---|
| MA-90 | Sprague | 8000 | 0.93 |
| GA439 (4JX1C741) | Texas Inst. | 1000 | 1.6 |
| 2N-398A * | R.C.A. | 7 | 100.0 |
| 2N-711A | Texas Inst. | 175 | 1.1 |
| 2N-1184 | R.C.A. | 140 | 10.7 |
| 2N-1184B | R.C.A. | 125 | 7.1 |
| 2N-1305 | Texas Inst. | 12000 | 1.3 |
| 2N-1309 | Texas Inst. | 700 | 1.0 |
| | | | |
| D-007 | Nat'l. Transistor | 140 | 0.0 |
| D-662 | Clevite | 22801 | 3.6 |
| SW-1250 (SCR'S) | Transitron | 195 | 0.0 |
| 1N-469A | Hoffman | 5 | 0.0 |
| 1N-748A | Texas Inst. | 100 | 0.0 |
| 1N-762 | Transitron | 20 | 0.0 |
| 1N-987B | Dickson | 20 | 0.0 |
| 1N-1217 | G.E. | 2 | 0.0 |

*Replacements

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## SALES

### A. Titcomb

| | |
|---|---|
| PDP-4's to JPL | 50% |
| Develope special equipment for JPL | 50% |

**PDP-4's to JPL**

Our sales department assures us that JPL has purchase orders pending for two PDP-4's.

Our machine requires an Extended Arithmetic Unit and the other a 57 Tape Control, their paint color and special multi-channel, 36-bit word length data transferral equipment.

Both the 57 control and Arithmetic Unit are being installed and initial checkout will begin shortly.

Our Los Angeles Office wants near immediate delivery on both of these machines, probably in an effort to assure this sale and future sales.

We are presently working up a schedule which should show when each machine can be ready for delivery.

**Blocking Osc**

As JPL requires isolated circuit ground, we will provide a gatable module with transformer output. (Positive for assertion). The circuit that I have been modifying to our voltages, levels, etc. can develop 3 volts across 15 ohms with a rise time of 30 ms and pulse width nominally 0.4 μsec.

### K. Larsen

Because I have not submitted anything to the Bi-Weekly recently, I have some catching up to do, so will list only the major projects that I have been working on. One of these is to make the Astro-data people familiar with the PDP-1 for interface between their data system for the JPL Wind Tunnel project. Last Friday was spent in conference with the project engineer and his staff making them aware of all the facilities for input/Output communications included in the PDP-1. I made use of some "dittoed" diagrams to describe the I/O characteristics of the computer, first using an overall picture and then going into specific details that relate to the overall picture; that is, how many gates are open on the I/O register input mixer; the gating structure of the data channel input; the IOT configuration and the registers that have bus drivers for driving cables to output devices. If anyone would like copies of this set of diagrams, just drop me a note and I will be very glad to send them to you. I find them to be most useful in that they give the individual something to write notes on and to carry away with him after the meeting is over.

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K. Larsen (cont.)

From NCR, we received a letter of acceptance from their engineering staff of our method of constructing the thin film test system for them.

I have been talking with the people at Aerospace regarding their requirements for computers for a film reading facility. The requirement includes 4 PDP-1 size computers with displays for reading radar "A" radar films, and two PDP-4 size computers for making densitometer readings of film from another source. One of the requirements is that they be able to lease the computers and they seemed to think that a third party lease would be satisfactory. Don O'Bell, of Aerospace, is very interested in making use of our office PDP-4 and its CRT for evaluation of the techniques to be used.

The V.A. Research Support Center has a requirement for a small computer to be used in a clinical lab to tie in with a semi-automatic clinical analytical device to take readings and correlate the data from a number of test stations on a fully automatic basis. I think this would be a job for the special systems group and I have sent all available information to Jon Fadiman and Gordon Bell. They also have a need for a special system to monitor a maze that will be used to study the effects of drugs and special nerve surgery on rats. The movement of the animals under study will be logged on paper tape to be analyzed by a computer.

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## ADMINISTRATION

F. Kalwell

Where appearance is not a prerequisite, Digital has been using cad chromate machine screws, and where a good appearance was required stainless steel was used. After looking into the cost of purchasing both types, it would definitely be advantageous to purchase, standardize and stock all stainless steel fasteners. An example of price differences would be for a 6-32 x 3/4 Phillips pan head machine screw cad chromated, $5.28/M as opposed to $4.98/M for stainless steel, or a 6-32 x 1/4 Phillips pan head machine screw in cad chromate at $5.02/M as opposed to $3.17/M in stainless. The price difference does not occur in all cases, but a good majority of cases in that the price of cadmium has doubled in the United States during the past few months. By buying all stainless steel fasteners, bulk prices would be in effect on all fasteners, and guaranteed stocks available for immediate shipment from our vendors. The type proposed is a non-magnetic machine screw. This is a Carpenter 10 type which consists of 15.5 - 16.5% chrome; 17.5 - 18.5% nickel, .08% maximum carbon. This grade also is similar to Type 304 and is an accepted equal in corrosion resistance and physical characteristics. It is an improvement on Type 305 since the cold working qualities are better. All 18-8 Phillips head screws are made from this grade, and since we use a bulk of the Phillips it would be necessary to go into this type.

I returned the following material for credit. The material was in the inventory surplus stockroom.

CORNELL-DUBILIER

2358 2-footed cable clamps, which were obsolete @ $.238/ea. $561.20

CANNON, INC.

| | |
|---|---|
| 248 DDSM-50s Connectors @ $8.53/ea. | $2115.44 |
| 235 DDSM-50p Connectors @ $7.15/ea. | 1680.25 |
| 2 CIT 20-13 Insertion Tools @ $10.70/ea. | 21.40 |
| 2 CRT 20-5 Extraction Tools @ $11.50/ea. | 23.00 |
| 200 DSM-51316-1 Contacts @ $7.20/50 | 28.80 |

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F. Kalwell (cont'd)

| | |
|---|---|
| 200 DSM-51315-1 Contacts @ $7.20/50 | $ 28.80 |
| 2 MS3191-1 Crimper @ $108.25/ea. | 216.50 |
| Total | $4114.19 |
| Plus 15% restocking charge | 617.13 |
| | $4731.32 |

ELECTRA MFG. CO.

| | |
|---|---|
| 899 1K ohm Deposit carbon ½ watt 1% @ .10 ea. | $ 89.90 |
| 20% restocking charge | -17.98 |
| Credit | $ 71.92 |
| Total credit received..... | $5364.44 |

D. Glazier

Klaus Doering has been searching for a bench center to be used in checking the concentricity of Tape Reels for the new linc unit. Dick Gaboury and I recently went to the United Machine and Tool Company in Worcester to evaluate a used bench center. This particular unit is now located in mechanical inspection and is being checked out for its accuracy. If we purchase the bench center, the cost will be $35.00, a considerable savings over a new unit. The cost of a new bench center ranges from $250.00 to $375.00.

D. Kuyamjian

Quotations were received this week from Ferroxcube Corporation and Fabri-Tek, Inc. for the following memory stacks.

| Memory Stack | Fabri-Tek | Ferroxcube |
|---|---|---|
| 512 word 10 bit | $ 720.00 | $ 465.00 |
| 512 word 18 bit | $1250.00 | $ 775.00 |
| 1024 word 10 bit | $1420.00 | $ 725.00 |
| 1024 word 18 bit | $2500.00 | $1225.00 |

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D. Kuyamjian (cont'd)

We have a commitment for the standard 4096 word memory stacks, the bulk with Ferroxcube. Deliveries are scheduled:

2 - 2nd week February
2 - 3rd week February
2 - 4th week February
4 - March
1 - April

Delivery on the Teletype Model 28KSR Page Printer is now running close to five months since Teletype has experienced production equipment problems on this line. This indicates that it is advisable for DEC to schedule well in advance of required delivery for these units.

Digitronics Corporation has also been running about two weeks behind in the production of Model 2500 Paper Tape Readers due to an unexpected increase in sales for this relatively new unit. They expect this trend to continue and predict a two-month lead time on delivery which will be in effect shortly.

Bob Savell will have an Omnitronics PTR-80 Photoelectric Paper Tape Reader here for thirty days evaluation. After evaluation on this unit has been completed, he will have a Rheem model in for the same purpose. The Potter unit has already been evaluated and returned.

| Equipment | Price | Delivery | Requisitioner |
|---|---|---|---|
| Ramsey Model 73 Core Handler | $11,845.00 | 4/15/63 | J. Fadiman (TDK) |
| Hally Computer H-207 300 line/minute Printer | $16,158.00 | 5/18/63 | R. Savell |
| VRC Magnetic Drum | $11,300.00 | 4/22/63 | T. Johnson (Foxboro) |
| Soroban Comparator | $ 1,345.00 | Received | H. Morse |

The above are recent major purchases.

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## ENGINEERING

### R. Doane

| | |
|---|---|
| VHF Modules | 50% |
| Data and Design for Level Amplifier | 12% |
| Test Equipment | 4% |
| Conic Generator | 30% |
| Miscellaneous | 4% |

Tests of ten transistor types for average offset voltage and saturation resistance at base currents of 1 ma, 3 ma, and 10 ma, both normal and inverted connection, show the PNP 2N522A and the NPN 2N1304 to promise the best accuracy of all the types tested. In the inverted connection with 10 ma base drive, both averaged about 1.5 mv offset and one ohm saturation resistance. The 2N522A seems somewhat better than the 2N1305 under all conditions, including speed specification. A new circuit that uses these transistors in the inverted connection with heavy overdrive during switching is being built.

### R. Melanson

Many people have asked for a standard DEC electrical template as an aid in drawing Block Schematics. The present DEC template that we have has proven unsatisfactory because the material fractures very easily. A new template has been designed but was held up pending any radical changes by the Standards Committee.
Al Blumenthal has given me information on new symbols that will be used in the future.

These new symbols will be incorporated on the template and an order for 100 templates will be placed in the next week or so. If any engineer has any comments regarding symbols, please contact me immediately.

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## SYSTEMS

R. Whipple

Operations in the Special Systems area have continued relatively smooth in Jon's absence. The Ferroxcube Memory Tester MT1521 has been delivered, as has the first Memory Exerciser, to Western Electric. I have completed 80% of the redesign of our Memory Tester MT1516. All other systems in process are progressing normally.

Jon's last biweekly pretty well listed our potential business in the near future. A new possibility is getting our foot back in the door at IBM, Kingston. They were our first experience at being an unhappy sub-contractor. We had sold them a Memory Tester MT1518 and were in the process of designing it when the B-70 program was cancelled and likewise the MT1518 purchase was cancelled. Now they need the equivalent of our Semi-Automatic Core Tester CT2108 in a big hurry, like last month. They called and read a long list of specifications to me and I really floored them by saying we had a system built that could be delivered next week, and where was the purchase order.

I hope everyone has noticed the new, cleaned up look of our Special Systems area. Since Dick Flaherty was appointed Production Supervisor, he has managed to take some time to set all operations in a more systematic manner. We hope to set up a "Rogues Gallery" of past special systems, along the aisle, one of these days.

P. Greene

Since the last biweekly a proposal has been sent to Mr. Hartway of RCA Communications, Inc., NYC for a TWX to TELEX code converter. A conference was held with Messrs. de Castro, Bell, Smith, Mazzarese and myself to determine how the job could best be done. It was agreed upon at the closing of the meeting that a PDP-4 with a drum memory system operating with teletype interface equipment would be best suited for this application. I sent the proposal to Mr. Hartway last week, as promised, and since then he has called me about the same. He said that we showed competence by arriving at a price that he looked favorably upon with the amount of time spent by us in preparing the proposal. This was encouraging.

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P. Greene (cont'd)

One complaint voiced by Mr. Hartway was the fact that if the PDP-4 or the drum system broke down the entire system would be inoperative. It will be a 50 or 100 line system. With this in mind, I have agreed to price out a duplex system for him employing 2 PDP-4's and 2 drum memory systems. This would be a total of 4 PDP-4's and drum memory systems for both their cost and west coast installations.

Ed de Castro and myself are in the process of preparing two quotes for DuPont. Each of these jobs is a Process Control system for use in their Tennessee Plant. It appears that Drexal has been supplying these systems, but now they are looking for another supplier. We are going to price these systems as special systems and compare them in price with a postulated, small 10-bit general purpose computing machine. Gordon Bell has proposed this machine and since then a lot of interest has been generated along these lines.

Harlan Anderson has mentioned that Princeton University is looking for a small system as an interim solution to a data reduction they have until a PEPR and a PDP-1 can be put into operation. The point here is that this is a possible application of the small general purpose computing machine. Harlan has suggested to Jon Fadiman that this product be developed by the Special Systems Group and used whenever possible as the heart of many of our special systems.

Even though the initial price of this machine may be slightly higher compared on a system by system basis, it seems feasible that once this midget was engineered it would save us considerable engineering time on future systems. Ed de Castro and myself are going to have a conference with Jon Fadiman when he returns from Paris to discuss the possibilities of such a machine.

The wiring diagrams for the Harvard job are complete and in production. The job is progressing rather smoothly.

A proposal has been made to Western Electric Co., NYC for a Decoder, Encoder and combination Encoder-Decoder Test Set. This was requested by them after they were notified of the delivery of the same machine to Western Electric, North Andover.

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E. de Castro

My trip to the Canadian Atomic Energy Commission at Chalk River proved quite fruitful. It gave us the opportunity to present our proposal unofficially and get their reactions before submitting the final draft. Thus we were able to submit a proposal which I feel will be well received at AECL.

At the moment, I am working with Pat Greene on two bids for DuPont. One involves a pressure control device capable of accepting 36 channels of analog information, performing several arithmetic operations and providing 36 outputs to control stepping motors. This bid is almost complete and I expect that it should be in the mail the first part of next week.

The second job involves a highly flexible sequencer for process control work. This machine has to step through a process in response to various external event such as count pulses and real time. At the moment, it appears that a plug board will provide the best means for programming this system.

We now have four jobs under consideration - AECL, DuPont (2) and Princeton University, which can more economically be built as a special system than by use of a PDP-4. However, it does seem that a real small computer would be quite useful as a basic building block for such systems. Pat Greene and I are therefore exploring the possibility of developing such a machine. As presently envisioned, it would be a 10 or 12-bit machine with 512 words of core memory. It would have a 3-bit plus indirect order code and would have a built-in analog-to-digital converter which would operate on a single instruction. We do not expect this machine to be a self-sufficient computing system by any means, but rather a general purpose controller around which various special systems will be built. Programming would have to be done either manually or with the help of an assembler written for PDP-4. If anybody knows of any other applications for such a machine or has any ideas regarding its design, I would certainly appreciate hearing them.

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## COMPUTERS

A. Blumenthal

EN 1016 100%

Design of the 1989 memory driver, which will replace the troublesome 1973, is just about complete. Many features have been incorporated in the circuit to protect it from accidental damage. Its output current is limited so that multiple addressing will not overload it. An accidental short from its output terminal to ground will turn off the output stages so that it doesn't attempt to drive the short. Hopefully, this will eliminate the major cause of memory troubles.

Many driving and addressing schemes are being considered for the 16K memory in an attempt to simplify it, use as much of the existing circuitry as possible, and reduce the mass of diodes that may be necessary. The use of faster cores should solve many problems provided the driving currents and signal to noise ratios are acceptable. A $128^2$ plane has been ordered from Ferroxcube using 1.1 μs 400 ma cores which seem to hold good promise.

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## MECHANICAL ENGINEERING

L. Prentice

| | |
|---|---|
| EN#1097 Module Development | 10% |
| EN#1136 DEC Tape 555 | 50% |
| EN#1027 Camera Mount for Display 30 | 5% |
| EN#1064 Display 31 | 20% |
| EN#1000 General Engineering | 15% |

### DEC Tape

This now is the official type tape designation. We finally made the deadline for advertising and one model of this unit, the table model, was mocked-up and photographed. Progress on getting outside vendor items is tediously slow. Almost none of the vendors' dates are being lived up to and the quality of work received from them is very poor. We have been trying two outside vendors for production of chemically etched front panels. Neither of these has been satisfactory to date. We had relied on at least one of these to produce control panels for the 555 Tape Unit. These will now be silk screened for the first units.

### Dynasert

We have checked over our drawings for master plates and board holding templets and could find no appreciable discrepancy in the dimensions. We received a call from Mr. Joe Beauregard of United Shoe and he admitted that their master templets were off .050". He came down one day last week and installed our boards and was able to insert components correctly. We are now investigating the possibility of cutting leads only .050" lead length and always turning these in the same direction so that we would need to use only a slightly larger land, approximately .110" to .125" in diameter, so that the lead could run in any direction and would not appreciably increase the size requirements for the board layouts. He reported their cost for tooling is approximately $350.00. The head has been removed from the machine and the machine is down in the machine shop awaiting our evaluation.

### Display 31

The decision has been made to push through one more unit in the same manner as the last unit was built. Mechanical work on this

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L. Prentice (cont'd)

cannot be completed before April 1st and this is dependent on vendors making at least as good deliveries as they have previously.

Camera Mount for Display 30A

This is still in the talking stage and not much actual engineering has been done. We plan to run some experiments in the near future to find out if the method proposed by Dick Best can be accomplished successfully before the mount is designed.

K. FitzGerald

| | |
|---|---|
| EN#1000 General Engineering (shop supervision) | 60% |
| EN#1051 Classroom Modules | 5% |
| EN#1136 Linc Tape Unit | 20% |
| EN#1064 Display 31 | 5% |
| EN#2432 Honeywell System | 10% |

The shop has completed all necessary rework on Classroom Modules and the Classroom Module Mounting Panel so that all existing stock is now up to date. The Sheet Metal Shop did a fine job in getting the first prototype model of the Digital 555 Tape Unit Desk Set completed for the Advertising Department photographs and the unit is now back in the shop for final assembly so that it will be ready for the show. Bob Savell has ordered another Display 31 which is going to have a very serious affect on the work load in the Machine Shop, so I advise anyone with work that is going to have to be done in the Machine Shop to place their orders as early as possible. (Seven to nine-week deliveries are not going to be unusual.) The order for all of the special trim and panels for the Honeywell System was logged into the shop on February 20th and is due out on April 5th. It looks like there will be no real problem with that date.

We were able to pick up another Sheet Metal trainee in the Sheet Metal Shop this past week, but this was immediately offset by a termination notice, so it looks like we are still lacking approximately five people in the Sheet Metal and Cabinet Shop. If anyone knows of any good experienced sheet metal workers that are looking for work, I am sure Bob Lassen would be glad to interview them to see if they could possibly fill some of our openings.

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K. FitzGerald (cont'd)

On March 19th I have an appointment with Mr. Donald Gearon, head of the Industrial Arts Department at Weston High School, and Robert Duncan, one of his teachers, who would like to tour the plant in order to become familiar with some of the newer developments of industry and perhaps be able to take back some ideas that they may incorporate into their teaching. Mr. Gearon is the President-elect of the Massachusetts Industrial Education Society and he would like to organize plant tours throughout the State of Massachusetts for industrial arts teachers during their vacations in order to make the industrial arts teacher of Massachusetts more cognizant of industrial trends and developments. If anyone has any pet peeve or suggestion which they would like to have passed on to the Massachusetts Industrial Arts Teachers, I would be more than willing to see to it.

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## QUALITY CONTROL

### J. Cudmore

Klaus Doering and I have been evaluating the Contronics Diode Tester in an attempt to get measurements that will correlate with the Type S plug-in unit. The recovery time measurements correlate very well, but the limited band pass of the 541 Scope masks the two forward peak readings. This machine should be in operation by the end of next week.

The 16B-1 Transistors described in the last biweekly have been exposed to severe moisture conditions for five days and are now being remeasured. The only problem encountered so far is a tendency for the leads to break off. These leads are very short, stiff and brittle.

The diode specification sheet has been updated and all specifications have been checked. The transistor sheet is just about complete and will be issued by the end of next week.

I have just ordered a set of military specs. This is a result of a proposal by Special Systems to DuPont. No one knows just what MIL specs, if any, Digital modules meet and the DuPont request is just loaded.

On Thursday, February 7, we obtained a waiver on a Western Electric order to bypass the supplier's inspection. For the last eight months all orders to Western Electric have been retested, before shipping, in the presence of a government inspector. This retest has been time consuming and no one seems to really want it. We obtained this waiver because the delivery date on the system using these modules was February 11. The people at Western Electric, using the modules, couldn't wait for the retesting. Perhaps this inspection clause will be removed from all future P.O.'s.

### K. Doering

Terminals (strain reliefs) from Heyman in New Jersey present some difficulties because the slot hole provided for the insertion of the solder lug is too small on approximately 30% of a first 800 piece lot. It is quite a job to press the solder lug in and even if

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K. Doering (cont'd)

one succeeds, he breaks the plastic part. The present stock is being inspected 100% and these pieces are being sorted out. The coloring on these strain reliefs is also very inconsistent. There are usually two shades. We will contact Heyco, but as in the past, our success might be limited as this company is in a somewhat monopolistic position and a bit reluctant to changes. Frank Kalwell will try to find a second supplier for these items.

A lot of new blue connector receptacles from Amphenol came in. Production is assembling mounting panels with it. This new design has some advantages as the solder terminals are reset in a zig-zag pattern, thus giving more space between each. The solder lug allows for more wires to be soldered in, the idiot strip could be eliminated and considerable assembly time might be saved because two-threaded pins are molded into the part at the spots we had the two mounting holes before. This replaces the mounting screw and eases assembly work. Finally, the solder terminals are twisted in a 45° angle which eases the insertion and dressing of the wires to be put in.

The Amphenol connector is done on a six cavity mold. A sample of every mold was inspected for the vital dimensions. It was found that the distance between the mounting pins was between .001 and .005 below lower tolerance limit. We have already quite a few variables contributing to the fact that systems modules often can be pushed into the mounting panels only with a considerable amount of pressure. The required dimension of 4½ is usually two small. The connector mounting pins being below the lower limit would diminish the 4½ even more. We already talked to the Amphenol representative who, hopefully, remedies this error.

For incoming inspection I have worked out the necessary paper work for the gradual introduction of statistical quality control in incoming inspection. These are actually a few tables that allow us to inspect a small sample of an incoming lot and still be very well protected against defects (this is based on past quality performance of the vendor, lot size, allowance for a certain percentage or fraction of a percent of defective parts, and a certain calculated risk). The savings on inspection time, together with the quality assurance, is steadily going up.

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K. Doering (cont'd)

The main problem remaining is to agree with our vendors on certain procedures, especially the disposition of rejected lots. This statistical inspection according to MIL STD 105C allows the rejection of a whole lot if certain conditions are satisfied (a certain amount of rejects found in a sample). However, our schedules and terms are of such a nature that when the lot is received, the production people are already waiting in front of the test or inspection department -- their hand open.

Therefore, if a lot is contaminated with defects, we cannot reject but have to sort it. Here the whole advantage of time and labor savings is gone. It still remains in case of an OK lot. To improve this situation and to agree with our many different vendors on reasonable AQL's and different procedures that still serve us in the best sense of quality assurance will be a great deal of my work.

Jim Cudmore and I have been taking measurements on the Contronics diode recovery tester (this is supposed to be used together with the Terradyne) for correlation purposes. We tested 15 samples of D001's, 15 of D003's, and 15 of D664's for forward voltage drop and reverse recovery time. The readings we found were compared with readings taken from an oscilloscope, Type 541. We got rather good correlation on Reverse recovery time, but a certain discrepancy on forward voltage drop. We found out that the oscilloscope was not capable of reading these fast drops, so we are really not sure whether we did read the actual drop. In our company there is no oscilloscope that can give us an accurate reading. We then took a Type 567 oscilloscope and are now trying to get some more accurate readings.

Dick Reilly, who has been working for me as a draftsman to make up the necessary die and jig inspection drawings, has finished his work with me and is going to be released to his department (drafting) as soon as he has finished a special job for Bob Hughes.

R. Grey

Electrical Inspections

| | | |
|---|---|---|
| PDP-1 | Stock | Final |
| Memory Tester 1521 | Ferroxcube | Final |

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R. Grey (cont'd)

| | | |
|---|---|---|
| PDP-1 | Stock | Intermediate |
| Memory Exerciser 2212 | Western Electric | Final |
| Mag. Tape 52 Control | Stock | Intermediate |
| PDP-4 | Stock | Intermediate |
| Mag. Tape 50 | Stock | Intermediate |
| Remote Typewriter & Table | CRC | Intermediate |
| PDP-4 | Stock | Final |

Of the three Memory fans under life test at 60°C, the two Rotron Gold Seal Muffin fans failed (stopped completely) at 4000 hours. During the test these fans were not oiled. After failing the heat test, these two fans were operated at room temperature with interesting results. When power was first applied, the fans started at 500 rpm and slowly worked up to their stable speeds. One operated perfectly (3200 rpm) with the other running at 1400 rpm while sometimes reaching 2800 rpm. There was a 25° difference in their coil temperatures with the fan running at the lower rpm rate having the higher temperature.

If these fans are to be operated in any degree of heat, they must be oiled or they will probably result in open windings as have some of ours in the field.

The third fan, a PA Motor, is still operating satisfactorily under heat at 3400 rpm.

R. Winslow

Semiconductors tested since last report.

| Type | Manufacturer | Units Tested | % Reject |
|---|---|---|---|
| MA-90 | Sprague | 6000 | 0.7 |
| SDA-1 | Texas Instrument | 228 | 0.0 |
| 2N1184B | R.C.A. | 123 | 8.3 |
| 2N1309 | Texas Instrument | 700 | 1.3 |
| 2N1499A | Philco | 4000 | 0.5 |
| 2N1754 | " | 7500 | 1.4 |
| 2N2475 | R.C.A. | 82 | 1.2 |
| *SW1250 (S.C.R.) | Transitron | 65 | 10.8 |

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R. Winslow (cont'd)

| Type | Manufacturer | Units Tested | % Reject |
|---|---|---|---|
| Q5100 | Int. Diode | 1 | 0.0 |
| 1N91 | G.E. | 100 | 5.0 |
| 1N2970B | National Transistor | 3 | 0.0 |

*29 matched pairs were obtained

R. Gaboury

During the past two weeks Mechanical Inspection has had the following final and intermediate inspections on machines:

| Intermediate | Final |
|---|---|
| DEC PDP-1 | Ferroxcube Memory Tester 1521 |
| Western Electric - Memory Exerciser 2212 | Ferroxcube Mag Tape Unit #50 |
| | MIT " " " " |
| | Western Electric - Memory Tester 2212 |

A comparison between our shop and vendors for the time 1/31/63 to 2/13/63 gave the following results:

| Digital | | Vendors | |
|---|---|---|---|
| Pcs. received | 2131 | Pcs. received | 6312 |
| Pcs. rejected | 110 | Pcs. rejected | 232 |
| Total % | 5.1% | Total % | 3.6% |

These figures are based on sheet metal work, paint and finishes.

D. Adams

EN 1098 100%

Since the last biweekly, there has been a total of 760 units tested automatically. We also had 3/4 of an hour down time on the AC tester to find a broken wire on one of the relay coils.

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D. Adams (cont'd)

The breakdown of time per machine is as follows:

| | |
|---|---|
| AC Tester | 7.25 hr. |
| Diode Tester | 3.5 hr. |
| DC Tester #A | 10.75 hr. |
| DC Tester #B | 3.75 hr. |
| Total No. of Hours | 35.25 |

Average No. of Modules per hour -- 22

The slower rate of testing during the past two weeks is due to the training of two new girls to run the testers.

D. Dubay

Test Equipment Service

The following equipment has been calibrated within the last two weeks:

| Description | Type | No. Calibrated |
|---|---|---|
| Oscilloscope | 543/543A | 13 |
| Preamplifier | CA | 13 |
| " | L | 2 |
| " | G | 1 |
| " | O | 1 |
| " | Z | 2 |
| " | R | 1 |
| Meter | 630 MA-RM | 25 |
| " | 630 MA | 9 |
| " | 980 | 9 |
| " | 260 | 1 |

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## SALES

R. Oakley, WCO

The overall interest in modules displayed by contacts made from the WCO during the past few weeks has been increasing steadily. Continued sales to existing customers and the prospective new customers gives the modules sales outlook an optimistic appearance at the present time.

Some of the factors which help sell are the new developments in the module line, particularly D-A and A-D conversion. Some people are interested in the VHF line primarily to the degree of curiosity, but in many cases it acts as a stimulant for persons looking at other module manufacturers to further evaluate our entire module line.

I have found that the use of Laboratory Modules in the form of demonstration kits which can be loaned to organizations for a few weeks has proved to be a very valuable sales aid. Most people who use a demonstration kit of ours usually buy modules from us eventually and are more apt to praise our products rather than to scorn them. This can be attributed to the fact that many times individuals will buy certain modules which are not appropriate to their application. This would not be a problem if we could see all the applications before purchases and make the appropriate recommendations to the engineers. This is, of course, impossible because many jobs are classified or proprietary to the organization with which we are dealing. Some of the companies currently in possession of demonstration kits, which we believe should result in sales immediately are: Stanford University Linear Acceleration Center and JPL. Other companies waiting for kits are: Beckman-Berkeley, Shell Development Corp., Marquardt Corp., and EG&G, Santa Barbara. We should probably increase the number of these demo-kits now. It would be most unfortunate if someone became disinterested because of a three or four-week delay to get a kit for evaluation.

S. Olsen

The formal sales plan has been accepted by the Board of Directors and now has to be put into effect and followed by those involved. The reason it "sailed through" was not only the hard work by the many people involved but the superb documentation by Andy and Win Hindle.

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S. Olsen (cont'd)

The Munich office has now been physically established and is in operation. It is presently manned by the secretary, Liselotte Siebert, and Miss Siebert is presently handling European correspondence and distributing literature. Gunter Huewe will come to the plant either March 1st or April 1st for one month of training and will then go to Munich for full-time technical sales and service. In the meantime, we will be establishing a subsidiary corporation called "Digital Equipment GMBH." The GMBH means Limited Liability Corporation.

In the Sales Department we have a system for correspondence with regional offices. There is a box marked with the name of each regional office and everyone places their correspondence in the appropriate box. At the end of the day we then make one mailing to each office each day.

We are presently under negotiations with a man from Ottawa to open our Canadian office. If everything goes as planned, we should have an Ottawa office very soon. This should certainly enable us to give better service to Chalk River and help to get the sales message across to the many Canadian government departments located in and around Ottawa.

Because of presently unsurmountable problems we will not be opening a Tokyo office. We have entered into a sales representation agreement with Rikei Trading Company of Tokyo to handle the sales until January 1, 1964.

The last week of February, Foxboro will be delivering the PDP-4 System to Nabisco in Chicago. We have been unable to open our office in that area; but, in the meantime Fred Gould has kindly consented to help us cover the area from Maynard.

H. Painter

Planning for IRE show programming is under way. We will have canned programs stored on DEC Tape. The 30G character Generator CRT will definitely be at the show; possibly the Incremental CRT also.

Other shows coming are:

Mar. 6 ARD Annual Meeting (Boston)

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H. Painter (cont'd)

| | |
|---|---|
| Mar. 30-Apr. 2 | Nat'l Science Teacher's Conv. (Philly) |
| Apr. 2-4 | PEEE (St. Louis) |
| Apr. 16-20 | Fed. of Am. Soc. for Exp. Biology (Atlantic City) |
| Apr. 17-19 | SWIRE (Dallas) |
| Apr. 17-18 | Magnetic Conference (D.C.) |

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## ADMINISTRATION

### R. King

As of February 4, 1963 Dave Glazier will replace me in the purchasing of the MRO items. I will now be handling the sub-contracting in place of Bob Blackwood, who is leaving DEC the 1st of February. In the sub-contracting line Production is considering having boards fabricated by an outside vendor. I have received a quote from Electrolab Printed Electronics Corporation on various quantities of boards up to 100,000. We are also in the process of writing specifications that will govern all vendors who may be fabricating or assembling boards for us.

### F. Kalwell

Good-All has sent samples of their Mylar Capacitor with solvent resistant ink which has been accepted by Quality Control. All future orders for these capacitors will be supplied with this solvent resistant ink. The problem has occurred on distributor purchases so all future orders will be placed direct to Good-All.

I've recently placed an order for 300 Oak Switch Assemblies to be used on our 53 and 63 Current Drivers. This switch assembly will be supplied without the Allen Bradley potentiometer and resistors, which our production department plans on assembling.

### R. Blackwood

A problem arose this week with relation to the plenum doors fabricated by Donnelly Manufacturing Co. The welded steel tubing used in these doors was of an inferior quality, showing very clearly the weld marks, in most cases, running the entire length of the door. This mark is even more clearly defined after painting, and even a heavy amount of fill fails to remedy the situation. Donnelly has agreed to rework and/or replace the 53 doors at no charge.

As of Monday, February 4, Dick King will again be responsible for sub-contracting in its entirety. I am leaving Digital to assume duties as Purchasing Agent for the Wright Line, Inc. of Worcester. I want to take this opportunity to express my gratitude to all department heads and personnel for the cooperation, patience and especially the education given me in my 16 months here. Those who

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R. Blackwood (cont'd)

were good enough to drop what they were doing to answer my questions have earned my deepest thanks. I hope that my performance, in return, has been satisfactory.

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## ENGINEERING

R. Doane

| | |
|---|---|
| VHF Test System | 25% |
| Glass Delay Line | 25% |
| 8103 Circuit | 10% |
| Zener Diode Impedance | 10% |
| Miscellaneous | 30% |

Several times a doubt has arisen about the dynamic impedance of zener diodes being a possible cause of jitter in 10 Mc clocks, input voltage sensitivity in Current/Voltage calibrators, etc. Without a tester designed for the purpose, collecting the equipment and preparing to make this simple measurement has been time-consuming and tedious. I have designed a tester which the model shop has completed. For zener voltages to 25, from 2.5 ma to 80 ma may be applied, and dynamic impedances from less than one ohm up can be measured accurately. Modulation is a 60 cps square wave. Measurements on a few units in engineering stock show variations of 3:1 for a single type, making incoming inspection to this parameter seem desirable to me.

Two other testers, one for checking pulse transformer winding ratios and one for collecting transistor offset voltage and saturation resistance data, will soon be built, depending in the first case on the arrival of a part and in the second on Model Shop work load.

A series of ultra-cheap circuits using Silicon NPN epoxy-cast transistors is also under way; it consists of a complementing flip-flop, a pulse amplifier for negative pulses, and a logic gate. All are compatible with present supply voltages and have 0 to -3 volt logic levels. They are short-circuit proof and have very high fan-out. No pulse transformers are used, to reduce costs. I have aimed at 500 kc operation with standard 400 usec pulses in these designs. The avoidance of clamp diodes helps reduce component cost, but does not sacrifice the advantages of speed and squareness usually obtained from clamped loads.

Dick Banks will be spending his part-time on a glass delay line write driver and read amplifier. Initial design is complete, and he has begun a careful circuit-wise printed wire layout. We have taken photographic data on the 50 Mc delay line recently received from Corning, to aid in the design.

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R. Doane (cont'd)

A change in the VHF logic module circuit has greatly improved its response to turn-off pulses, but no improvement in test system performance occurred when the new circuit was used. The intermittent bug in the system is obdurate. It now appears to be in the synchronizer. A new tack suggested by Dick Best may lead to better results.

Through Jim Burley I have received some feedback from users of our gift modules at APL. Together with generally favorable comments on ease of use and no apparent objection to circuit differences between these and our standard modules, we have had three objections to the double length, one of them strenuous. I have tested a 4 usec 50Ω distributed constant delay line from one manufacturer, and a 10 usec 50Ω lumped constant line from another, and both will probably lead to designs we can use. Considerable work will be required to prove the efficiency of a thermal redesign for a shorter board, so this change will be deferred until test system bugs are exterminated and the data-gathering first production run is finally done.

VHF outputs will have two changes in this first production lot. First, the transistor type will be changed from 2N709 to the faster, cheaper, epitaxial 2N2475. Extensive tests on the new $F_t$ tester showed a surprising sharp drop of $F_t$ in the 2N709 at just the region of full turn-on, which is totally absent in the 2N2475. The steepness of this drop-off is such that switching characteristics would be very sensitive to small variations in power supply voltages for some units. Indeed, such an effect has been observed in individual tests of flip-flop modules, but remained unexplained until $F_t$ data was available.

The second change will be to mount output transistors directly onto the printed board like any other. The use of special copper alloy spring wire for heat and signal connection from can to connector pin will introduce acceptably small thermal resistance while leaving inductance about the same and allowing spring wire instead of transistor leads to take pin floating motion. It will also facilitate use of our new connectors, which will not have the split pin into which the old heat clip fitted. Sample spring wire is being obtained after heroic efforts by Bob Blackwood.

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## SYSTEMS

J. Fadiman

Last week the Core Tester 2113I was shipped to Electronic Memories, Inc. in Los Angeles. The Memory Tester 1521 will be shipped to Ferroxcube sometime this week. The first Memory Exerciser 2212A will be shipped to Western Electric in Holmdel, New Jersey on Friday, February 8. Lee Butterworth has almost entirely completed checkout on this system. The 2212B will be shipped to Western Electric in Hawthorne, Illinois on March 8.

Pat Greene is working on the Spark Chamber Reader for Harvard University. We are now starting work on an Automatic Core Tester 2113K and Memory Tester 1516I for TDK in Tokyo, Japan. Total value for this order for TDK is about $100,000. It is also definite that we will receive the order from Siemens for a Memory Tester 1516 for a total value of $56,000. We are starting work on this immediately in parallel with the one for TDK.

Chances look very good for selling a Core Tester and Memory Tester to the Mobara Works of Hitachi in Tokyo, Japan and selling two Automatic Core Testers 2113 to Burroughs Corp. in Philadelphia. Chances also look good, about 80%, for receiving the code conversion job for Photon.

Other bids which we are working on include the Automatic Energy Commission of Canada and a code conversion job for RCA Communications. We also have requests for bid for two special system jobs for DuPont, both of which we are interested in. These jobs are for process control work.

Foreign Business: Our foreign business appears to be increasing both in terms of orders and in terms of work in setting up foreign offices. Our German office has already been opened by our secretary there. Guenter Huewe will start work with us in April. We are negotiating an agreement with Rikei Trading Co. for representing us in Japan until the time when we can open our office in Japan. We hope to be able to do that within a year.

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E. de Castro

Since my last Biweekly Report I have been engaged in a number of projects including installation of the 2114 Core Tester at IBM, Owego, checkout of the Memory Exerciser 2212 for Western Electric, and preparing a proposal for the Atomic Energy Commission of Canada. The AEC System will be used to monitor and control a reactor at Chalk River, Ontario. It will include a computer, probably a PDP-4 with 8K memory, D to A converter, real time option, display and drawn as well as a special system to operate in conjunction with a purchased analog multiplexer. The multiplexer will obtain information concerning temperature and neutron flux and supply it to a DEC analog to digital converter. After conversion, the information will go to the computer and also be compared with several preset alarm conditions. Thus, alarm conditions will be recognized even if the computer is off line or has been incorrectly programmed. The computer, after making the necessary calculations, will supply an analog output to control a servo system which will make the appropriate adjustments on the reactor.

R. Tringale

The final design for the NCR thin film tester has been completed. The tester consists of one program generator which is similar to a Semi-Automatic Core Tester and three separate test stations. The system is scheduled to be delivered by the end of March.

Because of the complexity involved in the PEPR system and the inability to orientate the logic involved in the controller with the rest of the system, I have generated two new PEPR drawings; one drawing being a flow diagram of the Precision Encoding mode, the other drawing being a flow diagram of the Pattern Recognition Mode.

The precision -10V power supply module 1704 is out of drafting. The final model is still to be constructed, the reason being that it takes weeks to acquire the special components which the module requires.

## COMPUTERS

E. Harwood

The checkout group has suddenly been loaded with some large engineering jobs; mainly, the line unit design and construction for the BBN Hospital Computer, the integration of the CRC A to D equipment on its computer, the rather large Honeywell system which has been reactivated, some work on the NSA computer and finishing off the four line units for the BBN Cambridge computer. We are handling various parts of these jobs in conjunction with other departments in the company.

We had summer in winter in the checkout area. If anyone happened to go by during the past week and wandered into the room, they would have noticed that the temperature was up to 105° and humidity around 90%. This is part of the testing procedure that was required on the Foxboro PDP-4 computer, and the computer came through with flying colors as expected.

At Arthur Hall's request, we have sent a PDP-1 to the Acton Labs to determine what affect radiation would have on the operation of the computer. We should have the results of these tests sometime in the next week or so.

Along with these interesting jobs, we have also been going merrily on our way checking out standard PDP-1's and PDP-4's.

A. Blumenthal

A 4K memory has been successfully operated using the new selection scheme. Tests have shown that some deterioration of performance can be expected with this type of selection because of capacitive currents flowing in some of the non-selected lines. Margins are about 25% less than the old scheme. Also, it has been noted that the capacitive surges when switching the write current on and off are nearly as great as with the old scheme. This increases the demands on the driving circuits, making satisfactory designs more difficult to achieve. These surges can be limited by using diodes and split switches at both ends of the x - y lines. The total number of diodes would then be so great that it would be impractical to mount them on the existing type of module. It is desirable, therefore, to avoid using them. Further tests will be made to determine if this

A. Blumenthal (cont'd)

can be done.

A trial was made using a single current limiting resistor per axis in place of the resistor per switch presently used. This resulted in a marked increase in noise outputs with worst case checkerboard even though it had no delsterious affect on the driving current waveform. Further tests will be made to determine the reason for this. This is worth a fair amount of attention because such a design would make it possible to isolate the driver output from the rest of the world through the resistor, thereby reducing the chance of damaging the driver through an accidental short.

Lay-out for a full 16K system is now being made. Although much of the design has yet to be done, the bulk of the wiring can be laid out at this time.

A recent flurry of troubles in memory switches have been caused by damage incurred to the transistors during marginal checking. A modification has been worked out which will limit the margin applied to -5 volts thereby assuring that some bias remains at all times. This mode will be made on all PDP-4's and PDP-1's.

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## MECHANICAL ENGINEERING

L. Prentice

| | |
|---|---|
| EN 1000 | 20% |
| EN 1136 | 60% |
| EN 1097 | 15% |
| Various problems with QC | 5% |

### Linc Tape Units

We are now striving to put together a unit sufficiently well mocked up to photograph for Design News Magazine, deadline February 7th.

The first casting for the door cover has been received and is now in the machine shop for machining. We are somewhat hampered in getting the prototypes underway because Dave Shuflat has been out, and some other people have been ill in the machine shop. One set of brass tape guides has been returned to Aluminum Anodizing Corporation of America for replating. The first were totally unsuccessful. We are in hopes that Martin hardcoat aluminum is the answer to this rather than chrome plated brass. So far, our experience with vendors on proper plating of the brass has been very discouraging. Some difficulty has been experienced in obtaining material for the main frame of the tape unit, as the warehouses do not stock the quality of finish that we desire. To get this type of finish I have made a trip to the warehouse in West Roxbury and selected the best material available, which was not really satisfactory but will have to do for the first prototype units. This means that we either have to buy 1000 or 2000 lbs. of this material from the mill specially packed and shipped to us from the mill and quality controlled at that end, or that we will have to design a sand casting to replace this part. So many changes have been made in the configuration of the head, both electrically and mechanically, that these drawings are going to be completely re-drafted just as soon as an opportunity presents itself, and new specs with broader interpretation will be written so that these can be put out to vendors in a more intelligent manner.

### Dynasert

The machine was demonstrated here this past Tuesday using their own plates. Some difficulty was experienced; the dimensions given by the company for plates did not prove to be correct, and because we

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L. Prentice (cont'd)

did not fully understand the configuration of the machine as thoroughly as should have been obvious, a further investigation has to be made as to proper layout of the master board. There seem to be some dimensional changes that have escaped our notice and these have to be studied and corrected.

A note was received from Dave Denniston, NYO, requesting information in regard to petitions. Dave, sketches and some suggestions will be forwarded to you as soon as possible.

K. FitzGerald

| | |
|---|---|
| EN 1000 | 80% |
| EN 1023 | 10% |
| EN 1053 | 10% |

The status of the four shops has not changed appreciably since the last Biweekly, so I will devote this one to a packaging and packing seminar which I attended on January 23rd. This seminar was given by the Industrial Educational Institute in Boston, and was conducted by a Mr. L. C. Heller, assistant to the head of the Packaging Branch of the Office of Naval Material, Washington, D.C. His subject was covered in four topics.

Topic 1 - "Military Packaging Objectives and Problem Areas" - this was more or less introductory in scope and showed that most of the reasons for packaging and packing were derived from common sense application of the methods used to get material from one area to another.

Topic 2 - "Specification Development" - outlines the procedure for instituting a new federal or military specification and how changes can be made in this specification if they are deemed necessary.

Topic 3 - "Military Procedures and Various Packaging Areas" and Topic 4 - "Quality Control for Packaging - these were really the most important topics and most of the seminar time was spent on these two topics. Most of the information during this seminar had little or no application in this company at the present time but no one knows what the future may bring. In the event that we ever do undertake any military contracts and, therefore, have to do packing or

K. FitzGerald (cont'd)

packaging to military standards, three of the most important things for us to be aware of are:

1. Read the packaging requirements on every invitation to bid. As was pointed out, there are times when these packaging requirements are so tight that a contractor can lose all of his profit simply by having to re-package or spend great sums of money on the original packaging requirements which were not taken into consideration when the bid was made.

2. Responsibility for the performance of inspection tests rests with contractor. In other words, when the bid calls for certain types of tests to be made on a package, it is up to the contractor to have these tests made, recorded, and inspected. Most of the standard tests which the government requires are fairly simple in nature, and equipment for making these tests can be purchased reasonably or built with a minimum of cost. However, there are tests such as "cyclic exposure and incline impact" that require large amounts of expensive and complicated equipment.

3. In all invitations to bid there is always an introductory statement which usually reads - "The following documents in effect on data of invitation for bids form a part of this specification." In listing these documents, the revision letter is never shown. Therefore, this introductory statement is a warning to bidders to check the last issue of the specification index to see that they have the latest issue of all referenced specifications. An outdated specification can drastically affect the outcome of the whole contract. The Navy Department has tried to help along these lines by making copies of any of the referenced specifications available from: Naval Supply Depot, 5801 Taber Avenue, Philadelphia, Pa.

Although this seminar was designed to specifically handle military contracts and packaging problems, I asked a few questions of Mr. Heller and the 25 people attending which I thought they might be willing to answer.

1. "If you people were allowed to specify your own type of package or crate for shipping a large electronic system, which

K. FitzGerald (cont'd)

would be the method preferred - complete packaging and crating or partial crating with a skeleton type crate?"

The entire group seemed to divide about 50-50 as to what method they preferred and the reasons given for their particular preference were the same reasons which have been advanced here about our method.

Some side comments resulting from that question were:

1. A package or crate should look "automatic or standard." In other words, a company that is producing and building an article should have a package that does not look like it has to be hand-fit or hand-made for each article.

2. A "production line" type packaging puts across to the customer as well as all handlers that this business of receiving orders, manufacturing, and shipping is all a matter of course and no particular problems are encountered with anything that a customer may ask for. (In other words, I think what they meant was a "big business" impression should be given from your package.)

Also during the question and answer period some amusing anecdotes about the problems of doing government work were offered.

One man, working for a wire and cable concern, told of receiving a government contract for two, six-foot spools of wire cable each weighing approximately 800 lbs. which were to be packed two per cardboard container!!

And on the other hand, he has also received orders for 50 six-inch diameter spools to be lagged one per skid for ease of mechanized handling. These spools weighed approximately 2 lbs. each!!

Another man, working for an electric motor concern, related how a military contract called for a motor which was designed for and intended to be operated under water. However, the packaging requirements called for it to be packed in a completely waterproof package so that it would not be damaged by moisture during transit and later storage.

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K. FitzGerald (cont'd)

I received and will keep on file in my office copies of:

1. The seminar outline.

2. Mil Standard - 129C - This standard provides for a uniform marking of military supplies and equipment for shipping and storage.

3. Mil Standard - P116D - This specification covers the requirements for the cleaning, preservation, and packaging of items, equipment and materials for protection against corrosion, physical damage and other forms of deterioration during handling, shipping, and storage.

4. Mil Standard - 726A - The purpose of this standard is to establish and define a system for coding essential preservation and packaging data.

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## QUALITY CONTROL

J. Cudmore

We are performing a preliminary analysis on the distribution of the parameters of the 16B-1 transistor. This General Electric device is an epoxy encapsulated planar epitaxial passivated NPN. Despite all the adjectives, it is a very inexpensive component. This transistor has the following manufacturer's specifications:

| | | | |
|---|---|---|---|
| $BV_{CEO}$ | 18V | @ | 0.5 A |
| $BV_{EBO}$ | 5V | @ | 0.5 A |
| $I_C$ (MAX) | 200 MA | | |
| $P_T$ | 200 MW | | |

Storage Temp. -30 to +125°C
Operating Temp. +100°C
Derating Factor 2.67 MW/°C

Beta 30(min), $V_{CE}$ = 4.5V, $I_C$ = 2 MA

$V_{CE}$ Sat 0.3V(max), $I_B$ = 3 MA, $I_C$ = 50 MA

$F_T$ 75 MC(typical), $V_{CE}$ = 5V $I_C$ = 2 MA, F = 20 MC

The results of this evaluation will be published in a final report. We are updating the transistor and diode sheets and expect to send them to drafting in two weeks.

D. Adams

EN 1098

During the past two weeks I have continued to work on the development and modifications of various circuits to be used in the new automatic tester.

Last week Roger Gagne left Automatic Module Test and went down to Engineering to work.

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D. Adams (cont'd)

There was an error in the total number of units tested automatically in the last report. That number was the number of units tested on all four machines. Any given lot of units may be tested on more than one tester. Most all are tested once on the DC tester and again on the AC tester. Therefore, about half of the reported number, or about 1100 modules, were tested during that time.

In the last two weeks 1370 units were tested automatically with no down time on any of the testers. In testing these units, the number of hours each tester was used is as follows:

| | |
|---|---|
| DC-A-Tester | 16.75 hrs. |
| DC-B-Tester | 10.00 hrs. |
| Diode Tester | 6.5 hrs. |
| AC Tester | 17.75 hrs. |
| Total testing time | 51.00 hrs. |

Approximate testing time 27 modules/hr.

K. Doering

Classroom modules and their mounting panels are in the works of being updated. All the drawings have been taken care of and should leave drafting within a reasonable time. The models of all these units are down in the Model Shop for revision. The 901C Mounting Panel model has been updated and all parts formerly in finished goods are now in production where they are reworked. After completion of rework, the whole mounting panel will be redesigned. The 728 Power Supply had some failures because of leakage of the resonant transformer diode. We found that one of the screws that hold the terminal bracket to the transformer was too long and was screwed into the diode, thus destroying it. The parts list specified this screw too short, assembly people used one too long, and we finally came to a happy medium. The parts list was updated accordingly. An audit of the finished goods room showed 16 system modules not having the proper test data sheets with them. The serial number did not match. This again indicates the importance of carefully checking the paper work when the modules are packed to be sent out to a customer.

In January we made two quality reinspection trips to our customers in New York, New Jersey and Montreal (ADX-1,2,4), which gave us some

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K. Doering (cont'd)

feedback of how our product was doing in the field. DEC made out rather well and still we could bring some useful information home that allows us here to check for some features of the machine which seemed to be of minor importance before.

R. Winslow

Semi-conductors tested since last report.

| Type | Manufacturer | Units Tested | % Reject |
|---|---|---|---|
| MD-114 | Philco | 10,000 | 0.43 |
| T1796 | " | 200 | 2.0 |
| GA 439 (4JX1C741) | Texas Instrument | 1,600 | 0.56 |
| 2N1305 | " " | 6,000 | 0.80 |
| 2N1309 | " " | 300 | 0.67 |
| D-007 | Transitron | 88 | 27.0 |
| D-662 | Clevite | 8,215 | 1.4 |
| D-664 | Texas Instrument | 141 | 100.0* |
| SW-1250 (SCR'S) | Transitron | 535 | 5.8 |
| 1N-469A | Hoffman | 70 | 18.6 |
| 1N-964A | Motorola | 90 | 0.0 |
| 1N-1217 | G.E. | 900 | 0.22 |
| 1N-1220 | Westinghouse | 300 | 2.7 |

*Resubmitted

R. Grey

Electrical Inspections (since January 21, 1963)

| | | |
|---|---|---|
| PDP-1 | Stock | Final |
| PDP-1 | Stock | Final |
| Core Tester 2113 | EMI | Intermediate |
| PDP-1 | Stock | Intermediate |
| Display 30D | DEC | Final |
| PDP-1 | Stock | Final |
| PDP-4 | Stock | Intermediate |
| PDP-4 | Foxboro | Final |
| Mag Tape 50 | Foxboro | Final |
| Memory Tester 1521 | Ferroxcube | Intermediate |
| Display 30G | DEC | Final |
| Memory Exerciser 2212 | Western Electric | Intermediate |
| Mag Tape 50 | DEC | Final |

R. Grey (cont'd)

Some work has been done on removing outdated and inactive models from our model files. So far, approximately 3 models of system models have been eliminated from the active model files.

R. Gaboury

During the past two weeks Mechanical Inspection has had the following final and intermediate inspections on machines:

| Finals | Intermediate |
|---|---|
| DEC display CRT 30G | DEC PDP-4 |
| DEC display CRT 30D | DEC PDP-4 |
| DEC PDP-4 | EMI Core Tester 2113-I |
| EMI Core Tester 2113-I | Ferroxcube Memory Tester 1521 |
| Foxboro PDP-4 | ITT ADX-9 |

A comparison between our shop and vendors for the time 1/17/63 to 1/31/63 gave the following results:

| Digital | Vendors |
|---|---|
| 707 pcs. received | 1431 received |
| 40 rejected | 73 rejected |
| 5.6% | 5.1% |

These figures are based on sheet metal work, paint, and finishes.

D. Dubay

EN1144

Test Equipment Service

| Description | Type | No. Calibrated |
|---|---|---|
| Oscilloscope | 543/543A | 5 |
| " | 541 | 2 |
| Curve Tracer | 575 | 2 |
| Preamplifier | CA | 5 |
| " | L | 2 |

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D. Dubay (cont'd)

| Description | Type | No. Calibrated |
|---|---|---|
| Preamplifier | D | 2 |
| " | H | 2 |
| " | S | 2 |
| Meter | 260 | 1 |
| " | 630 MA | 20 |
| " | 630 MA-RM | 4 |
| " | 980 | 2 |
| " | 931 | 4 |
| " | 433 | 1 |

I worked with Ken Wakeen for 4 days last week setting up the new Automatic Tester to program the Type 567 Read-Out Scope. We had little trouble making time measurements but ran into trouble when we tried to program the 567 to make external amplitude measurements. I found a discrepancy in the way that Tektronix resets the master gate during internal amplitude measurements and external amplitude measurements. I brought this to the attention of Dan Guy at Tektronix. He agrees with me that this is an error and he is taking appropriate steps to correct it in future models.

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## SALES

J. Burley, DCO

It looks as though a contact made last summer at the MIL-E-CON Show is going to be responsible for our getting some modules into NASA-GSFC. The small amount of business we've been getting from this tremendous user has really been a disappointment. They are buying 3C's almost as though they were sole-source. PB is being phased out due to reports of poor reliability and lack of breadth in the line.

Other activities include the following:

| | | |
|---|---|---|
| NASA-GSFC | - | Several groups interested in CRT displays. |
| U.S. Weather Bureau | - | CRT interest |
| Naval Research Lab | - | PDP-1 and PDP-4 interest |
| APL | - | Tests on VHF modules complete. We should be getting a copy of their report soon. Buying activity here almost at a standstill. |
| Naval Oceanographic Office | - | PDP-1 and CRT interest |
| Atomic Energy Comm. | - | Follow-up work for WCO on PEPR situation |
| DuPont | - | Instrumentation Division interested in our building special systems for process and automatic control. J. Fadiman now handling this. |
| David Taylor Model Basin | - | PDP-1 and PDP-4 interest |
| Melpar, Inc. | - | We lost out on evaluation here. They feel their short schedule will not permit their becoming familiar with our logic so they will use their own logic on this particular contract. |
| University of Dayton | - | Interest in educational devices |
| Litton Systems | - | PDP-4 interest |
| Western Electric Columbus | - | Just starting with our 5 mc logic |

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J. Burley, DCO (cont'd)

| | | |
|---|---|---|
| Philco - Phila. | - | Module interest |
| RCA - Bethesda | - | New RCA facility - quoting on large communication system around our 500 kc logic. |
| Western Electric Burlington | - | This group very active once again and should stay active for awhile with their recent contract awards. |
| Boeing - New Orleans | - | Plans to start buying modules this summer. They are one of the principal NASA contractors at Michoud. |
| Chrysler Corp. | - | Interest in modules and special systems. Another NASA contractor at Michoud. |
| Texas A & M | - | Module interest |
| Virginia Poly. Inst. | - | PDP-4 interest |
| G.E. Specialty Controls Div. | - | Module interest |
| Sperry-Piedmont | - | Module interest |
| Diamond Ord. Fuze Lab | - | PDP-1 and PDP-4 interest |
| Univ. of Mich. | - | We should know soon whether they get funds to buy PDP-1. |
| Univ. of Maryland | - | We should know soon whether they get funds to buy PDP-1. |

Computer interest is high and split fairly evenly between both machines. Probably the most active product area is our CRT line. Interest very high here.

H-Pac now being evaluated at APL. No electrical tests have been run but they are very much impressed with the packaging.

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G. Rice

The first piece of DEC equipment any potential customer sees when entering our front door is the PDP-4 prototype. Therefore, I feel that this machine should be a show piece, which is not the case. The prototype is covered with fingerprints and usually is operating with some part disassembled. The paper tape reader still has a mechanical design bug in it.

The only way to get around this is to operate the reader with the light hood off and this immediately ruins the computer's general appearance. Any action to correct this situation would be greatly appreciated.

H. Painter

The EEE Show in New York last week was rather dull. However, a few good prospects did stop by the booth.

Jon Fadiman will be attending the IEEC Show in Paris this month where we will have a ten-foot booth.

We have obtained 10' of booth space in the Fed. of American Societies for Experimental Biology Show in Atlantic City, April 16-20.

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## TECHNICAL PUBLICATIONS

J. Atwood

Public Relations - Major activity in this area has centered on four specific projects. The Personnel Committee has completed the final review of the draft text for the Employee Handbook, and this badly needed publication now goes into production. Also in process is a color slide Plant Tour, which should be a valuable public relations and sales promotion tool.

Just getting under way is a Training Film Program, being put together in cooperation with the Personnel Department. The aim of this program is to enable cost center managers to show appropriate instructional films to personnel in their particular groups. Already finished is a new Publicity Distribution List designed to run on the PDP-4. This application should have some of the same marketing potential as the mailing list application, since it permits extremely accurate selection of the proper media for plant, personnel, product, and utilization publicity of various types.

Sales Promotion - In this area the emphasis is still on trade shows, product bulletins and mailings, flavored with side ventures into proposal packaging a new (for us) form of visual aid. The self-contained trade show booth was refurbished and shipped to Paris for the International Electronic Components Exposition. Since the booth will stay in Europe, we are getting ideas and prices on a replacement unit for our "one-man" U.S. shows.

In various stages of production are product bulletins on new modules and new computer options, such as the Tape Control 54, Extended Arithmetic Element 18, and Drum System 24. New computer and module price lists are also being prepared. Next on the list are brochures on the Memory Tester 1521 and the Systems Group's special systems.

The response to the January mailing has been quite good. The October and November mailings were designed to bring our prospects up-to-date on new gear and new applications. This mailing was planned to capitalize on the effect of the two previous efforts by offering additional literature on request. The requests had reached the 1287 mark (over 5%) by February 5.

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J. Atwood (cont'd)

We are working closely with the Sales Department on the packaging of proposals to BBN and Atomic Energy of Canada. These will be the first such proposals prepared in the new format developed with Nick and Bob. We also turned out our first set of slides for the overhead projector under somewhat less than ideal conditions. The BUSPAK program was slapped onto slides virtually overnight for a presentation to Fitchburg Paper. While the results were far short of optimum, at least we worked out some of the techniques.

Technical Information - Our work in this area currently involves all three major lines - modules, systems and computers. Module application notes are coming out on a one-a-month schedule, and we are about to put Howie Painter's Lab Module Handbook into print for the IEEE show. We are also making overhead projecturals of the 3000 Series schematics for Don White's circuits class.

The Memory Tester 1521 Manual, which is a pretty sizeable job, is being ground chapter by chapter, and a rewrite of the Memory Tester 1516 Manual is in immediate prospect. In the meantime, the Memory Exerciser 2207 Manual has been completed and forwarded to the customer.

In-out manuals of all types are either in process or on the hook. The CRT 30C Manual is about wrapped up, as is the Tape Control 57 Manual. Next in line are the CRT31, 30D and 34 Manuals. With a little luck, we hope to get the revised PDP-1 In-Out Manual into production shortly, along with a new instruction card.

The MAINDEC 2 and 3 maintenance program manuals are about out of the print shop, and the current MACRO Manual has just been reprinted in order to meet requests generated by the January Mailing. Rumor has it that BBN has started its new course using the revised DECAL Manual, so there is hope that this one, too, will soon be available for publication.

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## ADMINISTRATION

### H. Crouse

A commitment for 200,000 2N1754 transistors has been made with Philco Corporation. This device will be used as an MD-114 replacing the order Sprague Electric Corporation cancelled. Sprague had difficulty in producing the MD-114 profitably. The price of the 2N1754 is $0.48 each.

The purchase is a "blanket order" for an approximate twelve month period which guarantees a continued supply.

### F. Kalwell

United Shoe Machinery has their new Model F Eyeletting Machine in production where it is presently being evaluated. This machine will set 5938 eyelets.

This week United Shoe Machinery will be attaching a "pantograph" positioning table to our dynasert machine. This unit will be evaluated by Jack Smith. This pantograph unit is used for automatic insertion when a printed circuit board has many components of the same electrical value parallel to each other. Loren Prentice is having a template made for this unit.

I've just recently ordered two adjustable thermostats for Arthur Hall used on the Foxboro machine which has an adjustable temperature range of -100°F to +400°F.

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## ENGINEERING

R. Melanson

As most of you know, the engineering drawings are being microfilmed and mounted in what is called a MIL D Aperture Card. One set of cards is filed in-plant, the other set is filed in an underground vault in Waltham, Massachusetts. The microfilm at this time is serving a three-fold purpose.

1. Security File
2. History File
3. Reference File

The Reproduction Department's goal is to put into operation an in-plant, semi-automated system based around microfilm print-out and diazo print-out of hard copies. It is hoped that sometime in the future satellite areas placed in key locations will maintain engineering drawings pertinent to that department's needs. This will enable a department to have access to reference material and hard copies without acquiring it from the main reproduction center (no waiting for prints).

New techniques in drawing procedures had to be established; pitfalls had to and still have to be overcome and system procedures had to be discussed and re-discussed. Daylight is starting to show and it is hoped better results will be forthcoming.

Engineers can at this time request reference prints or working prints (providing a full size print is not necessary) on Xerox copies in the place of standard blue lines that you are all used to. This will increase the use of the Xerox machine and give you a smaller size print to handle.

I am working on a procedure whereby draftsmen will be assigned to projects with the responsibility of being the main source of liaison and directly assisting the engineers in design layout. This, I feel, will accomplish the following:

1. Relieve the engineer of being tied down with drawing details.

2. Help to eliminate loss of information through channels.

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R. Melanson (cont'd)

3. Increase the morale of the draftsmen by creating an atmosphere of directly taking part in the accomplishment of a new product.

4. Coordinate electromechanical documentation.

5. Increase the draftsmen's knowledge by directly working with an engineer.

L. White

EN 1152 100%

The final logic design of the Digital Symbol Generator - Display Type 33 - has been completed and the first model will be checked out the week of January 21st.

Symbols are plotted by the symbol generator on a 5 x 7, or 35 dot, matrix in one of four sizes. Individual symbols are displayed by intensifying dots within the matrix under program control.

The symbol generator will display symbols at a 7.5 kc rate to give a flicker-free display of 250 symbols.

T. Stockebrand

1156 - 1161 - 1026

The main interest has been the incremental scope and a generator to produce pulses for it. Jim Sullivan has started to convert the dreams into reality by finding errors in my layout of the Type 1010 Diode package - used to build the DC counter with variable scaling in the scope counting buffers and in the generator. The hope for the future is that VHF tactics will solve the more complicated generation problems cheaply.

George Gerelds is laying out the various cards in our first few entries into the analog line; a summer, an integrator, a series-shunt switch and a 1/4 square multiplier of low accuracy. A general application note will be forthcoming. Barbera Stephenson and Ken Wakeen report good success with a 10 bit A-D converter which helps hopes for the completeness of an analog line we will offer.

Barbera Stephenson

## Accuracy of our A to D Converters

In his PDP-4 automatic module tester, Ken Wakeen is planning to use an A to D converter made from our newest modules. The converter was finished last week and we had an opportunity to test it with our new Kin-Tel power supply. The results were very encouraging. In the past we have avoided pretty much the question of the absolute accuracy of our converters and stuck more to terms that were easier to measure-like the number of bits which can be obtained with monotonicity. I think that we will always be able to manufacture a finished converter with greater accuracy than that which we want to specify to a module customer who is building his own converter. The reason for this is that the errors produced by specific modules are somewhat hard to define, and even more difficult to test thoroughly.

If we were to make an educated guess as to how accurate a converter would be made with our modules, we might add up figures something like the following:

| Old Modules | | | New Modules | | |
|---|---|---|---|---|---|
| 4677A | | .1 % | 4678 | | .04 % |
| 1547 | common mode | .05 | 1572 | common mode | .03 |
| " | sensitivity | .1 | " | sensitivity | .02 |
| " | current | .02 | " | current | .02 |
| 1562 | | .15 | 1565 | | .005 |
| 1564 | misadjustment for 10 bits ≃ | .01 | 1564 | misadjustment for 10 bits ~ | .01 |
| misc. | | .01 | misc. | | .01 |
| | total error | .44% | | total error | .135% |
| | safety factor | .06 to .16 | | safety factor | .035 - .085 |
| Estimated max. error | | .5 to .6% | Estimated max. error | | .15 to .2% |

These figures are quite conservative, principally because they are simply educated guesses.

The tests that we made on Ken Wakeen's converter were for DC absolute accuracy. We set the converter at its normal operating speed but initiated conversion from external clock as a somewhat lower rate. The input of the converter was from the new Kin-Tel power supply

Barbera Stephenson (cont'd)

which is accurate to within ±.01%. Results were read on indicator lights driven by the converter register. We measured the input voltage which caused the converter to oscillate between two successive states. This was done by eyeballing that point where the lights seem to be flickering between the two states with equal intensity. When the speed of the converter itself was fairly slow, these points were extremely well defined, i.e. 0.1 or 0.2 millivolts. As the speed of the converter was increased up to the published speed, these points became more spread out and would sometimes depend on the direction from which you approached them. For each test, we measured 19 points corresponding to the converter switching between such numbers as 00011 and 00100 or the points 11011 and 11100. The results of the test were as follows:

Accuracy (all figures ±.01% due to Kin-Tel)

| speed / temperature | 3.7 μs/bit* | 7.5 μs/bit | 25 μs/bit |
|---|---|---|---|
| +29°C | ±.09% | ±.038% | ±.026% |
| +61°C | ±.1% | | |
| +18°C | ±.06% | | |

*theoretical speed

These results, of course, are not the whole picture but they are encouraging, particularly the results of high and low temperatures. The biggest factor in the accuracy of the converter is the comparator. The comparator, which we used, had quite a low temperature coefficient. Therefore, we should not expect this type of temperature coefficient in all finished units. However, the decreasing accuracy at the high temperature can be explained almost completely in terms of the comparator which means that the other components do not exhibit a significant temperature coefficient (particularly the level amplifiers).

Even though we now quoted a temperature coefficient on our ladders, we really shouldn't expect them to be anything like this because the temperature coefficients are in themselves a function of temperature; in this relatively limited range, the resistors should change extremely little. However, resistor manufacturers do not like to specify this type of thing. The only way that we can guarantee it

Barbera Stephenson (cont'd)

is with a direct measurement.

The improved accuracy at low temperature is probably due to faster switching and hence, a similar increase in accuracy would not be expected at lower operating frequencies.

The low speed accuracy figures of .038% and .026% are probably better than can be expected in the general case. This is due to the fact that the gain bandwidth product of the input stage on the comparator is pretty nearly a constant. The particular comparator used in this test had high-gain in the input stage, and was relatively slow. A comparator which had low-gain speeds but high bandwidth would probably operate the same at the lower speeds as at the higher speeds. However, the very fact that we had a converter that tested out this good is in itself pretty impressive when you consider that the best units sold on the market right now have absolute accuracy of .03% plus a temperature coefficient. (Of course, these units are expected to keep this accuracy over an extensive length of time, something that we have not tested for yet. They also have a considerably large number of bits, which is a separate question.)

For the time being, I think the number that is the most meaningful is the .09% accuracy number. This is the area in which we must be thinking for the time being.

One thing that does not really show up in the above tables is the distribution of the error. The error was almost linear with respect to the voltage. At very small inputs, error was just slightly negative (i.e. switching occurred when the voltage was slightly less than it should be). The error increased to a maximum positive value somewhere between full scale, and half of full scale. Once it reached the maximum, it remained fairly constant until full scale. This is considerably better than a converter where the error on alternate points would be + and - the full value. The error figures could be made to look somewhat better by adjusting in the converters so that the error was centered equally positive and negative, but in the figures above the converter is adjusted so that the error is minimized at small voltages. I believe this is what is generally desired.

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Barbera Stephenson (cont'd)

It was particularly useful to be able to test this particular converter since it will be used here in the plant and we can check repeatedly to get more information about the stability of the unit. I also want to measure the repeatability on the computer by putting in a specific voltage and having the computer print the high and low values which occur during 100 samples or so. Another test which would be quite important is how the converter reacts to a square wave input, and to a variation in a conversion repetition frequency. At first blush, it appears that the accuracy should not be affected by these factors; however, past experience shows that they sometimes are and certainly must be checked for before we start quoting any fixed figures on absolute accuracy.



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## SYSTEMS

J. Fadiman

Final checkout is proceeding on the Memory Tester 1521 for Ferroxcube. Everything seems to be in order except that we do not yet have the Read-Write Switches, Model 1986. All the logic is almost completely checked out. We expect to ship the Tester in about two weeks.

Final checkout is also being done on the Core Tester 2113I for E.M.I. This machine should be ready for shipment in about one week and thus will be shipped on time.

All wiring has been completed on the Memory Exerciser 2212A for Western Electric and the machine is now being checked out. As of today the timing chain and addressing circuitry has been completely checked out.

Other machines under construction at the present time are the Memory Buffer for the University of Connecticut, the Harvard University Spark Chamber Reader, the second Memory Exerciser for Western Electric, and a second Automatic Core Tester.

### New Business

We are working on a bid for Atomic Energy of Canada which is a control system for an Atomic Energy plant. It involves the use of the PDP-1 or PDP-4 Computer, our standard Type 30 Display, our serial drum and Adage analog-to-digital converter and a special alarm signal monitor system. This bid is due on February 15. We are also going to work on a bid for the RCA Code Converter. In addition, we have two proposals to work on for DuPont involving two special purpose process control systems.

During the past week a considerable amount of time has been spent with some Japanese visitors. Mr. Ishikawa and Mr. Shiraiwa of Rikei Trading Co. were here first. After that Mr. Odawara, Chief Engineer of the Mobara plant of Hitachi, was here. He is interested in purchasing both a Memory Tester and Core Tester and chances of making this sale are about 90%. However, the order may not come through for about six months. Our next visitor was Mr. Hata of TDK. He is very interested in purchasing an Automatic Core Tester, Ramsey Handler and Memory Plane Tester. Chances of making this sale to

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J. Fadiman (cont'd)

him are about 70%. We will know definitely about this order by the beginning of February. The order would total close to $100,000, as he wants the Memory Tester complete for 128 x 128 x 64. All of the visitors were considerably impressed by our facilities here and by the new equipment which we have. I have also had some preliminary discussions with Mr. Hata concerning possibilities for DEC setting up a Japanese office. He may, perhaps, know someone who would be interested in this.

P. Greene

The two Western Electric test sets will be shipped Monday, Jan. 21. Some final details had to be polished up before they could be okayed for shipment.

Harvard University has finally placed a firm purchase order for the Spark Chamber Reader. Work is progressing fine on the necessary schematics and mechanical layout. It looks as if we now have a marker for the SW1250's that could not be matched for more critical use.

Some problems still are present in the production of the 1986 module. New SW1250 SCR's have been matched up and installed on the new modules and still the proper operation is not achieved. It is expected that this problem will be solved in the immediate future.

No word from Chicago University as to their interest or disinterest in a Spark Chamber Reader similar to Harvard's.

I have conversed with Mr. Johnson, Vice President of Photon, Inc., and he informs me that our quotation for a mag to paper and paper to mag tape converter is still under consideration. The quotation is still in the hands of the president and they will let us know by the 15th of February.

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## MECHANICAL ENGINEERING

K. FitzGerald

| | |
|---|---|
| EN 1000 | 70% |
| EN 2367 | 20% |
| EN 1020 | 10% |

### Machine Shop

The present load in the machine shop is mostly for jigs and fixtures to be used in production or assembly. They are also working on a small order of tube support castings for the Display 30's, and re-building all of the lugging machines which were on the production floor and are no longer needed as desperately as they were since the production people have put the new Segal machine into operation.

### Sheet Metal Shop

The sheet metal shop is presently engaged in training two new employees and building PDP-4 Reader-Punch Assemblies, special 1901 mounting panels, and quite a few small jobs for Special Systems. We have also been engaged in the sheet metal shop in repainting all of the component parts for the Foxboro machine a Foxboro gray.

### Assembly Shop

The assembly shop is down to two people now. We have been sending extra help up from the sheet metal shop when it was needed, and we have been training some of the sheet metal people to be able to work in the assembly shop if the need ever arises. Most of the work in the assembly shop for the past two-week period has been mechanical clean-up and touch-up before shipment of the JPL and Adams machines. They have also been working on the Foxboro system trying to get all the parts repainted Foxboro gray, and making the mock-up for PDP-4 front panels for Scott Miller.

### Carpenter Shop

The carpenter shop work load is slowly catching up. They are presently engaged in making a redwood wind screen for the front entrance of building 12 in order to keep ice and snow off the steps. They have just completed new offices for this department, and have orders to build benches for Special Systems and table tops for the stock room.

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K. FitzGerald (cont'd)

If at any time anyone requires carpenter work in or on the building, all work requisitions of this type have to be cleared through Ken Olsen. This can be done either directly by having him sign the work requisition or the job can be presented to me and I will present it to Ken for approval.

Tuesday, January 15, the JPL machine was shipped by air freight to California and Bob Beckman and myself went to the airport with the machine in order to supervise the loading and gain information and experience so that we might properly evaluate this method of transportation. After observing the rough handling this unit received while we were standing right there, we both wondered what kind of treatment it would have received if we were not around. Also in order to ship anything from this factory to a customer by air, the goods must be handled (loaded - unloaded) a minimum of six times. It is quite possible that this figure could go to eight or ten depending upon the number of times the airlines would have to shuffle them around in their warehouse while making up loads for various aircraft. It is my opinion that shipping by air is not the best possible method of shipment.

L. Prentice

| | |
|---|---|
| Gen. Engineering EN 1000 | 40% |
| EN 1136 - Link Tape | 25% |
| EN 1097 - Model Construction Development | 10% |
| EN 1165 - Rear projection display | 25% |

Link Tape Unit

Mechanical design has undergone a complete revision. A major portion of this was done to try to get the package into a smaller unit and a more simplified chassis and chassis mount. A good deal of time has been spent in cleaning up design details. Drafting is approximately 50% complete on the units. Barring any unforseen difficulties, most of these parts should be released to the model shop and sheet metal and machine shop during the coming week. We are approximately one week behind the predicted schedule, but believe we can still produce the units in time for the March IRE show.

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L. Prentice (cont'd)

Projection Display

A Daltan #160 television projector has been purchased from Teleprompter in New York City and should arrive here this coming week. This unit will be used to study the feasibility of this type of display. The primary problem seems to be whether or not we can resolve well enough to indicate fine lines appearing on drawings on the size display contemplated, 22 x 34. Material to make a back projection screen will be ordered shortly. The present model as ordered projects a much larger picture than we would like and an investigation has been made with American Optical Company towards producing a corrector plate to reduce this image size and also the throw distance from the corrector plate to the back projection screen.

Dynasert Machine

Designs have been completed and will be released to the shop for master template mounting plates to use with the pantograph and the dynasert machine. This machine supposedly was shipped yesterday from United Shoe Corporation. The first method employed will be to use our aluminum plates as now made on the template drilling machine on the pantograph to provide alignment with the boards on the dynasert. This might not prove wholly successful, although a conversation with Mr. Joseph Beauregard of United Shoe indicates that this method is feasible. We are to notify him when the machine is set up and these template mounting plates are on hand.

The Mechanical Engineering Department moved from the fourth floor of Building 4 to the third floor of Building 3 last Friday. The entire department was subject to some jokes about the affluence of our new offices. We have learned considerably about putting up the partitions, and we believe we can reduce the price by prefabrication of the top and bottom caps for these partitions plus good detailed layouts to start with, that we can reduce the costs of putting up this type of partition either in offices or larger classrooms to approximately $3.00 per linear foot. This type of office partition is 90-95% reclaimable and reusable. While they are very cheap, they do have some disadvantages in that there is no solid support for fixing such things as heavy loads on the walls and it is even somewhat difficult to install telephone and electrical outlets; but on the whole with our own people to install

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L. Prentice (cont'd)

them, this seems to be the cheapest method of getting very good looking offices and classrooms.

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## QUALITY CONTROL

D. Adams and Roger Gagne

### EN 1098

Our work continues on developing another automatic tester. More circuits have been modified for our specific needs, and a few more new circuits have been built. The majority of the time is now being spent toward integrating these special circuits into a system.

During the past two weeks, a log has been put into use for the existing automatic testers. In the log we include module number, lot size, time start and time stop. From January 7 to January 17 2200 modules have been tested.

| | | |
|---|---|---|
| #1 DC tester | --- | 21.90 hrs. |
| #2 DC tester | --- | 6.25 hrs. |
| Total | | 28.15 hrs. |
| Diode tester | --- | 3.33 hrs. |
| A.C. Tester | --- | 8.75 hrs. |
| Total | | 12.08 hrs. |
| Total testing time | | 40.23 hrs. |

R. Winslow

Semiconductors tested since last report.

| Type | Manufacturer | Units Tested | % Reject |
|---|---|---|---|
| MD114 | Sprague | 3635 | 0.58% |
| 2N1184B | R.C.A. | 27 | 3.7% |
| 2N1204 | Philco | 1510 | 2.7% |
| 2N1754 | " | 27 | 3.7% |
| 4JX1C741 | G.E. | 118 | 3.4% |
| 1N764 | Transitron | 100 | 0.0% |
| 1N964A | Motorola | 25 | 0.0% |
| 1N964A* | " | 42 | 0.0% |
| 1N1220 | Westinghouse | 150 | 0.0% |
| D007 | National Transistor | 2170 | 11.4% |
| D662 | Clevite | 30627 | 4.2% |

*Retest of previously reported 100% reject.

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D. Dubay

Test Equipment Service EN 1144

The following equipment has been calibrated since January 4th.

| Description | Type | No. Calibrated |
|---|---|---|
| Oscilloscope | 543/543A | 18 |
| " | 515A | 1 |
| " | 567 | 1 |
| Sampling Unit | 3S76 | 1 |
| Sampling Unit 3T77 | 3T77 | 1 |
| Digital Unit | 6R1 | 1 |
| Preamp | CA | 18 |
| " | L | 1 |
| " | M | 2 |
| " | E | 1 |
| " | K | 1 |
| L.C. Meter | 130 | 2 |
| V.T.V.M. | 412A | 1 |
| Time Mark Gen. | 180A | 1 |
| " " " | 181 | 1 |
| Meter | 980 | 13 |
| " | 630NA | 18 |

R. Gaboury

During the past two weeks Mechanical Inspection has had the following final and intermediate inspections:

| Intermediate | Final |
|---|---|
| DEC Stock PDP-4 | J.P.L. - PDP-1 |
| DEC Stock PDP-1 | J.P.L. Mag Tape |

A comparison between our shop and vendors on rejection rate for the time 1/2/63 to 1/16/63 gave the following results:

| Digital | Vendors |
|---|---|
| 1453 pcs. rec'd. | 582 pcs. rec'd. |
| 45 rejected | 110 rejected |
| 3.9% | 18.9% |

These figures are based on sheet metal, paint and finishes.

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J. Cudmore

| | |
|---|---|
| EN 1073 | 75% |
| EN 1000 | 25% |

The Contronics Diode Tester is not working yet. The high frequency front end was returned to their factory to have new relays installed. These relays perform the switching from AC testing to DC testing. Their operation was very erratic and would fail continually after warm up. This part of the machine and the manuals and drawings were scheduled to be delivered on the 15th. A flood at their plant washed out this unit and all the drawings. The new delivery date is the 22nd.

I have received the final report from Al Dowden of Liberty Mutual and a memo detailing their recommendations for improving our safety procedures. This report refers to our liability to our customers and our employees.

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## SALES

D. Denniston, NYO

The most important news in the New York area in the last few weeks is Bell Laboratories-Holmdel's keen interest in the PDP-4. There is one group with a requirement for one machine initially with a possibility of up to 10 machines eventually. The machine evaluation at this point is in the hands of American Telephone and Telegraph with the PDP-4 having been selected as the only possible general purpose machine to be used for their application. The alternative would be a special system built by the Bell Laboratories. Needless to say, there are several of us sitting forward in our chairs and awaiting the final decision of A.T.T. There is another group at Bell Labs interested in the PDP-4 but still in somewhat the initial thinking stages. They are presently modules customers and are considering the machine as a device which may be wheeled into a telephone central office and put on line while a conversion is made from old relay type dial equipment to electronic-switching system equipment. I have a feeling that the interest here will continue to grow in the next few months.

There is also growing computer interest at Brookhaven National Laboratories. We are sort of a "natural" there and I will be visiting several people out at Brookhaven next week.

I have recently loaned some modules to F.A.A.'s Evaluation Experimental facility at Atlantic City, New Jersey. They have already found several useful applications for the equipment and I am hoping that this will result in some nice non-renegotiable government business in the near future.

Also, I have loaned some 10 mc lab modules to Western Electric's research center in Princeton, New Jersey. They are in the process of setting up a general purpose physics laboratory. They are already using our current drivers and I feel that we are almost 100% sure of a sale here in time. However, having worked with these people before, they are somewhat slow moving and we will probably be leaving the equipment with them for several months.

As well as the interest in PEPR shown down at the Princeton-Pennsylvania Accelerator, there has also been considerable module interest. There is a small system now operating at Princeton

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D. Denniston, NYO (cont'd)

University in their Elementary Particle Lab performing a spark-chamber scan using our modules and this fact along with the recommendations of our users at Brookhaven makes modules sales here in the "90% certain category," I believe. I will be visiting one of the people at the Accelerator facility this week.

As some people already know, the lease which we had signed last summer for the new office space here in Clifton has been cancelled for reasons of nonperformance on the part of the owner. Since the lease on our present quarters expires next summer, we are in the beginning stages of looking for appropriate space, since this office is already overcrowded and there are presently several items such as a filing cabinet and storage cabinet on order. There are several factors that seem to indicate that we should consider an area other than Clifton, such as (1) the economic advantage of renting space somewhat further from New York City, (2) being somewhat closer to our largest customers, and (3) the alignment of new interstate routes now under construction. My feeling is that the Morristown area, in general, is one of the most desirable sections in all these respects. It might also be worth mentioning that there are several new research facilities in this area with, I believe, fairly extensive development still to come.

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## PURCHASING

H. Crouse

Some 715 2N1146A's Transistors were returned to Clevite Transistor for credit of $2009.15. This device is part of the surplus inventory that is for sale.

I am returning as many devices as possible directly to the manufacturers, since they are willing to allow almost full credit - the surplus dealers are not so kind.

R. King

I am presently receiving bids on a stainless steel food cart that we hope will allow for better service for employees in the production end of Building 5.

We recently purchased a #106 Green Engraver, bench model, for two and three dimensional engraving or light milling. This machine is equipped with an overhanging copy carrier for large panels up to 19" wide by any length and up to 3/8" thick.

We have had also a demonstration of a Haynes perforated tape splicer. This machine accomplishes the splice with a thermostatically controlled heat-sealing iron. This machine is rather expensive and time consuming so we are still looking for a splicing tape that can be applied without the aid of a machine, and is easier and faster to work with.

R. Blackwood

The Kirk Moulding Co. of Clinton shipped to us on January 2 the first 12 of the DEC Mag Tape Reels. Inspection rejected two of these as being out of tolerance but on the whole they were well received. The next reels to come will be slightly darker in color to conform with the Digital color standards.

Also received this week were 1000 Hub Inserts for the DEC Tape Unit from the Master Etching Co. of New Jersey. These inserts were also acceptable, but might not be used because of a possible design change.

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R. Blackwood (cont'd)

I am developing, with the aid of Fred MacLean, part of the IBM tasks to be performed for the Purchasing system.

F. Kalwell

I'm presently working with our vendors to supply all electrolytic computer grade capacitors with a solder lug terminal rather than the screw type which we've been using. Samples of this solder lug will be evaluated by QC once they are received. Quotations should be received in the future on all types of capacitors presently used, with the idea of trying to cut the long lead time we've had on capacitors.

The four types of delay lines we are presently using will now be supplied completely encapsulated with the positive meniscus sanded to a finished dimension. This revision replaces the negative meniscus which was shown at the top of the case, and in many cases showing an unattractive surface.

Two new types of Daystrom potentiometers, "Transitrim," have been ordered for production stock room. These devices will be used on the DEC 1572 Digital Analog Converter. These units are to be delivered by January 24, 1963.

We have discontinued using the standard SPDT Toggle Switch with Teflon wire leads. Many problems were encountered with the wire breaking off at the welded portion and the added expense of having these leads put on. The standard 7505K3 SPDT Toggle Switch is readily available from production stock room.

Presently Component Mfg. Company, who makes our patch cords, is attempting to manufacture a banana pin which will be used on Digital Equipment Corporation's patch cord. Within the next few days, samples will be submitted to Loren Prentice for evaluation, hoping that this will solve our past delivery problems on this patch cord.

On future orders for dipped mica capacitors, these units will be supplied with a special lead treatment, with the excess epoxy removed. This will insure that the capacitor is soldered to the wire leads rather than the epoxy.

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## ENGINEERING

### T. Stockebrand

| | |
|---|---|
| EN 1156 | 70% |
| EN 1161 | 30% |

EN 1156 - Curve drawing display equipment consists of several projects at present. The first is an incremental scope - that is, a Type 30 with counting buffers. In order to get the speed up to 1 MC with the LO speed line and avoid a jam buffer "DC" counting logic has been developed that doesn't use ripple carry. The diode boards are complete, the block schematics are complete, but the detailed layout awaits more help, and the diode drivers are still in the works. The second item is a pulse train generator suitable for generating lines and circles to drive the incremental scope. (The computers need instructions to deal with the scope directly as well as with the generator). The generator is in the block diagram stage.

EN 1161 - Analog modules....5 modules are designed - George Gerelds has a general layout board and amplifiers are coming. Marc Connely at MIT will buy what we are designing.

### R. Melanson

I recently received a letter from a Mr. Alvin Arnell of Brooklyn, New York expressing a desire to incorporate Digital's symbology on a publication in relation to Graphic Symbology for Engineers. This book will be published early in 1963 by McGraw-Hill Publishing Company.

A rough draft copy of the "DRAFTING ROOM MANUAL" has been given to Dick Best for his comments and approval. When Dick Best has finished reviewing the material, copies will be sent to the newly organized electrical standards committee and Loren Prentice for further review. The first phase of the manual explains three standards. They are:

1. Drawing Sizes
2. Drawing Format
3. Revision of Drawings

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R. Melanson (cont'd)

Once approved it will be bound and distributed to all engineers and supervisors for their immediate reference. Additional standards on cross-sectioning, tolerance, welding, coding of drawings, abbreviations for use on drawings, numbering system, etc. will be added to the manual in the future.

In order to minimize tolerance in designing printed circuit boards for use on dynasert machines and locating by registration holes, a special .100 grid on 24 x 36 x 1/4 frosted glass will be purchased with .100 spacing, basic lines .002 wide, every second line .004 wide, every 1" line .006 wide. It will also have two circles with cross-hair lines indicating the registration holes. The tolerance over 36" length is $\pm$.002. The cost for purchasing the master and one copy is approximately $300.00.

At present the draftsman is using a grid on a polyester base material. It has a tolerance of $\pm$.026 over 20" depending upon the relative humidity and thermal expansion. Two drawing boards will have to be modified so we can insert the frosted glass.

R. Doane

| | |
|---|---|
| Transistor $F_t$ tester | 90% |
| Special system current/millivoltage calibrator | 5% |
| Miscellaneous | 5% |

Good agreement of $F_t$ indications on the new tester with data taken on the same transistors by Sprague has been obtained. As soon as a calibrated X10 attenuator accurate at the three operating frequencies is designed and installed to permit accurate readings at low emitter currents, it will be ready for use in evaluating transistors for VHF and in quality control.

Brookhaven has asked for loan of enough VHF equipment to allow them to count pulses at 17 Mc. One logic module to standardize the input pulses and one flip-flop would do, and I have agreed to loan these to them indefinitely, in about a month, with the informal understanding that they will buy the production equivalents when they become available.

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Barbera Stephenson

Most of my time the last two weeks has been spent on development of a new high speed A-D Converter for N.S.A. Their original order for a 32 channel Analog-Digital Linkage (PDP-1 - PACE) calls for using the Raytheon AD 10-A Analog to Digital Converter, a Raytheon Multiplexer and 32 DEC D to A converters. The Raytheon AD 10-A was originally speced as a 10 bit, a 2 μs unit, with an overall accuracy of .097% ± ½ LSB. It appears now, however, that this unit is really a 4 μs device with an accuracy (on the lab model) of about .1% + 5 counts and -1 count plus a random error which they can't tie down.

In view of the situation, we plan to try to develop a 5 μs, 10-bit unit with appropriate accuracy. Two of these units operated in parallel would provide the necessary speed. I have begun work on a prototype and so far no major difficulties have come up (many minor ones, of course). The present schedule calls for completion and evaluation of this unit before the end of this month. At that time we will present the latest data on both our unit and Raytheon's unit to N.S.A.

At the present time we are also checking out the Raytheon Multiplexer which arrived this week.

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## SYSTEMS

### L. Butterworth

Companies having Special Systems production type equipment have requested us to find a more permanent way to letter our panels. Up until now we had used only screened letters and numbers which evidently wore off quite easily. We have purchased a Green panel engraver after considerable thought as to what type of lettering to go to. Photo etching would be fine for large quantity items, of which we have very few. Other processes fall under the same circumstances. We will try the engraving on a limited, research type basis until we can be sure of the efficiency.

### E. de Castro

During the past few weeks most of my time has been spent on final checkout of the 2114 Core Tester for IBM, Owego. The 2114 is essentially a programmable current pulse generator as it has no sense system or decision logic. It is programmed from a plug board and is capable of generating an almost infinite variety of current pulse trains.

IBM will use the machine for development work on their MARS (multi-apperture reluctance switch) device. The MARS device is a two-hole core capable of non-destructive readout in a coincident current array. This core will be used in the memory systems for both the Gemeni and O.A.O. spacecraft.

The people at IBM are extremely anxious to obtain the tester, as final development work is impossible without such a system and their own delivery schedules are tight. I expect to ship the 2114 next week.

### J. Fadiman

The Memory Tester 1520 has been delivered and installed at IBM, Owego and we have already been paid for the job. As Dick Whipple will tell you, this completes a long and difficult job on which, however, we have gained a great deal of very valuable experience.

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J. Fadiman (cont'd)

The Core Tester 2114 for IBM, Owego has been completely checked out. The people from IBM have been here and everything appears satisfactory. A few final items are being taken care of on this system and it will be shipped out next week.

Construction has been completed on the Memory Tester 1521 for Ferroxcube and initial checkout is now under way. We expect that we will have a working machine sometime the end of next week at which point Mr. Harry Schmidt of Ferroxcube will come down to inspect it. We plan to ship this machine about January 18.

All front panels, wiring and components have been received for the Memory Exercisers 2212A and 2212B for Western Electric. Construction is now fully under way and should be completed about the middle of this month. We plan to ship the first of these machines about February 8 and the second one about March 1.

The first Core Tester 2113I for E.M.I. is nearing completion and we expect to meet our required delivery date of January 28. The machine should be ready for checkout by the end of next week. We plan to ship the second machine approximately March 18.

We are now proceeding with the design of the interface equipment for NSA, involving 32 channel multiplexer, analog-to-digital converters and digital-to-analog converters. The Raytheon A-D converter which we intended to buy for this job so far looks unsatisfactory and DEC may end up by constructing this converter themselves. We have already purchased the 32 channel multiplexer from Raytheon and this has just come in within the last few days. Delivery of this large system is still uncertain. The required delivery date is June 30, but we expect to deliver both the interface equipment and the computer by the beginning of May.

We have received the purchase order for the Core Tester 2108 for National Cash Register Company which Dick Tringale will construct. Delivery is scheduled for March 28.

New Business: We will definitely receive a purchase order from Harvard University for a Spark Chamber Reader which will be delivered sometime in the middle of May. We hope also to receive

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J. Fadiman (cont'd)

an order from Photon Company for the magnetic tape to paper tape and vice versa converter. Chances of receiving this order are about 60%. Total cost of this system is in the neighborhood of $36,000, but a large amount of this money is tied up in a Potter Tape Unit, Tally Punch and Tally Reader and Fabritek Memory Stack, all of which are necessary for the job.

We are about to investigate the possibility of constructing a rather complicated code conversion system for RCA in New York City. We are also investigating the possibilities of constructing a Hough Powell System for the College de France and possibilities of building additional PEPR systems for CERN, University of California, etc.

We still expect an order for 1516 from Siemens and a 1516 and 2113 from Hitachi. However, none of these orders are definite as yet.

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## COMPUTERS

E. Harwood

As of January 2, all computer checkout will be handled by one group; namely, the group that is presently handling the PDP-1 checkout, augmented by some of the PDP-4 people. We have received three people and two computers from the PDP-4 group and these people will be integrated into one checkout group. We plan to have all the people become experienced on the various types of computers we produce; namely, the PDP-1's, PDP-4's and ADX systems. We hope that this will round out our checkout people so that they will be more valuable to themselves and to the Company. In line with this change, we also plan to rotate the people to various departments; such as, Customer Relations and Field Office installations when needed. In order for these people to perform adequately, they must be well rounded in both PDP-1, PDP-4 maintenance and also programming of these two machines.

The Adams machine which was supposed to go out on Thursday, January 3rd, was held up at the last minute because the building it was to have been housed in was not ready in time. We expect another call from Adams around the 7th or 8th of this month to confirm a new installation date for this machine.

At the present time there are three computers available for people to use. Two of these computers are in the checkout area and one is in the auditorium. This is not counting the Customer Relations machine. We want to get people to use these machines as much as possible. All I ask of the potential computer users is that they call us and let us know when they want the machines and fill in the log book properly after using the machine. Unfortunately, for some of the potential users, these machines are only the basic machine with no optional equipment. A display may be plugged into any machine as the display plug has been checked out.

The JPL machine has come back from its temporary home at Raytheon and is being prepared to be shipped to JPL sometime around the 15th of this month. The things remaining to be done on this machine are the installation and checkout of the Data Channel and the final checkout of the Mag Tape System, which includes a Mag Tape 52 and three Tape Transports.

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R. Reed

| | |
|---|---|
| Teletype Modules | 65% |
| Checkout Supervision | 35% |

Gordon Bell's teletype modules have been patched into a DEC 1906 mounting panel. The incoming line unit has been completely de-bugged and turned over to Dick Best for module packaging. The outgoing line unit is near completion and will be sent to engineering shortly.

G. Bell

We are going to offer an Automatic Counting Module for the PDP-4. The counter module would allow 16 pulse sources to increment 16 unique core locations. The combined pulse frequency input could be up to 125 KC. The price of the unit would probably be about $7,000. The device would be very useful for physics applications (counting events), and process control (counting turbine meters, etc.).

A. Hall

PDP-4 evolution has slowed down to a rate whereby the Checkout department can handle the computers more efficiently. Therefore, Ed Harwood has assumed responsibility for the checkout of PDP-4's.

John Simeone and Ed Duggan, who have been working on the PDP-4-7, will continue to do so under Ed. Dick Mangsen, who has been working on PDP-4-8, will also become part of the Checkout group.

A detailed checkout procedure, which has been written in outline and partially completed, will be turned over to Checkout by Engineering when it is completed. The checkout equipment list and installation kit list will also be turned over to Checkout.

Foxboro has ordered 5 PDP-4 computers from DEC, one for delivery in late January or early February and the rest for delivery at the end of this year, or earlier, by request. Each computer will have a reader, punch, teleprinter and drum as basic equipment with additional equipment as required when Foxboro receives an order.

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A. Hall (cont'd)

The Foxboro basic computer will also have lockable doors, a key switch to disable the operator console switching, over-temperature sensing switches and coaxial interface connectors. These computers will be painted in Foxboro colors.

Foxboro has tentatively agreed to use the new computer configuration which will have the reader and punch mounted in the front bay of the PDP-4. This will add an additional bay to the computer leaving more room for options.

Foxboro's first computer will be for their own use and for customer display at their Natick plant. It will have a tape unit and control and a 32,768 word drum which is now under development by Ted Johnson and Larry Conley.

We are going ahead with the Foxboro computer despite lengthy and very involved negotiations over terms of purchase and technical specifications. The last of these decisions should be made and the contract made within a week.

The tours which Foxboro customers have taken through DEC have revealed a difference between past customers and process control customers.

The people coming through the plant are frequently those fairly high in their companies and who hold the purse strings. More frequently than not the technical side of the visit is somewhat lost on them. Their questions are mostly:

Who is DEC? I've never heard of them before.

How large are they?

Is their business and financing stable enough so that they will exist a year from now?

What do computers <u>really</u> do?

The last question is one we should devote more time to answering. If the people who hold the purse strings don't understand what a computer does or how it works, we should tell them in terms they can understand and with demonstrations which are broad enough in

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A. Hall (cont'd)

concept to allow a prospective customer to interpolate from our problem solutions to his problems. A recent visitor from U. S. Steel (through Foxboro) showed no particular enthusiasm during his tour until he saw our CRT Display with Space War being played. After a short discussion and some questions, he was able to think of an application of computer and display to a problem in his own plant. The usefulness of a more general program for demonstration to this type of customer is obvious.

Another question raised by customers is reliability. Some other computer manufacturers are advertising some number of hours MTBF. We have no comparable figures right now; however, the CONTEST program, which tests all instructions, memory and the basic IO gear, is run at all times in PDP-4's which are not otherwise being used. Running time is logged so that we will be able to make some statistical predictions of PDP-4 reliability. While CONTEST is extremely useful in this respect and for early computer checkout, we will need a program which works the computer harder and tests it more thoroughly.

JPL has ordered 3 PDP-4 computers which include the Arithmetic Unit and the Type 57 Tape Control. Both of these are under development, the former by Gordon Bell and Bill Colburn and the latter by Roland Boisvert, Steve Lambert and Paul Scriven.

The Corning PDP-4 was installed without mishap by Bill Kelliher at Wellsboro, Pa. on the weekend of December 10th.

The Foxboro-Nabisco computer is being shipped on January 4th to Norwood where Foxboro will have the panels wired for their process control gear. On about February 22nd the whole works will be sent to Chicago for installation.

A. Blumenthal

EN 1016 Memory development 100%

A first run-through on cost estimates for the new memory system indicates that adding 4K fields to the basic 4K system in PDP-1

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A. Blumenthal (cont'd)

and 4 will cost about a third of the present cost of a Type 12 module. The stacks themselves make up the bulk of this figure. The cost of the memory extension control goes down in about the same proportion. By driving this memory with unsaturated self-regulating circuits, it may be possible to eliminate the memory power supply completely, running it from the existing indicator light and solenoid supply.

Looking into the possibility of using cores that require no temperature compensation has indicated that it may not be economically feasible because of the added cost of the cores themselves and the higher driving currents required.

Chet Johnson has elected to stay in the engineering department permanently and has already performed a valuable service in the construction and debugging of the memory tester.

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## MECHANICAL ENGINEERING

K. FitzGerald

EN 1000 100%

Since the past two-week period of this bi-weekly has only added up to seven working days, my report will be rather short. During this period we have crated and shipped one unit from special systems, a PDP-1, and a PDP-4.

The carpenter shop is getting ready to build more office space in Building 3 for special systems and the mechanical engineering group. The machine shop is presently working on jigs for the 1901 and special testing machines to be used in my evaluation of surface treatments of our steel doors and panels.

The machine shop is also working on more parts for the Digital "Linc" unit.

The sheetmetal shop lost two people to the Service recently. However, we were very fortunate in having Jim O'Loughlin return after spending his six months in the Service. We should be able to fill the gap caused by the terminations without too much difficulty.

On Wednesday, January 2nd, I made a trip to Worcester to look at some used machinery, particularly a 10-gauge six-foot Pexto squaring shear which we are going to have to have eventually. The unit we looked at was in fair condition but due to its age and type we will not be able to use it. While there we took pictures of other used equipment which was available, and pending quotations from the dealer we will try to determine whether we should make an offer on this equipment.

The cabinet shop is losing another employee to the Service Friday, January 4th. However, he will not be replaced immediately since the load is down in that area and it looks as if it may stay down for a while.

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## PRODUCTION

P. Greene

Recently a bid was made to Photon of Wilmington to build a magnetic to paper and paper to magnetic tape converter. Within this next year it looks as if three of these converters will be needed. The approximate cost will be 36K.

The proposal was made in person to Mr. Johnson, who is heading up the project. It looks as if they have made a proposal to J.P.L. in California and whether or not we do the job depends on what J.P.L. does with regard to Photon. The other customers are the U. S. Weather Bureau and a firm in England. Again this converter will be sub-systems of Photon systems.

One of the Western Electric Test Sets has been checked out and the others are in the process. It looks as if they will be shipped in a week. The delivery date is January 19.

A purchase order is on its way from Harvard for the Spark Chamber Reader. Drafting has been started and the machine delivery date is the end of April. The date should be met with no trouble unless there is difficulty in obtaining 1986 read-write switches.

A test set is under development for the testing of SW1250 SCR units that are used in the 1986 module. Due to the stringent requirements on the 1520 and 1521 Memory Tester systems, the units must be matched very closely.

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## QUALITY CONTROL

J. Cudmore

| | |
|---|---|
| EN 1073 | 75% |
| EN 1098 | 25% |

During the past week the modules in the life test rack in Building 12 have been examined. This rack contained: 1 - 721 PS, 1 - 1402, 2 - 1103, 1 - 1201, 4 - 1607, 17 - 1211, 19 - 1210, 2 - 1901 MP, 1 - 710 PS, 1 - 3401, 1 - 3201, 4 - 3101, 2 - 103, and 1 - 901 MP. The 500 kc lab. modules and the 721 PS were started on 1/21/60 by J.E.E. After three years at 70 kc all the lab. modules were found to be operating in a satisfactory manner. They were retested and no unusual conditions were found. The 721 PS's -15V filter capacitors were both broken. The top caps were broken open and there was no trace of electrolyte in either the capacitors or the power supply. The increased ripple evidently had no deleterious affects on the modules. All the patchcords were re-examined and several broke very easily with a slight pull. The 710 PS was evidently an engineering model and was driving no load. It was not evident when this unit was added to the life test rack.

The obsolete system modules 1210, 1211 went on life test 6/1/60 and have not been retested yet. Initial examination revealed an open clamp diode on one of the 1210 units.

The four month summary of the returned modules indicates that 15% of them are memory modules (1972, 1973, 1976, 1978, 1538, 1540) and better than 34% of them are from unknown sources.

R. Grey

The two muffin and one PA motor fans that are being life tested under heat have reached three thousand (3000) hours without failure.

The 901 mounting panels have been reworked and with new data sheets have been returned to finished goods.

The inspection of machines and the updating of models has taken most of my time.

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R. Gaboury

During the past two weeks, Mechanical Inspection has had the following final and intermediate inspections on machines:

| Intermediate | Final |
|---|---|
| Adams PDP-1 | Adams PDP-1 |
| DEC Mag. Tape 50 | IBM Core Tester 2113 |
| DEC Mag. Tape 50 | DEC Display CRT 30A |
| DEC PDP-4 | |

A comparison between our shop and vendors' rejection rate for the time 12/20/62 to 1/2/63 gave the following results:

| Digital | Vendors |
|---|---|
| 6.5% | 5.2% |

D. Adams and R. Gagne

| | |
|---|---|
| EN 1098 | 100% |

The last two weeks have been spent mostly developing and modifying different types of modules to do special jobs in the new automatic module tester. For example, we have modified a Reference Supply into a programmable 5 reference power supply; we have modified a couple of Pulse amplifiers to have variable amplitude pulse output; we are making special relay boards, etc. All these will be used to do various jobs in a new type tester.

D. Dubay

Test Equipment Service

The following equipment has been calibrated since December 21st.

| Description | Type | No. Calibrated |
|---|---|---|
| Oscilloscope | 567 | 1 |
| " | 555 | 1 |
| " | 581 | 2 |
| " | 321 | 1 |

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D. Dubay (cont'd)

| Description | Type | No. Calibrated |
|---|---|---|
| Oscilloscope | 543/543A | 11 |
| Preamp. | CA | 11 |
| " | 81 | 2 |
| " | 82 | 2 |
| " | 80 | 2 |
| " | M | 1 |
| " | K | 1 |
| " | Z | 2 |
| Meter | 630MA-RM | 21 |
| " | 630MA | 7 |
| " | 980 | 5 |
| LC Meter | 130 | 2 |
| Sig. Gen. | 107 | 1 |
| " " | 105 | 1 |

R. Winslow

Semiconductors tested since last report.

| Type | Manufacturer | Units Tested | % Reject |
|---|---|---|---|
| SP390 | Texas Inst. | 85 | 3.5% |
| T1796 | Philco | 40 | 0.0% |
| 2N1305 | Texas Inst. | 10,000 | 1.7% |
| 2N1719 | " " | 150 | 0.0% |
| 1N764 | Transitron | 20 | 50.0% |
| 1N964A | Motorola | 18 | 0.0% |
| 1N964 | " | 42 | 100.0% |
| 1N1217 | G.E. | 600 | 0.67% |
| 1N1315 | Hoffman | 94 | 0.0% |
| 1N2175 | Texas Inst. | 10 | 0.0% |

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## SALES

H. Painter

The 1963 Exhibits Schedule is fairly well along in the planning stage (see below). Thus far, there are 18 shows which are definite and approximately 10 maybe's.

Coming up in the near future are:

| | |
|---|---|
| Jan. 28-31 | Electrical Engineering Exposition (IEEE) - NYC |
| Feb. 8-12 | International Electronic Components Exhibition Paris, France |
| Mar. 6 | ARD Annual Meeting Boston |
| Mar. 25-28 | IRE Show New York City |

## PROPOSED 1963 TRADE SHOW SCHEDULE

| | | |
|---|---|---|
| Jan. 28-31 | Electrical Engineering Exposition | New York, N.Y. |
| Feb. 8-12 | 6th International Electronic Components Exhibition | Paris, France |
| Mar. 6 | ARD Annual Meeting | Boston, Mass. |
| Mar. 25-28 | Institute of Electrical and Electronics Engineers International Convention | New York, N.Y. |
| Apr. 2-4 | Progress in Electrical and Electronic Equipment Exhibit | St. Louis, Mo. |
| Apr. 16-21 | Fed. of Amer. Societies for Experimental Biology & Medicine | Atlantic City, N.J. |

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H. Painter (cont'd)

| | | |
|---|---|---|
| Apr. 17-18 | Amer. Inst. of Elec. Engineers-IRE Conf. on Non-Linear Magnetics & Magnetic Amplifiers | Washington, D.C. |
| Apr. 17-19 | IRE - Southwest Conference & Electronics Show | Dallas, Texas |
| May 20-23 | Design Engineering Show | New York, N.Y. |
| May 21-23 | Spring Joint Computer Conference | Detroit, Mich. |
| June 4-6 | AFCEA | Washington, D.C. |
| Aug. 20-23 | Western Electronic Show and Convention | San Francisco, Calif. |
| Aug. 28-31 | Association of Computing Machinery | Denver, Colo. |
| Sept. 9-12 | Instr. Soc. of Amer. Annual Instrument Automation Conf. & Exhibit | Chicago, Ill. |
| Sept. 30-Oct. 2 | IRE - Canadian Electronics Conference & Exposition | Toronto, Ontario |
| Oct. 28-30 | National Electronics Conference | Chicago, Ill. |
| Nov. 4-6 | Northeast Electronics Research & Engineering Meeting | Boston, Mass. |
| Nov. 18-20 | 15th Annual Conference on Engineering and Medicine | Chicago, Ill. |
| Nov. 11-15 | Amer. Inst. Electrical Engrs. Conf. on Magnetism & Magnetic Materials | Atlantic City, N.J. |
| Nov. 12-14 | Fall Joint Computer Conference | Las Vegas, Nev. |

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R. Wilson

PDP-1 and PDP-4 Familiarization and Maintenance Courses

In the coming six months it is planned to alternate the months for PDP-1 and PDP-4 courses. We anticipate an increase in the number of PDP-4 students and this will allow more flexibility in scheduling.

American Cable and Radio Corporation wants twelve men trained on the PDP-1 in rather a short period of time. We have scheduled April 8, April 22, June 3, and June 17 to accomplish this.

The proposed schedules are:

| PDP-1 | PDP-4 |
|---|---|
| January 14, 1963 | January 7-11, 1963 |
| April 8-19, 1963 | March 11-15, 1963 |
| April 22-May 3, 1963 | May 6-10, 1963 |
| June 3-14, 1963 | |
| June 17-28, 1963 | |

At the present time the PDP-4 is scheduled for one week; however, in case Foxboro desires a two-week course we can expand this.

G. Rice

For the time being I am going to be concentrating my sales efforts in two fields - one being process control and the other nuclear research. If anyone has any information such as sales leads, previous contacts, new equipment, or applications in these fields, I would appreciate it if they could write me a short note.

Some comments which have come from customers recently are as follows: These comments are to satisfy those persons requesting more feedback from the sales department. I feel we should have more of this in both directions.

1. "The Type 56 is ridiculously expensive for someone who wants to write tape with a 556 density or at a 41.6 Kc rate. What I would like is something between

G. Rice (cont'd)

the Type 52 and the 56 and available on the PDP-4."

2. "The PDP-4 has the best interface in the industry to tie external equipment to."

3. "I would be interested in a print-out device between the typewriter and the high speed Anelex with respect to both price and speed."

4. "I only want all silicon circuits."

5. "I never heard of your company. After checking around, whenever I ask someone about DEC they always give a favorable reply."

Recently I have heard people mention the possibility of making the PDP-4 a three bay machine. This offers a possibility that at least one good potential customer would like. The customer, in the process control field, would like to have the console on the side instead of being at the end. They would also like to have all controls; console switches, possibly vendor and punch, and typewriter in a position where they can be locked. This will prevent unauthorized persons from tampering with the controls during the running of important processes. The need for the console on the side is important in the control field because frequently the computer is just the center two or three bays in a long row of standard equipment cabinets. The reasons to prevent unauthorized persons from tampering with the machine are obvious.

S. Mikulski

Programming Course

A programming course is being conducted at DEC for PDP-1 users. The one-week course consists of an introduction to the central processor, a description of the options, a day on the use of MACRO as an assembler, standard debugging routines, and a lot of programming.

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S. Mikulski (cont'd)

The course describes, in detail, all of the instructions available in the standard machine and utilizes the program writing and machine time to actually teach.

After 4 days of coffee and sweat, the final exam (a typical scientific problem) gives the student a chance to express his opinion.

The next class will be conducted beginning the week of January 28th. Anyone interested in attending should have some background in basic computer programming, and should get in touch with me at Customer Relations.

By the way, the course is designed to familiarize a user with the PDP-1 and its capabilities, not to teach the fine points of programming.

The first programming course was held in the middle of December 1962 and was attended by 10 people from Raytheon who will be using a PDP-1 soon for controlling scientific tests and evaluating their results. In this first course, also, were our own Jim Burley (Washington office) and Gerry Moore (Sales).

During the Christmas holidays a two-day "Workshop" was held for high school teachers in neighboring towns. The class gave the teachers a chance to see and use digital computers. In a matter of four hours they were writing simple programs with the on-line computer typewriter utilizing a special program written for people with their backgrounds. All indications are that they enjoyed the course and will try to stimulate interest in their students in the value of digital computers. It is interesting to note that modern mathematics which deal in the use of number systems with different bases and Boolean algebra is being taught at the high school level. We can only wish good luck to the next generation of computer engineers and hope that their renovations in the field will not make present engineers obsolete.

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## TECHNICAL PUBLICATIONS

J. Atwood

To increase our effectiveness as a service operation, we are working informally with five "project review panels" in evaluating present and potential activities in our several areas of operation. These areas include sales promotion and technical information services on modules, computers and systems; internal and external public relations; and graphic arts services - such as photography, printing and silk screening.

The membership of the panels is as follows: Modules - S. Olsen, R. Best, B. Stephenson, D. White; Computers - N. Mazzarese, G. Bell, R. Savell, R. Beckman; Systems - J. Padiman, R. Whipple, P. Greene; Public Relations - W. Hindle, R. Mills, M. Sandler, R. Lassen; and Graphic Arts - L. Prentice, A. Hall, H. Crouse, K. Wakeen.

The panels are being asked to (1) suggest projects to be undertaken in their specific areas, (2) review suggestions from other sources, (3) recommend to the Works Committee those projects judged worthwhile and feasible, and (4) oversee the completion of those projects approved by the Works Committee.

The initial meetings, called to consider projects for the first quarter, have been most helpful in determining what we should be concentrating on now and what the future requirements may be.

Literature in various stages of preparation at the present time includes:

PDP-4 Manual
Classroom Module Bulletin
Tape Control 57 Bulletin
Arithmetic Element 18 Bulletin
PDP-1 Instruction Card
1000-4000 Series Diagram Card
Line Printer 62 Manual
Display 31 Manual
PDP-1 In-Out Manual
PDP-1 Installation Manual
Parallel Multipliers Note
Training Module Bulletin
Tape Control 54 Bulletin
Drum System 24 Bulletin
New Module Price List
Lab Module Handbook
Display 30C Manual
Memory Tester 1521 Manual
Memory Exerciser 2207 Manual
Serial Multipliers Note
Counters Note