BOX 15
folder 23

1960

2 of 8

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95-010/011/02

COMPANY CONFIDENTIAL

BIWEEKLY REPORT

COPY NUMBER 2

DATE December 28, 1960

L. Prentice

A considerable portion of the period since the last report has been spent investigating methods for better sheet metal production, and the design of new dies. A series of these has been put out for bids to various companies in the area. Bids have also been let out on quantities and deliveries of 901 end plates and top and bottom brackets for the building block plug-in units. A meter punch for punching meter hole and three mounting holes has been designed and is approximately ready for release in the drafting room. The same is true of a three hole punch for the 32 pin Blue Ribbon Connector used on test equipment.

January 3, 1960, Kenneth Fitzgerald formerly of the 128 Industrial Supply Company, will join our organization. He will be working in all the fields that I have formerly been operating in. Some of his first projects will be the revision and addition to our stock room on the third floor, more careful control of our tools, a numbering and indexing system for our dies and fixtures. He is also expected to exercise somewhat closer control over our machine operations and better control of costs in this area. He was formerly an instructor of Industrial Arts in Natick High School and is working toward his Masters Degree.

D. Denniston

Scheduled to be shipped sometime this week to the Navy Electronics Lab in San Diego is the Digital Processor 2305. This unit is composed of six panels of our 4000 series, a model 710 power supply, and a special Regatran power supply to furnish -15V. This special supply was necessary to comply with the Navy's wide tolerance of input power frequencies.

The unique mechanical feature of the processor is that the six mounting panels will be positioned with the wiring up. Since Building Blocks hang down in this position, special retaining bars have been constructed to eliminate the possibility of any Building Block falling out due to vibrations.

Of possible interest is the feature of versatility combined in the machine. All essential terminals of counter and register buffer amplifiers are brought out to Micro-Ribbon connectors for ease in selection of the inputs and outputs. In all, there are 85 input, output, and selecting connections that are available.

E. Harwood

PDP-1B

As most everyone knows, we have delivered our first computer to BBN in Cambridge. We had a bit of trouble getting it to operate at first, but we have managed through some minor corrections

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E. Harwood (cont'd)

and logic changes to eliminate most of these troubles. We still have some noise problems and the Tally Punches are still not operating as well as they should. There are two major problems still to be taken care of and that is to speed up the memory and also the display.

PDP-1

The Prototype computer was displayed at the EJCC. Although it operated very well at the show, we had some anxious moments up until the evening before the show.

The computer is now back here and we intend to run it every day to find out a little more about the reliability of the machine.

Anyone visiting the computer room will notice it has been cleaned up, and we hope to keep it that way to show off to our many visitors.

B. Stephenson

The Digital Processor 2305 for NEL is almost ready to be shipped. Check out has been completed and the only remaining problems are the power supply and the operations manual.

Inquiries have been coming at a fantastically rapid rate and almost every one of them has an application for one of our new units. Rough drafts of the literature for these units have been completed and in the meantime we have been sending out personally typed or mimeograph resumes of the characteristics along with logical diagrams.

A lot of inquiries have been coming in from nonengineering-type people; in particular, there has been a lot of interest in pulse height analyzers. Despite the large number of these which are commercially available, there seem to be a lot of people who want to build their own. There also seem to be a lot of other systems in which our A to D Converter will be helpful, such as an 18 Channel Converter and Comparator for Cambridge Research Center or a Star Tracking System for Smithsonian Observatory of Harvard University.

Other application requests include a Tape to Tape System for Diamond Ordinance Fuze Labs, an Automatic Resistance Measurement Control Circuit for Western Electric, and a Random Generator for the Canadian National Research Council. Also Polaroid Corporation expressed interest in the possibility of building a Machine Timing Control System with our building blocks.

Martin Company in Denver, Colorado is doing a comparison of various building blocks and asked

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G. Bell (Cont.)

A set of arithmetic subroutines have been written for the PDP-1 in floating arithmetic, and include sine, cos, $\tan^{-1}$ square root, ln, and e^x. Other subroutines exist to display numbers on the scope and to print all sorts of things. More routines are needed to have a basic program package.

We are getting together several sets of application notes for the computer, mentioning how it can be used in different areas of research. We would be extremely grateful for application note ideas. Similarly, we would like help with programming, and if the need were shown it might be possible to do something instructional for people who do not already program.

In short, there is no question in our minds but what we really have the VW of the computer world.

Library

New books which are now available for use are the following:

12 copies of the "Complete Secretary's Handbook".

Catalogs on Senior & Junior Colleges in Massachusetts

H. Van Cleef

The period was spent in becoming indoctrinated in standard practices of DEC; and the study of memory and core testers. A book for the Model 1514 Memory Tester was begun, and rough drafts of operating procedures and operating principles were written. A final draft, of a general description for approval by P.E.'s, was submitted. A final draft of the setup procedure is nearing completion and will be submitted to P.E.'s at the beginning of the next period. General philosophies applicable to instruction books for this sort of equipment were formulated; these philosophies cover all memory and core testers.

The next period will be spent in completing final versions for P.E. approval of the setup and the operating procedures for the Model 1514, and in writing a final draft version of the operating principles. Note that this material applies to the Models 1512 and 1515 as well, and books for these systems will be created principally from the material generated in the last period.

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A. Campbell (cont.)

design. We have been able to operate the 5 KC crystal in a modified circuit, but the output swing is too small to drive the rest of the circuit. Engineering change notices are being completed on all four clocks, with changes in resistor values to limit pulse width and amplitude to the desired regions.

I am returning to school next week and would like to take this opportunity to thank everyone I worked with this summer. Each person I encountered had extreme patience and showed genuine interest in me and my work. I feel I have gained valuable knowledge and experience at D.E.C. Once again, thank you all.

G. Bell

I have been working with Ben Gurley on several aspects of the PDP-1's development, including sales promotion material, programming and the magnetic tape system. The most important item in computer sales, I feel, is being able to interest the right people in the computer initially; then, on their enthusiasm follow-up in selling. We have quite a sophisticated machine, and unless the people we contact are capable of understanding the difference between it and other computers in its price class, we might as well not even try to make the sale. The computer's weakness (other than it doesn't have IBM cards, whatever they are) is our current program repertoire. Shortly, we will have quite a nice compiler-assembler. We presently have a good assembly program. The lack of programs makes it doubly important to be able to sell to someone who can see that since we don't have an ordinary machine, a lot of their programming jobs will not be ordinary. In this light, we would like to compile a list of people who we think might like a machine, and begin by sending them personal letters. This list would probably not be more than 200 names, and would be generated by individual engineers within the company. Thus, the letters would bear their signatures. In arriving at names for this list, the principle qualification (the person should be president of his company and able to afford the machine) is that he be capable of understanding the machine (or have people under him who are) and have some imagination, and in general a person known for quality engineering or scientific research. That is, an author of a particularly well written article (who doesn't work for Remington Rand, and there aren't too many of those) would be a good prospect.

A list of orders is being issued which affect the magnetic tape unit and describe how to program the tape system. In writing the description of how the machine works first, the design of the logic of the system should be more straight forward; thus, only a question of meeting specifications.

E. Harwood

PDP-1 at BBN in Cambridge

The people at BBN complained about the Memory Buffer Register getting cleared on single step. Gordon Bell, Bill Butler and I went down and checked the machine out. We found it to be a bad switch in the memory. It turned out that this switch would not read out of registers beginning with 7500. We also checked out the analog to digital converter and took series of pictures with the actual tape feeding the signals in. The reader has been giving trouble occasionally. Every time we go down, we have to re-adjust all the output voltages from the reader amplifiers. On Tuesday a group from Raytheon came down to look at our machine and see if it could be used in some of their problems. They were very impressed with the machine, but they weren't exactly sure how they could work it into their equipment. Ed Fredkin explained all the various applications the machine could be used for and he convinced them that it would really be the answer to most of their problems. They were particularly interested in the way the light pen is used and are going to make a trip to MIT to see the light pen in action.

On October 22, we will take the PDP-1 away from BBN. At that time it will be demonstrated to a group of business men at the Lexington Inn. The demonstration will be run by Charles Adams Associates. The computer will be at the Lexington Inn for one week. After this week, we hope to take the computer back here and install a new console and display and have it ready by the time the NEREM Show comes up, which will be around the middle of November. At the present time, we are making the new console and all the logic panels which go into it.

PDP-1B

It has been almost three weeks now that the checkout has started on PDP-1B. Most of the checkout has been done by Gordon Bell, Bill Butler and myself. We have found very few logical errors compared to the last time, but we have been slowed down considerably by wiring errors and also by a large number of bad packages. We have had approximately 20 bad packages so far, but now have most of the main frame checked out. Some of the in-out equipment is almost operating. We had hoped to ship the computer to BBN around the 1st of November and if the checkout goes along as we hope, it should be ready approximately by that date. If it is not ready by that date, we will send the PDP-1 back to BBN and finish their machine back here.

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B. Stephenson (cont'd)

us for particular advantages of DEC equipment. We sent a list of 26 good reasons for buying DEC and now plan to send the same list to the Reps.

J. Atwood

Changing over the mailing list from Addressograph to IBM is one of those jobs that are a lot more fun to talk about than to do. Each name and address has to be checked for changes, as shown on the mailing list clean-up reply card, and the IBM card has to be coded for (1) state, (2) city, (3) company name, (4) prospect name, (5) sales region, (6) job function, (7) date of original contact with DEC, (8) Building Block interest, (9) Digital Systems interest, (10) source of original inquiry, (11) S.I.C. industry code, (12) prospect or customer, (13) possession of such up-datable literature as Customer Binders or Logic Handbooks, and (14) total contacts with DEC.

Coding systems have been developed or borrowed for all these different categories, and procedures have been worked out to the point where the operation is reasonably straightforward. The girls can process the cards at a reasonable rate of speed, the information is being forwarded to Keypunch in a form that makes it relatively easy to transfer to punched cards, and the cards are being filed in a way that will make them immediately usable for bulk or area mailings. So it's only a question of time before we will be in a position to do highly selective mailings and prepare pinpoint prospecting lists covering various types of people with various types of interests in various types of businesses in various parts of the country.

Key items of literature now available are the new MT 1514 folder, the second edition of the Logic Handbook, and the PDP Program-Application Package prepared for the EJCC. The new 1000, 3000 and 4000 Series catalogs have been returned to the printer for final revisions and printing. Give us a couple of weeks on these. Next priority item is the folder on the Logic Kit, which will be mailed to prospects replying to the current space ad.

New procedures for the processing of test data sheets have been agreed upon, and we hope this problem is solved for a while. Weekly forecasts of data sheet requirements, better methods for preparing the original masters, a faster means of making offset plates, and the printing of larger quantities at a time should go a long way toward eliminating the delays that have sometimes cropped up.

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B. Hughes

Current Driver

A prototype of the Model 62 (Positive) has been tested and it was found to generate currents. Rise time is forty nanoseconds and it overshoots. An effort is being made to clean up the waveform with a new layout; decoupling is a tricky problem on this unit. Indeed, reducing wire lengths a few inches can change rise time from 40 to 20 nanoseconds.

R. Doane

A new 10 mc tester is nearly complete. It will allow 10 mc flip-flops, pulse amplifiers, and inverters to be tested on a single short-lead tester. Only one 'scope probe is used, making the fastest rise-time plug-in conveniently usable for increasing the visibility of detail in the waveforms. Leads in the flip-flop tester section are one to two inches long, significantly improving the appearance and ease of measurement of 'scope displays.

The 6603 PA has been redesigned and will be produced soon. Better pulse width standardization and increased output under load have been achieved.

The instruction book for the 2104 Programmable Pulse Generator is in the rough draft stage.

D. White

Recent inquiries regarding our capacitor-diode series of flip-flops and inverters have revealed several basic facts. The first and foremost is that many users do not understand that the 4213, 4214 and 4215 are unbuffered flip-flops and therefore have no internal delay. The adage that "you can't get something for nothing" applies here. Unbuffered flip-flops are inexpensive but must be more carefully used. The second fact is that there is a definite need for a flip-flop shift-register which contains parallel read-in gates. A new package, the 4216, has therefore been designed. Basically, it consists of a 4213 with additional gating.

Trouble with 4213 clear sensitivity arose two weeks ago. The problem has been solved by changing the clear circuit so that it is no longer a DC input. This change is being incorporated into the 4216. Barring unforseen difficulties, this package should be given to production by the time this report is printed.

A request for a binary up-down counter has led to preliminary experiments on a new capacitor-diode gate package. This gate might be useful in sampling the outputs of unbuffered flip-flops as well.

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D. White (cont'd)

The 4213 tester has been redesigned to provide an additional check on some of the internal gates, and at the same time was simplified. The 4215 tester will be redone next.

Several problems are awaiting answers on memory tester circuits. Demand is increasing for a faster sense system. First in line is an improvement on the speed of our 1555 and 1556 slicers. Preliminary work has been done, but more tests must be made before the circuit is finalized.

J. Smith

The 1514 B was put on a crash program in order to have it delivered to Lockheed by January 7. Packages 1974 and 1975 are the only units remaining to be delivered. These units will be available Friday, December 30. Wiring also should be completed at this time.

Wiring for the 2305 Digital Processor was completed December 16. This wiring, with all required units, was delivered to engineering December 18. Check out is just about completed and the system should be shipped tomorrow at the latest.

Work has been started on the 2306 Buffer for the U.S. Navy. The 4202 board was released last Thursday, and the units are currently undergoing construction. The control panel has been fabricated and will be screened Friday and available for wiring Tuesday. The wiring of the two 1901 mounting panels will be completed Monday.

With the arrival of the long awaited gold plated taper pins, construction of our new line of 912 taper pin patch cords began. The first set of patch cords were completed yesterday and shipped to the University of Denver. Construction of these cords is commencing rapidly and quantity issue from stock should be available by the first of next week.

During the past year a great many operational changes have occurred within the production department. We have seen a change over from physical powered to air powered machinery, resulting in reduced fatigue and increased output. We have also seen more and more systems wiring by production girls. This coming year we expect to increase this bench wiring even more. Persons who are called on to conduct plant tours should seek assistance periodically from the production department to keep abreast of new or improved operation techniques.

M. Sandler

Production

Our increase in units produced during 1960 has been indeed gratifying. During 1959 we averaged

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M. Sandler (cont'd)

1080 units produced monthly. In 1960 we averaged 2065 units monthly; the first six months average was 1380 units, and the second six months average will be 3000 units monthly, with the past three months indicating an average of better than 3400 units monthly. The number of people working in Assembly and Test was 29 as of one year ago and is presently 48.

Panel wiring for Systems and Computers was taken over by Production Assembly during the past year, as was material procurement for Systems and Computers.

Cost Accounting

Slow but certain progress is being made with our IBM equipment and the expansion of our control accounting system to measure profitability of products and cost groups. Labor distribution cards have been prepared for the month of December, and we look forward to using them for closing this month's labor accounts.

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BIWEEKLY REPORT

COPY NUMBER 2

DATE November 11, 1960

T. Johnson

West Coast Operations

After a summer of low activity, business should begin to pick up and hopefully the new representative organizations will be effective in getting our share. We have managed to make major in-roads into several key users: 1. JPL is placing its first large order, and 2. NEL has accepted our bid for a small system. These are two large 3C users and top potentials. Lockheed has finally got down to earth on buying a plane tester and might be a large market if their plans crystallize.

IFM is now touring California and Arizona in their new bus. I think it will be effective in reaching outlying areas and new customers. The Arizona trip was encouraging.

Seattle

In the next month, several "hot" computer customers should result in purchase orders. Rush Drake has done a good job to date in locating two customers. Considering their limited market, this was encouraging and both customers are good potential. Their annual show is scheduled for the end of this month and we plan to have a man there.

I am spending a number of weeks in Maynard. Jill Jennings, with support from the IFM office, is holding down the fort. Any expected visits to that area by DEC personnel should be discussed with me well in advance to utilize support time efficiently.

J. Smith

A 98.25 hour decrease in time spent constructing and checking out the latest 2102 has been realized. An appreciable amount of this time, 38.75 hours, was realized in shop time. This was due to having all required panels already in stock. Engineering contributed a decrease of 53 hours. This reduction is very significant in that most of the time saved was actual construction time. Increased experience was one of the contributing factors to this reduction; the other being an uninterrupted flow of panels and parts, which resulted in a steady construction schedule with no work stoppage. Actual wiring time in production decreased by 15%. Increased experience was the contributing factor here. Listed below are the hours broken down by departments.

Engineering	147 hrs.
Production	50.75 hrs.
Shop	5 hrs.
Total	202.75 hrs.

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J. Smith (cont'd)

Negotiations are underway to purchase a power eyelet machine from United Shoe Machine Corp. This machine will be used to set the eyelets on the front panels of our test equipment. With our current volume of work, the Stimpson foot power machine we are now utilizing is outmoded. Samples of the work we wish to accomplish were sent to U.S.M.C., and we are now awaiting their reply. Their salesman quoted us a rough figure of $650.00.

The last two panels for the 2202 Memory Exerciser have been released and are being fabricated. All packages and power supplies have been delivered. The delivery of the two above panels Tuesday should complete the job.

Tests were conducted yesterday to determine the amount of heat diodes undergo in the dip soldering operation. Utilizing a Tempilstik, it was determined that the diodes are heating up to slightly higher than 100°C.

John Stefanowicz, of silk screening, has been transferred to production wiring. He will be replaced by Tony Bader of Maintenance as soon as a replacement can be found for Tony. This transfer is beneficial to the company as well as the personnel concerned, in that both men are currently pursuing a course of study in their prospective jobs.

H. Anderson

PROGRAMMED DATA PROCESSOR MARKETING

The length of customer time required to reach a decision about purchasing a computer continues to amaze me. The red tape time, particularly of the government, is very great. In the case of the Navy in Pasadena, it has been 16 months since first contact and 13 months since the tentative decision, and we aren't done yet.

Another aspect of this is the high sales cost and time involved. In selling computers, it is important that we are talking to a man at the proper level in his organization. If we are not, there is a high probability that the program is not funded or does not have management support in the customer company. We have been asked for and sometimes supplied extensive consulting in the sales process only to find out later that their was no money to buy a computer. Another aspect of this is when a customer is submitting a proposal based on use of our computer. All of these should be approached with considerable caution.

Still another fact is that computer characteristics differ widely and almost defy highly objective comparisons. This leaves lots of room for prestige news releases, and personal appeal of the

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H. Anderson (cont'd)

machines to influence a customer's opinion. A customer study or evaluation can prove almost anything that he wants it to prove.

In spite of the above cautious remarks, several tentative sales are becoming more firm every day. These are:

1) Navy in Pasadena PDP-3

2) Air Force in Bedford PDP-3

3) University of California in Livermore PDP-1

J. Atwood

Highlights of the past two weeks include issuance of the new rep NEWSLETTER, release to the printer of several pieces of new or revised literature, preparations for and promotion of various trade shows, placement of our first multiple-insertion space ad, and almost continuous operation of our offset press.

The NEWSLETTER went out Friday night, thanks to service above and beyond the call of duty on the part of all those inside the plant who had a share in the project and in spite of all the road-blocks I.B.M. and the Post Office Department threw at us. Ted reports that his copy arrived Monday morning as scheduled.

At the printer's (or on their way) are the new MT 1514 folder, the second edition of the logic handbook, new letterheads for Maynard and Los Angeles, and revised 1000, 3000 and 4000 Series catalogs. The logic handbook has been expanded to 48 pages through the inclusion of a number of additional photographs and the organization of the text into six main sections. In the works are a new PDP manual, new PDP folder and new Short Form Catalog.

In addition to promoting the I.R.E. show in Greensboro for Roy Attaway and the "Representatives' Caravan" for Instruments for Measurements through special mailings to our prospects in the areas concerned, we have been up to our ears in preparations for the two shows we will attend next week. As a late entrant in the Magnetism Conference in New York Nov. 14-17, we have had to scramble to get both equipment and literature ready in time. And having several other irons in the fire, we are down to the wire again in getting things ready for NEREM. However, it looks as though we'll make it.

J. Atwood (cont'd)

Our DEC Logic Kit, which has been slowly gaining momentum since we dreamed it up as a DIGITAL DEVELOPMENTS back-page feature, is the subject of our first concerted effort in the field of space advertising. The new kit ad is appearing concurrently in eight publications which have done well for us in the past or, like SCIENCE and MILITARY SYSTEMS DESIGN, should tap promising new markets for this particular item. The kit is also the subject of a news release sent to our complete new product publicity list.

What with the rep NEWSLETTER, PDP proposals, special mailing pieces, schematics, test data sheets, office forms, and various pieces of show literature, the offset press has been grinding away from early morning to late evening practically every day. The way the NEWSLETTER ran was most encouraging, since the halftones were far superior to the quality ordinarily achieved on a press as small as ours, especially with negatives made in an in-house photo department.

We have heard from just under half the people on our direct mail list in response to our mailing list clean-up letter. This is reasonably encouraging, since the normal response to this type of mailing averages between 10 and 25 per cent on the first go-round. And the fact that 8 out of 10 respondents want to stay on the list is only slightly short of sensational, since our list has been built to a large extent on "bingo card" inquiries generated by trade paper publicity. These returns indicate what a good investment our direct mail operation is, particularly since we maintain a "clean" list, with a very low ratio "undeliverables" for a list directed to people who move around as much as engineers do.

B. Stephenson

Doctor Louis Osborn from the Synchrotron Lab at M.I.T. was out here last week. He is thinking of using our equipment in the processing and recording of the information which is collected from "events" which occur when the synchrotron beam is on. Our equipment would receive the information concerning the "event" and ascertain whether or not this represents a "true event". Our equipment would also be used to store this information as it comes in and to feed it slowly to a recording device. He is also thinking of setting up a rack of test equipment, or system plug-in blocks in a patch-cord panel, between the first decision circuitry and the storage circuitry. It would then be possible for people running different experiments to further process the particular type of data which they are working with.

Also at M.I.T. I visited Mr. Paul Niquette from Ramo Wooldridge. He was up here to trouble shoot their computer which is being used at M.I.T. and also to investigate using our equipment to connect his computer to a charactron for an air traffic control system for the FAA. While he

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B. Stephenson (cont'd)

was here, he had outlined the logic which he wanted us to perform in the same manner as they outline it for their computer. Whenever they perform any type of logic they use a combination of AND GATE, AND GATE, OR GATE, OR GATE. The connections they desire to put into this combination are then fed to one of their computers which is programmed for this particular arrangement. The computer will find any cases of overloading and tell them the necessary size for all load resistors. He gave me 13 pages of computer paper explaining the logic they wanted to perform, and I showed him the 2 pages in our logic book which cover our inverter loading rules. I think he was impressed.

S. Olsen

A TRIP TO NORTH CAROLINA:

A trip was made to Greensborough, North Carolina principally to attend the local I R E show. Monday, before the show, I went to Western Electric in Burlington with Sharkey Esdie and Roy Attaway. Our visit was not very successful in that we only contacted two people. These fellows are already users, so I took the opportunity to get their reaction to the use of our equipment. The only trouble they have is that when they first start using the equipment they burn out a few transistors or some of the transistors are gone when they receive them, and they replace these with a Western Electric microalloy # 2N559. After replacing these few transistors, they have absolutely no trouble and are amazed at the reliability of the equipment. They also were badly in need of schematic diagrams and general literature. They claim that they haven't got much in the way of contracts right now, but things should break shortly (6 months) and at that time they should be in need of considerable equipment.

The show itself was fairly successful for it's size. It was held in the new Greensborough coliseum, which is quite a nice place. It is only one year old. It's sort of Greensborough's town hall, auditorium, skating rink, and catch-all. Booth space is quite cheap, and we might consider taking our own space next year, depending on how the Nike-Hercules and the Nike-Zeus program is going.

Roy Attaway's sales techniques were a considerable flop. The first night the hospitality suite drew four free loaders, none of which were potential customers by a long shot. The two professional models ($250.00 for two days) drew no attention to the equipment and were outstanding only in their lack of personality.

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S. Olsen (cont'd)

TRIP TO FLORIDA:

I flew to St. Petersburg, Florida for the dual purpose of meeting with the newly formed Electron Development Co., and checking into the status at Honeywell. E D C has a good basic group of technically competent people but are sadly lacking in finances. They look like they could potentially be a good user of our building blocks for systems that they intend to build. Honeywell is going along quite well, they are quite happy with our equipment and have had almost no transistor failures in their 500 KC equipment, but have had several diode failures with the 514 diodes. It looks like they have the control for the Drone business pretty well sewn up. They are suppliers to the two largest Drone manufacturers, Republic Aviation and Fairchild Astrionics.

J. Cudmore

The bugs have been eliminated from the 1201 tester and it is now in use. All the tests made on this flip-flop are now done at one test stand by one person. Previously, two people at two different test stands were required.

The 201 flip-flop has been modified and is now in the works. The layout uses a symmetrical transformer, which should eliminate the possibility of installing this part incorrectly. The "P" pulse carry characteristic has been improved and the 201 is now compatible with the 1201.

A 201 tester has been designed and waiting to be built. This tester, like the 1201 tester, tests the unit completely at one test location. The tester should be very easy to operate and greatly simplify test procedure.

D. White

Tests have been made with new high-speed transistors in the sense amplifiers and slicers for core and memory testers. At this writing, 25 megacycle bandwidth is obtainable without changes in the basic circuit. These transistors are, however, capable of much better operation than the above data would indicate.

Loading requirements for the 4215 Four-bit Counter have been determined, and an Applications Bulletin will be prepared on this subject.

The 1547 DC Difference Amplifier is undergoing tests preparatory to production release. Some problems have arisen regarding stability. More on this in the next biweekly.

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L. Prentice

The 20 foot Product Display Booth is nearly complete and should be ready to ship on Monday, the 14th of November. Design work and drafting is completed on the table top version of the Digitronic Reader for PDP-1. Single table display unit has been mocked up and is ready to be used in the show. All the parts for new type table console have been completed for PDP-1.

We hope that a tally type punch, which is due to be shipped from California today, will reach here Monday in time to be installed in this table to be displayed at the Boston show.

R. Hughes

The Current Generators are held up for lack of transistors (Philco 2N1494). Thermal cycling tests are being made on most of the semiconductors that we use transistors and diodes are placed in our environmental test chamber and temperature is reduced to -65° centigrade for 1/2 hour. Then they are brought up to room temperature and tested. They are put in the chamber once again and temperature is increased to +85° centigrade and retested at room temperature. This treatment will be given three times on the devices. Object: to determine if the first thermal cycling "weeds out" the majority of the defective units. Many people in the semiconductor industry are working on the problem of catastrophic failures and a variety of tests are being devised. RCA claims that "power aging" will eliminate catastrophics. GE recommends power cycling i.e. switching power on and off several times. Somehow we must get a handle on this to prevent faulty equipment from being sold.

S. Olsen

New Employees

10/31 - Sheila Paul - IBM Key Punch Operator
11/7 - Joan Alexander - IBM Key Punch Operator
Arthur Vartanian - Draftsman
Richard Whipple - Engineer
Barbara Charnock - Secretary, Sales

Employees Left

10/21 - Maurice Chase
Pauline Chase
10/28 - Robert Trainor
11/4 - Donna Kopp
Bruce MacDonald

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S. Olsen (cont'd)

Starting
David Denniston - Engineer
Edna Bombard - Assembly
Norman Fitch - Northeastern co-op student
Brunhilde MacNevin - Draftswoman

Pending Physical
Edward Hoffman - Maintenance
Lillian Bobnis - Assembly
John Valentine - Northeastern co-op student

Recruiting Schedule
11/8/60 - Tufts - (K.H. Olsen, Recruiter)
12/7/50 - MIT - February Class
1/16/61 - Northeastern, Division B
3/9/61 - Northeastern, Division A
3/10/61 - MIT, Spring Class

J. Fadiman

I spent last week on the West Coast. There is a problem with the last Core Tester at TMI because the response time of the 1556 Slicer Units is not fast enough for the very fast 30-18 cores which TMI is testing. New Slice Amplifiers with faster transistors are being constructed today by Don White and will be mailed out to TMI. In addition, two bad 1209 flip-flops were found, which I repaired or replaced.

I went out to Lockheed, and it looks as if they are definitely going to buy a Coincident-Current Word-Address tester within the next month. What they want is a 1514 with capability of expansion to 128-128 for the X and Y counters, and possibly a 50 volt back-voltage capability. Our new solid-state current drivers are a requirement.

TMI (Culver City) is interested in some smaller exercisers for the same memory as the big one is for. Specifications will follow.

The large Memory Exerciser 2201 for TMI is almost completed. Some changes in timing wiring are required as a result of my recent visit. Two people from TMI will be here Nov. 21, and the machine will be shipped on the 23rd or the 28th.

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J. Fadiman (cont'd)

I also spent several hours at NEL in San Diego discussing the Digital Processor, which we will be building for them. In general, the reaction to our material is very favorable.

Memory Exercisers for RCA, Camden, and the two systems for Sylvania, Muchy, are still hanging fire.

B. Towle

CUSTOMER		REQUESTED
Don Bosco Tech. School	Rev. James L. Chiosso	Application Notes
Lab for Nuclear Science	Mr. William Lobar	Booklet on Logic
Johns Hopkins University	Mr. David M. White	Schematics
Minneapolis-Honeywell	Mr. E. Noltenmeier	Technical data
Computer Usage Co., Inc.	Dr. Liston Tatum	CRT Display - rent PDP
Raytheon Company	Mr. Leo M. Davis	Technical bulletins
U.S.Naval Ordnance Test Sta.	Mr. Ken Graves	Digital packages and systems
N.A.S.A.	Mr. W.E. Sivertson, Jr.	PDP-1 and 3
Food Mach. & Chemical Corp.	Mr. Louis Thayer	Computers
Worcester Polytechnic Inst.		
Mr. Richard J. Kosich		4000 Series
Dumville Mfg. Co.		Complete Catalog
Allison	Mr. R. A. Voorhis	Accounting Clock
Raytheon Company	Mr. Donald F. Allen	Logic
Sylvania Electronic Systems	Mr. Thomas R. Edge	Logic
Sanders Associates, Inc.	Mr. Robert J. Doyle	Logic
Remington Rand Univac	Mr. Chester W. Brooker	Logic
W T I C	Mr. Herman D. Taylor	Logic
Texas Instruments, Inc.	Mr. H. J. Boulanger	Logic
~~Mr. Joseph R. Maloney~~		~~Remington Rand Univac~~
Remington Rand Univac	Mr. Joseph R. Maloney	Logic
Univ. of New Hampshire	Mr. Albert D. Frost	Logic
Comm. & Nav. Equipment	Mr. Norman Into	Information and catalog
Mr. Edward M. Mahoney, Jr.		Logic
Bell Telephone Laboratories	Mr. R.S. Bagwell, Jr.	100 Series - Logic - 1512
M.I.T.	Mr. John E. Ward	Logic - PDP-3
		10 Megacycle Logic

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B. Towle (cont'd)

Northeastern University	Mr. Robert Klein	Logic
Raytheon Company	Mr. Erwin Hanke	Logic
United Aircraft Corp.	Mr. Joseph Piskor	Logic
Raytheon Company	Mr. A. Terranova	Logic
Revere Corp. of America	Mr. S. E. Warner	Logic
Beckman Instruments, Inc.	Mr. Herman Neidhart	General information
U.S.Army Ordnance Missile Com.	Mr. William French	General information

COMPANY CONFIDENTIAL

BIWEEKLY REPORT

COPY NUMBER 2

DATE October 28, 1960

Tele

J. Cudmore

The 1209 Flip-Flop etched board has been modified but will require one more change to eliminate the messy appearance of four resistors near the end of board.

The holes for these resistors were positioned in such a manner that the leads of these resistors couldn't be fully inserted in the board. The 1209 tester has been built and checked out. The 1209 is in test and appears to be O.K.

The 1201 Flip-Flop is now going through test, and we are experiencing poor compliment sensitivity and margins. These problems can be usually eliminated by changing the compliment diodes. If we use 894(R) diodes in the compliment circuit, these troubles should be eliminated. The 1201 tester has a few bugs in it. The main difficulty seems to be due to excessive wiring length in the tester. This tester is the most complete flip flop tester we have yet made and its wiring complexity seems to be its main problem.

B. Stephenson

The application file has been growing fatter and fatter at a very nice rate. Several of the engineers have been sending down copies of the applications they have worked out for various customers, and this has been a great help.

A new product file is being started. Hopefully, when a customer calls up and asks for information about a particular unit, we will be able to consult this file and give him all the latest dope immediately. Any help in keeping this file up to date would be greatly appreciated.

The reps have been sending in quite a few application problems as well as bid requests from new customers. Among these was one from Jim Burley regarding a system in which a temperature transducer commanded to decimal readout. This project was for Aero-Test Equipment Company in Dallas, Texas. We submitted a bid for a little under $5,000 worth of equipment to convert the temperature information into a decimal readout.

Another new prospective customer is the Applied Physics Lab at the University of Washington. We submitted a bid to them for about $18,000 worth of equipment. Their bid request did not say what the project was; however, it included 100 blank plug-in units. The use

digital equipment corporation
MAYNARD, MASSACHUSETTS
DF109

B. Stephenson (cont'd)

they planned for these was revealed quite by accident when Mr. John Okerlund of the University called here on October 19. He wanted to tell us that our Model 4215 didn't work. When I asked him about this, he explained that they were planning to build units similar to our Model 4215, using our basic design and making modifications for larger current outputs. In building these, they found that the inhibit input would inhibit when it wasn't supposed to.

Don White investigated this problem. Although the inhibit input had been operating quite well for us, he suggested a modification which I later reported to Mr. Okerlund. Mr. Okerlund said that this method was one of the ways he had thought of and he was happy to know that we had corrected this before we began production. They were very confident in DEC Building Blocks, but this particular unit had made them lose some of their confidence. I suggested that because of our long experience, excellent test facilities, etc., perhaps the University would like to consider having us build their 100 extra plug-in units. Mr. Okerlund replied that they certainly would take this under consideration in the future but that time was pressing on this particular model, and he felt they would be able to do it much quicker since they already had the circuits completely designed.

G. Gerelds

In a recent letter from W. Weeton, Sylvania Electric Co. in Needham noted several complaints about our Test Equipment which they said had 6 flip-flops from a group of 100 that had bad diodes and transistors or solder shorts. I am undertaking to intensify solder short inspection. I have asked the people in Test, when it is necessary to change a part, to solder it in to the printed board in a workmanlike manner and not to just tack it in as I know some of them have done in the past, leaving it to the girl in Final Inspection to touch up. Because I think that is the only place the shorts on the backs of the boards occur, I have instructed the girl never to use a soldering iron after the unit has been tested, and if it needs to be touched up, it then goes back to the tester who will solder it and retest it. I also think that if we had a small stiff brush, it would be a good idea to brush over the backs of all these boards to catch these small (hair like) solder shorts that are almost impossible to see by eye.

As for the diodes and transistors, we have 30 1105 units that went through Test and were packaged just as though they were being shipped

G. Gerelds (cont'd)

out. We have taken these units and in our experimental oven in Engineering we froze them to -42c and then gave them a blast of heat to 95c. We have retested them and find that there was only one unit, #42920D, that UCE Saturation Voltage on transistor Q3 increased from (72 to 125) bringing it out of spec's and causing us to charge Q3 - spec is (120).

We are also running a lot of 110 diode units through this process.

R. Doane

The new zener diodes for the stalled 10 mc variable clocks are in, so they will soon be off-the-shelf, at last. Two units were rushed through ahead of the lot about a week ago.

The required increase in pulse amplitude for the 10 mc line has not yet been achieved, though some of the work is done. No second production lot of any transformer-output 10 mc device will be released until the change is made.

Attention has been temporarily diverted from the pulse amplitude problem because half of a lot of 5202 10 mc flip-flops failed to pass the delay-time specifications in test. Tests revealed that the necessary delay time specifications for confidently reliable margins in counters and shift registers are even a bit tighter than those the 11 units passed. The usual method of changing output delay time gives unpredictable results, and appears to me to be largely black magic. Sorcery may save most of this production lot, but I hate to use it. At the least, the witchery must be excercised for future production.

J. Smith

An air operated eyelet machine has been set up to set ground lugs on 1901 and 1903 mounting panels. This replaces the foot power machine and greatly reduces operator fatigue. An overall production increase of 25% has been realized.

It has been brought to my attention that there could be a remote possibility that 514 diodes burning out in the field could be caused by overheating during the solder dipping operation. Work has been started to test out this possibility. Our normal dipping time is a

J. Smith (cont'd)

maximum of 4 sec. at 525°F. An 1110 Inverter was dipped five times normal dipping time or 20 seconds. The unit was tested and found to meet specifications. The test was then repeated with the same results. The unit has been left running and will be checked periodically to see if the diodes are working properly. Tests will continue at elevated temperature ranges.

Checkout of the 2102C Automatic Core Tester was completed the first of last week. It is now being exhibited at the Magnetics Conference in Philadelphia. Actual man hours of work done on the machine will be available next bi-weekly.

All panels and logic wiring released for the 2202 Memory Exerciser have been delivered to Engineering Construction and have been mounted in the rack. Interconnection between bays and panels commenced the first of the week. The Boolean Function Generator, Memory Mode Control and Timing Logic are the only panels left to be released. The remaining packages to be delivered are (40) 1201 and (35) 1682, which will be delivered by the end of next week.

Work has been stopped on both 1514 Memory Testers. All panels, with the exception of the two control panels were fabricated and screened. Four of the logic wiring panels had been completed.

All logic wiring and panels for the 2104 Core Evaluator have been completed and delivered to Engineering Construction. Remaining packages to be delivered are (3) 1201 and (12) 1681, which will be delivered by the end of next week.

S. Olsen

New Employees

10/3 Kenneth Peirce - Production Control
10/4 Wanda Tobin - Quality Control
10/6 David Kicilinski - Co-op student (Northeastern)
10/10 Eleanor Thayer - assembly
10/10 James Hogan - Wireman, Q.C.
10/17 John Anderson - Rec. & Shpg. Clerk

Left

9/26 Mary Lou Holt - Assembly
10/7 Joseph Lampasona - technician
10/7 Barbara Geise - Assembly

S. Olsen (cont'd)

10/13 Leslie Silliman - Rec. & Shpg. Clerk
10/21 Henry Van Cleef - Tech. Writer
10/28 Susan Sweenie - Secretary - Adv. Dept.

Starting

Joan Thompson - IBM Key Punch Opr.
Sheila Paul - IBM Key Punch Opr.
David Denniston - Sales Engineer
Richard Whipple - Engineer

M. Sandler

Status of Finished Goods

	On Hand	On Order	Available	In-Process
Test Equipment	398	130	268	580
SPU	887	490	397	1080
T.E. (Blue)	250	5	245	60
SPU (Blue)	566	240	326	770

Delivered to Stock to date: 2999 units

Critical Shortage Situation: 901,-83; 1201,-98; 1209-88; 4201,-93; 4209,-18; 1906,-27.

Five lecture groups for introduction to the IBM punched-card concept of accounting have been conducted this week. Interest seemed high and it is hoped that everyone will help us in providing accurate information for our machines.

S. Olsen

Report on Customer Correspondence - From October 14 to October 29, 1960

CUSTOMER	INFORMATION REQUESTED
Auerbach Electronics Co. Sally Ann Dolly	Logic
Sylvania Electronic Systems C. Lang Needham, Mass.	Logic

S. Olsen (cont'd)

CUSTOMER	INFORMATION REQUESTED
Shallcross Mfg. Co. Mrs. Margaret Dunn Selma, North Carolina	Complete catalog plus pulse generators
General Electric Co. Clinton D. Aiken Syracuse, New York	Info for survey
Hungarian Academy of Sciences Th. Dolinszky	Data sheet and price on System Building Blocks - Memory Core Tester Type 1513 and General Catalog
General Electric Co. Air Force Procects,Technical Publications Fred P. Day Syracuse, New York	Current Catalog
Cornell University Graduate School of Business & Public Administration Roger C. Morris Ithaca, New York	Programmers manual for each computer
The Perkin - Elmer Corp. Kendall Preston, Jr. Research Eng. Dept. Norwalk, Connecticut	Correction of mailing list
Remington Rand Univac Div. of Sperry Rand Corp. Memory Development Dept. Richard N. Hill Philadelphia, Pa.	Logic PDP-1
General Electric Co. Washington, D.C. B. L. Crew	PDP-1 and 3 Wants visit from Engineer

S. Olsen (cont'd)

CUSTOMER	INFORMATION REQUESTED
I T T Kellogg Missile and Space Systems Systems Planning Dept. C. H. Braddock Los Angeles, Calif.	General product info
American Bosch Arma Cynthia Nielsen Garden City, New York	Digital Computers Wants Sales Engineer to call

J. Atwood

As of yesterday, we had received reply cards from approximately one-third of the 10,000 people to whom we sent mailing list clean-up letters. Since the mailing was completed only a week ago, this is a pretty fair return. To date, 84 of every 100 have asked to remain on the list. The remaining 16 represent both those who have asked to be taken off the list and those whose original letters were returned as undeliverable.

The response to our promotional efforts at the Magnetics Conference has been excellent. Word of our exhibit was spread by means of a special mailing to memory test system prospects on our list, hangers on morning newspapers delivered at the hotel, cards on tables at the hotel elevators, and signs on the suite. Special material turned out in time for the conference included the ME2201 folder, a revised MT 1512 folder, MT1514 specifications, photo murals, functional diagrams, and a comparison data sheet on memory manufacture and step-by-step DEC test procedures.

Coming up next: a two-day IRE show in Greensboro which Stan will attend next Tuesday and Wednesday and the Magnetism Conference at the New Yorker November 14-17. The latter coincides with NEREM but is important enough for us to attend even so. Meanwhile we will be supporting a "caravan" sales tour in which Instruments for Measurements is participating with a special mailing to all building block prospects in California.

Another important project in process is a newsletter which will be

J. Atwood (cont'd)

mailed to our reps every other Friday. The aim of the letter is to get the reps hepped on the subject of DEC building blocks. The first issue mails a week from today, and we will circulate copies here in the plant so that you can see what we are up to.

Artwork for the new System Building Block blister pack has been completed, and these should be rolling in shortly. Together with our new carton, this will put us right up there in the class packaging category. Stan has now put the packagers to work on a blister pack sample for the Digital Test Equipment, just to make sure we keep up the good work.

The newest space ad is on its way to the publications. It sells (and I use the word advisedly) the "fireworks kit" and offers the logic handbook. We are also sending out a release on the kit and preparing a four-page folder on same. This should be a good one.

We are trying out a new letterhead design which ties in with the building block-style company logotype on the new carton. It will be used first at the West Coast office, and then, if Ted finds he can live with it, it will be used for sales correspondence here at Maynard.

Sue Sweenie is leaving today after a year and some months of a job well done. She took over a very demanding job here when she was only weeks out of high school, and she handled it like a veteran. Also leaving the department is Joanne Terrasi, who did so well the Sales Department shanghaied her effective Monday.

L. Prentice

Tuesday, October 18, 1960, a trip was made to W. H. Fields Company in Dorchester to look at their line of abrasive belt machines. We principally attended this demonstration to see whether or not some of these machines could be adapted to finishing our plug-in unit handles. It consists essentially of a vertically mounted abrasive belt and a semi-soft rubber conveyor belt which passes the work underneath the sanding belt. We talked quite at length to them of methods of doing this, and they suggested they use one of their smaller machines of which they have ones coming back from a company who had used it only slightly, it being too small for their use. This will be set up in the house so we can take some of our work down. They will demonstrate the machine to properly give us the finish that we require. The jig is now being made in the machine shop to hold five handles and as this machine can feed work under the belt at a rate of approximately 15 feet a minute, it will take two men to operate it. Even so, a preliminary study shows that we should save approximately $1550 a year in labor time over the present method of doing these handles. The twenty foot booth is well under way. This is made of steel tubing and walnut plywood panel. The first section was set up today and looks very promising. Design of a table top version for the Digitronic Reader for PDP-1 was started today. This is following along the lines laid out by Van Dyke Associates. Design for under table mounting of the Tally Tape Punch or the Friden Tape Punch has been completed and awaits checking.

J. Fadiman

The work has just about been completed on the Automatic Core Tester 2102E for Sylvania Electric in Muncy, Pennsylvania. It will be ready for checkout on this coming Monday. Total construction time; 1½ weeks. We will then start building a Memory Tester 1514B for Sylvania Electric, which we will deliver on December 15, 1960, without the plug-in units required for testing word address planes. These sales are a result of two visits which I made to Muncy.

We are just about to receive the order for a Memory Tester 1514C from RCA, Needham, as a result of W. Weeton's visit, and will start construction of that almost immediately.

A bid has gone out to Bell Telephone Laboratories, Murray Hill, for a Memory Exerciser as a result of my trip there two weeks ago. A bid for a second type of Memory Exerciser will go out shortly.

J. Fadiman (cont'd)

Work on the Memory Exerciser 2202 for TMI has been slightly delayed. All logic is completed except for the timing circuit. Likewise, most of the mounting panels have been wired except for control. All front panels except one have been made.

We are not going to be able to provide Ramsey Handlers with our Core Tester systems and I am going to visit Ramsey in St. Paul to learn more about the handlers.

A. Swift

Core Evaluator 2104 Burroughs is being assembled in the Engineering Department. We expect to be checking it out about November 15. This unit has considerable flexibility and could be used for general purpose.

Ed Harwood has assembled a bit of data on the amount of man-hours put into each system that we have assembled. I am helping him gather these times. This information will have value in estimations and in scheduling work on the systems.

COMPANY CONFIDENTIAL

BIWEEKLY REPORT

COPY NUMBER 2

DATE October 14, 1960

K. Olsen

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

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

They have four standard drum sizes now - 5 inch, 7 1/2 inch, 10 inch, and 18 1/2 inch. They usually record at about 130 bits per inch and so get 2024 pulses per track on the 5 inch drum and 7540 on the 18 1/2 inch drum. The one we are most interested in is the 10 inch on which they get 4048 because that is the size of our memory field. These drums have an integral motor and they offer a variety of speeds. This means that our circuits will have to tolerate a wide range of amplitudes and frequencies. Those motors that run very fast from 6000 to 24,000 use 400 cycle motors.

All their measurements on heads are assuming a return to bias type recording. They were not able to tell me which type recording they recommend, but this might be one for the considering. They record with one microsecond pulses when they collect their data. From their graphs I figure they get about 45 millivolts signal across their center taped head at 130 pulses per inch when running at 130 KC rate. This means for the lowest surface speed, which comes out to be 92 KC, the signal would be about 30 millivolts. For the highest speed, which would come out to be 800 KC, the output would be better than one-quarter of a volt; but this repetition rate is so high that I am sure there would be other problems. We may want to limit our circuits to the speeds available from 60 cycle motors.

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

COMPANY CONFIDENTIAL

K. Olsen (cont'd)

seconds per bit. We might buy an alternator that would put out somewhat less than 50 cycles. Forty cycles would give us 6.1 microseconds per bit.

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

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

M. Sandler

During September 3400 units were delivered to Stock and the Navy order was delivered on time. Our long list of overdue orders has become less long, but still includes 6401 and 5401 Clocks not yet out of Engineering, and we are in difficulty with all Flip-Flops. The redesign of Flip-Flops not only endangers on time delivery to customers, but production scheduling has been affected. Further, overdue delivery to us of Sprague MA-45 transistors has become a serious problem.

Starting next week the IBM punched card concept of accounting will be introduced in discussion groups which I will schedule with all groups.

J. Smith

A method of repairing units with lifted copper has been submitted and approved. There should be a very substantial savings, seeing 3% of our total volume of units were being rejected for lifted copper. All current up to date units which were sent to engineering for lifted copper will be repaired and sent to finished goods.

The 2102E Automatic Core Tester is nearing completion. All panels and parts,

J. Smith (cont'd)

power supplies and current drivers have been delivered and are mounted in the cabinet. The last of the logic wiring was delivered Thursday morning. All required packages will be available Monday morning, and Checkout should commence sometime Tuesday.

All the panels and logic wiring of the 2202 Memory Exerciser which have been released to production have been completed and are mounted in the cabinet. All power supplies and packages have been delivered except for the 1201.

Work has been started on the 1514B and 1514C. Panels are being fabricated and should be delivered with parts by the end of next week. All power supplies and current drivers will be available for delivery by the first of next week.

With anticipation of more system orders, two more girls are currently undergoing systems wiring training. This will bring our systems wiring group up to four girls.

R. Hughes

Test

We are reviewing all of our test specs and test units and revise these units when necessary. We now have new test units for all inverter packages.

In devising the test, it became obvious that we needed an accurate meter for making these measurements, and we decided on the Tripolet Model #630NA. This is a 1 1/2% meter with a mirror scale. We have ordered 10 and have 3 on hand.

Missing Equipment

We now have a total of 39 meters of all types. Of these, two are missing. They are Weston volt ohm milliammeters #7 and #15.

Circuits

The 4680 is being redesigned. The new design will use RCA 2N1184 transistors. These are a low frequency power transistor and have a lot less leakage than the Philco 2N670 that we have been using, and it is hoped that this will end our solenoid driver problems.

The 4407 low frequency crystal clock is progressing. An interesting feature of this

R. Hughes (cont'd)

circuit is that you can hear it work (at 5000 CPS). This circuit also uses such parts as a one henry choke. The equivalent inductance of one of the 5KC crystals we have is 380,000 henrys.

Components

OMC 514 diodes are now being checked for reverse recovery. This turned out to be important in our 5 and 10 MC flip-flops. The OMC 514 is factory tested for forward recovery time. The reverse recovery spec. is; 0.7 N sec @ 0.1 MA reverse current when forward current has been 10 MA. This will result in better flip-flop margins. The CTP 894 diode which we use in the 10 mc line is being reverse recovery specd. at 0.1 N sec @ 0.1 MA reverse current when forward current has been 5 MA.

Replacement Parts

We ordered and tested 100 1N276 diode (this is our replacement for the OMC514) and tests show it is a good replacement diode as it is checked for forward and reverse recovery (but not in the same way) as measured on the Tektronics Type S diode recovery unit. The longest recovery time was 0.7 N sec at 0.1 MA reverse current and 10 MA forward current. Its forward recovery was $\leq$ 2 V at 20 MA measured on the type S plug in unit.

2303 Burst Generator

Four of these units have been delivered to test and the rest will be completed in a week. This unit generates all the necessary testing wave forms for our test units which test plug in units.

New Test Equipment

We have received 3 new Tektronics 543 scopes. This brings the number of scopes to 21.

We recently ordered a type R transistor risetime unit and a model 160 current probe from Tektronics.

We are going to make a 765 power supply. This unit will provide variable voltages for testing our circuits.

J. Atwood

The product literature situation is as follows: The new 10 mc folders have been received and distributed, the 2201 folder is at the printer's being pasted up ready for camera, final corrections are being made in the 1000 and 4000 Series folders, the 1512 folder is being readied for reprinting, and the balance of the Logic handbooks are about to be run. Copies of all new literature are being forwarded to the Sales Reps, and the handbooks and 10 mc folders have been sent to all prospects who are waiting for them.

Specialized pieces in process or completed include: 1514 specifications and a 1514 folder, reprinted PDP-3 specifications, PDP photo albums, addenda sheets for the PDP-1 handbook, and the MT 1514 operating instructions (for which we are supplying the finished art and typewritten camera copy).

Rough schematics have now been issued on all items in the short form catalog. As rapidly as possible these rough schematics will be replaced with printed schematics on 5 1/2 x 8 1/2 sheets. The small size schematics will also serve as the basis for simplified schematics to be included in individual product bulletins. A special set of 12 schematics was run for IBM for use in connection with the Mercury project.

The job of cleaning up our mailing list, which now numbers over 10,000 names, is under way. As the reply cards are received from this clean-up mailing, the information will be transferred onto alphabetically arranged file cards, which will serve as the basis for our new mailing list. As soon as our key punch equipment arrives, this new mailing list will be put on to IBM cards, which will enable us to run address labels for future mailings on our new IBM accounting machines. This should greatly facilitate the making of selective mailings and the analysis of results from various media.

Arrangements for up-coming trade shows are being made as far in advance as possible. The next show is the Magnetics Conference in Philadelphia starting October 26. While there will be no formal exhibits at this conference, we will show an Automatic Memory Core Tester in a suite at the hotel, and we are using all the means at our disposal to publicize this fact among probable attendees at the conference. We have also met with the fellows from Eltron who are handling their booth at NEREM to make preliminary plans for our joint participation at that show.

Our next big push in the area of sales literature will be on bulletins and news

J. Atwood (cont'd)

releases on individual products. We have a very distinct need for these bulletins, and it is hoped that we can begin turning them out on a production basis. The basic ingredients of each bulletin are: (1) A photograph of the product (2) the logic diagram, (3) an appropriate wave form shot, (4) descriptive information, (5) a simplified schematic, and (6) one application example using the particular unit.

At the same time, we are making two changes in our method of handling test data sheets. If all goes well, we will be imprinting a condensed schematic of the unit on the back of each data sheet. Also the master for each data sheet will be prepared on plain bond paper instead of a paper plate. This master will then be used to make a contact negative in our photo copy machine, and this negative will in turn be used to make a metal plate for the offset machine. This will make it much easier for the girls to prepare the original master, and it will allow the making of minor changes in the data sheet by the simple method of pasting over a new section on the master wherever it is required.

Since we are fast approaching the point of diminished returns in employment recruitment in the Maynard area, we are making preparations for systematic recruitment advertising in cities further removed. We will probably concentrate our efforts west of Maynard to avoid the competition with firms along Route 128 to the east. Recent test insertions in the Worcester and Framingham papers produced good results.

We are also arranging a more systematic method of handling literature distribution to our Sales Reps. This has been on a pretty informal basis, with the result that both they and we have often been confused as to who wanted what. We now plan to be in contact with them on a regular basis to find out what literature they require, and we are also investigating the possibility of supplying each rep organization with its own binding machine so that complete catalogs can be kept up to date and other plastic bound pieces can be more readily adapted in the field.

On the purely incidental side, we have on order an IBM proportional spacing typewriter with a Gothic type face which will be used in our department for the preparation of product bulletins, manuals and other materials which we print ourselves.

J. Cudmore

1201 Flip-Flop

A 1201 model was built and found to be too sensitive to transistor changes for consistent delay characteristics. Changes have been made to correct this and the 1201 is in the works. The 1201 uses a symmetrical transformer which should be easier to manufacture and also eliminate the difficulty encountered in using the old style transformer. The old style transformer had to be installed right-side up or the F.F. wouldn't operate. The 1201 also incorporates an improved pulse carry circuit. The 1201 tester has been redesigned and will greatly simplify testing.

1209 Flip-Flop

The 1209 circuit has been slightly modified to conform to the 1201's delay characteristics. Both the 1201 and the 1209 will use OMC-514(R) diodes to replace the TIG(P) diodes.

The 1209 etched board will be changed slightly in an attempt to eliminate parts congestion in certain areas.

201 Flip-Flop

The 201 is being redesigned to use a symmetrical transformer also. It will use a circuit similar to the 1201 but with a few less parts.

D. White

Deflection system for the PDP is being checked out. Since Ed Harwood is in a hurry for four complete units, actual construction has begun. We will make changes afterward. At the present time, the only change will be the sizes of three capacitors in the final amplifier. This change is necessary to eliminate a slight oscillation in the amplifier.

Temperature runs on the 1562 Reference Supply show that the output voltage varies about 0.5 millivolts per ^{o}C. About half this variation is caused by the reference zener diode.

R. Doane

The Power Inverter 1681 for use in Core Evaluator 2104 has been released to production.

R. Doane (cont'd)

The first production runs of 10 mc pulse amplifiers have shown that pulse output amplitudes are dangerously low. Many units had 2.2 volts amplitude at the unit output when loaded with 47 , (considerably heavier than the heaviest rated load) and in passing through the tester to the scope probe, 0.2 volts more was lost. Though letting such a unit pass is justifiable, the justification takes on the color of an apology if a customer is involved, and I am now preparing to modify both pulse amplifiers and clocks so that their pulse amplitudes will be better.

The first 10 mc variable clocks had a more serious problem in the first production run, in that they failed to pass the reduced-voltage frequency stability check due to a combination of worst-case zener tolerances and marginal design allowances. As soon as new zeners arrive (a few days), they will be fixed.

L. Prentice

Separate table for PDP display has been completed except for some details relating to the securing of cables and protections of personnel operating the tilting device from high voltage. Details mentioned in the last report for the Digitronic reader have been made up and tested and after some modification of them were found to work satisfactory. However, we are waiting the return of Ben Gurley before proceeding to finish this item as there's a possibility of using a much simpler system. All parts for display system and the control system and new console table are on order for PDP-1 to convert it to be similar to Bolt, Beranek, and Newman Computer.

Thursday afternoon, October 13, 1960, was spent at the New England Regional Conference and Welding Show in the Commonwealth Armory in Boston. All the major companies have demonstrations of their equipment. Nearly all the major companies put out what is called the universal equipment that will handle any of the following welding operations: AC or DC in arc shielded gas welding, metallic arc welding either DC or AC and are built to handle or serve as a power supply for either small one pound wire feed machines or larger production type wire feed machines capable of welding either steel or aluminum. Significant inovations were a short arc wire feed for thin gauge material which is very versatile and welding can be handled very easily in vertical and even overhead positions. P and H welder of this type now uses tape control for sequencing the operation of water, gas, welding arc current, arc die out, and things of this nature. Tape seems to be used in place of the normal electric clock, type timers accomplish this.

L. Prentice (cont'd)

Several companies are offering CO-2 for steel welding in place of the more expensive argon. The Lincoln Electric Company has perfected a wire machine capable of making very heavy deposits on steel with a shielded arc. The gas is being produced directly as the rod is burned and not being introduced as a gas. This is an extremely fast operation and can be applied even by hand, manually, or an automatic and semi-automatic welding heads.

S. Olsen

A trip was made on the 12th of October to New Jersey and Long Island together with John Wild. In New Jersey, I gave a lecture to two groups at ITT. Their interest is primarily in the instruction of personnel and the testing of the different elements going into a large scale computer system. The basic computer itself is a Mob Dick; the rest of the system is built from their mill spec plugg-in units. The demonstration and lecture went along very well and the people were quite interested in our equipment. They would like to have test equipment for instruction purposes and also for patching together simulation devices for testing parts of the computer. They would also like to have equipment for the final test of their plugg-in units. For this they will perhaps send up some people to talk to us and look at our final test. Other people in the group were interested in the testing of the memory systems we turned down nearly a year ago and which Daystrom received. This is the whole system where Daystrom tests on our exerciser and ITT is supposed to receive them with a Harvey Wells Exerciser. The biggest problem is that the Harvey Wells exerciser really doesn't work, and they are quite unhappy with it. Should they require another memory exerciser, we will not only be asked to bid but their engineers will definitely contact us and give us a complete run down on what is necessary. They were quite sympathetic with what happened to us in the last bidding and also this is a new group of personnel who are plugging for our team. Of course, we must realize that in ITT and also in general throughout this area EECO is in very strong, and my feeling now is that they are our largest competitor in the country. ITT will probably immediately buy a "fireworks" kit and will eventually buy more, depending on how effective Jim Fahnestock is in following up.

The other company was Ford Instrument in Long Island City, Long Island. Here again I gave a very successful lecture and demonstration to four people, three of whom were interested in some 10 megacycle logic which they are ready to buy about eight plugging units but have no real appreciation for the fact that we are about the

S. Olsen (cont'd)

only ones that could supply them with these. They also want us to practically build the system for them and show them that it works before they'll buy the units.

The fourth man was the one with the most interest to us. He came out with a few key statements. They are building a computer which uses about 500 to 1000 plugg-in units. This computer is to operate at a 150 KC but there are several operations which would be much neater and utilize less equipment if they were to multisequence and operate at about three times this frequency or 450KC. Now the whole system is drawn up to use EECO equipment and they are running into several problems. First of all, it will not go much higher than 150KC. It is very load sensitive because of the trailing edge sensitivity in using trailing edge logic. Also they are running into problems of inadequate fan out. So in general, they are not quite happy with the idea of using EECO plugg-in units. They would like very much to use ours, especially after the demonstration and the discussion of merits of our products over the problems they are having with EECO, but they have certain obstacles to overcome; that is, that the company is emotionally and somewhat physically committed to EECO at this time, but with a little persuasion and some good applications work we might be able to get in.

B. Towle

CUSTOMER	REQUEST FOR INFO ON:	INFO GIVEN
Oct. 3, 1960		
Department of National Defense Shirley Bay, Ottawa, Ontario, Canada c/o Mr. Rennick	Dely on Bal. of items on Their File DRTE 760-4/1-722	Balance of order shpd on Sept. 30 our Invoice 2498
Oct. 3, 1960		
U.S. Air Force Security Service Headquarters Office of Long Range Requir. c/o William Brann, Chief San Antonio, Texas	Building Blocks	Info on 1000 and 4000 series

B. Towle (cont'd)

Oct. 3, 1960		
Sanders Associates, Inc. Nashua, N.H. c/o V.V. Nielson Document Section	Type 2101 Automatic Memory Core Tester	Pamphlet on 2101 Automatic Core Tester
Oct. 4, 1960		
Polish Academy of Sciences Computer Research Centre Warsaw, Poland c/o Zbigniew Michejda Information Officer	Memory Exerciser Models 2201 and 1514	Sent info available on 2201. Nothing on 1514 - Sent info on 1512
Oct. 4, 1960		
Telemeter Magnetics, Inc. Post Office Box 329 Culver City, Calif. c/o Laszlo Keresztury Electronic Engineer	Building Blocks including circuit schematics	Complete catalog and schematics. Referred to West Coast Branch
Oct. 6, 1960		
Westinghouse Electric Corp. Business Systems Equipment 3 Gateway Center P. O. Box 2278 Pittsburg, Penna. c/o Donald B. Houghton	Programmed Data Processor-1	Pamphlet on PDP-1
Oct. 7, 1960		
Defense Research Laboratory The University of Texas Austin, Texas C/O A. D. Opiela, Jr. Systems Development Specialist	DEC Logic Circuitry as used in systems design	Booklet on DEC Building Block Logic and price list-Referred to Hal Miller of J. Y. Schoonmaker

B. Towle (cont'd)

October 7, 1960 International Resistance Co. 401 North Broad St. Philadelphia, Penna. c/o Mr. Boyd Granger	Logic element packages	Complete Catalog Referred to Burt Dempster of Wild & Associates
Oct. 11, 1960 Fenske, Frederick & Miller Inc. Mercury Bldg. Room 407-8 Washington, D. C. c/o William Perry	Modules 1550, 1551, 1561 and 4677	Not much info available, Sent Price List, 1000 & 4000 Series and Form Letter. Asked for more info as to their specific problem, so can refer to applications engineer.

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L. Prentice

After considerable deliberation, it was decided to build a separate table to hold PDP-1B Display System. This should be able to be completed and ready for installation during the coming week. Drafting will be complete today. The island control section has been completed and is mounted on the console table. Wiring is now under way. All sheet metal work for PDP-1B has been ordered with the exception of the panel to hold the tape pockets for the Digitronics Reader. These are being worked on in Drafting. I believe this is the last bit of mechanical work that is needed to complete this unit. The drawings for memory development using Telemeter Magnetics Memory Stack are now being checked in the Drafting room. This should be somewhat simpler to build and a somewhat better looking unit than the previous stacks built for RCA memory units. Sixteen 22 pin connectors are accommodated. The basic unit can be adapted to either Telemeter Magnetics memory stack or RCA memory stack. Display unit for PDP-1B has been turned over to electronics for wiring in test. Mechanical parts for this, I believe, now to be complete.

A trip was made to Chicago to the Machine Tool Show since the last report was written. Thursday, September 15th, I spent from 9:00 o'clock in the morning until 5:30 in the afternoon traversing the various booths and displays at the International Amphetheater. This machine tool show is produced only about once in 5 years and while most of the machines were too large to be of much interest to us, from the manufacturing point of view, approximately 100 machines at the show were tape or numerically controlled in some manner. General Electric, with Friden tape punches and reader and Friden typewriter, account for the majority of the electronic equipment displayed at this show. However, several machine tool builders are building their own equipment. Notably, Warner-Swazy, Cincinnati Milling Machine Company and Gisholdt. Other electronic companies: Wang Laboratories, Tally, Digitronics, Singer Sewing Machine Company, and IBM. With the exception of Tally and IBM, the styling of their equipment is very much behind the times. The consoles and equipment were crude and quite largely out of date. Warner-Swazy is using vacuum tubes for almost all of their control equipment, which is very large and cumbersome. While there was considerable enthusiasm for numerically controlled machine tools, price and necessity for running the machines almost on a full time basis, that is, two or three shifts in order to cover the investment in them, is keeping a considerable number of people from purchasing them at the present time. Lucas sold three tape control boring mills during the show, and they have just sold one which has just been recently installed and operating at the Argonne Laboratories in Chicago. I do not have any other information on the sales

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L. Prentice (cont'd)

of tape controls and numerically controlled machine tools.

Several efforts are being made to reduce the programming required for these and several efforts were evident at the show to overcome the necessity of having the programmer program tape for tape controlled or numerically controlled machine tools. In one instance, this is done by programming the machine entirely by switches or dials at the machine tool. Another attempt is to make up a master. That is, to have an experienced operator produce the first part. That tape is generated while he is doing this and then is fed back for subsequent pieces. The third method employed is the use of optics to locate drilled holes for punched printed circuit boards. This generated a tape, then the tape was played back for drilling subsequent boards. The optical systems that I saw left much to be desired either in accuracy or ease of operator usage. Most of my time was spent inspecting small lathes, milling machines, sheet metal processing equipment that might be of some use to us in the future. Considerable catalog information will be arriving here within the next few weeks, based on inquiries made at the show.

M. Sandler

Production during September progressed to a new high. The number of units delivered to stock is in excess of 3000 units, and we are close to being in a good delivery status.

The initial delivery to the Navy has been made and completion of that order will be made well ahead of schedule.

Bob Dill completed a course on the 402 IBM Accounting Machine this week. Our Key-Punch and Sorter will be here in November, so the immediate weeks ahead will be spent in designing forms and procedures to effectuate our changing to punched-card accounting. We plan to put our mailing list on punched cards and our present Job-Cost Tickets will be done on IBM.

D. White

The 1547 DC Difference Amplifier model appears to be satisfactory. It is presently being tested in the temperature chamber. Should the temp tests turn out satisfactorily, a new layout will be made and the new model released. The circuit now exhibits a shift in balance of 2 millivolts for a -10V. common-mode voltage; hence an overall accuracy of 5 millivolts seems like a reasonable figure.

D. White (cont'd)

A change in the 1555 slicer will soon be initiated to provide means of balancing the two signal inputs.

Some work has been done on the 1975 Read-Write Switch. The operating speed of this unit is the limitation on the speed of our present memory testers. At this time, it seems possible to decrease the turn-off time from 30 microseconds to 15 microseconds.

K. Olsen

Chicago Machine Tool Show

Every five years the machine tool builders put on one grand show for the industry. This year the big interest was in numerical control. There were about seventy-one machines with digital control at the show, of which twenty-six used a General Electric system. Many of the others seemed relatively crude and experimental. GE by far has the biggest share of the market and is apparently doing a fairly good job. They have a whole line of control components, including high torque DC motors and amplidyne generators. GE systems have also been used on hydraulic positioning units. Cincinnati Milling Machine Company, Bendix, Norton, Sperry, Ramo-Wooldridge, also had control systems.

There are two basic types of digital control; one is simply positioning, and the other is contouring. Contouring needs a programmed computer to do the calculations involved, but plain positioning is relatively straightforward.

Most of the GE systems used a Ferranti paper tape reader, but the newer ones are using Digitronics reader. Sperry, the Canadian outfit, makes their own block reader, which is pneumatically controlled. A whole block of holes are connected to vacuum switches by plastic hoses. Wang Laboratories also has a block reader which is electromechanical, and someone else had a reader which looked from the outside as if it was a photoelectric block reader.

There were also a number of controlled program machines which didn't have tape but which read a program from a peg board or a row of switches. They had a limited number of steps in the program, of course, but sometimes they went up to twenty or so. The following companies have literature in our catalog file on numerical control:

K. Olsen (cont'd)

Specialties, Inc.
Syosset, Long Island

North Electric Company
Galion, Ohio

Giddings & Lewis
Fonddulac, Wisconsin

Gisholt Machine Company
Madison, Wisconsin

Carlton Controls Corp.
Worcester, Mass.
(a subsidiary of Carlton
Machine Co.)

Warner & Swasey
Flushing, New York

Fossdick Machine Tool Co.
Cincinnati, Ohio

Kearney & Trecker
Milwaukee, Wisconsin

EX-CELL-O Corporation
Detroit, Michigan

Giddings & Lewis seem to have the only contouring machine that was working. They are the group that had ties with Concord Control, but the controlling mechanism they were showing was General Electric. It might be that Concord Controls still make the director which converts computer tape to machine tape. We may be able to make a very inexpensive transistorized director or use our PDP for this. It will be well to look into this problem.

We should also contact General Electric and see if they can't use our Building Blocks in their system and to find out more about the problem because we might be able to use their components in any control system which we build.

H. Anderson

Visit to Johns Hopkins University

On September 27 I visited the Applied Physics Laboratory at Johns Hopkins University in Silver Spring, Maryland, to learn of any difficulties or problems that they were having with our equipment. The over-all attitude of the people there toward our equipment is that they are delighted and pleased with it in spite of the type problems they brought up. They have used our equipment in two areas. The first of these is classified and has represented the bulk of the equipment that we have sold them. It's a very sizeable installation of test equipment comprising about 10 six-foot racks operating as one system. Part of this system had been hooked together in

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H. Anderson (cont'd)

another system which they dismantled.

Of the problems they listed, the one which appears most significant to me is the low speed building blocks which arrived at their place with transistors which are inoperative. Their reaction to this problem was that our quality control was not as effective now as it was a year ago. It seems more likely that it may have something to do with the transistors we are using, but we should follow this up carefully. The man who has the most data on this is Mr. Frank Mahan. The following is a list of what I think are reasonably minor items, but we should evaluate them.

1. They would like patch cords which have a length between 16 and 32 inches. Binary numbers are nice, but that's quite a big gap.

2. They had some minor pickup problems on long leads going into pulse amplifiers and thought it might be a little better if the pulse amplifier was not quite so sensitive. I told them about twisted pairs, and they seemed to be satisfied that this was not a major problem at all.

3. The 4213 quadruple flip-flop is not ideal when you want to read into it in parallel from another register and still be able to shift. Our method of reading in by putting an inverter on the flip-flop output is awkward and expensive. On this point, I feel that their need coupled with the University of Michigan application and our own computer means that we should go all out on literature for the Type 4214 and the associated capacitor diode gates. The advantage of this new unit is rather subtle but genuine and usually occurs in a volume application.

4. Delivery of the 721 power supply is poor. In general, I told them that if they find themselves in a tight spot for delivery that we are always susceptible to reasonable pressure on these things, and they should be sure to let us know. Also, I told them that if their internal red tape in processing a purchase order was going to slow down things, we would be glad to enter informal equipment reservations with no obligation on the part of the Applied Physics Lab providing they were standard units.

5. They thought a multi-turn potentiometer on the delay unit would be nice for being able to set long delays more precisely than you can with the standard pot. I think the type application that they had in mind here was one where they wanted two long delays operating in parallel to have close settings relative to each other. I suggested a logical

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DF109

H. Anderson (cont'd)

variation of this where they used one long delay and one short delay which I think will probably help on this particular problem.

6. They feel the test equipment has too few logic resistors. This seemed to be a universal complaint among the people there.

7. They found a convenient way of attaching external capacitors to the delay and the clock was to tap the inside of one of our patch cord banana plugs with, I believe, a 5-40 tap and then put screws in. They thought this might be of interest to us.

8. They have had probably a half a dozen test equipment units come in with broken leads on the power connections.

R. Doane

The design of all advertised units in the ten megacycle line is complete. Models of the 5403 and 6403 will be sent to production in a few days, and these are the last over the fence.

The type 1130 3-bit parity circuit is waiting for parts, and can be produced as soon as they arrive. It's approximately 20 NS delay and complementary outputs make it an asset for both 10Mc and 5Mc applications. Since all the diodes on the input gates are brought out individually, it has some limited flexibility for purposes other than as a parity generator. It is equivalent to a 4-input "or" gate driven by four 3-input "and" gates for negative levels, or four "or's" driving an "and" for positive levels.

Memory core evaluator 2104 design now in progress has engendered one new building block: power inverter 1681. Three circuits, each equivalent to 2½ base loads at the input and capable of driving a 100 ohm cable to -3 volts (two in parallel for 50 ohms), are contained in each unit. When used in logic, each circuit has the same driving capabilities as a 5202 or 6202 flip-flop, including rise and fall times and saturation voltage drop.

A. Swift

The Engineering Plug-In Chart Board has changed considerably since its beginning. At first, we had 75 active engineering notices spread over 3 months. We have now reduced the number to 22 active notices spread over 3 weeks in September. Forty other notices were written in this time, but

A. Swift (cont'd)

they have been processed and filed.

Preliminary engineering work is being done on the core evaluator 2104 with Wally Weeton and Jon Fadiman.

J. Cudmore

1201 Flip-Flop

The new 1201 is now in the works. It uses symmetrical pulse transformers, which will simplify production, since they cannot be installed in the board incorrectly. The delays are very symmetrical, and the "p" pulse carry characteristics have been improved. The 201 is being modified to have similar characteristics. The 1209 will also be altered to have compatible delays.

A new 1201 tester is being designed to simplify the tester operation and will include inverter testing.

H. Van Cleef

Work continued on a pilot book for the memory testers. Simplified schematics were laid out and are being completed by drafting. Several discussions were held on the general philosophies of the book. At present, coverage of the building blocks, except as black boxes, is not to be part of the book, and the principle emphasis will be on a set of instructions primarily aimed at the engineer-operator and the technician-operator; the latter aimed toward a normal second-class technician. Instructions will reflect operation of the system, and will allow the higher grade operator to correlate the machine's functions with the testing efforts needed. Service will be limited to the material provided for operation and a complete set of schematics.

Program for the next period is to write final material for this book, and to lay out final artwork. Considerable guidance has been given in criticism of a draft copy, and it is felt that the new draft will be of such quality as to be publishable with a minimum of editing. Coordination with advertising will produce a suitable cover for these manuals; we do not have such at present, to my knowledge.

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S. Olsen

Employed:

9/6 Florence Dudzinski - clerical
Alice Schlickman - assembly
Joan Thompson - drafting clerk
9/9 Ronald Schofield - wireman, Q.C.
9/13 Nancy Labowicz - assembly
9/19 Anthony Bader - maintenance
Robert Budden - sheet metal
Marion Murphy - assembly
Vera Silva - assembly
9/20 Barrett Prichard - wireman, Q.C.
Donna Prichard - assembly
9/22 Allen Andrews - advertising
9/26 Mary Lou Holt - assembly
Marcia May - assembly
James Farren - gen'l. factory - part time after school
9/28 Elliot Towle - sales

Left:

9/8 Julia Scacciotti, assembly
Bruce Bromby - summer, drafting
Jon Moulding - eng. aide, summer
9/15 Joanne Buckley, quality control
Arthur Campbell, eng. aide, summer
9/16 Mary Bruen, assembly
David O'Brien, eng. aide, summer
James Sheahan, eng. aide, summer
George Veracka - maintenance
9/21 Stephen Mayuski, sheet metal
9/30 Wm. Daigneault, paint sprayer

Reporting:

10/3 Kenneth Peirce - prod. cont.

Job Offer Made:

Roger Appel - application engineer

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J. Atwood

The new trade show booth was completed in time for the I.S.A. Instrumentation Exhibit at the Coliseum. It is similar to the old booth except that it provides better storage, access to the back, and more adequate product display. The new header sign also does a better job of punching the key word "DIGITAL" in our corporate name, and there is a free-standing literature rack which shows off our product bulletins to much better advantage.

The official first edition of the "Logic Handbook" went on the press Monday afternoon, and copies were on their way to the show by air freight 24 hours later. This was a truly remarkable job of printing production, backing up an equally remarkable job of writing and preparation in our own organization. Certainly this is the most important single piece of literature we have issued to date, and it was well worth the extra effort to get it completed before the end of the show.

Some 800 copies of the Handbook are on their way to people who have requested them during recent months, and copies are being sent to all the sales reps.

The first copies of the reprinted 10 MC Catalog have been received. They are a big improvement over the first try. As soon as the main shipment arrives, copies will be mailed to over 1300 people who have been waiting for this one.

Reprints of the 1000 and 4000 Series Catalogs are being prepared, and the MT1512 folder is also due to go back to press. Work is being resumed (now that the Handbook is out) on a new version of the 3000 Series Catalog. The PDP-3 Programmers Manual is being redone by offset, both to enable us to keep up with the demand and to improve the appearance of the piece.

With the help of the Sales Department, we have printed "rough" schematics on practically all of the current boards for all catalog items. By the end of next week, this phase of the schematic printing should be done. The next step is to produce these same schematics in approximately 5½ x 8½ size for imprinting on the back of test data sheets and for issuance to sales reps and customers.

Two new people have joined the Advertising Department. Al Andrews, who comes from Epsco, and Florence Dudzinski, who was formerly with Rex in Concord. Al replaces Lew Yeager, and, in view of his experience in

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J. Atwood (cont'd)

similar work at Epsco, we expect that he will be a big help in stepping up our output of promotional material. Florence will be handling much of the typing, filing, billing, and schedule-minding for our group.

A new carton design has been worked out and is being readied for the box-maker. Within a month, we should have the first of a new series of very attractive white cartons with two-color printing carrying the DEC "message" wherever our equipment goes.

Preparations are being made for production-line processing of product bulletins on individual items in our line. These will supplement our catalogs and should serve as valuable sales tools, particularly in the hands of our sales representatives.

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L. Prentice

Work is still being continued on the BB&N's PDP-1B Computer. All parts of the table are complete and are waiting assembly. Implosion shields have been molded. The main problem on getting high quality pressings from Plexiglass seems to be the dust in the area. This might be overcome possibly by working during an overtime period when nobody else is in the area. Two shields have been made. One of them probably good enough for initial use on the computer. If time permits us, the third one should be molded up and be installed on the computer before time of delivery. Preliminary design work has been completed on rotating and tilting mechanism for PDP-1B display. Some material and details have been ordered. The rest will have to be held up until the display shroud is completed and the weight distribution has been found. The plug-in section for the memory stack has been designed and is now being built in the machine shop and should be ready for test before General Ceramics Plane Tester is shipped, Wednesday, August 31, 1960.

D. O'Brien

Tests on the PDP display deflection amplifier 31 were run using the yoke to be installed in the unit and a CRT similar to the one to be installed.

Results of this work lead me to change the operating point of the 12AU7 that drives the grids of the output tubes. This change gives the preamp better control and also cuts-off one side of the push-pull output when the other side is in full conduction.

New 1% resistors have been ordered for this change. A final model should be completed by the first of next week.

In the meantime, I will continue on the transistor version of the amplifier. I'm still trying to make calculations on the circuit that I have drawn. I am now involved in making a tester for preamp 1553, which is used with amplifier 31.

A. Swift

On July 29, 1960, we shipped CBS Electronics in Newburyport our new Logic Tester 2300.

We couldn't visit them at the time. On Wednesday, August 17, Wally Weeton and I visited the CBS Plant. We contacted G. Henderson in charge of research and his assitant Mr. Earl.

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A. Swift (Cont.)

The visit was very satisfactory. We brought them the operating manual and circuits but they had already set the machine up and were using it with no difficulties.

They described the equipment as "good gear" and "well constructed"

D. White

Testers have been designed and are now being built for the 4126, 4128, 1555 and 1556. A sawtooth burst generator has been built to assist in the development and test of the 1555 and 1556, and is also proving useful in design of the 1547 DC Difference Amplifier. The 1547 is presently being redesigned and should be ready for release in a few weeks.

J. Fadiman

The trip to IBM was partially successful. At least, they are aware of the abilities of our core tester. If the Rese unit does not prove satisfactory, we will get an order for one core tester. The main problem seems to be that we cannot drive 50 ohms at one amp. We have taken data on the temperature stability of the 1556 Slice Amplifier, and a plot of the 51 and 61 Current Drivers' output vs line voltage change. This last plot shows that our 749 supply is not entirely satisfactory for core testing to close specifications under a vaying line voltage input.

We are going to modify the first TMI core tester (2102) to put in DC slice. We are building a new Sense Amplifier panel for them. The report from TMI is that the DC slice gives excellent correlation with other testers, but the AC slice is not quite as good.

The modification to the Philco Memory Tester 1512B has been started. The modification is to install three calibrated slice levels.

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J. Fadiman (Cont.)

A purchase order to install one calibrated slice level on the TMI Memory Tester 1512 is expected soon.

The third Core Tester for TMI (2102D) is coming along quickly, and should be completely wired and ready for test on Sept. 2. Delivery should be before Sept. 12.

The Solenoid Driver, Model 4680, has been redesigned so as to increase the positive bias on the 2N670 output transistor. This should take care of all of our custormers' difficulties with this unit.

Some new panels have been designed for the Memory Exerciser 2202 for TMI. Wiring diagrams have been completed for the main counters.

M. Sandler

Status of Finished Goods

	ON HAND	ON ORDER	AVAILABLE	IN-PROCESS
Test Equipment	124	307	-183	640
System Equipment	590	531	+59	945
Blue Line (Test)*	256	1272	-1016	760
Blue Line (SPU)	281	691	-410	1140

Units to Stock: July - 1985; August - 2306

*Includes special Navy units.

J. Sheahan

A model of the 1304 delay has been built on a 3301 delay card. This change offers ease of production as well as two additional ranges (500-40,000). Due to the available wiring on this card it was necessary to make some changes in the 1304 circuit. These changes resulted in delay instability with varying supply voltages. This problem, however, has been corrected.

A tester has been designed and built for the 4113 diode unit and a test data sheet has been completed.

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J. Cudmore

1201 Flip-Flop

Since the MA-45 transistors have been found acceptable and are less expensive than the 2N588's, the 1201 circuit is being modified to use them. The compliment circuit is being altered to eliminate the effect of the "P" pulse on the level out waveforms. This alteration produces great symmetry in the delay of the Flip-Flop output. The results so far look good, with the problem of the A & B margins sensitivity eliminated. The 1209 will also be modified to use the MA-45 transistors.

To aid in the design of the Flip-Flop circuits an analysis of the transfer characteristics of the pulse transformers used in the complement circuit is being made.

Waveform Photography

It has been my experience that producing a photo of high clarity is a very difficult thing to do with any consistency due to the large number of variables involved. It usually requires eight to sixteen photos to get one acceptable one from the bunch. Tektronix is going to forward a brochure on the best way to take photos. This should help us get better pictures with less time and film being used.

A. Campbell

The design and test of crystal clocks 406, 1406, 3406 and 4406 has been completed and the customer orders are now in production on the third floor.

We experienced difficulty in getting the low speed series to run at 4 kc, since the impedance of the low frequency crystals became too large for the oscillator to operate. However, we have decided to release the 3406 and 4406 to production, for clocks that operate down to approximately 100 kc. Below 100 kc another circuit, presumably 3407 and 4407, will be designed to operate around a high impedance crystal. We have begun to experiment with a low frequency crystal feeding a high impedance circuit by putting a high input impedance emitter follower in series with the crystal.

Also, the high speed clocks 406 and 1406 have had changes in component values in order to insure wide margins of operation.

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A. Campbell (Cont.)

While trying to test a 5 mc clock that had been produced for a customer, we found we could not tune the crystal on frequency. After checking the frequency meter against a standard frequency from the National Bureau of Standards, we concluded that we had received parallel resonant crystals and not series resonant crystals.

Thus far three 406 units and one 1406 unit has been completed and shipped; nine 4406 units are presently being tested.

S. Olsen

Employed:

8/15 Gordon Bell, engineer
Mary Bruen, assembly
Joyce Charles, assembly
Pauline Chase, assembly
Mary Delgado, assembly
Joanne Buckley, Quality Control
Marilyn Cunningham, clerical

8/29 Kathryn Fagan, assembly
Carol Cataldo, production cont. clerk

8/31 Henry Van Cleef, Tech. writer

9/1 Patricia Kelley, clerical
Jill Jennings, L.A. office

Employees Left:

8/19 Arthur Zina, sheet metal
Agnes Wuorio, assembly

8/24 Marcella Mazzarelli, Summer assembly

8/26 Lewis Yeager, Advertising
Charles Manion, Summer drafting
Carolyn Cunningham, Summer assembly
Linda Treyz, summer production cont. clerk
Priscilla Rendell, Summer clerical
Richard Reynolds, Shipping clerk

8/31 Richard Bank, tech.

9/2 Walter Crowther, Summer stock

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BIWEEKLY REPORT

COPY NUMBER

DATE September 2, 1960

S. Olsen (Cont.)

Pending Physical

Ruth Childs, assembly
Alice Schlickman, assembly
Joan Thompson, drafting clerk
Florence Dudzinski, clerical

J. Moulding

The 3410 and 4410 Pulse Generators have been modified to be used with the 410 and 1410 etched boards. A transistor and a pulse transformer were eliminated from both low speed units in the transformation. In addition, 5% resistors replaced the 10% ones in the voltage divider biasing of all four units, thereby ensuring the tolerance of the threshold levels in the Schmitt circuit.

One other resistor was slightly increased in the amplifier stage of the 3410 and 4410 to narrow the output pulse enough to meet specifications. All the models have been built and tested, and the modified units will be put into production as soon as the old stock is used up.

For the past several days, pictures have been taken of the waveforms of transistor currents and voltages. The current waveforms were obtained by using a Tektronix 131 Current Probe Amplifier. High and low speed units have been used with first a flip-flop and then a pulse amplifier as the transistor load. With each separate load, pictures were taken with the emitter grounded and then with it coupled to three inverters.

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J. Atwood

Rush projects of the moment include the new trade show booth (which moves into the Coliseum September 21 for the I.S.A. Exhibit), the logic handbook (which is awaiting a couple of additional chapters), the 3000 Series Catalog, the Memory Exerciser 2201 folder, and the mailing list clean-up. On the priority list are new shipping cartons, new Building Block packages, publicity on the delivery of PDP-1B, additional replacement schematics, condensed circuit schematics, corrected 1000 and 4000 Series catalogs, and trade publication advertising for the fall.

New short form catalogs are in (the same version as those to be bound into the Electronic Designers Catalog), and the 100 Series catalogs have been delivered. The 10 mc catalogs are reprinting to make the halftones on the front cover look the way they were supposed to.

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File

BIWEEKLY REPORT

COPY NUMBER 2

DATE August 12, 1960

S. Olsen

Employees Left

7/29 Janet Chapman - Clerical
7/29 Erma Law - Clerical (L.A.)
7/29 Evelyn Ferguson - Assembly
8/2 Gertrude Paquin - Assembly
8/12 Ann Davison - Summer assembly
8/12 Carol Murphy - Summer assembly
8/12 Marcia Wilson - Summer assembly

Employed

8/3 Kathleen Conrad - Assembly
8/8 Ruth Dallamora - Assembly
8/9 Katherine Knight - Assembly
8/10 Donna Kopp - Assembly
8/10 Elizabeth Kopp - Assembly

Employees reporting for work week of 8/15

Joanne Buckley - Assembly
Mary Bruen - Assembly
Joyce Charles - Assembly
Gordon Bell - Engineer

Pending Physical Examination

Pauline Chase - Assembly
Mary Delgado - Assembly
Marilyn Cunningham - Clerical
Edward Mayall

Offer made - awaiting answer

Edward Stover - draftsman

SUPERVISORS: Kindly inform Personnel Office termination date of summer employees.

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BIWEEKLY REPORT

COPY NUMBER

DATE August 12, 1960

E. Harwood

PDP-1B

All the mounting panels for the main frame have been installed and most of the wiring on these panels completed. I have received most of the power supplies and about three hundred plug-in units so we can hope to start the preliminary check-out in about two weeks.

RCA has promised the first stack either today or Monday and the second one by the end of the month.

D. White

Testers for the following plug-in units are being made:

4215 Four-Bit counter - completed
1550,1554 X10 Amplifier - being debugged
1555, 1556 Slice Amplifier - test circuits being developed.

Quality Control has been having a little difficulty with margins on 201 flip-flops. The problem is apparently the result of normal variations in value of two resistors. An engineering change will be started if the trouble persists.

NEW BOOKS ADDED TO LIBRARY

1. MATHEMATICAL METHODS FOR DIGITAL COMPUTERS - Edited by Anthony Ralston and Herbert S. Wolf
2. THE THEORY OF OPTICS - Paul Drude
3. THE UNIVERSE OF LIGHT - Sir William Bragg
4. ASTRONOMY OF STELLAR ENERGY AND DECAY - Martin Johnson
5. THE INTERNAL CONSTITUTION OF THE STARS - Sir A. S. Eddington
6. THE THEORY OF FUNCTIONS OF REAL VARIABLES - James Pierpont - Vol. I.
7. THE THEORY OF FUNCTIONS OF REAL VARIABLES - James Pierpont - Vol. II
8. A TREATISE ON GYROSTATICS AND ROTATIONAL MOTION - Andrew Gray
9. FUNCTIONS OF A COMPLEX VARIABLE - James Pierpont
10. PRINCIPLES OF QUANTUM MECHANICS - William V. Houston
11. THE THEORY OF HEAT RADIATION - Max Planck
12. THE DYNAMICS OF PARTICLES - Arthur Gordon Webster
13. MAGNETIC AMPLIFIER ENGINEERING - George M. Attura

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(New Library Books - continued)

14. THE SKY AND ITS MYSTERIES - E. Agar Beet
15. PHYSICS - MECHANICS, HEAT, AND SOUND - Lloyd W. Taylor
16. TENSORS FOR CIRCUITS - Gabriel Kron
17. DIFFERENTIAL EQUATIONS FOR ENGINEERS - Philip Franklin
18. COORDINATE GEOMETRY - Luther Pfahler Eisenhart
19. BASICS OF DIGITAL COMPUTERS - John S. Murphy'
20. MODERN PROBABILITY THEORY AND ITS APPLICATIONS - Emanuel Parzan
21. DESIGN OF TRANSISTORIZED CIRCUITS FOR DIGITAL COMPUTERS - Abraham I. Pressman
22. NOMOGRAPHY - Alexander S. Levens - Second Edition
23. ELECTRONIC COMPONENTS HANDBOOK - Edited by Henney, Walsh, and Mileaf - Volume III
24. STATISTICS MANUAL - Crow, Davis, and Maxfield
25. APPLIED HYDRO-& AEROMECHANICS - Prandth and Tietjens
26. MICROWAVE TRANSMISSION - J. C. Stater
27. SIX-PLACE TABLES - Edward S. Allan
28. THEORY OF FLIGHT - Richard Von Mises
29. GREAT IDEAS OF MODERN MATHEMATICS - Jagjit Singh
30. PRODUCTION PLANNING AND INVENTORY CONTROL - John F. Magee
31. HYDRO-DYNAMICS - Garrett Birkhoff
32. DIGITAL COMPUTER AND CONTROL ENGINEERING - Robert S. Ledley
33. ELEMENTS OF PURE AND APPLIED MATHEMATICS - Harry Lass
34. GETTING THE MOST OUT OF YOUR LATHE - Deltacraft Publication
35. HOW TO ACQUIRE A QUARTER OF A MILLION DOLLARS FREE OF TAXES - Institute of Business Planning, Inc.
36. WHAT YOU CAN DO NOW TO CUT TAXES AND SAVE CASH THIS YEAR - Institute of Business Planning, Inc.
37. THE CASE FOR INDEPENDENT COUNSEL IN PENSION PLANNING - R. P. Burroughs Company, Inc.
38. THE CASE FOR INDEPENDENT COUNSEL IN EMPLOYEE WELFORE PLANNING - R. P. Burroughs Company, Inc.
39. THEORY OF PROBABILITY - William Burnside
40. A PRIMER OF REAL FUNCTIONS - Ralph P. Boas, Jr.
41. PHYSICS - LIGHT AND ELECTRICITY - Lloyd W. Taylor
42. HYDRODYNAMICS - Dryden, Murnaghan, and Bateman
43. ORDER AND CHAOS IN THE WORLD OF ATOMS - Saunders & Clark
44. RADIATIVE TRANSFER - S. Chandresekhar
45. THE APPLICATION OF ELLIPTIC FUNCTIONS - A. G. Greenhill
46. HYDRODYNAMICS - Sir Horace Lamb
47. ENCYCLOPEDIC DICTIONARY OF ELECTRONICS AND NUCLEAR ENGINEERING - Robert I. Sarbacker

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J. Cudmore

SUBJECT: Modifications to 1201, 1209 Flip-Flop

The present 1201 and 1209 flip-flops use 2N393 and 2N588 transistors. The circuit is being changed to use the less expensive 2N588s throughout. These modifications will also lessen the PRF sensitivity and reduce the variations in the delay characteristics of the flip-flops.

SUBJECT: Trigger Circuit Analysis

The input coupling circuits on the 1201, 1209, 201 have been modified from time to time as the circuits underwent revision. The four circuits used were compared to see if they all were capable of operating in a shift register containing a single "one". Although all circuits operated somewhat differently, all performed well at 5 mc.

D. O'Brien

The output unit for PDP-1B being built for BBN is to include a cathode ray tube for an analog display of results. The main changes from the unit in operation are a new physical layout of the deflection amplifier and a new deflecting yoke (Syntronics $85). The new unit has a response time of 50 usec. compared to over 100 usec. on unit now in use. Tests are now being run on a CRT to determine the total time between input of analog information and display.

Work has also been started on a transistor version of this amplifier. The power to drive a deflection yoke necessitates a power transistor, while the desired speed requires a high frequency device. The transistors purchased are Texas Instrument 2N1046 ($22.50)

ic max = 10 amp
Total dissipation = 30 Watts
Int. Cutoff Freq. (@B=1) FL = 15 mc

With two of these in a push-pull output combination, all of the yoke requirements are satisfied. A curcuit schematic has been worked out. I will continue calculations on this circuit after the tests on the tube model have been completed.

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BIWEEKLY REPORT

J. Maulding

For the past several weeks I have been testing the temperature stability of high and low speed clocks and delays over the range -20° to 55°C. Specifically, the units tested were 4401 and 1404 clocks, and 4301 and 1304 delays. With only one exception, the times changed less than 10 per cent from their values at room temperature. The graphs of the percentage change from room temperature versus temperature showed that the changes were not at all linear in nature, but more often parabolic. The results and the procedure followed are available in more detail in an inter-office memorandum. A new hot and cold chamber which recently came in will expedite future tests considerably.

At present I am working on the 4680 solenoid driver in which there is the problem of thermal runaway in the second transistor stage. It is suspected that this occurs after the transistor has been worked hard at a high temperature and then held for a time at cut-off.

J. Sheahan

The first model of the 710 power supply was delivered to the production department this week. This unit will supply ± 10 volts d.c. at 0.5 amp. with regulation within 0.5 volts from no load to full load. The supply will maintain this regulation for line variations between 105 and 125 volts a.c. while the ripple always remains below .5 volts peak to peak. The 710 will replace the more costly 730 supply in systems requiring a 10 volt supply.

A "Burst Generator," Model 2302, was completed this week and installed in the final test section. This unit supplies the necessary waveforms for checking DEC Building Blocks and Test Equipment. This package replaced three panels of Test Equipment formerly used in lieu of it. A modified model of this unit 2303 is now in the design stage and will be built shortly. This model will provide a number of additional waveforms and functions useful in the design and testing of DEC units.

BIWEEKLY REPORT

A. Campbell

A new circuit design for crystal clocks 406, 1406, 3406 and 4406 has been worked out and will be released to production shortly. The new circuit is basically a tuned oscillator feeding a modified pulse generator, and is so designed that by changing only two tank components and the crystal, any frequency clock, 3KC to 500 KC, and 500 KC to 5 MC, may be built. The original circuit geometry was the same for all four clock circuits, but now the high speed series will have a slightly different circuit since at frequencies above 2MC recovery time of Schmitt circuit became critical. This problem has been corrected and the experimental models have been successfully tested at 200KC, 500KC, 1.4MC, 4MC and 5MC.

The 10,000 volt power supply 763 for PDP-1B has been built and is ready for final tests. A current calibrator 70 chassis was modified to accommodate the parts. To insulate and seal the high voltage connectors a rubber compound that vulcanizes at room temperature was used with very good results.

M. Sandler

Production:

The separation of our assembly group into two sections - a pre-assembly section, which performs operations to prepare boards and panels and accessory items, and a unit assembly section, which performs operations to assemble units - has taken hold. In the unit assembly section we are further separating into a component assembly section and a final assembly section, and this division apparently will improve our productivity and supervision efforts.

Cost Control:

A proposal for a part numbering system which be adaptable for IBM punched-card processing is being worked on.

We have IBM tests available to be given to prospective card-punch operators.

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BIWEEKLY REPORT

COPY NUMBER

DATE August 12, 1960

J. Fadiman

During the past two weeks the Automatic Core Tester 2102C was delivered to TMI in Los Angeles. I installed it out there and also made several repairs to the other core tester there. The third core tester is due for delivery in the middle of September.

Panel layouts, some of the block diagrams, and some of the wiring diagrams have been completed for the Memory Exerciser 2202 for TMI. This is scheduled for delivery in the middle of October.

Lockheed (Avionics Division, Mr. Roy Skierik) is interested in a coincident current, word-address memory plane tester similar to the MT 1515. They say they are going seriously into the memory core and memory plane business. They are certainly possible customers, though difficult to deal with since they know neither what they want nor when they want it.

We lost the first evaluation core tester for IBM to Rese. However, Wally Weeton and I are going to Poughkeepsie next Tuesday to discuss the possibility of further testers.

The automatic core tester 2105 for General Ceramics is sure. We should receive the order next week.

R. Doane

Recently, I have been working principally on readying parts of our 10 MC line for production. 6603 pulse amplifiers are nearly ready for test, but difficulties in both variable clocks and the 3 bit parity circuit will require further circuit modifications before they can be released. I have tried to get the tests, testers, and test data sheets for the pulse amplifiers designed synchronously, so that the test results will be more meaningful to the customer and to ourselves, and so that the testing will be easy and fast. The 6603 run will be an opportunity to estimate my success.

Some experiments have raised doubts in my mind about the significance of our pulse diode specifications for the performance of the diode in our circuits. I hope to see whether we can design a test or tests which will have a positive and consistent correlation with circuit performance, if it really turns out that our present tests do not.

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BIWEEKLY REPORT

L. Prentice

Major emphasis during this period has been on completion of the display and console for the BBN computer. Major portions of the display units are nearly complete for drafting. Machine parts for holding the yoke and focus coil have been completed. The table is in the process of fabrication and can be complete within the next few days. Plans are under way to acquire additional personnel for Joe Gill to release one of his men so that he may be available to work on this program. It is our hope that Arthur Zener will be available Monday to assist in conducting tests and to assist in molding implosion shields, experimenting with cements, and a host of other small details which are needed to complete the design of the new display and a control section for the console.

K. Olsen

M.I.T. Magnetic Tape Unit

I talked to Tom Stockebrand on July 5 about the TX-2 tape unit because it is the type device we may need to solve the business problems. He says they are having good success with the first unit on TX-2, and although it makes some errors, the unit is very useful. He is designing a new unit now which will have one motor driving two reels (coaxially) through a differential. He claims this will allow very small tape tension and will make possible the driving of the reels through a very large 2 h.p. motor. In order to make the system work he had to increase the inertia of the reels significantly. He feels that it will get up to speed in three seconds. Their goal is to have 1.5×10^{10} bits of information held in 30 tape drives. The new unit will have 1¼" tape on 14¼ reels. The inside hub is 8" in diameter which cuts the capacity of the reel from 7200' down to 6000'.

They are using 3M type 189 sandwich tape, and he feels the optimum density is 400 lines to the inch. They will have 22 bits across the tape, but will end up with only 9 useful bits.

Many of these things will be very useful in the tape drive which we are considering. Ours will use the capstan and vacuum column but will be simplified as much as possible.

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K. Olsen (continued)

Analex Line Printing Logic

We have considered magnetic core arrays for storing information for an Analex line printer, but we worked up a much simpler and more clever system using flip-flops. We will package six 2-transistor flip-flops and one plug-in unit. There will be one plug-in unit for each column to be printed and this plug-in unit will hold the code of the character to be typed. There will be a complement input for each flip-flop for reading in and checking for coincidence, and a common clear. The zero output in each flip-flop will drive a six input AND circuit which will drive an unclamped converter to fire the thyratron. The output of the counter at any time will be the code of the character in the print position. Wherever there is a "1" in the character counter, that digit of all the column registers will be complemented. If a column register is then all zeros the thyratron will be fired. The same lines are complemented again so that the information is returned to its initial state and the counter is advanced to the next character code.

When reading in the character, code is read into the character counter register. In order to read three characters in simultaneously, three separate registers are used. Each one drives every third column register. To read into a column register, all the registers are complemented wherever there is a "1" in the corresponding character counter register. The then column register to be read into is cleared and the same complementing procedure carried out. All the other registers are returned to their original state, but the ones that were cleared have the new information put into them. A shift register (24 bits for 72 columns) is needed to keep track of which column it is read into.

R. Hughes

Circuits

The 410, 1410, 4410 and 3410 are being modified to incorporate 5% resistors. This change will allow us to have fairly constant ranges of triggering points in the schmidt circuit. In the past we had lots which will trigger the schmidt at voltages in the range 1.7 to 2.0 and some lots trigger in the range 2.0 to 2.4 depending on resistor tolerances.

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BIWEEKLY REPORT

R. Hughes (continued)

We have had troubles in reproducibility with the 201 flip-flops. Lately the delays are quite short and margins low. The short delay appears to be caused by the high speed of the T1927 transistors in the internal flip-flop. The low margins are partly due to the delay being so short. At present we are nursing these units through test.

The 710 power supply model works O.K. and will be in production soon.

A final version of the 2303 burst generator has been agreed upon and is in the works.

We have experienced some difficulty in making the 4406 crystal oscillator work at 4 KC. This has delayed the design of this circuit.

New Transistors

Texas Instruments is looking into the possibility of making a 2N711 with a VCE max. rating of 15 volts (the 2N711 is 12 volts). This transistor could replace the 2N1301 transistors we now use as a pulse amplifier in the 10 MC line and in the 5 MC line it could replace the 2N588(G). The 2N711 sells for $1.50.

Philco has sent samples of the 2N1499A transistor which look very good. They are a 12 volt version of the 2N1499 which is the replacement transistor for the T1692 which we use in the low speed line. The cost of this unit is $.96 versus $.92 for the T1692. This unit is spec.'d as a switch whereas the T1692 is an IF transistor.

Sprague Electric is selling some inexpensive M.A.D.T. transistors. We ordered 100 of the $1.55 kind and 100 of the $1.70 kind and are evaluating them for possible use in the internal flip-flop position of the 201 and 1201.

File
H.E.G.

BIWEEKLY REPORT

COPY NUMBER 2

DATE July 29, 1960

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S. Olsen

Employed: - (Permanent)

7/1	Joanne Terrasi, advertising
7/5	David Dubay, technician
7/5	Elizabeth Mariano, assembly
7/5	Barbera Stephenson, sales eng.
7/6	William MacMunn, technician
7/6	George Veracka, general help
7/6	Agnes Wuorio, assembly
7/7	Roger Williams, draftsman
7/8	Stephen Mayuski, sheet metal
7/11	Jon Armour, sheet metal
7/11	Stephen Lambert, technician
7/11	Charles Manion, drafting
7/11	Patricia Pizza, secretary sales
7/11	Richard Reynolds, shipping
7/12	Cynthia Stockwell, secretary, production manager
7/13	Maurice Chase, wireman, Q.C.
7/13	Mary Gooligian, assembly
7/13	Frederick MacLean, accounting department
7/13	Virginia Roche, assembly
7/18	Beverly Morash, assembly
7/18	Priscilla Prowten, assembly
7/19	Julia Scacciotti, assembly

Employed: - (Summer)

7/1	Priscilla Rendell
7/5	Richard Kangas
7/13	Marcella Mazzarelli

Left:

6/24	Michael Coite
6/27	Dennis Motta
7/1	Frederick Gould
7/1	Doris Dumas
7/12	Pauline Mercer
7/18	Beverly Morash
7/22	Patricia Pizza

Total number of employees:

121	permanent
15	summer
136	Total

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M. Sandler

Status of Finished Goods

	ON HAND	ON ORDER	AVAILABLE	IN-PROCESS
Test Equipment	197	355	-158	630
System Equipment	537	849	-312	1300
Blue Line (Test)	137	20	+117	340
Blue Line (SPU)	226	1068	-842	1425

Units to Stock: April - 1358, May - 1562, June - 2403,
July - 1800 to date

The physical inventory taking and pricing is now complete and the audit nears completion. This past year showed marked improvement in inventory paperwork integrity, but we still need improvement.

Plans for IBM data processing of cost information are gathering headway. Fred McLean of Accounting is attending IBM school this week and others of our accounting people are scheduled to attend classes during September.

J. Fadiman

The past two weeks have been spent mostly working on the Memory Exerciser 2202 for TMI, and the Core Tester 2102C for TMI. The Block Diagrams for the main registers in the Exerciser have been completed and these will be turned into wiring diagrams next week. Drawings have been completed for about half the front panels. The Block Diagram for the Pattern Verifier will be drawn next week. I will discuss further details about timing, etc, with TMI when I am out in California.

The Core Tester 2102C has been completed, and final check-out will be finished today and Monday. It will be shipped to TMI on Tuesday, August 2.

A proposal has been made to Mr. Kurt Schlacht of General Ceramics for an automatic Core Tester 2105 which will be a combination of our 2102 and his specifications. We are almost certain to receive this order in the near future.

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J. Fadiman (Cont.)

The proposal for a Memory Exerciser, 2203, has been made to IBM. We should receive the order for this as soon as their vacation is over August 1. Somewhat later we should receive orders for Core Testers, Model 2106, for which a final proposal has been submitted. We are still waiting to here from Remington Rand on Core Testers. No final proposal has been made to them.

Work is proceeding on the Memory Plane Tester 1512D for General Ceramics. All Mounting Panels have been wired and the remainder of the front panels are being wired.

B. Gurley

On the 18th of July, I visited the University of California Lawrence Radiation Laboratory at Livermore, California, and on the 19th of July, I visited Lawrence Radiation Laboratory installation on campus at Berkeley, California. The interest at Livermore is in a PDP-1 or perhaps, a PDP-3 to act as a common unit for the Remington Rand Univac LARC and the IBM 709 computers. Their particular interest in the machine is in the Cathode Ray Tube Display. They are also very much interested in a 5" high resolution display both for taking photographs, but more for the use of the scope together with an optical system and a photomultiplier for reading film data into the computer. Data they wish to read in is primiarily seismic data. They would like to be able to read and prepare tape compatible with the IBM format and tape compatible with the LARC magnetic tape. In both cases, an Ampex or Potter unit would be acceptable to them with the appropriate controls. They are also interested in the possibility of either an Analex Printer or a Stromberg-Carlson Printer being attached to the machine. They are not sure that they want the Sequence Break System, however, because of the time required to get into and to change sequence and to get back out of a given sequence.The time in this standard Sequence Break System is 50 microseconds, so that in handling magnetic tape, the 50 microseconds plus any orders actually necessary to handle the magnetic tape would occupy the computer almost more than half time without doing any data processing. So, they have asked for information on a fully synchonous transfer data for magnetic tape.

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B. Gurley (Cont.)

This would be a thing like a data synchonizer on the 709 and this is a very straightforward device using only our standard logic and no fancy special purpose circuits. There were perhaps a dozen people present at Livermore, including circuit people, programmers, and of course, Dr. Sidney Fernbach, the boss. Mrs. Dorothy T, Monk (Mrs. J. T. Monk) took notes of the meeting and she has kindly supplied us with a copy of her notes and we shall return a second price listing of various parts to answer any questions that arose in the meeting. It seems like a fairly sure bet that they will want to buy a PDP-1 or perhaps a PDP-3. They are extremely interested in delivery.

The people at Berkeley are interested in PDP-1 as a preliminary Data Processor of 35 millimeter films obtained from a Bubble Chamber. A Bubble Chamber is a device which records the tracks of ironized particles from a cyclotron. The problem appears to be not unlike the SAGE problem of indentifying aircraft tracks from radar data with a very large noise background. However, the Bubble Chamber photographs have many, many more tracks than the SAGE ever needed to handle. Again, they would like to read films into the Computer via a high precision scope together with an optical system and a photo-multiplier. Both Berkeley and Livermore are quite willing to build the optical system with perhaps some assistance from us, and amplifiers on the photomultipliers. The people at Berkeley probably are interested in some specialized orders such as a Tally order. A Tally order counts the number of ones in the Accumulator. This could be essentially an auxiliary attachment to the computer. Berkeley people are not interested in multiply and divide. The Livermore people are interested in multiple and divide. The Berkeley people may also want a high speed data transfer only to the cathode ray tube rather than to the magnetic tape. Mr. Howard White at Berkeley said that he would decide what sort of a configuration he would want within a month or so and would write us a letter indicating this and asking for a quotation. Also, at Berkeley, was a Dr. Bruce McCormick who is at Berkeley for the summer, but who has a regular appointment at the University of Illinois. They also are doing the same type of work as Berkeley, and they discussed the possibility of both Berkeley and Illinois having the same computer to do preprocessing of the data. They feel this would, of course, give

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B. Gurley (Cont.)

them quite an advantage each having the same piece of equipment and thus, they could communicate programs between each other. They asked about the possibility of having price reductions on special designs as a result of the possible purchase of two machines. I indicated that some reduction would be possible if we had in hand a firm order for two machines.

Harlan Anderson and I visited Cambridge Research Center during the past period and they also appear quite interested in obtaining a PDP-3.

We also visited the MITRE Corporation on the 26 of July, 1960. There seems to be two groups interested in PDP computers. However, on the way in we talked with Bob Everett, the Vice president of MITRE, and he indicated that we should hold our breaths until we received these orders from these groups.

K. Olsen

DARC

We have been thinking more about the design of the Digital Average Response Computer. Dr Weinstein is about ready to give us an order for one (if he can get his money). We led him to believe that delivery would be one or two months, and he was disappointed to hear that it would be two or three months. The DARC looks very much like one of our Memory Testers, and so it is a natural for us. It is somewhat simpler than a Memory Tester because it has fewer knobs and the memory works in a fixed timing cycle. The price will be higher because it includes the drivers, switches, and planes for a complete memory system.

We plan to sample 256 points on each response. It would be nice if we had another mode of operation in which we averaged two separate inputs and interleaved 128 samples on each.

I think we should put a time based pen recorder on the machine because it is simpler than an X-Y recorder. It would not be fast enough to record responses during normal operation, but we could periodically stop summing and relatively

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K. Olsen (Cont.)

slowly go through the memory and record the output on the pen recorder. We may need a flip-flop register to drive the recorder, but this would only take two of our four flip-flop plug-in units. If we want to record two simultaneous inputs, we probably would need two flip-flop registers.

We will have to count the responses and should have an automatic turn-off when a number reaches a preset value. I think we can limit the preset value to even powers of 2, and it probably should go to the 14th power of 2, which would be 16,364.

Dan Geisler feels that automatic scale factoring, even smooth uniform scale factoring, is not necessary; but we , of course, need a knob that will scale factor by two. This will be a 12 position switch.

Our latest thoughts are to have 6 bit encoder at 12 bits of overflow so that we can average 4000 full-scale samples or 8000 half-scale samples, or a lot more smaller samples. Dan Geisler uses 8 bit encoder but only uses a small portion of the scale and so uses only about 4 bits, I believe.

The memory will probably be like PDP-1 but with slower transistors. We will look into aperture plates because their price may be competitive and they come in just the size we want. If we want to interleave four inputs and have 256 samples on each, we could use the original PDP-1 memory.

Dan Geisler feels we should not supply the stimulus source because it would raise the cost and every good laboratory has oscillators and the like. However, I think we should offer a separate panel which would have a variable oscillator which drives a variable gate generator. This can be used to gate bursts of audio signals or produce clicks in earphones.

This unit should be reasonably portable and should have handles on the side and, if possible, it should be able to carry in the station wagon. Of course, station wagons are getting lower every year and maybe we should say it will

K. Olsen (Cont.)

fit into a panel truck. Possibly we could make it so that it could be laid on its side or on its back. Aluminum trim on it could be skids so that it could be laid down flat.

I don't like the idea of buying a commercial oscilloscope because it leaves dozens of knobs to confuse the operator and the oscilloscope is one of the few parts which show on the front panel of this rather expensive machine and I would hate to make the most impressive part of the DARC a $200 oscilloscope made by someone else. My thoughts on this oscilloscope are to make a high voltage digital to analog converter and drive the deflection plates directly. This eliminates all high gain amplifiers which always do have trouble.

We need three 12 position switches: Total Numbered Responses, Responses Between Recordings, and Scale Factor Switch. This latter switch if done with a rotary switch is very complicated so I recommend that we do them all with push buttons like the ones we use in our 1512 testers. They are made with 12 push buttons.

J. Atwood

Literature preparation status:

A-400 Logic Handbook -- ready to typeset
A-700B Revised Short Form Catalog -- printing
A-710 10 MC Catalog -- final copy being typeset
B-100 100 Series DTE Catalog -- awaiting salt print
B-3000 3000 Series DTE Catalog -- awaiting copy changes
F-2201 Memory Exerciser Type 2201 -- ready for final layout
F-1514 Memory Tester Type 1514 Bulletin -- ready for layout
DF393 Employee Handbook -- covers run, inside text being shot for multi plates

Material for mailing list clean-up approved and being readied for printer. This is about a three-to-four weeks deal.

Proposed trade publication advertising schedule under consideration. Effort will be concentrated on building block line.

Other projects proceeding apace.

BIWEEKLY REPORT

COPY NUMBER 2

DATE June 24, 1960

S. Olsen

Employed:

6/13 Carolyn Cunningham - assembly - summer
David O'Brien - eng. aide - summer
Jonathan Moulding - eng. aide - summer
Arthur Campbell - eng. aide - summer
Leslie Silliman - mail clerk
John Stefanowicz - production
John Dinopoulos - technician
Bruce MacDonald - technician
Joseph Lampasona - technician
Muriel High - stock clerk, production

6/14 Algimantas Yurkstas - draftsman
Caroline Maria - assembly

6/20 Thaddeus Rydzewski - technician
Robert Trainor - draftsman
James Cudmore - engineer
Dennis Motta - draftsman
William Butler - eng. associate
Henry DeMichele - sales
June Macomber - assembly

The following people have accepted job offers and will be reporting:

7/5 Joanne Terrasi - office, adv. dept.
Barbera Wertz - eng. - sales

7/11 Stephen Lambert - technician

8/15 Gordon Bell - engineer

Employees left:

6/13 Ellen Norton

J. Fadiman

On June 22, the Automatic Core Tester Model 2102B was delivered to RCA in Needham. We are now in the process of setting it up at RCA. On June 21 Bob Dawley and Mr. G. L. Cole of IBM, Poughkeepsie, were here to look over the core

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BIWEEKLY REPORT

COPY NUMBER

J. Fadiman (Cont.)

tester. They would like some modifications, which would change the machine somewhat, and then they would be interested in buying at least two machines. A proposal will be made to them on next Monday. The price of the standard Model 2102 is now $20,000. Last Friday a visitor from Remington Rand, Utica, was here, who was interested in buying a Model 2102 Core Tester.

The Model 2102C Core Tester for TMI is proceeding rapidly. All front panels have been made and are about to be silk-screened. All wiring drawings are completed.

Mr. John Erikson of IBM, Kingston, is very interested in our Memory Exerciser 2201, but wants some modifications and additions, including the ability to test a 0.5 usec. memory. A proposal will be submitted to him next week.

H. Anderson

Sales and Computer

The reps are beginning to be effective in calling our equipment to the attention of more people. Wild & Associates are particularly doing a good job on correspondence. Some good is bound to come of all of this extra effort.

All reports from Bolt, Beranek & Newman where PDP-1 is on loan continue to be very favorable except for the tape reader which Ben Gurley is actively working on.

I have been conducting an investigation of decimal adding techniques that might someday be useful in PDP. In general we don't believe in decimal computers, but in a restricted class of problem, they may be very useful. When a small amount of computation needs to be done on many pieces of data which are inherently decimal, the conversion process could occupy a significant amount of time. IBM had a discussion of this subject as it pertained to STRETCH in one of the recent issues of the ACM Journal.

Phister's book (Logical Design of Digital Computers) p. 266, discusses decimal addition. Two popular codes are (1) Excess 3 code (XS 3) and (2) Binary Coded Decimal (8-4-2-1) BCD. The addition method varies depending on which code is used.

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BIWEEKLY REPORT

H. Anderson (Cont.)

The XS 3 code looks interesting to me at the moment. The carries between decimal digits for this code occur at the same time that binary carries occur between the groups of 4 bits. The sum of two XS 3 digits when added in a normal binary mode will be in error by a count of three.

Normally, this error is corrected by making a logic net. This gets rather involved however. I am now investigating the desiribility of pulsing the binary carry into the 4 bit group three times to make this correction.

M. Sandler

Status of Finished Goods

	ON HAND	ON ORDER	AVAILABLE	IN-PROCESS
Test Equipment	227	429	-202	680
System Equipment	674	1355	-681	1220
Blue Line (Test)	140	74	+66	220
Blue Line (SPU)	168	1187	-1019	1520

Units to Stock: May - 1620 units
to date June - 1688 units

Our cost system program is gathering steam. Of course, present duties come first and physical inventory and year end closing work will take up our time during the coming few weeks.

Fernval, Inc. in Framingham, has invited Alma Pontz, Bob Dill, and myself to see their payroll preparation run on their IBM installation next Tuesday.

L. Prentice

Most of the effort during this period is gone into trying to ascertain how many and what kind of dies would be most profitable to build during the coming six months. Quotations have been received from two vendors on dies for the plug-in unit handles and for the top and bottom brackets. It has been decided to place the order for the plug-in handle die. Negotiations for this should be complete today. Procurement of stock and die making equipment is still to be done. The last major item, a milling machine is due to arrive early next week. This will complete major facilities added to the shop this year.

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E. Harwood

Most of the work done on the computer has been making the necessary modifications for the addition of the In-Out B reak System. I hope to have these modifications completed this week and start wiring the frames together next week.

K. Olsen

Card Machines for PDP

We have been carefully looking into card machines to be installed in the PDP machine and have tentatively come to the following conclusions.

For 100 card per minute operation the 523 Summary Punch is the most economical. This unit has one card feed, but can be used for either punching or reading. All connections can be made to the outside world through the summary punch connector, we think.

For faster reading, the 528 Accumulating Punch has a separate read and punch feed. The read can go at 100 or 200 cards per minute and the punch at 100 cards per minute. This would be a nice standard machine to go with PDPs where you want both read and write.

For high speed punch we would use the 88 Collator which will handle 650 cards per minute. This has two card feeds, but I think I would normally use only one of them.

For their 1401 computer IBM has modified the type 88 Collator so that one feed station feeds cards at 450 cards per minute through a punch and the other one reads at 800 cards per minute. This would be a very nice unit to rent except that it is very doubtful that IBM will rent them to other computer manufacturers when they are so far behind on 1401 deliveries.

Mr. Howard Ludke is a technical specialist at the Natick office. Their phone is OL 3-4600. He should be able to give us answers to technical questions. He measured the resistance of the punch magnets as 100 ohms. This means that at 48 volts it would take half an ampere to drive them. This seems high to me because they do drive them from 2D21 thyratrons which have a maximum cathode current of 100 ma.

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BIWEEKLY REPORT

COPY NUMBER

DATE June 24, 1960

K. Olsen (Cont.)

IBM machines normally have a floating 48 volt power supply. Punch magnets are tied in common to the -48 power supply terminal. If we grounded the positive terminal of the supply we could drive the punch magnets from grounded emitter transistor. Philco has a PNP power transistor with an 80 volt rating whose stud is connected to the emitter.

The 523 rents for $85 per month, the 528 rents for about $195 per month, and the simplest type 88 Collator rents for $325 per month.

We have already ordered a 026 key punch and a 523 for experimentation. We also plan to install a card system for our own accounting and cost measuring, and so we may also get an IBM 402 Accounting Machine and type 85 Collator.

J. Atwood

We seem to be pretty well settled into our new area. For those who come looking for literature, all the basic material (catalogs, bulletins, application notes and schematics) is now arranged product line by product line on the open racks. Each rack is labelled on both ends to indicate which product line it contains, so it should be relatively easy to lay hands on any given piece -- provided it has been printed and is still in stock. Proposals, operating manuals, and other specialized publications are in the four-drawer files, which are also labelled. If you still can't find what you want, ask us.

The latest mailing is on its way -- to 8300 names now on the mailing list. This total will be whittled down a bit the next month or so, since our next direct mail project is to clean the list of deadwood of various sorts. However, the way the inquiries continue to roll in, the reduction may be only a temporary one.

We are edging several projects into production. Dick and Bob have come up with the 10 mc. unit descriptive material, and a format for the 10 mc. catalog has been agreed on. With a little more copy, a few photos and some logic diagrams (all in the works), we will have this one ready to go. Progress on the new 100 Series catalog has been slower than desired, but we hope to get it to press about the end of the month.

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J. Atwood (Cont.)

Text and diagrams are being assembled for the "DEC Logic Handbook" -- which should prove to be about our most valuable publication when completed.

The Short Form Catalog is being revised in a few places before being reprinted for insertion in the ELECTRONIC DESIGNERS CATALOG, and the 2201 folder and 1514 bulletin are just about ready for layout. We also have a quantity of replacement schematics and condensed schematics that will go to camera any time we settle on a final version.

B. Gurley

On the 13th and 14th of June, I was at Case Institute of Technology in Cleveland, Ohio. On the 13th I talked to the people in a course on machine control and described the use of our equipment, both test equipment and system equipment. They had three set ups of DEC test equipment and three set ups of Harvey-Wells equipment. One of the engineers from Harvey-Wells was a member of the course. The next day I talked to the professor who was running the course, Professor Mergler. He is interested in a PDP-1 to do a control problem having to do with an interplanetary rocket control. The machine needs to perform on a curve fitting calculation which is a third order correction. That is, to fit a curve to two data points, it calculates the equation which would go through those two data points and the data point on either side of the two points of interest. When a new piece of data comes in, the curve fitting process is repeated between the next two points. He wrote a paper at the Western Joint Computer Conference of 1954 describing generation of this function by means of analog equipment.

We have received a very interesting request for a preliminary quotation for the University of California at Livermore, Calif. The Livermore Laboratories of the University of Calif. are a leading user of computers. It is very pleasing that such a prestigeous user of computers is interested in our PDP-1. They would like the PDP-1 to be able to act as an intercommunication link between IBM 790 Computers, 709 Computers, and the Remington Rand Larc which they have just received.

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B. Gurley (Cont.)

To do this job, the computer must be able to handle IBM tape, Remington Rand tape, and our own magnetic tape, plus have a display, line printer, and a few other in-out devices.

Our computer which has been loaned to Bolt, Beranek, & Newman is doing well with the exception of the photoelectric tape reader which does not perform very well. This is rather discouraging because our early experience with the device was very good. At Bolt, Beranek, & Newman, there are some very high powered programmers who are interested in working on the machine.

The sequence break system panels for PDP-1B are now wired and the logic for most of the in-out equipment is now drawn up.

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BIWEEKLY REPORT

COPY NUMBER 2

DATE June 10, 1960

S. Olsen

Employed

5/16 Herbert Norton - technician
Mae Wuorio - assembly
Donald White - engineer
Althea Healy - office

5/17 Georgina Mickevicz - purchasing

5/23 David Nevala - sheet metal dept. - to Nov. only

5/31 Russell Doane - engineer
Doris Dumas - assembly
Fred Mariani - accounting dept.
Gertrude Paquin - assembly
Carol Murphy - assembly - summer only

6/1 James Sheahan - eng. aide - summer only

6/6 Bruce Bromby - draftsman - summer only
Linda Treyz - production - summer only
Walter Crowther - production - summer only
William Daigneault - sheet metal dept.

6/8 Ann Davison - production - summer only
Marcia Wilson - production - summer only

The following employees will be reporting for work:

The week of June 13

Leslie Siliman - office boy, etc.
Muriel High - Production stock room
Arthur Campbell - eng. aide - summer only
Jonathan Moulding - eng. aide - summer only
David O'Brien - eng. aide - summer only
John Dinopoulos - technician
John Stefanowicz - production
Joseph Lampasona - technician
Roger Williams - draftsman
Carolyn Cunningham - assembly - summer only
Caroline Maria - assembly.
Algimantas Yurkstas - draftsman
Bruce Mac Donald - technician

The week of June 20

Robert Trainor - draftsman
James Cudmore - engineer
Dennis Motta - draftsman
William Butler - Eng. Associate
Thaddeua Rydzewski - technician

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S. Olsen (Cont.)

The week of July 4

Joanne Terrasi - office - Adv.
Barbera Wertz - eng. - sales

The week of July 11

Stephen Lambert - technician

K. Olsen

I've been studying the Burroughs Tube Division literature and concluded that they have some vacuum tube devices which might be very useful for us. Their new Beam-X beam switching tubes seem as if they might be very useful and economical for a number of applications. It is a 10-state counter or a 10-state storage device. They cost only about $24 each. They would not quite fit into our plug-in units, as they are about an inch in diameter, and they do need 300-volt supply. They will drive a Nixie indicator.

These decimal units might be very convenient and useful in machine tool control where people want to work in decimal numbers.

Burroughs also has a device which is interesting because it looks like Sprague made a direct copy of it. It is their 10-unit bucket and ladle magnetic core counter.

When we build computers or systems for severe requirements such as a machine shop, we should build them in rugged enclosed oil-tight enclosures. We picked up a copy of the Hoffman Engineering Corporation catalogue which lists a number of enclosures which are very convenient for machine tool type devices including console cabinets.

H. Anderson

Several independent activities are in process at the University of Michigan.

First, Professor Scott is going to start using a small quantity of our test equipment in the instructional end of their work.

H. Anderson (Cont.)

Second, the Willow Run Lab. is going to use some of our building blocks to tie in some special display equipment to an ~~10M~~ IBM 709 computer.

Third, we submitted a proposal to build a PDP-1 for use as the heart of a data logging system involving analog to digital conversion from IM magnetic tape. The A to D converter technique is unusual in that we measure the period of the IM signal by use of a 10MC binary counter. This means that the A to D converter technique is all digital. This looks very promising.

Navy Guided Missile School

We were visited by the instructional people in charge of using our equipment. We worked out a change in the future flip-flops for their use. The pulse inputs will be DC connected by means of the collector of the pulse inverter being tied to the collector of the internal flip-flop. This permits clearing of a flip-flop register in a counter with long DC levels. Thus they are able to construct binary counters using differentiating levels for carries and not be bothered by unwanted carry pulses during the clear operation. The clear pulse is not removed until after all caries have subsided.

There is a possiblility that a PDP-1 could play a role in their instructional work in the future.

M. Sandler

Status of Finished Goods

	ON HAND	ON ORDER	AVAILABLE	IN-PROCESS
Test Equipment	78	253	-175	780
System Equipment	587	1462	-875	1720
Blue Line (Test)	128	107	- 21	300
Blue Line (SPU)	101	649	-548	780

Actual Minus is 1888 units
Units to Stock : March - 1092, April - 1358, May - 1562, June to Date - 477

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BIWEEKLY REPORT

M. Sandler (Cont.)

We continue to be deeply behind in production, but are gaining slightly in production rate.

The draft of the new costing system should be ready for review next week.

Plans for taking physical inventory as of June 30 are under way.

J. Fadiman

During the past two weeks the specifications for a Memory Exerciser (Type 2202), for Mr. Irv Weiselman of TMI, has been carefully gone over, and a quotation submitted. We have also submitted a quotation on a less expensive machine, similar to the 2201 for RCA. At the moment it appears that TMI will order the more expensive machine.

Price: $45,000 - first machine and four months delivery.
41,000 - second machine and delivery two months after first.

A quotation has been submitted to Mr. John Erikson of IBM, Kingston, for a Memory Exerciser similar to the 2201.

Price (32 bits): $24,500 - delivery 3 months.

The Memory Exerciser 2201 was completed and delivered to RCA, Needham, on June 6. It was in acceptable working condition the following day.

The Automatic Core Tester 2102 for RCA has been completed, and is awaiting a few plug-in units. Check-out will begin as soon as units are available.

We have an order for another Core Tester, Model 2102B, from TMI.

Price: $18,000 - deliver on August 1.

digital equipment corporation
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J. Atwood

The changeover to field sales representation has occupied a good share of our time the past few weeks. Material put together for the reps includes: an inquiry handling manual, publicity reprints, literature order form, sales source code sheets, regional code sheets, inquiry analysis, mailing list analysis, and flip-chart presentation illustrating what we are doing to back them up with promotion of the Building Block product lines.

It has also been necessary to revamp our direct mail files on a regional basis and to set up a logging system to record the information on inquiries now being fed back to us by the reps. This information provides the first opportunity we have had for direct evaluation of the inquiries received through various publications and from various market areas. Judging by the initial returns, a surprisingly high proportion of the inquiries are rated as "good" (13 out of 16 in one area) and come from people who have both a direct influence on the buying of modules and interest is DEC modules in particular. This must be as encouraging to the reps as it is to us.

Inquiries last month finally passed the 1000 mark -- reaching a total of 1114. This includes 504 reader inquires, with DATAMATION, ELECTRONIC PRODUCTS and ELECTRONIC DESIGN producing the bulk of the responses and with interest centered on the 10 megacycle and 500 kilocycle Building Blocks and the Memory Test Systems. The 610 direct inquiries consisted principally of replies to the April Mailing to our own list and the PDP Invitation Mailing to the roster of the ACM. Inquiries for the year to date: 4107 (as compared with 5018 for the entire year last year).

Among the projects now being worked on are: the new 100 Series folder (type being set), MT 2201 folder (final copy done), MT 1514 flyer (final copy done), replacement schematics (going to AID for printing), condensed schematics (about ready for camera), 51 and 61 product bulletins (copy being written), preprinted mechanical drawing sheets (on the press), and a release to trade publication on our new manufacturers' representation in certain areas.

The current mailing, which goes out next week, includes a newsletter featuring the new rep set-up and the now complete

J. Atwood (Cont.)

line of Memory Test Systems, the PDP-1 folder, the 1000 and 4000 Series catalogs, and the 1906 product bulletin. The reply card is a soft-sell approach to setting up some definite appointments for our reps to call on interested people already on our mailing list.

Two new form letters have been prepared to go along with literature being mailed to prospects. Both letters call attention to the fact that our Building Blocks are now being handled by reps in key markets and list the individual reps to be contacted in the particular areas. The letter which is used for reader inquiries explains the variety of products now available from DEC and suggests the use of an enclosed reply card to request further information. The letter used for direct inquiries (mainly by reply card) invites the prospect to spell out his questions or diagram the application he has in mind on a new business reply form which is included in the literature package. This reply form is actually an 8½ x 11 letter which folds and seals to form its own envelope. We hope it will encourage prospects to give us more definite information on which to evaluate leads and plan follow-ups.

Items of interest: we have gone in with Eltron on space at NEREM to assure a good location, we are applying for a double booth on the First Floor at the 1961 I.R.E., we will have our short form catalog bound into the new ELECTRONIC DESIGNERS CATALOG which ELECTRONIC DESIGN is going to publish this fall (44,000 distribution), and we are reviving the "fireworks kit" -- the $1000 basic assortment of Test Equipment and Accessory units -- as a sales tool for the reps and a door-opener in the educational market.

Materials have been ordered for the new trade show booth. The booth will be made up as two 8 ft. and two 2 ft. modules, so that various combinations will allow us to make maximum use of anything from 8 to 20 feet of booth space or to be in two shows at the same time.

B. Hughes

Circuits: The new version of the 1209 Flip-Flop works ok and has been released to production.

The 4610 Pulse Amplifier has been released but since we only need 5 units, for Feedback Controls, Engineering will build them.

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R. Hughes (Cont.)

We are building the plug-in unit tester in a 1906 Mounting Panel. Now this will simplify training new men on how to test our units as well as prevent troubles in the tester, (such as when a wire is accidentally disconnected).

L. Prentice

All except one item of the heavier machine tools that we purchased have been received and installed in the Sheet Metal Shop. Every effort is being made to get the necessary shop furniture made and to get sufficient supplies ordered and stored for the coming year. For several of the past weeks, we have had extra help at night, three nights per week for approximately three hours to install these machines and to provide proper storage facilities for new equipment. Nearly every Saturday for the past month has been worked. Three new people have been hired in an effort to get back into the house, some of our outside vendor work. These are for the most part, unskilled people, and it will take some time before a great deal can be accomplished in this manner.

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BIWEEKLY REPORT

COPY NUMBER 2

DATE May 20, 1960

R. Hughes

Circuit Modifications

The 601 and 1606 Pulse Amplifiers were modified to increase the drive into the output amplifier base and increase the pulse width of the output pulse from 60 to 70 nanoseconds.

The Pulse Generators 3410 and 4410 were modified to increase the lower threshold voltage from 1.5 to 2.0 volts. The mod on the 1209 Flip-Flop to enable it to use 2N588's has been completed. Its delay time has also been increased.

New Designs

The 4610 Pulse Amplifier has been started. This unit will amplify a 3 volt 2 microsecond pulse into a 30 volt 2 microsecond pulse at low rep rates.

Literature

The corrected 100 series literature is being whipped into a new short form.

S. Olsen

New Employees

4-20 Evelyn Ferguson - assembly
5-2 Louis Tracey - technician
5-2 Eleanor Parker - secretary
5-9 Ruth Mozinski - assembly
5-9 Dennis Healy - draftsman
5-10 Gerard Bouthiller - production
5-13 Ellen Norton - office
5-16 Herbert Norton - technician
5-16 Mae Wuorio - assembly
5-16 Donald White - engineer
5-16 Althea Healy - office
5-17 Georgina Mickeuicz - purchasing

Left

4-22 June Carey

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S. Olsen (continued)

The following people have accepted positions with DEC and will be reporting for work on the following dates:

5/31 Fred Mariani - Accounting Dept.
6/1 James Sheahan - engineer - summer only
6/6 Bruce Bromby - draftsman - summer only
6/8 Arthur Campbell - engineer - summer only
6/13 Jonathan Moulding - engineer - summer only
6/13 Roger Williams - draftsman
6/13 David O'Brien - engineer - summer only
6/13 Joseph Lampasona - technician
6/13 Carolyn Cunningham - assembly - summer only
6/13 John Stefanowicz - Advertising Dept.
6/20 James Cudmore - engineer
6/20 John Dinopoulos - technician
6/20 Dennis Motta - draftsman
6/20 Robert Trainor - draftsman
6/20 Thaddeus Rydzewski - technician
6/20 Bruce MacDonald - technician
7/5 Barbera Wertz - engineer
7/11 Stephen Lambert - technician

The above information is provided in order that the supervisors in charge of departments named above can prepare now for new personnel, i.e., arrange for offices, desks, chairs, miscellaneous office supplies, blackboards, tool boxes, etc.

Florida Trip

This trip was quite successful and, as opposed to my last trip, Honeywell was quite receptive. There are three jobs which are going on now. The first one is a twenty bit shift register which takes the serial output of a computer and prints this on a CMC printer. We sold them equipment for the feasibility unit and they have an order in now for the first production unit. They will soon be buying two or three more of these. The second system is very similar to the first except that it has a 198 bit shift register and must print out the whole word. It must also have 198 indicator

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S. Olsen (continued)

lamps. This unit is in the area of 10K bucks. The third system is not quite defined yet, but it is something like three or four systems which take the space of about three racks of equipment. This last system is so large and they are expecting to do so much business with us that they are worrying about incoming inspection and environmental specs and setting up a test and repair center of their own. All in all, Honeywell looks pretty good. From St. Petersburg, I went to Orlando. While there I contacted several people on our mailing list, but none with much interest. I also contacted three sales representatives. The one with which I was most impressed and which was most outstanding was Murphy & Cota.

Production

Last week we began having trouble with our solder pot. It seems that our thermostat is not functioning right and the temperature goes too high. This causes some of the boards to burn. A remedy, however, has been taken in three areas:

1. A new thermostat to replace the bad one
2. A new solder pot has been ordered
3. Another thermometer has been purchased to keep track of the temperature.

The silk screening has been moved to the second floor and it seems to be functioning quite satisfactorily. Last week Jack Smith and Maynard Sandler went over to H. H. Scott to see a demonstration of a vapor decreaser. The next problem is to evaluate if the need will justify the cost and if it will truly do the wide variety of jobs we need done in the cleaning area.

E. Harwood

RCA Memory Exerciser

All front panels have been delivered and most of the wiring done. The drawings for the mounting panels have been given to production and these panels should start coming to us next week.

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E. Harwood (continued)

RCA Core Tester

We have temporarily stopped work on the core tester to concentrate our labor on the Memory Exerciser. This machine needs about one more week of work to finish the wiring.

PDP-1B

I have completed some of the wiring diagrams for the 4K memory and most of these panels have been received from production. As soon as the cabinets are received, we can start wiring between the bays.

We have just completed some preliminary block schematics of the In-Out break system and I should get some of these wiring diagrams into the shop next week.

M. Sandler

Status of Finished Goods

	ON HAND	ON ORDER	AVAILABLE	IN-PROCESS
Test Equipment	234	539	-305	860
SPU	638	1522	-884	1580
Test Equipment (Blue)	134	371	-237	560
SPU (Blue)	288	543	-255	660

Units to Stock, April: 1288
Units to Stock to date: 840

J. Fadiman

Automatic Core Testers

During the past two weeks I have spent some time finding out about and correcting troubles in the Automatic Core Testers. One logical error in timing was discovered and rectified on all existing machines. High Beta transistors have been put in the 1551 Slice Amplifiers in order to equalize the gain. We are also re-laying out the 1551 etched board so as to minimize coupling between the

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J. Fadiman (continued)

output of one amplifier and the input of the other which leads to false readings when testing fast partial-switching cores. We have found that we can reduce the 60 cycle ripple to within 1% on the core output by merely changing the position of one of the decoupling capacitors in the Model 51 Current Drivers. These changes have been made. The next Model 2102 Core Tester is to be delivered to RCA in Needham on June 10.

Memory Exerciser 2201

The Memory Exerciser 2201 is proceeding rapidly. It will be delivered to RCA in Needham on June 3. All front panels have been wired, all drawings completed, and three of the seven mounting panels will be finished wiring today.

New Orders

We have received a request to bid on a Memory Exerciser, similar to the Model 2201, from Mr. John Erikson of IBM, Kingston. The prospects look good, but we have not yet made the formal proposal.

We have made a bid to General Ceramics for another Memory Plane Tester similar to the Model 1512; price $35,000, delivery 90 days. We have not yet received the order, but this is a sure thing.

We have made a proposal to Mr. Rese Brown of the Electrodata Division of Burroughs Corporation for a special core tester, Model 2104; price $11,125, delivery 60 days. We have no definite answer yet, but prospects are good.

We have made a proposal to Mr. H. A. Cobb of Lockheed Aircraft for a Model 1512 Memory Plane Tester. This is very indefinite.

We are long overdue to Mr. Irv Wieselman of TMI on a proposal for a very complicated Memory Exerciser. Chances of getting this job are very good as soon as we get the bid in.

TMI is definitely interested in another Core Tester, Model 2102. They have the money appropriated, and should order as soon as the first one out there is working to their satisfaction.

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BIWEEKLY REPORT

COPY NUMBER

DATE May 20, 1960

J. Atwood

Since the last report, the 1000 and 4000 Series catalogs, the PDP-1 folder and handbook, and the short form catalog reprint have been completed. Both PDP pieces are back to press with a few changes, and the short form catalog is on its way for a third reprint. The 100 and 3000 Series catalogs are being pieced together. Due to time required to get the new sales rep set-up serviced, no time yet to bird-dog the "DEG Logic" and 10 mc material into printable form.

Mailings to the ACM roster and to our own mailing list have brought an excellent response. So have a number of recent publicity releases, particularly editorial mentions resulting from the memory test press kit distributed at the I.R.E. Show. Inquiries last month totalled 981 - almost breaking the 1000 mark for the first time. And inquiries for the first four months totalled 2993 - compared with 5018 for the whole of last year and 2561 for the year before.

New publicity has gone out on the 1000 and 4000 Series catalogs and the PDP-1 and 2101 folders. The local papers gave us a good play on sending PDP-1 to the coast and on the shipment of the 2102. This may help recruiting. Otherwise in the recruiting field, the "Dear Neighbor" letters have been mailed to all of Maynard and to West Concord. And, if they didn't do anything else, they did turn up a typist for the direct mail operation.

Preprarations for the May mailing are under way, and this will be followed early in June by a mailing list clean-up campaign to get the deadwood off our list, both for our benefit and for the sake of the sales reps. Several changes have been made in our inquiry handling methods to accommodate the reps and to help ease the burden of the large number of inquiries now coming in.

Several girls from AID have been assisting with the mailings, and they have just completed a geographical listing of firms on our mailing list. This should be of particular value to the reps in planning sales swings that will include potential customers for DEC equipment. In addition, we are making a complete run-off of the mailing list on 3 x 5 cards so the reps will have a personal listing of prospects to work from.

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J. Atwood (continued)

We are chipping away at the replacement schematic project - both the full-size versions for customers and the condensed versions for the reps to carry. Henceforth, these printed schematics will carry a copyright. (Seems that somebody up there - in North Adams - likes our schematics, too.)

The new format for the product bulletins has been decided on, and these should be ready for press soon. In the meantime, we are grinding out on our own press such items as a new customer order form, new test data sheets, interoffice memorandum forms, reply cards, stock control cards, direct mail letters, maps, and even a few halftones. We haven't licked the gadget yet, but we're winning.

Two ads of incidental interest: one for the Electronics Buyer's Guide punches home the fact that we now have 100 building blocks and accessory units to choose from; the other for a Maynard Beacon "industrial issue" (sic) shows what a pleasant place DEC is to be employed.

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BIWEEKLY REPORT

COPY NUMBER 2

DATE April 22, 1960

J. Atwood

Among the projects on which we have been working since the last Report:

A raised letter sign to go on top of PDP-1

Placement of college recruiting advertising

A run of revised college recruiting posters

An ad on our new bulletins for the May REFLECTOR

Photo Albums for all personnel doing sales contact work

Revisions of the 3000 Series Catalog preparatory to reprinting

Preparation of the PDP-1 "Textbook"

Negotiations for exhibit space at WESCON

Mailing of an invitation and reply card to some 4500 members of the ACM in connection with the WJCC and ISA shows

Mastery of the new offset printing press

A new Test Data Sheet form

A special mailing to prospects in Florida

Special covers for the 1512B schematics

Printing of the 1000 and 4000 Series Catalogs and the PDP-1 Folder

Printing of the 1213 and 4213 Quadruple Flip-Flop product bulletins

Reruns of the AMCT 2101 operating instructions

Operating instructions for the MT 1512B

Reprint of the new short-form Catalog with necessary revisions

Printing of the AMCT 2101 folder

COMPANY CONFIDENTIAL

J. Atwood (Cont.)

Arrangements for the shipment of PDP-1 to San Francisco

Mailings to IRE Show respondents

Working out of a special mailing to "occupants" in the Maynard area to aid in recruiting badly needed workers

A "help wanted" ad for secretaries

A comprehensive inventory of sales literature

The April mailing to our complete mailing list, including the preparation of the DIGITAL DEVELOPMENTS newsletter on our new press

Plans for a sales literature stockroom to conform to the new catalog system of bulletin numbers

Running of news release forms and letterheads on the new press

April inquiry code cards

Show reply cards for the WJCC and ISA shows

Mailing list revisions for April

A news release on the EJCC PROCEEDINGS

Final arrangements for the Cincinnati IRE Show

A detailed work schedule for the Advertising Department

Preparation of a Permanent Memorandum form

The April mailing, which is being sent first to West Coast addressees, includes a DIGITAL DEVELOPMENTS, invitations to the ISA show, the new short-form catalog, the MT 1512 folder, the AMCT 2101 folder, and the 1213 and 4213 product bulletins.

Because of the heavy load of mailings in connection with our busy show schedule, we have had to ask for help from the other girls in the office and to put on a temporary typist from AID. Everyone has been pitching in in grand style, and it looks as though we will have the situation under control shortly.

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J. Atwood (Cont.)

However, our expanded advertising efforts, a marked increase in publicity mentions and the rapid growth of our mailing list have combined to produce a far greater influx of inquiries than we have been handling. To accommodate this influx and to get our Department in shape to back up our new sales reps, we have asked to have June Carey assigned to our group. We also plan to hire a young fellow who can free Frank and Lew for more creative work and give Jim Myers some badly needed relief by taking over on the offset press and the mimeograph, helping out in the darkroom, running the office supplies and sales literature stockrooms, working on trade show displays, and doing numerous othernecessary routine chores.

Even more important, we are hoping to have biweekly meetings with the people directly concerned to program sales promotion activities. Since practically every job we do is custom made from original concept to finished product and since many of the jobs must be started well in advance of the date they will actually be printed, mailed or published, we have the same production scheduling problems in sales promotion as are now being encountered in the systems work. Attempting to operate without an agreed program is costly both in time and money, puts an unnecessary strain on the people involved, and results in conflicts of interest which, unfortunately, are not always brought into the open where they might be resolved.

As far as the main body of our literature is concerned, this is the current status of the various bulletins:

A-400	"DEC Logic"	No suitable copy
A-710	"DTE 10 mc Logic"	copy missing
B-100	"100 Series DTE"	Copy being reworked; small quantity of present version being reprinted for shows and mailings
B-3000	"3000 Series DTE"	Initial revisions made; small quantity reprinting as above
C-1000	"1000 Series SBB"	Off the press next week
C-4000	"4000 Series SBB"	Off the press next week

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J. Atwood (Cont.)

F-10	"PDP-1"	Off the press next week
F-30	"PDP-3"	Not scheduled
F-1512	MT 1512	In stock
F-2101	AMCT 2101	In stock
F-15	"PDP-1 Textbook"	Off the press next week

Our projected schedule of activities for the next few weeks is as follows:

Week	Literature	Direct Mail	Advertising	Publicity	Sales Aids
4/24	C-1000 folder	Occupant mailing		AMCT 2101 folder	Photo albums
	C-4000			WJCC show	
				QFF 4213	
	F-10 folder				
	F-15 textbook				
	5 mc DTE catalog				
	500 kc DTE catalog				
5/1	Replacement schematics		College recruiting	C-1000 folder	Sales rep kits
				ISA show	
				New employees	
				PDP trade release	
5/8	A-400 folder	EJCC mailer	Technical bulletins	1906 MP	

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J. Atwood (Cont.)

Week	Literature	Direct Mail	Advertising	Publicity	Sales Aids
5/8	A-710			C-4000 folder	
				PDP local release	
5/15	Product bulletins-standard units			A-400 folder	Customer binders
				PDP general release	
				New employees	
5/22	B-100 folder	May mailing		A-710 folder	
	B-3000 folder			PDP special releses	
5/29	Accessory equipment product bulletins			F-10 folder	Tracing cards
				1900 Series mounting panels	

The May mailing will probably include a DIGITAL DEVELOPMENTS, the 1906 and 1900 Series Mounting Panel product bulletins, and the A-710, C-1000, C-4000, and F-10 folders. In June, we may well be mailing a DIGITAL DEVELOPMENTS and the A-400, B-100 and B-3000 folders. In July, we should be ready for a special mailing list clean up mailing.

Literature for June publication may include a facilities brochure and application notes, and in July we may be concentrating on product bulletins and replacement schematics on our "supplementary" units. Our space advertising will probably be centered on the wide selection of Building Blocks which we offer and on the "Test Equipment Concept."

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S. Olsen

NEW EMPLOYEES

4/13 Eva Robblee-Assembly
4/20 Evelyn Ferguson- Assembly

Mr. Donald White, Electrical Engineer, has accepted our offer and will start May 16.

The Personnel Office has been quite busy the last couple weeks interviewing technicians and draftsmen from Wentworth Institute and Franklin Tech. We have made offers to the following:

Frederick Smith, technician, Wentworth
Thaddeus Rydzewski-Technician, Wentworth
Richard Gaudin- technician, Wentworth
Chris Samaras, technician, Wentworth
Joseph Lampasona- technician, Wentworth
Paul Connolly- technician, Wentworth
Bruce MacDonald- technician, Wentworth
Stephen Lambert- technician, Wentworth
Harvey Maibor- technician, Wentworth
John Regan- technician, Franklin
John Dinopoulos- technician, Franklin

Theodore Paul- draftsman, Wentworth
Dennis Motta- draftsman, Wentworth
John Borelli- draftsman, Wentworth
Roger Williams- draftsman, Franklin
Robert Trainor- draftsman, Franklin

Summer positions have been offered to the following:

Bruce Bromby- drafting room
James Sheahan- engineering
Arthur Campbell- engineering- called and accepted offer 4/20/60
Jonathan Moulding- engineering
David O'Brien - engineering

Engineering positions have been offered to the following:

Wes Baker - Tufts
James Cudmore - Tufts
David Ellis - Northeastern

All offers just recently mailed and it will probably be two weeks or so before we start receiving replies.

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BIWEEKLY REPORT

COPY NUMBER

DATE April 22, 1960

L. Prentice

We should be ready to move the drafting room into its new quarters over the weekend of April 30-May 1, 1960. The area is nearly complete. No difficulty should be experienced if Boston Edison will connect up new service to this area of the building.

Service wiring of sheet metal and machine shop about 50% complete.

The cabinets for the 1515 and 1512C are in process of rework.

Considerable effort has gone into the orderly change over from a piece meal system production to production scheduling of these systems. Maynard needs all possible cooperation to get this set-up with proper bills of materials and drawing list.

A premier cabinet has been mocked up to test the feasibility of the using of chassis slides to achieve greater component density in PDP-1B. The loading stages necessary to ship PDP-1 to the West Coast are complete and ready to be assembled to the various pieces of the computer.

R. Hughes

The design of the 1616 Pulse Amplifier has been completed.

The 1616 is similar to a 1606 but has only one pulse output. The output pulse is 5 volts 0.4 microseconds. Maximum PRF is 400 kc.

BTL has ordered 45 of these units.

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B. Gurley

The trip to ITT Labs. seems to have reopened the possibility of one or more PDP-1 sales. We will probably know by next Monday.

We have placed an order for two memory stacks from RCA. We may have to order one or two from TMI also.

The 2nd 733 supply is done and will be shipped today to NSA. The 1st will be installed in PDP-1. The third, which will be the model will be done in a day or so.

J. Fadiman

This past week has been spent mostly installing the Automatic Core Tester 2101 at Philco in Philadelphia. This is now working properly. Most of the difficulty was with the Ramsey Handler. I also visited Daystrom in Archbald, Pennsylvania, and took care of a few minor things with the Memory Exerciser 1513. They are very happy with the machine there.

The Core Tester 2102 for TMI is almost completed. Dynamic check-out will begin on Monday, and we plan to ship it on Monday, May 2.

Preliminary work has begun on the Memory Exerciser 2201 for RCA, and drawings and panels will be started on Monday. This is the next important RUSH job. Layout has also just been started for the Memory Tester 1515 for TMI.

W. Weeton

The profits on the RCA Word Address Coincident Current Memory Tester MT-1514 are satisfactory. There are still several problem areas. Chief among these is the development and production of the X10 Sense Amplifier package 1554, the Rectifying Slice Amplifier Type 1555 and the Sense Amplifier Switch Type 1974. A list of the System Building Blocks which will be necessary for the machine, and the required delivery of these packages, has been given to production. Logic wiring is being done in production at the present time, and the switch wiring is completed. The panels are all made except for the Sense Amplifier panel, and this is being worked on by Loren Prentice.

Telemeter Magnetic Memory Tester Model 1515. I am starting today to get the logic block diagram of the memory tester for Telemeter Magnetics. This is essentially a rather large type of modification to the Model 1514 diagram. The unit will basically consist of an X Counter and a Y Counter and considerable switching so that it can be used either for word address or coincident current plane testing.

RCA Model 2201 Memory Exerciser. Jon Fadiman and I have pretty well agreed on what the machine will consist of and find the process of trying to get the logic worked out. We have been asked by RCA to get together with them from here Monday or Tuesday or even some other time next week.

The logic has been worked out for a Memory Core Exerciser which could be built in one cabinet and could be marketed for approximately $7,000. This item would complete our line of memory

W. Weeton (Cont.)

test equipment and would give us, in essence, an inexpensive core evaluator which could easily be put together out of standard building blocks with an absolute minimum of engineering. I feel quite certain that this equipment could be sold to many places, and that RCA Needham, for example, would probably buy two of them within the next month.

M. Sandler

Status of Finished Goods

	ON HAND	ON ORDER	AVAILABLE		IN-PROCESS	
Test Equipment	549	633	-84	*	740	
System Equipment	687	410	+277	*	940	
Blue Line (Test)	254	964	-710	*	800	**
Blue Line (SPU)	257	645	-388	*	680	

* Actual Minus Units: Test Equipment -196; SPU -441; Blue Line (Test) -764; Blue Line (SPU) -463.

Total Units Minus: -1864 at this date.

Units awaiting release: 1616, 1974, 4676, 4213, and 4610.

** The June 2nd portion of the Navy orders are not yet in production.

The following books are missing from the library. Anyone knowing of any of these please bring the title of the book to Nancy Dawes. She keeps a complete record of books borrowed from the library.

1. The ABC's of Aluminum
2. Aluminum Fastening
3. Automatic Components
4. Automation & Computing
5. Basis of Digital Computers
6. Budgeting Principles & Practices
7. Channels for Training Abroad
8. Design of Transistorized Circuits for Digital Computers
9. Digital Computer Primer
10. Digital Computer Programming
11. Doing Business with Sweden
12. Electronics for Engineers
13. Electronics Manual for Radio Engineers
14. Engineering & Technical Handbook
15. Federal Budget in Brief the 1959

16. Feromagnetic Core Logical Circuits and its Application to Digital Computers
17. Fields and Waves in Modern Radio
18. France
19. Fundamentals of Optics
20. Handbook of Automation Computation & Control
21. Handbook of Industrial Electronic Circuits
22. Handbook of Semiconductor Electronics-Terman
23. Industrial Traffic Management
24. Labor Management Relations
25. Management's Mission in a New Society
26. The Language & Symbology of Digital Computer Systems - 2 copies
27. Mathmatics & Computers
28. Mechanical Engineers Handbook
29. Monthly Payment-Direct Reduction Loan Amortization Schedules
30. Pricing for Profit and Growth
31. Radio Amateur's Handbook
32. Successful Iow Pressure Salesmanship
33. Transistor Manual
34. Transistors in Radio and Television

H.S.G.

BIWEEKLY REPORT

COPY NUMBER 8

DATE March 28, 1960

R. Hughes

Delays

The Delay 3301 is being modified to correct an early goof on the circuit schematic. The etched board requires no change.

Literature

An idea is being sketched in an attempt to make our equipment understandable by using only two pieces of paper. (large ones)

E. Harwood

PDP-1 and PDP-1B

Most of my time has been spent in redoing the logic in various sections of the computer which has resulted in the elimination of about 25 plug-ins. We are now more able to add in such things as a Parity Check System and an In-Out Break System.

The past week at the IRE Show the computer behaved quite well. We encountered one trouble, however, which was traced to a damaged relay. We made a temporary repair such as tilting the relay at the proper angle and tying it in this position so we were able to operate during the show.

If we are to ship the computer to any other shows we have to make up some blocks and packing devices to insure that the panels and power supplies are properly supported to withstand the shocks of being transported over the road.

L. Prentice

The design for 1514 scope table has been reworked to suit RCA requirements. Will be a 14" x 88" shelf with single leg under a 24" x 24" section to support stack.

All 1514 hardware that has been released is being fabricated. Several panels should be ready for silk screening today.

Most of the hardware is available or being fabricated for 2102 and the same is true of a second memory exercisor if no significant changes are made. We have on hand three Bud double section racks. These may be assembled immediately.

L. Prentice (Cont.)

Tenative layouts of new Drafting area in new section of building are complete. Relocation of tools and benches in machine shop and sheet metal areas have been worked on. Survey of lighting and power requirements is nearly complete.

J. Atwood

This is the status of the 10 technical bulletins offered in the I.R.E. Show folder:

"DEC Logic" (A-400) -- some copy written

"100 Series" (B-100) -- present folder must be revised

"3000 Series" (B-3000) -- present folder must be revised

"1000 Series" (C-1000) -- final copy being set and final corrections in diagrams being made

"10 mc Logic" (A-710) -- unit descriptions drafted

"4000 Series" (C-4000) -- final copy being set and final corrections in diagrams being made

"PDP-1" (F-10) -- copy written, layouts being tossed around

"PDP-3" (F-30) -- draft of Section 1 completed

"MT 1512" (F-1512) -- in print

"AMCT 2101" (F-2101) -- paste-up being completed ready for printer

Random thoughts on the Show from an advertising and sales promotion standpoint:

Our people and our suppliers did a terrific job of getting things ready in view of the late, late start. From the movers, who snaked PDP down to the show on a moment's notice and got it back again in a hurry, down to the local job printer, who turned handsprings to get the PDP invitations printed correctly in time, our suppliers

J. Atwood (Cont.)

gave us the best possible support. And our own folks put in two tough weeks and two back-breaking Saturdays preparing literature, news releases, display materials, and such.

Our booth has just about had it. The header sags, the corners are chipped, and it's getting to be old stuff to many showgoers. If at all possible, we ought to get a new booth whipped up before the Western Joint Computer and San Francisco I.S.A. Shows. And in designing the booth, we should keep in mind that it has to show off a considerably expanded line of products, that it needs a certain amount of action and drama to attract attention, and that it must get some of the merchandise above head level so passers-by will still be able to tell what we're selling even if there are ten or a dozen people standing around in the booth.

Our literature needs to be pushed. We could use some type of rack that makes the literature seem extremely accessible, extremely plentiful and extremely desirable. And we need to keep it stocked. Several times Thursday I noticed that the piles were down to the point where people hesitated to take the last copy or two or, worse still, there wasn't even a last copy to take.

S. Olsen

New Employees

3/7 Arthur Zina
3/14 Robert Reed
3/15 Charlotte Bivens
3/17 Janet Chapman
3/21 Otis Bivens
3/21 Muriel Thompson
3/28 Patricia Judd
3/28 John Culpon

Left

3/4 Alma Reguera
3/4 Waino Honkala
3/24 Doris Bollinger
3/25 James Carew

K. Olsen

Digital Servo

A number of people, like Oil Gear Company and Dynamic Corporation of America, have requested units which are really digital servos. We should consider packaging a unit like this which consists of simply a register or two and a subtractor. If we design the circuits for a simple job like this we might make them cheaper than what we have made before.

DARC

I called Dan Geisler at M.I.T. to get his opinions as to what an average response computer should be. He feels it is desirable to take 10,000 samples when one is working with human beings because the background signals are often 40 to 60 microvolts and the desired signals are often as low as 2 microvolts. When people are working with animals they can slip off the skulls and get signals that will look good after 100 samples because they can get much closer to the cortex.

He felt that 256 points on the curve is very nice, but 128 might do and he suggested that one might even get by with 64 points. They use an Offner differential input amplifier with a gain of one to ten million. He uses a frequency response of 8 to 600 cycles but some people like to go lower and a few even like to go down to DC. As one gets closer to the source of the signals, the pulses are narrower and get down to about a millisecond in width which would need an amplifier response of about 5000 cycles.

On May 10 and 12 there is going to be a conference at M.I.T. on computers and biophysics. This is only for invited people and we would not normally be invited but Dan will see if he can get us on the list. We definitely should have some propaganda on our equipment then and it would be nice if we had a brochure written on DARC. It would be nice to have the computer installed nearby where people could come to visit it. This show conflicts with the shows in California and we can't have the computer in both places. If the computer is tied up with work at Maynard, we may not want to ship it to California anyway.

M. Sandler

Status of Finished Goods

	ON HAND	ON ORDER	AVAILABLE	IN-PROCESS
Test Equipment	446	80	366	440
System Equipment	755	39	716	440
Blue Line (Test)	107	45	62	300
Blue Line (SPU)	296	172	124	380

Units to Stock: to date March -- 818 units

J. Fadiman

The past two weeks have been spent mostly in work on the Core Tester for Philco. Several difficulties have been corrected, and this is almost ready to ship.

I spent three days in California, during which time Telemeter Magnetics has ordered an Automatic Core Tester, Model 2102. This is similar to the 2101 with minor logical changes, including an additional program, and provisions for obtaining narrower limits on the UV_1 output of the standard core than on the test core. The price of the 2102 is $17,800. Work has been started on this machine.

TMI will also order a coincident current and word address tester, probably 128 x 128 in size. It will contain no Z counter and no Z switches. Price: $50,000. I expect the purchase order for this momentarily.

Lockheed is very interested in a Core Tester, and the chances, are good though not sure that we will receive this order. They originally intended to buy a Reese machine. Lockheed will probably be interested in a 1512 Memory Plane Tester in the future.

Irv Weiselman of TMI at Culver City will probably construct a complicated Memory Exerciser out of our units. He will do the design and wiring himself. This will not materialize for about two months.

Dave Shansky of Datamatic is interested in our 1512B Plane Tester that we have on the floor. I have sent him a formal quotation. Price: $34,000 without the calibrated sense amplifier.

R. Best

Last week at the IRE Show I had a discussion with John Rose from the University of Wisconsin. Their problem is one of measuring precisely a frequency that varies between 8 and 10 megacycles. The plan of attack is to divide this input frequency 2^{13}. This will give a series of pulses at roughly a 1 kc rate. These pulses will be used to sample a real time clock. The real time clock will consist of a counter with an input frequency of 1 mc. The 1 mc will come from a very stable oscillator that they will supply. Each sampling pulse will read out the contents of the time counter. Each microsecond interval will be divided into 100 parts by using a dual circulating dalay line technique as described by Lefevre and Russell in Electronics a year ago. This equipment they will supply.

We have been asked to quote on a Digital Millimicrosecond Time Interval Measuring System from Mason and Hunger-Silos Mason Co. The contact there is Jim Applegate. They want to measure times varying from 0 to 99.99 microseconds and to be able to measure to the nearest 0.01 microsecond. Accuracy should be + or - one microsecond or + or $\frac{-}{}$ system stability. System stability should be three parts in 10^7 per week. They want to be able to standardize it against a WWV or some other standard. They don't want it until a year from next July. There is a possibility that the equipment that the University of Wisconsin will end up with would do this job.

I had a discussion with two men from Oil Gear on Friday about their digital control milling machine. They expect to start work on this actively next week. For the first system they will use a Frieden paper tape reader. There would be a block of information consisting of eight characters. Five characters specify the next position of the table. Two characters would specify the velocity magnitude and the remaining character will be a command. The information from the reader will be stored in a shift register made of 4213 Quadruple Flip-Flops. When the machine is ready for the next order, it will transmit the contents of this buffer directly into its own buffer which will also be 4213 Flip-Flops. There will be three commands: "0" will be stop, "1" will be a command to go to the next point with the specified maximum velocity, and "2" will be a command to go at the indicated velocity until the next point is reached, and than switch to the next command word. The shaft position will be detected by a contact making encoder. The encoder can drive standard inverters which would give us 20 pairs of lines which would simulate Flip-Flop waveforms. These 20 simulated Flip-

Flop would be combined with the information from the tape buffer and a subtractor which hopefully would be all DC logic. The output of the subtractor would go to a digital-to-analog converter which would in turn generate the error signal for the servo. The input to the digital-to-analog converter would be shifted automatically three orders of magnitude. The output of the digital-to-analog converters would be sliced in accordance with the shift command so that the error signal versus error curve will approximate a square root function. There will be another digital-to-analog converter that will be driven by the velocity magnitude. This will give 100 steps of velocity in each direction. A rough estimate using our standard building blocks comes to somewhere between 10 and $15,000. The price of competitive systems is in the neighborhood of $7,000. We hope to be able to get down to that low a price by using some special circuitry which we could develop after the feasibility model has been successfully demonstrated.

T. Johnson

West Coast Sales Status

The recent flurry at Telemeter Magnetics resulting in a 2101 sale and probably a Word Address Tester dominated the recent sales picture. It also looks like Lockheed will eventually straighten out their oun problems sufficiently to place orders for Memory Test Equipment.

Aside from the result of the Telemeter episode is that another group is thinking of using our 4000 Series as part of the electronics for present systems. This could be a decisive addition to our business.

Incoming orders expected at this point are from Hughes Aircraft in Culver City, Edwards AFB, and Livermore for 4000 Units, and 10 mc Test Equipment at UCLA.

SOC is currently doing a building block evaluation and like our 4000 Series.

JPL has an equipment loan and I did a logical design for a man who has bought a lot of 3C equipment. He expressed pleasure with the cost and simplicity of the application. Several groups are looking at the equipment with new interest.

NEL is still a prime target. We should listen for small systems work which might introduce our equipment.

T. Johnson (Cont.)

There are several PDP stron interests; Douglas Aircraft A-2 plant for a monitoring computer to up the reliability of their tape preparation systems and Livermore and JPL for a satellite computer primarily to do format translation and make their incoming 7090's more useful. USNOTS is proceeding favorably.

The general business climate is not too healthy at this point in California, but I think results of the past few months will begin to appear. We should make good use of the time spent at the WJCC and ISA Shows. Information received about customers activities indicate we are aiming at the right places.

Other developments are the Packard Bell computer, the large RW 400 simulation computer, P-B's new 3 mc logic, price competition from Reese on 5 mc units. Packard Bell is really trying to cover the field in the area of process control and analog-digital-analog work.

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BIWEEKLY REPORT

COPY NUMBER 2

DATE March 11, 1960

L. Prentice

Design of scope table for 1514 is complete. Sketch has been forwarded to drafting.

Premier Racks for 1514 will be delivered to floor ready for assembly March 15.

M. Sandler

Status of Finished Goods

	ON HAND	ON ORDER	AVAILABLE	IN-PROCESS
Test Equipment	498	10	488	4[illegible]
System Equipment	750	56	694	54[illegible]
Blue Line (Test)	70	59	11	3[illegible]
Blue Line (SPU)	213	199	24	5[illegible]

Units to Stock -- February: 895
Units to Stock -- To date March: 300

K. Olsen

DARC

DEC's equivalent to the ARC-1 computer which we call the DARC has received only a small amount of attention lately. It is really lacking someone to put on the problem full time. I made inquiries to all the companies that made encephalographic amplifiers and time-based pen recorders. Sanborn Instruments are the only ones that responded, and they are quite interested. Daniel Cleveland called me twice and wrote one letter. They see a future in this and would like to co-operate with us. I have been encouraging him. I invited him out and he invited me down there. They could help us quite a bit in selling to the medical field. His phone number is TW 4-6300, extension 419.

Shaft Synchronizer

American Measurement & Control Corporation, in Waltham has a subcontract from Bolt, Beranek & Newman to make a shaft synchronizer that will synchronize 36 large sirens to a shaft position of .01 degree over speed range of 50 to 1. The

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sirens have 45 slots in them separated by 8 degrees. Each slot generates one cycle of audio.

They have two systems they are working on. One has a frequency range of 125 to 2.5 KC, and the other has a range of 200 to 10 KC. This makes the minimum interval of between slots 400 and 100 microseconds, and to get the precision they need, I think they'll have to count better than 8 megacycle pulses. For now, they would like to mock-up a less ambitious system to prove its operation. They are very much in a hurry and are not interested in NavCor because their delivery is three weeks.

They want to compare a pulse that comes each time a slot goes by with a reference pulse that comes at the required audio frequency. They want to count clock pulses that arrive between the two pulses and convert the count to an analog voltage that will be proportional to the time interval between the two pulses. This will be positive when the reference signal comes before the feedback and negative in the other case. Synchronization, of course, has to be very carefully done so that it will not hunt or snap out of phase when both pulses come simultaneously or close to it.

This problem is very close to the up/down counter, analog to digital converter that Dick Best built. To make the number system easy to understand, we will propose a linear counter that we will preset at half scale at the start.

J. Fadiman

During the past two weeks the Model 2101 Core Tester for Philco has been completed. All final wiring, lacing, etc. has been done, and we are waiting for a few precision resistors to complete the job. The machine is now ready for preliminary check-out. Some preliminary literature has been written on the core tester.

The Model 61 Positive Current Driver required some more work to obtain the required turn-off time at low currents. The Model 51 and the Model 61 Drivers are now both ready for production.

The Model 4680 Solenoid Driver is now in production.

Logical design work has proceeded on the Memory Tester MT-1514 for RCA. The preliminary block diagram has been started.

J. Atwood

Among the nefarious schemes in which we are, or have been, involved:

Preparation of literature for the IRE Show -- including a four-page condensed catalog, 4000 Series short form catalog, revised 1000 Series short form catalog, 10 mc. folder, Automatic Memory Core Tester news release, PDP-1 brochure, Quadruple Flip-Flop 1213 product bulletin and news release, show reply cards, etc.

Production of ads, posters and mailing pieces for college recruiting.

Revision of the PDP instruction card and manufacture of many, many PDP-1 and PDP-3 booklets.

Placement of recruitment advertising in show issues of ELECTRONIC NEWS.

Assembling of photo albums for sales and home office use.

Mailing of the "Proceedings of the EJCC" which was finally delivered on our doorstep.

Working out of a new format for our product bulletins, simplification of our replacement schematics for use in these new product bulletins, photographing of all individual building blocks for tnis and other purposes, and drawing of logic diagrams on units without same.

Rearrangement of the sales literature section and the darkroom.

Devising of furnishings for the IRE booth.

Two steps we are hoping will help us keep pace with the needs for advertising and sales promotion material: we plan to work with the Technical Publications Division of S. Gunnar Myrbeck & Co. of Quincy in styling and preparing literature and manuals, and we will be using Buck Printing of Boston in getting this material printed, since Buck has a large, well qualified art staff to supplement our own efforts.

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BIWEEKLY REPORT

COPY NUMBER 2

DATE February 26, 1960

R. Hughes

Temporary

Literature on the 1607 Pulse Amplifier, 667 and 1667 Level Amplifiers and the 1111 Diode has been turned over to advertising for publication. Work will continue on literature for the 1310, and 1311 Delays, 202 and 1202 Flip-Flops, and also the 403 and 1403 Clocks.

Work has been started on the design of a 406 Clock. The 406 will be crystal controlled and cover the frequency range of 1-5 megacycles and put out a 70 nanosecond pulse. The system counterpart to this unit is the 1406. The 403 and 1403 crystal controlled clocks will not cover the frequency range 4 to 6 megacycles, instead they will go from 5 to 10 megacycles and put out a 40 nanosecond pulse.

E. Harwood

PDP-1

We removed the indexing feature from PDP-1 and PDP-1B. This entailed the removal of about 12 Plug-ins and the shifting around of a lot of wires. The modification was done perfectly and there wasn't one wiring error noted. We also did a small modification to make the divide work properly.

This past week we had a lot of demonstration time on the machine and no troubles were encountered.

The computer is being groomed for the ARD Stockholders Meeting at the John Hancock on March 2nd. In line with this we have installed a new CRT for the display and have also replaced the noisy fan in the console. Most of the on time is used by John Conley who is working on the demonstration programs for the show.

L. Prentice

The Hardware, Panel Chassis etc. for 2101 Core Tester will be fabricated this week.

Three Model 733 Power Supply Chassis will be completed early next week. A new model 1407 cover has been made up, and approved for use in future systems.

A used cut off saw has been received, set up, and ready for operation.

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L. Prentice (Cont.)

A purchase order has been written for leasing a full scale console model 42".

"Revolute" Reproduction Machines was a very substantial addition to our drafting department. Delivery should be by March 4th.

J. Fadiman

Most of the work during the past two weeks has ben concentrated on the Automatic Core Tester for Philco, Model 2101. All front panels have been completed, and these are now being wired individually prior to mounting in the rack. The rack has been completed with fan holes and painting. The wiring of the four mounting panels containing plug-in units has been completed, and is now being checked. The machine should be ready by March 15th.

The design for the Model 51 and Model 61 Current Drivers has been completed. Some circuitry changes were required in the Model 61 in order to achieve the necessary turn-on and turn-off times. New front panels for both drivers have been completed in drafting, and are about to be silk-screened. The Model 61 will have turn-on time variable from 0.1 to 1.5 usec and turn-off time variable from 0.1 to 0.7 usec from 100 ma to 1000 ma. The Model 51 will have the same specifications over the range from 50 ma to 1000 ma. New etched borads are now being made for both drivers.

The Solenoid Driver, Model 4680, has been designed and is about to be produced. Current capability is 500 ma at 24 volts.

The Skip Address Modification Panel was sent out to Telemeter Magnetics last week, and the report is that they are satisfied with it.

On February 24 a proposal was sent to Telemeter Magnetics in Los Angeles for an Automatic Core Tester, Model 2102. This would be similar to the 2101 except that the maximum Read and Write currents would be 3 amps, and the maximum Partial-Read and Partial Write currents would be 2 amps. This would be accomplished by paralleling our Model 51 and 61 Drivers to obtain the necessary current. Thus the 2102 would use three Budd Rack sections instead of two. My guess is that the chances of our obtaining this job are very good. Bill Terry of Telemeter seems very happy with the preliminary information which Ted Johnson had given him.

The order has been received from RCA for a Model 1514 Memory Tester. Preliminary design work has begun on this job.

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J. Fadiman (Cont.)

We are going to make a small working model of a Memory Tester for RCA to demonstarte at the IRE Show in New York on March 21. The logic design has been completed for this, and all that is required is to build it up in 1906 Mounting Panels. It will use the new Switch Units. Model 1975.

S. Olsen

New Employees

2-15	Pauline Mercer	Assembly Department
2-15	Nancy Dawes	Secretary Engineering Department
2-16	Joseph Gill	Sheet Metal
2-23	Anthony Coite	Receiving & Shipping

Sales

The trip to Florida was very successful. Honeywell at St. Petersburg first gave me the "what's he doing here, we have already made our decision" treatment. After two days of brainwashing they not only made a complete reversal of their decision, they also became very enthusiastic about our equipment. A couple orders have already been written and a few more are on the way. Orders should exceed twenty in the next couple of months.

After beating Martin Ovlando's system of protecting their engineers from the outside world, I managed to talk to most of the twenty-four people on our mailing list. Actually there was very little interest there.

Radiation in Orlando gave me a very fine reception, and now most of the important people have a complete rundown on our equipment.

Production

The new eyelett machine seems to work fine now. It has been held up waiting for a new set die tool, but that should be in today.

M. Sandler

Status of Finished Goods

	ON HAND	ON ORDER	AVAILABLE	IN-PROCESS
Test Equipment	455	13	442	520

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M. Sanlder (Cont.)

	ON HAND	ON ORDER	AVAILABLE	IN PROCESS
System Equipment	678	66	612	720
Blue Line (Test)	46	31	15	320
Blue Line (SPU)	184	50	134	380

Units to Stock to Date, February: 832

To handle increasing volume of assembly production we have set up a third test station.

K. Olsen

Remington Rand Memory Job.

Remington Rand asked us to bid on production qunatities of megnetic core memories to be used in their new commercial computer. This job has many attractive features, such as high volume with very low sales. We felt that because we had particularly advanced circuitry we might make very good profet while charging the same price as other people. However, we decided to turn down the opportunity to bid because we would be concentrating on one customer and one product which would not be building up our reputation and line of proprietary products. We started the PDP computer and now we'll have to give it all the time, enthusiasm and capital that we have. If we do a good job on the computer, we will have a significant company reputation and a profitable proprietary line of computers.

We are also afraid of this memory job because it would tie too much of our business to one customer, and he might cancel at any time. Part of the contract would be giving all the rights to the design and production of the system to Remington Rand. There are many details in specifications and design problems which have not been worked out yet that would take many trips and much liaison.

Flip-Flop Design

I have been spending a little time with Al Swift on a new transformer design for the common input of high speed flip-flops. The present circuit draws too much pulse current so we are trying the high impedance primary with a higher primary voltage. This will also make it possible to standardize carry pulses to a narrower width.

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B. Gurley

The proposal for Goodyear Aircraft goes out today. This is a 24 bit machine with PDP-1 instructions except automatic multiply and perhaps also divide. We probably won't hear from them until July and if we get it, there would be a six to nine month delivery. The proposal is twenty pages of stencils plus twelve figures.

Ed Fredkin of Balt, Branck, and Newman is very interested in PDP-1. The probablility for an order is rather high. He is writing a very fancy compilen program for PDP-1.

Mr. Clynes of the Rockland State Hospital in Orangeburg, New York, wants a proposal for the design of an ARC. He will buy the PIU's and assemble the system. I need to give him rather complete logic drawings.

J. Brown

The ISA Show in Houston and visits in the Texas area were very sucessful. We have already received some business as a result of the trip and anticipate more in the future.

The sales outlook for the next two months is reasonably good for both building blocks and systems. There are a great many leads that need following up and I will probably ask for some help form Engineering.

Dick Best and I visited L.F.E. yesterday to fix trouble they are having with our test equipment. We inspected only a few units, and to our embarrassment found eyelet wire connections intermittent, two wire circuit board connections intermittent, and one unit which intermittent for unknown reasons. L.F. . is a good customer and an excellent potential.

Bob Hughes and I are working on new literature sheets for the entire product line. Plans for the next two weeks are not fully determined yet, but I will be in the New York area next Tuesday.

J. Atwood

Publicity releases on the low-speed lines are catching on well, and there seems to be a fair amount of interest. The item on the 3000 Series in ELECTRONICS PRODUCTS and the 3000 Series Mailing are still top inquiry producers.

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J. Atwood (Cont.)

One problem is how to make the best use of these inquiries when we are not in a position to make more personal follow-ups. We have the outlines of a plan which may help to further qualify the respondents so we will know which ones are worth concentrating on.

Also under consideration is a plan for sales prospecting on a regular basis to obtain more adequate coverage of prospects and areas.

Materials for a stepped-up college recruiting program are in the rough layout stage, and we are working on a plan to tap the secretarial market a little more effectively than we have done with newspaper advertising.

All the plug-in units we offer for sale have been photographed for inclusion in new product specifications sheets. All available replacement schematics have been photostated, and the stats will be worked to give us camera-copy simplified schematics for the new sheets. The logic diagrams are also being reworked where necessary. At the moment, all this material, together with whatever information we have on hand, is being assembled unit by unit in preparation for the production of these sheets.

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BIWEEKLY REPORT

COPY NUMBER 2

DATE February 12, 1960

K. Olsen

Harvard Business Review

Mr. E. D. Frawley, of the Harvard Business Review, and Mr. James Watson, who runs the company that maintains the mailing list for Harvard Business Review, visited on February 8 to discuss the use of a PDP for maintaining their list. They have about 60,000 subscribers of which 50,000 are changed each year. The magazine is mailed out every other month but the list is revised several times during the two month period. In addition, they have to exchange mailing lists with other magazines several times during the year and they would like very much to get statistical information on their list for the verification services and for their own use. They now have all their subscriptions on multigraph plates, which is very unwieldy and useless as far as getting statistical information. The obvious next step is to go to punch card systems, but the filing and sorting problem there is not particularly satisfactory. Two companies have punched cards which have the address of the subscriber in hectograph master form on the back of the card from which addresses are printed.

Our computer does seem to be a natural, but for this size operation it is not obvious as to the economy. It is just about a toss-up right now but can go one way or the other depending on how a thorough investigation goes.

They may need three tape units when revising their list. One for the old list, one for the revisions being injected and one to rewrite the revised list. If we could figure out a way of doing this with two tape units, it would cut the costs significantly.

Printing the labels is part of the problem and normal Anelex machines could be used, but one made somewhat special that uses sprocket holes on one inch centers is the one that feeds the normal automatic stick-on machines. Anelec probably could modify one of their machines to do this. I think our system is only economical if we can use the computer for the storage involved in running the Anelex.

A 22 or 24 digit column Anelex printer would do the job, but it might be better to have an 8½ inch wide, 72 column printer so that they can do their billing and so they can deliver rather presentable outputs to people with whom they are interchanging lists. It might be possible to buy envelopes on perforated mounting strips that can be fed through an Anelex printer, or operations where you want to address envelopes without using a label. We have the wider paper and one could type two or three normal address labels in parallel.

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K. Olsen (Cont.)

Oil Gear Company

Wes Broome, from Oil Gear Company, called on February 9 and wanted to know if we could solve a problem that they have. My first reaction is that it is a natural for analog, but they are having trouble doing it because of the problems in getting wide range tachometers. This is a very classical problem and people have been working on it for many years. It is where they are winding up paper or cloth or like material and want to wind it with constant tension. Oil Gear makes the prime mover for the winding but apparently needs something better for tension control. The normal tachometers do not give the wide range necessary nor the precision, apparently. I find this hard to believe, but we will continue to look into it with them. They would like to use a pulse type tachometer, i.e., one that puts out pulses during each revolution and so the speed is proportional to the number of pulses per unit of time.

The diameter is equal to the surface or width speed divided by the hub speed. I don't know how to do this simply, however, and I am sure they can't afford a digital multiplier like we would normally make.

L. Prentice

The Bud Racks for two, 2101 Core Testers are nearly complete. They should be delivered to the floor on February 15.

Tooling for system building block handles has been reworked. Results should be a better handle plus saving in assembly time and fewer rejects. The punch jig for the matching etched board needs rework to reduce the amount of rejects from line operations.

A trip was made February 9th to Joseph Beal Inc., Cambridge to look at a used Delta cut off saw. Samples of our own case stock were cut very satisfactorily. A purchase order has been written for these items. Delivery to be during this coming week as we have a back log order for nearly 600 of the building block cases.

This saw may be used to cut steel tubing and light angle stock saving over our previous method about 1/3.

A 4½ inch die and hydraulic actuator has been purchased and used for mounting muffin fans in new equipment racks.

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BIWEEKLY REPORT

COPY NUMBER

DATE

H. Anderson

Houston ISA Show

Last week we exhibited at the Houston ISA Show, which is primarily made up of engineers in the process control field, particularly the oil industry. After meeting and talking with a lot of these people, it is apparent that there is a lot of educational type work needed before they will fully be able to use our equipment in their activities. Most of them are historically analog computer people and are not at all acquainted with digital techniques.

One rather specific potential job emerged from that trip. This was a computer device for the Columbia Gulf Transmission Company for a natural gas processing plant. They need a small computer to do some very simple mathematics in calculating the amount of natural gas entering and leaving an extraction plant. The gas meters that have been sold for this job are made by Rotron Controls Corporation which is a subsidiary of the Rotron that we buy our fans from. The Rotron people were exhibiting at Houston also and brought this problem of doing some simple digital calcuations on the output pulses from their meter. We are now in the process of examining this in more detail.

The first look at it says that maybe a 10 bit, 256 word PDP might do the job very nicely. It could be done using all Blue Line equipment and still meet their requirements for speed.

An interesting application arose in connection with an inquiry from the University of Wisconsin. They wanted to make a 10 megacycle 10 bit counter which could be read out into a buffer register without interrupting the counting process. This turned out to be a rather interesting application since the carry ripple down through the ten stages of the counter has not been completed before another count pulse has occurred. In investigating how long this ripple actually takes , Bob Hughes discovered that our carry pulse could not be propagated that far without changing our logical gating of the carry slightly. The change consists of putting two inverters in series and putting the gating signal on the base of the top inverter instead of what we have done in the past, putting the gating signal on the emitter. After doing this, the delay of the carry pulse per stage is roughly 14 millimicroseconds and the delay of a flip-flop measured from the leading edge of the input pulse to the final transition of the output level is greater than 40 millimicroseconds and less than 80 millimicroseconds.

We are getting several potential users of PDP lined up for making some experimental use of the machine at our facility. One of these is Ed Fredkin from Bolt, Beranek & Newman in Cambridge. Another one is Karl Friedman from Technical Operations in Burlington.

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J. Fadiman

During the past week work has progressed on the Automatic Core Tester 2101 for Philco. The logic has been completed and the final block diagram has been drawn. The logic, not including the sense amplifier and slice amplifiers, will take up three 20-unit mounting panels. The design of the front panels has been completed, and these are being drawn in drafting.

The Memory Tester 1512B is just about completed, and the final cabling of wires is being done. Unfortunately our sale to General Electric did not come through, so we are not in such a hurry to finish the machine.

The Skip Address Panel for Telemeter Magnetics is now being wired and this will be completed inaa day or so.

B. Hughes

A production release has been initiated on a 10 megacycle Voniable frequency clock (405). We have started a search of the literature for a high frequency (200 MC) medium power (200 MW) transistor. We will use this device as a RF amplifier and 10 megacycle Pulse Amplifier. At present we use the 2N1301, which has frequency limitations (F_T = 35 MC).

The Blue Line units appear to have good reproducibility. A 4209 flip-flop tester has been designed and a test data sheet co-ordinated with the tester to save time in testing.

About 104 measurements are made on this unit in test so the effort spent to make testing easy will be well worth it.

Work has started on transistor testers. We now use or catagorize 20 different types of transistors, some of which have nine tests. The object will be to have individual testers which will have a "go" and "no go" meter reading to tell if the transistor is ok.

An effort is being made to purchase electrolytic capacistors which can be used in the blue clocks and delays in place of the $1.40 lantalytics we now use and believe we can buy them for $.30 each.

A +10 volt power supply was made which used 14 silicon recitifiers in series in their forward direction as a shunt regulator. This supply worked quite well when we changed these regulating diodes to a string of Zener diodes operating in their forward region. The diodes we used were U.S. Semcor reject 10 volt Zener diodes (they

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B. Hughes (Cont.)

were rejects because they exhibited a slight negative resistance in the Zener region). (Datamatic tried to order 900,000 of these diodes but the manufacturer couldn't supply them.) Our latest thoughts are to use a regular large 10 volt Zener diode in the Zener region instead of a forward biased string.

The last batch of T2G diodes had a yeild of 25% pulse diodes and 75% level diodes. This fact overcame engineering inertia and we requested production to install 1100 ohmite diodes in our equipment where we now use T1G Pulse diodes. The ohmite diode is guaranteed to meet our pulse specifications and is less expensive than the T1G.

A group of ten 202 flip-flops were connected as a counter, and it was determined that they would not reliably (with margins) propagate a carry with our customary single transistor (emitter gated, base pulsed) technique. Two transistors must be used per flip-flop to propagate the carry. The transistors are connected in series, and the one closest to ground is pulsed with the P "out" pulse. The upper one is base gated by the preceding counter flip-flop.

M. Sandler

Status of Finished Goods

	ON HAND	ON ORDER	AVAILABLE	IN-PROCESS
Test Equipment	443	68	375	540
System Equipment	643	81	562	660
Blue Line (Test)	92	49	43	240
Blue Line (SPU)	90	45	45	290

Units to Stock January: 956
Units to Stock to Date: 455

J. Atwood

Much of our activity has centered on PDP. About 100 PDP-1 booklets (mimeographed "Preliminary Specifications") have been made up, and a good share of these are already on their way to what look like the more promising prospects. An initial batch of photos has been taken for use in future proposals and in printed material on PDP. The instruction card is being revised for reprinting, and additional PDP-3 "Operating Instructions" booklets are being assembled.

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BIWEEKLY REPORT

COPY NUMBER

DATE
February 12, 1960

J. Atwood (Cont.)

Also on the systems side, preliminary copy and artwork for a folder on the 2101 AMCT has been completed, and a proposal was run for Philco on the MT 1514. Also, the 1512 folder was sent to all the trade publications for inclusion in "new literature" listings.

The 3000-4000 Series twin ads are running in the March issues of AUTOMATIC CONTROL, WESTERN ELECTRIC NEWS and THE GRID ('Frisco I.R.E.). They are also running in the February special edition of THE BULLETIN (L.A. I.R.E.) which is being issued in conjunction with the 1960 Winter Convention on Military Electronics. The 3000 Series portion will be run in the March convention issue of THE PROCEEDINGS OF THE I.R.E., which will also earn us a product blurb in the show guide. In our next ad, we will try to get across the test equipment "concept."

The first memo on standard terminology has been issued. This will be a continuing effort to standardize the way we use the terms which are peculiar to our business and the way we reproduce them in typed and printed material. All suggestions are not only welcome but requested.

The replies on the 3000 mailing (now over the 5% mark) are encouraging enough to make a follow-up mailing on this line seem worthwhile. This would concentrate on applications information. The mailing will be "diluted" only by the MT 1512 folder and an I.R.E. show announcement.

In the works are a letter and business reply form to encourage further correspondence from people who write in for literature. This should help supply more solid sales leads. Also in the works are materials for recruiting (particularly at the college level), a release on the 10 mc units, and a folder made up of reprints of our recent space ads.

S. Olsen

New Employees

1-25 James Carew Sheet Metal
1-25 Clifford Fuller Clerk-Production Control
2-1 Helen Hallett Tracer, Drafting Room

Employees Left

2-5 George Colangelo

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BIWEEKLY REPORT

COPY NUMBER

DATE

B. Gurley

PDP Prospects

On February 1st, I went to Goodyear Aircraft in Akron, Ohio. They want a computer for a flight simulator. Mr. Norm Morrison, the computer engineer, seems favorably disposed to the PDP series. They want a 24 bit machine with automatic multiply. The machine also needs certain special In-Out abilities. They want a proposal by the 17th of February.

We have had other visitors or calls from RCA, Moorestown, Lincoln Lab. (Herb Ziegler), Teleregister, Bolt Branik, Newman, etc. It's hard to judge the seriousness of such inquiries. In any case, most talk of lead times are from six months to a year.

Wednesday February 3rd, two people from Rockland State Hospital in New York talked to us about an ARC. They had some good ideas and would like us to build them a machine. However, their funds are limited.

W. Weeton

Western Electric, Columbus, Ohio, is setting up a laboratory for digital work in connection with their memory systems. We have lent to them a considerable amount of test equipment which they will evaluate and probably purchase a similar amount. This is a new group there and only has in it six engineers at the present time. They expect to have about twenty-five engineers before September.

RCA in Needham has asked if we would be in the position to lend them a set up which would be capable of driving one of their aperture plate stacks for demonstration at the IRE Convention in their booth. They will be buying a Model 1514 Memory Tester next week. Money has been approved on the second quarter budget for an Automatic Memory Core Tester. The memory exerciser and the Automatic Core Tester have been approved for the second quarter budget, and we can expect an order for them approximately the middle of April.

Eclipse Pioneer in Teterboro, New Jersey will soon be ordering about $4000 worth of building blocks for memory core testing.

Westinghouse at Friendship Airport in Baltimore is interested in our standard line of test equipment and expects to buy some $10,000 worth of this equipment in the next few months.

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BIWEEKLY REPORT

COPY NUMBER 2

DATE

February 1, 1960

S. Olsen

New Employees

1/25 James Carew
1/25 Clifoord Fuller
1/11 June Carey
1/12 Anita Millett

Employees Left

1/29 Nancy Byers
1/29 Betty Scesny
1/29 Mae Wuorio
1/29 Dorothy Spaulding
1/5 Beverly Smith

J. Fadiman

On January 11, the MT-1513 Memory Exerciser was shipped out to Daystrom Instruments, in Archbald, Pennsylvania. I installed the machine at Daystrom at the end of the week without difficulty. One small addition was required, and I sent down the required logic drawings and plug-in units last week.

Some time has been spent working on the current drivers. By a slight modification it will be possible to obtain 70 musec. turn-off time on both the Model 50 and Model 60 Current Drivers. By the addition of a variable trimmer capacitor it will be possible to obtain turn-off times variable from 70 musec. to 0.7 usec. This might be installed in a new Model 51 and 61 drivers.

On January 26 we sent out a bid to General Electric Company in Syracuse, New York, for a Memory Tester, Type 1512. This will be the Model 1512B which we have nearly completed. We have not yet received the purchase order, but I am quite sure that we will by next week. This sale is a result of our demonstration last summer to Mr. Ross Holtz.

The Memory Tester itself is nearing completion. All panels are wired; the changes for variable strobe width have been included, and all drawings brought up to date; and the main switch panel has been completely wired in.

We have received a job from Telemeter Magnetics in Los Angeles for an addition to their Memory Tester. This involves the addition of four more rows of Skip Address Switches. I have completed the logic

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J. Fadiman (Cont.)

and a hinged panel is being made up which will contain the switches. We will wire the switches and provide diagrams for wiring in the additional plug-in units required; TMI will do the actual installation themselves.

M. Sandler

Status of Finished Goods

	ON HAND	ON ORDER	AVAILABLE	IN PROCESS
Test Equipment	575	114	461	520
System Equipment	501	71	430	800
Blue Line (Test)	29	111	-82	220
Blue Line (SPU)	92	18	74	270

Units to Stock during month: 872

All Blue Line units have been released to Production and by the end of next week an initial lot of all units are scheduled to be in stock.

Availability of 2N393 transistors has improved. We now have a full load of work in Assembly and Test.

E. Harwood

PDP-1

The Ferranti Photo Reader was removed from the computer and a lot of vague troubles cleared up. We also fixed two other troubles we had been having. One trouble was check sum alarms on reading binary tapes. The programs were read in and checked and seemed to operate ok. The trouble was traced to the accumulator where we were getting a weak pulse on a carry into one of the bits. This was due to a capacitor not being properly soldered on the etched card. This gave us a wrong sum even though the program was read in correctly.

The other trouble was the program stopping any time a sense switch was thrown. The reason for this was we tried to charge a 3.9 uf cap. on the sense switch to -3 and the -3 volt supply at the console couldn't deliver enough current. This had the effect of turning on the single cycle switch which was supposed to be held at -3 volts but went to ground, while the 3.9 uf cap was being charged. To

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E. Harwood (Cont.)

overcome this, we put a 39 uf cap from -3 volts to ground to supply the current when the switch was thrown.

We also ran temperature checks to try to determine how to cool the frame best.

K. Olsen

PDP Display

We invested so much time and effort in the present PDP display that it is very difficult to be objective in evaluating it. However, I have pretty much come to the conclusion that we need a better display. Ben Gurley thinks we should use the TX-0 scope, but I think we might be happy with a five inch scope. The five inch is particularly nice because the magnetic shields and hardware and bezels are all readily available. Cathode ray tube, of the kind used in the Tektronix 536, would give a very nice 6 by 10 centimeter picture. It is not unreasonable to use a rectangular screen for a computer because most pictures are rectangular in nature.

Magnetically deflected five inch tubes are available with line widths of .001 inches but it is a chore to make magnetic deflection, but we can get coils in any impedance from Syntron.

Dumont has improved the TX-0 type cathode ray tubes. They would be nice because you could then use a light pen. The big problem with them is the need for special hardware and the fact that they are 20-6dd inches long. The 12-½ inch tube has a spot diameter of .009 inches, which is good, and a post accelerator voltage of 9.5 KV. It would take a swing of 450 volts on each plate to deflect 7-½ inches but this probably isn't too bad.

Paper Tape Reader

We plan to start making our own paper tape reader with a Electomic clutch brake combination. The simple strip reader seems trivial after you get this clutch brake and we will start the design right away. The Texas Instrument type 1N2175 silicon photo diode seems to be the one that everyone is choosing nowadays. The Sylvania germanium unit has become very unpopular. These are small enough to put directly into the hole in the paper tape.

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K. Olsen (Cont.)

I would like to make a combination reeler and bin like we used at M.I.T. in spooler. For unreeling the roll of tape should just lay in an opening. To reel, I would make an expandable hub that would tightly grasp the loop on the end of the tape. After it was reeled, the hub would collapse and the roll could unroll with only its own weight to rotate.

L. Prentice

Under future consideration is a new or used 42 inch blue print machine. We plan to turn in the presently used 20 inch machine.. It is too small and can not be relied on. Sales representatives from "Oylid", "Paragon Pevolute" and "Chas Brunning" have called and presented us with full information on all their new models and used machines. Plans have been made to actually use the machines before purchase of the machine is made.

The frame for the Flexo-table is completed. All design work will be completed this week.

Design work on all parts of the skip address panel will be completed today.

J. Atwood

The Eastern Joint Computer Conference "Proceedings" is on its way to the press at long last. This turned out to be a monster -- running to more than twice the expected number of pages, subject to all types of editorial "modifications," and delayed by everything from large- company mail room confusion to mysteriously disappearing authors and editors. We'll not be sorry to see the last of it.

PDP activity continues. Programmers manuals on both machines, PDP-1 and PDP-3, have been mimeographed (despite stiff resistance on the part of the mimeograph machine), and we are going ahead with type styling for the printed PDP-3 manual. The expectation is that much of the typeset PDP-3 material can be incorporated in a PDP-1 brochure. The girls are sorting out those on our mailing list who have indicated an interest in PDP and computers in general so that we will be in a position to make special mailings to these prospects.

The 1512 folder is in. This gives us a printed piece to use both as the basis of future memory tester proposals and as evidence of our

J. Atwood (Cont.)

capability in systems work. Also in the area of systems activity, we have just mailed a release on the MT1513 which carried a memo to the editors pointing out how much Digital is doing to put memory testing on a production line basis.

The 3000 Series mailing is bringing a good response, most of it unfortunately from people asking for further information. However, we have had one order for the fireworks kit (three Roman candles, two salutes and ten boxes of sparklers), so it's not all "future." Preliminary specifications on the 4000 Series have been multilithed, and this information is now being readied for incorporation in a short-form catalog. Information on both lines, plus a mention of our 10 mc. units, has been put together in tabular form for our 1960 EEM ad, and a small display unit telling the three-speed story was produced for the ISA show in Houston.

Miscellaneous activities include a release on Ken's award, which was "merchandised" to all possible media; product bulletins on the 1906 Mounting Panel and on the complete mounting panel line, which are now being prepared; and a set of standards for type stylingnour terminology and for drawing our symbology, which we are just starting to assemble.

Recruiting at all levels remains a problem. We're taking to the airwaves in our search for local talent, with spot announcements on WSRO in Marlboro. On the professional level, we are working on a program of small space ads for college publications and on a dual-purpose brochure for use both in recruiting and in proposals.

Inquiries during January totaled 403. Reader inquiries accounted for 216, and direct inquiries reached 187. Top pullers of reader inquiries were the PDP story in DATAMATION, the 3000 Series release in ELECTRONIC DESIGN and WESTERN ELECTRONIC NEWS, and the Core Tester ad in ELECTRONICS. Leading producers of direct inquiries were the 3000 Series mailing and the mailing to DATAMATION readers who inquired about PDP.

H. E. Anderson

BIWEEKLY REPORT

COPY NUMBER 2

DATE January 15, 1960

M. Sandler

Status of Finished Goods

	ON HAND	ON ORDER	AVAILABLE	IN-PROCESS
Test Equipment	369	6	363	600
System Equipment	453	6	447	740
Blue Line (Test)	56	40	-33	40
Blue Line (SPU)	60	57	-55	100

Units to Stock December: 799
Awaiting Release:
Blue Line (Test) - 3201, 3301, 3410
Blue Line (SPU) - 4201, 4209, 4603, 4301
Miscellaneous - 1906 Patch Panel

E. Harwood

PDP-1

The only Plug-In failure in PDP-1 was 1548 display preamp which had a shorted 2N588.

We have added two temporary pieces of in-out equipment to the computer. One is the analog-to-digital converter, which works fine, the other is the Ferranti tape reader which doesn't work so fine.

John Conley is still the only user of machine time and this has been mainly on the ARC Program.

J. Atwood

The 3000 Series mailing is finally on its way to the 5437 U.S., 61 Canadian and 69 foreign addressees presently on our direct mail list. And the first space advertising on the new low-speed lines is due to appear momentarily. These efforts, together with the widespread publicity being given the 3000 and 4000 Series by various trade publications, can be expected to result in a relatively high degree of interest and even in some direct sales. (Be sure to tell me if it turns out I'm wrong)

The 500 kc. space ads have been so far placed in DATAMATION, INSTRUMENTS AND CONTROL SYSTEMS, and three local IRE publications, The Boston REFLECTOR, Los Angeles BULLETIN and Rome Utica ECHOES. We will have a full page in the REFLECTOR this year, made up each time of our regular two-thirds ad and a column of "Digital Developments" new items and comments.

J. Atwood (Cont.)

The Memory Tester folder, our first two-color printing effort, is about ready for the printer. This should be a useful piece, not only for answering inquiries about the testers but for demonstrating our proficiency in systems work as well. Other systems in process or completed: Jonos MT 1513 Operating Manual and Ben's PDP-3 Programming Manual.

Another small meeting has been added to the 1960 trade show schedule. The "Spring Technical Conference" of the Cincinnati Section of I.R.E. April 12-13 is due to attract some 500 -600 attendees with a program on electronic data processing. We are taking a booth because, if nothing else, it provides an opportunity to make a high ratio of sales contacts per sales dollar and per man hour.

Our department is in throes of "organizing." The personnel now have sufficient on-the-job experience to take basic responsibility for several general areas of activity. Lew will be following through onproduct information and publicity. Frank will be responsible for product photos and trade show display materials, Gertrude will handle all direc mail and sales promotion literature and Sue will be acting as our "production manager." Tentative plans and programs for 1960 are being formulated on the basis of our 1959 records and what we know about this years' requirements.

H. Anderson

Sales

The number of proposals being submitted at the present time is at an all time high for the company. It is interesting that many of these are for special purposes devices. Among the possibilities for the next 30 days are:

1. Memory for Remington Rand's new computer
2. Memory Tester for General Electric
3. Word Address Memory Tester for R.C.A.
4. Word Address Memory Tester for Philco
5. Core Tester with decision making logic for R.C.A.
6. Core Tester with decision making logic for Philco
7. Core Tester with decision making logic for Lockheed
8. Five experimental logic machines for Space Technology Labs.
9. Magnetic Tape Recording for Hollman Air Force Base
10. Logic Circuit Checkout for CBS Labs.
11. Small computer for MIT Lincoln Laboratory.

H. Anderson (Cont.)

In addition the normal building block business appears to be more solid than at any time in the last six months. PDP sales efforts are awaiting completion of more complete technical documents.

Literature

Preparation of enough technical literature is a problem across the board. Major projects not yet under control are:

1. Product Note Books
2. Programming Manual for PDP
3. PDP-1 Specification
4. 4000 Series Literature
5. Correcting of technical errors in existing literature.

K. Olsen

Oil Gear Company

We have always talked about working in the machine tool control field but have never had any worth-while contacts. Oil Gear Company came to us a few weeks ago and told us about a digital control they need to go with their prime movers which many machine tool companies use. One of their customers would like to have a unit working by the Machine Tool Show in September, which means we would have to have a unit working very soon. Dick Best and I have been working with them but there are many d tails to be worked out. It looks like an interesting field that may eventually be very profitable. We may sell a small console which will run between $15,000 and $30,000 that might be used in a number of machines. The system keeps track of the position of the cutter or work by counting pulses that come from the lead screw. A variation of this system would be to drive with a stepping motor and count the steps. This would work well for small machine tools such as jig bores.

Lincoln Laboratory Tape Buffer

Lincoln is building a special processing device, the output of which has to be put on magnetic tapes so that it can be processed by CG-24 or an IBM 709. They have 96 bit words which have to be buffered and put out as 6 bit words to feed the tape. We propose a 1000 word, 6 digit memory which would use our standard circuitry. Because they have extra time, we would use our low-speed circuitry and probably low-speed transistors in the switch position. We may use one symmetrical transistor where we now use two fast unsymmetrical transistors.

K. Olsen (Cont.)

Wes Clark's Job

Lincoln has another special emergency job which is an honest-to-goodness computer but very small. The memory is 256 words in 10 digits. The program counter is stored in register 0 and there are only three registers in the machine - BMB, the AC, and MAR. It needs no terminal equipment.

Anelex Printer Buffer

Still another memory problem that we will have to face in the next year is the buffer needed to drive the Anelex line printer. There are about 64 type positions on the Anelex print wheel and 72 or 180 columns, depending on the machine used. This memory will take the core per type position or a 64 by 78 or a 64 by 180 position memory. Some people would make the storage less and use a patchboard to define the spacing and format of the page, but I'd rather have this under program control. This memory could be linear selection because of the large number of digits and small number of words.

ARC Computer

There has been a lot of discussion of DEC building Average Response Computers. The party line on ARC has been that we as a company expect to make ARC's when there is a market for them. We are unusually well set up for it and appreciate the need. Right now there is little agreement as to what is necessary and until we get some consistent opinions, I would not like to build one on speculation. We would build one any time to a customer's order. We will gain a lot of experience on this problem when we sell the PDP-1 to Dr. Weinstein.

My guess as to the characteristics of a final ARC are as follows: 256 sample points which define the memory as 256 words. An analog decoder good to 6 binary bits, which I think is enough because of the nature of the signal being measured and also because of the precision obtained as result of averaging. 500 to 1000 averages are probably necessary, which means that if you do the process in the simple-minded way the number of digits would be the sum of the precision of the measurement, or 6 bits, plus the binary value of the number of averages, or 10, which would mean a 16 digit memory.

The other problem is what do people want for an output. A display oscilloscope is very nice to watch. A pen recorder makes a very nice record. A punched tape makes computer analysis very nice later. An analog magnetic tape makes a good record of the experiment. Making a system adaptable to all this and still complete freedom as far as the rate of which responses are

K. Olsen (Cont.)

taken and the rate at which samples are taken after each response leaves a number of things up in the air as to what the design should be.

Remington Rand Memory

Jack Brown dug up a need at Remington Rand for production quantities of memories for their new commercial computer. This memory is so close to what we are now building for PDP that it is a natural for us to bid. A contract with them may mean legal obligations that are implied or explicit that we may not like. We're going ahead with a bid for things not under our control. They want two memories in five months and then production quantities after that depending on how the machine sells. The memories are identical except that they will contain one, two, or four 4000 word modules. We are going to bid this the price of the frame and common circuitry without modules and the price of the modules separately.

John Hancock Mutual Life Insurance

Andy and I visited John Hancock to see what their need for computers was. They have been unusually successful in the application of computers to their business, where they have 15 million policies which they have to review regularly and for a good number of them they have to bill once a month. They have not as yet put the whole problem on the computer, but they have put enough on it that although their business expands 15 per cent each year, they have not had to expand space or personnel for several years; but they are looking forward to putting all their work on a computer. They are looking at the LARC and the STRETCH because of the size of their problem. We think they should have a bank of 36 digit PDP-1's. Storage is a big part of their problem. They have 600 decimal digits of information for each of the 15 million policies. They would like to review all this once a day. One magnetic tape has only 8 million decimal digits of information, so to hold all this information they would need 120 reels of magnetic tape.

DEC Magnetic Tape Handlers

Tom Stockebrand is finally having success with his high-speed magnetic tape unit. In fact, his problem now is making it slow enough so the TX-2 can receive the information. A variation of this would probably be what John Hancock needs. Other applications will come up later where we don't need to be compatible with IBM. I think we should run the machine as fast as we can but drive it from a capstan which is clutched by a standard magnetic clutch and use vacuum columns with simple switching. Simple induction motors will drive the reels directly. We may

K. Olsen (Cont.)

buy parts enough to run some experiments on a system like this so that if it looks promising we can decide whether we want to invest a man in it or not.

Linear Selection Memory

I have an idea that eventually linear selection memories will be the most economical for large size memories because of the ease in which the cores are wound and because of their large signals and lack of temperature variation. As the memory gets smaller, the advantages of LSM increase. We've worked on this since the start of the company but they take a little more experimenting than we have been able to invest. One approach we have is to use two silicon diodes back to back in series with each word line. We use in the coincident voltage switch. The two diodes back to back allow current to be switched in both directions.

The second approach is to use a coincident voltage switch with a single diode in series with a pulse transformer for each word. Reading is done with a pulse and writing is done with the overshoot that follows the pulse so that only a unit directional switch is necessary.

ITT Computer

Earl Pugh from ITT called on Thursday, January 14, and said that he has been put in charge of a computer that they want built in three or four months which will be 5 or 6 micorsecond memory cycle and 24 digits. He would like to buy our plug-in units and our memory. He claims we will get a purchase order in about a week or two. I asked him to come up and visit us so that we can tell him about all the rest of our plug-in units.

L. Prentice

Two new items: a 9 in. rotary milling table and a 8 in. veriner height gage have been ordered. They will be most useful in the production of small sheet metal dies.

An all Metal storage cabinet for storage of 90 gallons of red label solvent has been fabricated.

The blue print machine has been overhauled and should be ok for another six months.

W. Weeton

This is a quick report on the status of two companies:

RCA - Needham (MT-1514)

A proposal has been made to RCA in Needham for a word address or coincident current memory tester, Model 1514. They have gone to Somerville to obtain an emergency appropriation to purchase this unit. A presentation was made yesterday to their management.

RCA - Needham (Memory Core Tester)

A proposal has been given verbally to RCA to obtain a automatic core tester without the handler which would work with the Ramsey Handler. They have gone to Somerville to get money on the basis of an emergency appropriation for this unit. This presentation was made yesterday.

RCA - Needham (Memory Exerciser)

RCA in Needham yesterday requested a proposal for a memory exerciser which they would try to obtain on their second quarter capital budget. If they obtain this, I would expect a purchase on it on about April. I feel the probability of obtaining these three items would be about 99% on the Memory Tester, about 99% on the Automatic Core Tester, and about 40% on the Memory Exerciser.

Philco

On November 24th we made a proposal to Philco on the Word Address Memory Tester. We are planning to submit a modified proposal on this tester which will more closely meet their requirements. We have also talked to them about obtaining an automatic decision making logic to work with Ramsey Handler, and in the meantime, to use our equipment on the basis of a hand test. They have today requested that I obtain for them a price quote on the logic and the drivers necessary to drive two Ramsey Handlers with their programs. They are planning to use these handlers 24 hours a day, that is three shifts, seven days a week. They have asked that this initial proposal be built out of the test equipment blocks and will later be duplicated by the automatic decision making unit in the System Build-in Block packages. This would give them a supply of test equipment blocks for use in their laboratory as well on the same budget. They are in an extremely tight time position and have asked if we could do such a thing as start work on the automatic decision making logic (this means the sense amplifier and voltage calibrator) immediately using resistors or components

W. Weeton (Cont.)

which are available rather than holding up things for the precision elements. Since they will be testing by hand on the basis of three shift seven days a week, to try to maintain supply until they have the decision making logic, they are very anxious to get this. They are looking for delivery of a unit if possible in one month after receipt of order.

S. Olsen

New Employees

1-5	William Davison	Maintenance
1-11	June Care	Office
1-12	Anita Millett	Production (Rehire)

Job Offers Made

Clifford Fuller Production Control

Terminations

Beverly Smith Accepted job Koehler Manufacturing Co., Marlboro
Nancy Dawes Illness

Production

We finally ordered the eyelet machine and the eyelets from United Shoe Machine Company to replace the present P.C. Solder lugs. Delivery should be in about four weeks.

We are now potting our transformers for the low-speed line in Durez. The epoxy we had been using was affecting the core material.

We are going to try some paper base epoxy P.C. Boards on System P.I.U's to eliminate the fire hazard.

Bids

STL called with some questions to be answered. It would seem that their consultant is trying to justify his position by bringing up all sorts of problems.

Hollman Air Force Base has an invitition to bid. Our equipment is specified for the Logic, and a 16-bit FR300 Ampex Tape unit is specfied for the Magnetic Tape. It is used to record internal guidance data from a Univac Scietific Computer along with time and address data.

J. Brown

The prospects for building blocks is not as high as they have been for the last two months. The system out look, on the other hand, is very encouraging. I wonder if we should not review our scheduling of system bid outstanding. I suspect that if a significant number of our proposals are accepted, we will not be able to meet promised delivery.

Lincoln Labs. is very interested in the 4000 Series and John Taile expects he will be getting approximately 25k sometime in the future. He is screaming for literature and I fully agree. Bell Labs. also is presently interested in both our 10MC and 4000 Series. I have an appointment with Genke on Tuesday of next week.

My plans for the next few weeks are, next week a visit to Bell Labs. and New Jersey area. The following week will be spent in preparation for my trip to Texas. I will be gone from DEC approximately two an half weeks. Incidentally, all our material for the Houston Show has been shipped out unless something unforeseen has happened.

B. Gurley

The specifications for PDP-3 are nearly complete. This really takes the form of a programming manual.

Wes Clark of Lincoln Lab. has a job for us. I expect their P.O. monentarily. This is a very small computer. It has 256 words of memory and requires about 120 PIV's. It is about a $35,000 job. There is also the possibility of several more. Later ones would be lower priced.

R. Hughes

The Blue Line foundered in production because the Ferrite Cores which are used in the pulse transformers failed to function properly when potted in epoxy. The inductance of Ferramic O-3 decreased about 30% due to core compression. The inductance of Ferramic T-1 decreased by 50% when potted in epoxy. Now we pot the transformers in Durez and this changes the inductance by less than 3%.