Box 16
Folder 1

July - Dec. 1963

7 of 8

10275 0017

dec BIWEEKLY REPORT

COPY NUMBER 2

December 20, 1963
DATE

ADMINISTRATION

D. Kuyamjian

Seventeen major relay manufacturers have been asked to recommend and bid on a single-package dual time delay relay. Such a device would replace the Rowan contactors and the Agastat relays presently used in the power controller for the supplies in the PDP-6. Motorola is preparing a bid on a device using SCRs that will meet the requirements. Hopefully, the price of the package can be cut from its present cost by having one manufacturer supply it in toto.

We have received a quotation of $2890.00 from Digitronics Corporation for their Model OB3500 Square-Hole Paper Tape Reader. This is a Bi-Directional Reader for use with 6-level 7/8" tape. Delivery time for this unit is nine weeks.

An order for a second Holley Line Printer has been issued; delivery is scheduled for March 1964. Since Holley did such a poor paint job on the last printer, we have stipulated that they furnish us with sample panels painted for our inspection before actually painting this printer. This will insure a paint job that will meet our standard.

Larry White has found that the 15# weight version of the Standard Register Form 133 is more suited for use with the Holley Printer than the 20# which has been used in the past. A quantity of this paper in now on order.

Another Burroughs Serial Card Reader has been purchased for delivery in February 1964. A Friden Flexowriter is also due in that month.

Teletype Corporation has finally released the improved Model 33 ASR Page Printers for production. We expect to receive a shipment of ten units December 23, 1963 with a subsequent shipment of three on December 26, 1963. Teletype has offered to ship air freight at no charge due to the great inconvenience they have caused us. Some time ago, we placed an order for fifteen more Model 33 Printers for delivery at the rate of five per month beginning in February, 1964. Requirements for additional units should be considered well in advance of actual date of requirement since the three month engineering hold has put Teletype considerably behind in their ability to meet the demand for these printers.

All other major compoents, including the memory stacks, are being delivered according to the schedule indicated in the previous bi-weekly.

D. Glazier

Orders were placed for the new module packaging on Thursday, December 19, 1963. This includes a polyethylene pouch and a corragated w/plastic 12 pack. The pouch will be supplied by S.I. Jacobson, Inc. of Chicago represented by Mr. Rene Jacobs. A pilot run of 100 pieces will be made and shipped in by the first week of January. The 50,000 pieces will be printed, one color (white). Regular production runs should be arriving by the 3rd or 4th week of January.

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D. Glazier (cont.)

The 12 pack is being supplied by Stimpson Inc. of Boston, Mr. Bill Loud representing. Delivery appears to be no problem. A quantity of 5000 boxes were ordered.

Suggestions have been made to buy and use a better grade paper towel. A 3 month testing of Scott Paper Company's #150 towel will be conducted in an attempt to justify a price increase.

D. King

The first release for standard computer cabinets has been received and is now being checked out in mechanical inspection. Due today are the first releases for plenum doors, end panels, and long doors.

We have two etching jobs out with local vendors in the Boston area. We hope that one or both vendors can meet Digital requirements, thus eliminating sending jobs into the New York area and living with four and five week deliveries.

The last two orders for micro doors for the 555 tape unit, were big problems to complete due to poor quality workmanship. We hope we have solved this problem on the present order, by placing it with a Boston foundry who has a reputation for high quality work. The reason we were unable to use this vendor on the two previous orders was that he could not meet our critical delivery requirements at that time.

The sheetmetal work in the cafeteria kitchen has been completed this week. We are in hopes that the plumber and electrician can now complete their work by the first of the year.

F. Kalwell

Taylor Fibre has accepted a quantity of 836 glass epoxy boards which were recently rejected because of inclusions and imperfections in the base laminate. They agreed that these boards were excetionally bad and credited us for $409.64. They also indicated that the quality of future shipments would improve.

I've ordered one new muffin "Boxer Fan" for Jim Cudmore's trial run evaluating all muffins presently on the market. This unit is manufactured by IMC Magnetics and looks exactly like Rotron's. Presently units from Howard Industries, Pamotor, Rotron's new Sentinel Fan and Eastern Air Devices are being evaluated by Jim.

A blanket order has been placed with Astro Dynamics for our annual requirement on heat sinks and blowers used on our display units. The unit price of the heat sink and blower is $75.00.

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COPY NUMBER

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ENGINEERING

T. Stockebrand

Change notice: Al Titcomb is the man to see for all literature on MICRO TAPE. He will bus stocks and will generate pressures to get more an receipt of requests.

A. Hall

Recent developments make it look as if the tape units on the PDP-4 Prototype (Service Center) computer will soon be able to operate reliably at both high and low densities and with all three types of tapes currently in common use at DEC. It has been a terrific struggle to get these tape units working. Lack of clear agreement between Field Service, Tape Department and the users concerning operational specifications, adjustment, test procedures, current configuration and circuit capabilities have been the major problems. Despite other demands on their time Field Service has done a fine job of investigation, repair and modification assisted when possible by Engineering. I hope that the tape units will be capable of providing consistently reliable service by the 23rd of December. By the first of the year we also hope to have the card punch operating. The card reader operates reliably sometimes and sometimes not. A major reason may be the effect of varying environmental conditions on the cards. For this and other reasons (effect of humidity on mag. tape, effect of static on high speed printer, etc.) an instrument to record (permanently) the temperature and humidity will be installed near the computer.

Foxboro apparently feeling the pressure of Minneapolis-Honeywell, possibly reaping some good will from early installations and using some more knowledgeable people for selling has generated more business than in the past. Their recent order for another PDP-4 for their Service Center will allow them to put the present one in stock against future orders. The primary reason for the replacement was that they were convinced that they need 8K Memory and an Extended Arithmetic Unit for customer demonstration and in-house use. The 3-4 weeks down time to install these options in their current Service Center computer disallowed that expedient. An order for 5 PDP-4's (the first to have 8K and EAU) will be in the house shortly. I expect another order (for 5 PDP-5's) within a week or two.

A systems engineer for Foxboro recently slipped into an SDS Users meeting shortly before he attended our DECUS meeting. His comparison was flattering to us. He told me that the SDS discussions were considerably less sophisticated and not as useful as ours. The level and type of personnel attending were also not up to ours. I pass this along as congratulations to those responsible for the high tone of our meetings. (This man's attendance at this meeting may be responsible for some rumors that Foxboro is switching to SDS for their computers.)

George Rice and Tom Leonard have recently completed a design for a 16-channel hardware priority interrupt for the PDP-4. This will be tested shortly by Tom Leonard. The unit has been priced and will soon be available.

DF633 DIGITAL EQUIPMENT CORPORATION · MAYNARD, MASSACHUSETTS

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A. Hall (cont.)

With the help of Alan Kotok a Parity Checking Option for PDP-4 has been designed and priced. Employment of this option is to be discouraged as we consider it superfluous as a practical matter and valuable primarily as a morale booster for skeptical customers. This option will be built and checked at the soonest opportunity.

Foxboro has proposed and Ted Johnson has done the preliminary design for an option to divide each track on the #250 (serial drum for PDP-5) into two sectors. This willaallow the programmer to get fewer words at a time from drum. This is important particularly with a 1K or 4K computer where one track from the drum represents 50% or 15% (respectively) of total core storage.

PDP-6 is currently in checkout.

dec BIWEEKLY REPORT

COPY NUMBER

DATE December 20, 1963

SYSTEMS

On December 19, I visited RCA in the hope of promoting future memory tester business. After talking to these people I found that they had recently purchased a tester built by CTC. After discussing the merits of our product versus CTC's it became obvious to both parties that our machine had distinct advantages in this production application. It seems that one of the reasons they avoided Digital's machine was our failure to consider them as a possible vendor for 50 memory stacks. Whether we consider them a suitable source of stacks or not, it seems ridiculous to jeopordize the future sale of machines by failure to send them a request for a quote. Digital is in a unique position since it supplies the major test equipment to some of its vendors. This unique position should certainly be carefully considered when dealing with these vendor-cutomers.

The Memory Tester 1516 for Fuji has been checked out and will be delivered Dec. 23. We developed a new relay read-write switch module. The module has eight 2 pole reed relays. This package will be offered as an option in the memory tester drive system. We are also working on dual selection scheme using SCR switches. This will allow us to switch both sides of a memory.

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BIWEEKLY REPORT

L. Prentice

COPY NUMBER

DATE

EN 1252	30%
EN 1196	20%
EN 1136 Micro Tape	10%
EN 2609	5%
EN 2791	5%
EN 1000	30%

EN 1196 570 Tape Transport

The last of the first batch of ten cabinets should be shipped to Tulsa by December 24th. The one remaining cabinet will be used as a replacement for the cabinet now in use by the Midwestern Computer that is on the floor and that cabinet will be reworked to an up to date cabinet by removing and refitting a bottom pan. Phil Backholm has run some tests on cooling and noise levels. There is a good indication that we can get the noise level down to a reasonable figure. Several various combinations will be tried. The one that seems to give the most promising is two thicknesses of polyurethane foam with one thickness of aluminum foil between the foams with a pre preparation, a spray coat underneath the foams as a metal deadner.

EN 1252 security

The fire alarm system has been installed and we are now hooked in with the Maynard Fire Station so that an automatic flow of water in the sprinkler system or drop in pressure will trip and alarm not only in our own station at building #5 but also in the Maynard Fire Station. Seven pull boxes are located throughout building #5 where alarms may be pulled in. These would be small fires that would not trip a sprinkler or those seen by individuals before an alarm is tripped automatically.

EN 1185 Mechanical Development of Modules

The general outline of design for the 1935 mounting panel in its various forms have now been completed. The Stimpson Rivet Company has told us that they will rivet up samples of special handles mentioned in last weeks report and give us the data on rivets best suited for this purpose. It will be necessary for us to make some tooling changes in the bender and dies in order to produce the new handles for the .040" epoxy boards. The change orders effecting the .040 epoxy boards are being written.

EN 1177 PDP-5 Development

Ron Cajolet still has a few items changing the length of the bottom doors, the cover strip for the wiring between the two pairs of center doors on the two bay machine, and the use of a different type of striker plate to close in the area directly underneath the cabinet. These will be taken care of as quickly as possible.

December 20, 1963

BIWEEKLY REPORT L. Prentice (cont.)

COPY NUMBER

DATE

EN 2609 Fort Meade Micro Tape

This is a special system with a micro tape at the top of the cabinet and the rest of the front of the cabinet is covered with two nearly full length doors. The drawings have been completed and now awaiting check out.

EN 2719 PDP-5-10

Involves the modification of a standard cabinet so it may be bolted to the ships deck. The drawings to be forward to the coast guard are now complete and the modification to the cabinet is now in the shop. The cabinet is promised for delivery for next Tuesday.

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COPY NUMBER

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QUALITY CONTROL

B. Titelbaum

The standard cells which are being used to calibrate the Kintel power supply and the Fluke meter can now be used only for the lower scales but investigation is being done so that the 5RL voltage divider RVD105 can be used as a volt box giving a high accuracy on the high scales.

The overriding of the external operator by the internal operator has been corrected by adding a speaker for the internal operator.

Speakers will be added to engineering to increase the volume there.

Tektronix was asked if anything can be done about base line curvature in the 555. But nothing has presently been developed to correct this, they mentioned. Research will be done on this problem.

K. Doering

During the past two weeks I have spent quite some time on mechanical specifications of transformers for the purchase specs. My first attempt a few weeks ago on this project left us with an incomplete job. I learned a good lesson: These purchase specs need real concentrat centrated attention and some time consuming but very worthwhile reference to a lot of other drawings.

I did some tests on drill jigs to find out what temperature change does to dimensions. Results were baffling and unexpectedly close to the theory: Some jigs change more than the given tolerances allow. A memo with the test results will be issued next week. The whole story boils down to the necessity of using steel rather than aluminum for jigs and fixtures plus some revaluation of engineering specification.

Anybody who is interested in, but did not get a copy of the test results may please contact our secretary.

The papts motorem fan on life test has finally failed after 11.3 K hours at 60°C. The actual cause of failure hasn't been determined, but appears to be excessive shaft play.

Pulse transformer problems continue to plague us and there appear to be several problems in the handling of these units. This area is being carefully re-examined to close the loopholes and reduce our problems.

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dec BIWEEKLY REPORT A. Parks

COPY NUMBER

Module Repair New Lots Crystal Clocks DATE Sampling

Module repair from customers outside of Digital took up about 75% of our time. These were all repaired and shipped back within one or two days of our receiving them here.

The only new lots consisted of the 1664 and 1665. There were no troubles here.

We also made about 15 crystal clocks.

Dave Clark has given us 10 meg units to sample, but production has had the 10 meg Burst Generator tied up, but weeexpect to have these finished before the new year.

D. Gaboury

We were asked by Phil Backholm to inspect the welding jigs for the 570 tape transport cabinet. They were within the tolerance.

Three of the cabinets made also were inspected, but we found a few deviations. We are keeping the records of the cabinets so Phil can eliminate the error on the next run.

We are now able to properly inspect raw castings in incoming inspection - engineering specifications were made up recently, which in general allows 1/16" for the machinery. Surfaces subject to this allowance got a symbol.

J. Trubiano

In the past two week's this test equipment has been calibrated.

Type	Model	Quantity
Oscilloscope	543/543A	14
Oscilloscope	555	1
Oscilloscope	581A	1
Transistor curve tracer	575	3
Plug-in unit	CA	16
Plug-in unit	82	1

During the last two week's, we received one tektronix type D plug-in unit and 24 pincher type probe tips.

J. Dimauro

For Ulrich Skowronek I have been building a Zener Diode Switching Time Tester. The tester is complete, but a procedure sheet and schematic of the equipment has to be drawn up. Also the tester has to be checked to see that it operates correctly.

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J. Dimauro (cont.)

DATE

I tested for J. Cudmore three types of diodes, the 1N3208, 1N91 and 1N1217. The tests were to determine the forward drop static characterisitcs for different current levels.

The results will be issued in a memo.

Semiconductors tested since last report.

Type	Mfg	Units Tested	% Reject
SDA-6	Fairchild	750	.8
2N835	Motorola	305	.0
2N2904	Motorola	316	.6
2N2219	Motorola	110	0
SW1250-3	North American	416	1.4
2N1754	Philco	38900	1.0
MA89	Philco	3700	0.8
MA90	Philco	276	.0
MD94	Philco	502	35.0
MD95	Philco	240	3.7
2N744	Texas Inst	150	4.0
T1796	Texas Inst	250	0.1
GA439	Texas Inst	2924	0.3
2M711A	Texas Inst	200	0
2M656	Texas Inst	10	0
2N457A	Texas Inst	20	
2N2714	Gen Elec	1600	0.5
	Diodes		
D-662	Clevite	19503	.0
1A2917B	Dickson	9	.0
D664-3	Gen Elec	6675	0.28
1/4 M8-2Z5	Motorola	71	.0
1/4M6-8Z5	Motorola	30	0
1/4M2 4AZ5	Motorola	20	0
D664-3	Nat. Trans	3475	3.
D003	Nat Trans	1794	22.
D007-3	Nat Trans	7300	0.9
D007-2	Nat Trans	1415	0.7
D003-2	Sylvania	900	.0
D001	Transitron	10900	113
D007-3	Transitron	1340	2.0

DF633 DIGITAL EQUIPMENT CORPORATION · MAYNARD, MASSACHUSETTS

dec BIWEEKLY REPORT

COPY NUMBER 2

DATE December 6, 1963

ADMINISTRATION

H. Crouse

Northern Electric, Ltd. of Montreal has supplied our Ottawa office with four Teletype Type 33 ASR's. Northern Electric, Ltd. is the Canadian sales agent for Teletype Corporation of Chicago and inventories their equipment.

Teletype still has an engineering hold on the 33's, but released the thirteen units they have on an old order for delivery the weeks of December 16 and December 23 (seven and six units respectively).

We have several Type 35's on order from Teletype with delivery scheduled for January.

D. King

In the subcontracting line at this time our wiring houses are just about cleaned up with our present orders. At this time our wiring vendors owe us 6 PDP-5 units and 2 16K memory systems.

Sheet metal and machine shop vendors remain quite busy, as well as our silk screening vendor and etching vendor. The latest order for standard computer cabinets, plenum doors, long doors and end panels is progressing very nicely. These four items were placed with three different vendors. The first release against these orders is due December 16, 1963. It calls for 25 cabinets, 25 plenum doors, 25 end panels and 100 long doors. After visiting these vendors and checking on their progress it looks as if all items will be delivered on time.

D. Kuyamjian

Very few purchasing difficulties have arisen from CID's order for the HAVOC computer. One exception has been the Tektronix equipment. CID specified an oscilliscope and a time base that have been obsolete for some time. Fortunately we have been able to locate a demonstration model of the oscilliscope and a rebuilt time base. These should arrive during the week of Dec. 9, 1963.

A portable 0-20 VDC 10 Amp power supply has been purchased for Lee Butterworth. Since the unit is a portable one, the dimensions are less than the standard 19" rack mount type, and the unit can be hung from a cabinet door without interferring with the operation of the door.

We have received a quotation of $3020.00 from Associated Testing Labs. on a temperature chamber for memory stacks. This is a 27 cubic foot, CO_2 cooled chamber which will operate on 50 cycle power (for European use). This price includes the installation of sixteen 32-pin connectors on the inside and the outside walls of the chamber. Associated is able to accomplish this so that condensation does not affect the connectors. Delivery for such a unit is four to five weeks.

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COPY NUMBER

DATE December 6, 1963

D. Kuyamjian (cont.)

Tom Stockebrand has expressed interest in viewing tape slippage on tape transports during start/stop. Although we have yet to investigate exactly what type of camera and associated equipment is necessary, the whole set-up would represent a fair amount of money. Tom's purposes require speed in the order of 200 frames/.1 sec. Since Tom's need for this equipment would be of very short duration, we would like to know if such a camera could be of enough use to others to consider purchase or a lease agreement for this equipment. It would be appreciated if anyone who has a possible application in mind would contact Purchasing.

In our market search for magnetic tape format-convertors for Barbara Stephenson, we have discovered that Electronic Engineering Company of California:

1. Offers a format-convertor for a price in the neighborhood of $70,000.00.
2. Provides a service for converting tape formats for $125.00 per reel, minimum order $1000.00.

Delivery on Digitronics Model 3500 Paper Tape Reader, Soroban Computeriters, and Teletype BRPE-11 Paper Tape Punches has been reduced to one per month.

Ferrox cube Corporation is making progress in delivering the 4K 18-bit memory stacks. They should be in phase with our requirements of four per week by the end of December.

A new order for twenty 4K 12-bit stacks was placed this week with Ferroxcube; delivery is scheduled at four per month beginning in February 1964.

An order for ten Digitronics Model 2500 Paper Tape Readers was also placed this week; our schedule call for two readers per month beginning January 1964.

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COPY NUMBER

DATE December 6, 1963

ENGINEERING

R. Doane

Catalogue

The body of the first two sections of the catalogue and the format and tabulation of the first section are complete in first draft, and the general type of binder has been established. People in Publications and Engineering are working these over towards a second draft. Meanwhile, I am Proceeding to dictate and sketch diagrams and tables for the remaining original text, comprising the Timing and Special Signal Processor sections. I expect the rest of the catalogue to be mostly cut-and-paste from the present one, expect for the fold-out tabulations.

The new material is an attempt to reach people for whom the whole idea of logic is new, while providing enough signs and headings to let sophisticates hit their targets fast.

Miscellaneous

Several of the many module-customer new product ideas we have been collecting are on their way to realization:

1. Mounting Panel 1935 will probably go from Drafting to Production on Dec. 9 Panel 1938 (19 modules with power) should follow them in about 2 weeks.

2. Power supplies 782, 783, and 784 will be out of drafting by about DEC. 13 if all goes well. (Sales blanks are on their way)

3. A 1204 with a normal complement input available by re-jumpering is being initiated (it would be shipped with jumpers set for negative complement, like present units)

4. Jim Burley and I are working out a general purpose high-density diode matrix board.

5. Design is under way for 3 delays in a package, and 3 pulse generators in a package (if possible) will be initiated soon (must they have pulse outputs for any reason?)

6. A sample is on order for a formed plastic cover to beautify the new plain power supplies for customers that want to jazz up their systems. Appearance & cost remain to be seen.

7. A 5 1/4" panel with high-voltage power supply and 12 Nixie sockets is being tried to supply the last link in our decade-counter capability. They would be visible through holes punched by the customer in a plastic power-supply cover.

8. The 1607 is being modified (in the course of siliconizing) to reduce its peak input current from 40 ma to a safer value.

dec BIWEEKLY REPORT

COPY NUMBER

DATE December 6, 1963

R. Doane (cont.)

9. Several new indicator light assemblies are being announced, to increase customer convenience there.

All of these projects are responses to customer gripes in one form or another. I list them here so you can influence the way we respond before its too late. (Only items 1,2, and 9 are for sale; please don't promise customers the others yet!).

dec BIWEEKLY REPORT

COPY NUMBER

DATE December 6, 1963

R. Doane (cont.)

9. Several new indicator light assemblies are being announced, to increase customer convenience there.

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COPY NUMBER

DATE December 6, 1963
Page 5

COMPUTERS

R. Savell

On October 23, 1963 a memo was sent to Production, Computer Checkout and Field Service requesting trouble reports on every trouble occurring on all pieces of peripheral equipment whether in-house or in the field.

Since that date, I have received no trouble reports concerning the Teletype 33. Prior to that date, I had received two trouble reports; one dated September 6th, the other dated September 18th. The only assumption that I can make, therefore, is that the Teletype 33's are working perfectly, never break down, and require absolutely no maintenance of any kind. What a wonderful piece of equipment.

Now, we all know that filling out trouble reports is no guarantee that all the problems we are having will be solved, but not filling out the reports is a guarantee that:

1. If the problems are solved it will probably take longer to solve them.
2. It may result in us sticking with the Teletype 33's as a device much longer than we should, simply due to the lack of information about the problems.
3. I will not be responsible for any Teletype 33's except those used on the PDP-6 if I don't receive information.

H. Morse

The recently formed Engineering Programming Group, under Lenny Hantman, has resulted in clarification of the areas o f responsibility of that group and the Systems Programming Group, which was formerly called "Programming Group." Primarily, the Systems Programming Group will be responsible for development of the Programming Systems which will accompany our computers into the field.

Presently, the projects under way are the design and implementation of the entire programming systems for PDP-5 and PDP-6, and the implementation of a programming systems for the PDP-4 which will incorporate the present PDP-4 software into a magnetic tape system.

The group also publishes and distributes "Programming Notes" which describe changes in pre-presently existing systems, announce the availability of programs for initial trial, and clarify details concerning the use of programs, etc.

Further reports will contain details about the status of the projects underway.

dec BIWEEKLY REPORT

COPY NUMBER

DATE December 6, 196[illegible]

MECHANICAL ENGINEERING

Ken FitzGerald

EN 1253	30%
EN 1254	40%
EN 1097	30%

The ultrasonic vapor degreaser and the drying oven for the automatic module production area have arrived. The oven has been modified and should be wired up and in operation by December 12th. The ultrasonic generator has been sent out to have the transducers attached and generally check over and repaired as necessary. The electric heaters for the degreaser have been ordered. We should have the degreaser operational by the first week in January. Hopefully by that time, we will have had some experience with the drying oven so that we may calculate the size and temperature requirements for the new oven which will be incorporated as part of the etching and washing machine.

Loren Prentice

EN 1000	25%
EN 1252	25%
EN 1196	20%
EN 1136 Micro Tape	5%
EN 1185	20%
EN 1177 PDP-5 Development	5%

EN 1196 570 Tape Transport

This machine was not received from the Las Vegas Show until the 29th of November. This delay caused some difficulty between our office and Midwestern at Tulsa as they needed measurements that could only be taken off this machine and no drawings exist except sketches. Phil Backholm has spent considerable time on the telephone trying to straighten out all of these details and to prevent any further delays due to lack of drawings or lack of any other communications.

Excluding any unforseen delays, two cabinets have arrived at Tulsa, two will be shipped tomorrow, and two the following Monday or Tuesday, the 9th or 10th of December.

First test on cooling and noise level readings will be taken Saturday, December 7th. We hope to have all these tests completed by January 1st.

EN 1136 Micro Tape

All of the print changes for providing different adaptations of micro tape in standard cabinet configurations have been placed in drafting. These would be complete in approximately two weeks.

dec BIWEEKLY REPORT

COPY NUMBER

DATE December 6, 1963

Loren Prentice (cont.)

EN 1185 Mechanical Development of Modules

Work is still going on on the development of the 1935 mounting panel and its various forms of which there are now several. Russ Doane has issued a memo regarding how these are to be numbered and how the number system calls out the different configurations that we know of at present. We have received quotations from Southco Fastener for the special fasteners used on the locking bar to be used with this mounting panel and these will be placed on order today. Several different module handles have been tried out to eliminate the use of an eyelet with the .0040" epoxy boards. This work is still continuing.

EN 1252 Security

The electricians have now completed installations of the switches in the pull boxes in building #5 and have replaced the plunger on all the bells with a different type.

We will not be able to get Mr. Jack O'Connor of Autocall to check out the system until Thursday the 12th of December.

EN 1177 PDP-5 Development

A full scale mock-up was made on Westinghouse PDP-5 #1. In the absence of Scott Miller. I made a presentation to the Computer Guidance Committee. It was agreed that we would not accept the new design although the cost factor is at least a saving of $100.00 per unit. It was felt that the type of doors that we use has been too well identified with our product and that the wiring is much more excessable for maintenance.

I would like to point out here as I did to the Computer Guidance Committee, that this possesses a problem for us in mechanical engineering as we have to make sketches and drawings for almost every two bay machine that leaves the area as no two of these are alike. Almost every customer, at least to date, has required various kinds of different equipment that is nonstandard in the right hand cabinet. Ron Cajolet has been assigned the mechanical engineers function in this area and also to look into what changes can be made to effect cost savings in this unit. In general, these are of minor nature to save machining, to save assembly time, and in general, to try to provide a better production item thatn the unit now currently in production.

dec BIWEEKLY REPORT

COPY NUMBER

DATE December 6, 19[illegible]

QUALITY CONTROLS

Klaus Doering

The mechanical instrument calibration program is well under way and up-to-date. Dick Gaboury's group performs these duties usually on Fridays. If anyone at DEC wants his mechanical instruments calibrated, he is invited to use our services.

I am devoting a considerable amount of time to the inspection drawings for dies, jigs, fixtures, and the establishment of proper tolerances together with Loren Prentice. A memo with the procedures spelling out the concept and administration of this Q.C. tool will have been sent out to the people involved by the time this biweekly comes out.

The issuance and calibration procedures for test equipment have been written, clarified, and put into effect.

Jim Cudmore

Tests on relay module 1803 continue and initial results indicate that Foxboro's problems can't be simulated with the limited amount of information they have given us. Foxboro also returned several clamped load boards, 1001, with the 662 diode string burned out. It seems their checkout personnel is getting heavy-handed with probes and must have shorted several clamps to -15V.

Two samples of the electro-chemical elapsed time meters have been received and will be tested for operation and durability. These units have been prepared for some scopes and preamps to eliminate needless calibration.

Two samples of Rotron's latest effort in the muffin fan have come in and are now on elevated temp. life test.

Arthur Parks

New Modules Module Repairs Crystal Clocks Sampling

About 10 crystal clocks were made and no troubles were experienced by Norman Boisse.

First lots consisted of the 4705-4704. From finished goods we sampled about 25 modules. There were no major discrepancies found. The module repair is about holding its own as the amount going out, about equals the amount coming in.

John Trubiano

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

Type	Model	Quantity
Oscilloscope	543/543A	13
Oscilloscope	551	1
Plug-in-unit	CA	16

COMPANY CONFIDENTIAL

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Dick Gaboury

During the month of November, Mechanical Inspection inspected 1170 boxes of paper tape. There are 864 boxes left. 378 boxes were rejected for the following reasons:

77 for being too wide

76 for being too narrow

71 for the lead color missing

151 for bad fold

2 damaged

1 dirty

This is a 32.5% rejection rate. Because of many inquiries I felt that I should give this preliminary report.

DF633 DIGITAL EQUIPMENT CORPORATION · MAYNARD, MASSACHUSETTS

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ADMINISTRATION

F. Kalwell

A change order was placed to both our suppliers of glass epoxy boards which are used on system modules. Changes are for a new thickness material which will be .040 ± .0065 from our old standard size of 1/16" thick. Our production quantities of this new board should be received the week of November 25. The new price of the .040 board is $0.35/per card as opposed to the 1/16 board of $0.49.

The solid tantalum capacitors we are presently using from Sprague have recently taken a considerable drop in price. A typical example would be a 6.8 mfd unit at 35 volts, 20% for a unit cost of $.31/each compared to a year ago at $ .75/each.

The 22 guage teflon tubing we are presently using on our mounting panels is now priced at $2.80/C ft. as opposed to $4.50 a year ago.

I recently placed a yearly blanket order for the 12-contact Amphenol connectors which are used on our quadruple boards for the PDP-6. The new price of this connector is $1.11.

Tom Stockebrand has recently approved Electric Indicator Company, Inc. ("Elinco") for our second supplier of torque motors for the 555 unit. A small quantity of these motors have been ordered so they can be used on a trial run.

We have recently received the new CTS Series 385 miniature variable potentiometers. These units are 11/32 in diameter, with a wide resistance range available, infinite resolution. These units are presently being evaluated by Bob Hughes in Quality Control. If anyone is interested in obtaining samples on this metal film pot, please contact me.

Dick King

On the present order for 300 computer cabinet frames, mechanical engineering has decided to have corner stiffeners installed on the first hundred frames by the vendor. Having the stiffeners installed by the vendor at fabrication will not only save installation time at Digital but will save us roughly $4.00 per cabinet.

An order for ten 555 chassis was placed this week with a delivery requirement of three weeks. Also on order are the micro door castings and the tape reel hub castings for the 555.

The first order of 10 indicator panels placed with Apahouser Corporation for painting and silk screening has been received and all panels have passed inspection. It now looks as if we have found that badly needed second vendor in the silk screen line.

Monday, the 25th of November, Hudson Sheet Metal Company is scheduled to start installing the stainless steel hood and back drop in the cafeteria kitchen. Upon completion of this work the new grills and fryers that were recently purchased can be installed and put into operation.

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Dave Glazier

The return of a faulty Monroe Calculator was made on Thursday, November 22. The machine was purchased for accounting on September 30 and received in November. Since this time three breakdowns have occurred, pointing to the deficiency of this machine.

On Friday George Brown and I went to the liquidation sale at Maynard Building Supply Comapny on route 62. We purchased lumber and hardware at a substantial 30% saving.

Debbie Kuyamjian

An H.H. Scott sound level meter will be received here for evaluation by Mechanical Engineering. The meter has a range of 25-150 db with an accuracy of ±.5 db. A demonstration has already been given, and the unit will be here for a thirty (30) day no charge period.

Ferroxcube Corporation is still behind schedule in delivery of 4K18 bit Memory Stacks. Delivery of the 13 bit stacks, however, is going very well. Ferroxcube is expected to submit a new schedule for the 18 bit stacks, which will allow for delivery of enough stacks to continue our present rate and also to catch up on those behind schedule.

The Teletype Model 33 Printer is still on engineering hold. All other major components are being delivered as scheduled.

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ENGINEERING

R. Doane

Modules Catalogue	35%
8000 Series	15%
New Products for Modules Customers	30%
Miscellaneous	20%

Tuesday's sales meeting will be the first exposure of module catalogue format. (Copies will also go to everybody else with an expressed interest.) Please make your suggestions early, and preferably in writing so I won't forget. And please mention even your most simple-minded caveats; there will be so many corrections and improvements that we could overlook something obvious.

The 8201's and one 8103 went to Western Electric, North Carolina, for evaluation. Meanwhile, layouts taking advantage of silicon PNP transistors and dual output transistors are nearly through drafting for the 8201, 8104 (8103 replacement), and 8120 (8110 replacement). The first porduction modules will go to Brookhaven and Western Electric to replace their experimental boards, and to Special Systems for replacements in their 10 nanosecond - strobe machines.

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COMPUTERS

Ed Harwood

Things have been pretty slow in the Checkout area the past few weeks due to the lack of certain types of modules. Some of these are modules for the 8K systems on the PDP-4, the register modules on the PDP-5's and the memory systems on the PDP-1's. It seems most of these bottlenecks have been straightened out and we are about to receive some of these modules and proceed with our testing.

On the checkout floor at the present time, there are three PDP-1's, five PDP-5's and four PDP-4's in various stages of their checkout. Everyone of these machines, with the exception of one of the PDP-1's is committed to a customer, so we expect to be very busy during the next three months.

Dave Pinkney is in charge of the Checkout floor and all questions relating to problems in this area should be directed to him.

Henry Crouse and I had an interesting plant tour of the Boston Edison Company's Mystic River Works in Everett. Of particular interest to us was the use of their ISI Computer which they have had for some two years. They use this computer strictly as a monitoring device. It samples all the bearings in the generators and various other hot spots in the system; and if any of these points goes beyond its tolerance, an alarm goes on and it types out which particular area has caused the alarm. They sample every point about every one to two minutes, so this allows them to catch any potential trouble areas quickly and prevent major shutdowns due to catastrophic failures.

We spoke to the Purchasing Agent and found out that they are currently installing two more computer systems at two of their other installations. They've contracted these systems to Westinghouse and General Electric.

The Purchasing Agent told us that Foxboro was asked to bid on the job, but evidently these two p people got the contracts because they bid on the whole system including installation of the generators, the instrumentation, sensing devices and the programming system. They expect these new computer systems to work exactly the same way as the ISI System performing just a monitoring function and no system control.

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MECHANICAL ENGINEERING

Loren Prentice

EN 1000	50%
EN 1136	15%
EN 1196	15%
EN 1252	20%

EN 1196 - 570 Tape Transport

This machine is expected back from the Las Vegas Show either the 25th or 26th of November. Design work has been brought up to date and work is going forward on eight transports. The first of these will be delivered approximately December 2nd. The eight cabinets should be complete by January 1st. Investigations that we wish to make on this cabinet are; cooling, that is air distribution within the cabinet, and soundproofing to reduce the noise level to as low as possible. Instruments have been purchased or are on order to do these studies.

EN 1136 - Micro Tape

I believe all the drawings have been brought up to date on the units itself and there remains to be done some updating by ECO of the cabinet and parts for the cabinet. This work should be completed in approximately one week in the drafting department.

EN 1185 - Mechanical development of modules

Work is going forward in drafting on our new model of the 1901 module mounting panel. I believe the new number is 1935. We are still awaiting the special fasteners to use with the re-straining bar that is to be used for this mounting panel. Work has been done on the use of a lance tab to secure the full .040" thick epoxy boards to the aluminum extruded handle in place of an eyelet now used. We have received sample eyelets and semitubular rivets from Stimpson for test. These will all be assembled and tried in the next week or so.

EN 1252 - Security

We are unsuccessful in our attempt to get the Autocall Alarm System tested. Errors were found in the switches and it is necessary to order another bell for the fire house which will cause approximately one weeks delay. Mr. Jack O'Connor of Autocall spent yesterday here and all of the errors and mistakes will be corrected so testing should be completed by next week.

Ken FitzGerald

EN 1000	10%
EN 1253	20%
EN 1254	40%
EN 1097	30%

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Ken FitzGerald (cont.)

Supervision and general administration of the shops has taken the major percentage of my time for the past two week period. We have done considerable interviewing of candidates for the machine shop foreman and expect to interview quite a few more Saturday, November 23rd. We are in hopes that we will soon find a man to fill this position which will release me to spend more time on other engineering projects.

The automatic silk screen and etching machine which I have been working on, has progressed to the point that we are purchasing an oven for drying the silk screen boards immediately after screening and an ultrasonic vapor degreaser fro removing the silk screen after the boards have been etched. We expect delivery of these items on Tuesday, November 26th and we hope to put the oven into use immediately in the present silk screen area. It will still be necessary to design and build an etching machine and an addition to the conveyor system on the ultrasonic degreaser in order to carry the boards from the degreaser to the tin plating operation. At the present time the plan is for two separate conveyor lines, one for drying, etching, washing, and one for resist stripping and tin plating. This machine will also have the capability of being able to clean the raw stock before they are silk screened.

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QUALITY CONTROL

Bill Titelbaum

The modification to improve the depression and expansion for the 581 and 585 scopes has been completed. Modifications to put regulated D.C. filament supply into the 581 scopes to reduce vertical gain variations with line voltage changes are currently being done.

The modification that provides a new triggering source switch for the 581 and 585 scopes is also currently being done. This modification adds int. and ext. HF Sync and INT, AC, LF Rej. The HF Sync. mode provides triggering on signals above 100 MC. Also the tunnel diode circuit is c changed to improve the triggering characteristics.

10 CRT's have arrived to replace 6 - CRT's that are burnt out in the 543 scopes, 2 - CRT's that have poor emission in 543 scopes, 1 - CRT for the 581 and 515A scopes with poor emission.

Klaus Doering

Tolerances of jigs and fixtures have to be tighter than those of the actual pieces. There have been some misinterpretations as to how much. Usually there have not been drawings for fixtures other than the inspection prints made by Q.C. These will be dressed up the following way: The vital dimensions are given in letters, and have to be referred to in the piece drawing. Each letter however, receives the tolerance. Each inspection drawing has to be approved by mechanical engineering and Q.C.

Jim Cudmore

The pulse transformer tester is now in production and set up sheets have been drawn up for all transformers.

The ordering of test data sheets has been transferred to the production department. This will eliminate some of the delay in ordering these sheets. Q.C. will still generate and maintain all test data sheet masters.

Fans on life test are still running and Papst-Motorem has reached 10.6 hrs. and the Howard Industries 4.6K hrs. Most Rotron fans fail at about 3.5K hours at elevated temperatures. The Howard fan doesn't have a filter and looks very cheap, yet it continues to run. We are about to receive samples of Rotron's latest effort which is supposed to last longer.

Jim Dimauro

Semiconductors tested since the last biweekly.

Type	Mfr.	Units Tested	% Rejected
2N2904	Motorola	1650	1.

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Jim Dimauro (cont.)

2N2219	"	250	0
2N1754	"	5895 (silver)	100
2N1204	"	1500	0.1
MA90	"	4363	.6
2N1754	"	5837	1.5
MD94	"	4059	2.4
2N2714	G.E.	1000	0
2N1184	R.C.A.	100	2.0
2N1184B	"	100	8.0
MD94	Sprague	5000	.98
2N1305	Texas Inst.	2850	.7
2N1304	"	1500	2.0
2N1309	"	4803	.20
GA212	"	1500	2.8
SW1250-3	N. American	330	2.0
FSP-24	Fairchild	30	0
1N764	Dickson Elect.	40	2.5
1N1875	"	50	0
*D662	Clevite	2475	0
1N469	Hoffman	50	0
Q6-100	Int. Diode Corp	30	43
1N748A	Motorola	10	0
1N429	"	70	0
1/4M8.2Z5	"	3	0
1N3208	"	750	1.2
1N1220	"	100	2
*D007	National Trans.	9709	.4
*D003	"	12781	1.1
*D-664-3	"	900	0
*D-664-3	"	2 reels smapled (450)	2 reels rejected
*D-664-3	"	5 reels sampled (1250)	2 reels rejected
D003	Sylvania	54,000 (sampled 4150)	0

*Sampled tested

Arthur Parks

Module Repair - New Lots - Crystal Clocks - Customer Repairs

New lots of modules consisted of the 1993, 1994, 4524, 4801, 6205 and the 1021. All these were done by Norman Boisse in about a day and a half, with the exception of the 6205. Tom Karpowski did this and many problems arose here.

Norman Boisse also finished about 10 crystal clocks for various customers and also repaired several for our own use.

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Arthur Parks (cont.)

We are managing to catch up on our in-house repairs and have turned into stock or test equipment headquarters almost 3/4 of our inventory.

We have almost caught up with finished goods sampling for this week.

John Trubiano

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

Type	Model	Quantity
oscilloscope	543/543A	16
plug-in unit	CA	16
" " "	K	1
triplett multimeter	630-NA	17

During the last two weeks we have received ten cathode-ray tubes. These tubes will replace burnt and poor emission cathode-ray tubes. We also received twenty-four solder pullers. Some of these were, distributed among Q.C. technicians. The test-equipment sign-out and calibration file is not kept accurately so that there is much confusion and loss of time locating information on equipment. I have mentioned this to Bill Titelbaum several times and he seems to agree that the files are in a state of confusion. As of now no attempt has been made to correct this. Yet I think this system is a good one and I'm sure with a little work this matter can be be straightened out.

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SALES

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John Jones

The pulse height analyzer destined for Europe was shipped on schedule. The final preparation of this machine in analyzer configuration for 50 cycle power was done in the Special Systems area. Future analyzers will be prepared on a standard production basis. The next PDP-5 of this type is for Sales-Physics and must be available for software testing on 2 Dec.

Columbia has finally given verbal commitment to buy a PDP-4 to use for pulse height analysis. This order was sought after with much vigah by SDS, but it has come to DEC because of a reputation of technical support to the customer after the purchase. The order will be through our existing AEC quantity contract. Delivery of this machine is promised for 30 December. The CPU is already checked out (PDP-4-20) and the Tape Control Type 57A has been on order since September, so this delivery date presents no more than the usual problems.

The software for the PDP-5 pulse height analyzer grinds along slowly. It is due for demonstration on December 6. At present the programs are written, but neither assembled nor debugged. It's going to be a busy six weeks!

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ADMINISTRATION

Henry Crouse

We have purchased a 4K18B memory stack from Fabri-Tek to evaluate Fabri-Tek as second source to Ferroxcube, since we have encountered difficulty with Ferroxcube's delivery over the past few months. We expect the stack to be delivered in four weeks.

We have ordered from Philco Corporation adequate transistors MADT and MAT variety to last over a period of six to eight months. We are receiving these transistors now and expect that total delivery should be completed about the middle of January.

The completion date of the parking lot has moved so frequently, I have stopped giving promises of completion, but the way things are shaping up now I feel that the lot will probably be made available to employees prior to the publication of the next Biweekly. The parking lot was designed to accommodate some eighty-eight cars, however, some of these spaces will have to be reserved for customer relations, personnel and purchasing visitors.

Dave Glazier

We now have a Xerox 914 photo copier in operation in the purchasing department for use of all departments in the plant.

A maintenance agreement contract was approved for service on all IBM purchased typewriters. This contract covers the following:

Service, cleaning (3 times yearly), parts (except platen), travel time, and labor for the period of (1) one year starting November 1, 1963. Each standard IBM model C will cost $35.00/yr. and each executive $39.50/yr. as compared with an average charge of $49.50 per typewriter last year. Only one purchase order and one check will be issued per year.

D. Kuyamjian

Potter Instrument Compnay's supervisor of spare parts, Mr. Richard Hemson, met with representatives from Customer Relations and Purchasing. The purpose of the visit was to evaluate DEC's spare parts stock.

Mr. Hemsen indicated that the stock level we currently maintain can be expected to support the number of Tape Transports we have in the field. He did recommend a shift of emphasis to some areas of smaller parts which could be expected to wear out as our Transports became older. Mr. Hemsen's visit also served to acquaint us with the maintainance and delivery problems of those parts peculier to DEC's Transports.

Both the Model 33 and Model 35 Teletype units are still on engineering hold at the factory. Teletype has advised that the following areas are now subject to re-design:

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D. Kuyamjian (cont.)

1. distributor clutch
2. transistor mounting brackets in call unit
3. keyboard contacts
4. selector magnet driver

A firm date has not yet been established for production to resume on these printers.

Delivery for Ferroxcube Memory Stacks is as follows:

18 bit	12 bit
2 - week of 11/4/63	4 - week of 11/4/63
5 - week of 11/11/63	2 - week of 11/11/63
7 - week of 11/18/63	2 - week of 11/18/63
6 - week of 11/25/63	2 - week of 11/25/63
6 - week of 12/2/63	2 - week of 12/2/63
7 - week of 12/9/63	
6 - week of 12/16/63	

Delivery for all other major components is remaining in line with our requirements.

Dick King

This week we placed a large sheet metal order to cover our yearly usage on computer cabinet frames, plenum doors, end panels and long doors. Five vendors quoted on the above items. The four items were split between three of the five competing vendors. The three vendors who will be working on these orders are Donnelly Manufacturing Company, Prelco Corporation, Boston Precision Parts Company, Inc. By placing the orders with these three vendors we show a savings of $5000.00 over orders placed throughout this past year for the same items.

An order for ten indicator panels was placed with Apahouser Corporation of New England this week for painting and screening. Apahouser has submitted samples of silk screening which were approved by quality control and they have fabricated a few name plates for DEC which were also acceptable. This however is their first screening job for DEC on a purchase order. If this present order is satisfactory it will give Digital a badly needed second source to go along with Precision Screen in this line. This we hope, will alleviate the poor delivery we have been getting lately on screened panels.

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ENGINEERING

R. Doane

Module Catalogue	20%
Miscellaneous	80%

Special thanks to Dave Denniston, Jim Burley, and Bob Oakley for many fine catalogue suggestions, written down so I can't forget them.

I expect to send around a draft of the first fold-out tabulation with proposed format early next week. Prompt criticisms are invited, as before.

T. Stockebrand

1136	80%
1237	5%
1000	15% (Drafting)

Good news, Kie Corp. has accepted their set of micro tapes. They report error free operation except for a catastrophic trouble which turned out to be an unsoldered connection. Len Hantman is taking care of the literature and will distribute a complete set to those who request it about mid month. So far there is 1) a rather complete paper 2) detailed writeups of microtog and microtrieve for the PDP-4. 3) summary writeups of the diagnostic and users programs on the PDP-1 4) a checkout procedure usfull for home study use in obtaining a detailed understanding of the control 5) a full set of sketch form block schematics. 6) A bulletin not yet printed but in ditto form.

Yet to come is a field service normal and better prints (whew!). Don Vonada is taking over all engineering responsibility for the 555 transport and its solid state successor the 555A. The PDP-5 control willbbe worked on as the PDP-1 and PDP-4 program break control (550) is settled down into solid production. The biggest problem has been the writing of instructions to all the various departments of Production as to how to handle the building and testing of reasonably subtle electro-mechanical equipment - equipment which was beyond our abilities a year or so ago. The nut of this problem is a clear understanding on my part of what production, Q.C., etc. normally do.

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Systems

Ken FitzGerald

EN 1253 Sheet Metal Administration	25%
EN 1254 Machine Shop Administration	60%
EN 1000	15%

The PDP-6 operator control panel has been replaced with another anodized and silk screened panel because the brushing and anodizing on the first one was not satisfactory. However, this is not the final panel which is going to be on all equipment. All future panels are going to be anodized and chemically etched by an outside vendor. Most of the indicator light panels for the PDP-6 are pending changes due to the necessity for clarification of legends and additional lights for the operators use. These changes will have to be reviewed and made after the PDP-6 is complete and operational.

Most of the hardware for the 570 Tape Transport door has been completed and Phil Backholm is working desperately to mechanically assemble the unit so that it may go to the Fall Joint Computer Conference. It looks as if it will make it without too much difficulty.

The console for our tape controlled milling machine and the milling head are being returned to the factory the week of November 11th for the addition of a sequence read-out on the console and a turret depth stop on the head. This should make it much more functional and easier to program. While this machine is out of the house we will not be able to do any close tolerance jigs and fixtures and this will also mean that the next order of ten Microtapes will be extremely rushed since the orders for construction have been issued and the machine is leaving Friday.

On Tuesday of this week, Phil Backholm and myself visited a plant in Fitchburg with an automatic silk screening machine. This machine could be utilized in our silk screen department if the manufacturer can guarantee accuracy of about ± .002" and it can be adapted to handle silk screen frames large enough for our standard printed circuit boards. If it's feasible to use this machine, we will build a small conveyor system to take the boards from the machine through a drying oven and perhaps automatic etching. This should speed up our silk screening operation quite a bit.

The personnel department, Loren Prentice, and myself have spent considerable time this past week interviewing candidates for our shops. We hope that we will be able to pick up a few good people to help alevitate the load in the two shops.

Loren Prentice

EN 1000	75%
EN 1178	5%
EN 1136	5%

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Loren Prentice (cont.)

EN 1196	10%
EN 1252	5%

EN 1196 570 Tape Transport

This machine was received from Tulsa, Wednesday, November 6th. We now hope we can get this in a reasonable condition to ship to the show either Friday or Saturday of this week. Two other cabinets to be shipped to Tulsa should be on time as they are nearly complete at the present time. These are cabinets only; without trim, panels, rear doors, or a front door. We have a great number of minor changes that we want to make after the first three cabinets are completed. None of these are serious alterations, simply methods of fabrication that will produce better results at lower costs.

The 340 Display work done by Ron Cajolet has payed off handsomely and this machine is ready to go. It does not have a permanent logo but practically all of the rest of the machine mechanically is in its, we hope, final design stage.

1136 Micro Tape

All change orders have been given to drafting and approximately two to three more days of drafting work is needed to bring the prints up to date for this particular lot. After this lot, we hope the machine can be converted to Solid State. The preliminary models of the Solid State chassis have been delivered to Tom Stockebrand and Don Vonada for evaluation and lay-out for positioning all electronic components.

EN 1185 Mechanical Development Modules

This work is being persued by Ron Cajolet. A new model of the 1914 module mounting panel, I believe, has been approved. The special type fastener to make up for the variations and the various thickness of plugs are on order. I see no reason why we can't go ahead with this project. Picutres have been taken and hopefully, this project is nearing completion. We hope to be able to report on a new handle for the standard module but have been unable to get the necessary dies made to produce this.

Phil Backholm and Ken FitzGerald have been looking into both screening and conveyor systems for production and will report on this at the methods committee meeting and probably briefly in the bi-weekly.

As indicated in the last bi-weekly, we are converting entirely to brushed aluminum with black letters for all external panels, indicator, operator control, etc., for all units. The orders have been placed for most of these panels with the exception of the indicator panels for the PDP-6. As soon as these can be finalized, orders should be placed for these. This should be done this week. These are excellent panels, very cheap compared with the panels we are presently using. There is only one "hooker" or bugaboo" with this unit - no faster then four weeks delivery can be obtained.

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Loren Prentice (cont.)

Scott Miller is undertaking some work and we plan to put at least sample orders to another local vendor in the area who claims he can do competitive work. If this can be worked out, and there seems to be a good change that it can be, we would obtain good vendors for our indicator and operator control panels for the first time.

EN 1252 Security

As you have probably noticed, Dom Inferrara has been around installing new fire extinguishers in several of the areas. We now feel that we have almost complete converage throughout the plant. We were inspected recently by Factory Insurance Association's inspector and we probably will have to add perhaps two more extinguishers to satisfy his recommendations. We have also asked Henry Crouse to look into the possibility of having at least yearly inspections performed by an outside contractor on these extinguishers with our own maintenance people performing monthly or 90 day inspection of all fire extinguishers.

The Autocall system that ties our alarm system in Building #5 to the Maynard Fire Station is approximately 75% complete. We are frustrated today in our efforts to hook in the flow switches. We had planned to hook the first of the flow switches in Building #5 today, but could not shut off the outside hydrant. This work will be resumed Tuesday, November 12th. We urge everyone to use the utmost caution at the time that the sprinklers are out. This usually takes four to five hours for each quarter of Building #5 and should take place within the coming week.

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QUALITY CONTROL

Klaus Doering

In the past there have been questions as to what measuring equipment there is available at DEC. People found out after they had gone through quite some trouble with one kind, that we had equipment that would have done the job better or more accurately.

Form Q.C.-4 lists separately electrical test equipment and mechanical inspection instruments, and breaks it further down into one group that is due to calibration and one that is not. Copies of these 4 lists have been sent out to various engineers and the test equipment committee. Anybody who wants copies should call up the Q.C. office. The lists are updated periodically and shall also become part of theQ.C. manual.

Jim Cudmore

A new tester for our pulse transformers has been designed and built. This tester will simplify this operation and will not tie up a scope. The tester applies a step of known amplitude to the transformer and the output pulse or pulses are measured by means of a slicing circuit. The result is go-no-go indication.

Purchasing specifications continue to occupy some of my time as do the routine problems in production test.

Dick Gaboury

Mechanical Instrument Calibration

Starting immediately, all mechanical inspection instruments are scheduled for calibration. For the time being only Q.C. is on the schedule; however, upon request, other departments' equipment could be calibrated.

John Trubiano

Test Equipment Service

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

Type	Model	Quantity
Tektronix Oscilloscope	543/543A	3
Plug-in-unit	CA	3
" " "	S	2
" " "	M	L
" " "	D	1
L.C. Meter	130	4
Hewlett Packard Oscilloscope	175A	10

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John Trubiano (cont.)

Plug-in-unit	1750A	10
" " "	1781B	3

When any test equipment is taken from the plant, Test Equipment Service should be notified so that valuable time will not be spent trying to locate such equipment.

Arthur Parks

Sampling Crystal Clocks Module Repairs New Lots

New lots consisted of 6684 bus driver, 4658 bus transceiver, and the 6205, a triple flip-flop for PDP-6. The 6205 is the only one we have any real problems with and one man has been working on these for over a week.

About 10 crystal clocks were made and no problems were experienced here - Galen Davis tells us he has many orders but no crystals have come in as yet.

We sampled about 50 modules for Klaus Doering's group. Klaus's people are picking out all the 1500 series modules which are slow in testing because of the special equipment needed.

Repairs for customers have all been shipped back except for a few that came in this morning.

We are now working again on in-house repairs and Joe Rutschman's field service spares. We've managed to whittle down DEC repairs to roughly around 500 modules.

Jim Dimauro

Semiconductors tested since last report:

Type	Mfr.	Amt. Received	% Rejected
SDA-4	G.E.	350	0
2N2904	Motorola	600	2.6
2N2904A	"	100	2.0
SW1250-3	North American	205	2.4
MA-90	Philco	4248	2.0
2N1754	"	2157	0
MD94	"	1076	12.0
2N1184	RCA	200	2.5
2N1184B	"	150	1.0
MD94	Sprague	800	1.0
2N2100	"	50	0
GA439	T.I.	2,300	1.2
2N1305	"	36,500	.8
2N711A	"	100	0
2N456A	"	200	0

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Jim Dimauro (cont.)

D662	Clevite	18,660	1.0
1N469	Hoffman	205	0
D662	G.E.	17,367	.04
1/4M6.8Z5	Motorola	30	0
1N750A	"	78	1.2
1N964A	"	30	0
1N3340A	"	30	0
1N1217	"	300	0
D003	National Transistor	2844	.28
D003	Sylvania	9,000	0.6
D001	Transitron	15,000	0.7

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SALES

Bob Oakley

The past six weeks at the Los Angeles office have been quite promising for future sales. Inquiries and interest in some of our more recent product developments have been very refreshing from the standpoint of several new customer possibilities. The new high density modules have had a great effect upon module sales and give us an expanding market again.

We have two promising prospects for laboratory and training modules who are also interested in PDP-5's for educational purposes in the Engineering Departments of L.A. State College and San Fernando Valley State College.

Most recent sales efforts have dealt with those large companies which are traditionally unpredictable and difficult to forecast in terms of future sales. These are:

General Dynamics, Astronautics, San Diego
Hughes Aircraft, Culver City
Hughes Aircraft, Fullerton
N.A.A., Autonetics, Anaheim
N.A.A., Flight Simulation, Los Angeles
N.A.A., Rocketydyne, Canoga Park
Thompson-Ramo-Wooldridge, Canoga Park

Most of our customers are continuing to purchase modules, with JPL, SDC, and E.G. & G. the most active. The PDP-5 has several sure sales at JPL which in themselves will generate additional module sales for interfacing and implementation, as well as the continute instrumentation requirements for modules.

Because there have been several persons interested in the various digital computers at JPL, I am listing the machines that I know exist at their facilities. Possibly there are others of which I am not aware.

2 - IBM7094
2 - IBM 7040
4 - IBM 1401
2 - DEC PDP-1
4 - DEC PDP-4
2 - SDS 920
1 - SDS 910
2 - RR 1218
1 - PB 250
1 - CDC 160A
1 - Burroughs 205
1 - Burroughs E101

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ADMINISTRATION

Henry Crouse

We have purchased a 4K18B memory stack from Fabri-Tek to evaluate Fabri-Tek as second source to Ferroxcube, since we have encountered difficulty with Ferroxcube's delivery over the past few months. We expect the stack to be delivered in four weeks.

We have ordered from Philco Corporation adequate transistors MADT and MAT variety to last over a period of six to eight months. We are receiving these transistors now and expect that total delivery should be completed about the middle of January.

The completion date of the parking lot has moved so frequently, I have stopped giving promises of completion, but the way things are shaping up now I feel that the lot will probably be made available to employees prior to the publication of the next Biweekly. The parking lot was designed to accommodate some eighty-eight cars, however, some of these spaces will have to be reserved for customer relations, personnel and purchasing visitors.

Dave Glazier

We now have a Xerox 914 photo copier in operation in the purchasing department for use of all departments in the plant.

A maintenance agreement contract was approved for service on all IBM purchased typewriters. This contract covers the following:

Service, cleaning (3 times yearly), parts (except platen), travel time, and labor for the period of (1) one year starting November 1, 1963. Each standard IBM model C will cost $35.00/yr. and each executive $39.50/yr. as compared with an average charge of $49.50 per typewriter last year. Only one purchase order and one check will be issued per year.

D. Kuyamjian

Potter Instrument Compnay's supervisor of spare parts, Mr. Richard Hemson, met with representatives from Customer Relations and Purchasing. The purpose of the visit was to evaluate DEC's spare parts stock.

Mr. Hemsen indicated that the stock level we currently maintain can be expected to support the number of Tape Transports we have in the field. He did recommend a shift of emphasis to some areas of smaller parts which could be expected to wear out as our Transports became older. Mr. Hemsen's visit also served to acquaint us with the maintainance and delivery problems of those parts peculier to DEC's Transports.

Both the Model 33 and Model 35 Teletype units are still on engineering hold at the factory. Teletype has advised that the following areas are now subject to re-design:

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D. Kuyamjian (cont.)

1. distributor clutch
2. transistor mounting brackets in call unit
3. keyboard contacts
4. selector magnet driver

A firm date has not yet been established for production to resume on these printers.

Delivery for Ferroxcube Memory Stacks is as follows:

18 bit	12 bit
2 - week of 11/4/63	4 - week of 11/4/63
5 - week of 11/11/63	2 - week of 11/11/63
7 - week of 11/18/63	2 - week of 11/18/63
6 - week of 11/25/63	2 - week of 11/25/63
6 - week of 12/2/63	2 - week of 12/2/63
7 - week of 12/9/63	
6 - week of 12/16/63	

Delivery for all other major components is remaining in line with our requirements.

Dick King

This week we placed a large sheet metal order to cover our yearly usage on computer cabinet frames, plenum doors, end panels and long doors. Five vendors quoted on the above items. The four items were split between three of the five competing vendors. The three vendors who will be working on these orders are Donnelly Manufacturing Company, Prelco Corporation, Boston Precision Parts Company, Inc. By placing the orders with these three vendors we show a savings of $5000.00 over orders placed throughout this past year for the same items.

An order for ten indicator panels was placed with Apahouser Corporation of New England this week for painting and screening. Apahouser has submitted samples of silk screening which were approved by quality control and they have fabricated a few name plates for DEC which were also acceptable. This however is their first screening job for DEC on a purchase order. If this present order is satisfactory it will give Digital a badly needed second source to go along with Precision Screen in this line. This we hope, will alleviate the poor delivery we have been getting lately on screened panels.

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ENGINEERING

R. Doane

Module Catalogue	20%
Miscellaneous	80%

Special thanks to Dave Denniston, Jim Burley, and Bob Oakley for many fine catalogue suggestions, written down so I can't forget them.

I expect to send around a draft of the first fold-out tabulation with proposed format early next week. Prompt criticisms are invited, as before.

T. Stockebrand

1136	80%
1237	5%
1000	15% (Drafting)

Good news, Kie Corp. has accepted their set of micro tapes. They report error free operation except for a catastrophic trouble which turned out to be an unsoldered connection. Len Hantman is taking care of the literature and will distribute a complete set to those who request it about mid month. So far there is 1) a rather complete paper 2) detailed writeups of microtog and microtrieve for the PDP-4. 3) summary writeups of the diagnostic and users programs on the PDP-1 4) a checkout procedure usfull for home study use in obtaining a detailed understanding of the control 5) a full set of sketch form block schematics. 6) A bulletin not yet printed but in ditto form.

Yet to come is a field service normal and better prints (whew!). Don Vonada is taking over all engineering responsibility for the 555 transport and its solid state successor the 555A. The PDP-5 control willbbe worked on as the PDP-1 and PDP-4 program break control (550) is settled down into solid production. The biggest problem has been the writing of instructions to all the various departments of Production as to how to handle the building and testing of reasonably subtle electro-mechanical equipment - equipment which was beyond our abilities a year or so ago. The nut of this problem is a clear understanding on my part of what production, Q.C., etc. normally do.

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Systems

Ken FitzGerald

EN 1253 Sheet Metal Administration	25%
EN 1254 Machine Shop Administration	60%
EN 1000	15%

The PDP-6 operator control panel has been replaced with another anodized and silk screened panel because the brushing and anodizing on the first one was not satisfactory. However, this is not the final panel which is going to be on all equipment. All future panels are going to be anodized and chemically etched by an outside vendor. Most of the indicator light panels for the PDP-6 are pending changes due to the necessity for clarification of legends and additional lights for the operators use. These changes will have to be reviewed and made after the PDP-6 is complete and operational.

Most of the hardware for the 570 Tape Transport door has been completed and Phil Backholm is working desperately to mechanically assemble the unit so that it may go to the Fall Joint Computer Conference. It looks as if it will make it without too much difficulty.

The console for our tape controlled milling machine and the milling head are being returned to the factory the week of November 11th for the addition of a sequence read-out on the console and a turret depth stop on the head. This should make it much more functional and easier to program. While this machine is out of the house we will not be able to do any close tolerance jigs and fixtures and this will also mean that the next order of ten Microtapes will be extremely rushed since the orders for construction have been issued and the machine is leaving Friday.

On Tuesday of this week, Phil Backholm and myself visited a plant in Fitchburg with an automatic silk screening machine. This machine could be utilized in our silk screen department if the manufacturer can guarantee accuracy of about ± .002" and it can be adapted to handle silk screen frames large enough for our standard printed circuit boards. If it's feasible to use this machine, we will build a small conveyor system to take the boards from the machine through a drying oven and perhaps automatic etching. This should speed up our silk screening operation quite a bit.

The personnel department, Loren Prentice, and myself have spent considerable time this past week interviewing candidates for our shops. We hope that we will be able to pick up a few good people to help alevitate the load in the two shops.

Loren Prentice

EN 1000	75%
EN 1178	5%
EN 1136	5%

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Loren Prentice (cont.)

EN 1196	10%
EN 1252	5%

EN 1196 570 Tape Transport

This machine was received from Tulsa, Wednesday, November 6th. We now hope we can get this in a reasonable condition to ship to the show either Friday or Saturday of this week. Two other cabinets to be shipped to Tulsa should be on time as they are nearly complete at the present time. These are cabinets only; without trim, panels, rear doors, or a front door. We have a great number of minor changes that we want to make after the first three cabinets are completed. None of these are serious alterations, simply methods of fabrication that will produce better results at lower costs.

The 340 Display work done by Ron Cajolet has payed off handsomely and this machine is ready to go. It does not have a permanent logo but practically all of the rest of the machine mechanically is in its, we hope, final design stage.

1136 Micro Tape

All change orders have been given to drafting and approximately two to three more days of drafting work is needed to bring the prints up to date for this particular lot. After this lot, we hope the machine can be converted to Solid State. The preliminary models of the Solid State chassis have been delivered to Tom Stockebrand and Don Vonada for evaluation and lay-out for positioning all electronic components.

EN 1185 Mechanical Development Modules

This work is being persued by Ron Cajolet. A new model of the 1914 module mounting panel, I believe, has been approved. The special type fastener to make up for the variations and the various thickness of plugs are on order. I see no reason why we can't go ahead with this project. Picutres have been taken and hopefully, this project is nearing completion. We hope to be able to report on a new handle for the standard module but have been unable to get the necessary dies made to produce this.

Phil Backholm and Ken FitzGerald have been looking into both screening and conveyor systems for production and will report on this at themethods committee meeting and probably briefly in the bi-weekly.

As indicated in the last bi-weekly, we are converting entirely to brushed aluminum with black letters for all external panels, indicator, operator control, etc., for all units. The orders have been placed for most of these panels with the exception of the indicator panels for the PDP-6. As soon as these can be finalized, orders should be placed for these. This should be done this week. These are excellent panels, very cheap compared with the panels we are presently using. There is only one "hooker" or bugaboo" with this unit - no faster then four weeks delivery can be obtained.

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Loren Prentice (cont.)

Scott Miller is undertaking some work and we plan to put at least sample orders to another local vendor in the area who claims he can do competitive work. If this can be worked out, and there seems to be a good change that it can be, we would obtain good vendors for our indicator and operator control panels for the first time.

EN 1252 Security

As you have probably noticed, Dom Inferrara has been around installing new fire extinguishers in several of the areas. We now feel that we have almost complete converage throughout the plant. We were inspected recently by Factory Insurance Association's inspector and we probably will have to add perhaps two more extinguishers to satisfy his recommendations. We have also asked Henry Crouse to look into the possibility of having at least yearly inspections performed by an outside contractor on these extinguishers with our own maintenance people performing monthly or 90 day inspection of all fire extinguishers.

The Autocall system that ties our alarm system in Building #5 to the Maynard Fire Station is approximately 75% complete. We are frustrated today in our efforts to hook in the flow switches. We had planned to hook the first of the flow switches in Building #5 today, but could not shut off the outside hydrant. This work will be resumed Tuesday, November 12th. We urge everyone to use the utmost caution at the time that the sprinklers are out. This usually takes four to five hours for each quarter of Building #5 and should take place within the coming week.

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QUALITY CONTROL

Klaus Doering

In the past there have been questions as to what measuring equipment there is available at DEC. People found out after they had gone through quite some trouble with one kind, that we had equipment that would have done the job better or more accurately.

Form Q.C.-4 lists separately electrical test equipment and mechanical inspection instruments, and breaks it further down into one group that is due to calibration and one that is not. Copies of these 4 lists have been sent out to various engineers and the test equipment committee. Anybody who wants copies should call up the Q.C. office. The lists are updated periodically and shall also become part of theQ.C. manual.

Jim Cudmore

A new tester for our pulse transformers has been designed and built. This tester will simplify this operation and will not tie up a scope. The tester applies a step of known amplitude to the transformer and the output pulse or pulses are measured by means of a slicing circuit. The result is go-no-go indication.

Purchasing specifications continue to occupy some of my time as do the routine problems in production test.

Dick Gaboury

Mechanical Instrument Calibration

Starting immediately, all mechanical inspection instruments are scheduled for calibration. For the time being only Q.C. is on the schedule; however, upon request, other departments' equipment could be calibrated.

John Trubiano

Test Equipment Service

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

Type	Model	Quantity
Tektronix Oscilloscope	543/543A	3
Plug-in-unit	CA	3
" " "	S	2
" " "	M	L
" " "	D	1
L.C. Meter	130	4
Hewlett Packard Oscilloscope	175A	10

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John Trubiano (cont.)

Plug-in-unit	1750A	10
" " "	1781B	3

When any test equipment is taken from the plant, Test Equipment Service should be notified so that valuable time will not be spent trying to locate such equipment.

Arthur Parks

Sampling Crystal Clocks Module Repairs New Lots

New lots consisted of 6684 bus driver, 4658 bus transceiver, and the 6205, a triple flip-flop for PDP-6. The 6205 is the only one we have any real problems with and one man has been working on these for over a week.

About 10 crystal clocks were made and no problems were experienced here - Galen Davis tells us he has many orders but no crystals have come in as yet.

We sampled about 50 modules for Klaus Doering's group. Klaus's people are picking out all the 1500 series modules which are slow in testing because of the special equipment needed.

Repairs for customers have all been shipped back except for a few that came in this morning.

We are now working again on in-house repairs and Joe Rutschman's field service spares. We've managed to whittle down DEC repairs to roughly around 500 modules.

Jim Dimauro

Semiconductors tested since last report:

Type	Mfr.	Amt. Received	% Rejected
SDA-4	G.E.	350	0
2N2904	Motorola	600	2.6
2N2904A	"	100	2.0
SW1250-3	North American	205	2.4
MA-90	Philco	4248	2.0
2N1754	"	2157	0
MD94	"	1076	12.0
2N1184	RCA	200	2.5
2N1184B	"	150	1.0
MD94	Sprague	800	1.0
2N2100	"	50	0
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SALES

Bob Oakley

The past six weeks at the Los Angeles office have been quite promising for future sales. Inquiries and interest in some of our more recent product developments have been very refreshing from the standpoint of several new customer possibilities. The new high density modules have had a great effect upon module sales and give us an expanding market again.

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2 - IBM 7040
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4 - DEC PDP-4
2 - SDS 920
1 - SDS 910
2 - RR 1218
1 - PB 250
1 - CDC 160A
1 - Burroughs 205
1 - Burroughs E101

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ENGINEERING

R. Doane

ENGINEERING PROJECT	% WORK TIME
6205 (for PDP-6)	35%
New Module Catalogue	30%
8000 Series	10%
Miscellaneous	25%

A preliminary table of contents and outline of the new full-size module catalogue has been circulated for comments. A first cut of one of the data tabulation pages is the next step. Anyone who has suggestions should make them as soon as possible; even the best ideas will not help if they come too late.

We are now quoting three months delivery, when asked, on 8201 (flip-flop), 8103 (logic), and 8120 (two 6-input NOR). All three are finally on the beaten path to production. The clock (8401) will shortly follow.

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SYSTEMS

J. Fadiman

The Memory Tester 1521A was finally shipped back to Ferroxcube about two weeks ago and it appears that all of the problems have been solved. They have been billed for the system as of October 15 and payment should be received by November 15.

The Spark Chamber Scanning System is being shipped to the University of Chicago on Monday, after final acceptance has been completed by the customer here in our plant. The final checkout and inspection has been completed on the Memory Tester 1516K for the Cofelec Div. of CSF in Paris. This machine will be shipped on Monday.

The Semi-Automatic Core Tester 2110XE and the Memory Plane and Stack Tester 1516L are both under construction for the Fujitsu Co. in Tokyo, Japan. Wiring is nearly completed on the 2110 and this machine will be shipped out by November 7. Wiring is continuing on the 1516 and the shipment date for this is December 6. We are also now designing the Memory Exerciser 2214 for Hitachi, Kanagawa Works, Tokyo, Japan. All of the logic and front panels have been sketched out and the whole system is now in Drafting. Shipment of the machine will be on January 24, 1964 and the selling price is $37,400.

A few days ago we received an order for another Semi-Automatic Core Tester 2 1081 which will be sent to the Bendix Corporation in Kansas City, Missouri. Price of this machine is $13,900. and delivery date is December 17. The Special Systems group is also working on a Memory Exerciser 2215 for DEC to be used by Gordon Bell.

I recently made a sales call to Loral Electronics in New York City where we have lent to them our Programmable Pulse Generator 2 108 for evaluation purposes. This machine will be shipped back to us on Tuesday. Chances of selling such a system to Loral are however only about 40% as I believe that they are a company interested only in buying the cheapest thing on the market, irrespective of quality.

Yesterday two engineers from Northern Electric Co. visited us and we discussed detailed specifications for core testing equipment. An order for a Semi-Automatic Core Tester, Model 2110 for about $12,500. should come to this company in about one month. Chances of making this sale are about 95%. Future sales to Northern Electric Co. involve an Automatic Core Tester 2113 in about six months and an Automatic Ferrite Sheet Tester in approximately one year from now. Northern Electric should be a good customer of ours and we should keep close contact with them. I also visited Sanders Assoc. in Nashua, N. H. with Ken Wakeen to discuss the sale of a module tester. It turned out however that the units they wanted to test were not well suited to our type of module tester, since they are not digital plug-in units. Most of the work would be to design a mechanical system which would automatically tune up oscillators and this is probably not in our line of business Thus we shall probably not make a bid to them.

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E. de Castro

PDP-5's are now moving through production normally. The problems which caused delays during the past few weeks seem to be under control. The 4206 which is used for a MA, MB and AC had to be modified to reduce carry propagate time down the MB and also to insure that the MB complement gates reliably set up in a microsecond. These modifications required a rather extensive etched board change and the release of two new end modules to replace the 1957. The new end modules contain bus drivers to drive the carry enable lines as well as the terminating resistors for the pulse lines. The first lot of 4206's is in production and the new end modules (4801, 4802) should be there soon.

The memory system caused quite a bit of trouble in checkout. At the moment there is no memory exerciser available for PDP-5 memories and thus the sense amps, strobe, current, etc. must be set during checkout. This makes the checkout process of best one of successive approximations. One fundamental problem did develop with the memory system. Due to the peculiarities of the double ended selection scheme, inhibit current must be shut off at the same time as write current. Otherwise some of the cores which hold ones are partially switched and a low amplitude readout results. Once discovered this fault was easily remedied.

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MECHANICAL ENGINEERING

L. Prentice

ENGINEERING PROJECT	% WORK TIME
EN 1000	75%
EN 1178	5%
EN 1237	5%
EN 1196	10%
EN 1053	5%

EN 1178 - PDP-6

An attempt will be made to complete drawings for operator console panels and procure panels from our standard vendor on Long Island. This will take approximately four weeks at a cost of $54.00 per panel. I believe, all of the hardware has been delivered or can be delivered to PDP-6 people any time they desire.

EN 1196 - 570 Transport

The first unit was shipped back to Tulsa on Friday, October 12th. Some new decisions were made concerning the door. Most of the parts have been placed on order by Phil Backholm. Phil and Roland Boisvert are expected to leave for Tulsa on Monday, October 28th for a day or two stay with Midwestern Instruments to discuss the unit. The welding jigs for the new cabinets have been nearly completed and the first side sections of the panels have been welded. We will weld up six of these side sections and then start to produce a complete cabinet. We are still awaiting word as to what units will be used for power supplies. Roland Boisvert and some of the people in the power supply section are working out this unit.

EN 1136 - Micro Tape

Most of the change orders have been written to bring the drafting procedures up to the present production model. The rest of the MCO's should be written today.

EN 1185 - Mechanical Development of Modules

This work is being pursued by Ron Cajolet. A new model of the 1914 model was submitted to a sales meeting with a bar with the special type Dzus fasteners in place. Some more work remains to be done if these bars are to be applied to someof the other mounting panels. More talks have been held with suppliers of the standard printed circuit boards and we are still awaiting further information on the tolerances they can hold between punched locating holes, particularly on the thin material 030 and 040. Ken FitzGerald and Phil Backholm have made a report to the production methods committee in regard to their first investigations into automation of production operated circuit boards.

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L. Prentice (continued)

PDP-1D

The first attempt to work out a larger indicator panel and new styling for the front of the PDP-1D has been completed in the first phase. The second phase has been started. This will be the elimination of all white paint from the front and rear and the use of aluminum chemically etched panels in place of the painted blue panels, plus the styling already in place on the first PDP-1D.

S. Miller

Our module packaging system is in the process of reevaluation and redesign. It was found that our packaging system could be updated and made less costly with some changes. The first change contemplated to do is to replace the bubble pack which is now a nonreusable item to a plastic tobacco pouch type container. This has the advantage of not only being cheaper and better looking, but also reusable. The package will be loaded in production and sealed just after inspection with an inspectors seal. When the package is opened, this seal will be destroyed, this will insure the customer of getting an inspected module. Also, it means that the module will be protected while it is in the stock room waiting for delivery. The module will be shipped in a special plastic and corrugated mounting panel. For small orders it will not be necessary to use a large size box as this unit holds only 12 modules. The mounting panel will not only protect the module more than is done now, but will also be able to be reused in a customer's laboratory for restoring modules. A completely removable top will contain all shipping information and will be thrown away by the customer. In large shipments, the module mounting panel will be able to be shipped in our standard boxes. This would cut down the number of packages for large quantity orders. This system has the advantages of being easier for in plant and customer handling, I now have some samples for these units and will be receiving more in the very near future.

The PDP-5 is undergoing a minor face lifting. This was forced upon us by the amount of flexibility being demanded of this particular machine. A rendering of proposed changes can be seen in my office and actual models will be constructed in the very near future and will be put into production as soon as practical. The PDP-5 has had growing pains. There seems to be some difficulty in assembling the computer so a complete and thorough check is being run in drafting now and any problem areas will be changed. I do not believe the production will be delayed on account of any of the above.

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K. FitzGerald

ENGINEERING PROJECT	% WORK TIME
EN 1178	20%
EN 2740	30%
EN 1000	50%

PDP-6 EN 1178

All of the mechanical parts for the prototype PDP-6 have been completed and delivered however, the appearance of the anodized and silk screened panels leave something to be desired. We will have to use these for the prototype but orders have been placed with our New York source for panels similar to the PDP-4 operator control panel.

The paper tape punch was found to be impossible to empty the chad box or load tape from the front therefore, longer slides have been ordered to alleviate this problem. They will be installed on the prototype if they arrive in time.

Havoc Computer EN 2740

All the work orders for mechanical parts for the Havoc computer have been placed in the shops and 80% of the material has been received. This job has to be run on a high priority basis but with no overtime. As a result, the work load in both shops is extremely heavy.

General Engineering EN 1000

We presently have orders in the shops to fabricate three type 570 tape cabinets on a very high priority basis. The first one is due to be shipped November 5th, or sooner, with the others to follow immediately. There is a total number of over 40 pieces on the front door alone so that the capacity of the shops is pretty well saturated with this machine and the Havoc. At the same time, we have just completed fabricating parts for the 340 precision display and there are quite a few pieces for the PDP-5 in the shops for rework due to design changes. On top of these very high priority engineering jobs we naturally have our standard production work which also seems to be getting higher and higher priorities as we move along.

It has also been decided that we should design and build automatic silk screen and etching equipment. Some of the preliminary fabrication of this equipment will be coming into the shop within the next two week period along with special jigs and fixtures necessary for our present method of silk screening, etching, and assembly of mounting panels.

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QUALITY CONTROL

J. Cudmore

As a result of difficulties experienced with the relay modules used in some of the Foxboro PDP-4's, a relay tester has been designed. This device will permit us to give accelerated life tests to relays under various loads and detect both failures to close and failures to open. Our relay modules will be evaluated as well as new relay types.

K. Doering

Aerovox has supplied us with attractive looking disc ceramic capacitors (.001 and .0022 mfd) for evaluation. First tests, however, showed that they have difficulties with their temperature coefficient.

A goldplating standard has been made up to cover the specific area of eyelets and banana plugs. First pieces of plugs have gone through tests and shown satisfactory results. All eyelets have been plated and accepted. Purchasing is now trying to locate a vendor for the plugs who can do the job at reasonable cost.

Gartley and Skowronek

We are presently modifying 10 MC modules so that they employ silicon transistors and diodes instead of germanium devices. The modified version of the 6102 is operational. The other 10 MC inverters should also perform well with silicon. Both the 5202 flip-flop and the 5401 clock have been modified successfully, but tests of a larger number of units are still to be made. We are also making progress on the 6202 flip-flop and are presently investigating the performance of silicon semiconductors in negative OR-diode units.

D. Gaboury

Paper Tape Inspection

Past problems necessitated 100% inspection of width, fold and sampling inspection of thickness. Width inspection was difficult and time consuming with conventional equipment. It took two hours to inspect one (1) carton (18 tapes). We had a Go No Go gage made up which made the job not only easier, but also cut the inspection time in half.

The present work schedule allows us to inspect 15 cartons per week.

We have inspected 16 cartons (288 tapes) and have found (68 tapes) rejected for the following:

31 for being too narrow
18 for being too wide
11 for bad folds
1 dirty
7 no blue lead

All rejects will be collected in mechanical inspection until lot is completed.

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A. Parks

Module Repair - Crystal Clocks - Sampling Finished Goods - New Lots

We retested about 150 modules from finished goods. These were picked at random by Dave Clark and Dick Gaboury. We found no defects electrically.

We had about 5 crystal clocks to make and no real trouble was developed here.

As for new lots, we are currently working on the 4226, a serial to parallel assembler. This is causing us a lot of grief. Most of the trouble seems to be in the tester.

Also we did the 1260 - a subroutine card. The test was easy to perform but the packages in the tester gave us a bad time. The 6227, a ten meg. flip-flop, was relatively simple.

We have cut our in-house module repairs to about 1/3 of what we had two weeks ago.

Presently we have no repairs to do for customers except one current driver. We are also fixing up some spare packages for the New York office.

J. Trubiano

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

Type	Model	Quantity
Oscilloscope	543/543A	16
Oscilloscope	585	1
Oscilloscope	321	1
Oscilloscope	515A	1
Transistor Curve Tracer	575	2
L. C. Meter	130	1
Plug-in-unit	CA	15
Plug-in-unit	82	1
Plug-in-unit	R	1
Plug-in-unit	H	2
Plug-in-unit	S	1
Plug-in-unit	K	1

This equipment has been checked for calibration:

Type	Model	Quantity
Triplett Multimeter	630 NA-RM	12

At the present time most test equipment has been recalibrated on its due date.

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J. Dimauro

Semiconductors tested since last report:

Type	Manufacturer	Units Tested	% Rejected
2N835	Motorola	700	1.0%
2N2904	Motorola	600	2.6%
MA90	Philco	4458	1.0%
MD94	Philco	3000	7.7%
2N1754	Philco	8846	1.8%
GA439	Texas Instrument	3500	2.2%
2N1304	Texas Instrument	1800	2.0%
GA212	Texas Instrument	1600	2.8%
2N711A	Texas Instrument	1100	0.9%
2N1309	Texas Instrument	2600	0.4%
S1188A	Texas Instrument	70	1.4%
SDA-1	Texas Instrument	490	0.6%
2N2099	Sprague	800	1.0%
SW1250-3	North American Elect.	220	0%
SDA-4	General Electric	450	0.4%
NS3033-3	National Semiconductor	80	0%
1/4M6.8Z5	Motorola	60	0%
1/4M8.2Z5	Motorola	30	0%
1N758A	Motorola	20	0%
1N750A	Motorola	30	0%
1N1217	Motorola	100	0%
1N825	Motorola	140	0%
*D662	Clevite	1860	84%
1N469	Hoffman	26	0%
**D001	Transitron	11725	0.3%
1N764	Dickson	20	0%
1N648	Dickson	120	0%
D664	General Electric	9130	.65%
1N91	General Electric	99	1.0%
D664	National	3000	0.7%
*D003	National	2250	0%
D007	National	5222	1.8%

* Sampled tested
** Partially tested

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SALES

D. Doyle

My comments on the Toronto IEEE show are as follows:

1. It did a lot to get us known up here - people actively working in the field still came in and spent an hour or more at the booth, and every other statement was "How come we never heard of you".

2. We had the only computers at the show, with the exception of the Ferranti FP 6000 and the LGP 21.

3. The student problem was a serious one - unless we can be assured that the ratio of students to engineers at the next show will be less than 5 to 1, I suggest that we spend our money on other shows - in Canada. We found it impossible to keep control of our display programs and of the literature because of large hordes of 13 and 14 year-olds looking for our Module catalogs.

4. Several designs for module applications were handled right at the booth and this impressed people very much - time will tell how much business it has meant. This is probably typical, but there are many module and computer applications which seem to be about one year away.

After the show and a fight to the finish with Canadian customs, we brought the PDP-4 and PDP-5 to Ottawa where Jack Richardson gave a programming session to the Chalk River people and others who sat in at irregular intervals. These sessions were an extra show of strength on DEC's part and I now think we are laughing at the competition up here. The value of having machinery to show people right in your own office is unbelievable - you find that your invitations to see these machines get sent to the key people in an organization, and these are the people who show up. We get a jump on the competition in this way, as I am sure all of us know how difficult it is for a man on the road to get to see the key people. There are two PDP-5 prospects who are now in the 50% category and a couple others who are looking.

J. Jones

The brochure describing our pulse height analyzer capability has been completed. It has been designed as a companion piece to the PDP-5 brochure. However, the text stresses that our other computers also work well in this application. 80% of these brochures, with a signed letters, will be sent out on October 24 to a specially compiled list of nuclear physicists. An additional mailing will be sent out next week based on part of the Advertising mailing list.

The pulse height analyzer based on the PDP-5 will include basic analyzer software as specified by the new brochure. This software is written, but checkout will not be possible until PDP-5-6 is available, presumably early in November. The analyzer going to Europe (PDP-5-4) is now scheduled for shipment on November 7. It will be displayed with the original Ridgeway analyzer routines.

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ADMINISTRATION

F. Kalwell

Within the next week, I'll issue several preliminary manuals on the purchase specifications we have written to date. I'd appreciate a critical analysis from Engineering when receiving these manuals.

I've recently ordered a quantity of six (6); 1000 foot continuous lengths of an RG 62U coaxial cable with an impedance of 93 ohms, which will be used by the display's group in remotely controlling displays.

I've placed a blanket order for 10,000 pieces of the miniature cartridge light used on all operator console panels. The new price of the light is $0.75 each.

D. Kuyamjian

Ferroxcube Corporation is having some measure of difficulty in keeping the 4K memory stacks on our required delivery schedule. Although there are presently several stacks, both 18 Bit and 12 Bit, considerably overdue, it can be expected that the Ferroxcube will complete shipment of the overdue stacks within the next week and a half and will resume our schedule of four 18 Bit and two 12 Bit memory stacks per week.

Teletype Corporation has advised that the thirteen Model 33 Printers due for shipment in October are on Engineering Hold. It is expected that the hold will be lifted during the week of October 14, 1963, and shipment made at that time.

Delivery of all other major components, Printers, Punches, Readers and Computeriters, is proceeding without delay.

The delivery lead time situation of Potter Instrument spare parts for the 906 II Tape Transport was discussed with Mr. Stephen Keene of that organization. Although Potter Instrument does stock many of the small items for which demand is high, many other parts Digital requires for replacement purposes are not on their shelf. A good many of the parts we purchase have a lead time of six perhaps twelve weeks. All who are concerned with replacing parts in the Potter Transports should keep the above lead time in mind when reviewing DEC's stock of Potter parts.

In the past, Digitronics Corporation has charged a flat price of $250.00 for repairing Model 3500 Read Heads that are out of warranty. They have instituted a new policy of charging $20.00 for labor on each head and $16.00 for each photodiode that requires replacement in order to discourage their customers from replacing the photodiodes themselves. This represents at minimum a savings of $102.00 per repair of head.

D. King

The following equipment was purchased this week for the cafeteria in Building 5:

One Toastmaster fryer, one Toastmaster grille with stainless steel stand, and one menu board 65" long x 18" high with plastic cover has also been ordered. Under consideration at this time are quotes

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D. King (continued)

received on plastic trays 14 x 18" from Bolta & Keyes. We are also awaiting a sample tray of fiberglass with our company name printed on it. Quotes are being received from sheet metal vendors on a stainless steel hood for the cafeteria kitchen.

Apahouser Corporation of New England has submitted silk screened panel samples and have been approved by Q.C. as an acceptable vendor. Having another acceptable vendor in the silk screening line should help to speed up delivery on our operator control and indicator panels that now require a ten day delivery time.

D. Glazier

Request for quotes of cellulose wadding packaging materials have been issued. This is the material used to absorb shock in our module shipments and also the cushioning underlay on crating of computors.

The aerosol spray paint on order with Shield Chemical Company should be delivered within 10 days to two weeks. Every effort is being made to expedite this delivery.

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ENGINEERING

B. Stephenson

Toronto Show

The Toronto Show was quite interesting. We talked to a large number of people - mostly students as usual - but there were a few who were quite interested. Most of the research seems to be done in the government labs. Private industry consists largely of companies which are subsidiaries of UL companies. I did not see any one from Candidair.

We were able to attract large numbers to the booth by drawing sketches with the light pen. The ADA display operated quite well, but certainly is not an attention getter.

ADA Literature

We have several new A-D bulletins. These cover the Model 142 high speed unit, the 138 general purpose unit, the 138/139 AD and multiplexer, the ADA-1 interconnecting system, and a description of the demonstration at the show, I am also working on an A-D Manual.

A D Tester

Work has started on connecting the Julie precision D/A to the Module tester. It will be available to test finished converters and to evaluate new units.

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MECHANICAL ENGINEERING

L. Prentice

Engineering Project	% Work Time
EN 1000	75%
EN 1178	10%
EN 1237	10%
EN 1185	5%

PDP-6 Project EN 1178

We are still working on some of the hardware for the console and some of the panels that go with the display units for other parts of the computer. There seems to be some confusion between whether the display is going to be included with the PDP-6 at the show or whether a separate display is going to the show if the PDP-6 cannot make it. Ron Cajolet is making arrangements to have frames welded up as soon as possible which can be drilled to accommodate either situation.

EN 1196 570 Transport

All of the mountings for logic and power supplies have been completed for this unit. It has been stripped of the front and rear doors and all trim and the bare cabinet with logic mounting and power supply mounting is being shipped to Tulsa, we hope today. It should arrive in Tulsa via American Airlines Monday morning.

A large surface plate has been purchased and has been delivered from Botwinik Bros., Worcester, for the base of a welding jig for the 570 transport frames. The table has been cut down and work is ready to be started on making the welding jig for this cabinet. Work has been started on the top pans. We are waiting word from Roland Boisvert, whether or not the power supplies will be located on the rear plenium door before finalizing design on the bottom pan.

EN 1237 Solid State Micro Tape Chassis

The first model was delivered to Tom Stockebrand for evaluation. On receipt of the chassis trak, it was noted that it was impossible to operate with the chassis trak and a new model is being made to correct the oversight on the first model. Two of these are now being made in the sheet metal shop for delivery this coming week.

EN 1185 Mechanical Development of Modules

Ron Cajolet submitted a proposed model of a new 1914 mounting panel. The restraining bar for the modules does not have sufficient stiffness to prevent the modules from coming out of contact with its mating amphenol plug. Special miniature type Dzus fasteners have been ordered and an attempt will be made to apply them to the restraining bar to correct this deficiency.

We have received some notification from vendors of the tolerances that can be held in regard to the punched registration holes in printed circuit board blanks. This may cause some rewriting of

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L. Prentice (continued)

dimensioning as now applied to printed circuit boards.

Ken Fitzgerald and Phil Backholm have been drafted to look into possibilities of some automation to our printed circuit board line. Phil is to investigate the possibility of a silk screening machine, whether or not this can be made to work on an automatic or semi-automatic basis and Ken Fitzgerald is looking into the transportation or conveyer system for conveying the model boards through the various processes needed to produce the boards. They have already visited two plants in the vicinity and plan a visit to a third plant to see what prior art has been developed in this field.

K. Fitzgerald

Engineering Project	% Work Time
EN 1178	40%
EN 1000	60%

Most of my time since the last biweekly contribution has been spent on the PDP-6 console mechanical assembly and general shop administration. I have not been able to spend much time on some of the other projects such as the stepping motor paper tape reader; assembly jigs for mounting panel production; paint research; or our program of dies, jigs, and fixtures for production needs. One of the largest factors contributing to the necessity for spending so much time on shop administration has been the lack of lead time on shop work requisitions. This seems to happen every year when the company is busy. The shops naturally have an increased work load but the amount of time necessary for handling this load does not increase. I would like to take this opportunity again, to press upon all persons ordering material from the shops to plan on giving as much lead time as is possible on work requisitioned from the shops.

The second factor which has caused considerable scheduling difficulties in the shop, has been the need for fabrication of parts for new product lines being developed in engineering such as the PDP-6, 570 Tape Unit, 740 Display, PDP-5, and as always the short delivery dates from the special systems group which seems to be something they cannot eliminate and stay competative.

One of our biggest holdups in the sheet metal shop has always been the painting of parts which is extremely difficult in hot humid weather due to the nature of the paint. The paint shop has been running two, three, and sometimes four weeks behind schedule during the hot humid weather with reject rate as high as 60% in some cases. Now that the temperature and relative humidity is starting to slack off, the reject rate has dropped closer to 10% and we are beginning to see the end of the backlog.

The new paint booth has been installed and a water proof floor is being installed on Saturday the 12th. That will complete the work on the booth itself. This should also help speed things up as less time will be needed for clean up and maintenance of the paint booth.

The next phase of the new paint booth will be to work out more fixtures for handling the work during painting and improved methods for handling and storing the wet pieces after painting.

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K. Fitzgerald (continued)

The PDP-6 console which is scheduled to go to the show in November, is about 95% complete and I see no reason that this console should hold up the work on the PDP-6 in any way. The remaining work to be done is the silk screening of all the indicator panels. All of the panels have been made and will be anodized next week. Drafting has promised to deliver the silk screen mats to me by the 16th and the silk screen people should be be able to have them all screened by the 21st, which is the scheduled delivery date of those panels. On the console itself, the prototype is complete and painted however, the paint on one section of it is slightly off color from the manufacturer and we are trying to get a new batch mixed in time for the show. If we don't get the paint on time, the slight off color will have to go to the show but it can be changed later. However, it looks good that we will be able to get the correct paint on before the show.

The tape controlled milling machine in the machine shop has been working a lot steadier than it has in the past. We have been producing all of the panels for the PDP-6 on it and also running some of our standard production work such as memory stack mounting hardware and multiple plug buss bars. The last ten microtape units were also completely machined on the tape controlled milling machine with excellent results. We have also worked with Russ Winslow making templets for the Nawide drilling machines for the production department from tapes generated by Russ Winslow. The first production run using these templets, proved to be very successful and Russ Winslow, I believe, is going to continue working on programs to put other boards in production. We have had a few problems with the machine some of which have been remedied but with others, we have not been able to actually pin point the cause. One of our biggest problems was that the unit was overheating. We finally discovered a leak in the refrigeration system which has been repaired. We have had other problems while running a program. Occassionally the table mispositioned by approximately 1/64" and would repeat this error two or three times, then go back to its original accuracy with no apparent ill effects. The service technician has made a few adjustments that could help eliminate this problem but it is not definite. We will have to find out from experience whether he has eliminated the problem.

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SALES

R. Wilson

The proposed Course Schedules for the first half of 1964:

PDP-1 Maintenance

February 3-14, 1964
March 30 - April 10, 1964
May 25 - June 5, 1964

PDP-4 Maintenance

January 6-17, 1964
March 2-13, 1964
April 27 - May 8, 1964
June 22 - July 3, 1964

PDP-1 Programming

February 17-21, 1964
April 13-17, 1964
June 8-12, 1964

PDP-4 Programming

January 20-24, 1964
March 16-20, 1964
May 11-15, 1964
July 6-10, 1964

Note: PDP-5 classes can be presented during the interval between PDP-4 and PDP-1 classes. One week should be sufficient for the PDP-5 Maintenance Courses.

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QUALITY CONTROL

J. Cudmore

The new silicon PNP transistors are being evaluated for use in existing circuits. I have been examining the possible use of these devices in the 1567 display preamplifier. I am also obtaining information on the gain linearity and TC of the present unit.

A tester for measuring delay jitter has been designed by Don White. This tester will measure delay jitter on all one-shot's and clocks. This will be built by Q.C. from equipment available in T.E.H.

Norm Fitch has been doing some work on the temperature sensitivity of the 4303 and appears close to the solution.

K. Doering

Presently the silk screening is baked onto enamel color panels. We found that some air drying epoxy or enamel ink can do the job as well, allowing easier and faster touch-up work. A decision will be made with engineering about this, this week.

Recently we have been getting subassemblies into mechanical inspection, which we did not inspect the detail parts of. Even if the assemblies fit together well at this time, we are just kidding ourselves: Off tolerance parts can easily be fitted together now, but later there might not be any interchangeability: If a customer orders replacement parts, and they cannot be put together, there can be a lot of unhappiness.

Another negative feature: the drawing for this subassembly does not spell out the dimensions which are vital for mounting it into a major assembly. These dimensions are only on the detail drawing. The detail, however, was never inspected. If the inspector is real lucky, he can find the error. Then the assembly has to be tom apart at considerable cost and time losses; or he does not find it - as he has no detail drawing--and wrong parts can be sold to thecustomer. Both ways, we suffer. Therefore, I would like to stress the importance of parts in the detail stage.

U. Skowronek

In addition to reviewing further transistor tests and checking test setups charts, I have taken evaluating data of another PNP silicon transistor, the 2N2894, manufactured by Fairchild. Together with Carl Gartley, I investigated the behavior of a 1607 Pulse Amplifier when silicon transistors are used in the output stage. Presently I am substituting the germanium transistors in a 1201 Flip-Flop by silicon devices. Also, I am evaluating resistors made by various manufacturers for very high frequency use.

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A. Parks

Module Repair — Crystal Clocks — New Lots

We received about 120 defective modules from Elgin Watch Co. These were repaired and updated and shipped back. At present we have several small lots from MIT, EGG, and other various companies. Modules to be repaired from Special Systems, and computer checkout number about 1200. I have a list from Dave Kicilinski of the ones needed most and we will try to get these into stock as quickly as possible.

As for new lots, we had only one, the 823, an SCR unit by Derrick Chin. No troubles were experienced here as the test procedure was well written.

J. Dimauro

Semiconductors tested since last report:

Type	Mfg.	Amount Tested	% Reject
2N457A	Texas Instrument	20	0
SDA-1	Texas Instrument	37	0
2N1304	Texas Instrument	500	0.8%
2N1305	Texas Instrument	500	0.6%
GA212	Texas Instrument	1360	5.1%
2N711A	Texas Instrument	100	0
T1796	Texas Instrument	150	1.0%
SP390	Texas Instrument	750	0.45%
2N1309	Texas Instrument	1000	0.3%
2N2904	Motorola	800	2.5%
MM-999	Motorola	992	1.1%
NS3033-5	National Semiconductor	50	0
2N1754	Philco	31839	3.4%
MA90	Philco	7247	0.7%
MD95	Philco	17	0
MD109	Philco	349	18%
SW1250-3	North American Elect.	417	2.1%
2N2714	General Electric	500	0
*D662	Clevite	37000	2.5%
1N764	Dickson	100	0
1N987B	Dickson	20	0
1N1875	Dickson	20	0
*D664	General Electric	18000	0.4%
*D001	Transitron	18475	0
D001	Transitron	10700	46%
Q6100	Int. Diode	115	0
D003	National Transistor	10424	0.1%
D007	National Transistor	4600	0.1%
1N1315	Hoffman	51	0
1N1217	Motorola	500	0.2%
1N3210	Motorola	110	0
1N964A	Motorola	70	0

*Indicates sample amount tested.

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D. Gaboury

A comparison between our shop and outside vendors from September 26 to October 10 gave the following results:

Vendors:

Rec'd 14,121 Parts
Rej 1,999 Parts

Shop:

Rec'd 41, 929 parts
Rej 199 parts

These figures include for the Vendors:

paint jobs	4
anodize Jobs	3
Chromicoat jobs	0
fabrication jobs	33
plating jobs	1

For the Shop:

paint jobs	14
chromicoat jobs	18
fabrication jobs	35

DF633 DIGITAL EQUIPMENT CORPORATION · MAYNARD, MASSACHUSETTS

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ADMINISTRATION

F. Kalwell

The Special Systems group has recently replaced the SPDT Grayhill pushbutton switch with a more positive action type, a SPDT Micro Switch 1PB5.

We have ordered a new (#900-240-2) wire wrap connector from Amphenol which will accomodate a three wrap connection. This connector uses the same insulator body as the solder type (900-240-1). To be available in eight weeks.

I recently received a 100X-1016 transformer from North Electric Company which is presently being tested and evaluated. I hope within the week, North will be our second approved supplier.

The recent Acme Electric Company labor dispute was settled within three weeks, without any production shortage difficulties at D.E.C.

On the popular values used on dip mica capacitors, we have eliminated using the triple dip mica capacitor. I placed a blanket order with Cornell Dubilier and Electro Motive for single dip mica capacitors. These single dip units are considerably smaller in size and have identical electrical characteristics as the triple dip. These new units will be supplied with a "special" lead treatment, which controls the excess epoxy rundown to 3/64", eliminating any possibility of the capacitor not making a proper connection once the unit is inserted in our printed circuit boards.

Engineering has approved the use of a .001 mfd and .0022 mfd ±10%, 100 volt Erie disc ceramic capacitor with a new temperature range of -30° C to +85° C and a ?% maximum capacitance change (from 25° C value) over specified temperature range of ±7.5%. The old temperature range was +10° C to +85° C, with a maximum capacitance change of +22% -33%.

Mechanical Engineering has approved the use of Components Mfg. Company's new banana pin to be used on the patch cord assemblies. I hope this new pin will eliminate any future delivery problems previously encountered when we were using Ucinite pins. To insure all future deliveries, production is stocking 5000 Ucinite pins. With the special wire used on these patch cords (150/44) strands having a lengthy delivery, production will now stock 10,000 ft. of each color.

H. Crouse

Roland Boisvert and I are concluding the final phases of negotiating with Midwestern Instruments. The tape check that is in the house has been purchased. It is to be returned to Midwestern to be installed and rewired in our cabinet.

Sprague Electric has supplied us our hybrid circuits since the IEEE show. During this period Sprague had difficulty meeting our delivery requirements, due mainly to their limited hand production methods and market demand. Their automated lines are now in operation as noted by a 20% plus price reduction and a confident promise to meet our needs.

I anticipated relief from our germanium alloy transistor shortages this week, Texas Instruments is shipping 20,000, 2N1305s prior to the 4th. Their lead time is now running 4 to 6 weeks rather than eight weeks plus that created our initial difficulty.

Frank Kalwell anticipates distributing the first published series of Purchase Specifications within the next two weeks.

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D. King

Purchasing is in the process of obtaining quotations from four vendors on the following items: computer cabinets, plenum doors, computer end panels, and long computer doors. By ordering these items from one or two vendors once a year it looks like there may be a vast savings over our present ordering method of twenty-five to fifty four or five times a year. A comparison will be forthcoming when all quotes are received.

Ordered this week from Copymation, Inc. were 500 templates for drafting, and 150 templates for Sales from Eastern Process. Both of these orders are to be delivered by October 30, 1963.

D. Kuyamjian

Last week Mr. Don Glaeser from Central Institute of the Deaf visited Purchasing to discuss the component requirements for the Havoc Computer. We were able to provide quite a number of items from the Stockroom, and the purchasing of the remainder is now well under way.

After a joint meeting of Purchasing, Production and Mechanical Engineering with Mr. Glaeser, good communications between departments should help the project to proceed smoothly.

Proposals are beginning to come in for the walk-in temperature chamber in which Don Wardiman is interested. When we have a fair idea of what is available, Mechanical Engineering will be consulted to see if our present and future requirement in this area could more economically be met by assembly of a chamber here.

Shipments of both the 10 Bit and 12 Bit memory stacks are beginning to arrive more according to schedule than they have been in the past few weeks. Ferrotcube has indicated that there will be little deviation from our specified schedule in the future.

The first shipment of the 19 Bit memory stack was received from Indiana General Corp. The outstanding order for fifteen will be completed by November 15, 1963.

Two each KSR and ASR Model 35 Printers have been ordered from Teletype for delivery in October. Shipments of both the Model 33 and Model 28 Printers and the Punches from Teletype are arriving on schedule as are the Readers from Digitronics.

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ENGINEERING

B. Stephenson

The ADA-1, which was shipped at the end of July, has been operating extremely well. We are still cleaning up loose ends however. Next week Jim Reardon is putting in a field modification to inhibit overflow when the input signal exceeds the allowable range. The manual is also being corrected and up-dated.

Joe Nangle has made a nice product bulletin on the ADA-1 to give customers an idea of our capabilities in this area. Bulletins are also underway on the 138 General Purpose A to D, the 139 General Purpose Multiplexer, the 142 High-Speed A to D, the Models Type 4679, 1704 and 1572. For the meantime I have written a memo summarizing the characteristics of these new items.

Roger Gagne is working on the 138 and 139 for Raytheon. It is operating quite well and will be delivered this week. We are preparing test procedures etc., so that future units can go directly through production.

The Model 142 for sales is nearly assembled, but we have not started checkout yet.

The two major limitations on our ADA equipment right now are the lack of a dual ended input and the capacitance seen at the input when the multiplexer is switched. The dual ended input will be handled with an operational amplifier.

R. Doane

Engineering Project	% Work Time
6205 and 6615	50%
VHF	10%
Test Equipment	15%
Miscellaneous	25%

Printed board layouts for both 6205 and 6615 should be through drafting October 1. They are both 85-90% finished at this writing. The 6205 is a very sticky job; it has 51 inverters and four flip-flops. With the 6615; for pulse driving (15 pulse amplifiers) 36 6205s will form the arithmetic unit of PDP-6.

A tester to test both 6615 and 6205 modules is 50% designed and 10% built.

We have now test data sheets on all the 8201: from production, and hot & cold tests on two of them. I feel that the results are of about the quality of 6202 test data after the first two or three lots were manufactured. Fan-out and anti-splinter-pulse tests are beginning.

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COMPUTERS

A. Hall

The new Engineering area on the 3rd floor of building 5 is largely complete. All available wall space has been used (mostly for offices) and all but a small area in the middle is in use. Bench loading is low to medium on the average so we have spare capacity. The extra office space released by the departure of summer students has been taken up by new employees and the arrival of the Programmers group. When the expected new programmers and engineers arrive, six unoccupied offices will remain. The tape development department will move down to this floor as soon as the wiring is completed, a matter of perhaps a week (from 9/26/63).

PDP-6 development, while somewhat behind schedule, still shows promise of being available for the FJCC. New module circuit design is largely complete and a majority of the work necessary to produce these modules has been done. Mechanical design is nearly complete. The new mounting panel type will almost certainly be ready for Production when the wiring instructions arrive. Wiring lists are about 40% complete, many cards have been punched, some wiring runs have been listed and some wiring is underway using the lists. The Prototype 5 usec core memory and control checkout is complete. All modules have been ordered. A program to allow PDP-6 programs to be debugged on a PDP-4 is in progress. A simulator to allow PDP-6 IO equipment to be checked on the Engineering PDP-4 is in wiring. The Programming Manual is in progress. The PDP-6 assembly language has been defined and the first draft manual is at the printers. The Card Reader design and the Teleprinter logic is in drafting, the display is in the early stages of design, the Paper Tape Reader is in wiring and the Paper Tape Punch is in off-line test. Microtape is in design.

Foxboro, Digital Systems Division has not been selling as many process control computer systems as they had anticipated. The Nabisco system has been a success and the U. S Steel system will go on-line before long but other sales have been slow. Their management attributes this partly to the better selling job some of their competitors have done, particularly Minneapolis Honeywell, and some of the technical features which they feel are unimportant but which their customers think are important (i.e., high temperature guarantee, parity checking, multi-level, hardware, priority interrupt) Honeywell system prices have gone up due apparently to the termination of an incentive agreement with SDS. For this and other reasons Foxboro expects to sell systems at a better rate in the near future. Unofficial comments from within Foxboro would indicate that they plan to put their present Service Center computer in inventory and purchase a new 8K computer.

Field Service has acquired from Engineering a complete configuration file of all PDP-4s in the field. This includes a list of every drawing, electrical and mechanical, for each computer and all its options and including the field modifications. This file should be extremely useful to Field Service providing that it is kept current.

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MECHANICAL ENGINEERING

L. Prentice

ENGINEERING PROJECT	% WORK TIME
EN 1000	75%
EN 1053	5%
EN 1178	10%
EN 1237	10%

PDP-6

With a little bit of luck, we should be able to provide the mechanical cabinetry, panels, etc. in time for the machine to make the Western Joint Computer Conference. The decision was made to include the working display similar to the type 340 with the computer. At this point, it looks as if all the hardware for this can be produced in time to make the show.

EN 1196 570 Transport

We are nearly ready to ship the cabinet and machine back to Tulsa for recabling. Complete information was received today regarding the mounting of both the power logic - Midwest, and our own logic. As soon as the layout is completed for this and the necessary hardware is installed, the unit can be shipped. This should be some time this coming week.

Drawings are well underway for, what we hope will be, the final model of the cabinet for the 570 transport.

EN 1237 Solid State Micro Tape Chassis

The preliminary model has been delivered to Tom Stockebrand. We have not, as of today, received a special type of chassis trak necessary to use with this unit. This is suppose to be received not later than the end of this week.

REGISTRATION FOR DYNASERT AND SILK SCREENING

All of the change orders effecting the current types of printed circuit boards have been issued to the drafting room. This establishes registration holes for every printed circuit board. If new types of boards are contemplated or are not included in this list, they should be brought to our attention immediately so the proper registration holes can be put in for the above mentioned purposes.

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QUALITY CONTROL

K. Doering

Some of the drawing practices used at DEC leave room for interpretation. Usually, they are interpreted wrong, with resulting confusion and losses in time and money. Some drawing standards are being added without the people concerned about them knowing it. There is a definite need for doing it as especially the inspector suffers from these deficiencies and unacceptable material may enter the stockroom.

Until now "new design control" as a Q. C. function has been covering only the printed circuit design but not the mechanical design. As we are growing and this work becomes morecomplex and losses from misinterpretation more costly - I believe that we cannot escape this task any longer.

120,000 eyelets will be hard gold plated this coming week. Delivery to be 1 day. We made some tests with the gold plating and discovered that there was no need to strip our present stock and go through a complete replating cycle as originally thought. Our stock will take the gold plating without blistering after the crimping process. Purchasing located a good vendor, price less than half of the original estimate.

We have had repeated complaints about paper tape, either being too narrow or broken at the bend. Because of the time-consuming process of inspecting, especially width of the paper, we did sampling inspection, but have not been able to find a narrow or wide tape. Nor has a bad tape ever been presented to us. I would appreciate it, if any tape out of tolerances would be brought to my attention. 100% inspection takes well over 5 hours for one carton with 18 boxes. One lot usually involves approximately 50 cartons. I would like to save some of this inspection time if it is not warranted.

J. Cudmore

The Q. C. Department now has a life test data form. Life tests to date have been only on elapsed time meters and fans. The results have been the following: Elapsed time meters: Hayden #MH15DFD, General Electric NP227873, JBT 31-EX, all 9,500 hours and Rowan Control, 6,000 hours, at room temperature without failure. Elgin #9288-37 failed after 150 hours; Hayden #416LFA failed after 6,300 hours.

Fans: Rotron Gold Seal Fans #1 and #2 failed after 3,500 hours of operation at 60° C. When reoiled, both units started again but failed again at 9000 hours. The Papst-Motoren fan has run for 9,200 hours at 60° C without failure. The Howard fan Model 8010 has completed 3,200 hours of operation without failure.

I am starting to get involved in the formation of our purchase specifications for semiconductors.

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U. Skowronek

For the past two weeks I have been reviewing tests that we perform on transistors during incoming inspection. I specified a few low current leakage tests to be made on a more adequate instrument than the Teradyne Transistor Tester. Also I rearranged some Teradyne Tester set-ups, eliminating mostly one h_{FE} test and substituting it by a V_{ce} Sat test, such that we can now test all of the transistors that are used in big quantities in one step rather than in two. This should save a considerable amount of testing time.

I evaluated D-664 diodes made by National Transistor Company comparing them with the G.E. devices we buy. National makes slower diodes than G. E. ; however, they can meet the present specifications, as it was established in a conference with a factory representatives.

We now are using a fast rise time pulse generator/sampling scope combination to test reverse recovery time of the D-664 diodes. The auxilliary equipment for measuring forward recovery time, consisting of 50 ohms connectors has been ordered.

I evaluated two impedance comparators, for future use in testing capacitors. The one made by Bruel & Kjaer in Denmark suits our needs best, as compared with the General Radio instrument which is also more than twice as expensive.

Since we are trying to find transistors to replace Philco devices, I evaluated some transistors made by Motorola, spending the most time with a type designated as MM999. I plan to publish a memo describing it since it has some very good characteristics.

A. Parks

Repair — Crystal Clocks — New Lots

We received several new lots of modules in the last two weeks - the 4707 - 4706 - 4260 - 4261 - 15781 and 4523. This put our repair work for customers way behind - also our sampling of modules from finished goods has suffered. We now have a crew of six, but only three are experienced in module repair and testing. We are also handicapped by lack of proper scopes. We are having trouble with crystal clocks around the 400 KC range. Presently Ulrich Skowronek is working on this problem with us. It is our intention for the next few weeks to do mostly repair work and try to get back into finished goods, a large backing of modules.

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D. Dubey

Modification kits have been ordered to bring all of our 580 series oscilloscopes up to date. The modifications are as follows:

I. Tunnel diode high frequency sync provides the following trigger modes

a. AC for normal triggering requirements to 150 mc

b. AC LF reject to suppress low frequency components that may cause jitter or otherwise mistrigger the desired waveform.

c. HF sync for waveforms above 5 mc of insufficient amplitude for normal jitter-free triggering.

d. DC for triggering waveforms below 15 cycles

II. Regulated DC filaments modification (reduces variations in vertical gain due to changes in line voltage.) Put under modification.

III. Linearity modification

Improves vertical linearity

We recently received two 581A oscilloscopes. These and all 580A series oscilloscopes do not need the previously mentioned modification.

J. Trubiano

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

Type	Model	Quantity
H/P M.a. meter	428B	1
Weston zero corrector	931	5
H/P Audio Generator	200 CD	2
Tektronix Preamplifier	E	1
Tektronix Preamplifier	M	1
Tektronix Pulse Generator	109	1
Tektronix Preamplifier	L	3
Triplett meter	630 NA	9
Triplett meter	630 NA-RM	2
Weston multimeter	980	12
H/P oscilloscope	175A	2
H/P preamplifier	1750 A	1
H/P preamplifier	1781A	1

Hewlett Packard oscilloscopes and preamplifiers are on file to be calibrated next.

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J. Dimauro

Type	Manufacturer	Units tested	% Reject
2N711A	Texas Instrument	900	1.8%
2N1305	Texas Instrument	8150	1.6%
2N1304	Texas Instrument	3900	2.0%
2N1309	Texas Instrument	1000	1.2%
GA439	Texas Instrument	3500	0.76%
MD109	Philco	250	0.8%
MD94	Philco	8994	4.1%
MA90	Philco	9570	1.5%
2N1754	Philco	4499	2.6%
2N1184B	RCA	150	0.0%
SW1250-3	North American	80	2.5%
2N2904	Motorola	400	1.0%
NS3033-5	National Semiconductor	50	0.0%
D662	Clevite	16790	4.2%
* D662	Clevite	675	0.0%
** D001	Clevite	12000	.2%
1N764	Dickson	60	0.0%
* D664	General Electric	225	0.0%
D664	General Electric	9102	0.3%
* D001	Transitron	1600	0.0%
Q6-100	International Diode	115	0.0%
D007	National Transistor	5368	23%
1N469A	Hoffman	10	0.0%
1N469	Hoffman	24	0.0%
1N429	Motorola	50	0.0%
1N1220	Motorola	200	0.0%

* Indicates complete lot was sampled tested and passed.
** Indicates complete lot did not pass sample test.

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D. Gaboury

A comparison between our shop and outside vendors from August 12 to August 25 gave the following results:

VENDORS:

Rec'd. 1327 parts
Rej. 38 parts

These figures include for the vendors:

Paint jobs 5
Fabrication jobs 20
Plating jobs 1

Intermediate Inspections:

Electrical

PDP-1
PDP-1
Tape control 510
PDP-1 46
PDP-1 47
142 High speed A to D Converter
PDP-5
Memory Tester 1516
PDP-5

Finals

Electrical

PDP-1-46
Kie Corp.
Mag tape 50-51
PDP-1-47
142 A-D Converter
2010 Memory Buffer

SHOP:

Rec'd. 1584 parts
Rej. 184 parts

For the shop:

Paint jobs 14
Chromicoat jobs 13
Fabrication jobs 30

Mechanical

PDP-1
Tape Control 510
Memory Tester 1516

Mechanical

PDP-1-46
Mag tape 50-51
142 A-D Converter
2010 Memory Buffer

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SALES

J. Jones

The marketing program for selling PDP-5's to physicists is starting to move. a brochure on our pulse height analyzer has been written and is now being roughed out by the art department prior to submission for approval. Mailing lists are being drawn up in preparation for the first direct mail introduction of the PDP-5 in this application.

Two PDP-5's with pulse height analyzer equipment are now on order for Sales. The first will be sent to Europe in November and the second will make its first appearance at Oak Ridge in December and then go to the American Physical Society show in New York City in January. The software package for the analyzer is being developed by Sales personnel.

A meeting was held with Nuclear Data Inc.'s marketing director. He assured us that we can count on this source of supply for the special A to D converters used in the analyzer.

Physics sales that are now on the horizon include:

Columbia University - A PDP-4 for use as a pulse height analyzer. The only holdup is approval by the A. E. C.

Yale University - Another PDP-1. This one is to be used in conjunction with an "Emperor" Van de Graaff generator.

Oak Ridge - Has requested a seminar (December 10) on the use of a general purpose computer as a pulse height analyzer.

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J. Burley

Our new offices in Washington certainly are a contrast to our previous "home". Of the 4 rooms we now have, thelargest is naturally the computer room (also the emptiest.) It measures 20 x 25 feet with diamond shaped windows reminiscent of our logical symbol for levels. The other three rooms are the work room, next largest, the receptionist area then my office. The building is handsome-new-strategically located in the financial district. From the third floor we command a nice view of K Street. Jack Atwood printed up some "we moved" notices which are added to all outgoing mail. Barbara and I have added some touches of our own to brighten the place up. Anyone in the D.C. area is invited in for free coffee.

The communication problem seems to be steadily worsening. The only communication flow worse than that of Maynard to Washington is that of Washington to Maynard. All reports and biweeklys have been virtually non-existant lately for various reasons - some personal. Again DCO will try to keep everyone better informed. I have some concern that new literature doesn't automatically get sent to sales offices. If this isn't an automatic procedure then it certainly should be.

Business for 10 mc cards has taken a sudden leap - possibly indicating that either more responsive non-digital equipment is now available or that new techniques for using fast logic have been found. NASA is responsible for some $100.000.00 or more of 10 mc gear. NASA-Cleveland is buying some $40,000.00 worth and NASA-Houston will be ordering some $60,000.00 worth in the next six weeks hopefully. As usual they want good delivery in the order of two weeks but they really could live with a partial I'm sure. I hope activity in 10 mc will encourage a release of the 30 mc line soon. Although I have no customers panting in the wings for 8000 series, it's not being available is becoming more and more embarrassing. APL has some applications that might usefully incorporate 30 mc logic.

The recent ISA Show seems, in my mind, to indicate that we need to get the pricing story of the PDP-5 across better than we have. In itself the -5 represents no breakthrough in logical construction, command list, memory cycle time etc. The breakthrough is in the "not-at-all-evident" simplicity of design and construction that permited DEC to price it at $24,000 and $27,000. Until the ISA Show there wasn't really too much excitement over the -5. However, once engineers saw the machine and its price tag they started projecting computers into new markets. Hence the storm of very active customer interest after the show. I insist that the general prospect looking at the -5 without knowledge of its price will guess it at around $40,000.00. This is a waste for DEC. I haven't any answer for this problem, but it applies only to the -5 and should be studied. This is OUR machine and should not be outsold by the 13 bit machines that may be announced next week by our usual neighbors in the market.

Both Westinghouse of Pittsburgh and DuPont of Wilmington are talking multiple purchases of the -5. Ed deCastro has the full story on both interests. NASA-GSFC also has a requirement of 2 to 4 PDP-5's. The order is expected in January or possibly December.

Computer sales are taking up more and more of my time - almost to the exclusion of module sales. Still looking for a sales engineer for the DCO.

With all the flash and sparkle of our new products PDP-1 still does the tough jobs. Sun Oil in Texas has about 1/4 million budgeted for a real-time data converter. Speeds will be real-time but operation will be off-line due to the very fast speeds required to operate on-line. 30 analog channels

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J. Burley (cont.)

exist on mag tape. These are to be sampled and held simultaneously for conversion to digital numbers (8-11 bits) every millisecond. This infers a 30KC converter. Each "record" may last up to 6 seconds giving a sum of up to 180,000 words to be stored. Each word must then be sealed by a factor to be pulled from a previously calculated table of "step out" corrections (up to 180,000 multiplications) and still at "real-time" speeds. This new set of values are then held for further filtering and sealing before reconversion to analog for analog recording. The whole process is "brinking" on the state of the out but if any machine existing under 1/2 million dollars can do it, it looks like it would be PDP-1, PDP-6 not yet being a reality.

APC is still not buying at their rate of 2 years ago. No competition yet - just too many modules already on hand. Western Electric should come through as it's been 8 months since the last large order.

Beckman's successful incorporation of DEC modules at Dam Neck for draining looks to be bringing in another 1/4 million dollars in good business from the Air Force at Keesler AFB, Miss. He should be consulted on this if anyone is interested.

My grip on Ohio and Michigan has dropped to a new low. Invasions of territory are invited. Let me know when you're going and I'll pass on more good leads possibly.

The recent articles in the "Globe" only confirmed what we already know - we need take a backseat to no one. (Besides we'll do better in 1964 - this is only a temporary slump.)

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ENGINEERING

L. Hantman

ENGINEERING PROJECT	% WORK TIME
1210	100%

Progress on the "automatic" production of wiring lists has been extremely slow, for reasons which will be enumerated below. Certain basic problems have been solved however, and it is expected that wiring lists in run name order (for maintenance purposes) and lists in run pin order (for actual wiring) will be available shortly. As soon as the computer can reliably produce these lists, work will continue on the routines for correcting lists, and the routines for producing cross reference list showing each pin in order, together with the next pin in the run and the previous pin in the run.

Most of the trouble in the past few weeks has been primarily due to the unreliability of the Type 57 tape control and the Burroughs card reader. The tape problems fall into the following main categories:

a) Excessive parity errors
b) Short records
c) False end-of-record signals
d) Shifted records due to errors at load print

Unfortunately, because of the nature of the sorting being done and the randomness of the errors, it has proved almost impossible to show that the errors originate with the computer rather than the program. In the last few days, however, short diagnostic routines have been written which have been able to produce errors fairly consistant, and progress has been made in correcting the conditions.

The card reader has been a fairly consistant bottleneck until recently, some of the problems include:

a) Feed checks for no apparent reason
b) Wrong number of columns being read
c) Certain bits would be dropped
d) The last card would cause a feed check or be read incorrectly

It now appears that all but the latter condition has been corrected for most cases. There is one condition however, which requires overwhelming consideration in terms of the workability of the entire system. This involves two instances where Roger Melanson has brand new cards punched and in one case none of the cards could be read, in another case a great deal of feed checks occured. In both cases the cards appeared to be okay and could easily be read via the IBM tab equipment. When the cards were duplicated they gave no trouble on the Burroughs reader.

Some of the problems which appear to have been solved include the format for card punching, a program for a fairly fast unbalanced polyphase sort using three or more tapes, code conversion for special symbols, and recognition of the various polarities, and assertions of flip-flops.

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COMPUTERS

E. Harwood

PDP-5

We received our first PDP-5 in the Checkout area on Thursday, September 12, and immediately pu a man on to start testing this machine. Our first order of business on this machine will be to see ho well we prepared the checkout procedures and familiarize ourselves with the machine and at the same time finalizing these checkout procedures so we can test them out in a business like way. My initial estimates on the checkout of this machine call for a two week stay in Checkout once we become acquainted with the machine and have men trained to work on it.

Beckman PDP-1C-46 and PDP-1C-47

Both the Beckman Systems are proceeding on schedule and should be shipped out on the 23rd of September as we quoted to Beckman. The fellow in charge of this job did a fine job getting all the special drawings and wiring done.

The Harvard PDP-1 had undergone most of its production testing and we are just finishing off the heat test on the mag. tape 52. We still haven't received a display for it or the Data Control Type 131. I expect once the display arrives we will ship it out and then install the 131 in the field along with the 16K memory.

The PDP-4 has been completely checked out and also some checkout has been done on the drum. At present time the logic between the drum and display is being checked and these three pieces of gear should be fully operational some time next week. The only other remaining link to this system is the multiplexer from Pat Greene.

MECHANICAL ENGINEERING

L. Prentice

ENGINEERING PROJECT	% WORK TIME
EN 1178	20%
EN 1136 555 Micro Tape	5%
EN 1000 Administration	75%

EN 1178

Some time during this period was spent with Ron Cajolet designing buss plugging and mounting panels for the PDP-6. Several different types of mounting panels, at least three or four, are being considered for use in the PDP-6. Several different configurations of mounting boards are also being considered. All of these will represent a considerable effort to be made in tooling for these parts. A summary of the necessary tooling and an estimate of its costs will be made to the computer guidance committee in the near future. I believe we should also consider a somewhat larger cabinet as the

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L. Prentice (continued)

present system as contemplated, is going to result in considerable crowding and inconvenience in the cabinets we now use.

EN 1196 570 Tape Transport

The first attempt to install the unit in one of our prototype cabinets has been made with reasonable success. Changes are going forward to implement the changes recently discussed at a meeting with all concerned parties. These will be done preliminary to starting what we hope will be the final design for the cabinet for the 570 tape unit.

The sheet metal shop has been experiencing some expansion and renovation primarily due to the installation of a new water curtain spray booth. Approximately one more week will pass before this will be complete, however, it should be in operation Monday, September 16th. The water proof floor still has to be installed in the front area of the booth.

Still contemplated is a new set of chromicoat tanks with a greater capacity for chromicoating. These will be installed in the weeks ahead. This will probably be reported on in detail by Ken Fitzgerald.

A meeting was held with Ken Wakeen, Klaus Doering, and Cy Kendrick to discuss the possibilities of a uniform or near uniform method of registration holes in all of the printed circuit boards. These are necessary because of the automation we expect to apply in the future for all phases of printed circuit production. This will necessitate minor changes in some 18 masters. Close cooperation with Roger Melanson on the contemplated changes will be maintained.

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QUALITY CONTROL

K. Doering

A certain amount of lab modules in finished goods did not have the boards properly assembled; they were not held in place by the dimples. They are being fixed.

The different sizes of glass epoxy boards which are in current use have been drawn up. The locating holes were placed on the far outside of the boards.

The mechanical inspection department has been doing finished goods sampling for several weeks. It was possible to eliminate some deficiencies. As they use models as standards they have been able to get quite a few models updated and improved.

A. Parks

Module repair New Modules Crystal clocks

We have acquired one more new man from test - Norman Boisse -- This helps us out as I don't have to spend too much time with him explaining modules and test procedures.

Howard Carnes is now taking over Dave Ambrose's work on the 30 megacycle units.

The last two weeks have been spent repairing modules from MIT, and Elgin Watch and various other companies. We are all caught up except for one lot from MIT of about 70 modules that we just received.

We are expecting several new types of 1st lots.

C. Gartley

About 90% of the time during the past two weeks was spent repairing modules for MIT and Elgin Watch. Crystal clocks were set and checked.

A new tester was built for the 51/61 current drivers using the 71 voltage/current calibrator.

Four metal film potentiometers, two 500 ohm and two 20 kilohm, were checked for temperature coefficient. The worst temperature coefficient for the 500 ohm potentiometers was 4.5×10^{-3} ohm/°C and for the 20 kilohm potentiometers, 2.6 ohm/°C. Additional tests are planned for next week on these potentiometers.

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R. Gaboury

A comparison between our shop and outside vendors from Aug. 29 - Sept. 12, 1963, gave the following results:

Vendors		Shop	
Rec'd	14,243 pcs.	Rec'd	2,383
Rej.	326	Rej.	85
Jobs	46	Jobs	41

These figures include the following jobs:

Vendors	Shop
Fabrication - 24	Fabrication - 22
Chromicoat - 1	Chromicoat - 10
Paint - 12	Paint - 9
Anodize - 7	
Plating - 2	

Electrical and mechanical Assembly Inspections:

Intermediate		Final	
Elec.	Mech.	Elec.	Mech.
A-d Converter	EMI 2113 Core Tester	EMI 2113 Core Tester	EMI 2113 Core Tester
Mag tape control 57A	57A control		
Display type 30K	Raytheon AD converter		
PDP-5	DEC Mag tape 50-51		
CRT Display 30G	DEC PDP-4-20		
2010 Memory Buffer	DEC CRT Display Type 30G		
Interface 522-57A Mag tape	AECL serial drum type 2Y		
	F.A.A. 2010 memory buffer		
	AECL PDP-5		

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J. Dimauro

Semiconductors tested since last report:

Type	Manufacturer	Units Tested	% Reject
2N2714	General Electric	1800	0.5%
SDA-1	Texas Instrument	323	0.3%
2N2218	Motorola	150	0.6%
SW1250-3	North American	400	3.5%
2N1309	Texas Instrument	807	0.7%
GA-439	Texas Instrument	1000	0.9%
GA-212	Texas Instrument	640	0.4%
2N1204	Philco	900	2.0%
2N1754	Philco	2501	2.1%
2N1184B	R.C.A.	1250	2.8%
1N3208	Motorola	1000	0.9%
1N3209	Motorola	100	0.0%
1N429	Motorola	20	0.0%
1N469	Hoffman	20	5.0%
1N1315	Hoffman	15	0.0%
1N764	Dickson	60	0.0%
D007	National Transistor	597	4.6%
D662	Clevite	18595	2.1%
D001*	Transitron	11225	1.8%

*Indicates partially sampled lot, remainder tested 100%

H. Carnes

September 2 - 6 customer repair (Elgin Watch)

September 9 - 12 VHF-8201 Flip-flop test 30 mc

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SALES

R. Colman

The ACM show in Denver went very smoothly, due largely to Gene Henton's excellent coordination of the movers, the decorators, etc., and to the preparations which were made for us by H. Painter. There were about 2000 people in attendance, mostly computing center heads and university representatives. Probably nine out of ten of them will be instrumental in selecting a computer in the next few years. While several very promising contacts were made, our most valuable achievement was making the general impression of a prospering, competent computer manufacturer.

Many people think of us as the company which makes the PDP-1. The most important message we tried to convey was the variety of our equipment, the range of prices and the adaptability we can provide. To this end, we used the PDP-4 to invite discussion, as well as to demonstrate its own capability. Our main demonstration program drew patterns on the scope while playing NIM on the teletyper, penalizing the NIM player between each move unless he played optimally, by typing out phrases like, "My big brother, the PDP-6, has fifteen accumulators" and "Short memory?.....try micro tape." The scope program was Shag's "New Tron of Minsky", modified to restart periodically and to be used as a sub-program by NIM. The high speed output to the scope was not noticeably interfered with by the NIM program and served to indicate our I/O flexibility and speed. This invited questions which enabled us to mention our other products.

The only other computer manufacturer represented at a booth was CDC -- showing off their tapes, card reader and line printer under control of a 160. We were across the aisle on the main entrance, (they had four 10 x 10 sections to our two, but ours were the first to be seen by people entering). CDC had a 160 programmed by a group of high school students which made a very good impression. We could do a simiar thing for our next L.A. show. At one point, John McCarthy (who sent several important people to our booth, including Allen Perlin, of Carnegie Tech) challenged us and the CDC high scholl students to a Fortran race. Allen Fox finished the problem (a sorting program) first, but our version of Fortran was not the latest one and failed to compile properly. Dit Morse saved our necks by discovering the error and correcting it. We hope to receive an up-to-date version of Fortran soon.

Our only serious problem was lack of literature. It seems most important, to me, that we make known the variety of equipment we now offer, to enlighten the people who still think that we make only one computer. We ran out of PDP-5 and PDP-6 brochures on the first day and were unable to get more.

D. Denniston

The New York Office has not been heard from for some time; therefore, this may be considered our quarterly contribution.

Just prior to vacation and following, about 80% of my time has been spent on computer sales---the most promising of which are listed. It seems that there has not been too much time to devote to module sales; however, in comparison to last year, we exceeded, although slightly, the sales for July. Our August, 1963 sales are substantially less than last years.

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D. Denniston (continued)

Columbia University--Approximately three visits and much 'phone contact with Columbia, should show its benefits by the beginning of next week when they plan to make a decision regarding the purchase of a PDP-4. Our chances are about 85-90%. Competition is the DDP-24.

Rutgers--The State University--Dr. Plano in the Physics Department has one of our PDP-1's on loan. Also received a tip from him regarding interest in the PDP-4 in one of their other departments. Dr. Plano presented his system at a conference at Brookhaven National Labs this week.

Data Control Systems, Inc.--Quoting several telemetry systems based on PDP-4 and PDP-5. They have recently visited Maynard and are most impressed.

Western Electric Company--They are interested in PDP-5 for a test system to perform DC tests on modules. Their delivery deadline is January 1st, and the possibilities for sale look good.

Bell Telephone Laboratories, Murray Hill--Excellent PDP-4 and -5 interest (3 different groups). They have visited this office to see the PDP-4.

Brookhaven Laboratories--PDP-4 interest--they are now in the preliminary stages of defining a system to control Neutron Spectrometers.

Union Carbide Research Labs--Interested in a small on-site machine at their labs. They are presently sending programs into their home office in New York City to be run on the '90. They feel the PDP-4 is the most attractive machine available.

Steve Mikulski will spend several days at the New York Office with some of our more promising prospects next week to give them an introduction to PDP-4 programming.

D. J. Doyle

We have now been in Canada for about 5 months, and many biweekly readers are no doubt interested in knowing what we are doing. The following general statements will answer many of their questions.

1. At the present trend, sales for fiscal 1963-64 will approximately double those for 1962-63.

2. While the market outlook is very exciting, we are still largely dependent on two or three very large customers, Atomic Energy of Canada being one of them.

3. The first thing I learned after opening the Ottawa office was that we are not as well known in Canada as I thought we were. The Canadian mailing list had less than 400 names on it, whereas we should have had more like 2,000 on it. What was more, I found that many of these were very poor prospects or could not be located at all. We have removed about 50 names and have put on about 200 others.

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D. J. Doyle (continued)

4. Some of the factors affecting the Canadian market are as follows:

   a) Customs duties - unless our goods are used for research, they are subject to a 10% duty - this means that it will be difficult to compete across the board with Canadian manufacturers in purely industrial applications.

   b) Shift in potential market - up to now practically all research has been done by various Government departments - it is now being funneled into industry. The problem here is that many of the industries involved either want to make their own research equipment or are just not sure enough of themselves to buy it.

   c) Large geographical area - it is very difficult to get around to see everyone in a territory that stretches 3,000 miles from Halifax to Edmonton.

We now have the following customers:

1. Atomic Energy of Canada Ltd. - PDP-1 with a PDP-4 and two PDP-5's on order, plus modules.
2. Defence Research Board - Ottawa - modules - for use in telecommunications research.
3. Defence Research Board - Quebec City - Modules - for rocket and ballistics research - these people are beginning to show considerable interest in our expansion into Canada.
4. McGill University - Montreal - modules - I feel we should do more there, but there is just no prospect of it at the moment.
5. Technical Institute - Chicoutimi - lab modules
6. Technical Institute - Three Rivers - lab modules
7. Technical Institute - Edmonton, Alberta - lab modules
8. National Research Council - Ottawa - this is a government sponsored research organization with a budget of nearly $50 million/year. We have modules in there, but unfortunately no computers - they have IBM 1620's, a PB 250, an SDS 920, plus others that I don't know about.

We have a number of very good sales prospects:

1. Canadair - Montreal - modules and PDP-6 - but they have very serious financial problems.
2. University of Toronto - PDP-4 or PDP-5 for nuclear research - at least a year away.
3. Carleton University - Ottawa - modules.

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D. J. Doyle (continued)

4. Northern Electric - Montreal - memory testers.

5. University of Saskatchewan - PDP-4 + modules - at least a year away.

The Toronto CEE Show this month will put at least another 100 names on our mailing list and will boost the interest up here considerably.

As time goes on the Canadian company will have to rely more on its own initiative and services but at the present time, we are causing a lot of extra work for people in the shipping, accounting, and sales departments. Mrs. Murphy and I are both grateful for the co-operation we receive on seemingly silly details.

The one compaint I do have is a universal one with district offices - poor communications. It is very easy for people in the home office to automatically assume that the district office has all the answers and that he didn't really expect us to answer that last memo, since someone has told him by now surely. When everyone starts thinking this way, the results can be disastrous and a lot of time is lost trying to tie people down. What's more, it results in left-hand/right-hand trouble which is fairly easy to spot by the competition and by customers.

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MECHANICAL ENGINEERING

Loren Prentice

ENGINEERING PROJECT	% WORK TIME
EN 1000	75%
EN 1136 Micro Tape	10%
EN 1196	15%

Finalizing of the parts list for the current model of the Micro Tape 555 should be complete today. Several hours were spent trying to bring it up to date this past week, however, it is still not final. ECO's are complete on all units except the component mounting plate. Considerable time has been spent on preliminary design study of the Solid State model 555 Tape unit. This is still in the planning stage and more discussion will be had before starting any prints or sketches.

EN 1196 570 Tape Unit

While not all the final design of this cabinet is complete, we are reasnnably confident that we can install the unit with a minimum of difficulty. However, we are never sure of these things until the unit is in place and we are waiting word from Steve Lambert as to when these tests can be completed so the unit can be transferred to the new cabinet.

EN 1178 PDP-6

While Ron Cajolet was on his vacation, sketches were completed for a mounting panel capable of receiving Buss plugs for the register section of the PDP-6. These are now in the sheet metal shop being made. The first are dummy units and should be completed shortly. We are waiting plugs which should be received today, so that these models of the Buss plugs and mounting panels can be tried out before finalizing the design.

Ken Fitzgerald

ENGINEERING PROJECTS	% WORK TIME
EN 1000	50%
EN 1178	50%

I am afraid I have been rather delinquent on the last two or three biweekly reports. I am not going to recap everything in the past two months but rather the past two weeks before vacation.

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Ken Fitzgerald (cont.)

EN 1178 PDP-6 Console

Seems to be progressing nicely and if we develop no further snags, the completed mechanical console will be ready on schedule, the week of September 9th. The only possible delay we might encounter is the lay-outs for the indicator light panels.

EN 1000 Shop Management

About half of my time in the past two weeks has been spent getting the shops rearranged, supervising the electricians and plumbers in the shop area, and planning for the remaining shop expansion which should be done and completed by the end of September.

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J. Jones

PDP-5-1 was completed and shipped in time for display as a "pulse height analyzer" at the WESCON show. The machine was delivered to UCLA (at Berkely) on 24 August.

A study is now being made of alternate suppliers of the necessary A-D equipment for this application. In-house capability is being considered.

There was a great deal of interest at the WESCON show over three aspects of our exhibit - 1. The price of the PDP-5 compared to its performance.
2. The styling of PDP-5-1.
3. The physics application that was demonstrated.

R. Oakley

The past few months have been busy ones at the Los Angeles office and this report will cover those months. It is regrettable that more frequent donations are not made to the Biweekly report. We will make a more sincere effort in the future.

The Los Angeles office is temporarily at a man power loss. Ken Larsen has been transferred to San Francisco and our leader, Ted Johnson is in the Munich office for the next six months. We are hopefully anticipating an additional applications engineer and/or an additional computer systems analyst.

As more computers and systems are sold, the problem of expanding the field service facility is as serious here as it is on the East Coast. Gene Henton has been doing a fine job and the addition of Bob Brackett should help Gene to continue to do so. If sales of computers and systems in the next year are as good as the last year, and we have maintenance requirements for many of them, it is conceivable that we will need more field service men on the West Coast soon.

Listed below is a summary of some of the organizations being handled by the Los Angeles office. Since we have so many customer contacts it would not be practical to list them all. The contacts listed below are some of the more interesting ones.

1. AC Spark Plug Research, El Segundo, Calif.
These people, in the past, have been a high potential customer, buying small module quantities currently, and a promise of

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R. Oakley (cont.)

larger orders in the future.

2. California Institute of Technology, Pasadena, California
There have been no significant previous sales, small quantities of lab and system modules. They are highly interested in our CRT 30 for tie-in to IBM 7090, and also have a high interest in the PDP-4 for the Owens Valley Radio Astronomy Project.

3. Consolidated Systems Corporation, Monrovia, California
No sales so far to this very fine systems house. Several bids with PDP-4 have been made but none awarded. Currently a multiple PDP-4 controlled system has been bid to Lear-Seigler, prime contractor for NASA, Huntsville. This system looks good and several PDP-4 sales could result to CSC in the next year.

4. Edgerton, Germeshausen & Grier, Inc. (Las Vegas, Nevada Division)
EG&G is one of our finest module customer and looks good for the future. Possible PDP-1 sale this year if results of work for LRL convince the EG&G people the PDP-1 is what they want.

(Santa Barbara, California Division)
We have several personal contacts here but haven't been able to get a sale out of them, even though a goodly amount of digital work is performed.

5. Executone of Southern California, South Pasadena, Calif.
Executone is a fine commercial company building intercom systems, just beginning some communications work. A good relationship with most of the people in this company has been established. No sales yet but we expect some to develop in the next few months.

6. JCM Associates, Reseda, California
JCM Associates is a newly formed organization (one month) made up of ex-Computer Controls Company personnel. Systems building and consulting work is to be done. They feel they are not confined to 3C's products now and are very interested in our modules and computers.

7. General Dynamics, Electronic Division, Pomona, Calif.
We have received some large module orders from these people and are expecting to receive more this year. Several large projects they are currently bidding may use DEC modules. This could be a touchy sales job because they have a large in-house module facility.

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R. Oakley (cont.)

8. General Motors Defense Research Lab., Santa Barbara, Calif.
Two years ago GM bought large quantities of DEC modules. We have been unable to get any large sales here recently, which is probably due to internal company politics. The engineers seemingly prefer DEC modules but management is forcing use of Delco modules (a sister company).

9. Jet Propulsion Labs., Pasadena, Calif.

(Computer Section)

This section at JPL is by far our best customer for both computers and modules. PDP-1's and the four PDP-4 Computers are at the Lab. Due to budget cuts at JPL and the building of systems using the PDP-4's we are not expecting as much in the coming fiscal year as we did in the last for computers. Module orders should remain the same.

(Instrumentation Section)

This section operates the windtunnel and central recording systems. The PDP-1 system being built by Astrodata in Anaheim, Calif. is to be delivered to JPL this month. The CRS-PDP-4 job is going well and more options will probably be purchased in the next few months. Some module orders are also anticipated.

(Telecommunications Section)

Our first module sale has finally been made here despite their "3C's only" tradition. Currently there are three SDS Computers in this and associated telecommunications sections. The future for PDP-4's looks particularly good for use at tracking stations because of the quantity discount eligibility as well as their not too complete satisfaction with SDS machines.

(Space Sciences Section)

These people remain a good module customer now and in the future. Use of PDP-4 for data acquisition will boost module sales this year.

10. Los Angeles State College, Los Angeles, Calif.
Prof. Mano is interested in our modules for laboratory use. They have a large budget for a new engineering facility in the next year and a half. Possible use of PDP-5 for computer academic purposes.

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R. Oakley (cont.)

11. System Development Corporation, Santa Monica, Calif.
A large sized blanket order for modules has been issued covering the next six months. Much applications work is necessary for modules with extra tie-in to the PDP-1 which is to be installed this month.

12. Space Technology Lab., Redondo Beach, Calif.
Periodically we have received small module orders and have done applications work for these people. Several SDS Computers have been sold here and we are making efforts to get a very valuable first sale here. Activity and projects at STL far excell those at JPL and it is possible they could be a very large customer in the future.

13. UCLA, Westwood, California

(Physics Department)

PDP-5 delivery for UCLA is scheduled for August 24, 1963 for use as a Pulse Height Analyzer and a general purpose data gathering system and format/controller.

(Psychology Department)

Dr. Carterette is interested in the PDP-5. His application is for Stimulus/Response experiments, similar to the Harvard University's PDP-4 application.

(Computer Department)

There is a high interest here in PDP-6 for time sharing system. To this date, only three computers are under consideration with the PDP-6 leading.

(Medical/Anatomy Department)

These people are interested in using our color display system on their CDC-160A computer for mapping of human body anatomy. If this project pans out there is a good possibility of a computer sale.

14. US Naval Electronics Lab., San Diego, Calif.
NEL is a module customer requiring a moderate amount of servicing. No current large orders but the future looks good.

15. US Naval Ordnance Lab., Corona, Calif.
USNOL places continuous small module orders with periodic application problems. They have large quantities of lab modules in a system which requires frequent modification.

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R. Oakley (cont.)

16. US Naval Postgraduate School, Monterey, CAlif.
The Postgraduate School uses modules for academic purposes. ADC and DAC application for CDC Computers currently in process, will eventually result in a large sale. This customer is to be handled by Ken Larsen in the future.

17. Veterans Administration Research Center, Sepulveda, Calif.
There has been a recent purchase of lab modules by these people. There is a possibility for a sale of a PDP-5 next year. The automated maze for the rat study program is almost completed. A control system for the maze has still not been determined, hopefully we can come up with some ideas for them which will use our modules or possibly a PDP-5.

18. Westinghouse Astroelectronics, Newberry Park, Calif.
Optical scanning job for LRL, Livermore has stimulated these people to come out with a computer controlled system. SDS again is our only obvious competition. We have been spending a great deal of time working with engineers from Westinghouse. It still appears to me to be a 50-50 deal. There is a possibility of several machines to be sold as a result of this original work.

Ken Larsen

San Francisco Office has been in operation now for three months. Increasing numbers of inquiries are coming to us directly indicating that our customers and potential customers are aware of our new location. Actual module sales have been to our accounts of long standing - Lawrence Radiation Laboratory at Livermore and Berkeley, Stanford Linear Accelerator Center, and Stanford Computation Center. Particularly interesting module applications have been discussed with the Departments of Neurology and Preventive Medicine at Stanford Medical Center and with the Biomechanics Laboratory at the University of California School of Medicine. Shell Development Corporation, a subsidiary of Shell Oil Company, is considering the use of a PDP-5 to monitor the distribution at oil pipeline stations. George Rice has been following up on this with the Shell people in New York.

Stanford University's Computation Center was dedicated recently at a large luncheon-reception attended by California business and professional people. This is called the "outstanding research computer setup West of the Rockies". The PDP-1 was demonstrated with the display scope. Stanford has also a complete Burroughs B5000 and an IBM 7090 in the Center, but the PDP-1 seemed to draw the most attention. A heat equation describing the temperature in a rod, the mathematical model of a plasma and

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Ken Larsen (cont.)

the projection of 3-dimensional surfaces were demonstrated using the PDP-1 with the 7090. The 7090 under the control of the PDP-1 did the computation using John McCarthy's "time stealing scheme". Closed circuit television with several monitors was used enabling all the viewers to observe the scope display. The PDP-1 was used alone to demonstrate Spacewar, a complex Function Plotter, and Snowflake. Cleve Moller of Stanford gave an excellent presentation of the PDP-1 and explained its function in each part of the demonstration.

Stanford's multi-billion dollar Linear Accelerator Project is under actual construction in the foothills in back of the University. The Control Systems Group at SLAC uses our digital modules to control triggering of the klystrons used to accelerate the particles.

Our display at WESCON in San Francisco was the PDP-5 for UCLA operating as a Pulse Height Analyzer recording and displaying the nuclear decay of a radioactive sample. The equipment was attractive and we had our share of WESCON visitor interest - many of the visitors having come to WESCON to see the PDP-5. Special thanks are due Ed DeCastro and John Jones for their effective demonstrations of the PDP-5. They did a good job of adjusting the presentation to the particular interest of each prospective customer. A booth-working schedule with 3 or 4 DEC personnel on duty during the hours that the show was open seemed to work very well. Literature, particularly the new PDP-5 Pulse Height Analyzer Folder, was well received. More than 200 information requests were received, the majority for information on our digital modules. Our booth and equipment compared favorably with displays by our competition at the show, which included Burroughs, Computer Control Company, Packard Bell Computer, and General Precision. Considerable interest appears to exist in computers and computer equipment at WESCON, and I think we should continue to be represented. Having people from Management and Engineering personnel from Maynard attend and meet with top customers at this type of trade show resulted in favorable comment here and would appear to be worthwhile.

The PDP-5 from WESCON was delivered to the Radiation Laboratory in Berkely where it performed to the satisfaction of the Radlab Nuclear Instrumentation Personnel who will be responsible for the system to be used at UCLA.

A technical problem troubling us in this area is a report from SLAC on "hot modules" - modules having failed while operating at elevated temperatures. SLAC personnel like to work with our modules and had intended to make DEC their sole source; but because of these failures (isolated as they are), they are asking about our plans for a silicon line and will be evaluating other vendors. Inquiries as to when we will be offering a line of silicon modules are becoming quite frequent.

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R. Wilson

Type 57 Tape Control

Received this information from Kie Corp. late Friday evening Aug. 30, 1963. Quote: The tape units are operating as desired, and we have written over a 225,000 records and have had no noise records. No unrecoverable write errors. Only very few parity errors like one to the twelfth. Slight cross talk and one of the units. (minor).

The above statistics were obtained at High Density.

The 57 control can operate a type 50 transport that is properly cleaned using good tape at 556.

A pat on the back for Steve Lambert and also Ken Senior and Bill Newell who put about 30 hours straight licking the last bug. (Incidentally in the tape transport).

S. Mikulski

Fortran II Class (PDP-4)

1. There is a Fortran II class scheduled for interested DEC personnel on 25, 26, and 27 September 1963.

2. The material covered will be:
   a) Introduction to Fortran
   b) Review of available literature
   c) Sample problem writing

3. Please contact S. Mikulski prior to the start of the course. Size of class will be limited to eight (8) people.

4. Classes for customers will be arranged in the near future, dependent upon demand.

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QUALITY CONTROL

K. Doering

The Amphenol receptacle for 1909 and 1910 mounting panels seems to be too weak. If a module is inserted slightly crooked, the metal contacts get distorted. I believe, however, that this problem can be eliminated. Purchasing has already contacted the manufacturer.

Besides our standard size glass epoxy printed circuit boards, we have added a variety of other sizes, most of them are not drawn up nor have the locating pin holes specified. Work to eliminate this is being started together with mechanical engineering.

Through Purchasing we had Acme agree on some dimensional modifications on the 50 cycle transformer for the 728-A power supply. They will allow standardization of mounting hole configuration and eliminate some extra parts to cut assembly time. The balance of a current order will include these changes.

With the help of the machine shop we were able to have a rugged test socket for the cera circuit made up. We were unable to find anything on the market and even Sprague, the manufacturer, had nothing but some handcrafted ones, which did not inspire us to any ideas. I think we can sell them ours now.

C. Gartley

In the past two weeks the majority of the time was spent repairing customers modules. Two days were spent testing the 1704 precision power supply with reference mainly to heat sensitivity.

Only one first lot test was made. This was the 4304 Delay Control. This took a little more than one day to complete the lot of twenty.

Eight crystal clocks were calibrated and tested.

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E. Gianetto

Test performed on the first twelve 6227 Flip-Flops produced the following results:

Fastest Rise TTT - 14 nsec
Slowest Rise TTT - 25 nsec
Fastest Fall TTT - 32 nsec
Slowest Fall TTT - 50 nsec

All DC tests on these modules produced the excepted results. Load rules will soon be completed.

Tests on the 6143 Diode unit (Model) indicates that one output (Pin F) is always slower than the other output (Pin E) in both rise and fall TTT. Fall TTT differs by as much as 225 nsec. in one case. The difference between the two outputs was found to change with transistors. However, changing never brought the two outputs closer than 100 nsec. in fall TTT. Emitter followers were tried but they were not the answer. With the effective value of the base hold-off resistor reduced to 34K, it was found that the two outputs came to within 40 nsec. of each other in fall time plus the fall time was reduced to less than 100 nsec. Rise TTT was increased by approximately 15 to 20 nsec. This gave an end result of rise and fall TTT being almost the same. Further tests are to be made on this unit.

J. Trubiano

In the past two weeks this equipment has been calibrated:

TYPE	MODEL	QUANTITY
oscilloscope	543-543A	13
oscilloscope	581	1
plug-in unit	CA	13
plug-in unit	82	1

It would be appreciated that those who have oscilloscopes signed out to them know where their oscilloscope is at all times so that when it is time for them to be calibrated they can be located easily.

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J. Dimauro

Semiconductors tested since last report;

TYPE	MANUFACTURER	UNITS TESTED	% REJECTED
MD-94	Philco	1,630	3.0%
GS-212	Texas Instrument	1,000	1.0%
2N598	Philco	20	0.0%
2N456A	Texas Instrument	100	0.0%
2N1309	Texas Instrument	2,000	0.8%
2N1754	Philco	13,000	3.4%
SDA-4	General Electric	200	1.0%
S1188A	Texas Instrument	50	0.0%
NS3033-5	National Semiconductor	112	0.8%
*D-001	Clevite	60,000	0.6%
*D-001	Transitron	13,000	0.0%
D-003	National Transistor	6,500	1.0%
D-662	Clevite	5,325	2.0%
D-007	National Transistor	1,595	0.1%
D-664	General Electric	6,000	0.06%
1N1220	Motorola	50	0.0%
1N987B	Dickson Electric	10	0.0%
1N2970B	Motorola	100	0.0%
1/4M6-8AZ5	Motorola	30	0.0%
1/4M8-225	Motorola	37	8.0%
Q6-100	International Diode	600	36.0%

* Indicates sample tested each reel.

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D. Dubay

Our Standards Lab is beginning to take shape. The room in the Transistor Test area, which presently houses our paging system, will have benches and power installed. This area will be used to store our standards and calibrate secondary standards. We have two standard capacitors, four standard resistors, and three Eppley standard cells. As soon as we receive the Julie voltage divider, we will be able to check the calibration of our Fluke motors. We are already comparing our bridges against our resistance and capacitance standards. Frequency standardization is accomplished by beating the Time Mark Generator Oscillator against W.W.V.

D. Gaboury

A comparison between our shop and outside vendors, from August 16, 1963, gave the following results:

VENDOR	OUR SHOP
Rec'd - 2736 pcs	Rec'd - 1810
Rejected - 148 pcs	Rejected - 92
Different Jobs - 46	Different Jobs - 46

These figures include for:

THE VENDOR	OUR SHOP
Chromicoat 7 Jobs	Paint - 10 Jobs
Fabrication 34 Jobs	Chromicoat - 16 Jobs
Anodize 2 Jobs	Fabrication - 20 Jobs
Paint 3 Jobs	

H. Carnes

This project had to do with the modification of the 1616 pulse amplifier. The object was to develop a pulse amplifier with a consistent output waveform.

The pulse amplifier section of the 1616 P.A. was replaced by the pulse amplifier of a 4606 P.A. However, the output transistor which was a 2N1305 was replaced by a 2N2904. When all tests were performed and when the circuit was considered to be workable, an engineering change notice was filled out.

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H. Carnes (cont.)

The second project was to determine which output transistors were to be placed in the 1989 memory driver. In past modules 2N2100 were used. However, these transistors are no longer available. After testing several transistors 2N2099's were found to give satisfactory results.

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ADMINISTRATION

D. Kuyamjian

A 1KVA 50/60 cycle motor generator set has been purchased from William I. Horlick, Inc. for use at the show in Switzerland this month and our office in Germany.

A 36 x 16 diode matrix board, 'Sealectoboard', has been purchased for PDP-6 development. The board will be fitted with 192 diode holders assembled with D003 diodes.

Eight companies are presently preparing bids on a camera mount system, including a 35mm and a Polarioid, for Bob Savell. We hope to receive some feasible proposals within the next few days.

A demonstration model of an Alnor Anemometer was made available to Mechanical Engineering for a short period of time two weeks ago. The Alnor model, which is capable of measuring air currents of 20 to 1000 feet per minute, was used to measure the air flow in and around the cabinets of the computers. While we are waiting for quotations on similar units from four other manufacturers, Mechanical Engineering is considering the advisability of acquiring an Anemometer for their department.

Ken Wakeen is interested in the availability of a combination digital volt-current meter with ranges of 1 millivolt to 10 volts and 1 nanoamp to 20 milliamps; we are waiting for returns from several manufacturers.

Delivery of Computeriters, Punches, Readers, and Printers is continuing smoothly as is delivery of Memory Stakes from Ferroxcube.

The two serial card readers arrived from Burroughs with a poor paint finish. Since these units are to be repainted, Burroughs is crediting us for the painting charge. Burroughs, however, feels that they will be able to accomplish an acceptable finish for any future orders.

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ENGINEERING

R. Doane

PDP-6 Circuits	65%
VHF	25%
Miscellaneous	10%

The VHF burst generator is a bottleneck now, because almost all of the work to be done in the near future requires its signals. Once the testers for all current modules were checked and the first few production modules had been tested, I had spare time to offer PDP-6.

The 6205 (AR, MB, MQ, DR flip-flops) module is approaching definition, together with the associated register drivers and rear-plug bus system. The major circuits are about half tested in individual bread-board form. It will be a few days before both the 6205 and the associated terminator modules can be released.

R. Melanson

I have encountered difficulty with our vendor, Eastern Process Co., with engraving the new electrical templates. Their quality of work and delivery date is disgraceful. From an order of 150 I have received 24 templates, 11 of them unexceptable because of poor quality.

During the week of August 19, purchasing will request quotations from three other vendors on quantities of 500 templates. It is hoped that a partial shipment will be received in two weeks once the purchase order is placed. Three to four hundred templates will be given to sales for advertising and to fill the request of our customers who continue to call for templates. In the interim, purchasing will try to terminate our purchase order with Eastern Process Co.

The template shall be made of cellulose acetate butyrate, color - green or amber, matte one side, thickness .030.

A trial run wiring list using the Transflexer Readout System 2320 has been completed. A new source data form was used for conveying information to IBM cards. Fred Jancewitz's program called "INWIRL" utilized the prototype PDP-4 and associated line printer and card reader.

The greatest difficulty was incurred by the card reader and line printer. By Augutst 29, drafting will be ready to put PDP-6 on IBM cards and use the PDP-4 as an output for wiring list.

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SYSTEMS

Pat Greene

Work is progressing nicely on the Chalk River Ontario Job for A.E.C.L. At present, the analog multiplexer is waiting for the 1578-1 sampling switches. Several amplifier configurations have been tried for the operational amplifier and a final decision will be made very soon. Ed Harwood and Dave Pinkney inform me that the PDP-4 will be ready any day now. Ted Johnson and Larry Conley have just about finished the modified Type 24 Drum System. Larry White will have the Type 30 Display ready for systems checkout in the first part of September.

Several meetings have been held already to "iron out" the compatibility problem in the non-standard operation of the computer options. All parties have agreed and things should mate together alright.

Mr. Nari Vakil of the Gellman Co. was down last week to review the programming problems for Chalk River and also to learn more about our machine in order to solve his problems.

Another big data-logging job for Chalk River is being bid on by George Rice and myself. It will involve two low level low speed scanners (multiplexer) and 1 high level high speed scanner. Data will be processed by a PDP-4 operating with 2 typewriters, 2 A to D converters, 1 mag tape unit, 1 punch, and a digital calendar clock (special system).

Even though a great number of companies are bidding on the job, SDS seems to be our major competitor. The purpose of the system is to study various types of reactor fuel rods for most economical and reliable operation.

Los Alamos also has an RFQ in for a system to be used for the same purpose. However, as usual their ideas of how to do the job differ, although there is quite a bit of similarity. They will have a greater number of input channels. In both applications the inputs that will present the most difficulty are the thermocouples. Kintel of California does make an amplifier that will meet the specifications, as put forth in both RFQ's. These extremely low level signals will have to be switched with read-relays because full scale at .1% accuracy is ±2 mv. (11 bits + sign).

One can conclude from the above discussion that we are getting into the low-level scanner field. It is true that we can buy low level scanners as sub-systems but the price we pay for them plus the mark-up for engineering it into our system does not allow us to compete pricewise.

The 2319 Transfluxer Test System was shipped at the end of last month and Paul O'Malley has since gone down to install the same.

The University of Chicago Spark Chamber Scanning System is completely wired and partially checked out. The machine will be delivered by the end of this month.

Pat Greene (cont.)

Bell Labs. has been sent a proposal for a Data Collecting System to record time and address of Corona Discharges in submarine cable. Chances here, I would say, are 60:40 in favor of getting the job.

Several other proposals have been sent out from the Special Systems Department.

Dick Tringale

During the last few weeks I have been doing development work on the new current driver. The old current driver has one definite problem and that is output capacitance. On investigating the output capacitance of the TO-3 transistor package we found that by using one aluminum anadized washer plus silicon grease there was approximately 430 μμf of capacitance from case to ground.

The capacitance from case to ground for a stud mounted type transistor using again the thickness of one aluminum anadized washer plus silicon grease was from 40 to 75 μμf depending upon tightness of the stud.

The amount of capacitance introduced by the aluminum anadized washer in both cases accounted for more than 50% of the current drivers total output capacitance.

Another project which is taking up my time is the 1570 Slicer Flip-flop. Customers have been complaining that they cannot locate early and late peaking cores, using the 1570 in a system. The reason was found to be caused by a time delay in the slicer amplifier. The delay in the amplifier was a function of slice level and therefore could not be compensated for in the system. I am presently working on a new technique for slicing which will result in a new slicer flip-flop module.

The 1521 Memory Tester for Ferroxcube is still being improved. The main problem with the system is the inability of the current drivers to achieve less than 150 ns rise time through an inhibit line in a Ferroxcube plane of 64 x 64 bits. We are presently trying new techniques and new output transistors in the 53 and 63 Current Drivers. These changes should allow us to achieve the rise time Ferroxcube desires.

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COMPUTERS

H. Morse

The main concern of the Programming Group for the past three months has been FORTRAN for PDP-4. A two day FORTRAN course has been given to members of the Sales Department in an effort to familiarize them with the language and compiler so they may pass this information on to our customers and the rest of the DEC Sales people.

Recently available programs included Buspak for the Type 57 Magnetic Tape Control, and a Relocatable Assembler and Loader for PDP-4. The Parts List Explosion Program for production is operational using the Type 57 Tape Control.

Present estimates on the total effort that will have been expended in implementing FORTRAN will be:

1) FORTRAN Compiler (Morse and Piner) - 6 to 8 man/months
2) Operating System (Fellows, Hurley and Coleman) - 8 to 14 man/months
3) Documentation (ghost) - 1 man/month

The work that remains to be completed is the final debugging of the FORMAT Statement Interpreter.

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MECHANICAL ENGINEERING

Loren Prentice

EN 1000	60%
EN 1136 Micro Tape	20%
EN 1196 570 Tape Unit	20%

Display Type 30

Drawings have been revised for the implosion shield for the display and new ones should be on hand from the vendor to the new drawings. Additional dimensions have been added and changes made which are slight. We're trying to overcome the possibility of the implosion shield coming in contact with the face of the tube. This causes newton's rings which are disturbing and unsightly. With the new dimensions called out, it is possible for inspection to make measurements and reasonably accurate estimates of whether or not the vendor has compiled with the print.

Micro Tape 555

Progress on this unit seems to have gone rather badly, mainly due to lack of communication. Modifications are now under way to allow the chassis to be used in a standard 19" mounting panel without disturbing the general design of the unit. These are minor dimensional changes which will take effect on the next group of units to be put into production. A complete parts list will be generated which was an omission to date. Preliminary layout for a model using Solid State switching in place of the Bromfield relays has been made. There is considerable design work to be done to reduce this to actual design. At the present time, one and one half length modules are contemplated for use for the Solid State drivers.

En 1196 570 Tape Unit

We have experienced some difficulty with the door. Corrections to this item should be forthcoming this following week. Hopefully, the cabinet and door assembly will be ready as soon as the life test is completed on Midwest Tape Unit so the shift can be made from the Midwest cabinet to our cabinet. This is the preliminary design and lacks many features we would like to see and is too complicated and complex to be used as a production unit. A great number of changes have been noted as the unit has been built and suggestions are welcome from everyone concerning improvement of this enclosure.

Tape Control Milling Machine

We have experienced some difficulties with this unit. The micro switch had to be replaced because it was unreliable and we are having difficulty with the flexo-writer maintaining the proper hole spacing. Both of these items have caused delay but some of the first parts have been generated for the 555 Tape Unit. Dave Nevala, Northeast co-operative student, has been programming and putting together master tape files for use with the milling machine.

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Loren Prentice (cont.)

Vacations have cut into our work and output effort, paritcularly in painting where we have had only one painter available now for the past two week period and the painter that we have has been working as much overtime as possible and still the load has become excessive. Much of this backlog will be put out to outside vendors.

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QUALITY CONTROL

Klaus Doering

A terminal bracket that will eliminate the electr. hazard on the 728-A power supply has been designed. It is being made in the model shop for the model. If it works out, the engineering sketch will be used as the information drafting will make its drawings from. Thus, tolerances and specifications up to the engineer at minimum cost and maximum efficiency can be used. I believe we give the drafting dept. too little information when we have drawings made up - and once in a while we give them too much freedom and let them determine costly tolerances by themselves.

All fixtures used by production with the glass fiber board locating holes are going through Q.C. inspection at the time. We found some bad ones which will be reworked by an outside vendor, as I learned from Ken Fitzgerald that our shop is not able to make them at the required accuracy.

Jim Cudmore

The 4102 inverter package has now been found to be a trouble maker. The most common application of this unit is as a buffer for the unbuffered FF's. Problems arise when the 4102's are located at any significant distance from the FF's. The worst noise pattern occurs when reading in all "ones" and a "zero." When eight bases in the 4102 go positive, there is a current path through the off base back to the FF holding a "zero." This current is large enough to unhook the clamp diode and cause switching of the FF. The situation is not helped when the maximum number of base loads are hung on the zero output terminal. Every base load reduces the amount of noise current required to cause an error. With the maximum number of base loads on both outputs, the switching time is slowed enough to eliminate some of the trouble. The problems are minmized when the groundpath is short. When the FF's are 2 mounting panels away there can be as much as 1Vpp difference signal between the FF and inverter grounds. Don White has proposed a buffer driver package of NPN emitter followers. This package will have the same pin connections as 4102 but must be driven from the opposite output. This package will provide isolation from the gound path. In the interim system designers should plan to keep these modules in close physical proximity or be prepared to terminate each driving line.

Norman Fitch

During the past week, tests have been made in an attempt to correlate the readings between the conventional production test and the PDP-4 automatic Module tester. It has been found that when checking transition times on diode gates, that in some cases the automatic module tester (AMT) reads faster and in other cases it reads slower. In the case of a 1113 and 6113, the AMT reads rise and fall total transition times slower than conventional test and in the case of a 4113 the AMT reads rise and fall total transition time faster than conventional production test.

One possible reason for this discripency is the difference in the driving source impedance. In the AMT the driving source impedance is 56Ω to minus 3v and in conventional production test the impedance is about 600Ω. The difference in lead length between the two systems may also account for some of the discrepency. Another explanation may be the distortion of the waveform at times possibly confusing

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Norman Fitch (cont.)

the type 567 sampling scope. Also, the AMT reads the waveform from 20% of the input to 80% of the output whereas conventional production test measures from 10% to 90%.

Due to the ringing present on the ground and -3v lines, the waveforms are measured from 20% to 80% so that the type 567 sampling scope will not trigger on the ringing and give an incorrect reading.

A. Parkes

Repair New Modules - Crystal Clocks

The 4206 Triple Flip-Flop took up the first part of the week; this is a slow module to test and many troubles occurred.

Thursday and Friday we repaired current drivers for Bell Telephone Labs.

Dan Wardimon's 4551 and 4524, new modules, took up the first part of the second week. We also acquired at this time another man giving us four.

The remainder of the week was spent in repairing memory modules and other scarce modules for Jack Smith and Dave Kicilenski.

The next two weeks is my vacation and Carl Gartley should be able to handle things.

4551 Dual Sense Amp

Quality Control tested the first lot of 4551 August 12, 1963, It was found at first that all the output transformers were in wrong. Margin checks were taken by Jim Cudmore and Bob Hughes; the P.A. Fails at ±12.5 volts. Frequencies faster than 125KC were found to vary with -15 at the pulse width even to collapsing the output pulse altogether. 10 +A volt margins also collapse the output pulse. No special equipment is needed - time to test one module is about 20 minutes.

Circuit #1 and #2 must be balanced within + or - 5 millivolts of each other. On several modules the difference was about 10 millivolts, but by changing R28 or R7 depending on which was the higher output, this brought both circuits within tolerances - R7 and R28 are 681 Ω 50 PPM .5% resisters from Metohim.

The first lot consisted of 20 Modules, but at this writing only 10 were received as the other 10 were not yet out of production.

4206

Quality Control tested the first lot of 4206 on Aug. 7, 1963; this lot consisted of 12 modules. Each module had its own trouble. These were numerous: solder shorts, several capacitors were the wrong value, one cracked diode, and several diodes placed wrong.

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A. Parkes (cont.)

It was discovered that it took a full 2.5 volts to turn on any of the flip-flops. This was rectified by changing all the 664 diodes in the base circuits of the flip-flops to 003 diodes.

No special equipment is needed other than a 4604 pulse amp. for the tester; the tester consists of 10 switches and 5 variable pots.

The actual time for testing one module is about one hour.

Jim Dimauro

Semiconductors tested since last report:

Type	Mfg.	Units tested	% Rejected
2N1754	Philco	5,000	1.0
2N598	Philco	140	0.0
2N2099	Sprague	400	0.5
2N2904	Motorola	600	1.0
2N711A	Texas Inst.	300	2.0
MA90	Sprague	1,903	1.0
MA90	Philco	3,222	1.0
MD94	Sprague	1,570	1.0
D-001	Clevite	9,300	0.7
D-003	Nat. Trans.	4,750	0.8
D-007	Nat. Trans.	300	0.6
D-662	Clevite Trans.	15,987	0.3
Q6-100	Internat. Diode	160	0.8
IN1315	Dickson Elect.	15	0.0
IN748A	Motorola	10	0.0
IN987B	Dickson Elect.	10	0.0

Misc. Components tested:

7,816 resistors were tested 100%
120,000 resistors were sample tested
33,185 capacitors were tested
369 cera circuits were tested

Dick Gaboury

A comparison between our shop and outside vendors gave the following results:

Vendor	Shop
Rec'd 15,512 pcs	Rec'd 919 pcs
Rej'd 571 pcs	Rej'd 47 pcs
Different jobs - 58	Different jobs - 31

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Dick Gaboury (cont.)

These figures include the following:

Vendor	Shop
45 fabrication jobs	16 fabrication jobs
2 chromicoat jobs	13 chromicoat jobs
6 paint jobs	2 paint jobs
5 anodizing jobs	

John Trubiano

Test Equipment Service

In the past two weeks this equipment has been calibrated:

Type	Model	Quantity
Oscilloscope	543-543a	6

Ten 630 NA-RN meters have been checked for calibration.

In order to keep catalogue and test equipment manuals available, persons using them should return them as soon as they are finished.

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H. Crouse/R. Hughes

PURCHASING DEPT

New Devices

The 2N2801 is a PNP silicon epitoxial planar, has an Ft of about 100 megacycles, Vcbo of 50 volts, Vceo of 35 volts, a power dissipation of 800 milliwatts at 25°C, and is in a TO-5 can. This unit is used in the light pen amplifier #1559, the price is $9.80 in hundreds.

The 2N2387 (T1420) is a NPN silicon planar low noise amplifier. This device has replaced the 2N813. It is in a micromesa package. The price is $18.40 in small quantities.

The 2N2804 (T1X621) is a dual PNP silicon planar device which is being used in the 1570 slicer flip-flop. It replaced the MD94 and 2N995 single transistors which caused the circuit to drift. It is in a TO-5 can with a six lead header. The price is $24.00 in hundreds.

The 2N2904 is a PNP silicon Epitoxial Planar Annular process transistor which has replaced the 2N1204 in the 1982 inhibit driver. And this device in the future will replace the 2N1132 (and old mesa) in Stockebrands 1780 and 1781 analog modules. This unit has Vcbo of 60 volts and Vceo of 40 volts and has an Ft of about 200 megacycles. The 2N2904A is a high beta version of the 2N2904 with a Vceo of 60 volts all the other characteristics are about the same. Ai Tsung Lu is planning on using the A version in a high voltage intensification amplifier. Both units are in a TO-5 can. The prices are; 2N2904 $6.60 in thousands and 2N2904A is $10.85 in hundreds.

The SF2506 and SF2507 are silicon PNP and NPN compliments. These are being purchased for the current drivers and were in a TO-5 package, but now Motorola has agreed to supply them in a 7/16" stud mounted package, which allows greater dissapation. The prices are $19.00 and $24.00 in hundreds.

The SDA-4 is a dual NPN silicon planar transistor for use in differential amplifiers such as, the 1538 memory sense amplifier. It is in a TO-5 can with a six lead header. The price is $5.93 for five thousand.

We are now purchasing the D-007 germanium diode with a forward voltage drop specification of 0.6 Volts minimum 0.8 volts maximum @200 milliamperes. The price is $0.175.

Committements were made for the purchase of one million D-003 germanium diodes from two vendors. The price is $0.11 each.

The D664 silicon planar diode is purchased from General Electric in quantities of 150,000 at $0.20 each.

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H. Crouse/R. Hughes (cont.)

We are experiencing delivery difficulty on the 2N2100 and advise users to investigate possible use of the 2N2904.

The 2N835 is a NPN silicon planar transistor now under evaluation by Burt Scudney for PDP-6.application. The price is $1.55 in thousands. It is in a TO-18 can.

The 2N2894 is a PNP silicon transistor with an F_t of about 400 megacycles, which is being evaluated by Russ Doane for the VHF line. It is in a TO-18 can, the price is $3.50 in thousands.

Dave Glazier

The following list of transipads and quad cases have been obsoleted:

45,000 - 67D	$25.00/M
48,000 - 57D	$25.00/M
2,500 - 22D	$60.00/M
2,700 - Quad case #10047-4	.12/ea

Arrangements have been made to return this material to Milton Ross Metals, Inc. for credit.

Recently we received samples of touch-up paint in aerosol cans from two vendors. The suppliers are Spray-On Products, and Shield Chemical Co. We are requesting Shield Chemical Co. to resubmit samples because of an error in the texture of the paint by Raffi & Swanson.

The furniture we have purchased for the Engineering Department disappears at an increasing rate. We have not purchased for general storage. If you have a need for desks, file cabinets, etc submit a requisition to purchasing.

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SYSTEMS

Jon Fadiman

The Core Tester 2133N for Mobara Works of Hitachi in Tokyo, Japan was shipped out today. The manual for that Tester has been revised and the new manual has now been published. The Transfluxer Tester for NASA was shipped out yesterday.

The 1521A for Ferroxcube is still in our house. We have brought this up to date by replacing all the 1986 Read-Write Switches with 1990's. We have made a faster strobe and also taken care of several logical problems in the machine. This brings the system up to the required specifications for Ferroxcube. However, Ferroxcube would like to have a faster rise time through an inductance such as would be seen for the Z winding of the memory plane. Dick Tringale is working on means of providing this faster rise time. The problem is one of reducing the output capacitance of our drivers not only in using new low capacity output transistors but also in reducing the capacity from collector to ground by means of reducing the capacity of the heat sync to ground. We hope to achieve a rise time of at least 200 millimicroseconds through the Z axis of a standard 64 x 64 50 mil plane. We hope therefore to return the Memory Tester to Ferroxcube some time next week.

Other machines on the floor are the Core Tester 2113J for Electronic Memories Inc. which will be shipped out Sept. 1. There is also the Spark Chamber Reader for the Univ. of Chicago for which construction is nearly completed.

Two weeks ago we received an order for a Memory Tester 1516K from Cofelec in Paris, France. This is a division of CSF. Delivery time on this system is October 18, and the price is approximately $61,000. It appears very likely that we will also sell a Memory Tester 1516 to Fujitsu in Tokyo, Japan. The purchase order for this is expected within about one month. Other possible customers for the Memory Tester 1516 are Fujii Electrochemical in Tokyo, Japan and Olivetti in Italy. We have been talking at length with Minneapolis Honeywell here in Brighton and they are very interested in the purchase of a machine similar to our Memory Tester 1521. Chances of making this sale are about 60%.

Two days ago I visited the Northern Electric Co. in Montreal, Canada where I spoke with Mr. Vuckovic and other Engineers. They are just getting into the core business. At present they are interested in a Programmable Pulse Generator such as our Semi-Automatic Core Tester, Model 2108 or 2110. Chances of selling them a system such as this are about 90%. Some time in the future they will be interested in Automatic Memory Core Tester 2113, and maybe in a year from now a small Memory Plane Tester which will test a 16 x 16 ferrite sheet. Northern Electric, which used to be associated with Western Electric, is doing work in automatic switching circuits very similar to that done by Western Electric in this country.

The Prototype PDP-5 has been completely checked out and the first of the production PDP-5's which is destined for the WESCON show and after that to UCLA is now in final checkout. There appear to be no serious problems. The second production PDP-5 is for the Atomic Energy Commission of Canada's job and Chalk River. This machine is now being wired up by production. The third machine will be for Sales.

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Jon Fadiman (cont.)

Several new bids have been submitted. One to Columbia University for a small timing generator for about $6,300. and one to Autonetics for a Memory Tester. We are working on a bid for a Transfluxer Tester for American Borsch Armour Corporation.

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QUALITY CONTROL

J. Cudmore

During the past two weeks, several testers have been revamped. The 1572 which is one of our chief headaches is being re-evaluated. The tester has many strange signals floating around in it. These strange conditions have been eliminated and the validity of the tests is being evaluated.

The 4514 NRZ writer tester has been redesigned. A tester has been designed for the 4224.

The volume of new test data sheets is quite impressive. The teletype, PDP-6, and 555 units all require new sheets, testers etc. So please bear with us in our crisis.

K. Doering

There are 235 marked up laboratory modules with the old style case in finished goods. They are going to be replaced as soon as current orders have been filled.

We might want to switch over to one dip mica capacitors type 15 which are smaller in thickness by approximately .057" and in length by .067" than the three dips. There seems to be nothing wrong with them. The main question is whether the reduction in size is worth going into some work to have them stocked for us, as they are considered to be specials. I would appreciate any comment on this.

On the last methods committee meeting some decisions were made to solve the mounting panel problems, memos were sent out to all persons concerned.

D. Gaboury

A comparison between our shop and outside vendors from 18 July, 1963 to 31 July, 1963 gave the following results:

VENDORS:

Rec'd	3,295	Parts
Rej.	637	"

These figures include for the vendors:

2 paint jobs
1 anodize job
4 chromicoat jobs
21 fabrication jobs
2 plating jobs

SHOP:

Rec'd	524	Parts
Rej.	27	"

For the shop:

10 paint jobs
15 chromicoat jobs
21 fabrication jobs

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D. Dubay

Test Equipment Service EN1144

The last few weeks have been hectic. Jerry McDonald who had been working with me has left the company. John Trubiano who is taking Jerry's place has been on vacation. Consequently, I have only had a week to teach John the problems of Test Equipment Service. My vacation starts today so take it easy on John while I'm gone.

In the midst of all this confusion. I received ten new H/P oscilloscopes and 15 new Triplett multimeters which had to be checked out and distributed. The balance of my time has been used to repair and adjust stenorettes, time clocks, page system and various pieces of test equipment.

I just completed a report on the problems of Cathode Interface Impedance in electron tubes. This report will be distributed under a separate memo.

J. Trubiano

Test Equipment Service

Since I was on vacation for one of the two weeks this is a report for only one week. I have just recently been transferred to this department. Dave Dubay has been explaining to me basic oscilloscope circuitry and test procedure and also other duties of the department. The second part of the week I have calibrated this equipment.

Description	Type	Quantity
oscilloscope	543/543A	4
triplett meter	/630-NA	4

D. Ambrose

July 22, 1963	Field module and customer module module repair
July 24, 1963	Test first lot of 1559 Light Pen Amplifier
July 26, 1963	Test first lot of 30 mc 8301 Pulse Amplifier
July 30, 31 & August 1, 2	Tested model and one other of the 4706 Teletype Receiver, 4707 Teletype Transmitter, and the 4703 Teletype Transmitter.

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J. Dimauro

Semiconductors tested since last report:

TYPE	MFG.	UNITS TESTED	%REJECT
FSP-24	Fairchild	30	0.0%
GA-212	Texas Instrument	955	0.20%
2N744	National Semiconductor	200	1.0%
2N995	Fairchild	20	5.0%
SP-390	Texas Instrument	3	1.4%
SW1250-3	North American	210	1.0%
2N1304	Texas Instrument	1,000	1.0%
2N1309	Texas Instrument	3,000	0.50%
2N1494	Philco	100	5.0%
2N2099	Sprague	300	1.0%
2N2714	General Electric	1,000	0.0%
2N2804	Texas Instrument	3	0.0%
D-003	National Transistor	3,750	3.6%
D-003	General Instrument	3,000	0.2%
D-007	National Transistor	2,460	0.7%
D-664	General Electric	14,589	0.7%
2N748A	Motorola	10	0.0%

C. Gartley

In the past two weeks 36 crystal clocks were adjusted, and data was taken at 25°C, 55°C and -20°C. The remainder of the time was spent on first lot test which were the 4679 level amplifier and the 4506 IBM 7090 to DEC Conc (N) and customer repair, including Raytheon and MIT, also field service repairing. Arthur Parks showed me how to repair a 53 negative current driver.

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A. Parks

About 80% of my time went to repairing modules and current drivers from customers. We strive to give the customer as fast service as we possibly can. Approximately 20% of my time went to new modules and explaining testing procedures to our new man.

Carl Gartley, is replacing Ed Reilly whom we lost to Display. Carl is currently doing all our crystal clocks. In the past two weeks there were 36 of them.

Next week we lose Dave Ambrose as he is going on vacation, also at this time we are expecting an influx of new modules.

Dave Ambrose is tied up with Burt Scudney on the teletype transmission modules and also with Russ Doane on 30 megacycle modules. I am currently tied up with the new module 4206 for PDP-5.

H. Cames

The work of the past two weeks consisted of an assortment of tests on the 1570-A & B Slicer Flip-Flop. Each of the test on the modules consisted of time stability tests, temperature stability tests, marginal power voltages tests, temperature coefficient tests. The input transistor(s) were also changed and the tests mentioned above were performed to gain a comparison of operation utilizing the different devices. The following devices were used:

1570A - MD 94's & 2N995
1570B - T1X621 & Motorola Star Planer

A complete summary of the data taken in the tests was not made because of a time shortage.

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SALES

Dave Denniston

Since the beginning of July, we have had more than the usual number of requests for information and sales visits, and this last month has also been the best this year for module orders. It is also interesting to note that the volume of module business has been gradually increasing since January, just as it has in the past.

Of special interest is the fact that there has been considerable interest in displays. Many of these prospects desired systems that we are not at this time interested in undertaking, but people do now know we are actively into this field. We have also had several inquiries about photo-multiplier scanning systems for use with our displays from people in seemingly unrelated fields.

Our latest contact with people in the nuclear field is Columbia University's Pegram Labs. They are interested in using a PDP-4 for pulse height analysis.

John Jones

The first production-built PDP-5 will be delivered to UCLA. The personnel there intend to use it as a nuclear pulse height analyzer. Prior to delivery, we will show this machine at the WESCON Show August 20-23. It will be shown both as a general purpose computer and in the special analyzer configuration. The shipping date is 15 August.

At this time the main frame, core, and most of the modules have been delivered to Special Systems for checkout. The peripheral equipment should be delivered by August 2. (This includes a Type 34 display and the interfaces for analyzer equipment.)

Programs are being written and debugged for use at the show (to show the analyzer capability), and scintillation counters have been ordered from Baird-Atomic to provide input data. A "hand out" describing the system's operation is being prepared by Advertising.

The supplier of the analog to digital converters, (Nuclear Data Corp.) required for the analyzer configuration has just informed Purchasing that delivery to us is now scheduled for 15, August. (It was promised for 25 July.) This is not satisfactory and steps will be taken to speed them up.

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Ron Colman

Function Generation

Much work has been done here to obtain faster methods of generating the basic functions. The method of continued fractions was found to yield very fast routines, but required considerable mathematical effort to obtain the coefficients. This work has delayed availability of these routines for the PDP-4, but should now give us a worthwhile sales tool since computing times for these functions if often used to judge computing speeds of the machine. The work also gives us the coefficients for the PDP-6 so that implementation on that machine will be easily achieved. The following are times for a PDP-4 without Extended Arithmetic.

FUNCTION	ACCURACY	Time for Cont'd Fraction Routines (Programmed Mult/Div.)	Estimated Time for Stan. polynomial (programmed Mult/Div.)
Square Root	1×10^{-10}	44 milliseconds	78 millisec.
Sine/Cosine	1×10^{-9}	75 milliseconds	105 millisec.
Exponential	1×10^{-10}	62 milliseconds	180 millisec.
*Logarithm	1×10^{-10}		97 millisec.
**Arc Tangent	4.5×10^{-7}	49 milliseconds	90 millisec.

* Chebzchem was used here until continued fraction coefficients could be worked out.

** A more accurate routine is now being developed.

Marty Hoffman, who has worked out the sine/cosine and arctangent routines, will be writing a paper for our company archives so that this work will be available for future machines.

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ADMINISTRATION

H. Crouse

Purchasing

A letter of intent was given to Ferroxcube Corporation for them to supply us with our memory stacks.

The agreement allows us to order any configuration of a stack, yet based on the same 3.10 cent per core price. Ferroxcube agreed to have available 64^2 planes on the shelf to minimize delivery of our standard memory stack.

We have encountered some difficulty in people shipping property, other than end products, out without proper papers. There is a control point in Phil Feehan and Paul McGauun of returned materials, etc., to insure adequate precautions are taken in shipments. If you are sending DEC property out for repairs, etc. please use the method designed to cost less - lost material without papers are difficult to trace.

Previously I submitted a biweekly intending to show our great new quotation request form which we are using to have total information on vendors centrally located for everyone's reference. The form did not make it, but my pitch did. I shall try again.

Dick King

The use of vendors to help with our work load is continuing. The vendors we are using at this time all have good quality ratings, and all orders are progressing smoothly.

We could use a few more vendors in the board and wiring line and plan to visit a few prospective vendors in the near future to look at their facilities and capabilities. Two potential vendors under consideration at this time are Wilbraham Manufacturing Corporation in North Wilbraham, Mass. and Pentronics Corporation, a division of Atlas Engineering in Dorchester, Mass. Pentronics is prepared to be of service in either the assembly of boards or panel wiring. Mutron Corporation in Brockton, Massachusetts is a third possibility as a potential vendor. We had a brief experience with Mutron last year and they look like a very fine source on wiring as well as board assembly.

We were informed this week by Pastoriza Electronics, Inc. that they have entered into negotiations with George Philbrick Associates concerning the combining of the two companies. Jim Pastoriza informed us, that should these negotiations work out satisfactorily, that it would have no effect on our relationship for one year.

Frank Kalwell

We have recently hired Dave Kauppi as a draftsman to work on our Purchase Specification program which is well underway. Completed purchase specifications on components are being circulated to Engineering and Quality Control for approval. Preliminary Purchase Specification forms are available in Purchasing to Engineering personnel who wish to assist in writing specifications on any com-

digital EQUIPMENT CORPORATION
MAYNARD·MASSACHUSETTS

AREA CODE 617 • TWINOAKS 7-8822 • TWINBROOK 9-0510 • TWX MAYN 753 UX

REQUEST FOR QUOTATION

NUMBER

THE ABOVE NUMBER MUST APPEAR ON ALL QUOTATIONS AND RELATED CORRESPONDENCE.

THIS IS NOT AN ORDER

QUOTE NOT LATER THAN	REQUISITION NO.	DATE OF REQUISITION	CHARGEABLE ACCOUNT NUMBER(S)	P. O. NUMBER

VENDOR	ITEM	SUMMARY OF QUOTATIONS BY QUANTITY		
•				
•				
•				
•				
•				
•				
•				
•				
•				

DELIVERY REQUIREMENTS	EARLIEST SHIPPING DATE	TO BE SHIPPED VIA	TERMS	F. O. B.

ITEM	QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT

1. If unable to quote, please advise at once
2. To receive consideration, your bid must be signed and returned prior to _____
3. If additional information is required contact _____ Ext. _____

DIGITAL EQUIPMENT CORPORATION

REQUEST FOR QUOTATION

DATE _____ BUYER _____

REASON ORDER PLACED WITH SUCCESSFUL VENDOR

LOWEST PRICE	QUALITY	BEST DEL'Y	SERVICE	ONLY SOURCE	BEST DESIGN
☐	☐	☐	☐	☐	☐

OTHER REASON

FORM PH-6

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Frank Kalwell (cont.)

ponents we are presently using. Once a sufficient amount of completed specifications are accumulated, manuals will be available to Engineering, Drafting, Quality Control and Production Department.

Engineering and Quality Control recently approved use of 7/30 stranding on all #22 AWG Teflon hookup wire instead of the present 19/34 type. Due to increased usage the cost of the wire was reduced by $2.00/M ft.

With Sprague presently supplying us cera-circuits and unable to meet our production requirements, I've placed an order with Centralab for engineering evaluation, a quantity of 50 CR330, F150, F27 hybrid circuits for delivery the week of August 12, 1963.

D. Kuyamjian

Delivery of the 16 column Line Printer from Monroe has been delayed due to engineering changes initiated by DEC. The character coding has been changed from 55 to 64 characters and will coincide with ASA Standard X3-2. Delivery has been established by Monroe as the end of August.

Delivery of the standard major components, readers, punches and computeriters is proceeding fairly smoothly. BRPE-11 Punches and a 3500 Reader were shipped 7/12/63 a bit behind schedule. Ferroxcube has been unable to meet delivery during July due to their vacation shut-down. However, enough will be received here for production until the schedule is resumed when Ferroxcube returns from vacation.

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ENGINEERING

R. Doane

VHF Burst Generator and Testers	70%
Miscellaneous	30%

The VHF Burst Generator now produces a clean 63-pulse burst of positive or negative 10 nanosecond pulses at 30 Mc, and can be used to above 40 Mc. The generator includes controls to vary the amplitude and pulse widths for alternating and non-alternating bursts. At present, pulses narrower than 10 nanoseoonds are not available, but several widths from 10 nanoseconds to 18 are switch-selectable.

So far, only the 8201 tester has been fully checked out. The other four testers will be checked as soon as several terminating resistors omitted on each are provided.

The modules to be tested should be out of production by sometime next week. Meanwhile, the prototype glass memory module is over half built, and its tester will allow us to test its PRF sensitivity on the VHF burst generator.

Upcoming steps in VHF development:

1. See production module lot through Q.C. tests, and write test procedures.
2. Determine how transistor F_t and diode recovery affects operating margins and performance, using a special flip-flop already constructed for this purpose. Up to now, we have used the fastest components available. This investigation will lead to the writing of realistic specifications for future purchases.
3. Perform shifting, counting, and propagation experiments to determine catalogue-type numbers.
4. Design and perform a synchronization experiment to test a possible solution for the high split-pulse sensitivity observed with the VHF Test System.
5. Report to the Works Committee.
6. Loan modules from the new production lot to high-quality customers, as soon as we have all the data we need.

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MECHANICAL ENGINEERING

Loren Prentice

EN 1000	60%
EN 1136	30%
EN 1196	10%

EN 1000 - Building Layout and Relocation

This is being held up pretty much by lack of help. The contract carpenters have given us only a small amount of time and our own carpenters have been on vacation. We have only one in-house carpenter available for a period of approximately one month and his time is largely consumed by routine tasks of crating, making table tops, repairs to displays, etc. There have been delays in procurement of air conditioners. One promised for delivery the 15th of July has not arrived as yet and 20 fan motors promised us six days after June 26th are supposed to be shipped today from Jacksonville, Florida. They should arrive here Thursday, July 25th. All of the recent relocation has taken place in advertising and the drafting room. Neither job is complete. Investigation was made for humidity control in the new drafting section of the model shop in building #5, third floor. This proposal covers an area of 15' x 18' or approximately 270 sq. ft. It will be cheaper to lower the ceiling and exclude air from other areas and control Ithis with the humidifier. Area to be dehumidified is approximately 2,160 cubic feet. The ceiling will cost $152.40 for materials and $50.00 for installation by an outside vendor. To date this seems to be the most practical method rather then running the partitions to the ceilings which would necessitate a change in location of this area or a change of the location of the sprinkler heads or additional sprinkler heads all of which are prohibitive in cost.

EN 1136 - 555 Tape Unit

Twelve ECO's have been written covering changes due to errors or improvements in manufacturing techniques for this unit. At least two more are under consideration. We are working on methods of converting most of the machine parts so that they may be done on the tape controlled milling machine. New techniques are necessary both for the layout of the drawing and the approach to tooling for this particular milling machine. Even the design of the part is effected when it is originally designed. We have received several programming manuals and distributed these to engineers in our own sections and we can make them available to other engineers in the future. We will also reproduce tooling sheets and program sheets and have these in quantity available from Judy French in the near future.

EN 1196 - 570 Tape Unit

Fabrication for the cabinet for this unit has reached the assembly stage and should be painted and ready to install equipment by the end of the coming week. The plenum doors, rear doors, front doors, and panels should be ready shortly thereafter. There is a great multiplicity of parts to assemble just for the cabinet of this machine without reference to the mechanical parts of the tape drive and its axillary equipment. Most of these are now on order but have yet been received.

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Ken FitzGerald

EN 1178	PDP-6 Console	25%
EN 1000	Administration and supervision	50%
EN 1000	Tape control milling machine	25%

After a delay of approximately two to three weeks in the design of the PDP-6 we are back on thee board again with three draftsmen making preliminary sketches and in some cases finish detail prints for the console and related gear. I have promised to deliver a console prototype completed and ready for wiring on September 8, 1963 provided no further changes are made. I believe we will meet this date.

During the last week of June, a new tape controlled milling machine was purchased and delivered. Since that time, I have spent a good percentage of my time checking it out, learning to operate it and writing trial programs. I have had numerous questions in regard to this machine, some of which I will try to answer at this time.

1. This machine is nonelectronic. It operates on a numatic hydraulic principle. (The tape is read with air.)

2. The accuracy in the machine is ± .001 with a repetative accuracy of .0003.

3. The machine is only a two axis machine. It will position the table on either of the two axis in a point to point manner.

4. The machine is also capable of milling on a straight line direction on either axis or it can mill on an angular path by utilizing point to point increments for table positioning during the milling operation.

5. The present plans for utilizing this machine are for the micro tape panels, quides, and checks; memory stack mounting hardware; special amphenol plug mounting brackets, in which numerous amphenol plugs are mounted similar to the memory stack hardware; special panels that require accuracy greater then can be obtained with hand layout; and any other jobs that we should come upon that need a high degree of accuracy and point to point locations.

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QUALITY CONTROLS

K. Doering

We have rather well caught up with solder joint inspection of assembled systems. Things get fixed after "intermediate" inspection usually. Only modifications done to the system afterwards might get rejected at "final." The main bulk of rework is now done before check-out.

One of our problems was the repeatability of our inspectors, but constant review of the standards plus the drawn-up pictures have helped us quite a bit.

Procedures for mechanical and electrical assembly inspection were revised, clarified and agreed on. All people involved got a copy plus plentry to be distributed to their subordinates. We experienced some real improvements and cooperation; but also some baffling lack of communication: some subordinates were not instructed: inefficiencies, errors and delays resulted. We had to explain the simplest details all over again. I would appreciate if possible deviations from agreed on procedures would at least be made known.

J. Cudmore

During the past two weeks the first lots of 4505 and 1697 have been tested. The results were as expected and no unexpected problems arose.

The testing of the 4604 and 4606 PA's has been modified to include marginal checking. This circuit contains a one-shot that may hang up as the +10 on the off side is lowered. This problem with the addition of a NPN inverter (2N1304) used in place of the extra transformer for positive input pulses. These transistors can be leaky and rob hold off bias. The circuit has been modified to use a silicon transistor in place of the germanium 2N1305.

Measurements on the cera circuits using the Boonton RX meter have shown good agreement with Sprague's specifications on stray capacitance. A separate memo shall be issued detailing the results.

Tests are presently being performed on the 1550 and 1570 to determine the actual performance of these very critical modules in the memory tester sense systems. The results will be described in a forth coming memo.

Recent problems in a system using 4102 inverters driven from unbuffered flip-flops has indicated that there may be layout problems in this module. This is presently being evaluated.

J. Dimauro

Semiconductors tested since last report:

Type	Mfg.	Units Tested	%Reject
Fsp-24	Fairchild	25	8
GA-212	Texas Instrument	4,640	4.9

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J. Dimauro (cont.)

Type	Mfg.	Units Tested	%Reject
MA-90	Philco	4,000	.2
MA-90	Sprague	3,000	1.4
SDA-1	Texas Instrument	292	0
SP-390	Texas Instrument	250	0
SW1250-3	North American	1,060	9.8
S1188A	Texas Instrument	75	.9
T1796	Texas Instrument	600	1.3
2N656	Lafayette Industries	20	0
2N711A	Texas Instrument	900	.55
2N744	National Semiconductor	255	.82
2N744	Texas Instrument	150	0.0
2N995	Fairchild	100	0.0
2N1132	Motorola	100	6.0
2N1184	R.C.A.	100	2.0
2N1184-B	R.C.A.	50	0
2N1204	Philco	400	1.2
2N1304	Texas Instrument	6,500	1.9
2N1305	Texas Instrument	13,238	1.2
2N1309	Texas Instrument	2,4800	1.6
2N1494	Philco	100	10
2N1754	Philco	37,000	2.4
2N2099	Sprague	513	3.3
2N2100	Sprague	100	0
2N2218	Motorola	120	2.5
4JX1C741	Texas Instrument	200	.58
2N2804	Texas Instrument	200	1.1
*D-001	Clevite	5400	0
D-001	Transitron	38,900	1.3
*D-001	Sylvania	225	0
D-003	Clevite	720	0
D-003	National Transistor	3,000	0.9
D-007	National Transistor	2,950	0.13
D-662	Clevite	33,361	1.1
*D-664	General Electric	1,375	0.0
D-664	General Electric	3,000	0.9
1/4 M82Z5	Motorola	50	66
1N469	Durrell Electronics	30	0.0
1N748	Dickons Electronics	30	3.0
1N1217	Motorola	500	.4
1N1200	Motorola	200	.0

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J. Dimauro (cont.)

Type	Mfg.	Units Tested	%Reject
1N1315	Hoffman	25	0.0
1N3005A	Motorola	30	0
1N3208	Motorola	1,500	.00
1N3496	Transitron	100	1.0
Q6-100	International Diode Corp.	120	18

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SALES

D. Doyle

In order to compete in non-computer applications of A-D converters, there is a need for a variety of supplementary units, the most pressing one being a sample-and-hold circuit. Something with the following specifications would meet many of the requirements:

1. Aperture time - 1 microsecond
2. Max. Hold Time - 40 miscorseonds
3. Analog input - 0 to -10V
4. Bandwidth - D.C. to 1 megacycle
5. Pulse input - 70 nanosecond

Anyone in the Sales Department wishing to volunteer for a sales trip to the western part of Canada (University of Saskatchewan for example) while on a trip across the U.S. is asked to contact me. The same goes for other parts of Canada but please let me know.

Jack Shields

Field Service Summary

Installation	PDP	Calls	Man Hours
III	Prototype	2	9.00
BB&N	1B-1	6	32.25
Itek	1C-1		
CRL	1C-3	1	3.25
CRL	1C-4	4	26.50
MIT	1C-5		
CRL	1C-6	3	4.50
BB&N	1C-7		
Geotech	1C-9	1	40.00
LRL	1C-12		
JPL	1C-13		
Beckman	1C-15		
Beckman	1C-16		
SRL	1C-17		
DEC	1C-20		
United Aircraft	1C-24		
Minn.-Honeywell	1C-25		
MIT	1C-26	4	9.50
AECL	1C-27		
Rutgers	1C-28	1	40.00
JPL	1C-29		
Raytheon	1C-33	2	11.00

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Jack Shields (cont.)

Installation	PDP	Calls	Man Hours
Sales	1C-34		
CRL	1C-36	2	1.00
Lincoln Labs	1C-37	6	15.25
Raytheon	1C-38	1	13.00
Stanford	1C-39		
MIT	1C-40	3	14.50
Yale	1C-42	2	40.00
Princeton	1C-43	1	40,00
DEC Prototype	4B-1		
NBC	4B-2	1	11.00
DEC LA	4B-3		
Corning	4B-4	1	3.00
MGH	4B-5	3	6.50
Sales	4B-6		
Foxboro	4B-7		
JPL	4B-8		
Production	4B-9		
Engineering	4B-10		
Kie Corporation	4B-12	4	89.25
Harvard	4B-13	1	12.00
U.S.S.	4B-15	1	0.50

INFORMATION INTERNATIONAL INC. Prototype

The prototype was moved to I.I.I., where the memory stack was returned to it, and the computer was checked for proper operation.

BOLT, BERANEK & NEWMAN PDP-1B

Trips were made to B.B. & N. to install two on line computer-writers and the added lo mixerllogic. Parity errors in the parallel drum also necessitated a call and it was found that a 4113R module had been installed in place of a 4113 module. While investigating the parity error problem it was found that the signal "no fields being written" was only going from ground to minus 1/2 volt. This was due to a missing load resistor jumper in the 4110 module which makes up the signal.

The repaired memory stack for memory "zero" was returned, installed, and checked out.

CAMBRIDGE RESEARCH LABORATORY PDP 1C-3
PDP 1C-4

Service calls were made at CRRBI for the following:

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Jack Shields (cont.)

1. Mag Tape
   a) A rebuilt motor was installed on the vacuum blower
   b) A loose dividing plate in the vacuum chamber, which was causing slippage in the tension arm, was reattached with epoxy cement.
2. Color Display
   a) The NAC level to the display was not going to ground to allow done pulses back from the display because of a defective 1684 which buffered the level.
   b) MB_7 and MB_9 wiring was reversed for the colors red and blue.
   c) The intensity turn on was adjusted to 10 μsec.

CAMBRIDGE RESEARCH LABORATORY (DSL) PDP 1C-6

EMA #3 was being intermittantly set. A temporary was made, to keep it from being set, until the computer is available for proper servicing.

A 30G display was installed at DSL. While on this call it was found that the Sequence Break System wasn't being cleared because a PA, which supplied the CBS pulse, was wired incorrectly.

THE GEOTECHNICAL CORPORATION PDP 1C-9

Power failures caused memory problems and subsequently a service call at the AFTAC installation.

The problems were:

1. Blown 1973 R/W drivers
2. All sense amplifiers misadjusted - (done by customer)
3. Defective 1982 and 1978 inhibit circuit modules
4. Defective 1972 R/W switch for address X02.

Upon completion of the memory problems a complete systems test was run on the Geotech computer.

PDP 1C-20

The mag tape would continue to backspace on a single backspace command because program flag #2 failed to clear. The PA which clears the flag had an output wire which was shorting to ground.

The sail switch and the muffin fan on the display became inoperative at the same time and the resultant overheating required the replacement of two power transistors and two resistors.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY PDP 1C-26

Service calls were made for the following:

1. Reoccurring punch power control noise problems which were temporarily fixed by installing a thyractor on the turn on agastat and cleaning the contacts.

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Jack Shields (cont.)

2. The Io equipment was failing to give completion pulses. This was traced to the output of the bus driver for MB_6 always at ground level, which prevented a NAC level from being generated.
3 Mag tape problems which would not occur when checked
4. Installation of a remote reader spooler

RUTGERS PDP 1C-28

The loan machinewwas delivered and the lot's for the special equipment were installed, with the normal problems. The machine was checked statically and dynamically and the checkout was satisfactory.

CAMBRIDGE RESEARCH LABORATORY PDP 1C-36

A light pen was installed and checked out.

The #4 program flag would not clear and the program 4 flip-flop was replaced to correct the problem.

LINCOLN LABS PDP 1C-37

1. Mag Tape
   a) Not reading correctly--the forward pinch roller was adjusted
   b) Load Point and End Point bulb burned out
2. Display
   a) An inoperative sail switch was replaced and the new one was installed vertically instead of horizontally.
   b) Visual retrace was being caused by too sensitive coupling from the deflection cable. The 4688C module was replaced with a 4688D to correct the problem, and the intensity and focus were readjusted.
3. Computerwriter
   a) Accellerator pins were gauling the side frame. The marks were polished down and the pins were reset to obtain free action.
   b) Replaced ribbon
4. C.P.
   a) Replaced two burned out indicators in AC register.

RAYTHEON PDP 1C-38

A standard P.M was performed on the punch, computerwriter, reader, display and Central Processor.

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Jack Shields (cont.)

MASSACHUSETTS INSTITUTE OF TECHNOLOGY PDP 1C-40

Project MAC required service calls for the following:

1. The computer failed to complete a DIV instruction. A defective 1310 was interrupting the pulse train between MDP 8 and MDP 9.

2. a) Replacement of Ledex Solenoid in the computerwriter
   b) Replacement of a bad 4603 in typewriter logic

3. To move the computer to another building was quite involved as the computer had to be separated between bays one and eleven to load the computer on the elevators.

YALE PDP 1C-42

PDP 1C-42 was installed on June 24/25, 1963.

Problems which occurred were:

1. Moving difficulties because of lack of proper equipment

2. A defective 1209 module was replaced because flag #2 was not being set by tape control.

3. A drifting servo amplifier had to be replaced

4. The reader was dropping a line because a broken wire on the reader power relay was momentarily turning off the reader power during a read. Two inhibit driver failures were fixed over the phone.

PRINCETON PDP 1C-43

The Princeton computer was installed on June 26/27, 1963. An inhibit driver failure was corrected on the phone.*

NATIONAL BISCUIT CO. PDP 4B-2

Modifications #27 and 47 were installed and the computer was completely tested.

* Engineering is presently working on the problem of 1982 failures.

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Jack Shields (cont.)

CORNING PDP 4B-4

A trip was made to Corning to correct reader problems. A defective diod head was replaced and a modified tape feed arm was installed.

While on this call mod #46 was installed, and margins were run on the computer.

MASSACHUSETTS GENERAL HOSPITAL PDP 4B-5

The various problems which required service calls were:

1. The reader was stuck in the off position becuase an actuator spring had come loose
2. The teleprinter was changing to letters at seemingly odd times. This was traced to a program bug.
3. The computer would not deposit or examine--defective 4214 module.
4. Bit #3 of the IR register remained set--a defective 4214 module.

DIGITAL EQUIPMENT CORPORATION SALES PDP 4B-6

1. The interrupt mode would not always come on because a clamp diode in the 4218 flop had high forward resistance.
2. The second 4K memory was adjusted.
3. Modification #47, #46 and a new tape holding arm were installed on the reader.

KIE CORPORATION PDP 4B-12

1. An extra bay containing a 57 control was installed and checked out. Four 4605 lot package were missing and a bad 4215 in the parity control circuit was found and replaced.
2. The mag tape control would try to continue operations after a rewind. A twelve microsecond delay was installed in the logic and will become a permanent modification.
3. A drive belt was replaced in the reader.
4. Teletype station #7 would not receive or transmit due to a broken wire to "common" of the receive relay.

U.S. STEEL (FOXBORO) PDP 4B-15

Service was necessary to replace a broken Reader drive belt with the new type.

COMPANY CONFIDENTIAL

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COMPUTERS

A. Hall

Shortly following the advent of the recent heat wave about two thirds of the Engineering Department moved into their new quarters on the third floor of Building 12. Breezes cooled by the crystal waters of great Lake Assabet augmented by 15 large window fans make the new area more livable than the old.

When the carpenterial transient caused by Jack Atwoods printing room, the milling machine room, numerous computer shipments (and a carpenter on vacation) dies down, the remaining offices and benches will be constructed: Priority for remaining work is as follows:

1) Offices for remaining engineers and the necessary benches and wiring
2) Model shop benches and wiring.
3) Engineering stockroom
4) Peripheral equipment development area and wiring
5) Tape development area and wiring
6) PDP-6 development area and wiring
7) Engineering computer area and wiring
8) Library

SALES

J. Shields

My Biweekly contribution is a summary of Field Service from December 1962 to June 1963. In the future a summary will be submitted to each Biweekly covering that two week period of time. If anyone has questions about particular service calls, copies of the field service reports will be made available to them.

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COMPANY CONFIDENTIAL

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BIWEEKLY CONTRIBUTION DATE

Jack Shields

July 10, 1963

Field Service Summary · December, 1962 - June, 1963

Installation	PDP	Calls	Man Hours
Prototype	1	4	6.00
BB&N	1B-1	32	146.00
ITEK	1C-1	9	30.00
CRL	1C-3	26	117.25
CRL	1C-4	10	31.75
MIT	1C-5	2	8.00
CRL	1C-6	31	251.00
BB&N	1C-7	18	
Geotech	1C-9	6	205.50
LRL	1C-12	3	
JPL	1C-13	7	
Beckman	1C-15	3	
Beckman	1C-16	3	
SRL	1C-17	2	59.00
DEC	1C-20	19	57.25
United Aircraft	1C-24	2	6.00
Minn.-Honeywell	1C-25	2	37.50
MIT	1C-26	12	36.00
AECL	1C-27	3	33.00
Princeton	1C-28	2	22.00
JPL	1C-29	17	
Adams	1C-33	14	39.00
Sales	1C-34	1	2.00
CRL	1C-36	2	18.75
Lincoln Labs	1C-37	12	75.50
Raytheon	1C-38	7	36.75
Stanford	1C-39	2	
MIT	1C-40	2	10.25
DEC Prototype	4B-1	7	23.00
NBC	4B-2	4	22.00
DEC LA	4B-3		
Corning	4B-4	2	37.00
MGH	4B-5	9	61.00
Sales	4B-6	3	32.50
Foxboro	4B-7	14	66.50
JPL	4B-8	5	
Production	4B-9	3	18.00

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BIWEEKLY CONTRIBUTION (cont'd)

Installation	PDP	Calls	Man Hours
Engineering	4B-10		
KIE	4B-12	3	27.00
Harvard	4B-13	1	8.00
Ampex	Core Tester	1	
EMI	Core Tester 2113	13	
NCR	Thin Film Tester 2115	6	

The prototype would not read paper tape properly in the binary mode. The problem was traced to a defective 1310 delay line which generates the external rotate pulses for binary mode operation. Replacement of the module corrected the problem.

The reader required service for adjustment and replacement of a defective information hole amplifier.

Memory problems in the prototype were corrected by adjustment of the sense amplifiers.

BOLT BERANEK & NEWMAN PDP-1B

A preventive maintenance call found memory strobe to be late on memory #0. The delay tap for strobe was changed to be 100 nanoseconds earlier to improve margins.

Problems with the time sharing system were traced to intermittent failure of an ISB instruction on channel 17. Trouble--a defective 4214 flip flop. While on this service call a modification was added to the time sharing system so that instructions which address non-existant memory banks, were trapped and the instructions were not executed.

Memory problems required replacement of two defective read/write drives and replacement of the memory stack for memory#0. The memory stack had an open X13 wire in plane #3, and it was temporarily replaced with the stack from the prototype until it can be repaired.

Various drum problems were traced to defective 4604 and 4106 modules in the drum parity logic, and a defective 4519 in the drum write logic.

Installation of the 30H display and symbol generator uncovered inductively coupled noise on the -15 volt line to the intensity amplifier. The indications were retrace problems on the display as currents were changed in the defection coils. Relocation of the -15 volt line corrected this problem and a display design change was initiated to prevent future problems of this type.

B.B.&N. complained of poor light pen response and completion pulse problems with the symbol generator. The completion pulse problems were due to program errors and a misunderstanding of the symbol generator program blurb. The light pen problems were due mainly to the three micro-second intensify time in the symbol generator. A program which displayed one point on the CRT at a variable repetition rate was run with a bezel holding the light pen in a fixed position on this point. Wave form charts were drawn which showed the output of the light pen amplifier intersected -3 volts at 2.6 micro-seconds after intensify time. This output was then anded in a capacitor diode gate with the dpy done pulse which occurred 400 nanoseconds later. A circuit modification to a 4102 module was performed and the logic was changed so that the and gate for the light pen amplifier output and dpy done was two series 500 KC inverters, thereby eliminating the charge time problems in the capacitor diode gate. A memo with a full explanation of the mod. and the appropriate wareforms was sent to Engineering, and they are presently working on this problem. The noise problems on the new 4217 modules is still present as we also had this difficulty.

The reader required amplifier adjustments and replacement of a burned light bulb. The leading edge, before trailing edge modification, was also installed.

The teletype punches required service for cleaning and on punch 0 a bearing, feed hole pin, and detent spring were replaced.

Mag tape service was necessary to:

1. Adjust start stop time unit #2
2. Correct wiring errors in the control so the mag tape tester could be used
3. Adjust tension arms on both tape units
4. Add a fan to the top of unit #1.

The five computeriters at B.B.&N. suffered almost every type of conceivable malfunction. They were:

1. Five defective ledex solenoids
2. Four calls to reset various contacts and clean computeriters

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3. Replace ribbon advance cam
4. Replace missing spring on ribbon advance mechanism
5. Clean wax layer from power roll
6. Reset tab rebound
7. Replace pull wire on back space mechanism
8. Replace burned out solenoid driver--burned out by user plugging in computeriter plug backwards
9. Straighten bent pins on computeriter plug
10. Replace capacitors on switch filter with tantaluum capacitors.

Four teletype line units were installed at B.B.&N., however, they are as yet not operational pending some modifications and added receiver word buffers.

ITEK PDP-1C-1

A skp instruction was failing in the ITEK computer. The trouble was traced to a defective 1607 pulse amplifier in the /+ 1 Program counter logic.

The computeriters required service to adjust the carriage return linkage free cams from power roll, and adjust the spring bar. A burned out motor and starting capacitor were replaced on another service call.

Punch service calls involved replacement of a defective solenoid driver in the punch logic, and replacement of a feed pawl and feed pawl slipper in the punch.

The reader was serviced when the clutch assembly required adjustment.

CAMBRIDGE RESEARCH LABORATORY -1C-3

CAMBRIDGE RESEARCH LABORATORY -1C-4

A complete electrical and mechanical preventive maintenance was performed on PDP-1C-3 and PDP-1C-4 during the period

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covered in this summary. The P-M also included addition of modifications #64, 81, 91, 93, and 95 to the computers.

An interesting divide problem caused a service call on PDP-1C-3. Whenever an attempt to divide a number into zero was made and certain test word switches were thrown up, an incorrect answer was obtained. A quick check of the TW⟨1⟩AC pulse line showed noise pulses about 3/4 of a volt in amplitude on the output of the pulse amplifier. A check of the input showed noise pulses of 1/4 volt amplitude and as many noise pulses as divide timing pulses. A visual check of the mul-div. logic showed that the ground connections between 2K-L and 2 H were not made. Since the only ground connections between the computer and the mul-div. logic were now made on long line cable connections; excessive ground currents were generated in the computer whenever mul-div. operations took place. The line for an input for the TW⟨1⟩AC pulse amplifier was a collector output to the PA input and was about two feet long running next to the mul-div. cables and it was a twisted pair. Removal of the ground connections of the twisted pair at both ends corrected the noise coupling problem. A proper ground connection will be made on the 2 H to 2 KL logic on the next preventive maintenance call on PDP-1C-3.

Two problems with the information exchange logic required service calls at C.R.L. A sloppy solder connection on an information buffer flip flop caused the clear input to short to the set side of the flip flop, and as it was an unbuffered flip flop the flop was set on each clear pulse.

Unrealiable exchange of data at a random rate caused another call. The info-exchange buffers were designed using 4213 flip flops, as straight buffer registers and the zero shift input was not used. Since 4213 flip flops use capacitor gates on the internal zero shift line the flip flops are noisy and will set with no connection to the zero shift input pin. Grounding the zero shift input pins on all the 4213's in both info-exchange registers corrected this problem.

Service was necessary on the color display to correct a wiring error in the plug connection on PDP-1C-4.

The punchs on both computers required service to adjust the registration, and clean both die block assemblies.

Mag tape service calls were necessary for the following:

1. Adjust the write coupling plate
2. Replace a burned out Tape sensing bulb
3. Replace two vacuum blower assemblies with worn brushes
4. Replace a tension arm with a broken pulley
5. Recommend removal of a customers Ampex tape which the Potter Units literally chew up
6. Clean and test all units
7. Adjust a delay in the 52 control
8. Clean relay contacts in power off circuit.

Computeriter service calls consisted of:

1. Installation of on-line computeriter on 1C-3
2. Replacement of two decoder solenoids
3. Removal of metal chips from computeriter--the chips fell in the computeriter when C.R.L. technicians were drilling nearby
4. Replacement of solenoid and horseshoe spring in bell crank
5. Replacement of a defective switch filter.

Service on the A/D converter was necessary to change the decoding of an Iot for proper NAC operation.

A trip was made to C.R.L. to change the Fast Block Transfer logic at C.R.L.'s request. The logic was changed so that the number of words transferred no longer depended on core location, but now the programmer would merely load the number of words in the AC and the logic would do the rest.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY PDP-1C-5

A service call was necessary to install the parallel drum and replace a defective drum cable. A trip was made to M.I.T. to perform modifications #89, 93 and 95.

Two divide problems did not necessitate trips to M.I.T. as the problems were fixed over the phone with the aid of Divide Simulator Program.

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CAMBRIDGE RESEARCH LABORATORY PDP-1C-6

Preventive Maintenance was performed on the DSL computer during the summary period. The P-M consisted of:

1. A complete cleaning adjustment, and replacement of marginal parts on the peripheral equipment
2. A complete system test with marginal checking which necessitated:

   a. Replacement of an 1103 module in the accumulator gating--low positive margins
   b. Addition of diodes to the Pad gates on the accumulator--low negative margins
   c. Addition of terminators to appropriate pulse lines with low negative margins
   d. Correction of logic so that the overflow flip flop was stored on a PC$\xrightarrow{1}$AC transfer
   e. Installation of mod. #93.

Installation of equipment for PDP-1C-6 including:

1. A Memory Extension Control Type 15
2. A Memory Module Type 12
3. A new operators Control Console
4. A 30H symbol Generator and Control.

The equipment was installed, debugged, thoroughly tested, and accepted by the customer.

Mag tape problems were:

1. Two calls for programming errors
2. Dirty head and vacuum buffer--cleaned same
3. Plug wire shorting -15 volts to ground
4. A loose 4106 module in the Tape Control.

Punch problems caused four service calls at the DSL installation. Two service calls to adjust the registration of the punch and two service calls to "temporarily cure" noise generated by the punch motor control. The motor control noise problems have occurred on two other PDP-1 installations and we will correct this problem with the electronic motor control when the modification is released by engineering.

C.R.L. PDP-1C-6 (cont'd)

Programming problems with the symbol generator caused two service calls at DSL. The programming problems again concerned the completion pulse logic.

Another service call for the symbol generator required adjustment of the subscript and replacement of a defective micro-dot cable.

The reader required service for the following:

1. Replacement of a marginal diode head
2. Replacement of a defective SPA module
3. Adjustment of all amplifiers
4. Replacement of a worn clutch capstan
5. Replacement of a defective feed hole amplifier.

The computeriter service consisted of replacement of four defective solenoids and filing an oversized slash bar key.

A second mechnical preventive maintenance was performed on the DSL installation.

BOLT BERANEK & NEWMAN PDP-1C-7

Updating modifications were performed on the PDP-1C-7.

As a preventive maintenance measure, the old style brake (solenoid) on the Digitronics Reader was replaced. A service call was made at a later date to check the operation of the reader.

Several calls were made to B.B.&N. on an intermittent mag tape problem. The problem finally became a definite failure causing the circuit breaker to be tripped. The problem was caused by a faulty upper servo amplifier module.

GEOTECHNICAL CORPORATION PDP-1C-9

Installation of the computer in Washington D.C. caused a

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service call at Geotech. The problems were loose cable connections and a broken wire in the Geotech cabling to the remote console.

Reader and mag tape problems caused another service call at Geotech. The reader problem was due to a 4410 module inadvertently replaced by a 4401 module. The mag tape was adjusted and a program change was made to increase forward start stop time.

A preventive maintenance call was made at Geotech. The P-M included installation of mods #64, 89, 91 and 93.

Mag tape problems caused the majority of our service calls at Geotech. The major cause of the mag tape problems were due to programming in the basic mag tape control program. The hardware problems were:

1. A wiring error in the tape control
2. A loose vacuum hose clamp
3. A defective power supply
4. A defective read/write head assembly
5. Broken leed EOT sensing lamp
6. Broken lower tension arm
7. Defective 1539, 1542 modules.

As a side light--Geotech has used its mag tape for 2 1/2 months since our last service call and the only problem they have had was corrected by readjusting the forward pinch roller.

LAWRENCE RADIATION LAB. PDP-1C-12

L.R.L. service was necessary on the Type 31 and 30 displays. The Type 31 display was modified to protect the CRT from component failures. This modification went in quite well. The only difficulty was a pair of bad relays in the modified 826 power control.

A broken contact on the sail switch in the Type 30 display was replaced. Another trip was made to L.R.L. to replace the CRT on the Type 31 display.

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Trips were made to J.P.L. to:

1. Install a new reader diode head assembly. When the head was installed, it was necessary to paint the inside of the lamp cover a flat black to eliminate reflected light problems.
2. Perform preventive maintenance
3. Check the operation of a mag tape unit
4. Check the R/W head on a tape unit which had been giving many error indications. This trip was made with the local Potter Field Service Engineer and all the R/W head characteristics appeared normal.

BECKMAN PDP-1C-15

PDP-1C-16

Trips were made to Beckman to replace a defective marginal check power supply meter, and to replace a defective Hobbs time meter.

The Beckman installation also required service to:

1. Adjust a punch for proper registration
2. Perform modifications on the computers.

SYSTEMS RESEARCH LABS, INC. PDP-1C-17

Two calls were made at the S.R.L. installation they were:

1. Installation of Mul-Div. type 10
2. A complete preventive maintenance on the computer and peripheral equipment.

DIGITAL EQUIPMENT CORP. PDP-1C-20

Central Processor problems were:

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1. A defective 1685 module in the Io buffering logic
2. A defective 1684 module in the output of MB_{17}
3. Open windings in the memory muffin fan
4. Correction of some wiring errors incurred while the Sequence Break Type 20 was installated on the computer
5. Installation of modifications #84, 93, 88 and 89
6. A defective 1103 module in the NAC logic causing no completion pulses from a RRB instruction
7. Correction of wiring errors during installation of Mul-Div. Type 10
8. A defective 1982 inhibit driver module for bit 10
9. Installation of Mul-Div. Type 10 found that when the largest negative number was multiplied by zero a result of minus zero was obtained. A design change for the correction of this logic problem was installed and later submitted to become a PDP-1 design change.

Display problems consisted of:

1. Installation of intensity control
2. Replacement of a defective 4688 module
3. Replacement of shorted (collector to emitter) 2N1719's in the heat sink
4. Replacement of a defective 4677 module
5. Installation, test and evaluation of a display design change to insure that the light pen status flip flop and program flag 3 are set with the same pulse.

Service was necessary on the computeriter to replace a defective ledex solenoid.

Mag Tape service consisted of:

1. A preventive maintenance check of the vacuum motor brushes
2. Resoldering a poor connection on the output of the character buffer.

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D.E.C PDP-1C-20 (cont'd)

Reader troubles were:

1. Open diodes and a shorted transistor on the SPA module
2. A defective AAA module
3. A blown 2 AMP fuse
4. A defective feed hole amplifier
5. Adjustment of the amplifiers for margins.

UNITED AIRCRAFT PDP-1C-24

Two calls were made on the United Aircraft installation. They were:

1. Correction of power roll and TCM cam adjustments
2. Adjustment of reader amplifiers and clutch assembly.

MINNEAPOLIS-HONEYWELL PDP-1C-25

A mechanical preventive maintenance was performed at PDP-1C-25 during the summary period. The P-M consisted of:

1. Work on all peripheral equipment
2. Installation of appropriate engineering modifications
3. Instruction of all mechanical adjustments on Reader, Punch, Typewriter and Mag Tape for Minneapolis-Honeywell technicians.

Another service call was made to work on some memory and mul-div. problems. The memory call consisted of:

1. Investigation of why read/write drivers had been blowing out
2. Some short instruction on memory troubleshooting tips
3. Instruction on sense amplifier adjustments.

Minneapolis-Honeywell PDP-1C-25 (cont'd)

The mul-div. problems were traced to a defective 1105 module in mul-div. logic. ISP and MuL failures were corrected by working over the phone with Minneapolis-Honeywell technicians.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY PDP-1C-26

The service calls at the LNS installation were for peripheral equipment troubles. The problems were:

1. Display

    a. Three calls on sail switch problems--temporarily cured with new switch, sail and remounting the switch mechanism vertically. (We are anxiously waiting for the thermo couple system to replace sail switches.)

2. Mag Tape

    a. Installation of a Tape Unit Type 50
    b. Improper drag pad adjustment
    c. A defective 4301 delay module
    d. A missing load resistor in the parity decoding network
    e. Adjustment of load point sensing

3. Reader

    a. Replacement of a burned out lamp

4. Computeriter

    a. Reset TCM and power cam eccentric
    b. Cleaning decoder contacts.

Punch caused two calls for a noisy punch power control--replaced power control and rewired AC as a temporary fix.

Memory problems caused two service trips to A.E.C.L. The problems were:

1. Replacement of defective read/write drivers
2. Re-routing and insulating addressing lines to the memory--they were run very tightly and cut on ground lugs and module pins
3. Replacement of a defective agastat relay in the power control which switches AC to the memory power supply
4. Replacement of a defective voltage regulator module (1701) in the memory power supply.

A service call for reader problems required the replacement of a defective clutch solenoid. While in Canada on this call the A.E.C.L. maintenance technicians were instructed on adjustments and maintenance of the reader, punch and typewriter.

PRINCETON PDP-1C-28

PDP-1C-28 was moved from EA1 and installed at Princeton. The installation at Princeton discovered a wiring error in the display plug (wrong side of IO flip-flop). All appropriate modifications were installed on the computer prior to running the acceptance tests.

Replacement of a defective light pen amplifier caused another service call at the Princeton installation.

JET PROPULSION LABORATORY PDP-1C-29

Service calls on PDP-1C-29 were made for the following:

1. Central Processor

   a. Rework wiring to meet J.P.L. standards

J.P.L. PDP-1C-29 (cont'd)

2. Reader

a. Noisy reader--caused by a tape fold rubbing against the reader capstan

3. Mag Tape

a. Adjustment of load point delay
b. A loose taper pin in Iot section for DWB. to HSB. transfer
c. A bent pin in the module socket for the pulse amplifier which increments the character counter
d. A version of FRAP which calls its operands from mag tape would not work. The program read the first block of operands from tape and jumped to an error halt routine. This routine can be reached in one of two ways; either a Tape Control error, or an inoperative MEL instruction. After running A-OK extensively, one would assume all the magnetic tape instructions were tested. This is a false assumption. The MEL instruction was failing to transfer the CA $\xleftarrow{1}$ IO due to a miswire in the Iot section.
e. Dirty rewind switch contacts
f. Another MEL failure caused by another wiring error in the Iot section of the computer--this problem may have been caused by the customer as they were working in that section of the computer.

ADAMS ASSOCIATES PDP-1C-33

The Adams calls were:

1. Central Processor

a. Three calls for intermittent addressing problems finally traced to a defective memory address flip-flop
b. Replacement of a defective inhibit driver

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A.A. PDP-1C-33

2. Reader

   a. Adjustment of all amplifiers
   b. Adjustment of tape spring on photo-diode head cover

3. Computeriter

   a. Lack of lubrication causing space problems
   b. Adjustment of space lever
   c. Adjustment of TCM assembly
   d. Adjustment of encoder for proper spacing

4. Mag Tape

   a. Status bits incompatible with two tape units--changed Mag Tape status logic
   b. Improper plug connections when Adams moved the Tape Units.

SALES PDP-1C-34

The reader required amplifier adjustments on the Sales PDP-1.

CAMBRIDGE RESEARCH LABORATORY PDP-1C-36

The trips to C.R.L. were to install the computer and the 30A display.

LINCOLN LABS PDP-1C-37

The Lincoln Lab system was installed on March 5, 1963. The service calls were all on peripheral equipment. The problems

Lincoln Labs PDP-1C-37 (cont'd)

were:

1. Reader

   a. Replacement of a drifting diode head which has been inadvertently shipped with the computer

2. Punch

   a. Adjustment of registration

3. Mag Tape

   a. Correction of Status level incompatibly with two tape units
   b. Adjustment of end point detection
   c. Adjustment of low reel arm
   d. Adjustment of write lockout switch mechanism and reel hub position
   e. Replacement of burned indicator bulbs
   f. Cleaned Tape Units

4. Display (Type 30A)

   a. Poor connection on 50 pin plug when Display was moved
   b. Sail switch improperly installed--replaced vane
   c. 10KV ground shield shorting to -15 volts on display indicator panel
   d. Retrace problems caused by deflection coil switching--relocated cables
   e. Loose bolts in display table
   f. Noisly light pen amplifier--replaced
   g. Program flag three and light pen status incompatible--design bug a correction mod. now available
   h. 10KV arching to CRT--replaced CKT shield
   j. Defective intensity amplifier--replaced.

A mechanical preventive maintenance was performed at the Lincoln Labs installation.

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RAYTHEON PDP-1C-38

The Raytheon computer was installed on February 28, 1963. The problems during the one installation were:

1. Central Processor
   a. Two defective 1201 flip flips
2. Reader
   a. Improperly adjusted reader amplifiers
3. Display
   a. Open wires in the 50 connector display cable.

Problems other than installation were:

1. Punch
   a. Motor control noise clobbers memory--replaced agastat relay, added thyrector, rewired AC to motor control
2. Display
   a. Replaced faulty sail switch assembly
   b. Corrected wiring error--10 volts reference supply tied to light pen status flip flop
3. Computeriter
   a. Reset case shift cam linkage.

STANFORD PDP-1C-39

The Stanford computer was installated on April 29, 1963. The installation went smoothly and the only problem was a peeled printed circuit in the +10A line of a 1304 module in the symbol generator. The module was replaced.

Stanford PDP-1C-39 (cont'd)

A trip was made to check out the 7090 interface logic and to be on hand for the PDP-1, 7090, demonstration. The demonstration did not go so well due to program bugs in the 7090 program.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY PDP-1C-40

The M.I.T. computer was installed on April 30, 1963. An ISP instruction failure was corrected by lengthening the time between TP_6 and TP_6.

Previous to summarizing the PDP-4 service calls, I feel I should explain some of the Digitronies reader problems, otherwise, I would be repeating these problems on the summary for each installation.

Problem	Corrective Measure
1. Reader Run flip flop intermittently fails to clear	1. Design change
2. Reader amplifiers constantly need adjustment	2. Design change to allow better strobe facility
3. Excessive paper "flutter"	3. Design change--addition of hold down feet to paper guide
4. Wear on soft aluminum actuator assembly	4. Use of a stainless steel actuator assembly
5. Excessive noise from nylon gears in capstan drive assembly	5. Change drive assembly to pulley scheme with drive belt
6. Excessive breakage of drive belt.	6. Change drive belts to a new type.

There are a few more minor problems with the 2500 which are in the process of being corrected, however, I feel we now have the problem in hand and the readers should be fairly reliable. All the readers in the field have been updated except for the actuator assemblies and new drive belts, and we are in the process of correcting this at the writing of this summary.

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PROTOTYPE PDP-4B-1

Excluding the reader the prototype service calls were:

1. Central Processor

   a. Adjusted sense amplifiers in upper memory
   b. Replaced a defective 1690 module on the accumulator buffing logic

2. Mag Tape

   a. Tested and adjusted all tape units
   b. Replaced burned out tape sensing bulb

3. Line Printer

   a. Cleaned Format Tape reader assembly
   b. Adjusted hammer penetration for character 73

4. Card Reader

   a. Adjusted bulb for photo diode sensing to proper voltage

   b. Checked mechanical adjustments for proper card feed.

NABISCO PDP-4B-2

Nabisco service consisted of:

1. Adjustment of the A/D converter and replacement of the -10 volt reference supply with a module that would meet A/D specifications
2. Installation of reader mods
3. Installation and preventive maintenance on computer in Chicago.

CORNING PDP-4B-4

A preventive maintenance call was made at Corning. The P-M

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DIGITAL EQUIPMENT CORPORATION - MAYNARD, MASSACHUSETTS

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included both electrical and mechanical areas and the reader mods were performed as part of the P-M.

On a second service call to Corning the better part of two days were spent solving "bugs" which were a result of programming errors.

MASSACHUSETTS GENERAL HOSPITAL PDP-4B-5

Most of the M.G.H. service calls were for reader problems. Since the reader mods were added to the machine we have not had any reader problems at M.G.H. The other calls consisted of:

1. A complete preventive maintenance
2. Adjustment of punch tape guide
3. Replacement of a shorted solenoid in the punch.

SALES PDP-4B-6

The service on the Sales computer was:

1. Central Processor

   a. Memory problems--replaced diode in 1103 module
   b. Rerouted power cable to reduce noise on power clear line
   c. Replaced a defective 4129 in the information collector
   d. Replaced a defective inhibit driver (1982 module)
   e. Tightened the accumulator bar
   f. Replaced a defective 1690 buss driver
   g. Tuned sense amplifiers in both memories
   h. Replaced two 1538's in lower memory

2. Teletype

   a. Made a 4106-R module a 4106 as the module in this logic did not use the load resistors.

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FOXBORO PDP-4B-7

The Foxboro problems were:

1. Central Processor
   a. Reroute power clear to eliminate noise pickup
   b. A defective 4105 module
   c. A defective 1538 module
   d. Improper add--a defective 1607 module

2. Punch

   a. Cleaning and adjustment of registration
   b. An open resistor in the tape feed circuit

3. Mag Tape

   a. Improper delay adjustment in Tape Control
   b. Replaced a defective 50 pin cable
   c. Repaired a broken -15 volt lead for remote control of Tape Unit.

JET PROPULSION LABORATORY PDP-4B-8

The J.P.L. PDP-4B-8 was installated on 4/29, 30 and 5/1, 1963. Installation problems were:

1. A loose module for the reader flag
2. Difficulties in interpreting softwear writeups.

Service calls were necessary for:

1. Instruction of J.P.L. technicians for use of maintenance tapes
2. Replacement of a broken drive belt on the reader.

PRODUCTION PDP-4B-9

The production computer problems were:

Production PDP-4B-9 (cont'd)

1. The usual reader problems
2. A defective Accumulator bar
3. A defective 1982 inhibit driver
4. Cleaned and reset die block assembly on punch.

ENGINEER PDP-4B-10

Engineering performs maintenance on the PDP-4B-10.

KIE PDP-4B-12

The Kie computer was installated on 5/16/63. Service calls were made to:

1. Update the reader
2. Assist in the installation of the teletype system.

HARVARD PDP-4B-13

The Harvard computer was installed on 6/7/63. The only problems with the installation was a poorly wired wall plug in the installation room.

AMPEX CORE TESTER

A trip was made to Ampex to loan them too positive current drivers until we could get parts to repair their defective ones.

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E. M. I. CORE TESTER

Problems with the E.M.I. core tester were:

1. Current drivers would not operate--a poor solder connection on the 776 power supply
2. Adjustment of the 1570 slicers
3. "A" side of 741 power supply inoperative--replaced supply
4. A trip to replace the stock of S-1188A transistors used in repairing the current drivers
5. A trip to train E.M.I. technicians on maintenance of the core tester.

N. C. R. THIN FILM TESTER

The Tester was installated on 4/11/63, and 4/12/63. The installation went smoothly and all equipment was operational.

Service calls found:

1. A defective -10 volt reference supply module (1562)
2. A defective 2N 1184 transistor in the output I solenoid driver.

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ENGINEERING

T. Stockebrand

EN 1000	30%
EN 1136	50%
EN 1172	10%

EN 1000

The work in EN 1000 is concerned mostly with learning how the Drafting system works with an eye to describing it to everyone concerned. Standard operating procedures are in effect but are understood by only a few and, in a few cases, need revision. Of particular interest to me are:

1. How are print numbers assigned?
2. How do various different users retrieve the correct prints to answer their various needs? -- the problem is that of finding the correct print number given partial information.
3. How are changes handled so that
   a) The drawings of interest to current production are updated at the time of change.
   b) Those which pertain to machines in the field are updated when the field machine is actually modified.
   c) The proper drawings are continuously obsoleted.
4. What cognizance should the drafting department have of a project as it grows from sketches through engineering models and prototypes to production items?
5. What Control exists or should exist on the development, approval and implementation of ECO's of various different types?
6. Can the central print filing system accept Drawings in various numbering systems as new schemes are devised to add retrieval?
7. What does a project engineer have to be sure of and do before a project can be shipped out the door?
8. What records to control print location, exactly are kept by drafting and how are they maintained?

Answers to all the above questions should be contained in a manual addressed to young engineers (and old ones too!) who work for the company.

T. Stockebrand (cont.)

Some fair amount of work is being spent on the back panel wiring program with an eye on incorporating loading and eventually block schematics into the system. The microtape is being handled by wiring lists and cross referenced BS's to force new needs and ideas out into the open.

EN 1136

Microtape is approximately with us, my problem right now - aside from learning all the details that are necessary to get a project off the ground - is to avoid redesigns until the present design is solid so that things don't drag on and on. The suggestion to look into transistors instead of relays to do the local logic is being taken seriously. Off hand the cost seems prohibitive and yet another hardware redesign seems indicated. A tester for the logic must be built. The Wiring lists are being handled manually which works but which is slow.

EN 1172

Mark Connolly of MIT has checked our analog modules (summer, integrator analog switch) for use in building an honest-to-goodness 100 amplifier analog machine for himself. He wants to use the D-A-D of Barbara's similar to the NSA job and will have a trial module designed for us to build in a month or two. Roger Gagne is taking care of the minor revisions and the circuit people are looking first at the question of whether we might not be able to make our own operational amplifier instead of buying it from others.

R. Doane

VHF Burst Generator	30%
VHF Testers	30%
Miscellaneous	40%

The burst generator is about two-thirds checked out. Three module testers are finished except for front panel, and two others are more than half done.

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Loren Prentice

We have purchased, for use of the machine shop, a Moog Hydrapoint tape controlled milling machine. Briefly this uses four rows of a standard 1" eight row flexowriter tape and reads in blocks of 20 lines for each separate operation. The machine is capable of any positioning within .001" on an X - Y access over a 9" x 20" position. It will operate point to point for drilling and from point to point for milling and can mill in an angle by co-ordinate set up in .001" increments either curves or straight lines at an angle or from either X or Y access of the machine. The paper tape reader is an air sensing device converting air brought through holes in the paper tape to diaphragm valves which in turn actuate micro switches. Things that are left for the operator are the control of the feed of the table in both directions, the setting of the down feed of the table in both directions the setting of the down feed of the quil, and the spindle RPM. To efficiently use the machine perhaps a greater amount of planning for tooling and sequencing of operations is necessary then with a normal milling machine, but the speed of operation is increased and the chance for error is almost negligible after the tape has been proven. We plan to use a standard flexowriter for the production of the tapes and later as we wish to get somewhat more sophisticated we could use a PDP-4 to produce tapes for complicated machine operations. The machine was set up yesterday and the man, Mr. Duke from the Moog Company, will be here to give instructions today. The work planned for immediate use is the base plate for the 555 micro tape, the cheeks, the tape guide and the cast aluminum door or cover. We could make unusual panels for special systems use for this machine but it's size and travel make it somewhat easier to do this on our Wales Strippit Punch. We could also program and drill printed circuit boards.

Console Design for PDP-6

After delay of nearly 2 weeks we are now again working to revise the console for PDP-6. Ken Fitzgerald probably reported on this. He now has two draftsmen on this operation and Scott Miller is working on the latest layout for the console lighting, and switches.

Year End Purchasing

We have been busy since some time back in May on both capital equipment purchases and supplies used in the tool crib, machine shop, and sheet

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Loren Prentice (cont.)

metal shop. This has made not only a tremendous amount of work in this office but also in purchasing and expediting by the purchasing department. Nearly all the items ordered have been received. I believe better than 95% of the dollar volume was received prior to July 1st. This represented hundreds and hundreds of items in all catagories from $0.10 to $15 000.00 - $20,000.00 per item. I wish to commend all those whose efforts made it possible to achieve the high percentage that we received prior to July 1st.

570 Tape Unit

Mr. Phil Backholm has completed design work on prototype cabinets, two of which are now under construction in the sheet metal shop. The Leiman pump which was on test has proven unsatisfactory and has been returned to Leiman Brothers in New Jersey and a new pump has been received which will be assembled and put on test as quickly as possible. The cabinet should be approximately 30% complete by the end of this week and perhaps finished by July 19th with the exception of the door and the side plate covers. A number of details have been farmed out to Norman Jones and while there is a tremendous amount of detail work to be done on this, the end of July should see us fairly well along the first two prototype models of the 570 tape units.

P. Backholm

The 570 engineering tape transport project is approximately 25% complete to date.

Fabrication of the cabinet weldment has been started and should be completed by July 19th. The door assembly engineering sketches will be given to the shop for fabrication in approximately one week. Also included in this will be the plenium door side panels and rear door units.

The motor and vacuum pump breadboard assembly has been started and should be ready for testing by July 16th.

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P. Backholm (cont.)

All along delivery items have been ordered and should be in the plant by approximately August 5th.

I estimate the initial mechanical assembly to begin on August 5th. The complete mechanical assembly ready for final wiring and testing is to be no earlier than August 19th.