

H. Anderson



INTEROFFICE
MEMORANDUM

DATE July 1, 1964

SUBJECT Microtape Name Change

TO Computer Guidance Committee Members FROM D. Vonada

It has become necessary to find a different name for what is presently called Microtape. A number of names have been considered and these are listed below. Please review the names and either make a selection or add a few of your own. In either case be prepared to discuss the selection at the next Computer Guidance Committee Meeting.

- | | | |
|--|-----------|--------------|
| Minitape | Picotape | Compaktape |
| Micromag | Disctape | Ezytape |
| Magfile | Reeldisc | Reditape |
| Magmem | Micromem | Program Tape |
| Microdisc | Magnimem | Mitytape |
| Nanotape | Reliatape | Budgetape |
| Memotape | Datatape | Digitape |
| Migitape | Portatape | Dectape |
| Snapshot Tape (suggested by T. Stockebrand
Jan. 31, 1963) | | Handitape |

DV/II

H. Anderson

INTEROFFICE MEMORANDUM

SUBJECT: General PDP-6 Information

DATE: July 1, 1964

TO: PDP-6 Group

FROM: Bob Savell

ENGINEERING:

Norm Hirst is responsible for assigning and keeping a record of I/O device numbers.

The silicon transistor situation is still not completely straightened out, so don't be surprised if module orders are late. Plan accordingly.

The 834 Power Control is to be used to replace the 811 and 829 Power Control wherever possible in PDP-6 systems. The 834 costs about 1/3 as much as the 811, and will be available in about 4 weeks. All Project Engineers should incorporate this change as soon as possible.

PROTOTYPE OPERATION:

Commencing the weekend of July 3-5 Bob Brooks will be available in the plant 8:15-5 p.m. on weekends to service PDP-6. He may be reached via the paging system.

RES/mro

H. Anderson

**INTEROFFICE
MEMORANDUM**

DATE July 1, 1964

SUBJECT Subjects for the Computer Guidance Committee

TO Gordon Bell FROM Kenneth H. Olsen
Members of Computer Guidance Committee

Now that the Computer Guidance Committee has a very wide and extensive membership, I think we should plan carefully what items get brought up there. Many items have very narrow interest and we tie up people for long periods of time for things in which they are uninterested or in which they cannot contribute. I suggest that we try to get as much of the work done, for which there is a very narrow range of interest, in subcommittees or small groups. This would then free the Committee for those items for which there is general interest or for which it is important to be coordinated between many departments.

I am afraid that we tend to save very weighty subjects for the Committee and that the apparently easy decisions get made by default. However, many of these more-or-less easy decisions are the ones that need to be coordinated between departments. Anytime we change standards, start a new program or a new product, I think this ought to be coordinated between departments and the Committee is a very useful vehicle to do it.

KHO:ech

H. Anderson



INTEROFFICE
MEMORANDUM

DATE July 2, 1964

SUBJECT Training of Field Service Personnel on Peripheral Equipment

TO J. Shields H. Anderson FROM Bob Savell
K. Senior G. Bell
R. Beckman

This is to reiterate once again my often stated feelings on training of service personnel to maintain peripheral equipment.

I feel that PDP-6 personnel must receive thorough training on all items of peripheral equipment they are expected to maintain if they are to do a good job of preventive and corrective maintenance. My estimate of the time required to perform this training is a minimum of one to two days each for Paper Tape Reader, Paper Tape Punch, and Teleprinter, and a minimum of three to five days for each of the other items of peripheral equipment.

RES/II

H. Anderson

INTEROFFICE MEMORANDUM

SUBJECT: PDP-6 Prototype Operation

DATE: July 2, 1964

TO: PDP-6 Group:
Sales
Customer Relations
Field Service
Engineering
Systems Programming
Engineering Programming

FROM: Bob Savell

Commencing Monday, July 6th the PDP-6 Prototype will be available for systems programmers to use 24 hours a day except for a preventive maintenance period from 8 to 9 a.m.

Time required for computer checkout, engineering programming or sales demonstrations will be assigned on a needed basis by me.

RES/mfo



INTEROFFICE
MEMORANDUM

DATE July 9, 1964

SUBJECT FIA INSURANCE INSPECTORS RECOMMENDATIONS

TO Works Committee

FROM Loren Prentice

1. Put a red pilot light on all electrical boxes that are to be shut off at night.
2. Remove the old generator room next to the custodians area in building #3.
3. Install a drop-out ceiling over the corridor to the dark rooms in the top floor of building #12.

The last two items are inadequately covered by sprinklers at the present time.

4. Install and enforce "No Smoking" signs in the carpenter shop, top floor of building #5.
5. Remove the unnecessary sprinkler heads in building #3.

The largest single item which he left off of this list which he will probably make further recommendations on is a flammable liquid storage area. He has no specific recommendations at this time but our facilities are inadequate for this type of storage and he will make specific recommendations sometime in the future.

RECEIVED
1964 JUL -6 AM 9:04
DIGITAL EQUIPMENT CORP.
SALES DEPARTMENT

DIGITAL MAYNARD

DIGITAL EQLA
MSG. NO. LA-1806
7/6/64
TO: HARLAN ANDERSON
FROM: BOB STIVER

ADDITION TO THE INTRODUCTION OF THE RAND PROPOSAL

-----FREQUENTLY THIS TEXT WILL REFER TO DEC TECHNICAL BULLETINS
ACCOMPANYING THIS PROPOSAL. THESE DOCUMENTS CONTAIN ACCURATE SPEC-
IFICATIONS AND FUNCTION DESCRIPTIONS. ~~ALL OF THE SUBSYSTEMS PROPOSED
HAVE SPECIFICALLY DESIGNED TO MEET DATA PROCESSING REQUIREMENTS SIMILAR
TO THOSE PRESENTED IN THE RAND CORPORATION REQ.~~

TO: BOB STIVER
REF. RAND PROPOSAL

TWX

I don't see the need for the last sentence of your introduction addition.

ANDY.

NOTE TO HARLAN, IN SEVERAL PLACES THE MODEL NUMBERS OF THE DISC FILE
CONTROL AND THE PDP-4/PDP-6 CONTROL HAVE BEEN INTERCHANGED. I ASSUME
THE NUMBERS ON THE DIAGRAMS TO BE CORRECT AND WILL CHANGE THE TEXT TO
AGREE. MODEL 138 FOR THE COMPUTER INTERFACE CONTROL AND MODEL 137 FOR
OPTION 1 DISC CONTROL AND 137A FOR OPTIONS 2 AND 3.

END OR GA PLS

NOTES

SUBJECT: ADAMS

DATE: July 9, 1964

1. Need specifications for contract:
 - a) Drum
 - b) 630 Data Communication System
16 lines
 - c) Clock (microsecond stop-start)
millisecond advance of core counter.
2. Add 200 c.p.m. reader to configuration
3. Investigate Line Printer situation.
 - a) Put on PDP-4 for a month or so -- Termsor b) Forget it until 6 is delivered.
4. 30 Day Notice on lease termination.
5. Think about Parity.
6. Think about value of system to us for:
 - a) software development
 - b) free use of Adams Software
 - c) demonstrationsETC.

Engineering Planning and Control

This memo describes a proposed procedure for planning and control of engineering efforts within the company. It discusses the mechanics of the procedure, the information required for its implementation, and an operating schedule.

The Planning Process

At the start of a fiscal year, an engineering plan for each product line should be prepared. The plan should describe the engineering goals of the product line and the expenditures and resources required to achieve those goals. It should be prepared from detailed plans for each component project by the Project Engineer for the product line, under the supervision of the Chief Engineer. The Chief Engineer should coordinate the product line plans.

A summary plan should be presented to the Works Committee for approval. It should contain a statement of objectives and planned expenditures for each product line.

The Control Process

Works Committee approval is authorization for the planned expenditures. Expenditures in each product line are the responsibility of the Project Engineer for the line. In turn, leaders of component projects are responsible to product line Project Engineers.

Control at each level involves frequent comparison of planned and actual expenditures. Engineers guiding component projects will receive detailed statements of actual and planned costs. Engineers responsible for product lines will receive summary information on actual and planned costs of each component project. The Works Committee will receive statements of aggregate product line expenditures. Such information should stimulate action at each level to aid or discontinue lagging projects.

Three occurrences should automatically lead to Works Committee consideration:

First, if a product line seriously overruns its planned expenditure; the product line's activities should be reviewed by the Works Committee. The review may lead to authorization for additional expenditures.

Second, if a major new project, not included in initial plans, is proposed during the year, it should be considered by the product line Project Engineer and presented to the Works Committee for approval.

Third, proposals for major new products should be approved by Works Committee, even if their costs do not increase a product line's planned expenditures.

New projects too small for Works Committee approval should be considered by the Module or Computer Guidance Committee. For borderline cases, these committees will decide whether Works Committee review is necessary.

Product Line Associations

The above discussion pertains best to projects associated wholly with a single product line. Some efforts, however, pertain to two or more product lines. These efforts, called joint projects, should be treated in the following manner.

Joint project costs should be borne by the product lines that benefit from the project's completion. The particular method of splitting project costs should be decided by the product lines involved before costs are incurred. The fractional costs of joint projects should appear in product line plans. Should a project be proposed in a new line of endeavor that benefits no existing product line, project plans should be brought before the Works Committee. If approved, the new project may either be classed as a new product line of the company or designated as unassigned engineering effort.

Product line support of joint projects should be available for periodic review. At the beginning of every fiscal quarter, joint project support arrangements can be changed. Such changes require approval by the product line Project Engineers involved. Disputes should be settled by the Module or Computer Guidance Committee.

Schedule

Works Committee approval of product line plans should occur before May 31st of the year. Initial presentation of plans should be made by May 15th. Initial product line's plans should come before the Chief Engineer by May 1st. Thus, plans for component projects should be started early in April.

Dave Packer

DP:ncs

~~Head of Works Comm~~ Andy
2/21/64

DRAFT 7/13/64
David Packer

Planning and Control at Digital

This memo describes a proposed procedure for planning and control of company efforts. It discusses the basis for and mechanics of the procedure, the information required for its implementation, and an operating schedule.

Overview

This proposal rests on two principle concepts:

1. The most effective means of organizational control can come through viewing each product line individually. Departmental plans would be a result of product line considerations. Product lines become the focus for both planning and control activities.
2. A single individual, called the product line coordinator, should be responsible for coordinating product line activities. This individual should participate in both planning and control. In planning, he will work with various departments (engineering, marketing, technical publications), who supply services vital to the product line. In control, he will be responsible for coordinating efforts and solving problems. In practice, he will be the person to see regarding any item affecting the product line. He will have no direct authority over department operations but will have to operate through meaningful planning and negotiation. Conflicts will be taken to the appropriate committee (Computer Guidance, Module Guidance or Works) for resolution.

Below, product line planning and control procedures are described.

The Planning Process

At the start of a fiscal year, a plan for each product line should be prepared. The plan should describe the goals of the product line and the expenditures and resources required to achieve those goals. It should be built from detailed plans for each component activity by the product line coordinator, under the supervision of department heads involved. Department heads should coordinate product line plans and draw from them plans for departmental operations.

A summary of product line and departmental plans should be presented to the Works Committee for approval. It should contain a statement of objectives and planned expenditures for each product line and a summary of departmental expenditures.

The Control Process

Works Committee approval is authorization for the planned expenditures. Expenditures in each product line are the responsibility of the product line coordinator.

Control involves frequent comparison of planned and actual expenditures at every level. Engineers guiding development projects will receive detailed statements of actual and planned costs. Departments, such as Technical Publications, will receive statements of actual and planned expenditures by product line. Product line coordinators will receive summary information on actual and planned costs of each activity in the product line. The Works Committee will receive statements of aggregate product line expenditures. In all cases, information will be presented in the same format as plans were prepared, allowing easy comparison and evaluation. Such information should stimulate action at each level to aid or discontinue lagging projects or revamp plans.

Three occurrences should automatically lead to Works Committee consideration:

First, if a product line seriously overruns its planned expenditure, the product line's activities should be reviewed by the Works Committee. The review may lead to authorization for additional expenditures.

Second, if a major new activity, not included in initial plans, is proposed during the year, it should be considered by the appropriate product line coordinator and presented to Works Committee for approval.

Third, proposals for major new products should be approved by Works Committee, even if their costs do not increase a product line's planned expenditures.

New activities too small for Works Committee approval should be considered by the Module or Computer Guidance Committee. For borderline cases, these committees will decide whether Works Committee review is necessary.

Any person may undertake initial exploration of new ideas with the approval of the Chief Engineer and the coordinator for the product line supporting work currently being performed by that person. Pre-proposal costs will be collected under a distinctive number and be reported as unassigned engineering effort. Normally, such costs should not exceed \$2,000 (one man-month). Summary reports on pre-proposal exploratory work will go to the Chief Engineer. At the end of the exploratory phase, (assuming the project appears fruitful), a project proposal will be made and handled as stated above.

Product Line Associations

The above discussion pertains best to activities associated wholly with a single product line. Some efforts, however, pertain to two or more product lines. These efforts, called joint projects, should be treated in the following manner.

Joint project costs should be borne by the product lines that benefit from them. The particular method of splitting costs should be decided by the product lines involved before costs are incurred. The fractional costs of joint projects should appear in product line plans. Should a project be proposed in a new line of endeavor that benefits no existing product line, project plans should be brought before the Works Committee. If approved, the new project may either be classed as a new product line or designated as unassigned engineering ~~effort~~ effort.

Product line support of joint projects should be available for periodic review. At the beginning of every fiscal quarter, joint project support arrangements can be changed. Such changes require approval by the product line Project Engineers involved. Disputes should be settled by the Module or Computer Guidance Committee.

Schedule

Works Committee approval of product line plans should occur before May 31st. of the year. Initial presentation of plans should be made by May 15th. Initial product line plans should come before department heads by May 1st. Thus, plans for component activities should be started early in April.

RECEIVED

1964 JUL 10 PM 1:33

DIGITAL EQUIPMENT CORP.
SALES DEPARTMENT

MSG. NO. M-1915

TO BOB STIVER

FROM HARLAN ANDERSON

I SPOKE WITH CHUCK BAKER AT RAND TO CONFIRMAXX CONFIRM VISIT, MY SALES CALL REPORT WILL BE AT LA ON MONDAY. I CHANGED MY MIND ABOUT JOSS MANUAL. SEE IF YOU CAN EASILY GET ONE AND SEND IT TO ME TO READ MONDAY..

EDXX END OR GA PLS

END TU

for L
65



INTEROFFICE MEMORANDUM

DATE MONDAY, JULY 13, 1964

SUBJECT PDP-6 DEMONSTRATIONS

TO ALL SALES PERSONNEL

FROM R.P. HARRIS

Effective Monday, July 13, 1964, the following procedure will be followed for all PDP-6 demonstrations to customers.

- 1) The person responsible for the customer will notify the writer at least 24 hours in advance of the demonstration. At this time he must specify a time the demonstration is to take place and any special equipment or programs that are to be run.
- 2) The writer will inform the proper maintenance people immediately after this request to insure the machine will be properly set up for the demonstration.
- 3) The PDP-6 schedule will be changed allowing 15 minutes preparation before the time of demonstration and up to 30 minutes for the demonstration. The people being affected by this schedule change will be notified at this time.
- 4) There will be a standard sales demonstration having a specific format, showing a sample of all the hardware and software that is operational.

The present format will be:

- a. Physical layout description including console operating switches.
- b. Character generator for 346 scope. (This will be in memory before demonstration begins.)
- c. Load system programs from microtape.

- d. Assemble sample program using MACRO6. Input will be paper tape, output will be on paper tape punch, line printer, and console teletype.
- e. 630 Data communications system demonstration with as many stations as possible in action.
- f. On line debugging capabilities with DDT.

As more equipment and software become available, they will be added to the demonstration.

It is asked that only the people directly concerned with the customers be present in the PDP-6 area during the demonstration. To make the presentation more understandable, a set of flip charts will be prepared outlining each program being run.

Any comments or suggestions pertaining to PDP-6 demonstrations should be brought to the writer's attention.

DIGITAL EQLA

CONTINUING,

IS FOR THE FILM SCENARIO THAT YOU ALREADY HAVE.

IT HAS QUITE A BIT OF GOOD STUFF AT THE END IN THE QUESTION SECTION.

END OR GA

P

OK
N.B.G.

RECEIVED
1964 JUL 11 AM 2:13
DIGITAL EQUIPMENT CORP.
SALES DEPARTMENT

END

DIGITAL MAYNARD

DIGITAL EQLA

DIGITAL MAYNARD

DIGITAL EQLA

MSG. NO. 1825 7/10/64

FROM BOB STIVER

TO HARLAN ANDERSON:

THIS INFO JUST IN CASE YOU'RE IN THIS WEEKEND. THE JOSS MANUAL YOU
ASKED FOR IS NOT AVAILABLE. THE OMXXX ONLY DOCUMENT THEY HAVE THAT
IS FOR THE PUBLIC IS THE FILM @ @I↑U]DUCCUY-@

DIGITAL MAYNARD



INTEROFFICE MEMORANDUM

DATE July 13, 1964

SUBJECT COMPUTER AND SYSTEM ORDERS FOR WEEK ENDING JULY 10, 1964.

TO Harlan Anderson

FROM Tom Whalen

COMPUTER ORDERS

<u>Equipment</u>	<u>Customer</u>	<u>Qty</u>	<u>Amount</u>	<u>DEC#</u>	<u>EN#</u>	<u>REN.</u>	<u>Due Date</u>
Type 50 Mag. Tape Transport	Harvard U.	1	18,000.00	7569	20281	YES	9/1
KSR-28C	J.P.L.	11	2,230.00	7605	20304	YES	9/10
Micro Tape control Type 550. Dual Transport Type 555. Tape Handler . Mounting rack, cabling & Power supply package.	J.P.L.	1	18,100.00	7606	20305 20306 20307 20308 20309		8/18
Total			\$ 38,330.00				

NO COMPUTER CHANGE ORDERS. NO NEW SYSTEM ORDERS.

NO SYSTEM CHANGE ORDERS.

jsa

NUMBER	LOCATION	<u>PDP-5</u>	NUMBER	LOCATION
0	DEC Prototype		27	University of California
	UCLA		28	Jet Propulsion Laboratory
2	Atomic Energy of Canada Ltd.		29	San Francisco
3	DEC (Foreign)		30	Consolidated Systems Corporation
4	Data Trends (Rental)		31	Dow Badische
5	Westinghouse		32	University of Connecticut
6	DEC (Sales (Physics))		33	Carnegie Tech.
7	Bell Telephone		34	NASA (Huntsville) (Washington)
8	Lawrence Radiation Laboratory		35	DEC (going to Univ. of Md.)
9	Atomic Energy of Canada Ltd.		36	DEC (New York Office)
10	Coast Guard (Loan)		37	California Tech.
11	Westinghouse		38	NASA (Huntsville)
	Engineering DEC		39	Foxboro
13	Queens University		40	Lawrence Radiation Laboratory
14	University of Minnesota		41	NASA (Huntsville)
15	DEC (Los Angeles)		42	Atomic Energy of Canada Ltd.
16	DEC (Sales)		43	Foxboro
17	DEC (LA) dropped in shipment		44	DEC (Canada)
18	Westinghouse		45	Australia
19	University of Michigan (Rental)		46	Woods Hole Oceanographic
20	Applied Dynamics		47	Lawrence Radiation Laboratory
21	Rutgers University		48	Boston College (Loan)
22	Atomic Energy of Canada Ltd.		49	Boston College (Loan)
	Union Carbide		50	Observatoire de Meudon
24	Foxboro		51	General Electric (Richland)
25	Bell Telephone Laboratories		52	DRTE
26	University of California		53	In Process

26	UNIVERSITY OF CALIFORNIA	23	IN PROCESS
22	BELL TELEPHONE CORPORATION	22	DELA
24	BOXPORO	21	GENERAL REGISTER (DISPATCH)
	UNION SQUARE	20	OPERATIONAL DE WAGON
23	ATOMIC ENERGY OF CANADA LTD.	19	BOSTON COLLEGE (POST)
21	UNIVERSITY OF MICHIGAN (CENTRAL)	18	BOSTON COLLEGE (POST)
20	UNIVERSITY OF MICHIGAN	17	GENERAL REGISTER (DISPATCH)
19	UNIVERSITY OF MICHIGAN	16	MOORE HOPE OPERATIONAL
18	UNIVERSITY OF MICHIGAN	15	UNIVERSITY
17	DEC (NY) GROUPED IN AIRMAIL	14	DEC (CANADA)
16	DEC (POST)	13	BOXPORO
15	DEC (POST)	12	ATOMIC ENERGY OF CANADA LTD.
14	UNIVERSITY OF MICHIGAN	11	UNIVERSITY (DISPATCH)
13	UNIVERSITY OF MICHIGAN	10	GENERAL REGISTER (DISPATCH)
	UNIVERSITY OF MICHIGAN	9	BOXPORO
12	UNIVERSITY OF MICHIGAN	8	UNIVERSITY (DISPATCH)
11	UNIVERSITY OF MICHIGAN	7	CALIFORNIA TECH.
10	UNIVERSITY OF MICHIGAN	6	DEC (NEW YORK OFFICE)
9	ATOMIC ENERGY OF CANADA LTD.	5	DEC (GROUP TO UNIV. OF MICH.) (DISPATCH)
8	GENERAL REGISTER (DISPATCH)	4	UNIVERSITY (DISPATCH)
7	BELL TELEPHONE	3	CALIFORNIA TECH.
6	DEC (POST)	2	UNIVERSITY OF CONNECTICUT
5	UNIVERSITY OF MICHIGAN	1	POST REGISTER
4	UNIVERSITY OF MICHIGAN (CENTRAL)		
3	DEC (POST)	30	CONSOLIDATED SYSTEM CORPORATION
2	ATOMIC ENERGY OF CANADA LTD.	29	SAN FRANCISCO
1	UNIVERSITY	28	GENERAL REGISTER (DISPATCH)
0	DEC (POST)	27	UNIVERSITY OF CALIFORNIA

IBM Compatible Tape System For PDP-5

The MT-24 from Potter is due to arrive July 8, 1964. Jack Smith has a Type 50 electronics which will immediately be available. Therefore, testing will commence on approximately July 13, 1964 with the 57A on the Engineering PDP-4.

The recommended price for the tape drive is based upon direct substitution of Potter MT-24 into our present cabinet and electronics for Tape Unit Type 50. The price suggested by E. Simeone was arrived at by substituting the cost of the MT-24 for the 906-II into one of the cost data sheets for a Type 50 recently manufactured.

\$ 22,800

Since the recommended selling price is not competitive, the Computer Guidance Committee must decide on a competitive price or drop the product entirely.

The estimated time to complete the project is two months. This is based upon 100% availability of personnel required (1 engineer, 1 programmer, and 1 technician).

The estimated development cost of the project for a simple tape system and associated programming is approximately \$10,000.

R. Basier

MAGNETIC TAPE - TYPE 50

(Based on job number 9438, substituting a tape drive costing \$4600 for the \$7400 unit charged to this job.)

Labor:

Sub Assembly	48.75 hrs.	118.08	
Final Test	39.75 hrs.	79.50	
Sheet Metal	15.50 hrs.	32.25	
Quality Control	1.75 hrs.	4.24	234.07

Overhead:

525.64

Materials:

1	Logic buss panel & read-write cables	584.72	
1	Control panel	270.25	
25	Modules & power supplies	884.98	
1	Cabinet & frame	359.20	
	Miscellaneous materials	137.07	
1	Tape drive	4600.00	6836.22

Total Manufacturing Cost:

\$7595.93

Suggested Selling Price:

\$22,800.00

COST OF PROJECT

Eng.	180 hrs.	10.50	1890.	
Prog.	280 hrs.	8.20	2296.	
Tech.	96 hrs.	6.15	590.	
Prod.	40 hrs.	6.20	248.	
Adv.	80 hrs.	8.00	<u>640.</u>	5664.

Materials:

Tape			500.	
Modules			800.	
Mounting & P.S.			<u>500</u>	<u>1800</u> 7464

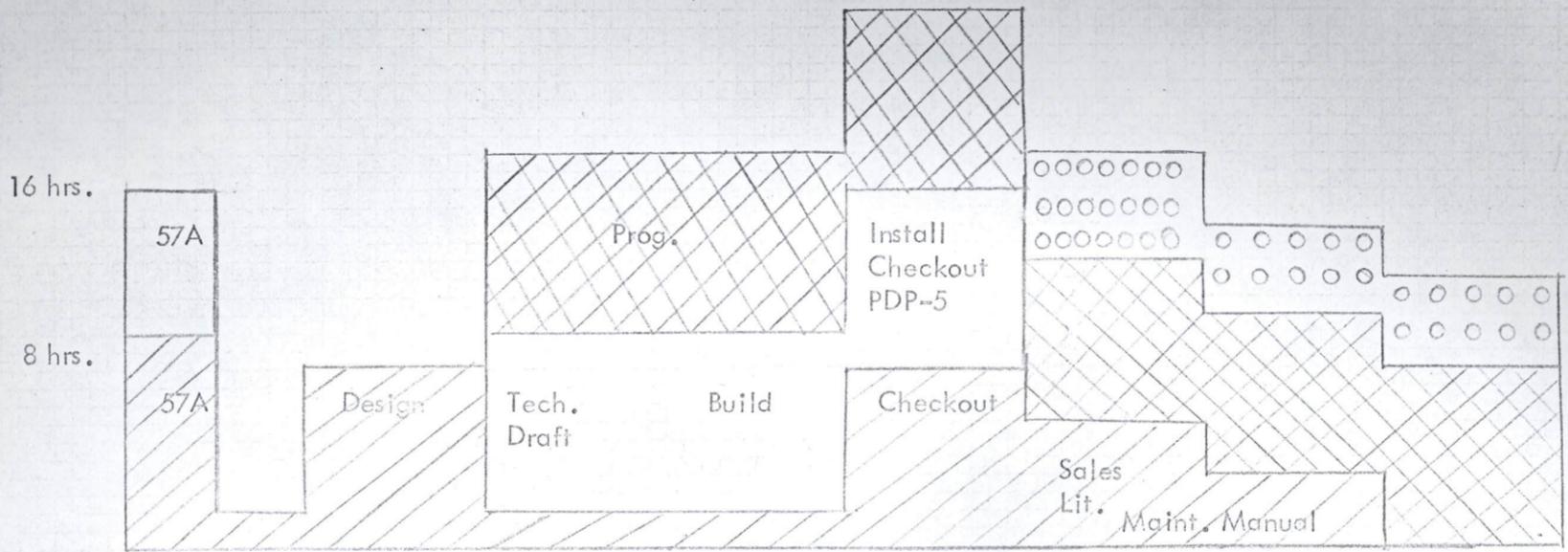
Computer Time In House:

Eng. Comp	120 hrs.			720
PDP-5	160 hrs.			480
			TOTAL	<u>\$8664.</u>

July 5

August 2

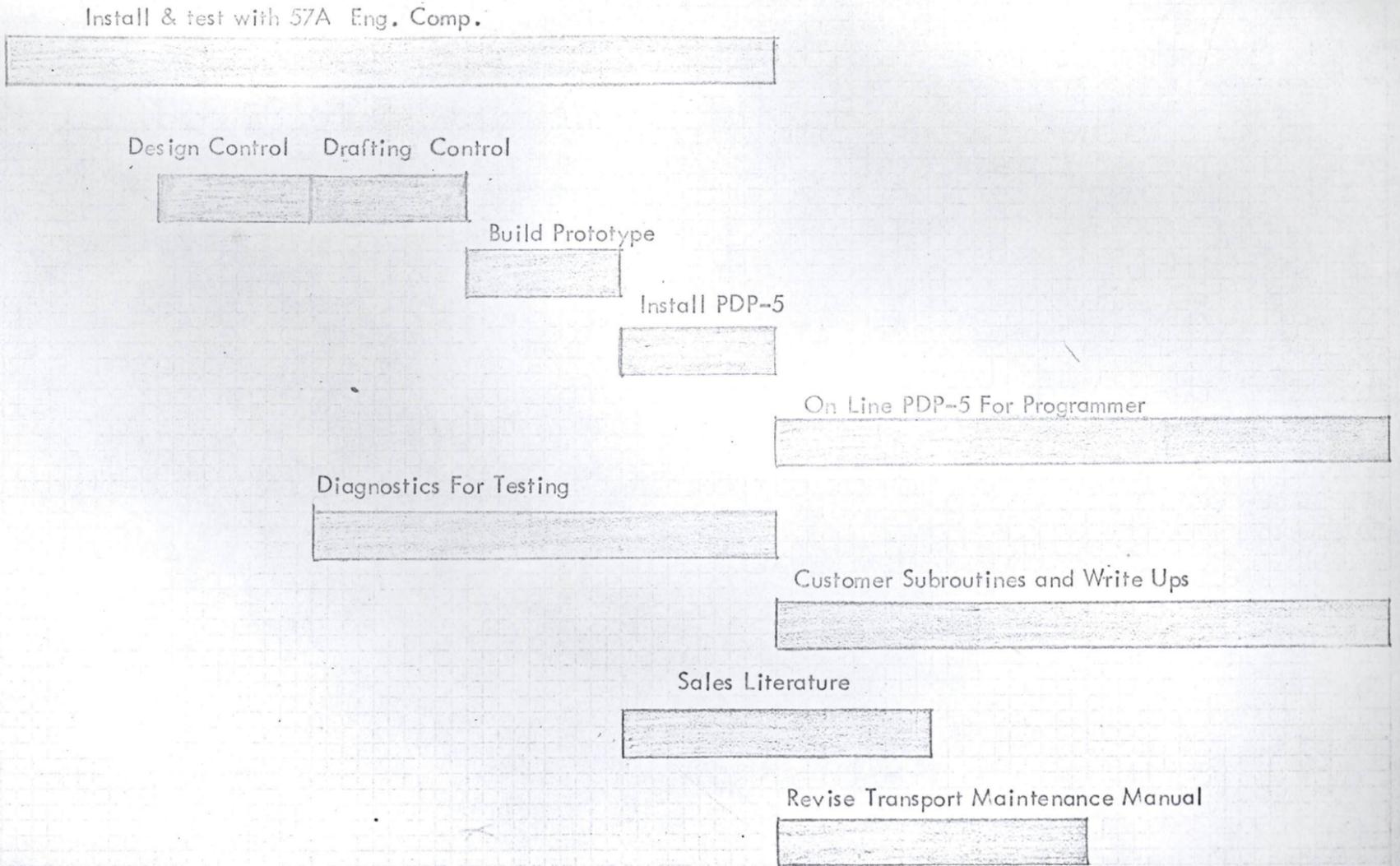
August 30



July 5

Aug. 2

Aug. 30



COVER ONE SUBJECT ONLY IN EACH LETTER

4-1414

REPLI-MEMO

FROM Ron Wilson - DEC	DEPT.-LOCATION Maynard, Massachusetts	DATE July 9, 1964
SUBJECT Paul Williams - Datronics	DEPT.-LOCATION Houston, Texas	

MESSAGE:

The Humble people as seated from your right to left were:

Charles Hubbard

Norman Crook

Bob Stanley

Me = *Paul Williams*

Jim Earthman

Paul

ORIGINATOR - DO NOT WRITE BELOW THIS LINE

SIGNED

REPLY:

Norman Crook is in charge of this group. These are the names of only the men that Paul Williams could recall the names

Paul

DEPT.-LOCATION

SIGNED

DATE

SEND PARTS 1 AND 3 WITH CARBON INTACT - PART 3 WILL BE RETURNED WITH REPLY

PRELIMINARY DESCRIPTION

Type 167 Processor:

The Type 167 Processor is designed to handle high speed input/output directly from the PDP-6 memory system. Figure 1, below, shows the relation of the 167 to other PDP-6 system components.

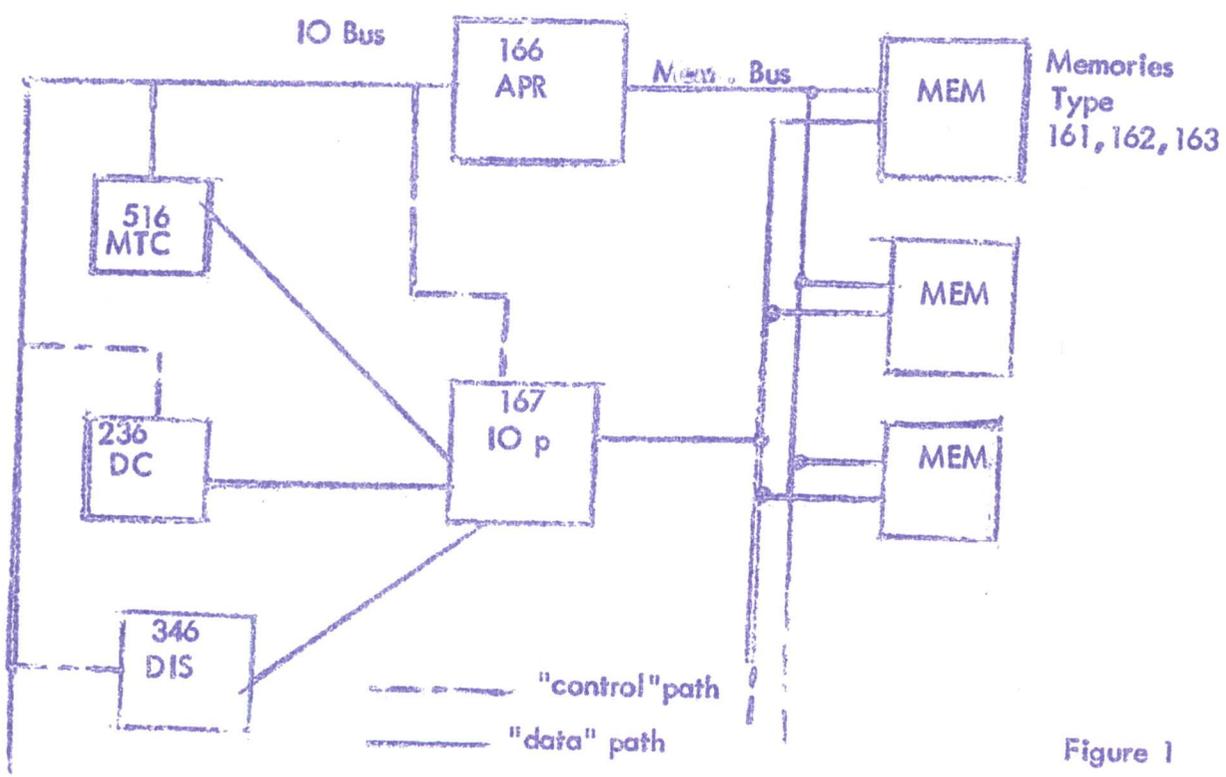


Figure 1

The 167 includes built-in memory address and word count registers, which are loaded from the 166 via the IO BUS. On output, data is passed in 36 bit words from the memory system to the 167, where it may be broken into 6, 12 or 18 bit bytes, and thence on to another IO device. On input, the 167 can assemble 6, 12 or 18 bit bytes, or take 36 bit words directly, and store them into the memory. Additional modes, to be described below, are provided for use with specialized gear. Table 1 shows maximum speeds of the 167 for different size bytes.

Byte Size	Max. Byte Speed	Max. Word Speed
6	2 mc = .5 μ sec	1/3 mc = 3 μ sec
12	1 mc = 1 μ sec	1/3 mc = 3 μ sec
18	2/3 mc = 1.5 μ sec	1/3 mc = 3 μ sec
36	1 mc = 1 μ sec	1 mc = 1 μ sec

Table 1

Maximum Speed of 167 in normal input/output mode

Figure 2, below, shows the control register of the 167. This register is accessed by CONO, CONI, CONSO, and CONSZ commands with device number 010 (IOP).

Figure 3 shows the Word Count and memory address registers, which may be accessed by DATAO, DATAI, BLKO and BLKI commands, with the IOP device number. The WC corresponds to bits 0-17 and the MA to bits 18-35. For normal block transfer operation, the WC should be loaded with the desired number of words as a positive integer, and the MA with the first core address. Actual transfer of data is controlled by the I/O device which is connected to the 167.

To initiate an action using the 167 in the normal mode, one would first load the WC and MA, then give a CONO command specifying the appropriate character mode, device, normal mode direction and interrupt channel. Next the connected I/O device would be initialized. When the requisite number of words had been transferred, the "JOB DONE" flag would come on, and an interrupt would be requested. Re-loading the WC and MA will reset the "JOB DONE" flag.

The remaining flags are: LATE CYCLE, which says that either a device could not get a byte from the 167 in time, or the 167 could not take a byte from a device in time. NON EXISTENT memory indicates that an address was referenced which did not exist. This flag is analogous to the flag of the same name in the 166.

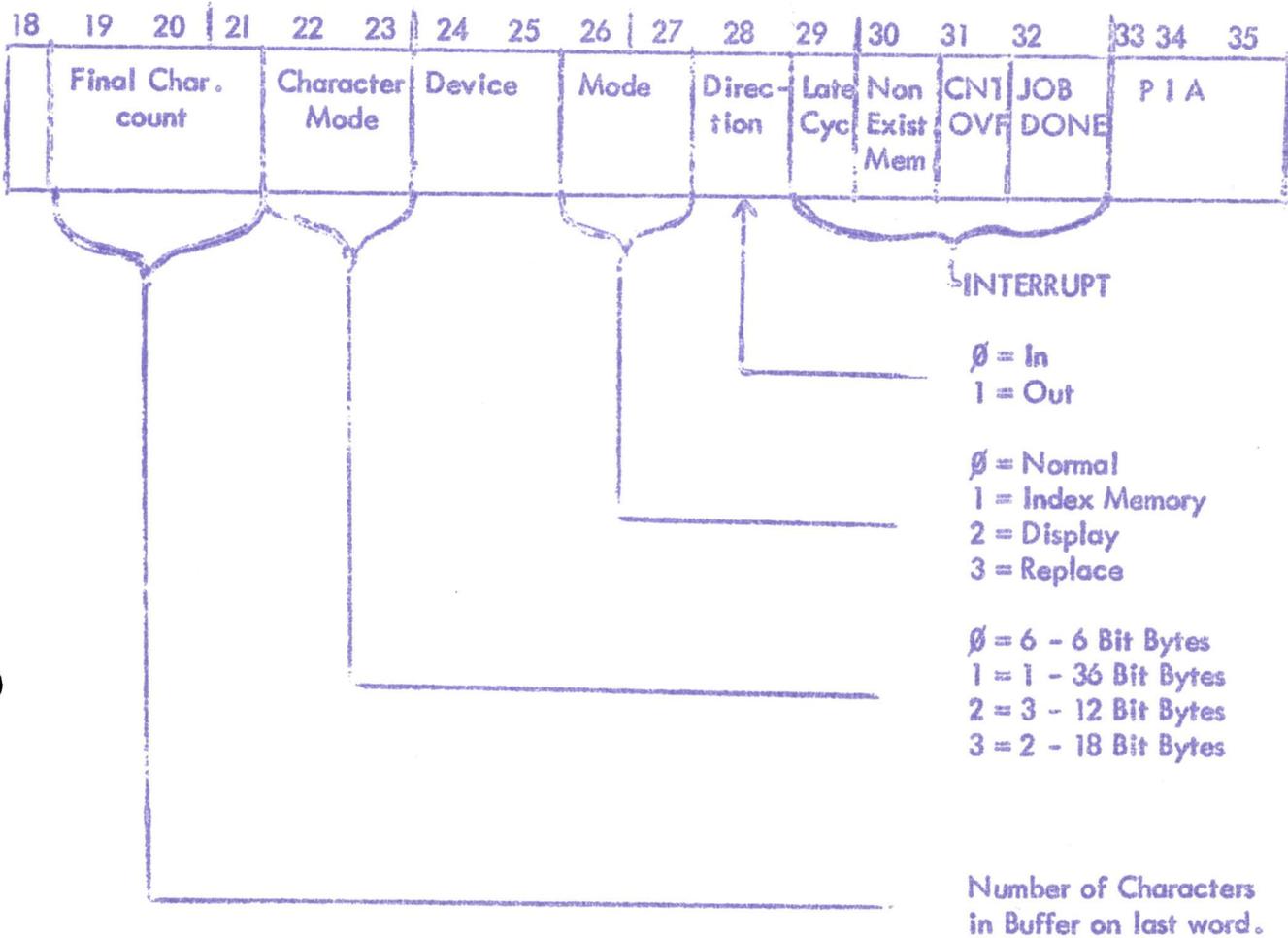


Figure 2

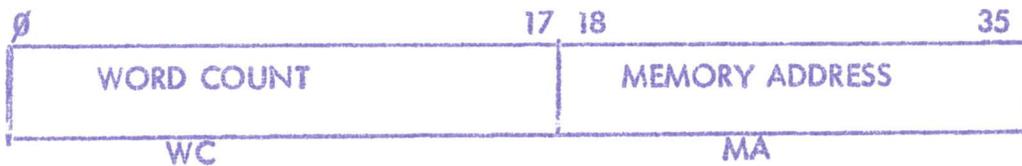


Figure 3

CNT OVF indicates that a word being indexed in the INDEX MEMORY mode just went from -1 to \emptyset .

Three special modes are provided in the 167. While some of these are designed for use with existing I/O devices, their purpose is to allow greater flexibility for future devices. In the "INDEX MEMORY" mode, the I/O device would send its own memory address to the 167's MA, and that word would be read out of memory, incremented by 1 (or some other single bit count), and written back into memory. The maximum speed of this mode is $500 \text{ KC} = 2 \mu\text{sec}/\text{count}$.

The REPLACE mode uses the WC and MA as in the NORMAL mode, but as each word is sent to the I/O device, a new word is assembled, and written back in place of the original word. In the REPLACE mode, the instantaneous character speed of the NORMAL mode is maintained, but for other reasons, 2 μsec must be allowed between successive words.

The DISPLAY mode is intended for use with the type 346 display. By use of the 167, the display can get its words directly from memory, and has a "sub-routining" ability. When in the DISPLAY mode, the 166 initializes the MA to the starting address of the display data. Data is taken from sequential locations until the display decodes one of the special commands:

- JUMP - The MA is reloaded with the ^{18 bit} ~~18 bit~~ address which follows the jump command. The next data comes from that address.
- JUMP & SAVE - The MA is saved in the WC and a JUMP is then executed.
- RETURN - The MA is reloaded from the WC.
- SAVE RETURN - The WC is stored, along with a JUMP command at the location specified by the next 18 bit byte. This does not affect normal sequencing.

The display mode operation will be better described in the appropriate document on the 346 display.

Interface Specs:

The 167 has 3 identical interface connections, plus additional connections for inputs to the MA and SR (Shift Register), and outputs from the SR. The primary interface is for 6 bit byte devices, and is identical to the corresponding interface of the type 136. Connections are made to a 22 pin Methode plug, using 18 conductor ribbon coaxial cable. Pins A, J, S and Z are ground. Pins B - H are inputs to SR 30 - 35 as negative levels. These are the data from the external I/O device.

Pins K - R are outputs from SR \emptyset - 5 as negative levels. These are the data to the external I/O device. Pin U takes the request pulse from the external I/O device, and signals that a byte is being taken or given, as determined by the DIRECTION bit. Pin V takes a pulse which will clear the character counter. Pin W, when at ground, signals that the 167 either has room for data on input, or has data available on output. Pin X, when at -3, indicates that this device is selected. Pins T and Y are reserved for future use.

The remaining connectors are for devices requiring more than 6 bit bytes.
See Alan Kotok for specs on these lines.

DISTRIBUTION ON 167 MEMO

✓ K H OLSEN
H ANDERSON
G BELL
R LANE
G MOORE
P HARRIS
H MORSE
S PINER
H HYMAN
W SEGAL
C FRAZIER
T EGGERS
N HIRST

R SAVELL
R TRINGALE
J MCKALIP
R BOISVERT
S LAMBERT
W LONG
W COLBURN
R REED
K SENIOR
D PINKNEY
R FRITH
P SAMSON

This specification is preliminary and subject to change. If you have any comments or suggestions, please notify me.

Alan Kotak

SUBJECT Cost Center Coding
Re-issue

DATE June 24, 1964
Revised July 8, 1964

TO All managers

FROM R. Dill

Effective June 29, 1964, this revised cost center list should be used. The change involves the use of numeric codes instead of Alfa codes.

The names of the cost centers have not changed as such. The new listing follows.

<u>Cost Center</u>	<u>Responsibility</u>	<u>Code</u>
Home Office Sales	S. Olsen	1
Los Angeles Sales	S. Olsen	2
Palo Alto Sales S.F.	S. Olsen	3
Washington D.C. Sales	S. Olsen	4
New Jersey Sales	S. Olsen	5
Pittsburg Sales	S. Olsen	6
Illinois Sales	S. Olsen	7
Ann Arbor Sales	S. Olsen	8
Orlando Sales	S. Olsen	9
Denver Sales	S. Olsen	10
Northwest Sales	S. Olsen	11
Texas Sales	S. Olsen	12
New England Sales	S. Olsen	13
Technical Publications	J. Atwood	14
Customer Relations	R. Beckman	15
United Kingdom	J. Leng	16
Canada	D. Doyle	17
Germany	G. Huewe	18
Japan	J. Fadiman	19
Sweden	J. Fadiman	20
Australia	R. Smart	21
France	J. Fadiman	22
Drafting	R. Melanson	23
Engineering	R. Best	24
Programming	G. Bell	25
Model Shop	G. Gerelds	26
Systems-Engineering	P. Greene	27
Test Equipment	R. Hughes	28
Computer Checkout	E. Harwood	29
Quality Control	R. Hughes	30
Mechanical Engineering	L. Prentice	31
Production Control	M. Sandler	32

<u>Silk Screening</u>	<u>M. Sandler</u>	<u>33</u>
<u>Module Assembly</u>	<u>M. Sandler</u>	<u>34</u>
<u>Final Test</u>	<u>M. Sandler</u>	<u>35</u>
<u>Maintenance</u>	<u>J. Culkins</u>	<u>36</u>
<u>Sub System Assembly</u>	<u>J. Smith</u>	<u>37</u>
<u>Sheet Metal</u>	<u>L. Prentice</u>	<u>38</u>
<u>Machine Shop</u>	<u>L. Prentice</u>	<u>39</u>
<u>General Administration</u>	<u>R. Mills</u>	<u>41</u>
<u>Purchasing</u>	<u>H. Crouse</u>	<u>42</u>
<u>Personnel</u>	<u>R. Lassen</u>	<u>43</u>

INTEROFFICE MEMORANDUM

H. Anderson

DATE: July 14, 1964

TO: H. Anderson T. Eggers P. Harris FROM: Arthur Hall
R. Savell L. Hartman G. Moore
H. Morse D. Brown G. Bell
S. Piner L. Gessel R. L. Best
H. Hyman R. Winslow A. Kotok
N. Hirst W. Kellicker W. Colburn
N. Hurley R. Beckman R. Reed
P. Samson S. Olsen R. Boisvert
C. Frazer N. Mazzaresse L. White
W. Segal R. Lane T. Strollo
R. Doane J. Sullivan S. Lambert
W. Long

Starting on Monday, July 13, 1964 I will administer the PDP-6 located on the bottom floor of Building 12. The purpose of this memo is to summarize and make explicit the conditions and agreements concerning this computer.

COMPUTER USE

Demonstrations for potential customers have first priority. As much as possible, they will be scheduled well in advance. Perry Harris will schedule all outside users. Only customers or likely customers will be accommodated and there will be no charge for the time.

Maintenance and modifications have next priority.

Scheduling is per memo from Bob Savell dated July 6, 1964. A copy of this memo is posted on the bulletin board behind the PDP-6. Call Lydia Lowe at 276 for extra copies.

Between the hours of 8:15 a.m. to 5:00 p.m. the computer will not be used for installation or debugging of new equipment. Previously-working computer options that go "down" will, of course, be worked on at any time.

MAINTENANCE

Bill Colburn will maintain the computer from 8:15 a.m. to 5:00 p.m. If Bill is not available during this time call Bob Brooks or Ken Senior (in that order).

Robin Frith is frequently available to help with computer problems between 5:00 and 11:00 p.m.

There is no maintenance coverage between 11:00 p.m. to 8:15 a.m.

I understand that a Customer Relations man named Killduff, who is presently in PDP-6 class, will, in the near future, maintain all computers on the first floor of Building 12.

Preventative Maintenance is performed daily from 8-9 a.m. More time may be required in the future.

SUPPLIES

Paper tape, typewriter paper and 120 column (13 5/8" wide) printer paper are available from Joan Cowles' office.

Check Bill Colburn for other supplies (printer, ribbon, etc.)

PDP-6 program library is maintained by Norm Hirst (ext.443). See Norm for tapes or information.

MODIFICATIONS

No modifications to any portion of the PDP-6 system will be made except through normal channels; to wit, an ECO approved by Bob Savell.

DOCUMENTATION

Sometime, hopefully in the near future, time used on this and other in-house computers will be recharged to the using Cost Center or project. For this reason and because it is important for Engineering and Field Service to know equipment usage and failure rates, log entries must be made fully and accurately for each use of the computer.

The current log form is somewhat involved and so I am proposing the attached format. Constructive comments concerning this format are welcome (call 204). Querulous complaints following printing of the new format will be given appropriate consideration.

AH/mro

H. Anderson



INTEROFFICE MEMORANDUM

DATE July 15, 1964

SUBJECT LINC

TO ALL SALES OFFICES

FROM Mort Ruderman

Our decision concerning the configuration of the LINC (Laboratory Instrument Computer) is now firm. DEC will offer the LINC as an exact copy of the MIT machine. (Originally DEC was going to call its version of the LINC the PDP-8 and use 2 standard DEC cabinets, DEC power supplies, and our own memory stack.) This means the same cabinet, power supplies, and memory.

The LINC is being offered with all documentation released by Center Development Office either duplicated by DEC or the complete set of the original documentation supplied. There will not be any programming or maintenance courses given. All existing software will be included in the documentation released and will continue to be available through Center Development Office in St. Louis. The LINC Computer delivered by DEC will be a completely assembled checked-out system. DEC will also provide a 6 month warranty with the LINC and a maintenance contract will be available after the warranty period.

The list price of the LINC of \$54,500, with a 20% education discount (which the majority of users are eligible for) reduces the price to \$43,600. This is a price that makes the LINC attractive to any potential user that might have thought of building the system himself.

The following reasons led us to the decision to market the LINC as an exact duplicate of what exists and not to offer some of the services that DEC normally makes available:

1. The logic prints, theory of operation, all software and assembly prints are being made available through Center Development Office.
2. There appears to be a very good market in there are 30 LINC's in use presently throughout the country.
3. Center Development Office is committed to continue the support of the LINC's both in hardware development and software distribution.

4. And maybe the most important is that we can market the LINC in this manner with the minimum development cost and with the minimum number of support personnel.

The main objective with the LINC and the new option available on the PDP-5 (will be explained next) is to capture the on-line biomedical market. With the LINC and the PDP-5 with the new option, DEC has now made available both to the novice in computers and to the somewhat knowledgeable researcher a machine that he is capable of using and also simple enough so he can operate and maintain the system with the price so that he can now purchase such a system.

The new option on the PDP-5 includes many of the features that the LINC has incorporated into its system. This remote unit offers the individual researcher better on-line control of both the computer and his experiment. A customer can build a PDP-5 configuration that has whatever LINC features he wants. If all the LINC features are desired then the PDP-5 would be far more expensive than the LINC which integrates all these options. Software in most situations will, however, be the determining factor. The attached sheet lists the features of this remote option. Also included with this memo is an instruction comparison of the LINC and PDP-5, specification sheet of the LINC and a list of individuals that now have LINC's.

There will be a computer bulletin available on the LINC very shortly. This will explain in more detail the system and applications. As more releases are made by Center Development Office they will be passed on.

LINC SPECIFICATIONS

The following information may be given to prospective customers:

The LINC that DEC will build will be identical to the one designed and developed at MIT Center Development Office.

Basic Specifications

Word Length	12 bits
Arithmetic	1's complement
Memory	2048 words, 8 microseconds
No. of Instructions	48, including high-speed multiply, half-word, mag. tape
Input Channels	16 analog. Converts a voltage to an 8-bit digital number and stores it in memory at a rate of about 30,000 per second. 4 digital, 12-bit. Transfer rate, 40,000 words per second
Output Channels	2 analog for displays and plotters. 1 digital, 12-bit 6 relay contacts 16 digital pulse lines
Power Requirements	1000 watts, 115 volts
Physical Size	Standard LINC Cabinet 22" X 25" X 72"

Standard System

- Console Module - Houses controls and indicators
- Terminal Module - Front panel connections for I-O
- Display Module - Mounting one small oscilloscope and controls
- LINC Tape Module - Containing LINC dual transport
- Soroban On-Line Keyboard

Averaging of Electrophysiological Responses - Acoustical stimuli were presented to an animal, and the computer averaged cortical and thalamic responses. The averaged responses, were immediately displayed and automatically stored on magnetic tape for later detailed examination.

Arterial Shock Wave Measurements - Comparative hydrodynamic measurements were made in the ventricular cerebro-spinal system in order to determine the dissipation and attenuation factors in shock waves attributable to the arterial pulse. The computer program was designed to work directly with amplifier signals from strain gauges.

In-Phase Triggering of Stimuli from EEG Alpha Wave - Simple criteria were applied to portions of EEG signals to identify and mark the occurrence of rhythmic bursts of alpha activity, and to trigger stimuli which were phase-related to the alpha wave.

Resolving a Sum of Decaying Exponentials - In a problem of compartmental analysis, a sum of decaying exponential signals was resolved into its individual components by displaying the logarithm of the waveform being analyzed and fitting a straight line to portions of the resulting curve. Using the parameter knobs on the computer, the experimenter adjusted the slope and position of a straight line, also displayed to get the best fit to the data. The component thus determined was subtracted from the original waveform and the process repeated with the remainder until all of the components were resolved.

Cursor Program - An experimental curve stored in core memory was displayed on the scope along with an adjustable cursor mark. Thus cursor designated a desired point on the curve and its location was controlled by a parameter knob. The amplitude of the point under the cursor was displayed numerically on the scope.

Processing of Single-unit Data from the Nervous System - Programs have been written to determine, from micro-electrode recordings, the times at which single neurons fired, and to calculate the distribution of intervals between successive firings. These programs can also be used to determine the distribution of firing times following the presentation of a discrete stimulus.

COMPLETE UNIT OF LINC MODULES1. Present Catalogue Units

<u>Quantity</u>	<u>Module No.</u>	<u>Unit Price</u>	<u>Total Price</u>
6	1001	\$ 32	\$ 192
8	1151	\$103	\$ 824
2	1304	\$ 88	\$ 176
3	1561	\$ 99	\$ 297
6	1571	\$203	\$ 1,218
1	1607	\$109	\$ 109
9	1669	\$ 37	\$ 233
31	4102	\$ 55	\$ 1,705
15	4112	\$ 68	\$ 1,020
14	4113	\$ 68	\$ 952
6	4114	\$ 54	\$ 324
12	4115	\$ 54	\$ 648
24	4123	\$ 59	\$ 1,416
12	4127	\$ 68	\$ 816
36	4143	\$ 56	\$ 2,016
22	4204	\$100	\$ 2,200
19	4205	\$100	\$ 1,900
6	4221	\$109	\$ 654
5	4303	\$ 91	\$ 455
1	4407	\$160	\$ 160
3	4410	\$ 39	\$ 117
12	4604	\$ 92	\$ 1,104
31	4606	\$117	\$ 3,627
5	4677	\$ 62	\$ 310
14	1914	\$150	\$ 2,100
1	1954	\$ 20	\$ 20
			<u>\$24,593</u>

2. Special LINC Modules

2	4997	\$102	\$ 204
2	4996	\$147	\$ 294
1	1784	\$266	\$ 266
2	1583	\$137	\$ 274
2	4995	\$ 99	\$ 198
3	1783	\$130	\$ 390
5	4525	\$206	\$ 1,030
1	1582	\$121	\$ 121
			<u>\$ 2,777</u>

TOTAL	\$27,370
10% Discount	\$ 2,737
	<u>\$24,633</u>
Cost of Jumpering & Marking	\$ 300
	<u>\$24,933</u>

PDP-5

LINC

AND - Logical and

TAD - Two's complement add

LSZ - Index Y and skip if zero

DCA - Deposit and clear A.C.

None

JMS - Jmp to subroutine

JMP - jmp X

CLA - Clear acc.

CLL - Clear link

CML - Complement link

RAR - Rotate right 1 place

RAL - Rotate left 1 place

RTR - Rotate right 2 places

RFL - Rotate left 2 places

None

IAX - Index A.C.

NOP - No operation

BCL - Complements Contents Y and performs logical AND with Acc.

BCO - Logical Exclusive OR

BSE - Logical OR

Uses one's complement

ADD Instructions are:

- 1. Add 16
- 2. Add to Acc. 8+
- 3. Add to mem. 16+
- 4. Link add to mem. 10+

Index and skip. Unconditional skip. Index if i = 1

- a. Store
- b. Store clear
- c. Store half

- a. Load
- b. Load - half

JMP. Store PC in O and continue X

None

Cla - Clear Acc.

None

None

ROR (n) places

ROL (n) places

Above

Above

Scale right

None

NOP - no operation

PDP-5

LINC

SPA - Skip on positive A.C.

APO - Skip on positive acc.

SMA - Skip on minus acc.

APO, i = 1 Skip on negative acc.

SNA - Skip on non-zero acc.

AZE, i = 1 Skip on non-zero acc.

SZA - Skip on zero acc.

AZE, Skip on zero acc.

.SKP - Unconditional

IDX and skip, i = 0

OSR - Or switch register

Toggle switch input

HLT - halt

HLT - halt

None

Acc. to relay

None

Relay to acc.

None

Multiply

None

Skip if AC = Y

None

Skip and rotate

None

Skip if half differs from Y

None

Skip on Sense switch

Skip on external level

Skip on external level

Skip on key

Skip on key

None

Set Y = X

None

Display character

None

Display point

None

Sample A/D

IOT

1. Pulse Output
2. Digital in-out
 - a) into AC
 - b) out AC
 - c) into mem.
 - d) out from mem.

IOT

1. Pulse output
2. Digital in-out
 - a) in AC
 - b) in mem.
 - c) out from mem.

Magnetic Tape Instructions:

- RDC - Read & Check
- RCG - Read & Check Group
- RDE - Read Tape
- MTB - Move Toward Block
- WRC - Write & Check
- WCG - Write & Check Group
- WRI - Write Tape
- CHK - Check Tape

The PDP-5 has three instructions which the LINC cannot perform as a single instruction. These are:

- a) Logical and
- b) Clear or complement link
- c) Index acc.

However, the LINC can execute these commands through groups of various instructions.

The LINC has seventeen instructions which the PDP-5 cannot perform as a single instruction.

Where the LINC has instructions comparable to the PDP-5, it may be noted that some of these are capable of operating in different modes. Such as the Add instruction:

PDP-5

TAD
None

=

3 Modes

LINC

ADD
 { Add to acc.
 Add to mem.
 Link Add to mem.

DCA
None
None

=

=

=

3 Modes

{ Store-Clear
 Store
 Store-half

The mag. tape, display and A/D are an integral part of the computer. That is, the operate commands and data for these devices are part of the logic configuration of the central processor. They are not options tacked on and operated by transfer pulses.

PRESENT LINC INSTALLATIONS

Dr. E. O. Attinger, Res. Dir.
The Presbyterian Hospital in Phil.
51 N. Thirty-Ninth Street
Philadelphia 4, Pennsylvania

Prof. Donald S. Blough
Assoc. Prof. of Psychology
Dept. of Psychology
Brown University
Providence 12, Rhode Island

Dr. C. Alan Boneau
Assoc. Prof. of Psychology
Dept. of Psychology
Duke University
Durham, North Carolina

Mr. James S. Bryan, Chief
Section on Tech. Development
NIMH/NINDB
National Institutes of Health
Bethesda 14, Maryland

Dr. J. R. Cox
Central Institute for the Deaf
818 S. Kingshighway
St. Louis 10, Missouri

Dr. Sidney Goldring
Washington University
School of Medicine
660 South Kingshighway
St. Louis, Missouri

Dr. Fred S. Grodins
Professor of Physiology
Northwestern Univ. Med. School
303 E. Chicago Ave.
Chicago 11, Illinois

Dr. Joseph E. Rind
University of Wisconsin
283 Medical Sciences Bldg.
Madison, Wisconsin

Mr. Lee Hundley
Department of Genetics
Stanford Univ. Med. School
Palo Alto, California

Dr. Keith Killam
Dept. of Pharmacology
Stanford University
School of Medicine
Palo Alto, California

Dr. John B. Lewis
Lincoln Laboratory
L-257
Lexington, Mass.

Dr. John C. Lilly, Director
Communication Research Inst.
3430 Main Highway
Coconut Grove
Miami 33, Florida

Mr. Henry Littleboy
Mass. Eye & Ear Infirmary
243 Charles Street
Boston, Mass.

Dr. George S. Malindzak
Dept. of Physiology
Bowman Gray School of Medicine
Wake Forest College
Winston-Salem, North Carolina

Lt. Charles E. Molnar
AFCRL, Hanscom Field
Bedford, Mass.

Dr. Gian F. Poggio
Dept. of Physiology
Johns Hopkins U. Sch. of Med.
725 N. Wolfe Street
Baltimore 5, Maryland

Dr. Ralph W. Stacy
Institute of Statistics
State College
Raleigh, North Carolina

Dr. Bernard Weiss
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Johns Hopkins U. Sch. of Med.
725 N. Wolfe Street
Baltimore 5, Maryland

Prof. J. Walter Woodbury
Dept. of Physiology and Biophysics
University of Washington
Seattle, Washington

Mr. James Bryan
National Institute of Health
Washington, D.C.

Prof. N.A. Coulter, Jr.
Ohio St. University Rec'g Dept.
314 Hamilton Hall
2009 Service Bldg. Rd.
Columbus, Ohio 43210

Dr. Jerome Cox
Biomedical Computer Laboratory
Washington University
St. Louis, Missouri

Prof. H. Shipton
Biomedical Electronics Dept.
State University of Iowa
Iowa City, Iowa

Dr. William Simmon
Harvard Medical School
Longwood Avenue
Boston, Massachusetts

<u>Item</u>	<u>PDP-5</u>	<u>LINC</u>
<u>Basic Usable Sys (BUS)</u>		
Core Memory	4096	2048
P.T. Reader (cps)	Yes	None
P.T. Punch (cps)	Yes	"
Card Reader (cpm)	No	"
Typewriter (cps)	Yes	Keyboard
Word Length	12	12
Cycle Time (μ s)	6 usec	8 usec
Arith. Type	2 Comp.	1 Comp.
Instn. Type	1 Word	1 Word or 2 Words
Index Registers	8 Auto Index	16
Indirect Addrng.	Yes	Via index reg. only
Multiply	Yes	Multiply
Fxd Add (μ s)	18	16
Fxd Sub (μ s)		
Fixed Mul (μ s)	2200 μ sec	100 + μ sec
Fixed Div (μ s)	3500 μ sec	None

INSTRUCTIONS

MSC CLASS

<u>Mnemonic</u>	<u>Operation</u>	<u>Time (μsec)</u>
HLT	HALT	8 μsec
CLR	CLEAR	8 μsec
MSC 13	WRITE GATE	8 μsec
ATR	ACCUMULATOR TO RELAY	8 μsec
RTA	RELAY TO ACCUMULATOR	8 μsec
NOP	NO OPERATION	8 μsec
COM	COMPLEMENT	8 μsec

SHIFT CLASS

ROL	ROTATE LEFT	16 μsec +
ROR	ROTATE RIGHT	16 μsec +
SCR	SCALE RIGHT	16 μsec +

FULL-ADDRESS

ADDX	ADD	16 μsec
STC	STORE-CLEAR	16 μsec
JMP	JUMP	16 μsec*

INDEX CLASS

LDA	LOAD ACCUMULATOR	8 + μsec
STA	STORE ACCUMULATOR	8 + μsec
ADA	ADD TO ACCUMULATOR	8 + μsec*

*Execution time: For X = 0, 8 μsec; for X ≠ 0, 16 μsec.

<u>Mnemonic</u>	<u>Operation</u>	<u>Time (μsec)</u>
ADM	ADD TO MEMORY	16 + μsec
LAM	LINK-ADD TO MEMORY	16 + μsec
MUL	MULTIPLY	104 + μsec*
SAE	SKIP IF ACCUMULATOR EQUALS	8 + μsec
SRO	SKIP AND ROTATE	8 + μsec
BCL	BIT CLEAR	8 + μsec
BCO	BIT COMPLEMENT	8 + μsec
BSE	BIT SET	8 + μsec
DSC	DISPLAY CHARACTER	112 + μsec

HALF-WORD CLASS

LDH	LOAD HALF	8 + μsec
STH	STORE HALF	8 + μsec
SHD	SKIP IF HALF DIFFERS	8 + μsec

MISCELLANEOUS

SET	SET	24 + μsec
SAM	SAMPLE	24 μsec
DIS	DISPLAY	32 μsec
ASK	INDEX AND SKIP	16 μsec
OPR	OPERATE	16 + μsec

OPERATE
 Toggle Switch Input
 Pausing
 Pulse Output
 Keyboard Input
 Digital Input-Output

<u>Mnemonic</u>	<u>Operation</u>	<u>Time (usec)</u>
	Digital Input to Accumulator	
	Digital Input to Memory	
	External Output from Memory	
SKIP CLASS		
SNS	SENSE SWITCH	8 usec
AZE	ACCUMULATOR ZERO	8 usec
AP0	ACCUMULATOR POSITIVE	8 usec
LZE	LINK ZERO	8 usec
IBZ	INTERBLOCK ZONE	8 usec
SXL	SKIP ON EXTERNAL LEVEL	8 usec
KST	KEY STRUCK	8 usec
MAGNETIC TAPE		
RDC	READ AND CHECK	
RCG	READ AND CHECK GROUP	
RDE	READ TAPE	
MTB	MOVE TOWARD BLOCK	
WRC	WRITE AND CHECK	
WCG	WRITE AND CHECK GROUP	
WRI	WRITE TAPE	
CHK	CHECK TAPE	

REMOTE OPTION FOR PDP-5

16 Channels A to D

16 IOT's

8 Pots - (A to D Control)

4, 12-Bit Digital Inputs

4, 12-Bit Switch Registers

2 D-to-A Outputs

1, 12-bit digital Output

6 Relay Contacts

16 Pulse Lines Output

Cables Extension

Scope - 561

\$16,200



INTEROFFICE
MEMORANDUM

DATE 14 July 1964

SUBJECT TWX Customer Equipment

TO R. Lane

FROM D. Smith

A TWX Customer Equipment (TWX') Model 33 KSR has been installed in the computer demo room.

The Model 33 is connected to line 07 on the 630 DCS. The Model 33 acts as a monitor.

The number is 710-347-0214. A dial is provided for originating calls.

cc: Ken Olsen
H. Anderson
S. Olsen
H. Morse
R. Best
N. Mazzaresse
G. Bell



INTEROFFICE MEMORANDUM

DATE July 15th, 1964

SUBJECT Attached--SPECIAL AGREEMENT FOR DEC EQUIPMENT RENTAL NO. 104

TO Harlan Anderson

FROM Bette M. Prebor, NYO
for Dave Denniston

In reference to Dave's telephone conversation with you before he left for vacation, I am attaching the Special Agreement No. 104 along with Mr. S. M. Ray's letter of July 14th. They have not made any changes to our suggested agreement; however, in Mr. Ray's letter he lists one addition to the agreement.

We had numbered this agreement No. 101, but in reference to a note from Judy Rougeau, I have changed the number to the correct No. 104.

Dave will return from vacation on July 20th, 1964, and he will, I am sure, wish to take the approved agreement to Bell Labs for the appropriate signature.

If we may assist in any way, let us know.

Regards,

Attach.--S. M. Ray's Letter, 7.14.64
Special Rental Agreement No. 104

BELL TELEPHONE LABORATORIES

INCORPORATED

463 WEST STREET, NEW YORK 14, N. Y.

AREA CODE 212

CH 3-1000

July 14, 1964

W. P. H. STEVENS
PURCHASING AGENT

MR. D. B. DENNISTON
Digital Equipment Corporation
1259 Route 46
Parsippany, New Jersey

Dear Mr. Denniston:

We refer to our recent conference and your letter of June 29, 1964, relative to the leasing of a PDP-5 Processor. Your lease agreement designated #104 will be acceptable to us with one additional condition which we would like added as item 4 under your heading "Exceptions and Special Conditions." It is as follows:

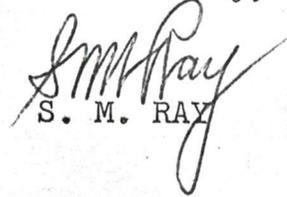
4. A. DEC shall maintain workmen's compensation insurance in accordance with applicable Federal and state laws and regulations, and employer's liability and occupational disease liability insurance in the amount of \$100,000 for each occurrence.
- B. DEC agrees to indemnify and save the Laboratories harmless from any and all claims or demands, including the costs, expenses and reasonable attorneys' fees incurred on account thereof, that may be made (1) by DEC's employees or any other person for bodily injury to persons or damage to property occasioned by the acts or omissions of DEC or its subcontractors, or agents of any of them, and (2) by DEC's employees under workmen's compensation or similar acts.

We would like five copies of the lease-agreement with the original and one duplicate to be formally signed, and the three copies for record purposes.

Mr. D. B. Denniston - 2

Your co-operation in this transaction is appreciated and we are anticipating a delivery of the equipment being specified by August 15, 1964.

Yours truly,


S. M. RAY

NY-7950-SMR-SW

DIGITAL EQUIPMENT CORPORATION

Maynard, Massachusetts

Special Agreement for DEC Equipment Rental

Name and Address of Customer

Agreement No. 104

Bell Telephone Laboratories, Inc.
463 West Street
New York, New York 10014

Digital Equipment Corporation (hereinafter called DEC), by its acceptance hereof, agrees to furnish to the Customer, in accordance with this Agreement, use of DEC

equipment listed below (hereinafter referred to as equipment), a manual of operation and instruction in the operation of the equipment.

Type	Description	Quantity	Monthly Charge Each
PDP-5	Programmed Data Processor-5	1	\$877.
Type 33	One-Line Teletypewriter	1	23.
630	4 Terminal Data Communications System	1	238.
	Extra Equipment Bay	1	20.
TOTAL MONTHLY CHARGE			<u>\$1158.</u>

Exceptions and Special Conditions

1. The labor furnished by the Customer as mentioned under the Transportation and Traveling Expenses portion of this Agreement shall be limited to any necessary movement of the equipment covered by this Agreement while it is on the Customer's premises.
2. Certification of Customer insurance should be supplied to DEC in lieu of a policy payable to DEC as specified under Insurance Coverage.
3. Due to the "customized" nature of the Type 630 Four (4) Terminal Data Communications System, the Customer agrees to purchase at least this portion of the equipment during the first year this Agreement is in effect.

Monthly charges will be invoiced on the first of each month. Payment shall be made in full within thirty (30) days after the date of invoice.

Term of Agreement

This Agreement is effective from the date it is accepted and shall remain in force, except as otherwise provided, for one (1) year from the date the first equipment is installed ready for use, and may be terminated by either party then, provided written notice is received three (3) months prior, otherwise this Agreement shall remain in full force and effect. Thereafter it may be terminated or any of the equipment may be discontinued by either party at the end of any calendar month provided three (3) months prior written notice is received.

Monthly Charges

The charges shown on the face hereof are those currently in effect. All charges are subject to change upon three (3) months notice. If the monthly charge is changed for any equipment, the Customer may discontinue it or terminate this Agreement on the effective date of such change; otherwise, the new charge shall become effective.

The monthly charges commence in each case the day following that on which each equipment is installed ready for use.

There shall be added to the above charges amounts equal to any taxes, however designated, levied or based on such charges or on this Agreement or the machines or their use, including state and local privilege or excise taxes based on gross revenue, and any taxes or amounts in lieu thereof paid or payable by DEC in respect of the foregoing, exclusive, however, of personal property taxes assessed on the equipment and taxes based on net income.

Acceptance

The date of acceptance shall become the invoice date and the beginning of the rental period described above. Acceptance shall follow the successful operation of the equipment using standard DEC test procedures applicable to the system involved. Subject

to DEC's approval, the Customer may include special test procedures and programs. The Customer must bear all costs of preparation and checking of any such special programs, and in no event can the final testing of the system be delayed by nonavailability of such special programs. Final agreement on test procedures and programs must be reached no later than thirty (30) days before scheduled delivery date of equipment.

Supplies

All supplies used in conjunction with this equipment are to be provided by the Customer and shall meet DEC specifications.

Maintenance

DEC will keep the equipment in good working order and will make all necessary adjustments and repairs. For this purpose, DEC shall have full and free access to the equipment. Charges for any repairs or replacements due to negligence of the Customer will be borne by the Customer. The required suitable electric current to operate the equipment and a suitable place of installation with all facilities as specified by DEC will be furnished by the Customer.

When the distance from the point of installation to DEC's nearest service location is greater than 50 miles, travel expenses of DEC's representatives beyond 50 miles for maintenance and repair of the equipment are to be paid by the Customer. The nearest service location for the purpose of this Agreement is _____

Insurance

During the period that the equipment is installed on the Customer's premises, the

Insurance Continued

Customer is responsible for loss or damage thereto caused by fire, lightning, sprinkler leakage, tornado and windstorm, water damage, explosion, smoke and smudge, aircraft and motor vehicle damage, earthquake, collapse of buildings or structures, strikes, riots and civil commotion, sabotage, vandalism and malicious mischief, burglary and theft. Insurance for this purpose payable to DEC shall be carried by the Customer at the Customer's expense.

Alterations and Attachments

Upon prior written authorization from DEC alterations in or attachments to the equipment may be made. If the alteration or attachment interferes with the normal and satisfactory operation or maintenance of any of the equipment in such manner as to increase substantially the cost of maintenance thereof, or create a safety hazard, the Customer will, upon notice from DEC to that effect, promptly remove the alteration or attachment and restore the equipment to their normal condition.

Transportation and Traveling Expenses

All transportation, rigging and drayage charges upon the equipment, both from and to the DEC plant, are to be paid by the Customer. Necessary packing cases for the equipment and a representative to supervise the packing and unpacking will be furnished by DEC without charge. The equipment covered by this Agreement is not to be moved to a new location without prior consent in writing from DEC. The Customer will furnish such labor as may be necessary when the equipment is in the possession of the Customer.

General

The terms and conditions of this Agreement supersede those of all previous agreements

between the parties with respect to DEC equipment rental, and such service hereafter is subject to the terms and conditions of this Agreement.

Either party may terminate this Agreement for failure of the other to comply with any of its terms and conditions.

All equipment remains DEC's property except as indicated in Purchase Option below and may be removed by DEC at any time after termination of this Agreement.

This Agreement shall be governed by the laws of the Commonwealth of Massachusetts and constitutes the entire Agreement between the Customer and DEC with respect to the furnishing use of DEC equipment. The foregoing terms and conditions shall prevail notwithstanding any variance with the terms and conditions of any order submitted by the Customer in respect of DEC equipment rental.

It is further agreed that any claim for damages against DEC arising out of failure to comply with the terms and conditions of this Agreement shall be limited to refund of rental payments and no consequential damages of any kind will be covered.

Purchase Option

The Customer may purchase at DEC standard list prices the equipment covered by this Agreement in accordance with the following conditions:

1. Three-fourths of the net rental payments made during the first year may be applied as a credit towards the purchase price of the equipment covered by this Agreement.

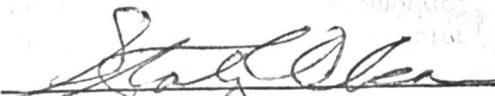
Purchase Option Continued

2. In addition, one half of the net rental payments made during the second and third year may be applied as a credit toward the purchase of the machine(s) covered by this Agreement.
3. Rental payments made after the third year do not create any credit toward purchase of equipment covered by this Agreement.
4. Notice of intent to exercise this purchase option must be given in writing to DEC while this Agreement is still in effect. This notice will become effective thirty (30) days after it has been issued. On the effective date the net amount of the option price will be invoiced and will be due thirty (30) days later. Title to the equipment will pass to the Customer at the date of invoice and this Agreement shall be terminated and no further obligations on either party shall exist.

5. All credits under this purchase option are nullified if this Agreement is terminated prior to the notice of intent to purchase being given.
6. These credits are not transferable to other DEC products.
7. The maximum purchase option credit from rental payment shall not exceed 70% of the purchase price.

Accepted by:

Digital Equipment Corporation

By 

Date 7/16/84

STANLEY C. OLSEN
SALES MANAGER

Customer

By _____

Officer's Title

Date _____

ADDENDUM A

DIGITAL EQUIPMENT CORPORATION

Maynard, Massachusetts

Special Agreement for DEC Equipment Rental

Name and Address of Customer

Agreement No. 104 Addendum A

Bell Telephone Laboratories, Inc.
463 West Street
New York, New York 10014

Per Customer's Request of July 14, the following is an addition to the Exceptions and Special Conditions of DEC's Agreement No. 104:

- 4. A. DEC shall maintain workmen's compensation insurance in accordance with applicable Federal and State laws and regulations, and employer's liability and occupational disease liability insurance in the amount of \$100,000 for each occurrence.
- B. DEC agrees to indemnify and save the Laboratories harmless from any and all claims or demands, including the costs, expenses and reasonable attorneys' fees incurred on account thereof, that may be made (1) by DEC's employees or any other person for bodily injury to persons or damage to property occasioned by the acts or omissions of DEC or its subcontractors, or agents of any of them, and (2) by DEC's employees under workmen's compensation or similar acts.

Accepted by:

Digital Equipment Corporation

By *Stanley C. Olsen*

Date 7/16/64

STANLEY C. OLSEN
SALES MANAGER

Customer

By _____

Officer's Title

Date _____

RECEIVED
1964 JUL 16 PM 1:21
DIGITAL EQUIPMENT CORP.
SALES DEPARTMENT

DIGITAL MAYN

DIGITAL WA

MSG. NO. W-71664-28

TO HARLAN ANDERSON

FROM BARBARA WHALEN

JUST RECD A CALL FROM WAYNE BROBECK AND HE ASKED ME TO TELL YOU THAT HE HAD LUNCH WITH A MR. THOMAS OF THE ENGINEERING DIV. OF GENERAL DYNAMICS IN SAN DIEGO. APPARENTLY THEY ARE INTERESTED IN A COMPUTER SIMULATOR CORRECTION THAT IS A COMPUTER FOR A REACTOR SIMULATOR AND IT IS THE SECOND ONE THAT THEY HAVE BUILT. THE FIRST WAS A BECKMAN SYSTEM. IF YU XXX YOU ARE INTERESTED FURTHER IN THIS WAYNE CAN GET YOU THE MANS PHONE NO. AND OTHER INFO. END OR GA PLS END!@J+# @@
DIGITAL MAYN

DIGITAL EQUIPMENT CORPORATION (UK) LIMITED,
11 Castle Street,
Reading,
Berks.

21st July, 1964.

MEMORANDUM.

TO: Ken Olsen.

FROM: John Leng.

Has the Company formulated any policy yet on the pricing of PDP-4's and 5's now that the 7's and 5A's are being introduced?

It seems to me that our deliveries of 4's and 5's, during this interim 6 months period before delivery on the fast machines commence, could be severely affected as customers will either wait for the faster machines or take delivery of competitors' equipment.

One suggestion is that we allow all new customers for 4's and 5's to trade them in on the 7's and 5A's when these are available. At this time we then reduce the prices on 4's and 5's by 20 - 30% say, so that we have no difficulty in parting with them. In fact, if we are still able to make them profitably at this price we should continue to market them generally.

A second suggestion is that we reduce the price on the 4's and 5's now so that they continue to sell as separate items in spite of the 7's and 5A's. It would seem reasonable to do this as we already sell a large number of our machines at 24% discount. Further our sales costs on these machines are considerably lower now that we have a good number delivered. Perhaps in these cases we could introduce a less favourable quantity discount arrangement.

There seems to me to be an advantage in continuing to market our less advanced computers, even at an artificially depressed price, because they will give us new customers, will take sales away from competitors and make it harder for them to reduce their prices and will provide future sales for ourselves as we will already have compatible machines to offer with much greater speed.

Suggested prices on these computers, with a 20% reduction say, are as follows:-

PDP-5	
4K memory, paper tape printer etc.	£ 22K
PDP - 5A	
4K memory, paper tape printer etc.	£ 30K
PDP-4	
4K memory, paper tape printer etc.	£ 52K
PDP-7	
4K memory, paper tape printer etc.	£ 72K

Continued

If one allowed a maximum discount of 15% on the slower machines we'd still be making money (I think).

I'd appreciate some firm policy on this matter as it's hard for us to decide in Europe without being fully aware of all the facts in regard to manufacturing costs etc., and we are going into the problem of customers losing interest in the 4's and 5's in favour of 7's and SDS 92's.

c.c. Mr. H. Anderson, ✓
Mr. S. Olsen,
Mr. N. Mazzaresse.
Mr. J. Fadiman.

JL/HJ.

Interoffice Memorandum

To: PDP-6 List

Date: July 22, 1964

Subject: Priority Assignments in Core Memories

From: Bob Savell

The changing of priority assignments will be made by changing of back-panel wiring from 1664 outputs instead of by unplugging and moving Memory Bus cables. This is due to the crossover problems that arise with the flat coax cable.

RES/II

H. Anderson



INTEROFFICE MEMORANDUM

SUBJECT Peripheral Equipment Ordering

DATE July 22, 1964

TO G. Moore
R. Lane
R. Beckman

FROM Bob Savell

cc: H. Anderson
G. Bell

At present, long delivery items such as Card Readers and Line Printers are ordered or in stock sufficient only to cover MAC, Brookhaven, University of Western Australia, Lawrence Radiation Laboratory, and Rutgers University. Delivery of these items can run 3 to 4 months from the vendor to us. Any systems in prospect beyond these should have Construction Requisitions released in time to order.

RES/II

H. Anderson



INTEROFFICE MEMORANDUM

DATE July 23, 1964

SUBJECT

TO H. Anderson
R. Beckman

FROM Bob Savell

Maynard Sandler and Herb Norton told me today that there are eight girls assembling 6205 modules. Each of these girls can produce one and a half to two a day. Herb will begin getting modules Thursday, July 23, at a rate sufficient to keep him up to his ears in testing. He has two testers at present and people to run them which give him the capability of turning out five to eight tested modules per day. Since Western Australia lacked only seventeen modules yesterday and five were in Herb Norton's hands at this time, the Western Australia machine should have all its modules by Monday morning at the latest.

Providing Western Australia does get all its modules by Monday morning, this means that Herb has the entire week to test 6205's for the LRL machine at a rate of five to eight a day. If we are lucky and there are no real problems the 6205's should be done by the time the machine goes upstairs on August 3. Maynard did say, however, that his best guarantee would be probably a half week late based on the fact that he might run into some problems. There are enough modules in final assembly, and Maynard assures me that the assembly is continuing at a constant rate.

My conclusions from my discussion with him and from direct questions put to him regarding the production rate are that even with complete hand assembly using the girls our production rate is sufficient to meet our one and a half machines per month quota of fifty-four 6205's per month and then some.

There is a new board layout now being finished up by Russ Doane which will allow automatic insertion of components and a third tester being built by Russ Doane which will further up the production rate.

RES/mro



INTEROFFICE MEMORANDUM

DATE July 27, 1964

SUBJECT Visit by University of Penn.

TO H. Anderson
G. Bell

FROM G. Moore

Dr. John Francis Lubin, who is the newly appointed Director of the Computer Center at the University of Pennsylvania, called to arrange a visit up here. He was one of the audience in Bob Lane's recent presentation at University of Pennsylvania. At that time, Bob suggested that he come to Maynard to talk to Harlan Anderson and Gordon Bell about PDP-6 time sharing and about long range programming plans. His forthcoming visit for that purpose is on Friday, August 7.



INTEROFFICE
MEMORANDUM

DATE July 27, 1964

SUBJECT 6th ANNUAL DEC OUTING--September 12, 1964

TO Works Committee

FROM Bob Lassen

Place - Camp Ararat

Date - Saturday, September 12, 1964

Estimated Attendance - 1600 (1963 attendance - 1400)

Attendance this year must of necessity be limited to husbands, wives and children of DEC employees. Employees who are not married will be limited to not more than 2 guests.

	<u>Estimated Cost--1964</u>	<u>Last Year's Cost</u>
Camp Ararat	\$170	\$170
Police	90	90
Bus Service	50	50
Maynard Band	200	200
Cartoon Films	25	25
Children's Rides	400	150
Food (labor & supplies)	2,800 ^{1.75}	2,400 ^{1.72}
Beverages	135	115
Pop Corn	55	50
Cotton Candy	65	60
Prizes	250	200
Rentals (tents, chairs)	100	50
Miscellaneous	<u>150</u>	<u>100</u>
TOTALS	\$4,490	\$3,660

Activities

In general, the planned activities will be similar to last year with an emphasis on a "carnival" atmosphere. This year I recommend that we have additional children's rides and possibly a "midway" of game tents. Children's rides are always popular and are useful in keeping the kids both happy and busy. In addition, I feel that we should repeat the cartoon films, pop corn, cotton candy, hay rides and the Maynard Community Band. All of

these activities were extremely popular last year.

We will also hold the usual children's contests including the egg throwing, pie eating, tug of war and sack races. Softball will be limited to the late afternoon.

Food - No menu has been planned thus far. Suggestions are welcome! We must plan on faster service possibly through the use of a tent to enlarge the present Ararat facilities.

RTL/jfr

July 27, 1964

Telegram to Bob Lane
cc: Harlan Anderson
Stan Olsen
Nick Mazzaresse

Mr. Varda is very upset because of a rumor that DEC is considering merger with Bunker-Ramo. This is foolishness. I never heard the rumor before and would never consider it. Please acknowledge your receipt of this telegram.

Ken Olsen

Telare AB
Industrigatan 4
Stockholm K, Sweden



INTEROFFICE MEMORANDUM

DATE
29 July 1964

SUBJECT
Warranty, Per Call, and Contract Maintenance of Computer
Systems
TO
Sales Personnel
Customer Relations Personnel
FROM
R. Beckman

COMPANY CONFIDENTIAL

INTRODUCTION

This memo is intended to clarify and insure proper dissemination of DEC's policies and practices concerning warranty and post-warranty maintenance of computer systems. Attached are copies of our Terms and Conditions, Per Call Maintenance services available, and Maintenance Contracts available. These are discussed and amplified below.

The following subjects are covered: warranty policy; per call maintenance policy, including comparison to corresponding IBM service; maintenance contract policy, including comparison to corresponding IBM service; policy on providing full time maintenance personnel; and application of these policies in foreign areas.

The information here reflects current DEC policy and practice. These are certainly subject to change and improvement and your comments and suggestions will be welcomed.

WARRANTIES

DEC's computer warranty as it appears in the terms and conditions is fairly typical and covers the replacement of malfunctioning parts only. No mention is made of the work required to determine which parts are at fault. It has been our practice to interpret this very broadly and to provide the trouble shooting and maintenance work required if the customer requests it. In addition, we attempt to visit every installation periodically and perform preventive maintenance in order to reduce unscheduled down time to a minimum. As our facilities and number of trained personnel increase, we hope to get to the point where the majority of the actual field service work is preventive maintenance rather than corrective maintenance. The objective, of course, is to insure that the customer gets efficient, reliable service from his equipment. This will result in the customer coming back to us for additional equipment and will help to convince other prospects that they should use our computers. In addition, the type of maintenance a customer receives during the warranty period has

a significant effect on his interest in our maintenance contract once his warranty has expired.

Obviously we intend to do much more than the written warranty itself implies. We do not, however, want to put all of this in writing for quotation and proposal purposes. The situation is analogous to our policy of free repair of modules. We repair modules as a standard practice and our module customers (and many of our computer customers) know this, but we do not want to reduce it to any sort of formal written obligation.

While written quotations and proposals should include a copy of terms and conditions and let that cover the question of warranty, it is appropriate to discuss the subject with a potential customer on an informal basis. The customer can be assured that we are prepared to help him in any way we can. In general, we treat warranty maintenance like Plan 1 maintenance contracts (described below) with the exception that we do not charge for after hours work. It should also be pointed out to the customer that he will be billed at our per call rates for any maintenance work that is clearly the result of damage caused by the customer, or failures in system components that are not supplied and warrantied by DEC.

PER CALL MAINTENANCE SERVICE

Attached is a description of our policy on per call maintenance charges. "Per call" refers to maintenance work that is not covered by a warranty or a maintenance contract.

Note that the hourly charge is independent of the number of personnel working during that particular call. It is very seldom that a particular maintenance problem will require more than one person, but as part of the training of new field service personnel, we often send a new man along on a service call to assist and learn from the man actually performing the maintenance. This is an important part of the field service training and in the long run is to the customer's benefit and to our benefit. Most customers, however, would object to being charged an hourly rate for what they would consider an untrained and inefficient maintenance man.

The hourly charge applies only to the actual time spent working on site and is fixed regardless of the time of day during which the work is performed. In other words, we do not charge for the travel time going to and from the customer's site, and we do not charge extra for what would normally be overtime work.

COMPANY CONFIDENTIAL

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The majority of per call maintenance work is done within a 50 mile radius of the office providing the service (the proportion will increase as we expand and get more maintenance people into field offices). As a result, many calls are handled on the basis of a man going from one place to another rather than from and back to the office. Determining actual travel time spent as a result of any one customer's call can be a time consuming and expensive process. As far as after hours work is concerned, our normal practice is to receive trouble calls only during normal working hours, but once the work has started it continues as long as is practicable or necessary. Establishing a flat rate that does not apply to travel time and is constant regardless of the actual hours worked is a convenience both to the customer and to DEC. The rate itself has been established taking these various factors into account and at the present time is considered to be equitable to both DEC and the customers.

It is interesting to compare our per call maintenance with that provided by IBM. At first glance their rates seem better than ours but when you dig into it deeper and take everything into account, it usually turns out that we are providing more at equal or less cost. Of course, where IBM really has us is the fact that they have roughly five times as many maintenance people (just for computer equipments) as we have total employees. As a result, they (relatively speaking) can blanket the country and can claim closer facilities and faster response. At the same time, several of our customers have told us that they get faster response and better service from a DEC office 200 miles away than they do from an IBM office 30 miles away.

IBM's basic hourly rates are \$14.50 during regular working hours, \$19.00 outside regular working hours and \$21.00 on Sundays and holidays. On the average it looks like our rate is a little bit higher, but IBM charges portal to portal and the customer pays these rates for the time the man is traveling from his office to the customer's site and back again. As a result, for the same job our charges would usually be a little bit less. In addition, IBM's charges are on a man-hour basis. If two men go on a call during normal working hours, the customer gets charged \$29.00 an hour for the total time from the IBM office to the customer's site, fixing the equipment, and back to the IBM office.

MAINTENANCE CONTRACTS

Attached is a description of the two maintenance contract plans we offer.

Maintenance is not DEC's primary business. Maintenance work must show some profit in order to continue providing the service, but the real profit in maintenance contracts is the continuing contact with the customer and the opportunity to insure proper operation of the equipment.

From the customer's point of view there are many advantages to a maintenance contract. First, is the fact that the contract provides for regular preventive maintenance for his system. Proper preventive maintenance will invariably improve the performance of the system and will reduce and even eliminate unscheduled down time due to component failures. A DEC maintenance contract provides the customer with trained, experienced maintenance personnel who work full time on nothing but DEC supplied equipment. This further reduces down time due to system failures by reducing the time required to locate and correct a fault. In addition, changes in maintenance personnel do not result in costly and time consuming retraining on the part of the customer. The burden of such training is borne by DEC and in the event of changes in the DEC maintenance personnel involved, sufficient overlap is provided to insure continuity of service. Since the maintenance contract covers all parts that might be required it is, in effect, an insurance policy that covers the customer for catastrophic failures in his system. The maintenance contract covers all expenses (including travel and living expenses), which allows the customer to accurately predict what his maintenance costs will be. To the majority of our customers this is an important point since they can usually arrange for allocation of a fixed amount per year much more easily than they can get an open-ended fund to cover maintenance on a per call basis.

The percentage method of calculating maintenance contract charges was adopted to simplify the process and to minimize the cost (both time and money) of administering the contracts. Obviously, a fixed percentage is more than adequate in some cases and inadequate in other cases when considering specific pieces of equipment. On a system basis, however, the percentages represent reasonable averages. The advent of the PDP-5 required the establishment of the \$2400 minimum. The minimum amount represents average expenses for the bi-monthly preventive maintenance work plus a fudge factor to cover parts replacement and some unscheduled maintenance calls.

The printed form indicates that the minimum charge for either plan is \$2400. This is an error; it was not a printing error, it was my error. At the time the minimum charge was established it was decided that the \$2400 was appropriate in both cases. Since that time consideration of specific cases have proven that it is unworkable. The minimum charge for Plan 2 contracts has been increased to \$4000 per year. New sheets with this correction will be made available and in the meantime the present sheets can be used with a pen and ink correction to the Plan 2 minimum charge.

The provision in Plan 1 for additional charges for travel time outside normal working hours is not rigidly enforced. It was included primarily to discourage unnecessary requests for after-hours work. Within reason, we will do some after-hours work without extra charge, but we don't make any promises to the customer in this respect. Our usual practice is to continue work once started in order to get the system back on the air. This provision for extra charges does not apply to the travel time required to get to remote installations

Note that the description of maintenance contracts does not obligate us to enter into a contract if we don't want to; for example, we will not write Plan 2 contracts for those locations where several hours of airline travel time are required. In these cases the customers probably won't want Plan 2 contracts because the only really significant difference between Plan 1 and Plan 2 is response time to trouble calls. When airline travel is involved there can seldom be any significant difference in response time between a call at midnight and a call at eight o'clock the following morning. Under these circumstances, and in the best interest of the customer, it is the company's right and duty to refuse to enter into such a contract. In effect, this restricts the writing of Plan 2 contracts to those installations that are within reasonable driving distance of offices that have permanently assigned maintenance personnel.

As in the case of per call maintenance it is interesting to compare our services and charges to those offered by IBM. The IBM contracts cover all parts and labor just as ours do. They have varying charges depending upon the hours of coverage desired, but they have a much more detailed (and complicated) breakdown than our simple two-plan system.

COMPANY CONFIDENTIAL

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IBM makes no specific commitments in regard to preventive maintenance. PM's are an important part of our maintenance philosophy. What we're really shooting for is to see happy customers once every other month instead of seeing irate customers every other day.

Our contracts cover all transportation and living expenses, whereas IBM charges extra for transportation and living expenses outside a fifteen mile radius from the office. IBM has enough people spread around in enough places that this is an academic point for the majority of their customers. Our contracts are figured to include transportation charges for two reasons. One is the previously noted fact that it's usually easier for the customer to arrange for a fixed amount for maintenance. Second, charging transportation separately in each case would put us in the awkward position of essentially telling a potential computer customer that if he buys our equipment it will cost him more to have it maintained because we're a small company and he doesn't happen to be close to one of our offices. The other side of the coin, of course, is that the local customer may feel that he is paying extra to help subsidize travel to remote locations. The answer to that one is that the local customer enjoys shorter response time and gets a little bit more attention just because he is local and can get hold of us easier.

IBM's method of figuring maintenance contract charges is completely different from ours. They establish a dollar amount per month for each specific type of equipment. The dollar amount refers to one shift, Monday through Friday maintenance. Anything beyond the basic maintenance involves an additional charge that's figured as a percentage of the basic charge. The table of percentages is so long and there are so many possible combinations that they must use a 7090 to figure out how to quote a maintenance contract. To get twenty-four hour, seven day a week service corresponding to our Plan 2 you start with the basic monthly charge; add 60 per cent for twenty-four hours, Monday through Friday; add another 15 per cent for twenty-four hours on Saturday; and another 18 per cent for twenty-four hours on Sunday.

The basic monthly rates that IBM has established reflects what we all know; that some things are easier to maintain than others. The rates for central processors are much lower, for example, than the rates for things like mag tapes and line printers. Some examples are given below. For purposes of comparison to our rates the monthly charges used by IBM have been converted to a percentage of the selling price of the item involved. Keep in mind that our Plan 1 charge is 3 per cent and our Plan 2 charge is 5 per cent.

COMPANY CONFIDENTIAL

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729 Mod. VI Mag Tape Units; Plan 1 type maintenance 4 per cent per year and Plan 2 type maintenance 7.72 per cent per year. 1401 Central Processor with 4K memory; Plan 1 type maintenance 0.62 per cent per year and Plan 2 type maintenance 1.2 per cent per year. A line printer; Plan 1 type maintenance 5.6 per cent per year and Plan 2 type maintenance 10.8 per cent per year.

A system consisting of a 1401, a 1402 Card Reader and Punch, a 1403 Line Printer, and two 729 Mag Tapes; Plan 1 type maintenance 2.5 per cent per year and Plan 2 type maintenance 4.86 per cent per year.

Note that while individual items vary tremendously, the total for a typical system comes out quite close to what our charges would be. This indicates that with two completely different approaches we wind up with, on the average, essentially the same results. There are, of course, advantages and disadvantages to both methods. The straight percentage method has the advantage that it is easy to use and easy to apply to new devices on which you have little or no operating information. It has the disadvantage that it depends on a pretty good overall mix of various equipments to average out to the proper amount. The specific amount method removes the problem of unusually large concentrations of high failure rate items. It does, however, require a fair amount of past history on which to base rates; it makes it much more difficult to establish (and quote to customers) the charges for a new item; and it would require constant, detailed review and revision of rates.

Our rates (and the method of calculating the rates) are, of course, open to review and revision. As we gather and analyze data on maintenance costs we will get a better feel for just what the contract charges should be.

FULL-TIME, ON-SITE MAINTENANCE PERSONNEL

We occasionally get requests from customers and potential customers for maintenance personnel to be assigned to work full time on their installation. We're really not geared up to provide this, but it could be done on the basis of hiring the necessary personnel for the specific job. Each specific case has to be considered in order to provide a firm quote, but the following figures can be used as an estimate. For one-shift maintenance corresponding to Plan 1 the charge per year would be \$25,000 or three per cent of the value of the system, whichever is greater. For twenty-four hour service corresponding to Plan 2 the charge per year would be \$75,000 or five per cent of the system value, whichever is greater.

COMPANY CONFIDENTIAL

-8-

APPLICATION IN FOREIGN AREAS

At the present time the policies and charges described above apply in all areas.

It is recognized that some variations in the present arrangements may be required in different countries. Comments and suggestions from the people concerned in the various offices would be helpful. In particular, information is required in regard to appropriate labor rates and geographical limitations.

CONTRACT FORMS

A formal maintenance contract form was drawn up some time ago, but so far there has been no requirement to reproduce it in quantity. All of our contracts to date (which are presently bringing in about \$4000 per month) have been either government contracts on their forms or simply purchase orders that reference the description sheet and quotation letters.

Detailed quotation and negotiation of maintenance contracts is handled by Customer Relations. The greatest single factor in selling maintenance contracts is, of course, the field service man himself, and the impression the customer has of our maintenance services. Salesmen in the field can be a big help in selling contracts and we will issue periodic notices of warranty expiration dates on the various installations in specific areas.

Contact Bob Beckman, Jack Shields, Steve Mikulski, or Alan Ross, for additional general information or to prepare a specific quotation on maintenance contracts.

TERMS AND CONDITIONS OF PRICE QUOTATIONS

The following Terms and Conditions apply to the attached quotation unless specifically modified within the letter of transmittal.

- A. Prices quoted herein shall remain in effect for sixty (60) days from the date of this quotation.
- B. The prices quoted herein are f.o.b. Digital Equipment Corporation, Maynard, Massachusetts, and do not include Federal Excise Taxes or any applicable state and local taxes, any insurance costs, or any foreign taxes, including tariffs, customs duties or any exporting or importing taxes.
- C. All invoices are due and payable thirty (30) days after invoice date. Payment must be in United States Dollars.
- D. All transportation costs and any special packing or installation costs involved with the delivery of the equipment quoted herein from Maynard, Massachusetts to location of installation will be paid by the customer.
- E. Any modifications to the equipment or terms specified herein may cause extensions of the delivery dates and/or increases in the quoted prices.
- F. All of the equipment quoted herein is guaranteed to be free from design and manufacturing defects for a period of six (6) months following the date of delivery and/or acceptance (see below). Any component which fails during this period will be repaired or, at DEC option, replaced. This warranty does not cover components which have been modified without DEC approval or which have been subjected to unusual physical or electrical stress. Upon expiration of the warranty, system maintenance service is available from DEC on a contract or per call basis.
- G. The date of acceptance shall become the invoice date and the beginning of the guarantee period described above. Acceptance shall follow the successful operation of the equipment using standard DEC test procedures applicable to the system involved. Subject to DEC's approval, the buyer may include special test procedures and programs. The buyer must bear all costs of preparation and checking of any such special programs, and in no event can the final testing of the system be delayed by nonavailability of such special programs. Final agreement on test procedures and programs must be reached no later than thirty (30) days before scheduled delivery date of equipment.
- H. Any standard options, to be added to a system after delivery, will be charged for on the following basis:

Total selling price of added equipment plus 5% to cover field installation costs. These installation costs are to be not less than \$200 nor more than \$5,000.

In addition, all applicable travel expenses for person(s) making the installation will be paid for by the customer.

DIGITAL EQUIPMENT CORPORATION

FIELD MAINTENANCE SERVICES AVAILABLE

PER CALL BASIS

Digital Equipment Corporation offers field maintenance service for PDP computers and associated equipment upon expiration of warranty, on a per call basis.

The services discussed here are available anywhere within the continental limits of the United States. At the present time, DEC service centers are located at 146 Main Street, Maynard, Massachusetts; 8939 Sepulveda Boulevard, Los Angeles, California; 2450 Hanover Ave., Palo Alto, California; 1259 Rt. 46, Parsippany, N.J.; 1430 K St. N.W., Washington, D.C.; 1301 Richmond Road, Ottawa, Ontario, Canada; 910 North Busse Highway, Park Ridge, Illinois; 300 Seco Road, Industrial Park, Pittsburgh, Pennsylvania; South Melbourne, Victoria, Australia; 8 Munchen 22, West Germany; and Paris, France.

Maintenance work performed on a per call basis is subject to the following charges:

1. \$20.00 per hour of actual on-site work (minimum charge, \$20.00).
2. Transportation at \$.10 per mile (automobile or actual cost of commercial transportation).
3. Cost of replacement parts.
4. Additional charges for installations in Area 2.
 - a. \$20.00 per day (including travel time).
 - b. Minimum charge \$100.00 plus transportation.

NOTE:

AREA 1 - Within a 50 mile radius of a DEC Service Center.

AREA 2 - Locations more than 50 miles from a DEC Service Center.

H. Anderson

INTEROFFICE MEMORANDUM

SUBJECT: General Information

DATE: July 31, 1964

TO: PDP-6 Distribution List

FROM: Bob Savell

During the period between August 1 and August 16 I will be away on vacation. All PDP-6 ECO's and any new production drawings will be signed by Alan Kotok in my absence. Commencing August 17, both Alan and myself will approve all PDP-6 ECO's. Engineering problems arising during this period should be referred to Gordon Bell or Alan Kotok.

From now on any Production problems arising related to production of PDP-6 systems for MAC, Brookhaven, etc., should be referred to R. Beckman or A. Ross of Customer Relations as it is their responsibility to supervise and coordinate the activities of PDP-6 System Project Engineers and the production of PDP-6 systems.

Problems related to use or operation of the PDP-6 Prototype should be referred to A. Hall, except for routine service calls.

RES/mro



INTEROFFICE MEMORANDUM

DATE June 1st, 1964.

SUBJECT On Foreign Operations

TO Jon Fadiman

FROM D. J. Doyle

cc: ~~Ken Olsen~~
Harlan Anderson ←
~~Stan Olsen~~
Dick Mills
John Leng

The Canadian company should provide many of the answers to the questions posed in your memo of May 20th. Its first full year of operation (which ends on June 30th) will provide a sales volume slightly greater than 600,000 Canadian dollars. No real attempt has been made to measure our efficiency, but the following points should be noted:

1. From the beginning we took on a very large share of our own accounting and business responsibility. This is a course of action which is not very comfortable, but I can recommend strongly. The inefficiency is insignificant compared with that which would result if all foreign administration is carried out from Maynard. The latter method would require a completely separate accounting and office staff probably under the direction of international sales. The payment of foreign salaries, income taxes, unemployment insurance, workmen's compensation, the collection of foreign sales taxes, the conversion of currency, quoting and invoicing on sales, delivery follow-up, etc., are functions which can best be done in the foreign country.

What this means is that each foreign operation really becomes a miniature version of Maynard and all of the Maynard support facilities are not available to it as they are to the U.S. branch offices. Any attempt to make them available would result in extra manpower at Maynard greater than that which would be required "on-site".

The Canadian company now keeps two girls very busy, and the paper work is still kept to an absolute minimum. For example, we are now being asked to quote F.O.B. Ottawa in some cases and we will adopt this as a general policy shortly - this will mean that we must get into the business of clearing shipments through customs, arranging for transshipment and keeping account

June 1st, 1964.

of shipping charges etc. Shipping goods "customer to clear" is most unsatisfactory and often involves two weeks delay due to the customers' own fumbling.

What has been said so far is that a foreign operation requires a lot of paper work for smooth operation, and little can be handled from Maynard, U.S. sales expense figures are therefore not applicable in measuring foreign efficiency.

2. The question of how much help do we really get from Maynard should be considered. The U.S. sales machine is available to us in the form of humans who will travel, and in the form of advertising material, which is mailed to the customer. The actual number of sales trips to Canada has been less than six, with at least as many more being done for installations. (As of now, a certain portion of the installation and warranty work is being done by an employee of the Canadian company.) The Canadian mailing list contains 600 names out of the 25,000 total.

Unlike the accounting question, the Maynard facilities are at our disposal when it comes to sales, but the ultimate aim must be to provide as much help as possible from the foreign company itself. As of August, the Canadian company will be equipped to handle any conceivable sales situation and will conduct its own programming classes on a regular basis.

There is no sensible reason for doing our own advertising, although more foreign identification will have to accompany the literature from Maynard in the future.

What this section has said is that whatever the foreign burden to the U.S. sales force, be it 50% of the 12% sales budget or whatever, a well equipped foreign operation will remove a large load from customer relations by handling its own maintenance and installations.

3. To summarize therefore, a properly operated foreign subsidiary cannot be considered as an extension of the sales department, either from a cost or management point of view. It is really

June 1st, 1964.

a small octopus and several cost figures would enter into the establishment of a discount structure. The ideal situation would be to have the subsidiary treated as just another customer and this is very much how the large U.S. corporations treat their Canadian counterparts.

If the question of discount structures is in fact urgently important, I would like to sit down and go over the arithmetic with someone. The same rule will not apply to all subsidiaries, since some will become manufacturers and others will not, and some will take on more of their self-government than others.

DJD:LMM

D. J. Doyle.

H. Anderson

INTEROFFICE
MEMORANDUM

DATE June 3, 1964

SUBJECT 2 μ sec Memories

H. Anderson	J. McKalip
R. Best	A. Kotok
E. Harwood	T. Strollo
R. Frith	R. Lane

FROM Robert E. Savell

In order to insure that PDP-6 system deliveries are not held up it will be necessary to supply tested 16K 2 microsecond memories to Computer Check-out according to the schedule below. These will probably all be of the present design.

Responsibility for ordering early enough and producing to this schedule rests with Jim McKalip.

MAC	A.S.A.P.	probable date July 15-22
Brookhaven	July 1	probable date August 15-22
Univ. of W. A.	Sept. 1	
Inventory	Sept. 1, Oct. 1	

RES/II



INTEROFFICE
MEMORANDUM

DATE June 2, 1964

SUBJECT Visit by Brookhaven Engineer

TO R. Savell N. Mazzaresse FROM Gordon Bell
A. Kotok ✓ H. Anderson
R. Lane R. Beckman

Howard Pate will be here Monday-Wednesday, June 8-10 to ask questions about PDP-6 hardware so that Brookhaven can connect equipment to it.

~~Tom~~ Stollo, the project engineer, will not be here and as such I have asked Howard Pate to contact Bob Savell when he arrives.

GB/II

INTEROFFICE MEMORANDUM

DATE June 2, 1964

SUBJECT

TO

R. Hughes
J. Cudmore
K. Olsen
✓ H. Anderson

R. Best
M. Sandler
D. White

FROM

Arthur Hall

A request from Foxboro for some measure of module reliability led me to explore the matter yesterday with Jim Cudmore.

It is my understanding that we do not currently have any figures derived from the raw information which reveal either relative or absolute reliability of our modules.

We know how many modules have been submitted for repair but not how many required repair nor how many were in use and thus liable to possible trouble.

At the very least, I would suggest that we find out for all module types currently in production what percentage of each module type manufactured (since some date) have required repairs.

I do not see the utility of recording (as I believe we currently do) only the absolute totals of modules submitted for repair.

AH/II

Mr. Lee Ware	DECEO
Mr. Ted Knight	DECEO
Mr. M. Thompson	Western Union
Major William Clay	Contracting Officer - USAMA, Philadelphia
Mr. William Chadwell	DECEO
Mr. Paul Hachigian	ITT
Mr. Matthew Tutino	ITT
Mr. R. A. Leonard	ITT
Dr. Friedman	ITT
Mr. Kenneth H. Olsen	DEC
Mr. Harlan Anderson	DEC
Mr. Robert Lane	DEC



INTEROFFICE MEMORANDUM

DATE June 4, 1964

SUBJECT Rental Discussion Minutes

TO Kenneth Olsen
Harlan Anderson ✓
cc: Win Hindle
Dick Mills
Dick Best
Stan Olsen

FROM Dave Packer

It was decided to offer rental terms to the following potential PDP-6 customers:

1. Adams-Keydata
2. University of Arizona
3. Lockheed (Georgia)

Terms will be based on a monthly rate of about 1/30 of price.

Boston College has been offered a time payment plan for a PDP-6.
Terms are: 5 year period with 6% interest on outstanding balance.

Dick Mills will pull together rental information as a first step toward development of a standard rental policy.

DP:ncs

dec

INTEROFFICE
MEMORANDUM

DATE June 2, 1964

SUBJECT Films for Australia

TO Jack Atwood
cc: Jon Fadiman and Bob Lane

FROM Harlan E. Anderson

Several weeks ago I asked you if you could make arrangements to borrow the Air Force film on the Psychology Laboratory at Bedford and the Sketchpad Film for use by the University of Western Australia. Have you had any success on this so far?

Andy

Sketchpad shipped to Ron for 5/25 meeting at Perth. Psych Lab film requested at same time but still not fixed loose from official reel tape.

Tuck



INTEROFFICE MEMORANDUM

DATE June 4, 1964

SUBJECT Reliability Information

TO A. Hall
R. Hughes
K. Olsen
R. Best
M. Sandler
D. White
→ H. Anderson

FROM Jim Cudmore

Arthur Hall's request for reliability information has prompted me to change the record keeping system of module repairs.

The raw data to obtain % of module repairs by type is available. This information must however, be manipulated to get the actual results requested.

Enclosed is a copy of the form to be used for each module type presently being manufactured.

Unless absolutely necessary, the conversion to the use of this form will be gradual and take several months.

INTEROFFICE MEMORANDUM

SUBJECT: Microtape Protection

DATE: June 4, 1964

TO: PDP-6 List, PDP-6

FROM: Harris Hyman

There are three classes of Microtape reels in the cabinet on the PDP-6.

RED STICKERS: These should have the users initials.
Use these reels with write lock only.

OTHER STICKERS: Free reels

NO STICKERS: No timing and mark tracks.

HH:fw

H. Anderson



INTEROFFICE
MEMORANDUM

DATE June 12, 1964

SUBJECT Proposed Cost Center Coding

TO Works Committee

FROM W. Hindle
R. Mills

We would like to discuss the following cost center list at the Works Committee Meeting next Tuesday.

- Sales 0 - 29
- International Marketing 30 - 49
- Engineering 50 - 69
- Manufacturing 70 - 89
- Administration 90 - 100

<u>Cost Center</u>	<u>Responsibility</u>	<u>Code</u>
Home Office Sales	S. Olsen	01
Los Angeles Sales	S. Olsen	02
Palo Alto Sales	S. Olsen	03
Washington D.C. Sales	S. Olsen	04
New Jersey Sales	S. Olsen	05
Pittsburg Sales	S. Olsen	06
Illinois Sales	S. Olsen	07
Ann Arbor Sales	S. Olsen	09
Orlando Sales	S. Olsen	10
Denver Sales	S. Olsen	11
Northwest Sales	S. Olsen	12
Texas Sales	S. Olsen	13
New England Sales	S. Olsen	14
Technical Publications	J. Atwood	28
Customer Relations	R. Beckman	29
United Kingdom	J. Leng	30
Canada	D. Doyle	31
Germany	G. Huewe	32
Australia	R. Smart	33
France	J. Fadiman	34
Drafting	R. Melanson	50
Engineering	R. Best	51
Programming	G. Bell	52
Model Shop	G. Geraldts	53
Systems - Engineering	P. Greene	54
Test Equipment	R. Hughes	55
Computer Checkout	E. Harwood	56
Quality Control	R. Hughes	57
Mechanical Engineering	L. Prentice	58

<u>Cost Center</u>	<u>Responsibility</u>	<u>Code</u>
Production Control	M. Sandler	70
Silk Screening	M. Sandler	71
Module Assembly	M. Sandler	72
Final Test	M. Sandler	73
Maintenance	J. Culkins	74
Sub System Assembly	J. Smith	75
Sheet Metal	L. Prentice	76
Machine Shop	L. Prentice	77
Small Module Production	M. Sandler	78
General Administration	R. Mills	90
Purchasing	H. Crouse	91
Personnel	R. Lassen	92



INTEROFFICE MEMORANDUM

SUBJECT Brookhaven Laboratories

DATE June 12, 1964

TO Harlan Anderson

FROM *Bob*
Bob Lane

Following several discussions with Dr. Linderbaum at Brookhaven Laboratories, I found it highly desirable to propose leasing the Type 570 Tape Unit to Brookhaven for a period of either one or two years under the following terms and conditions: that during the first year the equity build up would be 75% of the rental paid; during the second year the equity build up would be 50% of the rental paid. The rental rate is \$1,000 per month including on call maintenance. I realize the above is contrary to your recommendation; however, I discussed the above with both Nick and Stan and arrived at the above figures and decision to make the offer to Brookhaven Laboratories. The possibility of their accepting is 99%.

CC: Ken Olsen



INTEROFFICE MEMORANDUM

cc: N. Mazzaresse
G. Bell
R. Lane
H. Anderson

DATE June 15, 1964

SUBJECT COBOL

TO Those Concerned FROM George Rice

The following was taken from a recent Air Force Regulation:

"4. General Policies:

a. Automated data systems within the Air Force are categorized as follows:

(1) MANAGEMENT SUPPORTING DATA SYSTEMS.

Those which maintain records and produce information or data in support of management or administrative functions. Subsystems concerned with source-data automation, information retrieval, data display, and similar techniques are included within the management supporting category when directly related or integral to such data systems. Systems or subsystems for training or educational purposes, including advanced mathematical or similar studies, are also considered to be management supporting.

(2) OPERATIONS SUPPORTING DATA SYSTEMS

Those which produce information, usually on a real-time or near real-time basis, for decision making related to direct command and/or control of forces and also those which support weather, warning, intelligence, and other operationally associated functions. For command or control, and support systems, the term applies only to the information processing portion thereof.

(3) RESEARCH and DEVELOPMENT SUPPORTING DATA SYSTEMS

Those systems or processes which are computational in nature (i.e., simulation, data reduction, test analysis, biometrics, etc.) and directly support approved research and development activity.

b. HQ USAF will control and monitor the design of automated data systems."

The enclosed letter shows that for Management Supporting Data Systems the Air Force is pushing hard to standardize on COBOL. The PDP's without it should still do well in categories 2 and 3. We should realize that COBOL is becoming a standardized language and the PDP-6 may be lacking some when selling to computer centers for business type schools.

Under item b. above "HQ USAF" is located here at Hanscom Field.

HEADQUARTERS
ELECTRONIC SYSTEMS DIVISION
AIR FORCE SYSTEMS COMMAND
UNITED STATES AIR FORCE

LAURENCE G. HANSCOM FIELD

BEDFORD, MASSACHUSETTS 01731

REPLY TO
ATTN OF: ESQ

JUN 9 1964

SUBJECT: Air Force Policy on COBOL

TO: Digital Equipment Corp.
Maynard, Massachusetts
Attn: Mr. George L. Rice

1. Questions submitted to this office in connection with a mandatory COBOL requirement on a recent computer selection project have indicated a need to further disseminate the policy of the Air Force on the use of COBOL. A copy of a letter from this office to the participating vendors elaborating upon this recent mandatory requirement to use COBOL is attached for your information. The guidance contained in this letter reflects current and future Air Force policy based upon a phased implementation of a COBOL capability.

2. The basis for the Air Force policy on COBOL is contained in a letter dated 12 July 1963 from Hq USAF to all Air Force Commands, Subject: "Implementation of COBOL". This letter designated COBOL as the standard programming language for management-supporting data systems and called for an orderly transition to COBOL. The letter required the following implementing actions:

- a. Train all programmers in COBOL.
- b. All new detailed flow charts to be prepared in COBOL.
- c. Whenever possible, new data systems or major revisions to existing systems to be prepared in COBOL.

3. In view of the announced Air Force policy on COBOL, manufacturers should anticipate a requirement for an increased COBOL capability on future Air Force EDPE selections for management-supporting data systems and plan accordingly.



EDWARD McCLOY
Colonel, USAF
Chief, EDP Equipment Office

1 Atch
Mandatory Requirement for
COBOL-61 Extended



INTEROFFICE
MEMORANDUM

DATE June 15, 1964

SUBJECT COMPUTER OPTION TABLE

TO Computer Guidance Committee FROM Jack Atwood
Dave Packer
Trudy Karr
John O'Leary

In response to a proposal which has had the enthusiastic support of virtually everyone contacted, Trudy Karr and John O'Leary have compiled a preliminary "Computer Option Table." This table attempts to indicate which options go with which computers and where details on each option may be found in our literature.

This project could be one of the most helpful side jobs we have ever undertaken. Properly compiled and periodically up-dated, the table would tell the salesmen what options we actually offer - whether or not they appear on the price lists. It could also serve as a guide to the distribution of costs among the various product lines. And it could even bring final agreement on the desirability of offering certain options about which there is or may be some difference of opinion between individuals and/or departments.

Because I am suggesting that the Table have this sort of semi-official status, I have asked that it be included for discussion at the Computer Guidance Committee Meeting on Wednesday, June 17, before the draft version is circulated for review. I think that some of the questions uncovered in gathering information for the Table can be settled by the Committee, thereby avoiding needless banter on the part of people with more opinions than responsibilities in the subject areas.

Please review the attached copy of the Option Table and bring it with you to Wednesday's Guidance Committee Meeting. In the meantime, Trudy and John will be happy to provide any background information you may want on the data included in the Table.

J. L. A.

fd
Enclosure

COMPUTER OPTION LITERATURE

Option	PDP-1	PDP-4	PDP-5	PDP-6	PDP-7
ANALOG-TO-DIGITAL					
Analog-to-Digital Converter (11-bit)			137 F-55		
General Purpose Analog-to-Digital Converter	138 F-13 (138)	138 F-13 (138)	138 F-13 (138)	138 F-13 (138)	138 F-13 (138)
High Speed Analog-to-Digital Converter (10-bit)	142 F-13 (142)	142 F-13 (142)			142 F-13 (142)
Multiplexed Analog-to-Digital Converter	138/139 F-13 (138/139)	138/139 F-13 (138/139)	138/139 F-13 (138/139)	138/139 F-13 (138/139)	138/139 F-13 (138/139)
DISPLAYS AND PLOTTERS					
Incremental Plotter			350 F-55		
Oscilloscope Display	34C F-43/53 (34)	34A F-43/53 (34)	34B F-43/53 (34)		34 F-43/53 (34)
Precision CRT Display	30E, G, H, J, K, M F-13 (30)	30 D, G, L F-13 (30)	30 N F-13 (30)		30D F-13 (30)
Symbol Generator	33 (with 30 G, H) F-13/43 (33)	33 (with 30G) F-13/43 (33)			
Portable Display Tester *(Also used with 31)	371 (with 31)	371 (with 30D, 31)	371 (with 31)	371 (with 31)	371 (with 31)
Monitor Display *(Also used with 340)	373 (with 30)	373 (with 30)		343 (with 340) F-65	
Photomultiplier Light Pen *(Also used with 340 and 31)	370 F-03 (370)	370 F-03 (370)	370 F-03 (370)	370 F-03 (370)	370 F-03 (370)
Camera Mount *(Also used with 340)	372	372	372	372	372

*May be used with other options

COMPUTER OPTION LITERATURE (continued)

Option	PDP-1	PDP-4	PDP-5	PDP-6	PDP-7
Precision Incremental CRT Display	340 F-13 (340)	340 F-13 (340)		346 (340+342+344) F-65	
Character Generator	342 F-13 (340)	342 F-13 (340)			
Subroutine Option	347	347		347	
Ultra Precision CRT Display	F-13 (31)	F-13 (31)	F-13 (31)	F-13 (31)	F-13 (31)
MEMORIES AND DRUMS					
Core Memory 4K	170A	134	155	161-A (5 μ sec)	147 F-71
Core Memory 8K	170B	135		163B and 161F (6 μ sec) F-65	149 F-71
Core Memory 12K	170C			161-C	
Core Memory 16K	170D			163C (2 μ sec) and 161D	
Core Memory Control For 1, 2, 3, or 4, 170's	121A, B, C, and D				
Core Memory Extension Control	171 (with 170)		151		148 F-71
Flip-Flop Memory				162 F-65	
Drum Memory used with Drum Control 236 and Drum Processor 167				237	
Parallel Drum	23 F-15D				

COMPUTER OPTION LITERATURE (continued)

Option	PDP-1	PDP-4	PDP-5	PDP-6	PDP-7
Serial Drum 8K			250A (12 bit) F-53 (250)		
Sector Option for 250			251		
Serial Drum 16K			250B (12 bit) F-53 (250)		
Serial Drum 32K	24E (flying head) F-13 (24)	24E (flying head) F-13 (24)	250C 24E (flying head) F-53 (250) F-13 (24)		24E F-71 F-13 (24)
Serial Drum 65K - flying head	24F F-13 (24)	24F F-13 (24)	24F F-13 (24)		24F F-71 F-13 (24)
Serial Drum 131K - flying head	24G F-13 (24)	24G F-13 (24)	24G F-13 (24)		24G F-13 (24)

CENTRAL PROCESSOR OPTIONS

Automatic Priority Interrupt	120 F-15D	143 F-45			172
Extended Arithmetic Element		18 F-13 (18)			177
High Speed Multiply and Divide			153 F-53 (153)		

IN-OUT CONNECTIONS AND CONTROLS

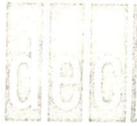
Clock Multiplexer		132 F-13 (132)			
Data Interrupt Multiplexer		133 F-13 (133)	129 F-53 (129)		173
Device Selector Extension		127			
Data Control	131 F-13 (131)	131 F-13 (131)		136 F-65	174

COMPUTER OPTION LITERATURE (continued)

Option	PDP-1	PDP-4	PDP-5	PDP-6	PDP-7
High Speed Channel Control	19 F-15D				
Relay Buffer	140	140			140
MAGNETIC TAPE HANDLING EQUIPMENT					
Magnetic Tape Transport	50 F-15D	50	50 F-55	50	50
Magnetic Tape Transport	570 F-03 (570)	570 F-03 (570)	570 F-03 (570)	570 F-03 (570)	570 F-03 (570)
Programmed Magnetic Tape Control	51 F-15-D	54			
Automatic Magnetic Tape Control	52 510 5-15-D F-13 (510)	57A F-13 (57A)	57A F-13 (57A)	516 F-65	57A F-13 (57A)
Microtape Dual Transport	555 F-03 (550)	555 F-03 (550)	555 F-55	555 F-03 (550)	555 F-03 (550)
Microtape Program Control (Word Transfer)	550 F-03 (550)	550 F-03 (550)	550A F-55	551 F-65	550A F-03 (550)
Microtape Data Break Control (Block Transfer)	553	553	552		
Microtape Storage Unit for 555	530	530	530	530	530
PERFORATED TAPE AND CARD HANDLING EQUIPMENT					
Card Punch (100 cpm)	40 F-13 (40)	40 F-13 (40)	450 F-55	460A F-65	40 F-13 (40)
Card Punch (300 cpm)				460B	

COMPUTER OPTION LITERATURE (continued)

Option	PDP-1	PDP-4	PDP-5	PDP-6	PDP-7
Card Reader (200 cpm)	421A F-15D	421A	451A F-55	461A F-65	421A
Perforated Tape Punch		75 F-45	75A F-55	761 F-65	75
Perforated Tape Reader		444	750 F-55	760 F-65	
Perforated Tape Spooler (for #2500 Digitronics Reader)			435		
Perforated Tape Spooler (for Teletype Punch)			436		
PRINTERS					
Automatic Line Printer (300 lpm)	644	644	645	646 F-65	
Automatic Line Printer (1000 lpm)				680 F-65	
Data Communication System				630 630 Bulletin	630 630 Bulletin
Printer-Keyboard	65	65 F-45		626 F-65	



INTEROFFICE MEMORANDUM

DATE June 16, 1964

SUBJECT Status: PDP-6 Construction

TO	K. Olsen	N. Mazzaresse	FROM	J. Smith
	H. Anderson ←	E. Harwood		
	S. Olsen	R. Savell		
	R. Best	A. Kotok		
	G. Bell	R. Frith		

M.I.T. (Project MAC)

Delivery 8/17/64

PDP-6-2 Central Processor
Delivered to Computer Checkout.

16K Memory 163C-162
Construction completed, delivered to Jim McKalip
for off-line checkout.

Micro Tape Control 551 and Data Control 136
Construction completed, delivered to Bob Reed for
off-line checkout.

Reader, Punch, Printer Control 760, 761, 626
Construction completed, off-line checkout complete,
installed into the central processor.

Missing Modules

<u>Model Number</u>	<u>Present Status</u>	<u>Available Date</u>
9 - 6203	Assembly	6/26/64

Brookhaven

Delivery 9/7/64

PDP-6-3 Central Processor
Logic wiring and power wiring complete. Quality
Control inspection complete and signed off.
Received modification number 17 yesterday, June 15,
1964. Modification will be completed and the machine
available for Checkout June 18, 1964.

Paper Tape Reader and Control 760

Construction complete. Off-line checkout will be complete by the end of next week.

16K Memory 163-162

"Engineering Hold": J. McKalip

Micro Tape Control 551 and Data Control 136

Construction 90 per cent complete. Available for off-line checkout June 22, 1964.

Line Printer 646-3

"Engineering Hold": L. White

Missing Modules

<u>Model Number</u>	<u>Present Status</u>	<u>Available Date</u>
3 - 1316	Test	6/19/64
6 - 6227	Test	6/18/64
36 - 6205	Test	6/26/64
13 - 6206	Final Assembly	6/24/64
9 - 6203	Test	6/26/64

University of Western Australia Delivery 11/16/64

PDP-6-4 Central Processor

Presently Bay 1 and Bay 2 are being wired together. All cabinets and associated hardware have been received. Operator control and indicator panels are being assembled. Construction will be completed and the central processor available for Checkout by July 10, 1964.

Line Printer Logic 646

"Engineering Hold": L. White

Card Reader Logic 461

Delivered to Jim Sullivan for off-line checkout.

Micro Tape Control 551 and Data Control 136

Will be available for off-line checkout July 1, 1964.

PDP-6-5 Central Processor

To date, I have not received a construction requisition for this system.

The central processor will be available for checkout July 20, 1964.



INTEROFFICE MEMORANDUM

DATE June 16, 1964

SUBJECT Classroom Training
TO Computer Guidance Committee
all Sales Personnel

FROM Bob Beckman

A limited training schedule must be issued due to nonavailability of instructors. The following schedule is in effect immediately. PDP-5 Programming Course, convening 3 August 64, one week in length. PDP-5 Maintenance Course, convening 10 August, one week.

Attendance will be limited to present customers on a first come, first serve basis. Attendance will also be limited to 9 people with a maximum of 2 for any customer. Confirmation of attendance can be obtained from Miss Eleanor Barron, extension 526, DEC, Maynard.

Cancellation for attendance of the course will be expected at least one week prior to the convening date to allow for rescheduling of personnel.

A complete class schedule for the remaining portion of 1964 will be issued by the end of July.



INTEROFFICE MEMORANDUM

DATE June 17, 1964

SUBJECT MIT - Project MAC

TO H. Anderson

FROM R. Lane

I visited with R. Mills today to obtain a final P.O. on the traded system. It appears that our original plans included \$156,100 for the Type 166-621. We discussed this one day but never got around to correcting it. In preparing my notes before I left, I corrected it and now we owe them money on the trade! I suggested to Dick that he use the "windfall" for additional micro tape units. He thought that was a good suggestion.

Further procurements are subject to this contract being extended and this is expected August 1, 1964. These items under consideration are:

- Type 163C - 16K, 2 μ sec memory
- Type 162 - Fast Memory
- Type 340 - Display (Trade old Type 30)

M. Minsky feels the Model 33 is a step backwards since it doesn't have upper-lower case, etc. Consequently, he has asked us to look into the IBM Selectric (which John Ward is using) and use it on the PDP-6. I advised A. Kotok of this and he will pursue it from an interface standpoint.

MAC has hired a left winger who represents the Model Railroad Club for an anti MACRO-6 movement. He is to write a super assembler for the PDP-6. I told Dick we would cooperate in any way we could and definitely wanted the results - for free!

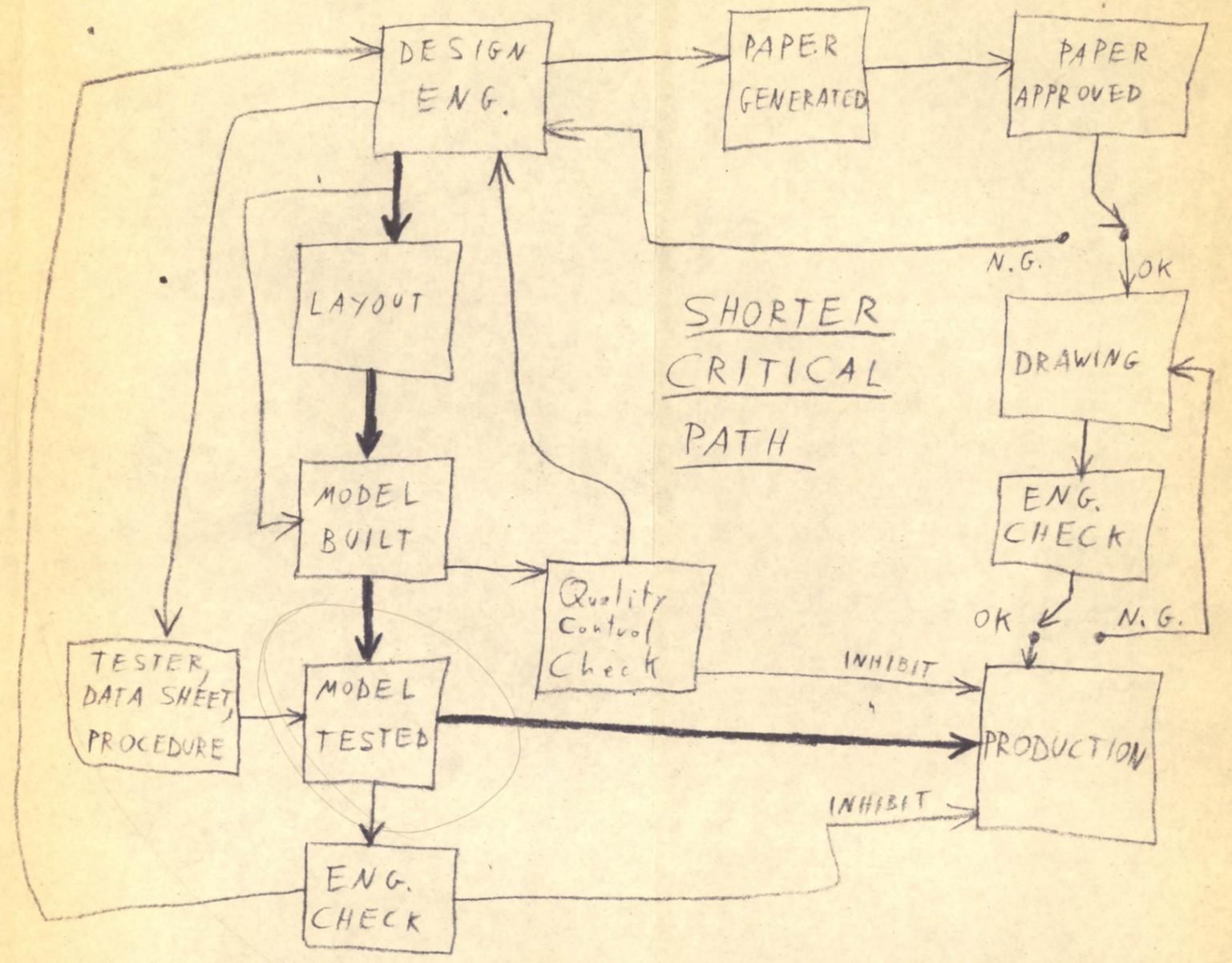
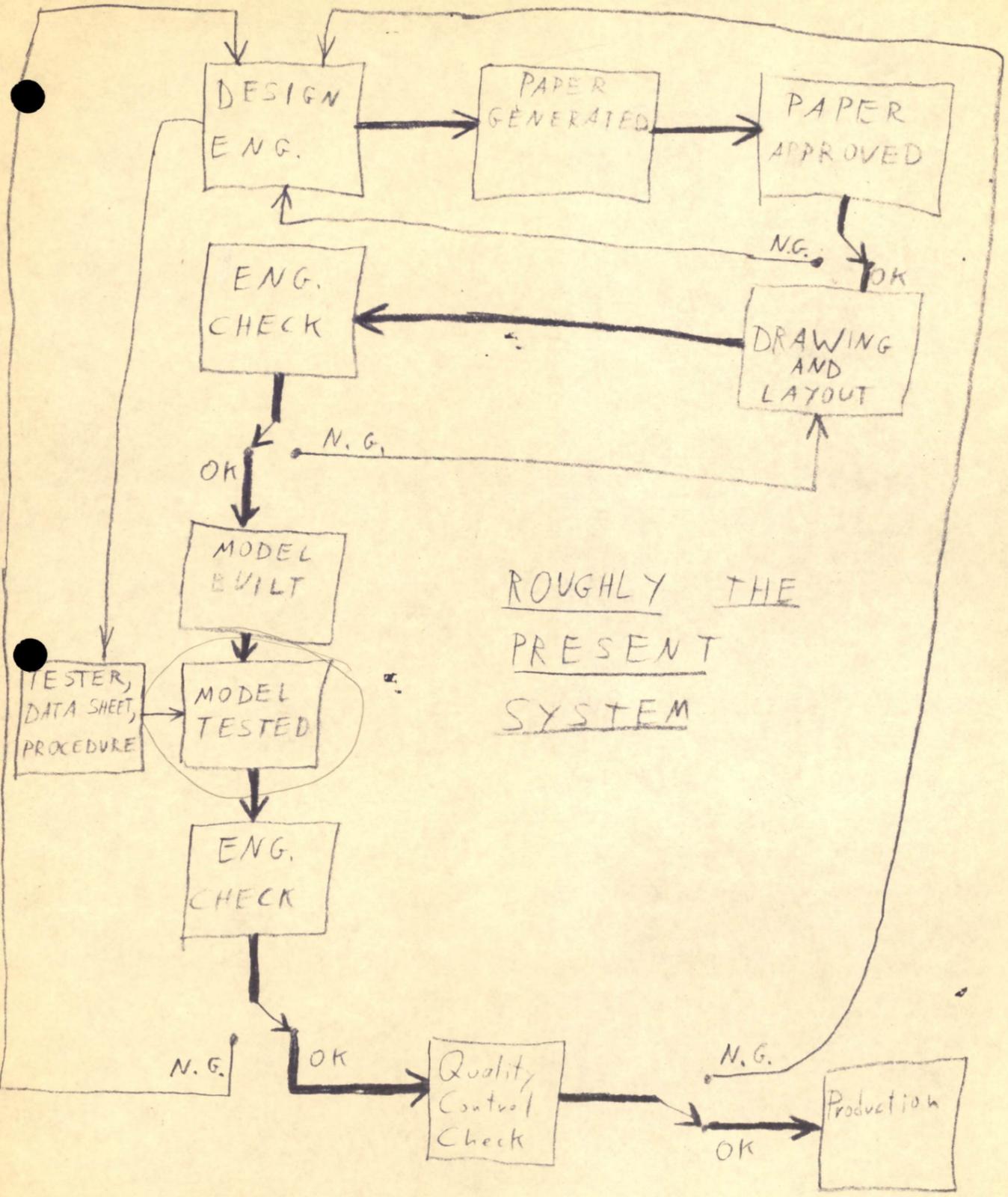
Dick further requested about 50 additional copies of the handbook to teach a course at MAC. I said OK! More exposure is very healthy there!

CC: Nick Mazzaresse
A. Kotok
G. Bell

\$BN 2:00

Heart on new models
Phil Backlund, Russ

Med. Guid
✓



Would this change speed development?
 Would wasted effort increase too much?

Memo to: Ken Olsen, Dick Best, Don White, Jim Hastings, George Gevels, Roger Melanson, Jim Cudmore, Klaus Doering
 From Russ Doane 6/17/64

H Anderson



INTEROFFICE
MEMORANDUM

DATE June 22, 1964

SUBJECT Status of PDP-6-2 (MAC) -

TO Computer Guidance Committee FROM Alan Kotok

1. Processor 166

We are still waiting for modules (6203). These are promised for this Friday. In the meantime, various mods are being put in. The machine has run all test programs not requiring the shift count modules. No trouble is anticipated in getting the processor going.

2. Core Memory 163

This project seems to be having its troubles. Latest estimate from J. McKalip is August 1 on line.

3. Fast Memory 162

As a result of recent discussions with Bob Savell, the 162 is now being re-designed to be associated with only one processor. Bob says that design should be complete by this weekend, and that production should be able to start work by 6 July.

4. Microtape Control 551

This unit has just been delivered to Checkout. Bob Reed is out this week, but Dave Ambrose seems ready to start preliminary checkout.

5. Data Control 136

R. Reed has been checking this unit out for the past week or so, and as far as I can gather, there are no bad problems. Again, R. Reed's absence may cause some delay.

6. Tape Reader 760

This unit has been in use for some time, and is essentially complete.

7. Tape Punch 761

The punch has been installed in the processor after extensive off-line checkout. It hasn't gotten

much use yet, but no troubles-are anticipated.

8. Teletype 626

Same comments as punch apply here.

Summary:

Things seem to be moving along fairly smoothly with the exception of the fast memory. Since this is not an essential component of the system, we should be ok. Although the construction req. calls for August 17 delivery, the original date of August 31 is the more realistic. We should be able to deliver on August 31.

AK/11

T. Guderson

June 23, 1964

The Company's Engineering Department performs two types of activity - Development Engineering and Production Engineering. Heretofore, no distinction has been made between these two areas. However, beginning with our new fiscal year, June 29, 1964, all personnel are requested to distinguish between these areas for reporting purposes. The following definitions and examples are provided as guidelines:

Development Engineering is defined as that engineering required for the initial design, fabrication and testing of a product-oriented project.

Module Line - 8000 series module line project. This project was undertaken to offer an entirely new module product. Russ Doane had to follow through on all of the development stages, design, fabrication, testing, etc.

Computer Line - Type 570 tape transport project. This project was undertaken to offer a new tape transport. Roland Boisvert had to follow the same development engineering procedure course as Russ Doane.

Production Engineering is defined as that engineering required to provide facilities necessary for the manufacture of a product or to make modifications necessitated by factors outside the company's control.

Module Line - Silicon module conversion. This project was undertaken to change from germanium to silicon transistors because of the loss of our source of germanium devices.

Computer Line - Automatic module tester project.

The attached current 1000 series numbers issued by R L Bast for July 1, 1964 has been slightly modified to provide the means for you to differentiate between Development and Production Engineering. You will note the activity code preceding the number. When you assign a number for the new labor job ticket, please preface the 1000 series number with a D for Development Engineering, or a P for Production engineering, whichever is applicable. For example, EN 1196, Type 570 Tape Transport - would be reported D1196. EN 1157, PDP-4 Automatic Module Tester - would be reported P1157. In addition, there are some projects, such as Computer Aided Design that may be development engineering and/or production engineering.

JPH:ASJ

Att

OVERHEAD

0001	GENERAL ENGINEERING	R BEST
0002	NEW TEST EQUIPMENT	R HUGHES
0003	ENGINEERING STOCKROOM	D WHITE
0004	STANDARDS	R BEST
0005	REPAIRS TO GOODS DAMAGED IN SHIPMENT	R BEST
0006	TECHNICIAN TRAINING CLASSES	D WHITE
0007	OBSOLETE GOODS STOCKROOM	H CROUSE
0008	SECURITY	L PRENTICE
0030	COMPUTER CHECK-OUT ADMINISTRATION	E HARWOOD
0031	DRAFTING DEPARTMENT ADMINISTRATION	R MELANSON
0032	REPRODUCTION DEPARTMENT=DRAFTING	R MELANSON
0033	SHEET METAL SHOP ADMINISTRATION	L PRENTICE
0034	MACHINE SHOP ADMINISTRATION	L PRENTICE
0035	MODULE ENGINEERING ADMINISTRATION	D WHITE
0036	MECHANICAL ENGINEERING ADMINISTRATION	L PRENTICE
0040	DRAFTING AUTOMATION	L HANTMAN
0050	QUALITY CONTROL	R HUGHES
0051	QUALITY CONTROL TEST EQUIP=LABOR MATERIALS	R HUGHES
0052	QUALITY CONTROL MODEL TEST	R HUGHES
0053	QUALITY CONTROL MODULE REPAIR FIELD FAILURE	R HUGHES
0054	QUALITY CONTROL MODULE REPAIR SALVAGE	R HUGHES
0055	FINISHED GOODS SAMPLING	R HUGHES

GENERAL

D P	1022	POWER SUPPLIES	D WHITE
D P	1023	MOUNTING PANELS	L PRENTICE
D	1031	COMPUTER DEVEL SEE SPEC # FOR PDP=1,4,5,6,7,LINC	A HALL
D	1087	RELAY AND SWITCH INVESTIGATION	D WHITE
D P	1100	POWER CONTROLS	D WHITE
D	1225	INDICATOR DEVELOPMENT	D WHITE

ANALOG=TO=DIGITAL, DIGITAL=TO=ANALOG

D	1044	ANALOG=TO=DIGITAL CONVERTER MODULES	B STEPHENSON
D P	1244	A=D CONVERTER TEST EQUIPMENT AND TESTING	B STEPHENSON
D	1301	NEW A=D DEVELOP	B STEPHENSON
D	1312	SAMPLE AND HOLD DEVELOPMENT AND PROTOTYPE	B STEPHENSON

CARD READERS AND PUNCHES

D	1068	421CARD READER AND CONTROL DEVEL, PDP=1,4,5	R SAVELL	1-7/64
D	1232	461 CARD READER&CONTROL, DEVELOP PROTO PDP=6	E SAVELL	
D	1246	460 CARD PUNCH DEVELOP AND PROTOTYPE PDP=6	R SAVELL	

DRUMS

D	1242	DRUM CIRCUIT DEVELOPMENT	R TRINGALE
D	1243	NEW DRUM DEVELOPMENT	R TRINGALE
D P	1251	TYPE 237 DRUM&CONTROL DEVELOP&PROTOTYPE PDP=6	R TRIANGALE
D P	1279	TYPE 250 SERIAL DRUM&CONTROL DEVELOP PDP=5	R TRINGALE
C P	1314	TYPE236 DRUM CONTROL DEVELOP&PROTOTYPE PDP=6	R TRINGALE

DISPLAYS

D P 1180	DISPLAY 30 CAMERA EQUIPMENT	D CHIN
D	1209 DISPLAY DEVELOPMENT, GENERAL	W LONG
D P 1236	340 DISPLAY DEVELOPMENT AND PROTOTYPE	W LONG
MAG TAPE - MICRO TAPE		
D	1026 NEW MAGNETIC TAPE DEVELOPMENT TO BE USED PRIOR TO MODEL NUMBER DESIGNATION	R BOISVERT
D P 1136	RELAY MICROTAPE UNIT DEVELOPMENT	D VONADA
D P 1161	TYPE 57A MAG TAPE CONTROL DEVELOPMENT	S LAMBERT
D P 1162	TYPE 57A MAG TAPE CONTROL PROTOTYPE	S LAMBERT
D P 1189	TAPE CONTROL 510 DEVELOPMENT	R SORENSEN
D P 1195	M=3000 TAPE TRANSPORT PROTOTYPE TYPE 570	R BOISVERT
D P 1199	TYPE 580 TRANSPORT DEVELOPMENT AND PROTYPE	R BOISVERT
D P 1237	SOLID STATE MICROTAPE DEVELOP AMD PROTOTYPE	D VONADA
D P 1259	MAG TAPE TEST EQUIPMENT	R BOISVERT
D P 1262	TAPE CONTROL 516 PDP-6 DEVELOP & PROTOTYPE	S LAMBERT
D P 1271	TYPE 551 MICROTAPE CONTROL PDP-6 DEV & PROTO	R SAVELL
D P 1285	TYPE 552 MICROTAPE CONTROL PDP-5 DEV & PROTO	E DECASTRO
D P 1290	TYPE 157 INTERFACE 57A TO PDP-5 DEV&PROTOT	S LAMBERT
D	1313 TAPE TRANSPORT SIMULATOR DEVELOPMENT	S LAMBERT

MEMORIES

D	1016 CORE MEMORY DEVELOPMENT	J MCKALIP
	1052 MEMORY STACK ASSEMBLY	J MCKALIP
D	1143 MAGNETOSTRICTIVE DELAY LINE MEMORY DEVELOP	D WHITE
D	1150 GLASS DELAY LINE MEMORY DEVELOPMENT	D WHITE
D	1193 THIN-FILM MEMORY DEVELOPMENT	J MCKALIP
D	1247 FLIP FLOP MEMORY TYPE 162 DEVELOP & PROTO	R SAVELL
D	1249 2USEC MEMORY DEVELOP AND PROTOTYPE TYPE 161	J MCKALIP
D	1269 WORD ADDRESS MEMORY DEVELOP LINEAR SELECT	D WARDIMON
D	1297 PDP-7 MEMORY DEVELOPMENT AND PROTOTYPE	D CHIN
	1307 PDP-6 MASS MEMORY	J MCKALIP
D	1318 PDP-5A MEMORY DEVELOPMENT AND PROTOTYPE	J MCKALIP

I-7/64

MISCELLANEOUS IN/OUT

D	1190 DATA CONTROL 131 DEVELOPMENT PDP-1	R SORENSEN
D	1261 DATA CONTROL 136 DEVELOP & PROTOTYPE PDP-6	R SAVELL
D P 1283	630-4 DATA COMM. SYSTEM FOR PDP-6-1	D SMITH
D	1294 PERIPHERAL EQUIPMENT TESTER AND PROCESSOR	E HARWOOD

MODULES

D P 1010	5 MC SYSTEM MODULES	D WHITE
D P 1011	500 KC SYSTEM MODULES	D WHITE
P	1013 CURRENT DRIVERS, VACUUM TUBE	D WHITE
D P 1017	SIGNAL CONVERTERS	D WHITE
D P 1029	10 MC SYSTEM MODULES 6000 SERIES	D WHITE
D P 1039	CURRENT DRIVERS, SOLID STATE	D WHITE
D P 1043	VHF MODULES	D WHITE
P	1051 CLASSROOM MODULES	D WHITE
	1088 MODULE PACKAGING FOR SHIPMENT	R BEST
P	1092 10 MC LABORATORY MODULES	D WHITE

P 1093	5 MC LABORATORY MODULES	D WHITE
P 1094	500 KC LABORATORY MODULES	D WHITE
D 1097	MODULE CONSTRUCTION DEVELOPMENT	D WHITE
D P 1098	MODULE TEST DEVELOPMENT	D WHITE
D P 1127	CURRENT CALIBRATOR DEVELOPMENT	D WHITE
D P 1148	TELETYPE LINE UNIT DEVELOPMENT MODULES	D WHITE
D P 1172	ANALOG MODULE DEVELOPMENT	D WHITE
D P 1185	MECHANICAL DESIGN OF MODULES	L PRENTICE
P 1268	SILICON MODULE DEVELOPMENT	D WHITE
P 1288	AUTOMATED BOARD PRODUCTION LINE	L PRENTICE
D P 1291	MECHANICAL DESIGN FOR 18-36 SERIES MODULES	L PRENTICE
D P 1302	2 MC SYSTEM MODULES 18-36 SIZE	D WHITE
D P 1303	10 MC SYSTEM MODULES 18-36 SIZE	D WHITE
D P 1304	COMPONENT DEVELOPMENT	T STOCKEBRAND
D P 1310	MEMORY MODULE DEVELOPMENT	D WHITE

PAPER TAPE

D 1217	75-B PUNCH AND CONTROL DEVELOPMENT PDP-5	E DECASTRO
D 1230	760 PAPER TAPE READER & CONTROL DEV & PROTO PDP-6	E SAVELL
D 1231	761 PAPER TAPE PUNCH & CONTROL DEV & PROTO PDP-6	E SAVELL
D 1233	3 PHASE PAPER TAPE READER, DEVELOP & PROTO	T STOCKEBRAND
D P 1272	PAPER TAPE READER ENGINEERING	R SAVELL
D P 1273	PAPER TAPE PUNCH ENGINEERING	R SAVELL
D 1276	75-A PAPER TAPE PUNCH AND CONTROL PDP-4	R SAVELL

PDP-1

D P 1020	PDP-1 DEVELOPMENT	G BELL
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PDP-4

D P 1062	PDP-4 DEVELOPMENT	A HALL
D P 1157	PDP-4 AUTOMATIC MODULE TESTER	J CUDMORE
D 1195	PDP-4-10 OPERATION - ENGR. COMPUTER	A HALL
	1260 PDP-4-19 OPERATION - MAG TAPE COMPUTER	R BOISVERT
D 1277	PDP-4 PROTOTYPE OPERATION	A HALL

PDP-5

D P 1177	PDP-5 DEVELOPMENT	E DECASTRO
D 1191	PDP-5 PROTOTYPE OPERATION	A HALL
D 1315	PDP-5A DEVELOPMENT	E DECASTRO
D 1316	PDP-5A PROTOTYPE CONSTRUCTION	E DECASTRO

PDP-6

D P 1178	PDP-6 DEVELOPMENT	G BELL
D 1205	PDP-6 PROTOTYPE	G BELL
D 1250	DRUM PROCESSOR TYPE 167 DEV. & PROTOTYPE	G BELL
D 1300	PDP-6 IO DEVICE TESTER DEV. & PROTOTYPE	E HARWOOD
D 1311	TWX INTERFACE, DEVELOPMENT & PROTOTYPE	A KOTOK

PDP-7

D P 1282 PDP-7 DEVELOPMENT AND PROTOTYPE

R WILSON

LINC DEVELOPMENT

D P 1292 LINC

M RUDERMAN

PRINTERS AND TYPEWRITERS

D P 1194 20 COL LINE PRINTER & CONT DEVELOP & PROTOTYPE
FOR MODULE TESTER

J CUDMORE

D 1228 PRINTER KEYBOARD&CONTROL TYPE 626 DEV&PROTO

R SAVELL

D 1229 646 LINE PRINTER&CONT 300 LPM DEV&PROTO PDP-6

L WHITE

D P 1274 TYPEWRITER ENGINEERING

R SAVELL

D 1275 PDP-5 ASR TELEPRINTER AND CONTROL

E DECASTRO

D 1239 680 LINE PRINTER AND CONTROL 1000 LPM PDP-6

L WHITE

D 1298 64 LINE PRINTER&CONTR ANELEX 300 LPM PDP1,4.

L WHITE

PROGRAMMING

D 1032 PDP-1 PROGRAMMING

H MORSE

D 1096 PDP-4 PROGRAMMING

D FELLOWS

D 1219 PDP-5 PROGRAMMING

L PORTNER

D 1256 PDP-6 PROGRAMMING

G BELL

D 1257 PROGRAMMING SYSTEM DEVELOPMENT

H MORSE

D 1263 PDP-1 MAINTENANCE AND DIAGNOSTIC PROGRAMMING

L HANTMAN

D 1264 PDP-4 MAINTENANCE AND DIAGNOSTIC PROGRAMMING

L HANTMAN

D 1265 PDP-5 MAINTENANCE AND DIAGNOSTIC PROGRAMMING

L HANTMAN

D 1266 PDP-6 MAINTENANCE AND DIAGNOSTIC PROGRAMMING

L HANTMAN

D P 1267 COMPUTER-AIDED DESIGN

C STEIN

D 1280 PDP-4 PROGRAMMING SYSTEM

D FELLOWS

D 1293 ACCOUNTING PROGRAMMING

R MILLS

D 1296 MANUFACTURING PROGRAMMING

M SANDLER

D 1299 ADVERTISING PROGRAMMING

J ATWOOD

D 1317 LINC MAINTENANCE AND DIAGNOSTIC PROGRAMMING

L HANTMAN

SPECIAL SYSTEMS

D 1018 MEMORY TESTER DEVELOPMENT

P GREENE

D 1021 CORE HANDLER

P GREENE

D 1057 CORE TESTER DEVELOPMENT

P GREENE

INTEROFFICE
MEMORANDUM

DATE June 23, 1964

SUBJECT PDP-6 Delivery Rate

TO N. Mazzaresse
R. Lane
E. Harwood
G. Bell

FROM Robert E. Savell

cc: S. Olsen
K. Olsen
H. Anderson

It seems we are making the same mistake with the PDP-6 delivery schedule that we made 2 1/2 years ago with the PDP-1. Since we are starting construction of Arithmetic Processors at a rate of one per month we are assuming we can deliver systems at the same rate. Unless all the systems are identical, this simply isn't true, since the amount of time required to checkout a system varies with the size of the system; the danger in miscalculating the time required is that delivery of large systems will be later than promised. This is especially true on the first few large PDP-6's we construct.

To enable making more realistic quotes the following table should be used:

Basic System	(AP-166 PTR-760 PTP-761 TTY-626 CM-161, 163 FM-162).	16 wks. after delivery to Computer Checkout.
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For enlarged systems add:	CR-461 LT-551 DC-136 MT-516 DC-136 LP-646 DCS-630 I/OP-167 Drum Cont-236 Drum-237	1 wk/device
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Special equipment -- contact Eng. and Comp. C.O.

Final system test add: 1-2 weeks.

Acceptance Test, Quality Check & Crate add: 2 weeks

Contact Ed Harwood to find dates when available computers are due into Computer Checkout.

res/II.

H. Anderson

SUBJECT Cost Center Coding
Re-issue

DATE June 24, 1964
Revised July 8, 1964

TO All managers

FROM R. Dill

Effective June 29, 1964, this revised cost center list should be used. The change involves the use of numeric codes instead of Alfa codes.

The names of the cost centers have not changed as such. The new listing follows.

<u>Cost Center</u>	<u>Responsibility</u>	<u>Code</u>
Home Office Sales	S. Olsen	1
Los Angeles Sales	S. Olsen	2
Palo Alto Sales	S. Olsen	3
Washington D.C. Sales	S. Olsen	4
New Jersey Sales	S. Olsen	5
Pittsburg Sales	S. Olsen	6
Illinois Sales	S. Olsen	7
Ann Arbor Sales	S. Olsen	8
Orlando Sales	S. Olsen	9
Denver Sales	S. Olsen	10
Northwest Sales	S. Olsen	11
Texas Sales	S. Olsen	12
New England Sales	S. Olsen	13
Technical Publications	J. Atwood	14
Customer Relations	R. Beckman	15
United Kingdom	J. Leng	16
Canada	D. Doyle	17
Germany	G. Huewe	18
Japan	J. Fadiman	19
Sweden	J. Fadiman	20
Australia	R. Smart	21
France	J. Fadiman	22
Drafting	R. Melanson	23
Engineering	R. Best	24
Programming	G. Bell	25
Model Shop	G. Gerelds	26
Systems-Engineering	P. Greene	27
Test Equipment	R. Hughes	28
Computer Checkout	E. Harwood	29
Quality Control	R. Hughes	30
Mechanical Engineering	L. Prentice	31
Production Control	M. Sandler	32

<u>Silk Screening</u>	<u>M. Sandler</u>	<u>33</u>
<u>Module Assembly</u>	<u>M. Sandler</u>	<u>34</u>
<u>Final Test</u>	<u>M. Sandler</u>	<u>35</u>
<u>Maintenance</u>	<u>J. Culkins</u>	<u>36</u>
<u>Sub System Assembly</u>	<u>J. Smith</u>	<u>37</u>
<u>Sheet Metal</u>	<u>L. Prentice</u>	<u>38</u>
<u>Machine Shop</u>	<u>L. Prentice</u>	<u>39</u>
<u>General Administration</u>	<u>R. Mills</u>	<u>41</u>
<u>Purchasing</u>	<u>H. Crouse</u>	<u>42</u>
<u>Personnel</u>	<u>R. Lassen</u>	<u>43</u>



INTEROFFICE
MEMORANDUM

DATE June 24, 1964

SUBJECT Checkout of Brookhaven PDP-6-3

TO Computer Guidance Committee FROM Ed Harwood

The Central Processor arrived in the Checkout area on Friday, 6/19/64, with some of the large modules missing (6205, 6206). These are expected by 6/26/64.

As soon as the modules are delivered, we should go on two--ten hour, two-man shifts.

On the assumption we have manpower to do this, I expect the check-out of the Central Processor to take at least ten weeks. We will need one more month to get the whole system out of the house and into the trailer. Total time - 3½ months.

To further insure that we deliver in this time, we will need one, and possibly two, back-up men to cover for vacations during this period.

The following people should be considered possible candidates for this crew:

- | | |
|-----------------|------|
| 1. Herb Millman | CC |
| 2. Don Murphy | CC |
| 3. Ted Strollo | Eng |
| 4. Bill Colburn | Eng |
| 5. Bob Clemens | F.S. |
| 6. Ken Senior | F.S. |

G. Anderson

INTEROFFICE MEMORANDUM

DATE: 6/25/64

SUBJECT: Sales Programming

TO: Computer Guidance Committee
J. Ridgeway

FROM: N. Mazzaresse

In an effort to identify the problems in the software area and separate fact from fiction, Jack Ridgeway, Bob Beckman and myself have spent a good deal of time in the last month analyzing the situation.

It is quite clear that our customers are, in general, quite dissatisfied with our software. This creates a need for expensive quick fixes (i. e., sending Dave Fellows to JPL for a week) and acts as a deterrent in future sales. We have, therefore, decided to create a new software group headed by Jack Ridgeway which, generally, will be responsible for program maintenance, documentation, and description as well as giving our software a "salesy" look.

The functions of this group are outlined in the following and have been discussed and agreed to by Stan Olsen, Gordon Bell, Nick Mazzaresse, Bob Beckman, Win Hindle and Jack Ridgeway.

It is proposed that the name of this group be "Sales Programming".

NM/jr

A. Program Documentation and Maintenance

1. Documentation

All programs for customer use will be submitted to the sales programming group before distribution. The symbolic program tape, listing, and write-up, as prepared by the original author, will be submitted.

The tape will be a working version which has been verified or certified by the original programmer.

The write-up will be a technical explanation of the program and will contain the information specified in the write-up standards.

If the data supplied by the systems or engineering programmer is not sufficient or not in a usable form, the original author will be requested to supply the correct data.

The sales programming group will attempt to use the submitted program according to the usage description in the technical write-up. Any differences in the operation of the program and the specifications submitted by the programmer will be discussed and the appropriate corrections made (either in the tape or write-up). At this time all program bugs will be removed and minor modifications will be made.

By checking, debugging and modifying the original program the sales programmer will become familiar enough with the program to clean up the tape, make the symbolics more meaningful, improve the flow chart, and rewrite the program documentation. In addition to the documentation aspect, the sales programmer will have enough of a working knowledge of the program to maintain it.

2. Maintenance

There are two categories of program maintenance:

a. Proposed or suggested program modifications

These will come from both in house users and customers. They will be documented and filed in the library and periodically reviewed.

Depending on their worth and/or ease of implementation, the modifications will be made and a new write-up and tape will be made. This in no way affects the operations now connected with the DECUS library. Straight forward modifications will be made by the sales programmers and gross changes will be made with cooperation from the original programming group. This type of change will be kept at a minimum.

b. Program Errors (Bugs)

These will receive immediate attention and modified tapes will be distributed. Again most of these fixes can be made by the sales programmers.

To implement these procedures, we have to do the following:

1. Inform all users that we have a maintenance procedure.
2. Request that all outside users appoint a delegate to communicate with DEC. This delegate will help keep down the noise by being a single channel from each customer and by doing some preliminary evaluation before modifications are requested. All users will be informed of the procedure and their cooperation will be requested.

B. Program Distribution

New users will be given a complete set of programs and their names will be added to the distribution list. When modifications are made in write-ups or tapes they will be redistributed to the users with a memo describing the changes made.

A backlog of tapes and write-ups will be maintained so that new users will not wait to receive their materials.

All sales offices will receive a copy of new write-ups and possibly receive program tapes if they have a computer.

Joan Cowles will continue to take care of the distribution. She should have some assistance. Jack Ridgeway will supervise her and establish some procedures and schedules.

C. Software Sales

1. Help present and future customers appreciate the advantages of our software by direct contact as well as by offering direction and assistance to the rest of the sales staff in becoming more software oriented.
2. Assist advertising in their efforts to make brochures, product bulletins, and option write-ups more software oriented.
3. Prepare software specifications in the form of capabilities and comparisons as well as other sales aids.
4. Set up demonstrations for visitors and shows and either write or coordinate the writing of demonstration programs.
 - a. Design and implement demonstration programs that will display the competence of our processors in various data processing areas (i.e., process control, physics applications, medical applications, etc.).

D. Customer Programming and Assistance

1. Answer customer's technical questions relating to programming of our computers.

J. Ball



INTEROFFICE
MEMORANDUM

DATE June 26, 1964

SUBJECT Your Memo Of June 17 Concerning PDP-6 Computer Systems

TO Bob Lane FROM Bob Savell

If you will pull out your copy of my memo for June 3 concerning two microsecond memories you will see that Jim McKalip is suppose to be producing for five which would be done soon enough to meet the schedule you suggested. In addition, I would like to suggest the following delivery schedule:

<u>Serial Number</u>	<u>Delivery Date To The Customer</u>
#5 for L. R. L. -	November 30
#6 for Rutgers -	December 21
#7 for Oregon	January 15
#8 for Adams	February 10
#9 for Univ. of Pennsylvania	February 28

Please note that the Oregon system, which is a very large one, will be a real dog to deliver by this date as it will not go to Checkout until sometime during September. Please consider my recent memo on checkout time as soon as possible in order that we may avoid unhappy customers.

Copies to:

E. Harwood
N. Mazzaresse
G. Bell
J. McKalip
R. Beckman

RES/II

June 29, 1964

The problem of FORTRAN Maintenance

H. Anderson
J. Ridgeway
R. Wilson
H. Morse III

Dave Fellows

1) The operating systems. (status)

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O
P
Y
There are two (executive) operating systems on the books, one for microtape, one for normal mag tape. The microtape system has not been worked on since April 21 or thereabouts when development work was stopped to prepare for the SJCC.

The normal mag tape system which I feel has more potential than the microtape system and is in fact easier to implement has not been worked on for ten days (see ϕ 4)

2) Dit recently took the trouble to send me a memo which makes the following points:

- a) New Fortran tapes are not documented.
- b) The operational Fortran language is not properly documented.
- c) Is the library operating being properly supervised (Fortran)?
- d) There are entirely too many Fortran tapes.
- e) A suggestion to re-program format statement processing.

3) Comments on ϕ 2

a) This is a reasonable objection. I have been writing "Fortran System Notes" for information on any pertinent subject and this is certainly one.

(Existing notes:

The Fortran assembler qua assembler; Error Reports, Diagnosis, Corrections and use of the IBM Compatible 57A Fortran opsys.)

b) I had hoped that Shag Graetz could do this but it is not reasonable to expect anyone unfamiliar with the details of the Fortran produced machine language to write about it. This is something I will have to do; a limited and capsule version appears as appendix one in the "Summary". One of the necessary subjects is an exhaustive treatment of arrays and their handling.

c) Supervising the librarian is my responsibility in this area. I've been trying but, for example, I don't know to whom tapes have been sent or system notes. The list of Fortran users is nearly as long as that of PDP-4 users.

d) At present there are four binary systems in the library. I have on my desk a request from Mass General Hospital to supply a 4K version with EAE capability. The point Dit makes is that with proper documentation of the English tapes we could ask the customer to assemble his own version from a large symbolic library. If the documentation existed, this might be feasible. but there are problems. For example, every time an error is found (see ø4) a new English tape must go out to the user with the necessary eventuality:

COPY

- 1) Either he must be sufficiently competent to write and assemble (or use DDT) his own binary patch,
- 2) or he must reassemble the operating system, get new definitions for the assembler, make a new symbol table for same, and reassemble his library tape.

Neither of these procedures is too formidable or particularly terrifying to a competent programmer versed in our system, but I hesitate to ask this competence of Dr. Lidofsky at Columbia, Dr. King at Mass. General Hospital, not even sure of Don Norman at Harvard -- the non-programmer physicists at Harwell -- etc. The point being that so many of our present users are insufficiently competent. The alternative is higher cost to us for program maintenance, for example, five documented and probably different error corrections for one detected error.

e) No matter how valid re-programming might be, I don't believe it should be done. We can't continually re-start and make money on the deal.

4) Since the Fortran System tapes were put into the library, the following errors have been noted:

- a) "A" format input. A parenthesis was lost from an edited tape giving an introduced error.
- b) Floating divide was reported by Foxboro to have an error. This took three days to find, diagnose, and cure; the algorithm

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used had a rather subtle error.

c) Floating point addition with EAE had an error. I found this when I took advantage of the presence of an EAE in check-out to give the modified programs a good work-out; this had not previously been done.

d) Both Dr. Norman at Harvard and Dr. Lidofsky at Columbia reported that Hollerith Output did not work on their brand new tapes. It turned out to be a problem with the slash punctuation (C/R) when used alone with a Hollerith list item.

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5) Many of our potential customers for Fortran Systems have benchmark problems which they would like to see run. One which I did for George Rice recently took a day to re-write and run -- it was a matrix triple product of dimension 30 x 30. My agenda for this evening is another one of like nature for potential customers from R.P.L. -- I regard this as a necessary and proper thing for me to do since no one else can, but it is time consuming. As an aside, card input for Fortran (Dit thinks this works), card input for the operating system (non existent) and data handling for micro-tape (non-existent) have been requested by these customers.

6) The point of all this is to suggest that Fortran for both the PDP-4 and eventually the PDP-7 is time-consuming in the extreme. From ¶ 1 you'll note that the operating systems (necessary) are progressing hardly at all (I did work on the second for a day recently). Modification of programs for the PDP-7 stands at absolute zero. We've

discussed this before, but reiteration can't hurt. The potential market for the 4-7 as a Fortran processor has hardly been scratched, but old customers need support, new customers need selling and guaranteed support. At the moment my time is budgeted up to and beyond the hilt. We need a more sophisticated assembly system for the 7.

"What is to be done?"

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7) I've effected a rapprochement, at least temporarily, with Lidofsky at Columbia, who felt I'd insulted him, and Norman at Harvard who felt I was neglecting him. I'll spend a day at Harvard next week -- an unpredictable but necessary expenditure of time. Some further notes:

a) Lidofsky would like to write line-at-a-time records on mag tape for listing on his line printer. The present opsys writes one card records, one item per card which is not too appropriate for line printers. I've promised him to look into it, not sure how much programming is involved. Notice that unless we restrict the peripheral configuration of a Fortran System, which I regard as undesirable, re-programming and extension of existing programs will always be implied.

b) Harwell (and possibly JPL) have an extended memory.

Subroutines and/or documentation should be provided to allow them to access data out of the Fortran core bank.



INTEROFFICE MEMORANDUM

DATE June 29, 1964

SUBJECT The problem of FORTRAN Maintenance

TO H. Anderson
J. Ridgeway
R. Wilson
H. Morse III

FROM Dave Fellows

1) The operating systems. (status)

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INTEROFFICE MEMORANDUM

SUBJECT: JOB ALLOCATION, MECHANICAL DESIGN

DATE: June 30, 1964

TO: All Engineers

FROM: Loren Prentice

K. Olsen
 S. Olsen
 H. Anderson
 N. Mazzaresse
 M. Sandler
 J. Smith
 R. Maxcy
 R. Maroney
 K. Peirce
 H. Crouse
 B. Brackett
 W. Hindle

To better acquaint all engineers and management with job responsibility within the mechanical design department, a memo will be issued periodically as required.

<u>ENGINEER</u>	<u>JOB NUMBER OR EN NUMBER</u>	<u>DESCRIPTION</u>	<u>% COMPLETE</u>
Ron Cajolet	D000000001178	PDP-6 Development	90%
	D000000001236	340 Display Development and prototype	97%
	D000000001209	Display development, general	78%
	D000000001023	Mounting Panels	--
	D000000001177	PDP-5 Development	
	D000000001282	PDP-7 Development and Prototype	80%
	D000000001297	PDP-7 Memory Development and Prototype	30%
	D000000001023	Mounting Panels, 1943	50%
	M000000010000	Dynasert holding plates	95%
	C000000002945	Console push button & light section	90%
Dick Clemente	DP000000001304	Component Development	10%

<u>ENGINEER</u>	<u>JOB NUMBER OR EN NUMBER</u>	<u>DESCRIPTION</u>	<u>% COMPLETE</u>
Phil Backholm	D000000001249	2USEC Memory Development and Prototype	60%
	P000000001288	Automated Board Production Line	90%
	DP000000001291	Mechanical Design for 18-36 Series Modules	75%
	D000000001026	New Magnetic Tape Development to be used prior to model number designation	50%
	DP000000001023	Mounting Panels, PDP-7	50%
	DP000000001304	Component Development	15%
Dick Richardson	P000000001185	Mechanical Design of Modules	100%
	0000000000033	Sheet Metal Shop Adm.	--
	0000000000034	Machine Shop Adm.	--
Loren Prentice	0000000000001	General Engineering, Building Layout	--
	0000000000004	Standards	0.5%
	D000000001237	Solid State Microtape Development & Prototype	30%
	D000000001304	Component Development	15%
	0000000000008	Security	--
	D000000001282	PDP-7 Development and prototype	10%
	D000000001291	Mechanical Design for 18-36 Series Modules	30%
	0000000000002	New Test Equipment	parts ordered
	0000000000036	Mechanical Engineering Adm.	--
	0000000000033	Sheet Metal Shop Adm.	--
0000000000034	Machine Shop Adm.	--	

<u>ENGINEER</u>	<u>JOB NUMBER OR EN NUMBER</u>	<u>DESCRIPTION</u>	<u>% COMPLETE</u>
John Fitzgerald	D000000001178	PDP-6 Development	90%
	P000000001288	Automated Board Production	50%
Dave Nevala	C000000020096	Brookhaven PDP-6	25%
	C000000020105	University of West Australia PDP-6	40%
	P000000001136	Relay Microtape Unit Development reel holder	30%
	DP000000001023	Mounting panels, fabrication process for module racks	30%
Scott Miller	D000000001136	Relay Microtape unit development, clean-up	50%
	D000000001178	PDP-6 Development, clean-up	95%
	D000000001301	New A-D Develop, case	25%
	D000000001282	PDP-7 Development and Prototype	98%
	D000000001291	Mechanical Design for 18-36 Series Modules	90%
	D000000001292	Linc Development	10%
	D000000001315	PDP-5A Development	5%
	P000000020009	A-D-A Converter	90%
	D000000001088	Module Packaging for shipment	OPEN
		Computer Cabinet Design	30%
	Product Identification	OPEN	



INTEROFFICE MEMORANDUM

DATE 30 June 1964

SUBJECT 630 Data Communication System

TO Gordon Bell

FROM D. Smith

Your ability to monopolize this company, to insure that your projects come first, has caused me quite a bit of hardship. It just seems that if it isn't your idea, there must be a better way. Well, I'm tired of defending the 630 System. I feel that I have surmounted many obstacles (intended or otherwise) in order to make the 630 a computer option.

Your recent suggestions that possibly the 630 would fare much better if I were in the Engineering Department, sort of disturbed me. I would like to suggest that advancement of the 630 is not dependent upon my location within Digital but that the 630 will advance much more rapidly under your control, direction and domination. I feel that the advancement of the 630 System should not be delayed further and therefore, I am presenting you with the complete system. Attached to the system are a fair amount of loose ends. These primarily exist due to your domination in a number of critical areas during the non-priority reign of the PDP-6. These should pose no problem to you due to your ability to get things done, at the expense of others. I would like to suggest that this matter be given your immediate attention since some systems have been or are about to be ordered and there are still no production type prints.

I think that July 2 should afford sufficient time for your assuming complete control of the 630 System.

I do not wish to exchange ideas or opinions with you concerning this decision unless you are in complete agreement with it. (You should recognize this method of squelching opposition).

cc: Ken Olsen
H. Anderson ✓
S. Olsen
N. Mazzaresse
R. Best



INTEROFFICE
MEMORANDUM

DATE 30 June 1964

SUBJECT PDP-5 Systems for ITT - the Status of the project is as follows

TO Nick Mazzaresse

FROM D. Smith

1. R. Lane watching over things very closely. Making customer contacts.
2. Ed de Castro PDP-5 design and liason with Dick Tringale on Drum System
3. Gordon Bell and A. Kotok doing inexpensive teletype interface.

The capabilities of the above group tend to reflect that sufficient Engineering and Sales effort have been delegated to the project.

I see no reason to be held responsible for the project and will assume that my responsibilities in this area cease with the issuance of this memo.

cc: K. Olsen
H. Anderson ✓
S. Olsen



INTEROFFICE MEMORANDUM

DATE 30 June 1964

SUBJECT Digital Spare Prices

TO Ken Olsen
→ H. Anderson
S. Olsen
N. Mazzaresse
E. Simeone
D. Kuyamjian

FROM D. Smith

Attached is a list containing Digital purchased products. Problems arise due to the various methods of mark-up on these items. When quoting spare items to customers other problems arise.

If columns in the attached list could be completed and the Spare unit price be distributed, many pricing problems would be eliminated.

The availability of the DEC pricing cost should be a valuable aid for those who design special or new systems.

1. Our cost is in our buying quantities.
2. Pricing is for unit only (includes 6 months warranty costs).
3. The price of any major modifications or additional hardware, engineering, special handling, installation, etc., must be added to the pricing cost to obtain a system cost.
4. The spare unit price represents the point where the spare may be most easily interchanged with the original (i.e. the model 28 KSR requires internal wiring).

			DEC Cost	DEC Mark-up	DEC Pricing Cost	Spare Unit Price
1	Teletype Corporation					
	Model 28	RO Sprocket Feed				
	Model 28	KSR Sprocket Feed	1097.65			
	Model 28	ASR Sprocket Feed				
	Model 32	RO Friction Feed	370.00			
	Model 32	KSR (TG) Friction Feed	427.00			
	Model 32	ASR (TH) Friction Feed	561.00			
	Model 33	RO (TB) Friction Feed	417.00	1.978	825.00	
	Model 33	KSR (TA) Friction Feed	445.00	2.023	900.00	
	Model 33	ASR (TC) Friction Feed	592.00	2.027	1200.00	
	Model 35	RO (AV) Sprocket Feed	1277.00			
	Model 35	KSR (AP) Sprocket Feed	1476.00	1.693	2500.00	
	Model 35	ASR (AS) Sprocket Feed	2313.00	1.729	4000.00	
	BRPE-11	PUNCH	717.80			
2	Soroban Typewriter		1910.25			
3	Digitronics					
	Model 2500 paper tape reader		769.80			
	Model 3500 paper tape reader		2145.00			
4	Potter Instrument Company					
	Model M 906 II Tape Transport 60 cycle		7475.00			
	Model M 906 II Tape Transport 50 cycle		7495.00			
5	Midwestern Tape Transport		8312.00			
6	Anelex Series 5					
	Fio - Dec or ASC II characters					
	50 - 60 cycle operation					
	Digital levels interface					
	Includes buffer					
	300 lines/minute		15,500.00			
	1250 lines/minute		25,260.00			
7	Burroughs					
	Model B-122 200 cards/minute		6095.00			
	Model B-124 800 cards/minute		11,900.00			

	DEC Cost	DEC Mark-up	DEC Pricing Cost	Spare Unit Prices
8	ckronics			
	Model RM 503 display	655.00		
	Model RM 564 display	1388.40		
9	Calcomp Plotters			
	Model 563			
	29½", 12,000 steps/min, step .01"	8000.00		
	Model 564			
	29½", 18,000 steps/min, step .005"	9650.00		
	Model 565			
	11", 18,000 steps/min, step .01"	4550.00		
	rack mounted	5050.00		
	Model 566			
	11", 18,000 steps/min, step .005"	4950.00		
	rack mounted	5450.00		
10	Vermont Research			
	10" Drum, 320 track capacity	3500.00	3.0	10,500.00
	1750 RPM, maximum of 8 Bars			
	Bar (holds 5 Pads)	100.00	3.0	300.00
	Pad (heads for 8 tracks)	224.00	3.0	672.00
	20" Drum, 896 track capacity	7500.00	3.0	22,500.00
	1750 RPM, maximum of 8 Bars			
	Bar (holds 14 pads)	300.00	3.0	900.00
	Pad (heads for 8 tracks)	224.00	3.0	672.00
11	Monroe			
	Model 1046			
	16 column line printer	2290.00		