dec PERMANENT MEMORANDUM

December 31, 1962
DATE

SUBJECT Operating Procedures for the Program Libraries at DEC

TO

ABSTRACT This memo describes DEC's policies and procedures for program libraries, tape and write-up reporduction, and distribution of these materials.

FROM

APPROVED BY Harrison R. Morse

Harlan E. Anderson

INTRODUCTION

The Program Libraries now consist of the DECUS Program Library, the Library for the PDP-1, the Library for the PDP-4, and the Digital 1 and Digital 4 libraries which fulfill DEC's contractual software. The purpose of these libraries is the assimilation and dispersion of program tapes and writeups.

DEC's primary function in the operation of these program libraries will be that of reproducing tapes and writeups for distribution. Request for tapes should not be, in general, addressed directly to the program librarian, but should go through the organization responsible for the particular library. The program librarian will distribute tapes upon request through the proper channels, and in addition, will serve as an information source for people wanting information concerning the tapes in the program libraries and the distribution process.

This memo deals with the storage and reproduction process performed in conjunction with program library operation, and the basic set up of the program libraries. The process is shown in Figure 1.

1. Tape Program Identification Data

Each tape is labelled (with a stick-on label) and in addition abbreviated information (*indicated below) is punched on the front of the tape. The coding is as follows for the printed label:

*a Library name - refers to library from which tape is sent. The currently active libraries are DECUS and DIGITAL.

*b Machine number - refers to the model number of tapes (1 or 4)

*c Tape Type - The tape types are coded by a single letter:

U - Utility routines

S - System routines (assemblers, compilers, debugging routines, etc.)

IO - Input and/or output

M - Maintenance and Checkout routines

A - Arithmetic (programmed) routines

D - Demonstration programs

B - Business programs

X - Special

*d Tape Serial or Sequence Number - This serial number identifies the sequential entry of a routine to the library. A dash may follow the number followed by a digit which codes various parts of a long, broken tape.

*e Tape revision letter - follows the tape number and identifies a change to the tape in the library. The effect of a change (unless otherwise stated) will be to destroy tapes in inventory.

*f Tape format - A 2 or 3 letter sequence identifying the tape format.

Current symbolic language tapes in FIO-DEC codes are:

(DS) - Decal Symbolic

(FS) - Frap Symbloic

(MS) - Macro Symbolic

(AS) - Assembler Symbolic (PDP-4)

Current tapes from translators are:

MB - Macro Binary (a block binard format)

DL - DECAL Loader (a format which can be read by DECAL linking loader)

RIM - Read in mode - a format read by either PDP-1 or PDP-4

FB - Funny Binary - Output from PDP-4 Assembler

BB - Block Binary (format for PDP-4 similar to PDP-1 MB Format)

Others:

HLB/MBL/LBL - A tape with an RIM loader, followed by blocks of information similar to MS and BB.

*g Tape Name - Title of the tape

*h Original source reference number - The name by which the tape is known at its source.

*i Operation data - Very concise message giving operating instructions e.g.starting address, sense switch settings, etc., if possible.

*Denotes information which is also punched on the tape title.

2. Submission of Program Tapes and Writeups for Reproduction

Tapes for submission must be accompanied by a Program Submission form (see attachment). The form indicates the nature of tape and provides a check list for information regarding reproduction.

Tapes in the library will be controlled by the Program Reporduction Control form. This describes the material to distribute, and allows tapes to be properly prepared before reproduction. It also controls the inventory levels for the documents.

Library

Each tape submitted for inclusion in any of the program libraries should be in master tape form (with character count and checksum), and accompanied by a writeup either on reproducable masters or punched on a flexo tape in FIO-DEC code. Upon receipt of the above, the librarian will enter the tape in the proper library, initiate reporduction of the writeup, and inform the proper parties that the tape is available for distribution.

3. Storage of Program Tapes

For each library, there will be three program tape files:

(a) Master File The master file will contain the original source tape and a master tape from which reproducing masters are made for each program. This file will be locked at all times and the combination of such lock available only to the program librarian. The master file of DECUS shall be controlled by DECUS.

(b) Distribution File The distribution file will contain as many tapes as necessary to satisfy immediate distribution needs and a tape from which tapes may be made. (The file will be locked).

When copies of the tapes in the distribution file get below a limit prescribed by the Program Reproduction Control form, new copies will be made.

(c) Users File There should be, with each permanent machine at DEC, a user's file containing one copy of each tape and writeup. This file will be kept open at all times so that any user of the computer will have available tapes in the program library.

4. The Reproduction Method of Library Tapes

A checksum and character count will be punched on each master tape for verification purposes. When a tape is reproduced from the master tape, the character count and checksum will be punched also. To verify the reproduction, the Tape Reproducer need only be set in the verify mode which will read the character count and checksum, read the rest of the tape, computing a character count and checksum, and compare the read and computed character count and checksum. If these agree, the tape is assumed to be a valid reproduction of the master tape. This scheme may be used for both paper tape reproduction and mag tape to paper reproduction. The burden of accuracy falls on whomever makes the original master tape. However, once the master tape with character count and checksum is verified to be correct, all reporductions may be immediately verified. All tapes which have been punched and verified will be stamped by the person reproducing the tape.

5. Distribution of Tapes from the Program Libraries

The physical handling of tapes, and the distribution of tapes and program writeups should be done only by the program librarian. Though the method of obtaining tapes varies from library to library, all requests for tapes should be to the program librarian for the following reasons:

(a) The control problem: Library tapes and writeups are often updated and the program librarian, because of the centralized operation of the library, is most likely sure to have up-to-date copies.

(b) The keeping of records (see secion 6) requires that all requests for tapes go through the program librarian.

Normally, only symbolic tapes and writeups will be distributed. Program listings may be made by the user from the symbolic tape and the translation to binary should also be done by the user. While there are obvious exceptions to this (such as the larger system programs, MACRO, DECAL, DDT), a symbolic tape will normally be sufficient. The Program Requisition form will be submitted to the librarian. In some cases, this form should be made in quadruplicate. The four copies of the Program Requisition are:

(a) Original - This copy is kept by the librarian and it records the shipment of tapes to a particular installation, individual, etc.

(b) Requestor Acknowledgment - Returned to the requestor when the requisition has been filled.

(c) Shipping Copy - A copy included within shipment of tapes and writeups.

(d) Requistor original - Kept by the person requesting the tape.

6. Records

The program librarian will keep the following:

(a) The past distribution history of each tape in the library.

(b) A history of requests and submissions by each organization. In particular, the records of each tape indicates who has requested the tape and when it was distributed; and the tape errors in the writeup, etc. In general, the records for the individual tapes will contain all the information that a prospective user of the program may want to know. In addition, the records on each organization's activity will indicate at any time whether the organization has received a given tape and who in the organization received it. This aids the reproduction-distribution process by allowing the program librarian to refer multiple requests for a particular tape to the original person in the organization who received the tape. This will also facilitate the establishment of a limited library in each organization for commonly used tapes. Furthermore, when a tape and/or writeup are updated, the program librarian will notify the people who previously received the tape and writeup.

7. Digital -1 Program Library

The Digital-1 Program Library will cont ain all PDP-1 tapes for which DEC is primarily responsible. That is, the correctness, upkeep and accuracy of tapes and writeups will be guaranteed by DEC. Tapes in this program library will accompany each machine that is put in the field. At the present, the Digital-1 Program Library contains the following programs:

MACRO

DDT

Master Tape Reproducer

Expensive Typewriter

Octal Debug

Punchoff

18-bit Fixed Point Multiply and Divide Subroutines

Maintenance Package

In addition, certain DECUS Library tapes will be distributed with each PDP-1. These should probably consist of DECAL, Single DEC, and any DECUS programs which permit the user to make better use of his optional equipment.

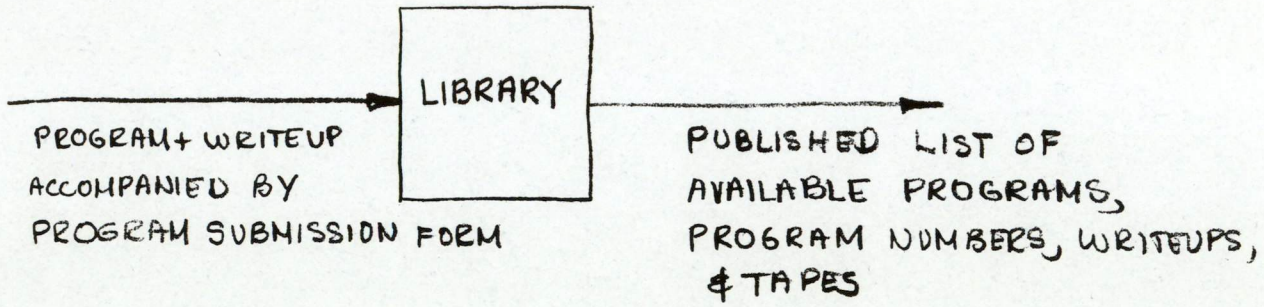
The Tape Reproducer will permit the user to reproduce tapes distributed to him for further distribution throughout his own organization. Each of these tapes will be distributed in the format of the master tapes; that is, they will contain a character count and checksum so that the user may accurately reproduce them.

8. Incorrect Tapes

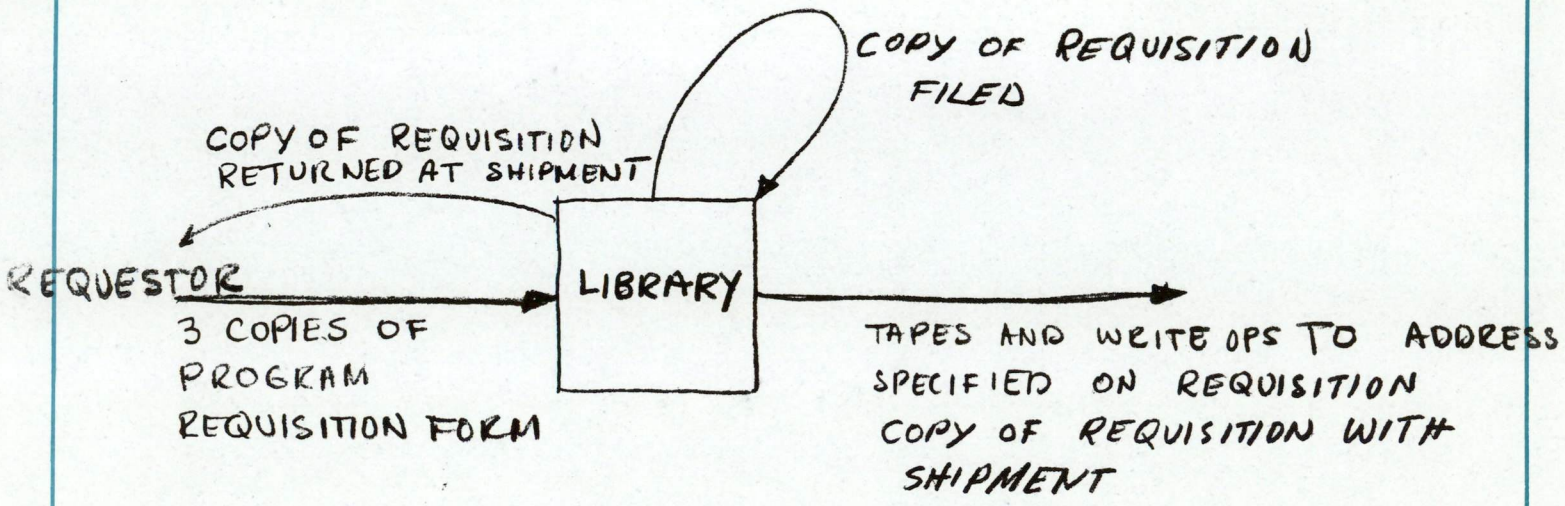
In the event an incorrect tape is distributed, either a bad reproduction or an undebugged program, it is requested that the faulty tape be returned to the library.

9. Summary

The responsibility that DEC assumes with relation to the program libraries will be that of accurate reproduction of tapes in the libraries and distribution of such upon request. In addition, the program librarian will keep records concerning tapes in the library and be a centralized information source for the channeling of information concerning library tapes. This information will consist of at least the following: the availabiltiy of tapes, the propogation of comments concerning the correctness of tapes, a cross-referenced index of all tapes available in each library, information on procedures for submitting tapes to each of the respective libraries, and information concerning from whom tapes may be requested.



PROGRAM SUBMISSION



OBTAINING COPIES OF LIBRARY INFORMATION

FIGURE 1

PROGRAM SUBMISSION FORM

LIBRARY _____

Tapes Submitted _____

_____

_____

Write-up Submitted _____

_____

_____

Program Name _____

Source Reference Number _____

Distribution Formats _____
(DS, FS, MS, AS, MB, DL, RIM, BB, FB, HBL, LBL, MBL)

Tape Type _____
(Maintenance, In, Out, I/O, Arithmetic, Business, System, Utility)

First Distribution Requested By _____ Date _____

Probable Write-up Request Rate _____ Copies/Month

Probable Tape Request Rate _____ Copies/Month

Submitted By _____ Date _____

Write-up Approved for Entry to Library _____ Date _____

Reason for Rejection _____

_____

Assigned Library Number _____

By _____ Date _____

PROGRAM REQUISITION

Library: DEC DECUS Digital

Requested by _____ Date _____

Shipment required by _____

Ship to: _____

_____

_____

_____

Special handling _____

_____

_____

Date Shipped	Program	No. of Tapes	No. of Write-ups

PROGRAM REPRODUCTION CONTROL

LIBRARY _____

FILE NO. _____

Machine Number	Tape Type	Tape Serial Number	Number of Separate Tapes	Revision Letter	Format

Program Name _____

Original Source Reference Number _____

Operation Data _____

_____

_____

Label:

Information Punched on Leader _____

Write-up Title _____

_____

Summary of Material to Distribute _____

Number of Write-ups for Inventory _____ min. _____ max.

Number of Tapes for Inventory _____ min. _____ max.

Number of Labels for Inventory _____ min. _____ max.

Approximate Time Required to Duplicate Tape _____

Tape Master Submitted _____ date _____

Tape Master Approved _____ date _____

Write-up Approved _____ date _____

Overall Approval _____ date _____

MSG. NO. WC-501

TO KEN OLSEN

FROM TED JOHNSON

HAVE TO BE AT LRL THURSDAY. WEDNESDAY FOR JPL. THEIR SCHEDULES AT LRL TIGHT. SUGGEST FLIGHT HERE WEDNESDAY EARLY. THEY WANT TO DISUXX DISCUSS HYBRID USE OF PDP-1 TO ELIMINATE HYDAC DIGITAL EX SECTION OF PACE SYSTEMS AT LRL.

WORD FROM TOM MILLER ON PDP-4 FOR TPS.. QUOTE.. DONT SWEAT IT.. UNQUOTE.

END OR GA PLS

RECD TNX END MM

Margaret Rand 1/8/63

PROPOSED 1963 TRADE SHOW SCHEDULE

Jan. 28-31	Electrical Engineering Exposition	New York, N.Y.
Feb. 8-12	6th International Electronic Components Exhibition	Paris, France
Mar. 6	ARD Annual Meeting	Boston, Mass.
Mar. 25-28	Institute of Electrical and Electronics Engineers International Convention	New York, N.Y.
Apr. 2-4	Progress in Electrical and Electronic Equipment Exhibit	St. Louis, Mo.
Apr. 16-21	Federation of American Societies for Experimental Biology & Medicine	Atlantic City N. J.
Apr. 17-19	IRE - Southwest Conference & Electronics Show	Dallas, Texas
May 20-23	Design Engineering Show	New York, N.Y.
May 21-23	Spring Joint Computer Conference	Detroit, Mich.
June 4-6	A.F.C.E.A.	Washington, D.C.
Aug. 20-23	Western Electronic Show and Convention	San Francisco
Aug. 28-31	Association of Computing Machinery	Denver, Colo.
Sept. 9-12	Instrument Society of America Annual Instrument Automation Conference & Exhibit	Chicago, Ill.
Sept. 30-Oct. 2	IRE - Canadian Electronics Conference & Exposition	Toronto, Ontario
Oct.	N.C.I.R.E.	Greensboro, N.C.
Oct. 28-30	National Electronics Conference	Chicago, Ill.
Nov. 4-6	Northeast Electronics Research & Engineering Meeting	Boston, Mass.
Nov. 18-20	16th Annual Conference on Engineering and Medicine	Baltimore, Md.
Nov. 11-15	American Institute of Electrical Engineers Conf. on Magnetism & Magnetic Materials	Atlantic City N. J.
Nov. 12-14	Fall Joint Computer Conference	Las Vegas, Nev.

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June 17-21	Amer. Medical Assn. Annual Meeting	Atlantic City, N.J.
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Nov. 4-6	Northeast Electronics Research & Engineering Mtg.	Boston, Mass.
Nov. 20-+?	16th Annual Conference on Eng. and Medicine	Chicago, Ill.
Nov. 11-15	Amer. Inst. Electrical Engineers Conf. on Magnetism & Magnetic Materials	Atlantic City, N.J.

# of booths?

~~Nov.~~ 12-14	Fall Joint Computer Conference	Las Vegas, Nev.
? Nov. 12-16	Electrical Techniques in Medicine & Biology	Baltimore, Md.
? Nov. 19-21	5th International Automation Congress & Exposition	Philadelphia, Pa.

Probably No.

Under Consideration

Check SF Jan. 23-26	American Institute of Physics	New York, N.Y.
~~Feb. 8-12~~	6th International Exhibition of Electronic Components	Paris, France
~~booth?~~ No Feb. 17-21	International Frankfurt Fair	Frankfurt, Germany
Coop with For Mar. 11-14	Amer. Inst. Chem. Engineers Petrochemical & Refining Exposition	New Orleans, La.
? Mar. 18-22	Western Metal Exposition & Congress	Los Angeles, Calif.
? Mar. 25-28	American Association of Petroleum Geologists	Houston, Texas
WH Mar. 31-Apr. 4	National Science Teachers Convention	Philadelphia, Pa.
~~Apr. 2-4~~	Progress in Electric & Electronic Equipment Exhibit	St. Louis, Mo.
asked Apr. 24-26	IRE-Regional Technical Conference & Trade Show	San Diego, Calif.
No Apr. 28-May 7	German Industries Fair	Hannover, Germany
No Apr. 29-May 2	Aerospace Medical Association	Los Angeles, Calif.
Tried? May	Instrument Automation Pacific Northwest Reg. Exhibit & Conference	Seattle, Wash.
WH? May 6-10	Amer. Soc. of Training Directors	Chicago, Ill.

No	May 6-10	National Industrial Production Show of Canada	Toronto, Ontario
Check	May 12-17	Amer. Pharmaceutical Association	Miami Beach, Fla.
✓	June 4-6	Armed Forces Communication & Electronics Association	Washington, D.C.
No	June 6-8	Canadian Chemical Exhibition	Toronto, Ontario
No	June 10-14	Canadian Medical Association	Toronto, Ontario
No	June 19-21	Joint Automatic Control Conference	Minneapolis, Minn.
No	June 19-26	International Exhibit to World Petroleum Congress	Frankfurt, Germany
No	June 26-29	Society of Nuclear Medicine	Montreal, Quebec
No	July 1-3	National Convention on Military Electronics	Washington, D.C.
?	July 15-18	Medical & Scientific Exhibition	Oxford, England
?	July 22-26	5th International Conference on Medical Electronics	Liege, Belgium
?	Aug. 26-29	American Hospital Association	New York, N.Y.
?	Oct.	Air Traffic Control Association	Kansas City, Mo.
No	Nov. 11-15	National Hotel Exposition	New York, N.Y.
?	Nov. 12-14	Manufacturing Automation Show	Detroit, Mich.
No	Nov. 18-21	Atom Fair	New York, N.Y.
Fox.	Dec. 2-6	Exposition of Chemical Industries	New York, N.Y.

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Dec. 2-6	Exposition of Chemical Industries	New York, N.Y.

file

INTEROFFICE MEMORANDUM

DATE January 10, 1963

SUBJECT

TO Ken Olsen

FROM Bob Savell

cc: Dick Best
Gordon Bell
Ed Harwood
Jon Fadiman
Loren Prentice
Nick Mazzarese
Tom Stockebrand

A Mr. Ress from Ress Electronics will be here at 11:00 a.m. next Tuesday, January 15, to demonstrate the Franklin Electronics High Speed Alpha-numeric Printer. This is a small printer which prints 20 columns of information at a speed of 20 lines per second and sells for $4575. It contains no buffering, requires character by character loading.

Franklin has recently sent me a letter asking about the possible market for a 30 or 40 column version of the printer. As such, or if they extend it to yet more columns, I feel that the mechanism may be of interest.

Margaret
Plse remind me

K. Olsen.

INTEROFFICE MEMORANDUM

DATE January 4, 1963

SUBJECT Dinner and Gift for Ben Gurley

TO All Interested Personnel FROM Party Committee

A dinner party is planned for Ben Gurley to be held at the Fairway Restaurant, Route 2A, Lexington Road, Concord, Massachusetts on January 16, 1963. Dinner is to be served at 6:15 P. M. A choice of steak or lobster at $5.00 for the complete dinner including tax and tip. Reservations for the dinner must be made by Friday, January 11, 1963.

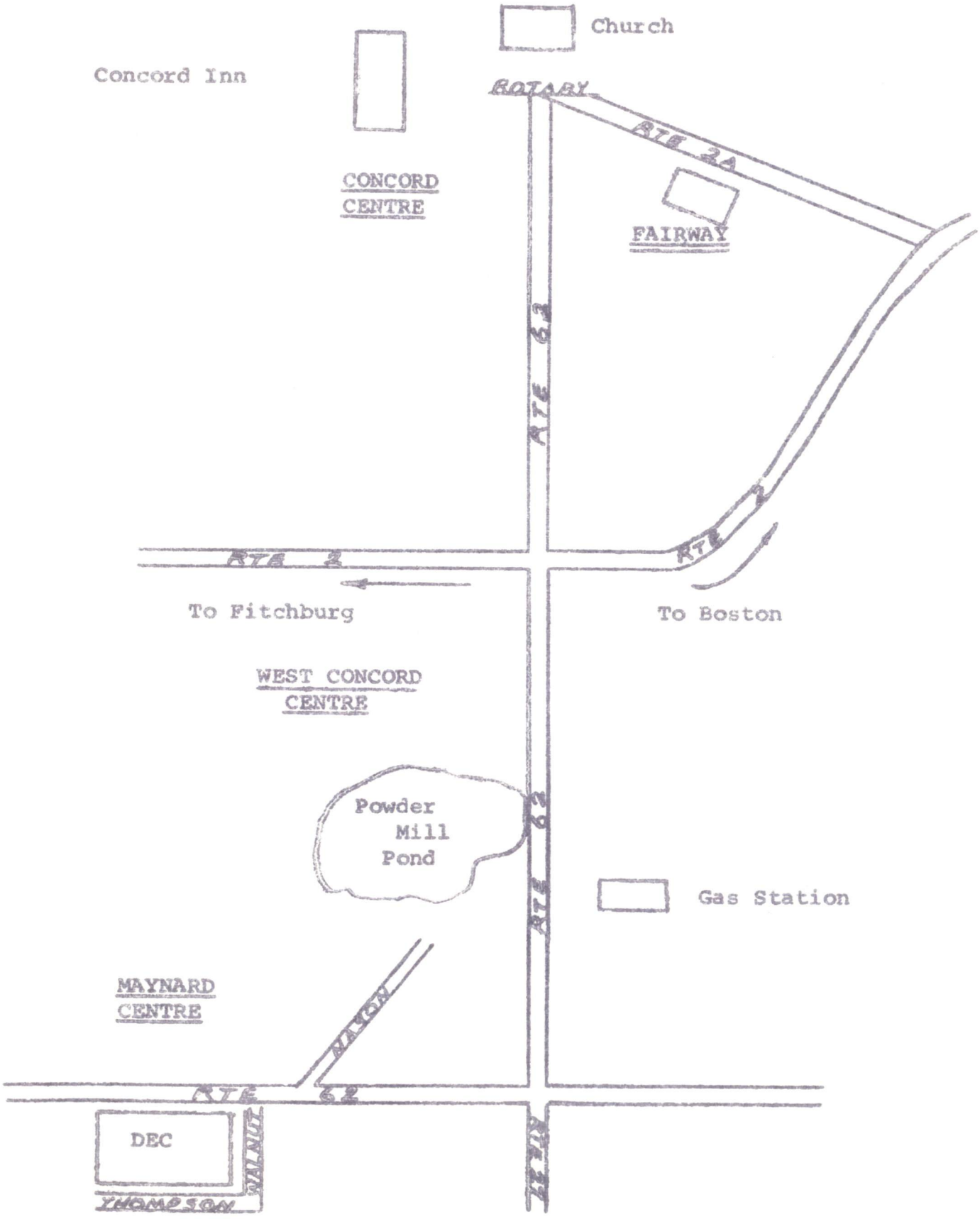
A gift will be presented to Ben at the dinner. Contributions for the gift will be welcome.

Those wishing to attend the dinner and or contribute to the gift: should contact Bob Savell, Ed Harwood, or Henry Crouse.

Please sign and return.	Yes	No
Would like to attend dinner	☐	☐
Would like to contribute to gift	☐	☐

_____

Signature


Church
Concord Inn
ROTARY
RTE 2A
CONCORD CENTRE
FAIRWAY
RTE 62
RTE 2
RTE 2
To Fitchburg
To Boston
WEST CONCORD CENTRE
Powder Mill Pond
RTE 62
Gas Station
MAYNARD CENTRE
MAYNARD
RTE 62
DEC
WALNUT
THOMPSON
RTE 117

FIELD MAINTENANCE SERVICES AVAILABLE

Digital Equipment Corporation offers field maintenance service for PDP computers and associated equipment on a per call basis, or one of two maintenance contract plans. The following is a brief discussion of the services available and charges involved.

The services discussed here are available anywhere within the continental limits of the United States. For convenience, two "areas" are defined: Area 1 is everything within a fifty (50) mile radius of a DEC service center. Area 2 is everything outside this 50 mile radius. At the present time, DEC service centers are located at 146 Main Street, Maynard, Massachusetts, and 8820 Sepulveda Boulevard, Los Angeles, California.

PER CALL BASIS

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.

MAINTENANCE CONTRACTS

Charges for maintenance contract plans #1 and #2 will be figured as a percentage of the base value of the equipment. The base value for this calculation will be the current published retail price of standard equipment, the last published retail price of a discontinued item, or the selling price of equipment unique to a particular installation, as applicable.

With one exception, the maintenance contracts provide for preventative and corrective maintenance on all PDP computers and associated equipment. No contract maintenance is available for

computer typewriters that have been in service for more than eighteen (18) months.

PLAN NUMBER 1

This plan provides minimal preventative maintenance service and limited corrective maintenance service. It is intended for those users who plan to do a portion of the necessary maintenance themselves. The plan provides for one (1) preventative maintenance call per month, to be scheduled by DEC, and a limited number of trouble calls per year. The number of trouble calls allowed is a function of the complexity of the installation. Twelve (12) trouble calls per year are allowed for a basic computer with no options, and the number of calls will be increased by one (1) call per year for every $600.00 per year (or portion thereof) over the charge for a basic computer. Once the limit on trouble calls has been reached, additional calls will be on a per call basis. Charges for plan #1 are:

1. 2% per year of the base value of the equipment.
2. Cost of replacement parts.

PLAN NUMBER 2

Plan number 2 provides the same monthly preventative maintenance calls to be scheduled by DEC, but places no limit on the number of trouble calls during the contract year. Charges for plan #2 will be figured on the basis of 5% per year of the base value of the equipment.

ADDITIONAL PROVISIONS

All service is on a "working hours only" basis. Working hours are defined as 0800 to 1630, Monday through Friday, (Excluding holidays). The calls must be placed within these hours. Work once started will continue as long as necessary.

Troubles traced to modifications or to additions not supplied or approved in writing by DEC, will be charged for at the per call rates regardless of any existing maintenance contracts.

Items of equipment that are still within the original warranty period will continue to receive free service as in the

past. As warranties expire, the items concerned can be added to existing maintenance contracts with appropriate adjustment in charges.

For further information concerning field services and maintenance contracts, contact:

R. J. Beckman
Manager, Customer Relations
Digital Equipment Corporation

INTEROFFICE MEMORANDUM

DATE December 31, 1962

SUBJECT Foxboro Purchase Order # 170814

TO K. Olsen
H. Anderson
A. Hall III

FROM R. Mills

Arthur Hall and I went down to Foxboro, Natick, December 27, 1962 to meet with Roy Fine, Manager of Operations, regarding a new revised purchase order, additional articles and specifications which we had both been working on. Changes were made by Foxboro and DEC satisfactory to both parties and the expected final purchase order and additional articles have been sent today to John Barnard and Bob Cesari for final review before signing the purchase order, hopefully, January 3, 1963 at 2:00 p.m. at Foxboro.

While we were there, there were several items that came up which should be mentioned:

1. Drum Warranty - Roy Fine expressed some real concern about service on the drums and we assured him that service would be available through DEC and we agreed to handle all calls to Vermont Research rather than their calling direct. This has a two-fold benefit for us in that we then become cognizant of all problems in the drum systems which should help us on current production and also puts us in an unusually strong position with Vermont Research. The Vermont Research drum warranty is written for one year from acceptance by the customer, which is compatible with our own carry-forward warranty to Foxboro.

2. Spare Parts Kit - Roy Fine asked if they could obtain the maximum percentage that we give them for the PDP-4 on the purchase order of 24% for the Spare Parts Kit, which is well over 90% in modules and I told him that this was contrary to our company policy and that the only thing I could do was bring up this request before our Executive Committee, as a special case.

General Comments:

The attitude of Foxboro, Natick, continues in a positive vein.

SUBJECT: Repair of Returned Modules DATE: December 28, 1962

TO: Ken Olsen FROM: Jim Cudmore

The following is a list of modules returned for repair during the week of December 17, 1962.

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
63	4421	Special Systems	No output	Q6-Q7-Q8 open B-E
63	4326	Special Systems	No Output	Fuse blown. S1188A shorted E-C.
63	4424	Special Systems	No Output	Fuse O.K. S118A shorted E-C, B-C, B-E
63	4433	Special Systems	No Output	Fuse blown. S1188A shorted B-E, B-C, E-C.
110	6832D	Bell Labs.	Bad diodes & transistors	Philco 2N393 open B-E. D001 open D001 high leakage
110	6204D	" "	" "	Sprague 2N393 open B-E. D001's open 2N393 high leakage D001's high leakage
110	6194D	" "	" "	2N393 open B-E D001 open.
110	25062D	" "	" "	D001 high leakage D001 open
110	6838D	" "	" "	Sprague 2N393 high leakage
110	6809D	" "	" "	Sprague 2N393 open B-E. D001 open
110	8199D	" "	" "	Philco 2N393 open B-E. D001 open D001 high leakage
110	25354D	" "	" "	D001 high leakage

Unit	Serial No.	Customer	Complaint	Defect
1201	66814P	Western Electric	No Output	Replaced obsolete components
1201	47405N	" "	Not Indicated	Replaced Obsolete components
3410	21898	N. Y. Office	Push button doesn't operate	6.8 mfd. capacitor was shorted
3410	20664	Ft. Monmouth	Erratic push button operation	Wire from J6 broken causing erratic operation
4110	75358E	A.P.L.	Customer doesn't have facilities for testing, so sent back for retest.	D001 shorted Replaced obsolete components
4110	75277E	"	"	Replaced obsolete components
4110	78175E	"	"	" "
4110	76746E	"	"	" "
4110	76787E	"	"	" "
4110	78165E	"	"	D001 shorted Replaced obsolete components
4110	78200E	"	"	Replaced obsolete components
4110	78025E	"	"	" "
4110	78179E	"	"	" "
4110	63800E	"	"	T.I. 2N1305 shorted E to B. D001 open Replaced obsolete Components
4110	63798E	"	"	D001 open Replaced obsolete components
4110	75366E	"	"	D001 open T.I. 2N1305 shorted emitter to base Replaced obsolete components

Unit	Serial No.	Customer	Complaint	Defect
4110	77981E	A.P.L.	Customer doesn't have facilities for testing Sent back for retest	D001 shorted Replaced obsolete components
4110	39868E	"	"	D001 shorted Replaced obsolete components
4110	78177E	"	"	" "
4110	76740E	"	"	" "
4110	75353E	"	"	" "
4201	49842L	"	"	" " D001 open
4201	48667L	"	"	D001 open Replaced obsolete components
4201	49022L	"	"	D001 shorted Replaced obsolete components
4201	74894M	"	"	D001 shorted Replaced obsolete components
4201	51064L	"	"	D001 open Replaced obsolete components
4201	51849L	"	"	2N1754 open B-E and C Replaced obsolete components
4201	47702L	"	"	Replaced obsolete components
4201	47705L	"	"	" "
4201	47706L	"	"	" "
4201	47713L	"	"	" "
4201	48002L	"	"	" "
4201	48064L	"	"	" "

Unit	Serial No.	Customer	Complaint	Defect
4201	48167L	A.P.L.	Same as before	Replaced obsolete components
4201	48177L	"	"	"
4201	49006L	"	"	"
4201	49054L	"	"	"
4201	49071L	"	"	"
4201	49081L	"	"	"
4201	49569L	"	"	"
4201	49730L	"	"	"
4201	49792L	"	"	"
4201	49797L	"	"	"
4201	49844L	"	"	"
4201	50253L	"	"	"
4201	50255L	"	"	"
4201	50317L	"	"	"
4201	50327L	"	"	"
4201	50865L	"	"	"
4201	51051L	"	"	"
4201	51054L	"	"	"
4201	51056L	"	"	"
4201	51804L	"	"	"
4201	51836L	"	"	"
4201	51842L	"	"	"
4201	51850L	"	"	"
4201	51996L	"	"	"
4201	61683M	"	"	"
4201	64144M	"	"	"

Unit	Serial No.	Customer	Complaint	Defect
4201	65244M	A.P.L.	Retest	Replaced obsolete Components
4201	74290M	"	"	" "
4201	75426M	"	"	" "
4201	76815M	"	"	" "
4201	76823M	"	"	" "
4201	76828M	"	"	" "
4201	77105M	"	"	" "
4201	78467M	"	"	" "
4201	78472M	"	"	" "
4201	78478M	"	"	" "
4201	87355M	"	"	" "
4201	96429M	"	"	" "
4201	96439M	"	"	" "
4201	96460M	"	"	" "
4213	74191D	"	"	" "
4213	55485D	"	"	" "
4213	99122D	"	"	" "
4213	48098C	"	"	Wrong transistor 2N1305 instead of 1754. 2N1305's had hot case--were shorted against each other. Replaced obsolete components
4215	69266F	"	Retest & Inspect possible heat sensitive	No defects Replaced obsolete components
4410	0063518	Bell Labs	Plugged in backwards. Believe pulse Xmfr. gone	2 transistors were cut from module.

Out of 91 modules tested, 62 had no defects.

INTEROFFICE MEMORANDUM

DATE December 28, 1962

SUBJECT Graphics at DEC-Progress and Promise

TO Those concerned

FROM Tom Sotckebrand

In order to deal with graphical information on a machine, a device is needed which will allow the displaying of lines and curves rapidly and without the use of tremendous quantities of core memory or of lots of computer time. In order to do this we are developing several pieces of gear. The first and most fundamental piece of hardware is called an Incremental Scope. Such a scope contains counting X & Y registers which allow the beam to be moved over the scope phase in small steps in response to a series of pulses which count the X & Y buffers up or down. The existance of this incremental scope will allow the construction of various pulse train generators which can be loaded from the computer and will then produce grid lines in X or Y only similar to our present grid line generator but with more power to control starting and ending points. It might cost three thousand dollars, ($3,000.00). The most complex generator that has perhaps immediate saleability would generate general conic sections with rotations and translations. It might cost forty thousand dollars, ($40,000.00). We plan to build an in-between complexity generator which will create pulse trains to make lines and circles, that is, circular arcs which may cost ten thousand dollars, ($10,000.00). Following this we will make a generator which produces general conics so that we can prove the techniques. This will allow some programmers the hardware so that they can get software done. The rest of this memo concerns the details of the incremental scope for those who would like to read and make comments and changes at this stage in the development and few comments about the line and circles drawing generator.

INCREMENTAL SCOPE

The incremental scope consists of a type thirty display system whose buffer register is wired as a pair of counters. Each counter is 11 bit long rather that 10 so as to provide overflow capability when drawing curves which go off the scope face. A digital-analog decoder is connected to this 11 bit buffer so that the beam position will correspond to the number in the buffer interpreted as an 11 bit signed number. That is, positive zero and negative zero give dots in the middle of the screen (separate by the least displacement); the number 0.01111 will locate the beam at the maximum upword or rightword deflection; and the number 0.11111 will locate the beam off the edge of the scope by 1/2 of a total scope deflection in the positive direction. Correspondingly the number 1.01111 will cause the beam to be positioned at the bottom or left edges of the scope and the number 1.00000 will cause the spot to be located 1/2 the scope deflection beyond the edge to the left or below.

The beam will be blanked if its outside the normal scope range. A control bit will be provided to allow the scope buffer to be treated as if it were ten bit buffer on loading by causing sign extension to occur into the 11 bit when it its loaded with 10 bits; that is, the tenth and eleventh bits will always agree. When loaded as an 11 bit buffer from PDP-1 the overflow bit will load the 11 bit of the scope buffer and on PDP-4 the next most significant bit from the present loading word will be used. A manual switch will be provided to reverse the loading of the two most significant flip-flops in cases where the users desires this action.

The incrementing action takes place normally on pulses produced by a pulse generator kludge, which supplies pulses on four wires called "X up", "X down", "Y left" and "Y right", which set buffer flip-flops in the scope. Upon the receipt of an INCrement pulse both the X & Y registers are counted according to the contents of the buffer flip-flops just loaded. The control flip-flops include two or three intensity flip-flops, one or two flip-flops called focus control (which allow specific amount of defocusing useful in some applications). One flip-flop will be called "Ignore Bit Eleven", Another pair for Light Pen Status and Light Pen On and two flip-flops to control the scale factor-whether to increment the buffer 1,2,4, or 8 steps per input pulse--complete the group. These are loaded from the computer upon the receipt of the Control Set Up pulse. One more flip-flop called "no flash", allows the generators to operate without causing displays to occur in the event that the computer would like to use the generator to compute arc tangents, arc signs, arc cosigns and so forth. To change scales will cost one or two microseconds. Pulse will stroke information into some of the same flip-flops from the generator when desired.

At present it is planned that only eighteen lines will connect between either the -4 or the -1 and the incremental scope and its generators so as to make the system as compatible as possible to any or particular installation. As an extra 18 more lines could be brought out as in the PDP-1 to allow simultaneous loading of both X & Y buffer. This is less necessary in a line drawings scope that it would be in a point plotting scope since the extra cost of 15 microseconds or so to plot a point may well be buried in the gain of plotting lines at the rate of 10 inches per millisecond. It should be noted that if only one set of lines comes from PDP-1 this set would be from the accumulator - so that the overflow bit could be used as noted above - rather than from the IO. If the option to take two sets of lines is excercised, the question arises as to where the most significant bit should come for the axis which is loaded from the IO. Onepossibility is to have it always be a 10 bit load only and thus have the capability of loading only start points which actually appear on the face of the scope. This is, I feel, is unacceptable.

Overflow incrementation will be provided in the form of a pulse entitled "You just went off the screen", whenever bit 11 is not been ignored. It should be noted that this is not the same as a simple overflow in either X or Y because an overflow can occur in one axis while the beam already off the screen in the other axis. The other immediate pulse type information supplied by the incremental scope is a pulse saying that light pen just saw a flash. This is in addition to light pen status information normally supplied so that the generator may make use of it more quickly. Levels back to the computer from the incremental scope will include the X buffer and Y buffer levels, 8 or so control flip-flops.

In summary then, the command pulses are as follows:

CONTROL SET-UP

This pulse loads the intensity flip-flop, focus, light pen status, light pen on, scale factor, ignore bit 11 and no flash. (Ignore bit 11 means that counting off the edge of the scope will cause the dot to reappear on the opposite side of the scope and that no off edge pulses will occur.)

LOAD X, LOAD Y

Pulses on these wires will load the 11 bits of X or Y and cause a flash of light after the set-up time of thrity-five microseconds unless the no-flash flip-flop is set by the previous set up command.

X, UP OR DOWN, Y, RIGHT OR LEFT

These pulses (normally coming from a generator) load up four flip-flops called move X, move Y, down and right, as appropriate for the pulse coming in in preparation for the increment pulse.

INCREMENT PULSE

This pulse causes the X or Y buffer to count according to the scale factor previously set and according to the contents of the move and direction flip-flops set up by the up and down pulses. The generate pulse may be supplied to one axis only simultaneous with the direct incrementing by the appropriate pulses of the opposite axis. A small amount of back panel rewiring will allow several options.

GENERATOR CONTROL PULSE

This pulse loads certain control bits according to the information from the generator itself so that beam blanking and scale changing can be done by the generator as well as by the computer. The input lines are to the no-flash, the scale, the intensity and the light pen flip-flops.

The above listed pulses complete the command lines and pulses to the incremental scope. The scope returns some pulses and levels to the machine:

a) The pulse that proclaims that you just went off the screen in the event the ignore-bit-11 flip-flop is a zero and,

b) The light pen saw a flash pulse if the light pen "on" flip-flop is a one and,

c) Twenty-two wires from the X & Y registers as well as all the wires from the control flip flops.

TS/nbh

dec INTEROFFICE MEMORANDUM

DATE December 28, 1962

SUBJECT High Voltage Protection in Cathode Ray Tube Displays

TO Works Committee

FROM Bob Savell

At Ken Olsen's request, this memo is being submitted to describe steps we have recently taken to improve the safety of the high voltage power supplies for cathode ray tube displays.

1. All high voltage supplies have had bleeder resistors added to reduce the high voltage output to 0 in the shortest possible time after turning off the supply. The maximum time for any of our three types of high voltage power supplies to decrease to 10% is 10 seconds. Previously the longest took about 45 seconds.

2. Type 30 Precision Displays: These have always had a polyethylene shield enclosing the cone of the cathode ray tube that is tested for 25KV. The tube cones run at approximately 10KV. These shields have been increased in size to better cover that part of the cone which serves as the tube mounting ring. In addition, a protective plexiglass ring has been added around the outside of the 1/8" thick plexiglass implosion shield which covers the face of the tube so that a barrier is formed that makes it impossible for one to get their fingers any closer than approximately 1" from what little of the ring is still not covered by the polyethylene.

   In summary, all high voltage points within the CRT housing on the Type 30 Display are now completely isolated.

3. Type 31 Ultra-Precision Displays: These have always been quite well protected. The only addition has been to cover the top of the polystrene tube which has been used in thepast to enclose the high voltage terminal point within the cathode ray tube housing. In the past it would have been necessary for one to stick their finger 2" down through this tube to make contact with the high voltage point. The addition of the cover now makes it impossible to do this. All high voltage points are now completely enclosed.

4. Color Display: The color display has also been fairly well enclosed, with the exception of the point contact on the CRT bulb. We are purchasing rubber insulators to completely cover this point.

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INTEROFFICE MEMORANDUM

DATE December 27, 1962

SUBJ: AEC Type 30A Display

TO: Bob Savell

FROM: D. J. Chin

The AEC display was shipped along with the rest of the system on Wednesday November 21, 1962 by exclusive van. When Ed Harwood and Jack Shields arrived at Chalk River on Wednesday November 28, 1962, they found the display uncrated and the top of the CRT shroud removed. The focus coil mechanism was dangling against the neck of the CRT. Of the three alignment screws fastening down the focus coil mechanism, one was missing and later found by Jack Shields fifteen feet away from the display. The light pen cable was also unscrewed from the light pen amplifier. AEC personnel told Jack Shields they removed the top of the CRT shroud to see was was inside.

The missing screw was replaced but when the display was turned on, it did not operate properly. A check of the output of the NJE supply by Jack Shields showed -8 volts instead of +50 volts. At my suggestion he removed the supply and checked it under no load conditions. Again the output was -8 volts. The NJE power supply manual which should have been sent with the display was not sent. Thus when Jack Shields called later on Wednesday November 28, the following conditions were

1) the focus coil needed realignment
2) The NJE power supply seemed defective
3) the NJE power supply manual was missing
4) the deflection preamplifiers and amplifiers may have been damaged.

The manual could have been sent by mail to reach AEC within two or three days but, assuming the supply could be fixed, there was also the possibility that the preamplifiers and amplifiers were damaged in which case the display would have to be shipped back to Maynard for repair. It might also have been possible for Jack Shields to realign the focus coil by instructions over the phone. Rather than having the display not completely meeting the specifications we have established, I decided to have the display returned to Maynard.

On Thursday December 13, the display was received at DEC. It had been shipped in an enclosed crate and the CRT shroud was properly braced against vertical and lateral movements. One of the cover panels had fallen off but otherwise everything seemed O.K. Jack Shields pointed out the screw that had been missing which, in Ken FitzGerald's opinion, could have fallen out due to vibration. The light pen cable could not have fallen off due to vibration. A quick check of the power supply showed there was nothing wrong with it. The -8 volts output is obtained if the current limiter control knob is reduced to 0% instead of being at the value of 70% to 80% preset at checkout. This know may have been turned down during Final Mechanical Inspection or up in Canada. Since the cover panel had been taped down, it does not seem possible that the panel had fallen off and rubbed against the ~~knew~~ knob during shipment.

The display was completely checked out by Friday December 14 and shipped on Monday December 17 in the same manner as we have been shipping other displays with one precaution.

The present skid we use was adapted to float on "hair". Dennis O'Connor went along with Dave Bjorkgren to Canada for the installation. The display arrived without any apparent mechanical damage. All screws were securely fastened and none seemd to have become loose during shipment. Again the current limiter control know was turned down to 10%. This was reset to 80% and the diplay turned on. One of the muffin fans was inoperative and the trouble traced to an open motor coil. After the fan was replaced, the display operated properly.

The following additional precautions will be taken with each display shipped starting with Prod. No. 6000-7899.

1) All control knobs not having shaft locks will be adapted with shaft locks. The light pen gain adjustment will remain as is.

2) The focus alignment screws will be "nyloc" fastening screws.

3) Electrical and Mechanical Inspection will be requested not to turn control knobs on displays.

4) All prints, schematics, and manuals will be checked by Joe Rutschman, enclosed in manila envelope and wired wrapped to the neck of the CRT housing.

5) The following sign will be placed in a conspicuous position on the covered display.

"Do not uncrate unless DEC representative is present".

6) The present skids will be adapted to be floating skids (subject to S. Olsen's approval).

cc: K. Olsen
H. Anderson
S. Olsen
R. Beckman
J. Shields
J. Rutschman
E. Harwood
K. FitzGerald
L. Prentice
S. Miller
B. Towle
J. Duffy
R. Hughes
R. Gaboury

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INTEROFFICE MEMORANDUM

DATE December 27, 1962

SUBJECT

TO K. Olsen
H. Anderson

FROM J. Smith

The addition of a PDP-1 console bay to PDP-4 will entail an additional cost of approximately $490.00.

INTEROFFICE MEMORANDUM

DATE December 27, 1962

SUBJECT

TO K. Olsen
H. Anderson
M. Sandler

FROM J. Smith

Attached you will find two reports that may be of interest. I have generated these reports to be received on a weekly basis. The reports serve several useful purposes.

1. Production starts
2. Production stops
3. WIP status of all sub-assemblies
4. WIP inventory value
5. In-stock status of options
6. In-stock value of options
7. Status of computers in process
8. Turnover rate of options
9. WIP turnover ratio

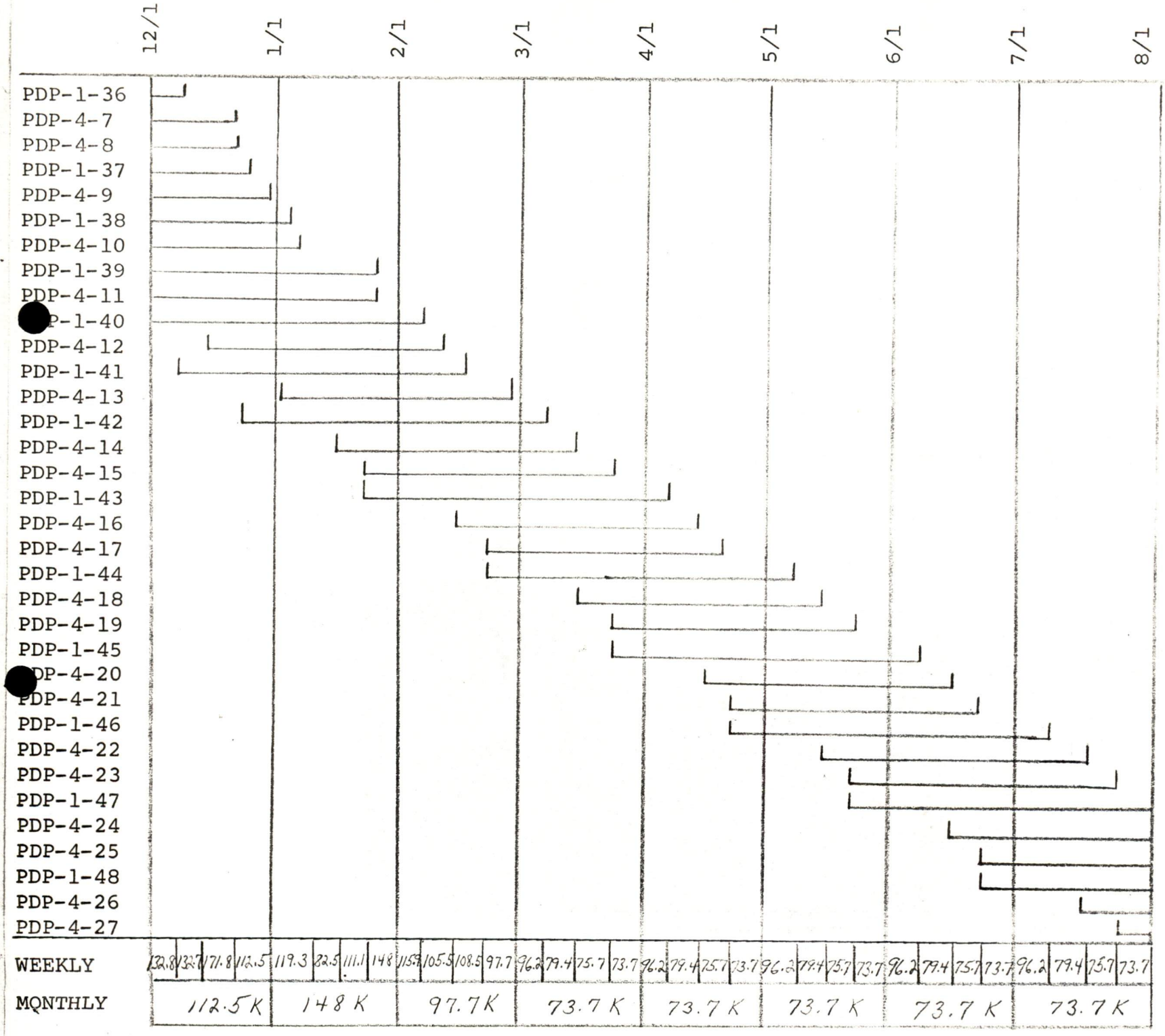
Accounting is being sent copies of these reports.

STATUS REPORT

WEEK ENDING 12/23/62

OPTION INVENTORY STATUS

In Stock (Beginning)			In Stock (Ending)			WIP STATUS	% COMPLETE	DOLLAR VALUE
QUAN		Dollar Value	QUAN		Dollar Value			
8	1Y-1Z 131-70-3392	2663.14	8	1Y-1Z 131-70-3392	2663.14	PDP-4 SUB ASS'Y. 131-70-3525	0 (START)	0
2	2Y-2Z 131-70-3393	598.62	2	2Y-2Z 131-70-3393	598.62	MAG. TAPE 50 SIMPLEX SUB ASS'Y. 131-70-3262	10%	148.80
2	3Y 131-70-3412	133.48	2	3Y 131-70-3412	133.48	17 PANEL SUB ASS'Y. 131-70-3266	10%	292.94
1	MULTIPLY & DIVIDE 131-70-3394	318.58	1	MAG. TAPE 50 SIMPLEX SUB ASS'Y. 131-70-3262	496.76	MEMORY SUB ASS'Y. 131-70-3264	25%	392.50
1	MAG. TAPE 50 SIMPLEX SUB ASS'Y. 131-70-3262	496.76				17 PANEL SUB ASS'Y. 131-70-3266	33⅓%	976.37
						PDP-4 SUB ASS'Y. 131-70-3525	33⅓%	1291.00
2	MAG. TAPE 52 LOGIC WITH CABLES 131-70-3390	3658.22	2	MAG. TAPE 52 LOGIC WITH CABLES 131-70-3390	3658.22	30 D LOGIC 131-72-3526	66⅔%	602.00
						PDP-4 SUB ASS'Y. 131-70-3525	75%	2905.50
						PDP-4 SUB ASS'Y. 131-70-3525	75%	2905.50
						I O T 131-70-3447	75%	1023.00
						MEMORY SUB ASS'Y. 131-70-3264	80%	628.00
	TOTAL	7868.80		TOTAL	7550.22		TOTAL	11,165.61



WIP COMPUTERS PLANNED SCHEDULE "62 - 63"

PDP-1 | 1.8 | 3.7 | 5.5 | 7.4 | 9.2 | 11.1 | 17.5 | 23.9 | 30 | 37.4 |

PDP-4 | 1.8 | 3.6 | 5.4 | 7.2 | 11.4 | 15.8 | 17.4 | 24.4 |

Ken Olsen

dec INTEROFFICE MEMORANDUM

DATE December 26, 1962

SUBJECT Meeting RE IRE & SJCC Shows - 63

TO

✓Ken Olsen
Harlan Anderson
Stan Olsen
Nick Mazzarese
Jack Atwood
Gordon Bell

FROM Howard Painter

There will be a meeting to discuss the IRE Show (March -63) and the SJCC (May -63) in Ken's office on Friday, December 29, at 2:30 p.m.

K. Olsen

dec INTEROFFICE MEMORANDUM

DATE 20 December 1962

SUBJECT PDP-1 Field Service Summary

TO PDP-1 Distribution List FROM Jack Shields

Attached is a summary of field service performed on PDP-1 installations for the month of November, 1962

SUMMARY OF FIELD SERVICE

November, 1962

Number of calls: 35
Man hours: 143.3

Maynard Area		Calls
Prototype		3
PDP-1B	BBN	12
PDP-1C-1	ITEK	3
PDP-1C-3	CRC	8
PDP-1C-4		
PDP-1C-5	MIT	0
PDP-1C-6	CRC(OAL)	4
PDP-1C-9	GEOTECH	0
PDP-1C-17	SRL	0
PDP-1C-20	DEC	3
PDP-1C-25	MINN. - HONEY.	0
PDP-1C-26	MIT(LNS)	2
PDP-1C-27	AECL	0

Los Angeles Area		Calls
PDP-1C-7	BBN	0
PDP-1C-12	LRL	2
PDP-1C-13	JPL	1
PDP-1C-15	BECKMAN	0
PDP-1C-16		

SUMMARY OF FIELD SERVICE

November, 1962

Prototype

Programs would fail to read in to the prototype. The trouble was traced to a weak pulse amplifier module (1607) which generates the pulse to clear the I-O register. Replacement of the pulse amplifier corrected this problem.

Display problems were traced to the display plug where the taper pin for AC_3 flip flop output had broken off. The taper pin was repaired and the display operated properly.

Reader problems occured when the computer attempted a read paper binary or a read in mode operation. Investigation found that the transfer from AC_1 to AC_0 was not taking place. Subsequence checks found the ~~IO . shift~~ level to be incorrect; this was traced to the External Rotate level out of an 1110 module. The input to the 1110 module was good and replacement of the 1110 module corrected the reader problems.

Bolt, Beranek, and Newman, Inc.

Preventative Maintenance	3 calls
Programming Errors	2 calls
Drum Acceptance	1 call
Malfunctions	5 calls

Intermittent problems with picking up bit 0 in memory on the PDP-1B. The trouble was traced to a defective 1982 inhibit driver module. This 1982 failure is a common problem, which is under investigation by Quality Control at this time.

Service was necessary at BB&N on the computeriters. Two ledex solenoids and a broken back space actuator spring were replaced. The computeriters were also cleaned and adjusted.

The light pen was inoperative on the Type 30 display. The trouble was found to be an open transistor and an open diode on the 1559 light pen amplifier; investigation also found that the +10B wire on the light pen amplifier had broken off. Reconnecting the broken wire and replacement of the amplifier corrected the light pen problems.

Itek

An intermittent trouble had been occuring at Itek for some time. The trouble would occur in a large interpreter program, and all the DEC diagnostic tests would run fine. The failure would show itself as random register changes in core memory. Margins on memory and other related areas in the computer seemed to have no effect on the program operation. The interpreter program was then broken down on a step by step basis while checking the registers, which were changed when the failure occured. This method enabled the program to be reduced significantly and then it was noticed that a Y27 address had been changed to contain the same word as a corresponding Y37 address. With a current probe on address Y27 and a Jmp Y37 in Y37 running; read/write current was detected on address Y27. From this point, routine checks revealed a defective 1151 module in the Y selection decoding of the memory address register. Replacement of the module corrected the problem, and the interpreter program ran perfectly.

Service was required for the BRPE punch at Itek. Adjustment of the registration restored the punch to correct operation performance.

Cambridge Research Laboratory PDP-1C-4

Memory pick-up of a bit was traced to a 1982 module in the PDP-1C-3. This problem was similar to the one mentioned in the section on the PDP-1B. Another memory problem was traced to the sense amplifier adjustment for memory bit 2.

Peripheral equipment troubles were corrected by replacement of the Soroban decoder unit and the power cam follower on the two CRC computeriters.

Various troubles occured on the PDP-1C-4 following its move to Itek for the fast block transfer modifications.

One problem was that the computer would fail to perform any instructions. This trouble was traced to a defective 1311 delay module in the basic timing chain. Another problem was the failure of the typewriter buffer bit 15 transfer to the in/out register via the input mixer. This problem was caused by a "cold" solder connection on the output of typewriter buffer 15 flip flop to the input mixer.

A service call was necessary when the computer was connected to the Itek logic to check out the fast block transfer system. The fall time of IO_{17}^{0} was 200 nanoseconds long. Normal computer use did not find this detrimental, however, when a fast block transfer was executed - a shift pulse every 250 nanoseconds - this was found to be an area of probable marginal difficulty. The slow fall time of IO_{17}^{0} was attributed to the load and/or the line length capacitance. The logic was modified so the flip flop output was connected to a 1684 bus driver module, and its output was tied to the long line computer logic. This modification shortened the IO_{17}^{0} fall time to approximately 120 nanoseconds.

Cambridge Research Center (OAL)

Preventative Maintenance	1 call
Program Errors	1 call
Malfunctions	2 calls

The Hayden time meter and the reader drive motor were replaced as part of the preventative maintenance program.

Service was necessary to adjust the start-stop time on the Mag Tape Type 50, and to replace a broken typewriter decoder seeker.

DEC

The reader on the PDP-1C-20 had a history of various problems which were traced to temperature drift in the photo-diode head assembly. The photo-diode head was replaced and the reader amplifiers were adjusted for best margins.

Memory troubles on the PDP-1C-20 were traced to a defective 1978 module which was the resistive load for bit 7. After this problem, margins were taken on memory and the sense amplifiers were readjusted for margins.

Massachusetts Institute of Technology (LMS)

Troubles with the display would occur from time to time at the LMS installation. The problem would cause a display shift on both the x and y axis. This trouble was traced to a cold solder connection on the +10S line on the -10 Volt reference module. Resoldering the "cold" connection corrected the display problem.

Lawrence Radiation Laboratory

Service calls were necessary at LRL for the Mag Tape units. The modifications which were applicable to the Mag Tape Control 52 were performed and these modifications cleared up the small problems which LRL had experienced.

Jet Propulsion Laboratory

JPL required service on their mag tape units. Some of the problems found and corrected were:

Dirty contacts on the auto/manual switch

Start-stop time out of adjustment

Worn brushes on the vacuum motor

INTEROFFICE MEMORANDUM

DATE December 20, 1962

SUBJECT

TO K. Olsen
H. Anderson
S. Olsen
M. Sandler
G. O'Dea
N. Mazzarese
R. Mills
G. Bell
R. Best

FROM J. Smith

Pursuant to the Works Committee decision this morning our computer construction program will be reduced. Presently we are construction two PDP-1's and two PDP-4's per month. This program will continue until the month of March. During this month and all subsequent months, we will reduce our program to one PDP-1 and two PDP-4's. This program will eliminate a need for sub-contracting and will be accomplished by our in-house capabilities.

dec INTEROFFICE MEMORANDUM

DATE December 19, 1962

SUBJECT

TO K. Olsen ✓
H. Anderson
S. Olsen
G. Bell
A. Hall

FROM J. Smith

PDP-4-7 (8000-7437) was delivered to Checkout 12/17/62. The second PDP-4 for December will be completed on 12/21/62.

INTEROFFICE MEMORANDUM

DATE December 19, 1962

SUBJECT University of Rochester

TO Nick Mazzarese

FROM Win Hindle

cc: Ken Olsen
Harlan Anderson
Stan Olsen

I discussed the ground rules for NSF Grants with Nat Sage, Associate Director of MIT's Division of Sponsored Research who administers these grants for the Institute. He reported that he knew of no rule set down by NSF which required an educational discount on equipment purchases. He suspects that the University of Rochester will request that DEC give them the most favorable educational discount that is given to any educational institution to be sure that we are not doing less for them than we are for other schools. Parenthetically, he added that he would welcome an educational discount for the many modules which we sell to MIT.

Win Hindle

WRH:ncs

To: Mr. Kenneth H. Olsen

SALES MEETING NOTES

Morning Technical Session
given by Tom Stockebrand

12/19/62

Stocky first indicated he personally would like all the hints and feedback possible from the Sales Department, and then introduced two subjects for the morning, the LINC-type tape transports and the Incremental Scope. Concerning the availability of these two items, Stocky said that the LINC-type transports should not be talked about with the outside world yet, but that the Incremental Scope should be ready shortly and could be "sort of" sold. Stocky also mentioned that he would like to talk a little about analog soon.

LINC-Type Transports (We will not use the name LINC)

The LINC transports are used on the Laboratory INstrument Computer (LINC) at MIT. It is about the same size as a PDP-4A, with its hardware worth about $30K. The major features of the LINC that differ from the "4" are as follows:

(a) 10us memory cycle
(b) 12 bit words -- 1K (fixed) memory
(c) Only I/O devices are (all are standard):

    (1) 2-5" CRT's
    (2) Keyboard
    (3) Tape
    (4) A-D Converter (about 1/2%)

For the LINC, the keyboard and a display scope function as a flexowriter with the added advantage that one entire line can be erased with one push of a key. All programs are prepaired on line, since this is a low cost machine and they are placed on magnetic tape.

One 3" spool of tape can hold all available programs and such a reel of tape costs only about $4.00 (maximum).

The tape units are simple, straight-forward, and are easy to thread. Each tape can hold about 1,000 blocks of 256 words (256 word blocks seems most reasonable). The tape speed is 40 i.p.s., and the tape is not NRZ recorded. In IBM compatable tape units, blocks can not be replaced without re-writing the entire tape due to slight differences in tape speed (except when quite large inter-record gaps are used), where as the LINC does have this block replacement capability. Essentially, this is because this LINC-Type transport is comparable to a long five-track magnetic drum. That is, two of the tape's tracks are the Timing and Mark tracks while the other three contain data. Therefore, 6 lines of data would be required to form one 18 bit word (or one memory slot). The Mark track information indicates the beginning and end of each slot, while the Timing track provides synchronization between the tape drive and the central processor. This technique completely eliminates inter-record gaps.

Although the transport has long start/stop times and is run at the rather slow rate of 40 i.p.s., the capability of replacing a single line or character on the tape is most advantageous. It was pointed out by John Koudela that two IBM transports can be used to replace given blocks of information, but this process consumes six minutes, since an entire tape must be read, modified, and rewritten on the other tape. Another feature of this type of tape unit is that it has the capability of both reading and erasing simultaneously.

These tape units are extrmely reliable for several reasons. First, the unit incorperates Sum Checking. Also, each of the five

tracks is in reality two (10 total) so that an error due to drop-out and pick-up should be overcome by the true and stronger signal on a majority decision basis. The pairs of tracks and heads are also oriented to minimize skew errors.

Summarizing the LINC-type transport characteristics:

(1) Low Cost
(2) High Reliability
(3) 40 i.p.s.
(4) 256 Word Blocks (18 bit words)
(5) 1,000 blocks per reel
(6) 250 feet tape length - 3" spool
(7) Block modification
(8) No inter-record gaps
(9) Non-IBM Compatible format

Incremental Scope

The addition of up/down counters and generators to the standard Type 30 displays is the basis of the Incremental Scope. Each generator, on command, supplies pulses to an up/down counter which in turn provides deflection signals to the display buffer. The first generators we will build will be capable of providing circles and lines, and a second, more sophisticated generator is planned that will also incorporate elipes and angles. X-Y scaling factors will naturally be included.

The incremental scope will be able to plot a point every 2us. This fantastic speed is accomplished through the use of a predetermination device that allows the point to move before the decoder outputs have fully settled. This pre-determination technique is definitely company confidential since it is responsible for the minimal 2us time required for point plotting.

INTEROFFICE MEMORANDUM

DATE December 19, 1962

SUBJECT Installation of Standard Cost System for Module Production

TO Ken Olsen
Harlan Anderson

FROM George O'Dea
Dick Mills

cc: Maynard Sandler

Phase I of subject Installation will appear on the Books in January of 1963. It consists of eliminating from Inventory the difference between the Standards Purchase Price and the Actual Price appearing on the Vendor's Invoice. For now the writing off of the variance will be confined only to new purchases. These acquisitions will be co-mingled with Maynard's 12/31/'62 Raw Materials Inventory (priced at actual cost). His costing of material withdrawals will proceed at F.I.F.O. until all of the non-standard articles have been consumed.

The standard prices to be used are those provided by Henry Crouse in October of this year and have been pegged at quantities consistent with an overall module production level of 7,500 units per month.

Disposition of the Price Variances will be debited or credited to a new account in the Cost of Sales section of the Profit and Loss Statement called "Purchase Price Variance".

Phase II of the Installation will deal with the various facets of material usage variance and is presently under study with a tentative target date of installation by March First.

Phase III of the Installation will deal with Direct Labor variances and is presently thought of as being applicable by April First.

Phase IV of the Installation will deal with overhead variance. This must be coordinated with Dick's Departmental Budget System. Hopefully, we will have this Phase concluded in time to price our June 30, '63 Physical Inventory at Standard Cost.

G.T.O'Dea

GTO'D:ncs

K. Olsen

dec INTEROFFICE MEMORANDUM

DATE December 19, 1962

SUBJECT 24th Meeting of the Test Equipment Committee

TO Richard L. Best

FROM Russell Doane

Members of the Committee:

Robert Hughes, Chairman
Russell Doane, Secretary
Donald White
George Gerelds
Dave Dubay
Dick Tringale
Jim Cudmore
Larry White
Ken Wakeen

1. Two more current probes with passive terminators were ordered for Ed Harwood and three for Bob Beckman. All five have arrived.

2. We have not yet decided whether to buy a type 290 transistor tester.

3. We had a demonstration of a 10 megacycle portable oscilloscope made by Avnet, which is a British company. We passed a favorable impression on to Jim Burley in Washington, (a representative of Bob Beckman's group was also present).

4. We have had a demonstration of a General Radio limit bridge, a General Radio resistance comparator, and a Terradyne resistance limit checker. No decision has yet been made on purchase of an instrument such as these for incoming inspection of passive components.

5. The Contronics diode tester was delivered, but several serious doubts arose about its functioning and part of it was returned to Contronics for further work. It now seems to be operating satisfactorily on AC tests, but not on DC with the Terradyne DC tester.

6. It came to Bob Hughes' attention that it is now possible to obtain precision zener diodes with National Bureau of Standards traceability. We informed the John Fluke Company of this fact and requested that our .01% Fluke meter, which is on order, be equipped with such a zener diode. We do not yet know to what extent this may delay delivery of the Fluke meter.

7. While we are investigating the possibility of purchasing a commercial F_t tester for 100 megacycle operation, Russ Doane will put our present F_t tester back in operation at 10, 30, and 50 megacycles.

8. Ken Wakeen will soon need a type 567 sampling oscilloscope for his work in automatic module testing. Jim Cudmore will also require the use of the second type 567, which we now own, for his work in automatic checkout within two to three months. Since delivery is approximately 11 weeks, Ken Wakeen will order a third type 567 immediately, including the necessary sampling plug-in unit and digital readout plug-in unit. These moves will reduce VHF to the Hewlett Packard sampling scope.

9. Ken Wakeen will need a digital voltmeter of approximately .1 or .2% accuracy for 20% of the time over the next 4 months, after which he will no longer need it, but during this time, the speed of reading digital voltmeter being much faster than that of operating a fluke meter, he recommends that we buy one, adding that its proposed accuracy will lie between that of our dc multimeters which are nominally 1 1/2% and our fluke meters which are .025 and .05%, and that other uses would be found for such a digital voltmeter. Jim Cudmore thinks that there are some production applications for such a device where the fluke meter is now employed. Ken Wakeen will investigate further and come up with a more detailed recommendation after discussion with Jim Cudmore to insure the useability of the device in a maximum number of applications.

10. Dave Dubay announced that a new oscilloscope calibration schedule is in effect, as recommended, to lighten his work load. It calls for recalibration of oscilloscopes used in production testing once every six weeks as is done at present. However, oscilloscopes which are used in engineering will be calibrated on a three months' schedule since accuracy is not quite so crucial in most applications.

11. We have been contacted by Acton Labs., who offer oscilloscope calibration services including pickup and delivery, which sounds considerably more attractive than what the Lexington Tektronix field office seems able to offer. We will invite a representative of Acton Labs. in to discuss this possibility.

12. The new Contronics diode tester, when it is finally working, will free two type 541 Tektronix oscilloscopes which are now equipped with type "S" diode recovery time plug-in units and are in full-time use in component test. Neither of these oscilloscopes are provided with type "CA" plug-in units, and both will be in demand for general purpose engineering work almost immediately. Therefore, we decided to order two type CA dual trace plug-in units. This will maintain our current practice of having one fewer type CA plug-in units than we have oscilloscopes in use.

The next meeting of the Test Equipment Committee will be on Tuesday, January 8, at 1:30 PM in Bob Hughes' office.

cc: H. Anderson
B. Beckman
W. Hindle
N. Mazzarese
R. Mills
J. O'Connell
G. O'Dea
K. Olsen
S. Olsen
H. Painter
G. Rice
M. Sandler
All Engineers
All Technicians

dec INTEROFFICE MEMORANDUM

DATE December 19, 1962

SUBJECT Northeastern University
Suburban Campus

TO Ken Olsen ✓
Harlan Anderson
Dick Best

FROM Win Hindle

On December 17th I attended a luncheon meeting at the Lexington Inn where Asa S. Knowles, President of Northeastern, presented a preliminary proposal for establishing a Suburban Campus on Route 128. At the present time, Northeastern is offering courses in graduate engineering subjects at Weston High School. The number of students attending these courses has exceeded Northeastern's expectations and has prompted the Northeastern staff to find a better way to serve the Route 128 Companies. About seventy firms were represented at the luncheon.

Northeastern proposes that an organization called the Northeastern Suburban Affiliate Plan be formed and share the cost of financing this new campus. The annual membership fee in this organization would be proportionate to the use made of the suburban campus by each company and would range from an annual fee of $500 minimum to a maximum fee of $15,000. This fee would be charged for a period of seven years, at which time the building would presumably be completely paid for. The courses offered on the suburban campus would be primarily graduate courses in engineering, physics, and mathematics leading to a master's degree. Other courses would be offered also. At the start, there would be ten classrooms in the building.

At the conclusion of the luncheon meeting a questionnaire was handed to each person to register his initial reactions to the proposal. Answers to the questions were merely an indication of interest and not a commitment to support the effort. I registered a definite interest in the proposal and feel strongly that it would serve DEC's interest to support this venture at the minimum level required. This would fit well with our desire to develop DEC's engineers and I believe would stimulate many more engineers to work on evening studies.

Win

W. R. Hindle

WRH:ncs

dec INTEROFFICE MEMORANDUM

DATE December 19, 1962

SUBJECT Visual Communications Congress

TO Kenneth Olsen
Dick Best

FROM Roger Melanson

The weekend of December 8th was spent at the "Visual Communications Congress" in Philadelphia, Penn.. The Congress is sponsored by the Society of Reproduction Engineers, American Institute for Design and Drafting, and The American Records Management Association.

The drafting exhibits, displayed no new equipment and supplies. The changes made were to better the products already on the market.

Minnesota Mining & Mfg. Co. displayed their new "Filmsort 1000" processor-camera. It automatically exposes and developes aperture cards ready for use in 60 seconds at a cost of five or six cents per card. It has the capacity to film a 18" x 24" or four 8½" x 11" drawings. The Filmsort aperture card is mounted with an unexposed silver negative film that has archaic quality. In the summer of 1963, 3M hopes to have a silver negative film that will meet DOD specifications. The Processor-Camera cost $3,000.00 which is inexpensive compared to the cost of planetary equipment.

Poly Repro International Ltd. (formerly Burton Mount Corp.) had two workable prototype models of the new Polydex M35 Electro-photographic microfilm Reader-Printers. They hope to steal some of the market from Xerox. Their process is much like Xerox except they're introducing a paper drum while Xerox uses a electrostatic process with a selenium drum. The Polydex will sell for $2,000.00 with less maintenance while Xerox's 1824 sells for $15,000.00. One feature the polydex does not have and that is it cannot print an intermediate vellum.

Photostat Corporation, the Business Products Division of Itek, displayed their 18.24 Reader-Printer. It was the first time I physically came in contact with the machine. In my opinion the 18.24 is a fine Reader-Printer. It can accommodate 35MM, 16MM, jackets and produce and intermediate vellum. One good feature this machine has over others is that it can make a good hard copy over a density range of .6 to 1.3. The cost of the 18.24 is $3,000.00.

Dietzgen has developed a two-color print made in one pass through an ammonia diazo machine. The trick here is that the vellum must have two different shades of opacity. A possible use for this material lies in printed circuitry, charts and graphs.

K & E displayed a data plotter using electronics manufactured by Datamation. Magnavox displayed its MEDIA which is a high speed document storage and retrieval system using 16MM.

Copymation, Inc. has a very nice automatic diazo whiteprinter called the Lancer "45". It had a unique anhydrous ammonia feed system, a rear vision mirror and ran very quite compared to our Revolute Star.

Log Etronic's and Post displayed equipment and the latter material in the use of photodrafting. The field of photodrafting is becoming quite popular especially in the tool engineering field.

Other equipment displayed were various offset presses, different methods in obtaining offset plates, blueprint folding machines, Friden typewriters, planetary microfilm equipment and tapes for printed circuit layouts.

INTEROFFICE MEMORANDUM

DATE December 18, 1962

SUBJECT Adams Associates

TO Ken Olsen ✓

FROM Harlan E. Anderson

cc: Stan Olsen
Bob Beckman
Ed Harwood
George O'Dea

I have told Adams that we would loan them a PDP-1 computer that we have been testing for them commencing soon after January 1st. The agreement is that they will continue to use it as long as it is convenient for us to let them do so or until such time as they go ahead with their purchase order on behalf of the Oregon Priming Center. During the time that they are using it, they will reimburse us for whatever time they are able to use on their own projects or rent out to people such as Itek. We will give them 30-day notice if we decide to discontinue the loan arrangement. They have the following potential users of the equipment:

1. Itek (Library Work) - Kuipyers
2. Itek (Drafting Work) - this time will probably be used for program debugging, etc.
3. Stelma - Adams have written a simulator for the computer that Stelma is now developing and will be debugging some of Stelma's programs on the PDP-1

I told them we would provide whatever part of the configuration that they had originally ordered that we could get together. It now appears that this will include the basic machine, the plotter, two tape units. The machine that we have been planning to use for them has been changed around several times internally at DEC and now happens to have multiply and divide although they had not ordered this. We plan to leave this in for now. Most of the hardware for the extra typewriters will also be in although the extra typewriters will not be furnished. Sometime in the next two weeks, whoever is going to handle the installation should visit Adams to inspect the area that they plan to put it in. As I understand it, this is a new area which they are now remodeling and it will be done by January 2nd.

H.E.Anderson

HEA:ncs

dec INTEROFFICE MEMORANDUM

DATE December 18, 1962

SUBJECT Fitchburg Paper

TO Arthur Hall

FROM Harlan Anderson

cc: Ken Olsen
Stan Olsen

Dick Sonnefeld of Foxboro telephoned me to indicate what the situation is at Fitchburg Paper. Apparently, a Mr. Hollander joined Fitchburg Paper recently as Director of Research. He had ambitious plans for using computers to make significant changes in their operation. His first attempt, which has now been installed about six months, was based on use of the IBM 1710 which they rent for about $4,000 per month. Sonnefeld feels that this was a poor match of equipment to the problem since it has not been able to do the things they had originally hoped for. For example, it is operating only in a logging load and there is apparently not sufficient capacity available to close the loop nor do they know how to do it. Apparently, Mr. Hollander feels that he has not gotten all the support from IBM on this project and the atmosphere is one of disenchantment with IBM. Perhaps he has promised too much.

The current thinking is to try and obtain a more capable computer to do the job. Fitchburg Paper apparently is an old time customer of the Foxboro Company and they are now asking the Foxboro Company for some help. The plan of the moment seems basically unsound and we should be very cautious. They hoped to time share one computer between a close loop process control operation and their business applications. They also expect the total rental to be $6,000 to $7,000 per month. Independent of the process control applications they are considering buying a IBM 1440. Last Friday two of the people came here with Saul Dinman of Foxboro to talk to us. They spent some time with Dit Morse learning about out own internal business of operations. I think we should encourage them to believe that these things can be done but I think we should be very careful not to promise that 1) we will have a business compiler or 2) that we would believe in and support the kind of time sharing that they are talking about.

Foxboro feels that if they end up buying any of our hardware items that Foxboro does not get a discount on, they would prefer that they deal directly with us. If they buy a process control system of course Foxboro is then interested. My own personal hope is that they will buy a process control system and divorce it from the business applications. If they really have support they might consider buying two PDP-4's but I am sure that's too ambitious for them at this time.

Harlan E. Anderson

HEA:ncs

dec INTEROFFICE MEMORANDUM

DATE December 18, 1962

SUBJECT University of Rochester

TO Nick Mazzarese

FROM Harlan Anderson

cc: Stan Olsen
Ken Olsen
Win Hindle

Dr. Fullbright of the University of Rochester asked for some type of an educational discount in connection with the PDP-1 Computer that they are considering . He has strongly implied or said this was some type of requirement for National Science Foundation support of his project. I telephoned Gordon Kingsley who is the Assistant to the President of High-Voltage Engineering Co., to see if he knew of such a policy of the National Science Foundation. They are selling some type of a tandem accelerator for use in the same project at the University of Rochester but he did not know of a policy of this kind at NSF.

In general grants from NSF have been the opposite extreme. They are normally thought of as having no strings attached to them and the University receiving them can use the funds in any way that they wish. Also, he mentioned that the Renegotiation Act does not apply to NSF funded projects. He mentioned that they sell the same product to the Atomic Energy Commission or Universities using NSF funds at the same price.

I personally suspect that since a particular sum of money is given to the University, they are motivated to make it go as far as possible by being frugal, etc. This is quite different than military money which is given to a University. In the military case, the University is reimbursed for what is has spent plus its overhead, plus a small fee. There, there would be no motivation to cut down on the spending since any money saved would not be available to the University to spend. My guess is that this educational discount is something that the University of Rochester hopes to receive so that whatever money they get from NSF will go further in supporting other projects.

Even if this is the case we still should come up with a conclusion or decision relative to their request. Gordon Kingsley is going to have a discussion with their salesman who is handling this project for them to see if he knows anything about it. Also I have asked Win Hindle to check with someone at MIT to see if they know of such a rule by the National Science Foundation.

H.E.Anderson

HEA:ncs

dec INTEROFFICE MEMORANDUM

DATE December 18, 1962

SUBJECT Doing Business in West Germany

TO Stan Olsen

FROM George O'Dea

cc: Ken Olsen ✓
Harlan Anderson
Dick Mills

The attached abstract of Lybrand's memo on doing business in West Germany may prove helpful in preparation for your trip to Munich. Many of the comments deal with German Corporate Structure. While we do not contemplate such a form for DEC, it is interesting to note the dissimilarities with the American form.

To the extent that it is possible to foresee trouble from such fragmentary sources, two hazards seem to lurk on the horizon.

a) The equalization phase of turn-over tax. Literally, I could not find any guarantee that we would not be required to pay 4% on DEC inventory shipped to our Sales Office and then another 4% when shipped to a customer. Hopefully a consignment treatment on shipments to the Sales Office would eliminate the extra tax.

b) Capital Transaction Tax - there is reference to loans to German subsidiaries as being interpreted as Capital investments for Tax purposes. We would want to make certain that the establishment of a Cash Working Fund for a Munich Branch would not be so regarded.

The whole question of duty is referred to in only the most general way in the abstract. Against the possibility of having to maintain an inventory of Maynard-made commodities in Munich, we would hope that duty could be deferred through the free port concept or some other technique.

To the extent possible we would like to see Munich do their own billing - for collection in Maynard. Their day-to-day cash needs could be fulfilled out of a Working Fund - subject to periodic replenishment out of Maynard - on documentation of funds disposed.

We would expect Mr. Huewe would be paid out of here. If local help is needed they would probably have to be paid locally - with the necessary payroll tax reporting done at that end.

We would certainly recommend your approving Huewe's expense reports. I would think this would lend itself to our giving an advance to him (not the branch) and replenishing his account as vouchers are approved by you.

Our first target for treatment of this operation on the books would be to carry his gross profit on the P&L, the branch expenses in the Sales expense section, the receivables and consigned inventory as separate current assets with a Branch Control Account as the clearing house for all transactions. This will make it easy to strike a quick direct P&L and investment status at the close of each month's business.

Yesterday, we wrote to the people at the Morgan Guarantee Trust requesting that they recommend a Munich Bank and a reliable local attorney. Another reference which may help in answering questions is that of the Foreign Branch of our Public Accounting Firm.

Cooper's and Lybrands
Sonnenstrasse 33/V, Aufgang, B, Munich 15

Telephone: 55.40.06

Resident Managers: E. Burger
H. Leistner

G.T.O'Dea

GTO'Dnes
Attachment

Abstract of Lybrand, Ross Brothers and Montgomery Notes on Doing Business in West Germany

1. L, RB, & M may be called upon to provide a list of prominent local Banks, Attorney's etc.

2. The unit of currency is the German Mark (DM) - Value approximately 25¢.

3. Wages (using '53 as the base) '61 = 178%; '60 = 161%; '59 = 148%.

4. Cost of living (using '53 as the base) '61 = 114%; '60 = 111%; '59 = 110%.

5. Typical Corporate Structure is the Aktien gisellschaft (A.G.)

   a) Ultra Vires acts not recognized as such.

   b) Governed by The Company Law dated 1937.

   c) Must be formed by 5 or more persons (either natural or Corporate). Need not be Germans.

   d) Minimum Capital of DM 100,000; 25% of which must be paid up, ($6,250).

   e) Share certificates must have Face Value of DM100 (no such thing as No Par.) May be either registered or bearer.

   f) Board of Directors of at least 3 people.

   g) 1/3rd of the Board must be elected by the employees to act as labor representatives.

   h) The Board cannot be held responsible for the management.

   i) The Board must appoint at least 1 Manager as legal representative w/o restriction.

   j) Managers and Directors may be non-resident foreigners and need not be stockholders.

   k) The A.G. is subject to Compulsory Audit and Publication of annual Accounts.

6. A Limited Liability Company, characteristic of Smaller Companies or of Subsidiaries is the Gisselschaft mut beschrankter Hoftung (G.m.b.H.)

a) Governed by the Law on Limited Liability Companies of 1892.

b) Must be formed by at least 2 persons (Natural, partnership, or Corporate.) Need not be Germans.

c) Minimum Capital of DM 20,000; 25% of which must be paid up ($1,250).

d) Share certificates must have face value of DM 500 and require documentary authentication for transfer.

e) Stockholders may Vote orally.

f) Board not required if less than 500 employees.

g) 1/3rd of the Board, if any, must be elected by the employees.

h) There must be at least 1 Manager appointed by the Stockholders - without restriction as to representation of the Company.

i) Managers may be aliens and need not be stockholders.

j) Liability of Stockholders is limited to the unpaid part of stock shares (articles of incorporation may permit assumption of added responsibility on the part of individual shareholders.)

k) Neither compulsory audit or publication of accounts is required.

l) All shares of G.m.b.H. may be combined under single ownership after registration.

m) Cannot be listed on German Stock Exchanges.

7. Germany has CPA firms with Professional standing roughly equivalent to that in the U.S.

8. AG Companies are required to Publish Annual Reports. This is the responsibility of the Manager. G.m.b.H. are not required to divulge their operating results, both forms of organization are required to keep books (double entry), take physical inventories.

9. German Companies are permitted to take much more liberal position on P&L as regards minimizing Income Taxes (Inventory Reserves, etc.)

10. Quirks: Long Term as a Balance Sheet Item is taken to mean four years.

11. All Income both Domestic and Foreign of Corporations having their management in Germany is subject to unlimited Corporate Taxation. Foreign Corporations are taxed only on income from German Sources. Corporate tax rates are 51% on retained earnings and 15% on distributed profits.

12. Business Taxes on other Than Income Include:

    a) Turnover Tax - 4% on all Transactions in Germany and on Imports

    b) Trade Tax - 14% on Taxable Income - levied by some local authorities.

    c) Trade Tax - on payroll - in some municipalities

    d) General Property Tax - Annually at 1%

    e) Real Estate Tax - 7% at time of Purchase - annual levy up to 3%.

    f) Capital Transaction Taxes of 2 1/2% are levied at time of issue of Common Stock (This can be interpreted as on loan from Parent to Sub.)

Employment/Foreigners

13. Normally no restrictions here; generally the employer must obtain an authorization from the competent German Labor Office.

14. Overtime: Normal 125%, Sunday 150%, religious holiday 200%.

15. Social Benefits:

    a) Paid Vacation of 12 to 24 days per year.

    b) Special paid days off for family deaths, marriages, moving.

    c) Old age and disability Insurance - 7% of first DM 11,400.

    d) Unemployment Insurance - 1% of first DM 9,000

    e) Accident Insurance premiums - up to 2%

    f) Health Insurance up to 9%

    g) Childrens Allowance 1% of payroll

16. There are no restrictions on currency exchange or transfer of capital.

17. Normally there are no restrictions on Imports. Some items require licensing. Import declarations required on everything. Export declarations required on commodities having a value of DM 50 or more.

18. Present customs tariff provides for duty-free entry or very low rates on raw materials. Rates are subject to constant change - and vary with country of origin. Valuation is on "normal price" including delivery, freight insurance, etc.

MEMO

SUBJECT: VHF Logic Diagrams

DATE: December 17, 1962

TO: Engineering Projects Committee

FROM: VHF Diagram ad hoc Subcommittee

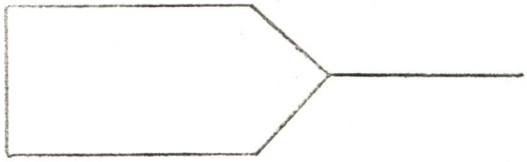
We recommend the following:

1. Solid half-arrows ( ) will represent 1 1/2 volt, 10 nanosecond negative pulses; open half-arrows ( ) will represent 10 nanosecond pulses going to ground from minus 1 1/2 volts.

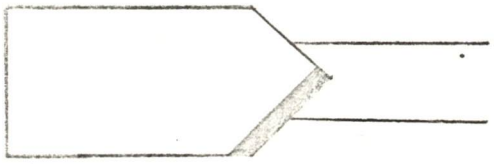
2. Solid half-diamonds ( ) will represent 1 1/2 volt negative-for-assertion levels; open half-diamonds ( ) will represent 1 1/2 volt ground-for-assertion levels.

3. No arrows will be shown for logical connections that don't use the connector.

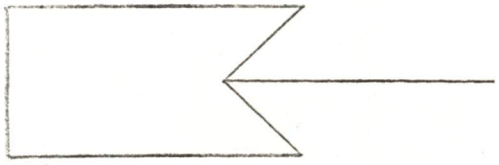
4. This is an "OR" gate whose output is not available at the connector:



5. This is an "OR" gate whose outputs drive 25 ohm loads for 1 1/2 volt signals, and whose heavy-side output is negative when any input is asserted:



6. This is an "AND" gate whose output is not available at the connector:



7. This is an "AND" gate whose outputs drive 25 ohm loads for 1 1/2 volt signals, and whose heavy-side output is negative when all inputs are asserted:

8. Inputs can be shown at any of the three straight sides of any simple gate.

9. Catalogue diagrams identify gates with the words AND and OR for familiarization.

10. Logic Module jumper lugs are numbered from left to right as they appear when holding the module plug upwards; here is an example of notation showing module type, location, and jumpers included, as they might appear on a system logic diagram.

8103
2A23
12/45

Jumpers from lug one to lug two and from four to five are indicated.

11. Flip-Flop input "AND" gates are combined to get a diagram of manageable size. The catalog description will explain that if inputs J, H, and F are asserted, input L can set the flip-flop or input M can clear it; similarly for the other gate. The catalogue also explains that ungated input K and gated inputs L and S are combined in an "OR" function for setting the flip-flop and similarly for inputs U, M, and T for clearing.

SUBJECT: Repair of Returned Modules DATE: December 17, 1962

TO: Ken Olsen FROM: Jim Cudmore

The following is a list of modules returned for repair during the week of December 10, 1962.

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
1501	Unreadable	Johns Hopkins University A.P.L.	For retest	Q9-Q8-Q7 missing Q3 open 2 Bournes trim pots fastened to handles on modules but not connected to circuit
1547	55911C	Information International	No Output	Q6 (MD94) shorted emitter to collector
1547-C	0033924	Information International	No Output	Q6-Q8 (MD94) shorted emitter to collector
1671	50161B	Johns Hopkins University A.P.L.	For Retest	No defects
1684	0028642C	ADX-7	Marginal on Pin L	A 68K resistor was wrong value (18K)
1706	0014013	Color Display	Bad Output	Proper heat sink washers added
1706	0033828	" "	Bad Output	GE 167 open base to emitter Proper heat sink washers added
1706	0014020	" "	Bad Output	Proper heat sink washers added
1706	0033831	" "	Oscillating Output	Proper heat sink washers added
1706	0033849	" "	Oscillating Output	Wrong value resistors
1706	0033853	" "	Oscillating Output	Wrong value resistors

Repair of Returned Modules - Cont.

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
3102	15113A	U.S.Navy	For retest	No defects
3112	15648A	" "	" "	" "
3112	14263A	" "	" "	" "
3112	14027A	" "	" "	" "
3112	14747A	" "	" "	" "
3112	14855A	" "	" "	" "
3112	13943A	" "	" "	" "
3112	14954A	" "	" "	" "
3114	13276A	" "	" "	" "
3114	14018A	" "	" "	" "
3114	14877A	" "	" "	" "
3114	14425A	" "	" "	" "
3114	15774	" "	" "	" "
3114	14191A	" "	" "	" "
3114	15141A	" "	" "	" "
3202	15049A	" "	" "	" "
3202	14453A	" "	" "	" "
3202	14960A	" "	" "	" "
3202	14646A	" "	" "	" "
3202	14756A	" "	" "	" "
3202	13921A	" "	" "	" "
3202	14883A	" "	" "	" "
3202	14761A	" "	" "	" "
3202	14124A	" "	" "	" "
3203	22954A	" "	" "	" "
3203	14652A	" "	" "	" "

Returned Modules - Cont.

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
4106	65212F	Johns Hopkins University A.P.L.	For retest	Updated Obsolete Components
4106	54226F	" "	" "	" "
4106	65262F	" "	" "	" "
4106	54213F	" "	" "	D001 diodes open Updated Obsolete components
4106	54202F	" "	" "	D001 open Updated Obsolete Components
4106	54208F	" "	" "	Updated Obsolete Components
4106	65263F	" "	" "	" "
4106	65275F	" "	" "	" "
4106	74557F	" "	" "	D001 diodes open 2N1305 open base to emitter
4106	54702F	" "	" "	Updated Obsolete Components
4106	67420F	" "	" "	" "
4106	67423F	" "	" "	2N1305 open base to emitter Updated Obsolete Components
4106	54736	" "	" "	D001 open Updated Obsolete Components
4106	67427F	" "	" "	Updated Obsolete Components
4106	85732F	" "	" "	" "
4106	54701F	" "	" "	" "
4106	54708F	" "	" "	" "

Returned Modules - Cont.

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
4106	54212F	Johns Hopkins University A.P.L.	For retest	D001 open Updated Obsolete Components
4106	65278F	" "	" "	Updated Obsolete Components
4111	48735D	" "	" "	D001 shorted Updated Obsolete Components
4111	58020D	" "	" "	D001 open Updated Obsolete Components
4111	86623D	" "	" "	Updated Obsolete Components
4111	92682D	" "	" "	" "
4111	92690D	" "	" "	" "
4111	92691D	" "	" "	" "
4111	53488D	" "	" "	" "
4111	48843D	" "	" "	" "
4111	79709D	" "	" "	" "
4111	91075D	" "	" "	" "
4111	48828D	" "	" "	" "
4209	65521H	" "	" "	D001 open Updated Obsolete Components
4209	65601H	" "	" "	Updated Obsolete Components
4209	65605H	" "	" "	" "
4301	90350E	" "	" "	" "
4301	51818E	" "	" "	" "
4301	56959E	" "	" "	" "
4301	51899E	" "	" "	" "

Returned Modules - Cont.

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
4301	61582E	Johns Hopkins University APL	For Retest	Obsolete Components Updated
4301	76912E	" "	" "	" "
4603	85920C	" "	" "	" "
4603	53284C	" "	" "	" "
4603	79845C	" "	" "	" "
4603	56465C	" "	" "	" "
4680	99978F	" "	" "	" "
1684	0061885C	Unknown	None	No defects
1684	0023690C	"	"	" "
1684	0061880C	"	"	" "
1684	0061888C	"	"	" "
1684	0056268C	"	No output on Pin R	2N711A failed under heat test
1684	0031417C	Unknown	Retest	No defects
1684	0032501C	"	"	" "
1684	0031284C	"	"	" "

December 14, 1962

PDP-4 Manufacturing Cost Estimate

Material (mechanical parts)		2,045.00
Mechanical Assembly		600.00
Sub-Assemblies & Wiring (includes material)		
1A to 1F Int. Processor	2,388.	
1K-1L-1M In-out Control	325.	
2E-2F-2H Real Time Section	735.	
Final Construction*	960.	
*(Power wiring & wiring together complete system)		4,408.00
Major Components		
Printer 28-C	1,097.	
Reader 2500	779.	
Punch 11	739.	
Memory System (wiring, stack, modules)	8,101.	10,716.00
Power Supplies		944.00
Modules		
Real Time Section	1,410.	
Punch and Teleprinter	1,050.	
Real Time Section	3,330.	
		5,790.00
TOTAL MANUFACTURING COST (Does not Include Checkout)		$24,503.00

dec INTEROFFICE MEMORANDUM

DATE December 14, 1962

SUBJECT

TO K. Olsen
H. Anderson
R. Mills
G. O'Dea

FROM J. Smith

This is a cost study I made for Gordon Bell. I thought it could be of interest to you.

dec INTEROFFICE MEMORANDUM

DATE December 13, 1962

SUBJECT New Tape Systems

TO Roland Boisvert

FROM Computer Guidance Committee

CC: Computer Guidance Committee Members
(K. Olsen)
(S. Olsen)
(H. Anderson)
(W. Hindle)
(N. Mazzarese)
(G. Bell)

Repeated requests for an inexpensive tape system which will handle IBM 556 bpi or 800 bpi densities may require investigation. We would like to review these on December 19, 1962, at 8:30.

Tape Systems presently include:

200 bpi - IBM

1. Type 50 with 51 (PDP-1)
2. Type 50 with 52 (PDP-1)
3. Type 50 with 54 (PDP-4)
4. Type 50 with 57 (PDP-4) under development for February 15, 1963

Tape Unit Evaluations

1. Potter 906II, Potter MT12, Potter Low Speed COSX
2. Ampex (February 1)
3. CDC
4. Burroughs ≈ 7K (February 1), Hiperformance 17K
5. Datamec

Hi-Density, HiPerformance System

1. DEC large (TX-2 type Bulk Storage)
2. IBM Hyper Tape
3. Information Storage System DK3
4. Potter High-Density

Paper Tape - Magnetic Tape Replacements

1. DEC Linc Type

IBM High Density Effort

1. 729 Type using type 56 Control (for delivery May 1)

Summary

There seem to be many possibilities for tape systems. Some degree of standardization would be helpful. Two possibilities may exist:

a) Discontinue type 56 and 57 designs and design one control for either PDP-1 or PDP-4 for either density IBM tape using a high performance drive such as the Potter MT12.

b) Persuade NSA to buy the above tape system.

dec INTEROFFICE MEMORANDUM

DATE December 12, 1962

SUBJECT

TO K. Olsen

FROM GERRY HAYNES

Attached is your new Hertz Credit Card replacing your present one which expires the end of December 1962.

dec INTEROFFICE MEMORANDUM

DATE 12 December 1962

SUBJECT Mr. Beranek's letter of December 10.

TO Ken Olsen ← FROM Bob Beckman

In connection with Leo Beranek's letter of December 10, I would like to point out that Bill Newell was also a valuable contributor to the work done.

I have asked Bob Lassen to include copies of the letter in Shield's, Gadaire's, and Newell's personnel records.

#####

Copy

dec INTEROFFICE MEMORANDUM

DATE December 12, 1962

SUBJECT Programs for PDP-1

TO H. R. Morse

FROM Gordon Bell

cc: K. Olsen
S. Olsen
H. Anderson
W. Hindle
N. Mazzarese

The above committee would like to begin a review of software for PDP-1 on December 19, 1962 at 9:15. The present state of the software, together with past developments and a library status report should be considered.

######

INTEROFFICE MEMORANDUM

DATE December 11, 1962

SUBJECT

TO K. Olsen ✓ B. Gurley FROM J. Smith
H. Anderson G. O'Dea
S. Olsen R. Mills
M. Sandler R. Best

Our present computer construction program of two PDP-1's and two PDP-4's was formulated to maximize use of our available labor without the need of purchasing additional material. To realize this goal, personnel from Module Assembly were transferred to Computer Wiring to increase the capability of this group. This addition of labor hours plus a substantial quantity of wired sub-assemblies in stock has enabled us to construct at a rate of four computers per month. Even with this increased labor supply, the labor hours required for this schedule are not available from our present wiring group. Therefore, there has been a steady drain on our inventory of wired sub-assemblies. With our present wiring capabilities and inventory of wired sub-assemblies, I can continue to construct four computers per month until the month of March. At this time, my supply of sub-assemblies will be depleted and our present capabilities will force a decrease in construction rate from four to two and a half computers during March and all subsequent months.

I can continue our present schedule of four computers per month and indeed even increase this number by one of two methods. First, the addition of labor hours by increasing the number of personnel in our present wiring group. To keep our present construction rate, I would need an additional seven girls. These girls would have to come from our module assembly group which has depleted to a great degree through transfers and terminations. Transferring this number of girls at this time would hamper our module production to a great degree. The second method would be to realize additional labor hours through sub-contracting. To keep our present schedule, we would have to expend $4,600 per month to sub-contractors. This figure is a labor figure and does not include material costs.

It is my recommendation that if we do decide to keep our present program that we sub-contract the additional labor hours needed. As the speed of our present wiring group increases through experience, we will be able to decrease our sub-contracting. On a long range plan we could continue to add to the wiring group until we no longer have a need for sub-contracting. If our sales

program does not require this quantity of computers, we should reduce our schedule and not increase our expenditures for unnecessary labor and materials.

It is the intent of this memo to point out that our in-house capabilities are limited. This in turn does not necessarily limit our output of computers. We have a fine group of sub-contractors trained to our requirements. With this available labor market, we can keep or even increase our present program by an appreciable amount. It is not a question of whether we can produce, but a question of how much we wish to expend to produce at this time.

I submit this report for your consideration at the next Works Committee meeting.

REPORT OF MEETING AT DIGITAL EQUIPMENT CORP., MAYNARD, MASSACHUSETTS

DATE: December 11 and 12, 1962

BY: Mike Cridland, Van Dyck Corporation

PRESENT: Messrs. Loren Prentice, Scott Miller, Paul Rawson (one day), Mike Cridland

The following people were also met during the course of the two days: Messrs. Harland Anderson, Vice President; Jim Larouski, Art Director; Jack Atwood, Director of Advertising; Frank Howland, Display; and Art Hall, Cost Control PDP 4.

OBJECTIVE: The purpose of this program is to supplement work done by Digital designers, make suggestions on appearance design, and be a general stimulus in the overall design area.

GENERAL IMPRESSION: The writer and all others at VDC feel that Digital is doing a very impressive job, and the corporate image in general is very good. This includes product, graphic, display and plant, and the general "awareness" of all concerned with the company. The areas mentioned below are some that would help to make this impression even stronger.

AREAS DISCUSSED:

PDP

A mockup of a new end panel was viewed and discussed. VDC feels this is an excellent direction to take, and makes the control panel end of the computer become a "front". The PDP suffers somewhat from an appearance of a "control panel stuck on the end". L & M I think felt this situation when they emphasized the control end of the computer for ITT.

The off-white end panel with the etched control panel, aluminum trim and off-white table in a "High Key" color scheme is fortunate and is desirable as a direction for Digital computors.

The black panel we feel, may be more desirable as a medium grey with the same texture. The name "PDP" would be placed on this panel and the company name could be letter spaced along the white strip. (See sketch) This would also provide the opportunity to place a customer's name in this same position.

The shape of the control panel we feel is somewhat confusing, and a mockup may be considered with straight sides. It is understood that this panel was designed to be "free standing" and its application on a flat panel causes this undefined look. The 1/8 inch black edge is an attempt to define this shape against the light background, which it does successfully.

This emphasis on the "end" and making it the "front" will also want to be considered for the PDP 5, and it is our suggestion that exploratory design work be activated on this unit in the near future.

DIGITAL EQUIPMENT CORP. MEETING December 11 and 12, 1962

DIGITAL LINK UNIT:

Some suggestions were made on this unit to eliminate the strong horizontal repetition and try to relate each control panel to its unit. There was also some concern over the preponderance of brushed aluminum finish on this unit, and it is suggested the cast aluminum door be painted off-white and its edge brushed. A piece of natural aluminum trim could be added to control panel to further point made in the first paragraph. (Also see sketch) The sketch shows our recommendation for a color break-up of this unit.

The name of your company placed on both the reel and its hub seems to us repetitious, and we feel a color disc is all that is required. When it is sold to another manufacturer a Digital nameplate could then be added.

CORPORATE IDENTITY

During the two days spent at Maynard the writer noticed several inconsistencies in the trademark and its use, and we feel that this is an area where some minor modifications could increase its value.

There seems to be two "Divisions" -- one is "DEC" with a tan color scheme, and makes modules. The other is Digital Equipment Corp., with a blue and white color scheme, and produces computors.

It is our feeling that they should all be either grouped under the seven block Digital Equipment Corp. mark using blue color, or develop a DEC Division and stay with its original color scheme, i.e., tan.

Also discussed was the possibility of producing a larger table for the PDP 1, and some scheme to reduce the height of the high speed printer. The latter problem would mean either changing cabinets so printer is slung between the units, or finding another source for a printer, i.e., Telex, Holley, etc.

MC:n
12-15-62

cc
Messrs. Olsen,
Prentice
Miller

December 11, 1962

Control Logic/Welded Modules/Employment of Dave Bold

Win Hindle — Gordon Bell

General

Today Dave Bold, BSME, 1958, and member of my house at MIT visited us in regard to producing welded modules. He's currently at CONTROL Logic, Inc. Control Logic is going on a four day week for everyone, and as such he's looking for a job.

APL - Johns Hopkins

A big order arrived at Control Logic from APL in the last few days for welded modules (of the laboratory variety).

CL Welded Modules

15 pins, rectangular $\frac{3}{4}$" x $1\frac{1}{2}$" x $\frac{1}{2}$", 7 and 8 pins on either side.
Small Mother board $\approx$ 3-6 modules - 23 pins on mother board
a Micro - Module = 30 minutes (avg) welding
600 micro-modules/week production capacity
30 people at CL, 10-12 welding stations

CCC

Reportedly has hired a welding expert.

Gordon Bell

cc: R. Lassen
M. Sandler
R. Best
K. Olsen ✓
S. Olsen

SUBJECT: REPAIR OF RETURNED MODULES

DATE: DECEMBER 11, 1962

TO: Ken Olsen

FROM: JIM CUDMORE

THE FOLLOWING IS A LIST OF MODULES RETURNED FOR REPAIR DURING THE WEEK OF DECEMBER 3RD.

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
1208	23714 D 23664 D 23848 D 23776 D 23939 D	MITRE CORP.	FOR RETEST	NONE
1209	90174 K	M.I.T.	NO OUTPUT	Q3 - Q6 BUFFERS OPEN B TO E D1, D11 OPEN
1410 C	25209 C 25208 C	MITRE CORP.	FOR RETEST	NONE
1669	0031821 C 0031813 C 0038819 C 0038903 C	D.E.C. (2240)	RETURNED BY A. BLUMENTHAL ON EN2240 FOR RECHECKING BY Q.C.	NONE
1539	0037668 C	MAG. TAPE ADX-8	FREE RUNNING WITH NO INPUT	NONE
1539	0037666 C	MT 52 - HONEYWELL	OUTPUTS AT PINS TTR WITH NO INPUT. BELIEVE TRIGGER CKT. NEEDS ADJUSTMENT	NONE
1539	0037695 C	MAG. TAPE 52 HONEYWELL	TRIGGER CKT. FAULTY	(1)SOLDER SHORT 2N1305 REPLACED
1539	0037665 C	MT 52 - HONEYWELL	GETTING PULSE AT PIN R WITH NO INPUT. BELIEVE TRIGGER CKT. NEEDS ADJUSTMENT	NONE
1539	0037669 C	M.T. 52 - ADX-8	NEEDS TO BE RESET	NONE
1539	0059443 C	MAG TAPE 52	MARGINAL	NONE
1539	0037670 C	M.T.52-HONEYWELL	GETTING OUTPUT AT PIN T WITH NO INPUT. BELIEVE TRIGGER CKT. NEEDS ADJUSTING	NONE
1539	0037655 C	M.T. 52 - ADX-8	NEEDS TO BE RESET	NONE
1539	0037667 C	MAG TAPE 52	NEEDS TO BE RESET	NONE
1539	0037662 C	MAG TAPE 52	FREE RUNNING	REPLACED 2N1305

REPAIR OF RETURNED MODULES (CONT.)

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
1539	0037663 C	M.T.52-HONEYWELL	GETTING OUTPUT AT PIN T. NO INPUT. BELIEVE TRIGGER CKT. NEEDS ADJUSTING	NONE
1539	0059438 C	MAG TAPE 52	OUTPUT OF R MARGINAL	2N1305 REPLACED
1685	0035177 B	D.E.C. - PDP 1	SOCKET #24 - 47 1/2 VOLT OUTPUTS ON PINS N.T.L.R.	T.I. - ALL 1304'S SHORTED FROM C TO E. DIODES D001 OPEN
1972		D.E.C.	THIS WAS A GROUP OF 37 MODULES TO CHECK FOR CUSTOMER RELATIONS & MAKE SURE THAT THEY WERE WORKING PROPERLY.	D001 - 6 INPUT DIODES WERE OPEN TO BASE OF 2N599'S (2) 2N599'S OPEN B TO E MD114 SHORTED E TO C
1972	0027118	J.P.L.	2 OUTPUTS NO GOOD	MD114 HIGH LEAKAGE
1972	0038522	D.E.C.	NO OUTPUT PIN "Y"	SPRAGUE-MD114 HIGH LEAKAGE
1972	0037728	D.E.C.	NO GOOD	NONE
1972	0044318	D.E.C.	NO OUTPUT PIN "X"	NONE
1972	0038458	D.E.C.	NO OUTPUT PIN "X"	SPRAGUE-MD114 HIGH LEAKAGE
1972	0038155	D.E.C.	NO OUTPUT PIN "X"	SPRAGUE-MD114 HIGH LEAKAGE
1972	0037616	D.E.C.	NO OUTPUT PIN "Y"	SPRAGUE-MD114 HIGH LEAKAGE
1972	0025745	D.E.C.	BAD TRANSISTOR NO OUTPUT	SPRAGUE-MD114 HIGH LEAKAGE
1972	0038470	D.E.C.	NO OUTPUT PIN "Y"	SPRAGUE-MD114 HIGH LEAKAGE
1972	0038473 B	D.E.C.	NO OUTPUT PIN "X"	SPRAGUE-MD114 HIGH LEAKAGE
4113	0078516 C	D.E.C.	OVERISSUE. NO TEST DATA RETURNED FOR RETEST	NONE
4113	0077610 C	D.E.C.	OVERISSUE. NO TEST DATA RETURNED FOR RETEST	NONE
4113	0024848 A	D.E.C.	OVERISSUE. NO TEST DATA RETURNED FOR RETEST	NONE
4113	0056251 A	D.E.C.	OVERISSUE. NO TEST DATA RETURNED FOR RETEST	NO DEFECTS

REPAIR OF RETURNED MODULES(CONT.)

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
4113	74530 A 0027449 A 0010581 A 0027448 A 0057449 A 0027551 A 0010572 A 0010034 A 0010040 A 0048459 A 0010029 A	D.E.C.	NONE	NONE
4113	0024460 A	M.I.T.	NO OUTPUT PIN "L"	SPRAGUE-MD114 OPEN B TO E
4203	0035963	PDP-4	Q1 OPEN B TO E	SPRAGUE-MD114 OPEN B TO E
4203	0029730 D	PDP-4	NONE GIVEN	NONE
4213	0023526 E	ADX-6	NO OUTPUT ON W-Z PINS	NONE
4213	0046167	MAG TAPE 52	OUTPUT H & J DIFFICULT TO CLEAR	SPRAGUE-MD114 SHORTED C TO E
4213	94871 E	I.T.T.-ADX-8	NO OUTPUT	2N1754 OPEN E TO B. SHORTED C TO B. D001 OPEN, D001 SHORTED
4215	69026 B	PDP 4	DEFECTIVE OUTPUT	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8 OPEN BASE TO EMITTER. D001'S ALL OPEN
4215	89791 B	M.I.T.	NO OUTPUT FLIP FLOP A	PHILCO 1754 1J4 6220 OPEN B TO E (2)D001'S OPEN
4218	0069609	PDP-4	NO OUTPUT	(8)D001'S OPEN (2)SPRAGUE 2N1499A SHORTED E TO C (6)SPRAGUE 2N1499A OPEN B TO E
201	29071 M	UNKNOWN	NONE GIVEN	IND. LIGHT FAILED MARGIN TEST GE-4JX 1C741 SHORTED E TO C
201	28962 M	UNKNOWN	NONE GIVEN	NONE
1539	0007841 C	UNKNOWN	NONE GIVEN	NONE
1539	0007834 C	UNKNOWN	NONE GIVEN	NONE
1685	0030833 B	UNKNOWN	NONE GIVEN	NONE
1685	0030831 B	UNKNOWN	NONE GIVEN	NONE
1685	0011765 B	UNKNOWN	NONE GIVEN	NONE

REPAIR OF RETURNED MODULES(CONT.

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
1685	0011764 B	UNKNOWN	NONE GIVEN	NONE
1685	0031832 B	UNKNOWN	NONE GIVEN	NONE
1685	002063 B	UNKNOWN	NONE GIVEN	NONE
1685	04663 B	UNKNOWN	NONE GIVEN	NONE
1685	0031835 B	UNKNOWN	NONE GIVEN	NONE
1685	0031840 B	UNKNOWN	NONE GIVEN	NONE
1685	0030361 B	UNKNOWN	NONE GIVEN	NONE
1685	0009338 B	UNKNOWN	NO TAGS	NONE
1685	0011763 B	UNKNOWN	NO TAGS	NONE
1669	0031805 C 0034374 C 0038816 C 0031804 C	UNKNOWN	NONE GIVEN	NONE
1973	91917 C	UNKNOWN	INOPERATIVE	(4)D662 DIODES WERE ADDED TO CKT. SPRAGUE 2N2099 SHORTED E TO C SPRAGUE 2N2099 OPEN B TO E 2N2099 OPEN B TO E, SHORTED B TO C MD94 SHORTED E TO C MD 94 OPEN B TO C DIODES 003 OPEN
4209	0019650 H	UNKNOWN	NONE GIVEN	OUTPUT OF FLIP-FLOP B BAD T.I. 2N1305 HIGH LEAKAGE
4209	0018404 H 0028847 H 0030696 H 0015613 H 0015500 H 0064803 J 0064790 J 0064793 J	UNKNOWN	NONE GIVEN	NONE

OUT OF 97 MODULES RETURNED BY CUSTOMER, 40 HAD NO DISCERNIBLE DEFECTS

OUT OF 30 MODULES UNKNOWN, 27 HAD NO DISCERNIBLE DEFECTS.

dec INTEROFFICE MEMORANDUM

DATE December 10, 1962

SUBJECT Stanford University Computer

TO Ken Olsen

FROM Harlan Anderson

John McCarthy telephoned today to bring me up to date on the situation regarding a PDP-1 Computer at Stanford.

First, the financial support from the Advanced Research Projects Agency headed by J.C.R. Licklider. He is not available yet and they probably will have no further word concerning it until after the first of January.

Second, a new and expanded source of financial support appears to be possible. This new support is being lined up by McCarthy selling the idea of time sharing systems for use as teaching machines within Stanford. In particular, he has pretty well convinced Professor Pat Suppes of the Philosophy Department that a PDP-1 is desirable for use as a multi-student teaching machine. Professor Suppes is interested in eventually equipping each student station with a typewriter, a scope and light pen, and an audio output. McCarthy has been so interested in this that he thinks there is immediate financial support available for the kind of system necessary to do this. He is being urged by the Carnegie Foundation to submit a formal proposal requesting funds to be reviewed at the January 3rd Meeting of the Carnegie Board.

The configuration that he would be interested in would be quite similar to that at BBN. It would contain a basic machine, one extra module core memory, sequence break system, five typewriters, one scope and light pen, drum system, memory protection control, and a new item, a connection to the IBM 7090 that is available at Stanford.

This latter connection can be done one of two ways. The first way would be through the IBM direct data device similar to the way that Gordon Bell had proposed to connect the PDP-4's to MIT's 7090. John recalled that we had quoted $10,000 for that. This way would probably be somewhat less desirable to Stanford since their 7090 has a direct data device which is on loan at the option of IBM and might disappear at any moment unless they buy it.

The second way of connecting to the 7090 that has been considered is to make our interface look like an IBM magnetic tape unit. This way would be preferable if it is not too expensive.

The people at Stanford are also looking at data display scopes for the teaching machine application. They, of course, did not yet know of our character generator which I told him about. There is also some possibility that our audio voice demonstration in Philadelphia might play some part in their audio requirements. John inquired about our willingness to work with them in some of these areas and I encouraged this

within the normal two limits that we impose on developments, i.e., our ability to make a technical contribution and general purpose need for the product resulting from the development.

If, they were to teach Russian with this setup, they would probably want approximately 2,000 Russian words stored on an audio system of some kind. I should emphasize that the audio things are not necessarily to be available immediately.

The questions for us are – how interested are we in this work and what kind of an educational discount or other assistance can we provide? If, when Ken Olsen is in California, it is possible for him to visit McCarthy to get a first hand impression of the situation, this would be very desirable. This should also be discussed with the DEC Board of Directors.

McCarthy has submitted a paper for consideration by the Committee for the Detroit Computer Conference on the subject of time sharing. If this paper is accepted, we might do well to try and demonstrate time sharing. In any event, we should form a judgement on our interest and willingness to proceed with increased participation in the time sharing use of the PDP-1.

Harlan E. Anderson

HEA:ncs

INTEROFFICE MEMORANDUM

DATE December 10, 1962

SUBJECT A Synchronous Memory Module (tenatively assigned designation Type 17)

TO Nick Mazzarese FROM Ben Gurley

SECTION 1
INTRODUCTION

The Memory Module Module 17 is a standard PDP-1 sized memory module having the added features of being of a self-contained memory buffer register and memory address register. In addition, it has its own internal timing. One can have several of these memories and these memories thus can be used synchronously so that drums, high-speed channels and one or more PDP-1's can be simultaneously using the several memories. This design is an essential part of the new BBN proposal and would also be a possible addition to the PDP-1 line where more than one machine could share a common memory.

Certain modifications to the basic cycle of the PDP-1 must be made, and therefore in reference to this PDP-1 in this tenative document I have referred to PDP-1D.

In order to choose among simultaneous request, there is a priority in synchronizing network. This network looks every 150 nanoseconds to see if any of the users are requesting service. If a user requests service, the memory cycle is started and the highest priority address is read in.

The modification necessary for the Type 12 is indicated in the block diagram are quite trivial. They are noted on the memory address register drawing and mean the removal of several packages of inverters and reversing of the polarity of the sense amplifier output pulse. They are in the order of somewhat less than 100 modules in the Type 17 not including those modules normally contained in the Type 12 memory. It would require one cabinet and a fair amount of cabling as indicated on the block diagram. I think that each channel A, B, C, and D would need one low speed 50 pin cable. This could be bussed so that the line would go from cabinet to cabinet. The PDP line which is channel E, lowest parity, would require two coax lines and this also would be bussed, the last coax line having a terminator plug inserted in it. The output of each module requires two coax lines going back to the computer. In the computer would be a distribution network that would connect the data from a particular memory to the appropriate channel output or into the computer.

SECTION 2
PRIORITY NETWORK

Each input channels A through D have a one flip-flop synchronizer which is looked at

with a 6.7 megacycle clock. PDP-1 has a two flip-flop synchronizer. Essentially all of the logic on this drawing is of the 6000 series modules, and although the list price of these is quite high, I understand that the cost of these is fairly modest. Where a drum is referred to on the drawings, this is the swap drum such as the BBN drum. This would go on the highest priority channel and I am sure that the logic is not complete for this. While the drum is transferring, it cannot accept requests from any other device. I have indicated a drum start and the drum done pulse into drum synchronizer one and two. When the drum has started, the clock is shut off and no further requests will be acknowledged. Also, on the control for the inputs to the synchronizers during a normal cycle memory pulse 9 looks as the state of the inputs. This is done so that if a high priority device has been served and immediately requests again, a lower priority device would not be shut out. Therefore, on the input to the control for reading into the synchronizers, the MP9 pulse is anded with drum synchronizer 1 on a one.

The timing pulse relationship, incidently, of the numbered pulses has the same relationship as the timing pulses on PDP-1. There are not as many timing pulses in the memory as on the PDP-1, therefore some of the timing pulse numbers are absent. However, MP10 occurs at the same time as TP10 in the computer.

The output of the request flip-flops is a parallel priority network. This was done to speed the path through the request levels and so forth so that the clock may run at high frequency. All of these inverters are 10 megacycle inverters.

If a request is present, the clock is shut off and the memory cycle is started. On MP8, the synchronizer for the channel being served is cleared and on MP9, the inputs are again looked at to see if something is waiting with a request. If at the end of the cycle there is still the request present, a new cycle is started from MP10. The negative levels "serve A, serve B, serve C, serve D, and serve E" are fed back to the PDP-1D MBR distributor.

SECTION 3

MEMORY ADDRESS REGISTER

A drawing shows part of the Memory Address Register, three of the 12 bits. The flip-flops used here might be 4214. Since they may be cleared and then read into some two-tenths of a of a microsecond later, the 4214's may not be fast enough. It certainly would be possible to make a 1214 which would be the same circuit with MD94's replacing the MD114's and a lowered value of coupling capacitor.

Each MAR digit has a two transistor input from PDP Memory Address Register. Note that it is the Memory Address Register not Memory Address Decoders. The Memory Address Decoders in PDP-1 would be dropped out and the 12 memory address digits would be piped over direct by means of 1684 bus drivers. The other inputs, with the possible exception of the drum, (I don't know the timing requirement on the drum to this extent) feed in through 4127 inputs, each digit taking one half 4127. If necessary, the drum would feed in in a manner identical to the PDP inputs. The only load on the MAR's is the 1151 binary to octal decoder which feeds to the Type 12 memory. The Type 12 memory has inverters on the memory address decoder

inputs and these inverters would have to be removed with the 1151's feeding the points which are normally the outputs of the inverters. It would also be possible to remove these inverter packages and put in jumper packages so that the wiring on the Type 12 is not modified.

SECTION 4

MBR - MEMORY BUFFER REGISTER

A typical bit of the Memory Buffer Register is shown. The inputs from PDP-1 are two series inverters directly pulling the output to ground. The flip-flop timing is similar to the MAR, therefore, 4214 or 1214's would be used. ONE on the ground output of the MBR goes to the inhibit drivers. The ONE negative output would go to the one fou rth of a 1684 bus driver and is piped back to the PDP-1D MBR distributor. Again, for the BBN type drum the 4127 may not be fast enough and it may be necessary to use two series inverters for the drum inputs as with the PDP-1 inputs.

SECTION 5

TIMING CHAIN

The timing chain for the memory module is very similar to but simplier than the PDP-1 timing chain. The timing would be slightly faster than the PDP-1 timing chain for all operations except idx and isp in which case it would be somewhat slower. For idx and isp on cycle 1, PDP-1 would request a long cycle. This adds some eight-tenths of a microsecond to the cycle which is morethan enough to allow for the extra transfers from the MBR to the PDP-1's MB and from MB to MBR. Memory pulses 2, 3, 7, and 9 are ORed to form the memory operate pulses.

SECTION 6

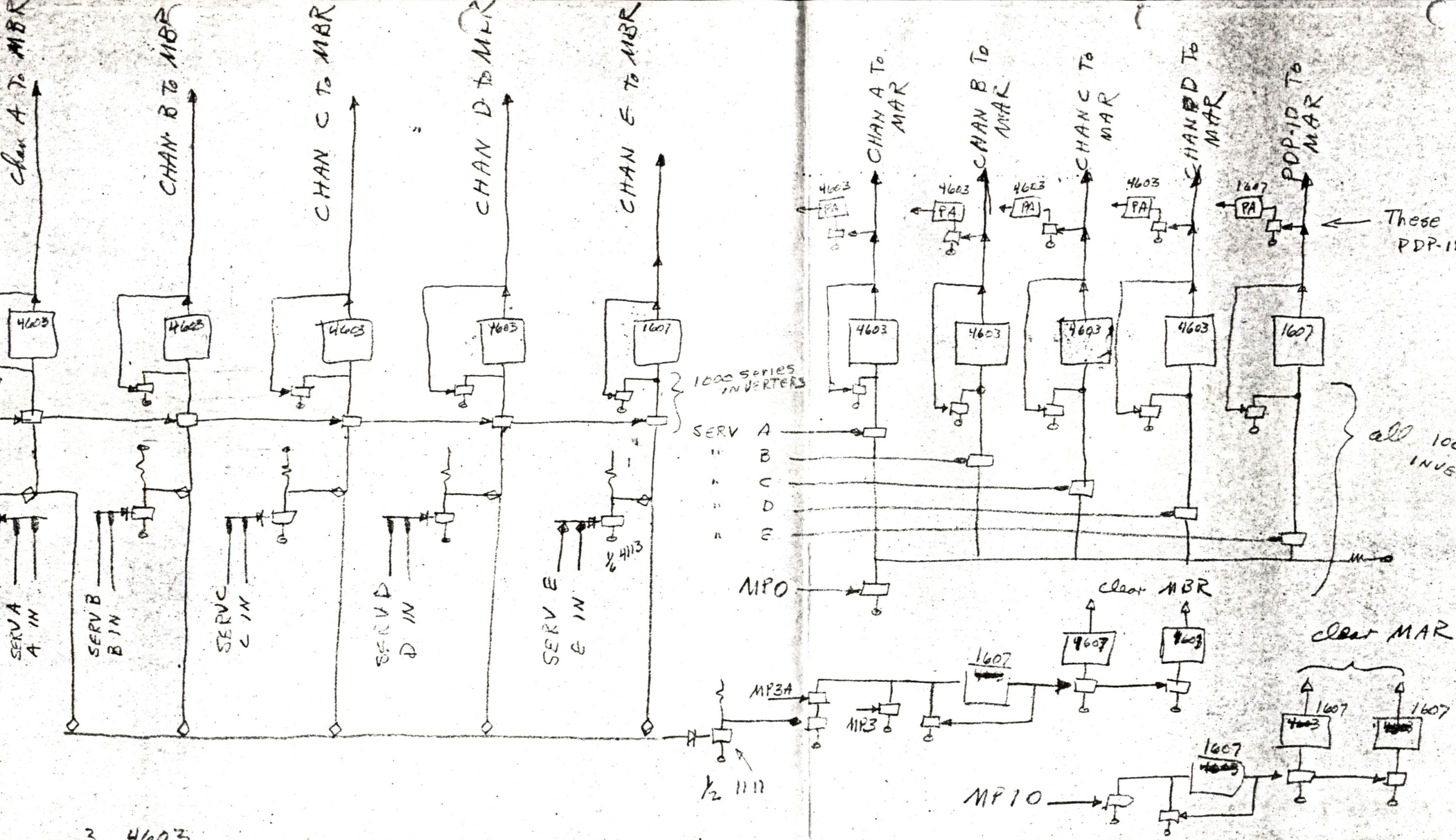
MBR AND MAR CONTROL

The lines SERVE A, B, C, D, or E, negative, come into both upper right and upper left hand corner of this drawing. The MP0 pulse will feed in the appropriate set of addresses to the MAR from the incoming address lines. Since one and only one of these lines would be negative, one and only one address set would be sent. The same pulse is also sent back to the PDP-1D via coax. This would go out to a channel to indicate that its address was accepted. This is the standard indication for a channel. In PDP-1D this causes the time chain to progress past the point at which it had been broken. This point probably is the time between TP1 and TP2 thus this PDP-1 to MAR pulse would go back and cause TP2 and at the PDP. Each channel will also request either input or output. If it is requesting output, the memory cycle just does a normal read and re-write. If it is requesting input, the memory does a read cycle and will clear the memory buffer register on MP3A which is shortly after the strobe. Also on MP7, the contents of the data inputs to MBR would be strobed for the appropriate channel that is being served.

DWG NO. 01576
SB- 01577
01578
01579
01580
01581

cc: Ken Olsen, Dick Best, Gordon Bell, Al Blumenthal, Gerald Moore

SB-01581

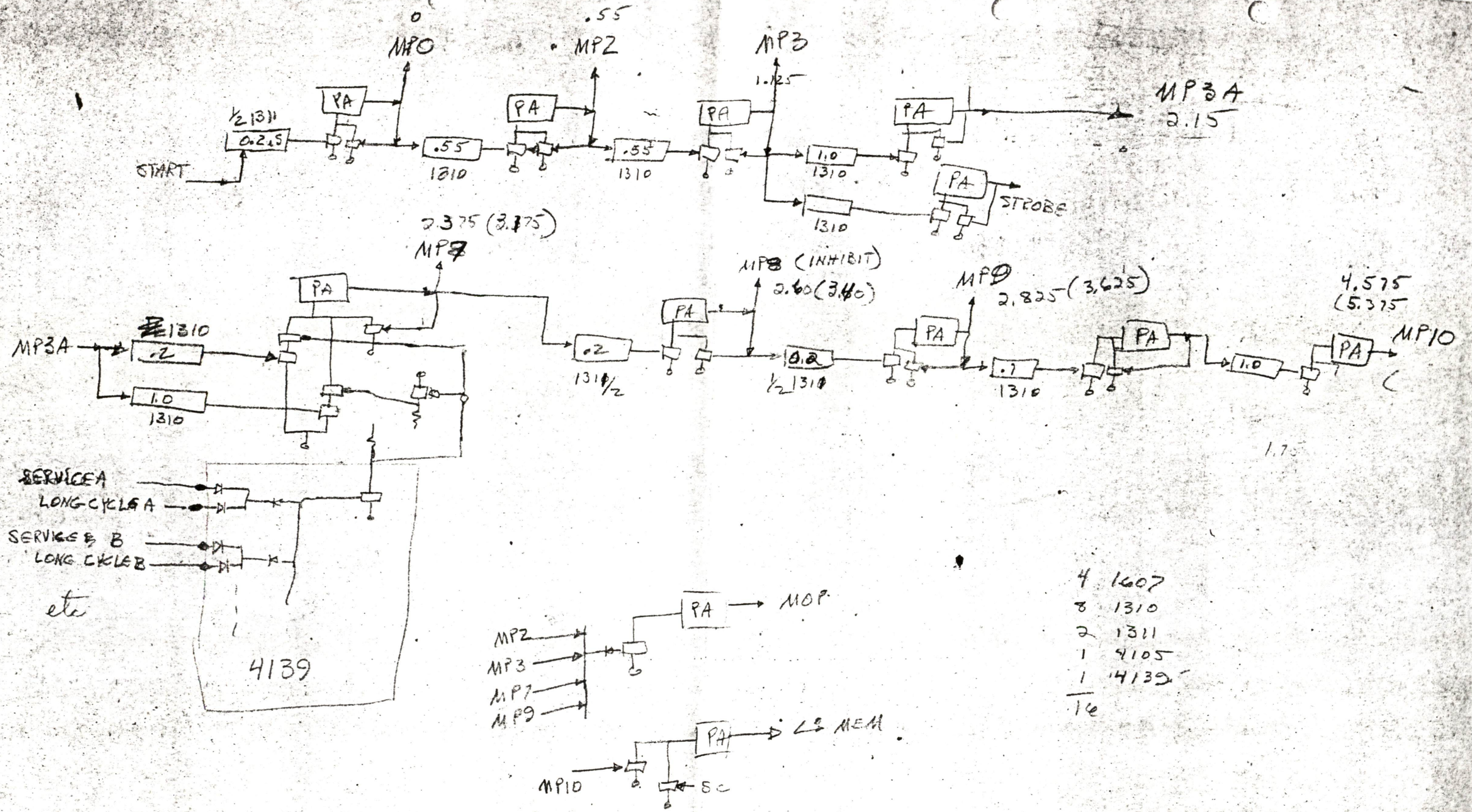


3	4603
3	1607
1	4113
1/2	1111
4	1105
11 1/2	

MEMORY MODULE 17 (tentative)
MBR & MAR CONTROL.

SB-01581

SB-01580

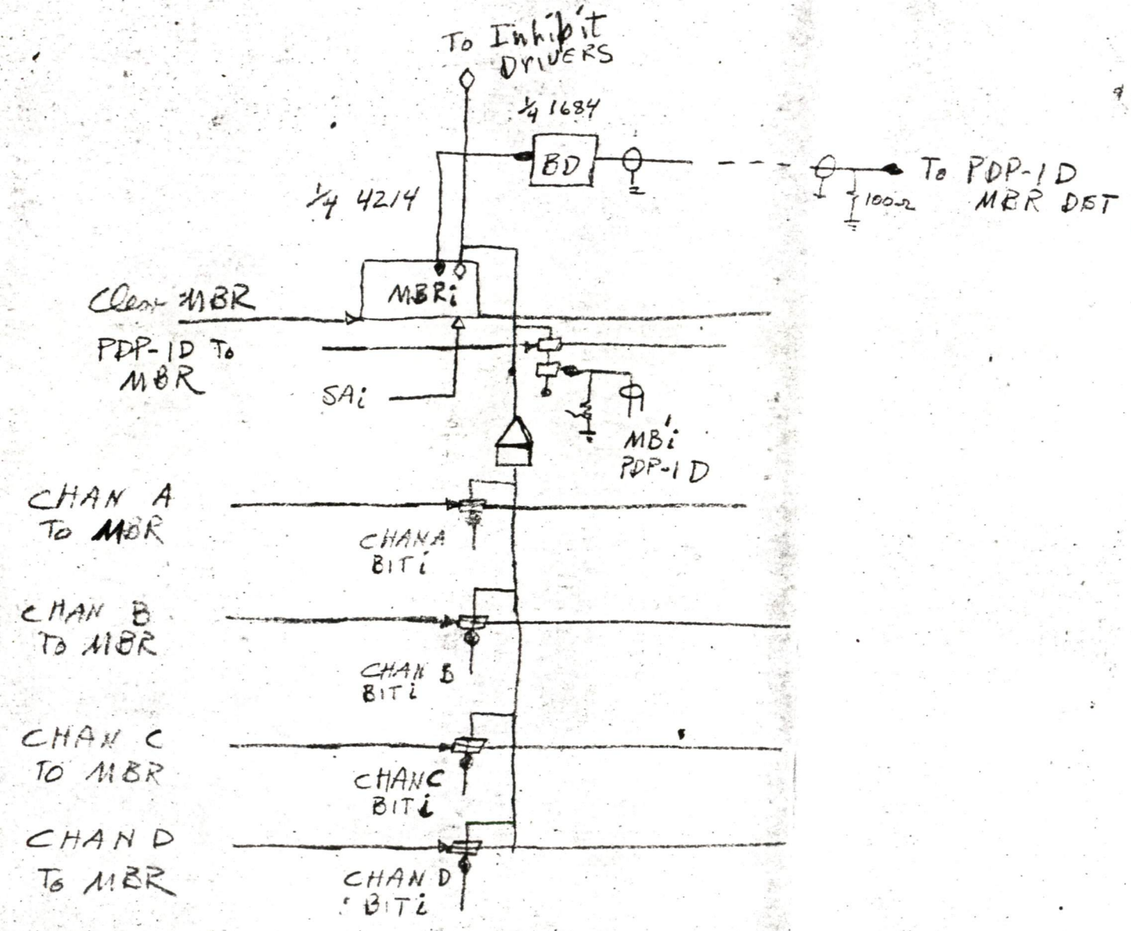


4	1607
8	1310
2	1311
1	4105
1	4139
16	

MEM MODULE 17 (TENTATIVE)
TIME CHAIN

SB-01580

SB-01579



5	1684
5	4214
9	4127
6	1103
25	

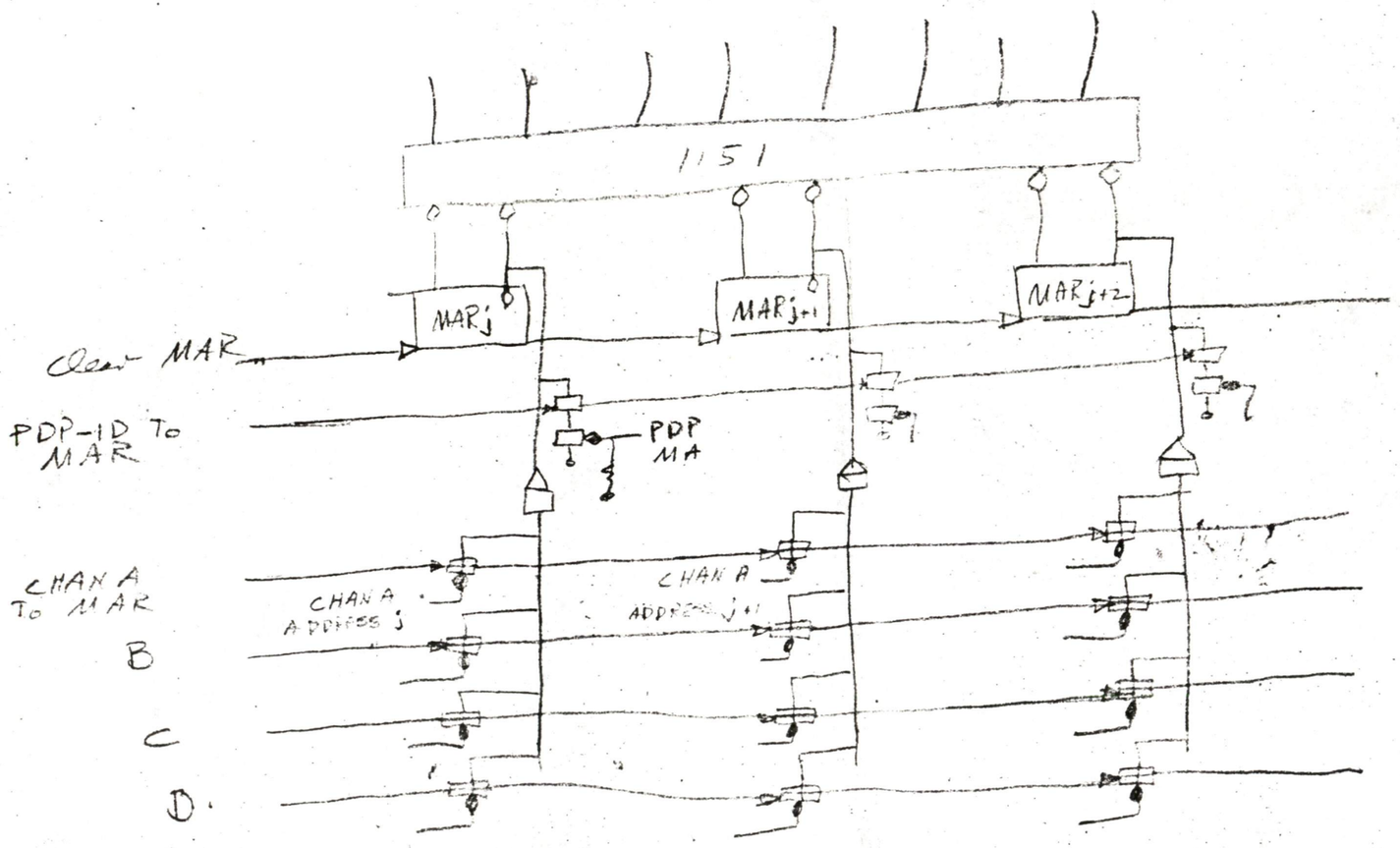
only 1 coax Lo SP 18

MEM MODULE 17 tentative

Typical MBR BIT

SB-01579

SB-01578



MEM 17

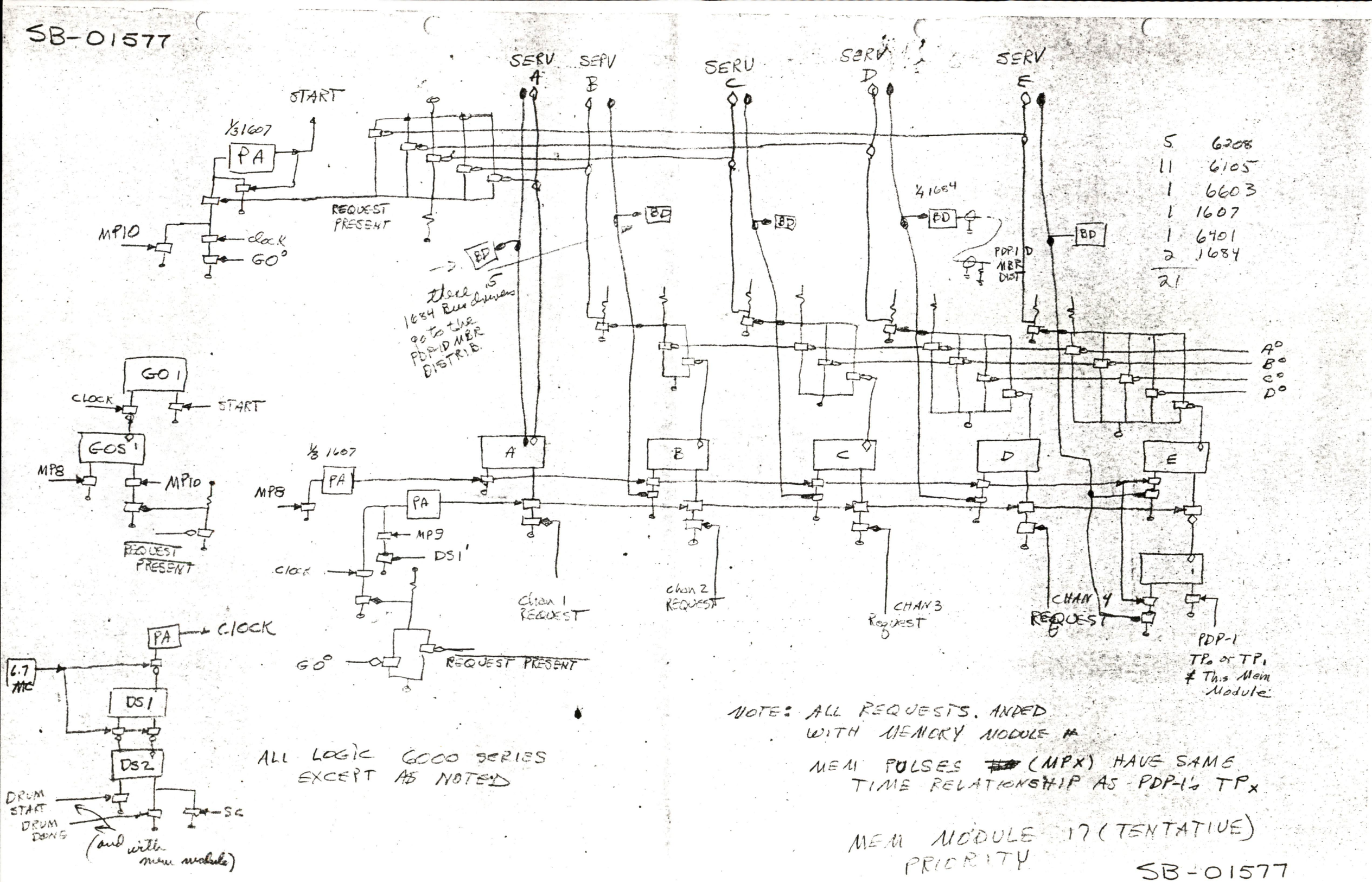
Includes a mem type 12 modified as follows:
The 32 ~~MAD~~ MAR inputs are ~~eliminated~~ (as listed from 1151 schematic)
SA polarities of output pulses is inverted

4	1151
3	1214
6	4127
4	1103
17	

MEMORY MODULE 17 (~~Control~~ Typical) MAR

SB-01578

SB-01577



ALL LOGIC 6000 SERIES EXCEPT AS NOTED

NOTE: ALL REQUESTS ANDED WITH MEMORY MODULE #

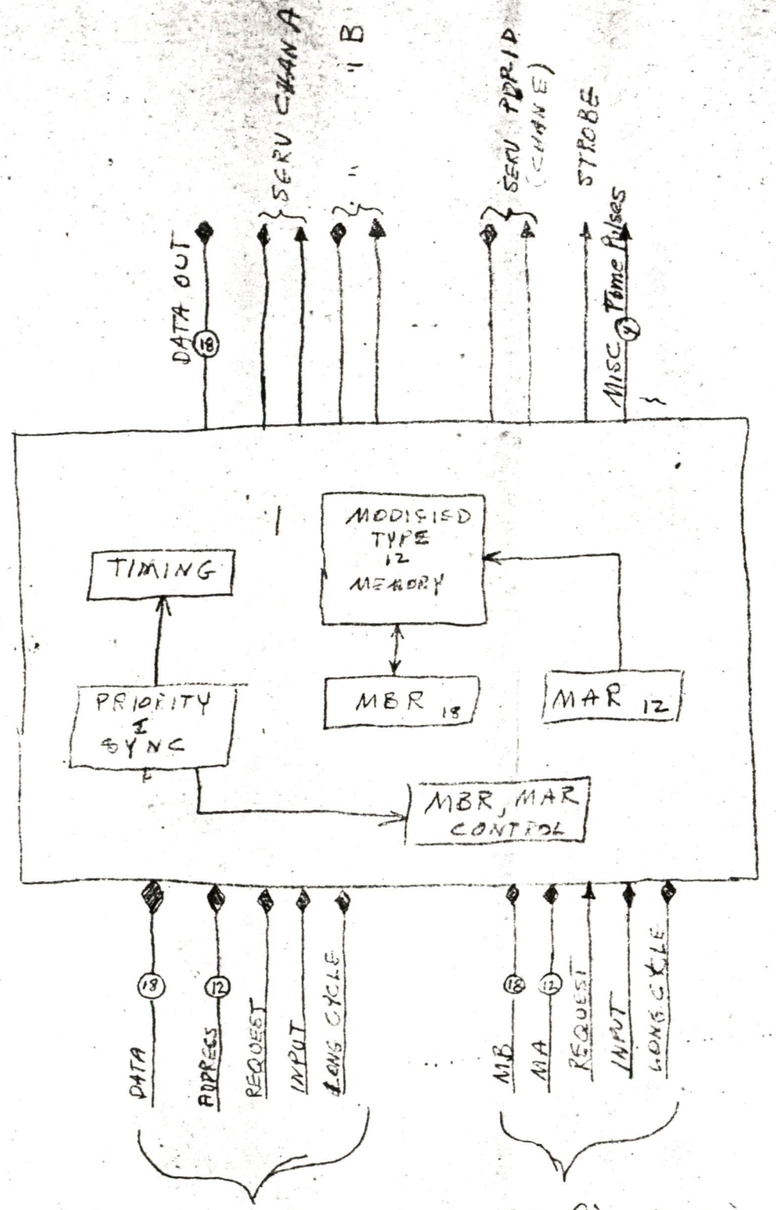
MEM PULSES ~~#~~ (MPX) HAVE SAME TIME RELATIONSHIP AS PDP-1's TPx

MEM MODULE 17 (TENTATIVE) PRIORITY

SB-01577

SB-01576

To PDP-1D for Distribution



MEMORY MODULE TYPE 17 (TENTATIVE)
BLOCK DIAGRAM

SB-01576

dec INTEROFFICE MEMORANDUM

DATE December 7, 1962

SUBJECT Quality Audit

TO Bob Hughes

FROM Klaus Doering
Jim Cudmore

The first Finished Goods Stockroom Quality Audit took place from October 31 to November 3. All modules, power supplies, mounting panels and accessories were inspected. Several problem areas were uncovered and the following is a summary.

Approximately 5,000 modules were visually inspected. A total of 7% of the system modules were found to have minor defects. Two hundred of these units were rejected because the amphenol plug was tipped. Ten modules were rejected as a result of excessive flux, solder on the amphenol plug or a missing DEC label. One hundred units were accompanied by test data sheets on which were missing either the date, the tester's number, the inspector's number, or any combination of these. Forty modules had either the wrong test data sheets or no test data sheet at all. Out of 400 laboratory modules inspected, 73 were rejected because the power plugs were drilled out of tolerance. This inspection was done with a special jig made by the machine shop. 35 lab. modules were rejected because the test data sheets were incomplete. 11 of 200 mounting panels were packed in boxes with incorrect markings. These units were 1909's but had 1901 stamped on the box and on the inspection sheets. One power supply out of the fifty inspected had no serial number. All these defective units were repaired, reinspected and returned to finished goods.

This audit showed definite weak points in the inspection procedures. Most of these weak points may be attributed to a lack of formalized procedures.

The first week of finished goods sampling inspection was completed on November 19. Three units of each type are removed from finished goods, electrically tested and reinspected. Approximately 100 units were sampled during this time. One unit, a 1982, was found to have an electrical defect. The output transistor was open on serial #0056243-B. Four units were unacceptable because of poor cleaning and one unit had no DEC label. In all cases sampling inspection showed good correlation with the prior test results.

cc: Ken Olsen
Harlan Anderson
Stan Olsen
Maynard Sandler
Dick Best
Q. C. Manual

CURRENT ENGINEERING DEVELOPMENT AND FIELD SERVICE NUMBERS

FROM: Richard L. Best DATE: December 7, 1962

EN 1000	General Engineering
EN 1010	5 MC System Modules
EN 1011	500 KC System Modules
EN 1012	Non-Compatible Low Speed B.B.
EN 1013	Current Drivers (vacuum tube)
EN 1014	Digital-to-Analog Converter
EN 1015	PDP-1 Typewriter
EN 1016	Core Memory Development
EN 1017	Signal Converters
EN 1018	Memory Tester Development
EN 1019	Modules Sales
EN 1020	PDP-1 Development
EN 1021	Core Handler
EN 1022	Power Supplies
EN 1023	Mounting Panels
EN 1024	PDP-1 Paper Tape Reader
EN 1025	Paper Tape Punch
EN 1026	Magnetic Tape Equipment
EN 1027	Large Tube Display
EN 1029	10 MC System Modules
EN 1030	Educational Building Blocks
EN 1031	Computer Development
EN 1032	Utility Programming, PDP-1
EN 1033	Sales Programming, PDP-1
EN 1034	PDP-1 Sales
EN 1036	Light Pen Development
EN 1037	Core Tester and Memory Tester Sales
EN 1038	Special System Sales
EN 1039	Solid State Current Drivers
EN 1040	Drum Circuit Development
EN 1041	Drum System Development
EN 1042	Current Driver Power Supply 766
EN 1043	VHF Building Blocks
EN 1044	Analog-to-Digital Converter
EN 1045	Digital Average Response Computer
EN 1046	Punched Card Equipment for PDP-1
EN 1048	Test Equipment Headquarters (RH)
EN 1049	Engineering Stockroom
EN 1050	Data Phone
EN 1051	Classroom Modules
EN 1052	Memory Stack Assembly
EN 1053	Computer Cabinet

EN 1055	PDP-1 Production Test Equipment
EN 1057	Core Tester Development
EN 1058	Anelex Development
EN 1062	PDP-4-1 Operation
EN 1064	Display 31 Development
EN 1067	Information International (Ed Fredkin)
EN 1068	Burroughs Card Reader
EN 1069	PDP-1 Computer Administration
EN 1072	Standards
EN 1073	Quality Control
EN 1074	Memory Tester Field Service
EN 1075	Core Tester Field Service
EN 1076	Memory Exerciser Field Service
EN 1077	Misc. Special System Field Service
EN 1078	ITT Prototype Rework
EN 1086	Telex Printer (BS)
EN 1087	Relay and Switch Investigation
EN 1088	Module Packaging for Shipment
EN 1089	Line Unit Tester (GB)
EN 1090	4203 Development
EN 1091	4204 Development
EN 1092	10 MC Laboratory Modules
EN 1093	5 MC Laboratory Modules
EN 1094	500 KC Laboratory Modules
EN 1095	PDP-4 Sales
EN 1096	PDP-4 Programming
EN 1097	Modules Construction Development
EN 1098	Module Test Development
EN 1099	Field Service, General
EN 1100	Power Controls
*EN 1115	Repairs to goods Damaged in Shipment
EN 1116	Memory Tester Field Modification
EN 1122	3 KC Power System Development
EN 1123	Core Tester 2114 Development
EN 1127	Current Calibrator Development
EN 1128	PDP-1 Checkout Training
EN 1129	Character Generator Development
EN 1130	1521 Development
EN 1131	Anelex Prototype Construction
EN 1132	ADX Systems Administration
EN 1133	PDP-4 Systems Administration
EN 1134	PDP-4 Flexowriter Prototype
EN 1135	Display 30-D Prototype (PDP-4)

EN 1136	Linc Tape Unit
EN 1137	Type 56 Tape Control Development
EN 1138	Prototype A-D for PDP-4-1
EN 1139	Serial Drum System Development
EN 1141	Fortran
EN 1142	Serial Drum Circuit Development
EN 1143	Magnetostrictive Delay Line Memory Development
EN 1144	Quality Control: Test Equipment Labor, Materials
EN 1145	Quality Control: Model Test
EN 1146	Quality Control: Module Repair-field failure
EN 1147	Quality Control: Module Repair-salvage
EN 1148	Teletype Line Unit Modules
*EN 1149	Eastern Joint Computer Conference
*EN 1150	Glass Delay Line Memory Development
*EN 1151	Coaxial Tape Transport Development
*EN 1152	Digital Symbol Generator
*EN 1153	PDP-4 Paper Tape Reader
*EN 1154	PDP-4 Typewriter
*EN 1155	Houston X-Y Plotter
*EN 1156	Curve Drawing Display
*EN 1157	PDP-4 Automatic Module Tester
*EN 1158	Production Engineering
*EN 1159	PDP-4 Multiply and Divide Prototype
*EN 1160	PDP-4 Installation Kit

Supercedes Memo Dated October 26, 1962

* Indicates New Numbers Added

dec INTEROFFICE MEMORANDUM

DATE December 7, 1962

SUBJECT Reinspection Trip to ADX-5, ITT, N. J.
November 28, 1962

TO Bob Hughes

FROM Dave Adams
Bob Grey

We arrived at John Hart's office (he is ITT's purchasing agent) where we waited a few minutes until Don Nell, Field Maintenance Mgr., took us out to Gil Slaw, the man in charge of the ADX-5 system.

Gil Slaw took us to the machine and pointed out the panels and cabinets that they had added to the computer. We did not officially inspect these areas, but just out of curiosity, a quick look at the wiring on the panels added to the main frame showed poor soldering and wire dress; a large number of resistors soldered together on one end and not insulated; very poor taper pin crimp on some wires (the pins were not crimped on the wire insulation); wires soldered together and not to a pin, and they were not insulated.

As far as our own work is concerned, attached is an inspection form showing what had to be done. They asked us to leave a copy of the inspection report with them which we left with Gil Slaw. Some of this work may have been missed in inspection, and some due to tighter inspection criteria now than when this machine was first inspected, but most of this touch-up was to the modifications done by I.T.T., where wires were added here and there to tie in their equipment.

The general condition of the computer and mag. tape units was pretty good, although they were covered with dust. In some cases we had to blow the dust off the bottom two panels just to see the solder joints. The room in which the ADX-5 is kept, in general, was quite dusty, and we noted that some of the floor fans in the cabinets had their filters removed.

I.T.T. made some modifications to our computer that might be of interest. They put a sheet of plexiglass over all the power supply large capacitors, some transformer terminal strips and power controls. They also cut holes in the air baffled plates, in a few of the bays in the computer, and mag. tape cabinets, and put in standard A.C. power outlets so they can plug a scope, or anything else right into the machine instead of using long extension cords.

We finished working on the machine around 3:30 P.M. Don Nell wanted to see us after we were through, so Gil Slaw took us to his office. Don Nell asked us if we had looked at the 1976 and 78 resistor boards to check for cold solder joints. We told him we didn't know anything about them so he took us back out to the computer and pulled out several boards before he found one that he considered very poor. It did not have a sufficient amount of solder on the lug and wire, but it had enough so that neither of us could break the wire loose. He also complained about a hairline crack around the base of the eyelet on the copper side of the board between the soldered eyelet and the board. He could not find one to show us.

He then went over the inspection report and seemed horrified to think that we had found some wires that were not pushed all the way into a pin or that some wires were just tacked with solder. He couldn't picture that some of this might have happened while they were putting in their modifications, but when he came to a list that Gil Slaw had added to their report on things that had to be touched up on their own wiring, he quickly dropped the subject.

He then went on to question us on our own inspection procedures on all computers here at the plant. We wanted to know how many of his machines had only received one inspection. We could not answer this. He wanted to know if some were never inspected. He seemed shocked to find that the same person did both intermediate and final inspection. He also wanted to know if we always got this many rejects on final inspection. He ended by saying that he thought he would have to come up here to inspect ADX-8 before we shipped it down to him.

During this time, Gil Slaw kept telling Mr. Nell that some of the things we found bad on ADX-5 were their own fault, and that we are tightening up on our inspection procedure all the time, but Mr. Nell could not understand that anything like this could happen in the first place.

cc: Ken Olsen
Harlan Anderson
Stan Olsen
Maynard Sandler
Dick Best
Nick Mazzarese
Jack Smith
Bob Maxcy
Jim Cudmore
Klaus Doering
Q. C. Manual

INTERMEDIATE
FINAL 2
AT ITT

ELECTR. ASSEMBLY INSPECTION

CUSTOMER: ITT
UNIT NAME: ADX-5

EN NO.:
SHEET 1 OF 3

INSPECTED BY: DAVE ADAMS
BOB GREY

DATE: 11-23-62

FRONT (WIRING SIDE)

LEVEL NO.	PINS	GROUND LUGS	OTHERS	REASON FOR REJECT	CORRECTED BY	CORRECTED DATE
0Z	20J, 24Z, 17Y			NEEDS SOLDER		
0A		TOP #8, BOTTOM #11		NEEDS SOLDER		
0D			TAPER PIN BLOCK #11	BOTTOM ROW OF TAPER PINS NEARLY SHORTED TO GROUND. BLOCK MUST BE MOVED UP		
0D			TAPER PIN WIRES	SOME WIRES ARE NEARLY BROKEN OFF		
0L	17Z, 20Z, 8D			NEEDS SOLDER		
0L	17P + 17R			NEARLY SHORTED TOGETHER		
1Y	20 4			WIRE NOT PUSHED INTO PIN		
1Z	12S, 23J			WIRE NOT PUSHED INTO PIN		
1B				DISCONNECTED WIRE BETWEEN PLUGS #21 + #22		
2Y	4-M, 4-N			DRESS UP WIRES		
2Z	5N			WIRE NEEDS INSULATION		
2A	16F			WIRE NOT PUSHED INTO PIN		
2E	11T			WIRE NEEDS INSULATION		
2E	23R			WIRE NOT PUSHED INTO PIN		
2J				DISCONNECTED WIRE BETWEEN PLUGS #2 + #3		
3Y	6E, 19J			WIRE NEEDS INSULATION		
3Y	11D, 11E, 11K			NEED SOLDER		
3Y	19N			WIRE NOT PUSHED INTO PIN		
3H	1D			DRESS UP WIRES		

TURN OVER

INTERMEDIATE
FINAL 2
AT ITT

ELECTR. ASSEMBLY INSPECTION

CUSTOMER: ITT
UNIT NAME: ADX-5

EN NO.:
SHEET 2 OF 3

INSPECTED BY: DAVE ADAMS
BOB GREY

DATE: 11-23-62

FRONT (WIRING SIDE)

PANEL NO.	PINS	GROUND LUGS	OTHERS	REASON FOR REJECT	CORRECTED BY	CORRECTED DATE
EXTRA MEMORY (SINGLE BAY)						
1st [redacted]		TOP #1		NEEDS SOLDER		
2nd 3B		BOTTOM #13		NEEDS SOLDER		
EXTRA MEMORY (TWO BAY UNIT)						
1st BAY						
1st 3D	16K			WIRE NOT PUSHED INTO PIN		
2nd 3A	4-F			NEEDS SOLDER		
2nd 3C		BOTTOM #10		NEEDS SOLDER		
2nd 3D				O/W WIRE UNCONNECTED UNDER PLUG #1		
[redacted] 3C		TOP #1		NEEDS SOLDER		
2nd BAY						
3B		BOTTOM #5		NEEDS SOLDER		
3D		TOP #4		NEEDS SOLDER		
1st 52 MAG TAPE CONTROL						
16			BETWEEN PLUGS #1 #2	3 WIRES SOLDERED TOGETHER BUT WERE NOT CONNECTED TO A PIN (MUST BE INSULATED)		
16	21M			DRESS UP WIRES		

TURN OVER

BACK (POWER SUPPLY SIDE AND OTHER)

BAY NO.	POWER CONTROLS	POWER SUPPLIES	PATCH AND POWER CORES	WIRE DRESS	OTHERS (GIVE DETAILS)	REASON FOR REJECT	CORRECTED BY	CORRECTED DATE
BACK	OF MAIN	COMPUTER	FRAME					
1					DC POWER CORD NEAR FLOOR	NOT CONNECTED		
2					WIRES ON BACK OF SWITCH PANEL	MUST BE DRESSED PROPERLY		
3					DC POWER CORDS NEAR FLOOR	MUST BE DRESSED PROPERLY		
(BACK	OF EXTRA	MEMORY	DOUBLE BAY UNIT)		POWER FAN CORDS	MUSTBE CLAMPED TO DOOR		
BACK	OF ALL	TAPE UNITS			FAN POWER CORDS	MUST BE CLAMPED TO DOOR		

REINSPECTED BY :

DATE :

COMMENT :

INTERMEDIATE
FINAL 2
AT ITT

ELECTR. ASSEMBLY INSPECTION

CUSTOMER : ITT
UNIT NAME : ADX-5

EN NO.:
SHEET 3 OF 3

INSPECTED BY : DAVE ADAMS
BOB GREY

DATE : 11-23-62

FRONT (WIRING SIDE)

PANEL NO.	PINS	GROUND LUGS	OTHERS	REASON FOR REJECT	CORRECTED BY	CORRECTED DATE
2nd	MAG TAPE 52	CONTROL				
16			BETWEEN PLUGS #1 + #2	3 WIRES SOLDERED TOGETHER BUT NOT CONNECTED TO A PIN (MUST BE INSULATED)		

DF-22-14

TURN OVER

K Olsen

INTEROFFICE MEMORANDUM

DATE December 7, 1962

SUBJECT Quality Control Procedures

TO Bob Hughes FROM Ed Harwood

In the past, I have complained to you on several occasions that the Quality Control people were delaying the shipments of the machines, sometimes for considerable periods, because they were finding many troubles in their final inspection which were there during all the previous inspections.

On the last few machines we have attempted to ship out, they have gone through the whole system of inspections, all the way from the final assembly area up to the checkout area. However, in the final inspection which takes place just before crating, there are too many troubles being found, such as cold solder joints, poor wiring, and scratches on the machine, which have been there since the machine was delivered to the checkout area. Some of these may be due to different people inspecting the machine at the various stages in the production of the machines. Some may be oversights on the part of the inspector checking the machine. Some may be because the inspector feels that he can always catch it just before it goes out the door. Whatever the reason is, I suggest that we try to catch all these troubles, or the biggest part of them, before this final inspection.

One case in particular which has just occurred was the ADX-8 machine, which we have been trying to ship out to ITT for approximately two weeks now. During these two weeks we have been held up for various reasons. One reason was that Quality Control decided at the final inspection that they would have to repaint all the doors because the touch-up had not come out well. These doors had all been touched up before the final inspection and this decision could have and should have been made at that time.

Let's go through the inspection routine on the ADX-8 machine, and see what has happened. On September 14, 1962, an inspection was made on this machine and there were 22 electrical troubles noted in my inspection report. These troubles were all fixed and signed off by the Inspection Department. On October 23, 1962, seven troubles were found on the mag tapes and these troubles were also fixed and signed off by the Inspection Department. A little later

Quality Control Procedures - cont'd

on November 5, 1962, another electrical inspection was made and, at this time, some 50 to 60 troubles were found with the machine. These troubles were fixed and signed off. A little later, November 30, 1962, at which time the final final inspection was made and, by the way, this inspection should be just a casual look see by Klaus------70 to 80 troubles were found on the machine. These troubles also were fixed and signed off by the Inspection Department. On all the inspections on this machine, the electrical inspections were all done by the same man and reinspected by that man; so, it couldn't be different people on the job that were causing the difference in the number of errors found. Now, we in the computer production area do not say that those bad solder joints are not on the machine, all we say is that if they were on the machine they should have been caught at the preliminary inspection before the machine even came up to the checkout department. We do very very little soldering on the machines now and most of the troubles found on the machines were the wiring that was done by the girls and the men in the Production Department. To help eliminate some of these problems in the future, I would like to suggest the following:

1. All panels made in the Production Department in groups of one or three, or however they are assembled, be inspected and tagged by the Quality Control Department before they go into stock.

2. All sections of three or more panels be reinspected before they go back into stock to be assembled into a computer.

3. The computer be inspected again before it leaves the computer assembly area. It is hoped that by this time every bad solder joint and all bad wire dress has been eliminated from the machine.

4. I would suggest that the next inspection be pulled after the computer has gone through its checkout and is ready for its final acceptance test. I suggest one more inspection as we currently do; that is, just before the computer goes out the door and has had all its doors and all its peripheral gear tied in and connected, the computer be given one more "look see" by the head of the Quality Control Department to make sure it meets all the standards we have set for this equipment.

K. Olsen

dec INTEROFFICE MEMORANDUM

DRAFT

DATE December 6, 1962

SUBJECT Blanket Purchase Orders

TO Works Committee

FROM Henry Crouse

PURPOSE: To establish an operating policy for the Blanket Order Procurement System.

OBJECTIVE: The Blanket Order approach to material procurement insures:

1. Lowest possible material cost.
2. Availability of material for a specified time.
3. Shortest possible lead time.
4. Reduction of inventory levels by sharing actual materials with vendor.
5. Effective control over large purchases.

APPLICATION OF SYSTEM: All materials with an expected life of at least six months and adequate volume/to gain either availability or cost advantages shall be examined in light of applying the Blanket Order System. Only those materials with a proven record of acceptance, specifically its quality, shall warrant consideration.

OPERATION: The Inventory Control Section after usage analysis establishes the quantity of material to be ordered. The Purchasing Department then negotiates with a vendor stipulating unusual terms and conditions so that they are definite to the point of making any misunderstanding impossible. Since only written provisions are binding to both parties, a blanket order will have an acknowledgement copy signed by the vendor and any revisions of the order signed by the vendor.

The Blanket Purchase Order will state:

1. Price of material and any provisions applying to pricing, such as:
   - A. Price based on market price at date of shipment with reference to method of determining the "Market Price". A maximum price level shall be determined and noted on the face of the purchase order.
   - B. Sliding scale agreement with a fixed maximum price so that decreasing price structure may be applied.
   - C. If seller wished to retain a provision that he may increase prices, a thirty day or more period of notification to Digital Equipment Corporation prior to the effective increase for acceptance or termination by Digital Equipment Corporation. This clause should read, "Digital Equipment Corporation shall have the right to cancel this contract at any time in the event that such price revisions are not satisfactory to Digital Equipment Corporation".
   - D. Escalator clauses for a price increase based on specific contingencies shall have provision for price decrease if the same or additional contingencies vary differently.
2. Quantity of material ordered with specific notes to acceptable under or overshipments against individual releases. Maximum limits shall be established and noted on the face of the order. Excessive shipments against

releases shall be returned to vendor. The total quantity of the order shall not be exceded unless specifically agreed upon causing a revision of the order. Material shall not be accepted from the vendor unless a definite release is issued.

3. The time period the order will be effective -- "This order will be completed over an approximate twelve month period, beginning_____".

4. Description of material shall be clear to the point no misunderstanding is possible. Specific instructions such as Vendor Specifications, Part Number, Prints, Test Reports, Standards, Certifications and Digital Equipment Corporation's Specifications shall accompany the Blanket Order.

5. PROTECTIVE CLAUSES:

   A. Termination: The following clause will be included; "In the event only a partial of this order is filled due to the termination at the convenience of Digital Equipment Corporation, the price will revert to the increment price of that quantity received per your quotation dated_____".
   The exact price schedule shall be included on the Blanket Order.

   B. The vendor will give notice of material availability change thirty days prior to the effective date of change, if possible.

   C. Digital Equipment Corporation shall have cancellation privileges for nonperformance except where nonperformance is due to acts beyond the vendors control, ie. Acts of God, etc.

6. Guarantees shall be specifically stated if not covered by general terms and conditions.
7. Cancellation due to any cause shall be discussed with the vendor. Appropriate steps to terminate the contract are:
   A. Notification to vendor of pending termination.
   B. Discussion of liabilities.
   C. Agreement to conditions of termination.
   D. Termination in writing acknowledged by vendor.

MECHANICS OF THE SYSTEM: A blanket order is issued to the vendor and individual releases are issued against the order. The releases shall be numbered so that each shipment can be identified. The Inventory Control Section initiates a requisition and a release is issued to the vendor.

FORMAT: A standard Digital Equipment Corporation purchase order form #DF178 revised shall be used, unless the total dollar value or unique characteristics of the material warrant a "contract". A "contract" shall contain all the general terms and conditions of a standard purchase order, the special negotiated terms and conditions and concur by application with the policy established herein.

Henry Crouse

December 6, 1962

STATUS OF PDP-4 - MAJOR COMPONENTS

Printer 28-C

Present Status	Delivery Date	Assigned
on order	January	
on order	January	
on order	February	
on order	March	

Reader 2500

on order	December	
on order	January	
on order	February	
on order	March	

COPY

TO: K. Olsen
H. Anderson
G. O'Dea
D. Mills

FROM: J. Smith

dec INTEROFFICE MEMORANDUM

DATE December 4, 1962

SUBJECT

TO Ken Olsen

FROM Stan Olsen

For some time now I have been taking home the negatives of all printed circuit layouts as a security precaution in case of fire. This is not really a cumbersome task, but I tend to become unreliable. Therefore, I suggest that we consider perhaps sending these to the New Jersey office to be kept there in the locked file.

This could be done quite easily because we send an envelope to New Jersey every night. Also the secretary there could file them quite neatly, and they would be in order should we ever need them.

dec INTEROFFICE MEMORANDUM

DATE December 4, 1962

SUBJECT Visit with J. N. Ackley, ITT, Paramus - Wednesday, November 21, 1962

TO Nick Mazzarese FROM Gordon Bell

I was very impressed with J. Ackley's development facilities in Paramus. The rate and direction of their growth is significant, and extrapolating, the ADX 7300 II might be into production within the next year. Also their other devices should be operative too.

ADX Circuit Line

Cubic modules are used, and a group is connected to a large mother board. The board power consumption might be one quarter that of DEC logic. The modules run a ± 12.5 supplies and are .5 -1 m.c. The module nests have three front panel switches on them for marginal checking, and come in standard 19 and 30 inch widths. The power supplies are made for computers and supply up to 25 amps using SCR's to avoid frequency dependence. Some of their circuits use a strange 4 forward biased diode string to generate bias voltages.

Memory

J. Ackley mentioned they can purchase a 4K memory system for $10,000 from several manufacturers, and are concerned about our prices now.

Tape Units

They are using the Potter 906 to develop a DEC compatible unit. Theirs will have 556 and 800 bpi density however. Their models are now running 556 bpi @ 75 ips without skew correction!

ADX 7300 II

I watched their prototype computer run checkerboard, and do some printing. It's too early to say how it will perform, but it's roughly one half the physical size of a PDP-1 (very dense though in a 30" rack), but includes the order code of the 7300.

They've added several commands to the order code. These help process characters and tables and there is a compare instruction. Ackley likened it to the 704 - 709 change, necessitated through program and peripheral equipment compatibility. They have a facility built in to do lamp checking.

Their standard I/O consists of a Teletype model 28 ASR which they have trouble getting to fail. Ackley was quite elated when I mentioned the Teletype 100 char/sec tape reader that reads chad less tape, since the Teletype 28 is slow.

Drum System

They have a 1.8 megalit drum on a machine now which is to shipped shortly. It is a Bryant drum, and works similar to the one for the PDP-4.

Line Units

Have been operating for 9 months or so.

Gordon Bell

CC: Kenneth H. Olsen
Harlan E. Anderson
Richard L. Best

dec INTEROFFICE MEMORANDUM

DATE December 3, 1962

SUBJECT Troubles in Paris ADX Machine

TO Ken Olsen

FROM Ben Gurley

The troubles that seemed to have been encountered in the Paris ADX machine are a compound of troubles resulting from us and troubles resulting from ITT. For the most part, the troubles that are basically DEC's fault I think are relatively easy to be cleared up and most cases have been solved. With respect to the difficulties I observed in ITT's operation, I'll be completely frank with you and then on the basis of this we can decide what part of this material we should tell ITT. I certainly feel that we owe it to them to discuss these problems as frankly as possible with them. Here, however, I won't make any attempt to be diplomatic about it.

Most of the equipment troubles observed have been on the memory systems. I have the private feeling that this is not because the memory systems are particularly troublesome but it is my impression that the service personnel have some understanding of how memories operate and therefore if they will concentrate on it. I don't believe that they have a detailed knowledge of the operation of the central processor and only a superficial knowledge of the memory.

Before I arrived in Paris, they had discovered some intermittent memory resistor boards. The Paris machine has three memory banks, one of them being the original memory bank. It was somewhat unclear as to where the other two came from. I heard from various people that they had come from the ADX-2 machine and others that they had come from the ADX-1 machine. In either case, two of the memories were later production than the first one. The first one presumably was produced in the July-August, 1961 period. The other two were probably produced in the period December, 1961 or January, 1962. The earlier core bank, according to the information I was able to get, did not have a noticable number of intermittent resistor boards. The later memory bank did and they went through and resoldered all of the resistor boards. In addition, they found a number intermittent transistors in 1972 boards. These transistors there were some MD-114's or MD-114 Type Transistors, a few 2N-1065 transistors, and one or two 2N-599 transistors. If the number of transistors is statistically significant, it would appear that the MD-114 was somewhat more subject to intermittents than the 1065 which in turn was somewhat more sensitive than the 2N-599's. These intermittents were found in the following method: They would rattle the back of the units while plugged in the sockets with a 12" wooden ruler. They evidently had vibrated them rather severely so that the ends of the wooden ruler were rounded. If while running a program they found a failure when rattling in a particular area, they would rattle more severely in that restricted area until they found a board that appeared to be the cause. They would then remove the board from the socket, put it on an extender and bang on that individual board. By this means they would narrow the trouble to a particular component on the board by selective tapping.

It is a moat point as to whether the transistors should have taken this vibration. I just don't know. It is clear that some of them were intermittent at a modest vibration level.

However, I also suspect that a fair number of these intermittents were induced by the rattling. Whether or not these transistors would have become more sensitive at a later date, I do not know. In any case, predominately out of these two memories, they culled some 16 transistors. I understand that the ITT management is terrified to find that there were 16 microphonic transistors. We should certainly stress the fact that, even if this is a legitimate vibration test, they perhaps found two years or five years worth of intermittent transistors in that one week.

I think that we should proceed as follows on these transistors. Have them sent to us from ITT, and we should send them to the manufacturer for analysis. The manufacturer presumably has had much more experience in this analysis than our quality control, and would have a better feeling as to whether this was solder failure within the transistor or whether this appeared to have been a perfectly good transistor subjected to unusual vibration.

A third area in which we are certainly somewhat to blame for the troubles at the Paris machine is inadequate documentation of changes in the older machines. This procedure is now clearly spelled out and I think that we are in excellent shape now as far as getting the information to ITT on any new changes. There was a period probably covering ADX 0, 1, and 2 in which these procedures were not very well established. We should see what research can be done to insure that odd little terminators and so forth that have been found to be desirable are indeed on those earlier machines.

Later in the report I will detail what Al and I did at Paris, but I will now direct my comments to observations I made and observations Al and I made at Paris of the ITT part of the program. Included in this are opinions of mine, Al's and a mixture of added in opinions from other DEC personnel who have had contact with ITT field operations or maintenance personnel.

The ITT group certainly does have some exceedingly competent personnel. Strikingly competent personnel that I can think of off hand are Don Smith and Jeff Finch. This unfortunately, however, is not true of the general level of the maintenance personnel. I contrast them with our checkout and maintenance personnel and find there is nearly a world of difference between them. We have on several occasions encouraged ITT to send some of their people up here on a regular basis to partake in checkout of the ADX machines. I believe finally one or two have engaged in the checkout of one computer. They have sent numerous people to our course that Ron Wilson teaches. However, there is quite a difference between attending a two week course and actually working with the machine solidly for a number of weeks.

A very important aspect that I feel that they don't fully appreciate is the power of regular marginal checking. This probably would be adequately shown to them in a thorough system checkout.

I further have the feeling that the ITT maintenance personnel are somewhat nervous about their position. As a result tend to create a smoke screen around their operations. If the machine appears to have a trouble, it is my observation that they start troubleshooting it in a shot-gun fashion. As an example of this, they had recorded the status of the console lights, mag tape control lights, etc. during each of the stopages at Paris. I should amend that in that they had recorded the state of the lights in some of the stopages at Paris. The documentation left something to be desired. In particular, the most poorly recorded stopages did not have the name of the person recording the stopage and people had not analysed this data.

As you know, one of the most severe problems that we have discovered in this recent chain of events is that we had no information feed back from these people until they felt that they were in serious trouble. We certainly should have gotten some prior indication of troubvles. This is one of the secondary troubles resulting from the lack of self confidence of the ITT maintenance personnel.

Beyond the maintenance aspect, they are in severe trouble on the programming end. The three programmers that worked on the Paris system are fairly sharp people. They were certainly working under a big disadvantage as far as time is concerned. Also, surprisingly, they were ingnorant of the existance of MACRO and DDT so they have worked entirely with a rather poor version of FRAP.

These people were working under considerable pressure from the customer and from time deadline, and the result is a rather patched-up program that is nearly impossible to follow. A major portion of the core memory of the Paris machine is allocated to patches all of them I believe in octal. The listing I saw had many patches in octal written on it, that is, that part of the program that was in symbolic form had many patches written on top of it and at least one of these patches that I happened to be trying to followdid not exist in the program that was in the computer. This patch had been patched out. It is entirely possible that the troubles that they are having at Paris or at least some portion of these troubles are not due to equipment at all, but do to programming. An elaborate multiple sequence program of this nature can result in exceedingly subtle troubles. Several of the stopages I saw had occurred when a fast input line had started the break and then this break was interrupted by a clock input. This clock input then having completed its operation and released the priority to the high speed input again. During some part of the program completing the high speed input an incorrect address occurred. This certainly could be a subtle program trouble.

I do know that they are doing - one of the three people is at Paris working on certain improvements on the program, and I believe that some one back in the states is also working on this program. However, this is a major problem that is probably not being attacked with sufficient vigor.

What makes this matter worse is that the customer (in the person of Captain Pelosi) is well aware of this situation. He has learned something about programming and knows that some of the operational featureshe feels are sorely needed cannot be put in the program for lack of space in the core memory. He also knows that the space i s not available because of the multitude of patches.

I believe that why need to make a really major effort in this area. Perhaps such a thing as proceeding along two fronts; one, immediately getting an additional core bank over there so that they can include some of the features that the customer really feels that he needs, and from seeing his operation work, I agree with him. In the meantime, they should make a major attempt to clean up the documentation and remove the patches from this program. Now in additon to the above, they should take a second pass at this program. The above obviously represents a fair investment on thei r part. I wouldn't imagine that the extra core memory would have to be over there than any longer than the time necessary to clean the patches out of the program. This still means a significant investment on their part. However, this is their first installation and obviously of considerable importance to them and of course to us.

While I am casting stones at the maintenance and programming group I guess, in this confidential memo, I can cast a stone or two at their management. Again may I stress that this is my own opinion. It is lots easier to criticize someone from the outside than to correct it from the inside, but I have the feeling that they are worried too much about the profit and loss picture on this particular installation and are not considering the importance of this installation as a sales medium. I understand that they pulled too many of their people back as soon as the acceptance was through. The first installation of a system as complicated as this and in particular in the system program will not likely be profitable. The programmers working on the job seems to be very competent people but I don't believe they had any communications experience prior to this. I think that the basic outlines of the program are probably good as a first pass considering the newness of this type of work. However, a second look at the operation of this system would probably show some new directions that should be taken on a second pass.

This last part of this report will describe the detailed things that Al Blumenthal and myself did. While previously criticizing ITT personnel for operating in a shot-gun fashion, I'm afraid Al and I did very much the same thing. The symptoms we observed in the stopages would indicate either a program subtlety or perhaps trouble either in memory addressing or changing of memory bits. I did spend osme time trying to follow through the portion of the program that was causing the trouble but did not have any success in pin pointing anything. We therefore looked at or did the following things:

1. With Don Nell of ITT, I adjusted the strobe time of memory bank zero. Bank zero could not be adequately marginal checked because of the mixture of two types of sense amplifiers having significantly different margins. Therefore, together with him we trimmed the slice of these sense amplifiers by running the slice all the way to failure of one extreme and all the way to failure in the other and then setting the slice at the center. This is a cumbersome but reasonable technique.

2. Don Nell also found an intermittent memory address flip-flop. At first glance it did not appear from the program to have a direct result in the failure of this sort. However, the program failure when the flip-flop was jiggled was related to the sort of failure that had been observed.

3. I checked for noise on the High Speed Channel Buffer Mixer and Address Mixer. Even with the +10 margins all the way down and looking directly at the inputs to the pulse amplifiers these lines seem exceedingly clean.

4. Al and I checked the signals on the Memory Address decoder lines which should have been terminated but were not. Each memory normally has an input plug and an output plug and a terminator is placed on the last output plug. For reasons I do not know, either we or they removed this output plug so the terminations of this memory were made directly on the bank two mounting chasis. Before the terminators were installed we saw noise on the output of the Memory Address decoder inverters. However, none of this noise appeared to be getting through the switches. I say appeared because there are 128 switches on each of the three memories and we obviously could not look at all combinations of signals into all of these lines in available time. There conceivably could have been trouble due to this and that this could have ~~been~~ cleaned it up.

5. I pulled a change on the high speed cycle timing. I observed that the Memory Address register was set up approximately 150 nanoseconds later during a high speed cycle relative to the setup time during the normal cycle. This resulted from the number of pulse amplifiers that these timing signals went through. I changed the logic slightly in this area so that the timing was at least as early as a normal cycle. The possibilities of trouble caused by this timing are similar to the possibilities of troubles due to noise on the inputs to the switches. It could have conceivably caused trouble during a subtle address sequence.

6. We added load resistors at some of the shift inputs to the AC and IO end bits. Some of these were on the drawing of the arithmetic element but not on the machine and one or two others were not on the drawing and, of course, not on the machine. These again could have shown up as reduced margins in shifting.

7. We added terminators at the high speed address mixer pulses going into the extended memory address flip-flops, and terminated a SP3 pulse in the same area.

8. There was a known trouble which resulted in an interaction of the sense switch, single step switch, and single instruction switch. Although the signals on these switches are heavily decoupled, the grounding in the operator control panel area is rather poor so that the decoupling, if anything, tended to feed the signals back to each other. Don Smith had affected a temporary fix on this. Al Blumenthal and I looked at the signals and had them add capacitors at the receiving end of these lines.

cc: Nick Mazzarese Dick Best
Ed Harwood Bob Hughes

SUBJECT: REPAIR OF RETURNED MODULES

DATE: DECEMBER 3, 1962

TO: Ken Olsen

FROM: JIM CUDMORE

THE FOLLOWING IS A LIST OF MODULES RETURNED FOR REPAIR DURING THE WEEK OF NOVEMBER 26TH.

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
1310	0039522 F	A.E.C.	FAULTY OUTPUT	NONE
1310	0059342 F	I.T.T.-ADX-3	"H" OUTPUT HAS TWO PULSES	NONE
1976	0040178 C	ADX-6	3B2 BURNT RES.	R7 REPLACED
1978	0058849 C	I.T.T.	3C9 LOW MARGINS ON PINS L.K.J.	NONE
4113	0048462 A	ADX-8	3H1 Q6 OPEN	SPRAGUE MD114 OPEN B. TO EM.
4113	0048461 A	I.T.T.	OUTPUT PIN "T" BAD TRANS. OPEN	SPRAGUE MD114 OPEN BASE TO C. AND E.
4126	0044704 D	I.T.T.	NO OUTPUT ON PIN "L"	NO DEFECTS BUT CIRCUIT WAS UPDATED
4126	0045179 D	MAG TAPE 52	NO OUTPUT AT PIN "H"	SPRAGUE MD114 OPEN B. TO C.
1104	03770 D	UNKNOWN	NONE GIVEN	Q1 IN UPSIDE DOWN
1104	0008178 D	UNKNOWN	NONE GIVEN	NONE
	0010751 D			
	0037647 D			
	0015605 D			
	0037606 D			
	0014444 D			
	0010717 D			
	0010735 D			
	0008167 D			
	0014437 D			
	0014436 D			
	0011031 D			
	0037648 D			
	0014439 D			
	0014443 D			
	0037607 D			
	01364 D			
	0037628 D			
	03775 D			
	0037612 D			
	0014445 D			
	0014433 D			
	03771 D			
	0008172 D			

REPAIR OF RETURNED MODULES (CONT.)

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
1104	0014448 D	UNKNOWN	NONE GIVEN	NONE
	0011033 D			
	0014435 D			
	04836 D			
	0014442 D			
	0014415 D			
	0014451 D			
	0014434 D			
	0014441 D			
	0010719 D			
	0014447 D			
	0010737 D			
	0011032 D			
	0014449 D			
	0038419 D			
4680	0007286 F	UNKNOWN	NONE GIVEN	NONE
	0007432 F			
	0007431 F			
	0007781 F			
	001851 F			
	0007426 F			
	0008416 F			
	0008143 F			
	0007422 F			
	0007287 F			
	0007281 F			
	0007429 F			
	0007284 F			
	0007419 F			
	0007420 F			

OUT OF 8 MODULES RETURNED BY CUSTOMERS, 3 HAD NO DISCERNIBLE DEFECTS.

OUT OF 55 MODULES UNKNOWN, 54 HAD NO DISCERNIBLE DEFECTS.

MEMORANDUM

TO: K. Olsen
H. Anderson
S. Olsen
M. Sandler
G. O'Dea
R. Mills
N. Mazzarese
W. Hindle
E. Harwood
R. Reed
J. Rutschman
R. Beckman
B. Prichard
A. Hall
J. Myers
G. Bell

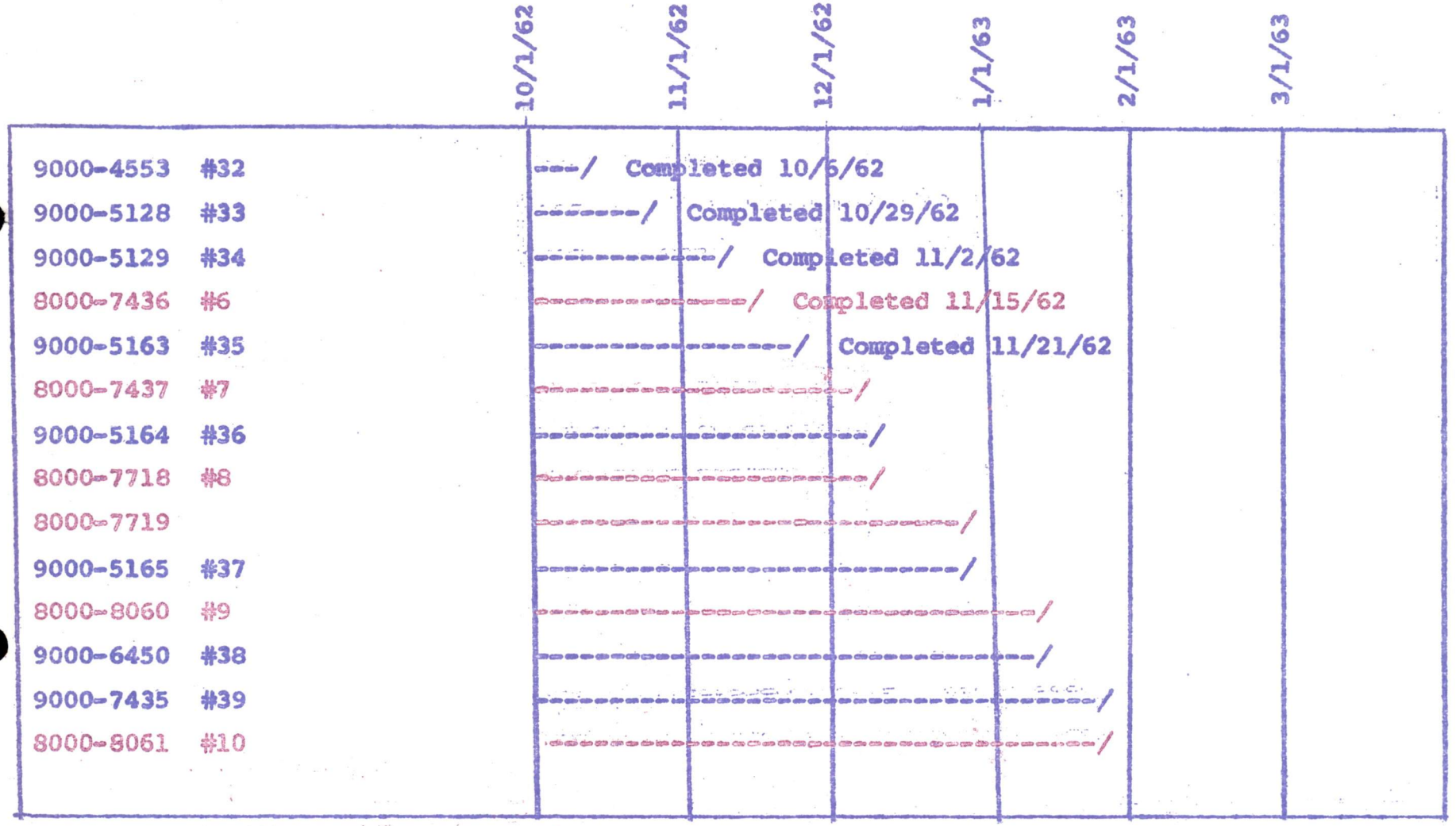
FROM: J. Smith

DATE: December 3, 1962

The 4606 Engineering Change has been completed on PDP-4 and all wiring diagrams have been released. This Engineering hold on wiring diagrams for PDP-4 Central Processors was in effect for nine working days. In effect, the delay causes the second system for November to be completed in December. Three PDP-4 systems will be completed in December. During the month of January and all subsequent months, two systems per month will be completed. Attached you will find a revised schedule for PDP-4 systems. PDP-1 schedule remains unchanged. Exact completion dates are listed below.

PDP-4-7	12/14/62
PDP-4-8	12/18/62
PDP-4-9	1/11/63
PDP-4-10	1/25/63
PDP-1-36	12/7/62
PDP-1-37	12/21/62
PDP-1-38	1/4/63
PDP-1-39	1/25/63

PRODUCTION SCHEDULE COMPUTERS



9000 series numbers - PDP-1

8000 series numbers - PDP-4

dec INTEROFFICE MEMORANDUM

DATE December 1, 1962

SUBJECT SPARE PARTS AND REPLACEMENT ITEMS

TO H. Anderson
R. Beckman
G. Bell
R. Best
A. Blumenthal
P. Bonner
H. Crouse
D. Chin
R. Doane
W. Farnham
F. Gould
B. Gurley
E. Harwood
R. Hughes
J. Koudela
N. Mazzarese
R. Mills
J. Myers
J. O'Connell
K. Olsen
S. Olsen
G. Rice
J. Rutchman
R. Savell
ALL DEC Sales Offices (2 copies)

FROM Bob Maxcy
J. Shields
G. Moore

The attached list of spare parts and replacement items has been updated. Please destroy all previous copies in your possession.

RM/ak

SPARE PARTS AND REPLACEMENT ITEMS

QUANTITY	PART NUMBER	DESCRIPTION	PRICE
Connectors and Cables			
1	115-115S	50 Pin Amphenol (Female)	22.00
1	115-114P	50 Pin Amphenol (Male)	32.00
1	54B24479	50 Pin Cinch (Male)	22.00
1	54B24495	50 Pin Cinch (Female)	22.00
1	115-114P	Assembled on Cable End	78.00
1	54B24479	Assembled on Cable End	68.00
1	113-022-21	Module Connector Plug	3.33
1	143-022-04	Module Receptacle Plug	1.40
1	AN-3057-16	50 Pin Connector Shield	1.85
1 ft.	50 Conductor	Typewriter Cable	1.75
1 ft.	20 Conductor	Ribbon Cable	.28/ft.
1 ft.	50 Conductor	Cable	4.00/ft.
25 ft.	50 Conductor	Cable with 2 male connectors	256.00
1	#2425	Cambion Banana Jack	.30
1	100-F-2041	Unlettered Terminal Block	2.15
1	100-F-2042	Lettered Terminal Block	3.20
Fans and Filters			
1	53E168 Type CFG	Rotron Fan with #2R Blade	26.60
1	Rotron Venturi	Muffin Fan with Mounting Clips	20.00
1	10" x 10" x 2	EZ Kleen Filter	2.50
1 pint	418	Super Filter Coat	3.00
Indicators			
1	101-5030-975	Indicator Light	2.35
1	130-34IND-1	2F Indicator Light Circuit Board	23.70
1	100-AIND-2	18 Bit Indicator Light Circuit Board	33.00
In-Out Equipment			
Punch			
1	Teletype 131-30BPRE-11	Paper Tape Punch	1,050.00

12/1/62

R. F. Maxcy

In-Out Equipment (continued)

Punch

QUANTITY	PART NUMBER	DESCRIPTION	PRICE
1	146177	Link and Bushings	6.10
1	124269	Link	1.90
1	142847	Link Shaft	.13
1	142896	Feed Wheel Shaft	1.95
1	142888	Feed Wheel	17.95
1	143048	Spring	.12/ea.
1	82726	Spring	.20
1	143077	Spring	.11
1	142876	Spring	.30
1	119652	Retaining Ring	.01/ea.
1	119648	Retaining Ring	.01/ea.
1	143044	Retaining Ring	.03
1	142829	Pin	.80
1	142828	Feed Panel	5.35
1	124311	Punch Feed Pin	1.95
1	124332	Punch Code Pin	1.80
1	124257	Arm Toggle	2.10
1	124284	Arm Toggle	2.85
1	124244	Washer Felt	.03/ea.
1	2191	Lock Washer	.01
1	124320	Armature	1.05
1	142866	Magnet Assembly 20 volt	5.80
1	143007	Magnetic Pickup	18.35
1	142917	Tape Cutter	.55
1	143057	Guide & Die Set Plates	29.95
1	142660	Guide Plate	6.60
1	142987	Tape Guide	1.80
1	142910	Stud Detent Support	1.20
1	142865	2 1/32 Hexscrew	.20
1	151633	Ball Bearing	1.55
1	142807	Bearing	5.50

In-Out Equipment (continued)

Punch

QUANTITY	PART NUMBER	DESCRIPTION	PRICE
	142839	Bearing	4.75
	124289	Ball Bearing	1.80
	135097	Belt	1.05
Reader			
1	Digitronics 3000	Reader	3,300.00
1	100-Y-3422	Reader Handle (ADX)	5.95
1	131-74-3423	Brushed Aluminum Reader Trim	10.85
1	PGF 1106	Card	62.25
1	PSE 1101A	Card	70.00
1	PGE-A-BC 1403	SCM Card	39.20
1	BC 417	SSA Card	26.32
1	BC 412	FRA Card	26.18
1	BC 413	SDA Card	38.22
1	CC 1367	SPA Card	53.20
1	A 1073-1	Bearing	3.00
1	A1072-2	Bearing	3.75
1	142866	Solenoid Magnet	7.25
1	3500	Drive Belt	3.00
1	B-C462	Read Head Assembly	460.00
1	10-6411	Osram Lamp	1.00
1	A-A2300	Lens	7.35
1	B-127	Capston	26.30
1	A-B73-1	Clutch - Solenoid	13.75
1	B-C890	Coil Assembly	67.00
1	6E4JA411BC1BD1	Selinium Rectifier	7.55
1	6E4JA411AC1AD1	Selinium Rectifier	7.55
1 pair	100-Y-3375	Reader Tape Catchers (PDP-1)	206.00

12/1/62
R. F. Maxcy

Typewriter

QUANTITY	PART NUMBER	DESCRIPTION	PRICE
1	Model ETC-777-878	Computerwriter	2,800.00
1	X-5531	Complete Translator	806.00
1	D-5043	Coder Assembly	312.00
1	B-5530-1	Power Cam Assembly	33.38
1	B-4805A-P2	Cam Accelerator	2.85
1	B-4804B	Cam Trip Arm	1.20
1	SS418 FCHH	Bearing (Soroban #6)	6.90
1	MPB 3332	Bearing #4	7.30
1	B-4904A	Drive Crank Spring	7.70
1	MPB-5632	CHH Bearing #44	6.40
1	A-4809	Support Shim	1.90
1	B-3326	T6 Flanged Bushing	1.15
1	A-4853-A	Clevis Pin Bushing	1.65
1	B-4786P2A	Permutation Bar Stop	8.25
1	C-4810T1	Coded Permutation Bar	10.65
1	C-4810T2	Coded Permutation Bar	10.65
1	C-4810T3	Coded Permutation Bar	10.65
1	C-4810T4	Coded Permutation Bar	10.65
1	C-4810T5	Coded Permutation Bar	10.65
1	C-4810T6	Coded Permutation Bar	10.65
1	C-4810T7	Coded Permutation Bar	10.65
1	C-4810T8	Coded Permutation Bar	10.65
1	C-5041 P2A	Power and Drive Unit Assembly	227.85
1	A-4700A	Seeker	1.50
1	A-4905	T1 Spring	.50
1	A-4970B	Bracket and Bushing Assembly	7.30
1	B-4969	Latch and Pin Assembly	7.00
1	SS-PHH 418	Bearing #52	7.30
1	B-4705-B	Actuator Assembly	29.05
1	C-3817C	T4 Pivit Pin Washer	.56
1	A-4854	Cam Drive Shaft Assembly	11.90
1	J-35EC	A-209895 Relay	8.40

In-Out Equipment (continued)

Typewriter (continued)

QUANTITY	PART NUMBER	DESCRIPTION	PRICE
1	A-4950	Pull Wire Assembly	5.20
1	A-2229B	Translator Solenoid Assembly 35 Wire 24V	26.75
1 set	3MHA 156	Contact Form B	2.10/set
Panels and Cabinets			
1	131-74-3217	1-18 Bit Panel Assembly (complete)	165.00
1	1901-NC 19"	Mounting Panel w/o connectors	37.50
1	131-74-2036 8"	Plenum Door Blank	4.80
1	100-Y-3317	SBS Output Panel (ADX)	18.95
1	131-74-3239 computer	Cabinet (complete including fan without end panels)	600.00
1	131-74-3220	End Panel	75.00
1	131-51-1906	Front Panel 1906 Card wired and lettered	3.75
1	2019	Current Driver Blank Panel	2.70
1	1905	Mounting Panel w/o Connectors	75.00
1	131-53-700-2017	741 Power Supply Panel	12.35
1	131-74-3241	19 1/2" Trim Strip for cabinet	3.90
1	131-74-3277	Door Stop Rod	2.70
Power Supplies			
1	NJE-EQR-60-6B	Power Supply (Type 30 & 31 Display	777.00
1	Mikros HV-41 40KV 500 mi a	Power Supply (Type 31 Display)	805.00
1	NJE-5300 RM $-150V_{+6.3AC}$ +500V	Power Supply (Type 31 Display)	455.00
1	Krohn Hite UHRT 361R 36V 1A	Power Supply(Type 31 Display)	1,194.00
1	NJE-P30-1 20V	Power Supply (Type 31 Display)	139.00

12/1/62
R. F. Maxcy

Switches

QUANTITY	PART NUMBER	DESCRIPTION	PRICE
1	12451	3 Position, 5 pole Shall Cross Switch (Marginal Check Panel Sw.)	23.80
1	6AT1-T2	SPDT sub-miniature toggle switch (control panel)	5.95
1	6AT4	DPDT sub-miniature toggle switch (control panel)	8.35
1	829K12	STDP toggle switch 15A at 125 VAC (Marginal check switches)	2.25
1	16006	Telever Switch (Central Processor)	4.50
1	PJE-4203-Z2P1	Mossman Switch	19.40
Conversion Kits			
1	63 to 110 char./sec Conversion Kit for Punch		58.50
1	Hobbs elapsed time meter on 813 power control	Kit for convert from Haden Meter	28.35
Transistors and Diodes			
Diodes			
1	1N3208		1.70
1	1N3209		1.65
1	1N3316		13.20
1	D001-1		.45
1	D003		.96
1	D664		.60
1	GA-439		.90
Transistors			
1	2N744		11.60
1	2N1204		7.88
1	2N1427 (MA89 or 90)		6.60
1	2N1545		4.05
1	2N769		9.45
1	S1188A		42.14
Miscellaneous			
1 reel	498-24R 1/2"	Magnetic Tape	43.60
1	64 x 64 x 19	Memory Stack	7.200.00
1	131-74-3356	Bat Handle	3.70

Miscellaneous (continued)

QUANTITY	PART NUMBER	DESCRIPTION	PRICE
1		Fanfold Tape Tray	3.25
1 box	1000 ft.	Fanfold Paper Tape	3.00
1 case	14 boxes	Fanfold Paper Tape	40.00
1	3AG-5	Fuse	.24
1	330-25E-3	Delay Line	8.00
1	330-25E-6	Delay Line	10.00

12/1/62

R. F. Maxcy

dec INTEROFFICE MEMORANDUM

DATE 11/30/62

SUBJECT Loan of PDP-4 to Rand Corporation

TO H. Anderson
K. Olsen

FROM Ted Johnson

Fred Gruenberger is presently interested in hearing from our company as to our interest in having a textbook written around the PDP-4 Computer. He is currently considering four machines: Univac 422 (a training or educational computer with 512 word memory, 15 bits, and flexowriter), the PDP-4, CDC 160 and the SDS 910. I would assume that he would find the 422 and the 160 quite limiting from the standpoint of word length. I would be quite surprised if SDS were in a position to provide such a machine within such a period of time considering the level of their computer committments. This indicates to me that from a practicability point of view, our computer would be the most desriable machine. Fred Gruenberger is committed to have the book finished by June 17 if he gets the final approval from Rand. The project would receive funding from Rand and be known as a Rand-sponsored project.

Gruenberger would then be interested in getting started on this sometime next month and hopes to get this final approval within the next few days.

We discussed several possibilities. He wants to have the machine close at hand and readily available so as to first of all gain intimate familiarity with the machine and then be able to work out sample problems and application examples, etc. He has received offers from other companies to use the machine at their facilities but does not consider this a reasonable approach. I suggested that he spend most of his time at our office and use our machine, but he objected with the remark that as an employee of Rand he would have to be accessible within the Rand facilities. I somewhat question the absoluteness of this position. If we are to give a machine full time to Rand for the 6 month period, this machine would cease to function as a continuously readily accessible demonstration machine. Going on the assumption that we would have a demonstration machine here (and I feel that this is a necessity and certainly more desirable with respect to the new facilities we will have in our office) there are three possible alternatives:

1. Two local machines, one at Rand and one at WCO.
2. Full time location of one PDP-4 at WCO and use by Rand at our facilities.
3. Share usage of the PDP-4 between the Rand location and WCO location.

Gruenberger was quite amenable to alternative #3. If he could have full time of the machine for the first month at his facilities, he would be happy with having direct access at his facilities to a machine on alternate periods of time, possibly every two weeks. I indicated to him that we could be of some assistance to him in this project of becoming familiar with the machine and he was quite pleased with this.

After feeling him out on all of these points, I feel that we should indicate our interest in cooperating on this project. I feel that we are in a good position and could possibly work this out with Gruenberger the terms of alternative #3 and possibly on #2. Their primary consideration should be the selection of the machine itself based on suitability and it's position at the time that the book becomes available. If we consider this a worthwhile project, I would suggest a statement expressing our interest in being incorporated in a book and in being cooperative in the writing of such a book but would hesitate to overly committ ourselves on the allocation of a computer on a full time basis.

Under separate cover, I have sent several chapters of the first book that Gruenberger wrote including a table of contents which I have made up for easy review. Please look this over and return to me asap since these are internal Rand documents.

Ted

dec INTEROFFICE MEMORANDUM

DATE November 26, 1962

SUBJECT Purchase Requisition Authorization

TO Kenneth H. Olsen

FROM Henry Crouse

To insure my list of those authorized to sign Purchase Requisitions is up-to-date would you confirm the following people as authorizing sources:

Kenneth H. Olsen
Harlan Anderson
Stanley C. Olsen
Richard Best
Benjamin Gurley
Jonathan Fadiman
Nick Mazzarese
Maynard Sandler
Cy Kendrick
Jack Smith
Henry Crouse

Henry Crouse

INTEROFFICE MEMORANDUM

DATE November 21, 1962

SUBJECT Display 31 at FJCC

TO Ken Olsen
cc: Harlan Anderson
Stan Olsen
Ben Gurley
Nick Mazzarese

FROM Bob Savell

I want to register my strong objections at the decision that was apparently made, and which I found out about last week, not to run the Display 31 at the FJCC but simply to take the table holding the cathode ray tube housing as a cold piece of equipment to the show. It was my understanding previous to last week, and as a result of the meeting we all held about three weeks ago, that the Display 31 was to go hot if possible, cold if not. I at that time registered strong objections to taking any cold piece of equipment to a show. Since hearing of this decision we have not continued to try to complete the entire Display for the show, and none of the instructions have been wired into the PDP-1 necessary to run the Display 31.

I simply want to repeat at this time my strong feelings that it is a very poor sales policy to take a cold piece of equipment to a show. I feel that it gives prospective customers the impression that either you brought it to the show and tried to make it work and you couldn't, or that you just plain don't have it running. I really feel, as I have already told Nick, that we would be better off simply not taking it at all rather than to take it and not run it.

INVENTORY POLICY - DIGITAL EQUIPMENT CORPORATION

The inventory status of DEC is both a condition of and a determinant of our company policy and activity.

Perhaps we may best analyze policy by delineating the mechanisms which determine the need for material and labor procurement.

Our product is basically divided into Modules and Computers/Systems. For purposes of this study, Systems are combined with Computers.

A. Determination of Module Finished Goods Availability

Our stated goal is to provide module units in Finished Goods Inventory to cover all orders (external and internal) AND an amount of each module to cover all expected orders; the company aim is to be able to fill any order off-the-shelf.

1. We maintain a stock of approximately 250 different module types. Perpetual inventory record cards are maintained for each module type.
2. The Balance on Hand being known, customer orders and internal orders are posted as a deduction of available inventory balance, giving us an On-Hand Stock Availability for each type.
3. Manufacturing Orders are issued to correct minus availability.
4. Open Manufacturing Lots are posted as an addition to available inventory balance, giving us a To Be Available Balance for each module type.
5. We now must plan for that amount of each module type to cover expected orders. The To Be Available Balance is matched against that average monthly quantity which has been used during the last 5 - 6 months. Adjustment of averages are made to reflect whether we are on an increasing or decreasing slope in rate of new orders for modules.

Manufacturing Orders for modules are issued to bring the To Be Available Balance to the desired stock level.

Example

	Type	Balance On-Hand	-Orders	On-Hand =Availability	Units +In-Process	Balance To Be = Avail.	One Month Usage
(1)	1201	60		+60		+60	60
	receive customer orders for 30 units						
(2)	1201	60	(30)	+30		+30	60
	issue manufacturing order for 30						
(3)	1201	60	30	+30	(30)	+60	60

Type	Balance On-Hand	-Orders	On-Hand =Availability	Units +In-Process	Balance To Be = Avail.	One Month Usage
	ship 30 units and receive order for 75					
(4) 1201	(30)	(75)	-45	30	-15	60
	complete manufacturing lot of 30 and issue mfg. lots of 80					
(5) 1201	(60)	75	-15	(80)	(+65)	60
	receive 80 into stock and make shipment					
(6) 1201	60+80-75= (65)		+65		+65	60

This is the basic arithmetic mechanics which determine the availability of modules in the Finished Goods Stockroom.

B. Determination of Raw Materials Availability

The need for Components is determined by the same basic mechanism. We use approximately 1200 Components.

1. The actual to-be-issued Manufacturing Lot for a module type is an "order". An expected future Manufaturing Lot is an "order".

2. We now explode each module type into the required quantities of each component specified in the parts list for that module. We thus arrive at the current need for each component.

3. We maintain perpetual inventory record cards for each component. This card indicates present On-Hand Balance, Open Purchase Orders, and Module Types in which component is used.

4. The Need for a component is deducted from the On-Hand Balance to give the On-Hand Availability.

5. Open Purchase Order quantities are added to availability to give a To Be Available Balance. A minus here will be the determinant to place a Purchase Order.

6. Minimum available levels of stock for each component are determined by exploding the desired level of module unit production i.e. 8000 per month, the quantity for each module type being calculated by ratio of the usage mix.

Example

Component	Balance On-Hand	-Need	Available = Balance	Open +P.O.	To Be =Available	Usage
1.5K Res.-5%	10,000	13,200	= -3200	5000	= +1800	10,000

The above mechanics will insure a minimum amount of inventory. We must now examine the reasons why we deviate at times from this procedure:

1. The relatively unpredictable mix of types in module orders urges us to add a safety factor to each module type need and thus each component need. Again, we stock 250 different types which use 1200 different components.

2 New module types and new components are continuously being introduced, effecting an increase in our needs.

3. Engineering changes either slow down usage of stock or, at worst, obsolete stock.

4. Purchasing negotiations for best unit prices often require increased quantities and shorter deliveries.

5. Risk-taking on yield of semiconductors often dictates larger orders and results in ineffective inventory or slow down of usage.

6. Specific deviations from formula can be determined by decision to manufacture at a level beyond actual need, again because of predictions of expected order levels.

7. Production at times is authorized in excess of formula demand because we have available production capacity.

8. It will be noted that we have not introduced the time or timing dimension into the above discussion. Faced with sharply increasing demand, we issue Manufacturing Lots and Purchase Orders to meet expected demand. Good inventory control practice would argue that we bring in materials in the amounts our production capacity can use during given periods. Production is Material + Labor. We have procured Material faster than our ability to add Labor, because we optimistically hope that we can drive upwards that labor addition capacity. When we fail we have excess Material inventory.

9. In order to augment our Labor capacity, we have purchased Outside Contract operations. In order to make the relationship attractive to such vendors, we normally must purchase subassemblies in larger quantities than we may require from a time standpoint. The lead time here also necessitates more material procurement.

During periods of sharply increasing demands for our products we basically

(1) Recognize that Production = Material + Labor and that we procure Material at a faster rate than our Labor capacity will use that Material. Timing is virtually ignored. The objective is to have enough material.

(2) Augment our Labor capacity by use of Outside Contractors, thus yielding time and quantity control to the urgencies of need, both present and expected.

(3) Seek to increase individual productivity and levels of production. We have often decided how many units we wished to make without asking ourselves how many units we expected to need.

dec INTEROFFICE MEMORANDUM

DATE 11/30/62

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K. Olsen

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Ted

This is Digital (English-French-German)	A-105A
Module Catalog (First Edition)	A-705
Hard Cover Module Catalog (First Edition)	A-705(HC)
Replacement Pages for Module Catalog	A-705(RP)
Supplementary Pages for Module Catalog	A-705(SP)
Module Catalog (Second Edition)	A-705A
Oct. 1 Module Price List (Catalog Insert)	A-705A (PL)
Logic Kit Folder	B-50
Preliminary VHF Modules Folder (Company Confidential)	C-8000P
Pulse Train Techniques Application Note	E-60
"Integrating Different Series of DEC Modules" Bulletin	E-100
Binary-Coded Decimal Codes Application Note	E-400
Analog-to-Digital Conversion Handbook	E-460C
PDP-1 Brochure	F-11A
Precision CRT Display Type 30 Folder (Preliminary)	F-13(30P)
Fanfold Tape Tray Bulletin	F-13(99)
PDP-1 Manual	F-15C
PDP-1 Instruction Card	F-16
PDP-1 Maintenance Manual	F-17
PDP-1 Input-Output Systems Manual (Preliminary)	F-25
Programming Primer	F-30
MACRO Assembly Program Manual (Preliminary)	F-36AP
MAINDEC 1 Instruction Test	F-39 (1)
MAINDEC 10 Read-Binary Test	F-39 (10)
PDP-4 Brochure	F-41B
PDP-4 Instruction Card	F-46
PDP-4 Maintenance Manual	F-47
ARC Folder (PDP-4 Application)	F-460
Systems Brochure	F-1000
Burst Generator Type 2309 Folder (Preliminary)	F-2309

dec **MEMO**

DATE 11/30/62

TO Ken Olsen FROM MS

Cost of 4700 Printer Buffer-Driver Unit

~~$~~ 67.89

4700 Board - no components

~~$~~ 5.20

DAP 984

dec INTEROFFICE MEMORANDUM

DATE 11/30/62

SUBJECT Scientific Data Systems

TO ~~Ken~~ Olsen
~~Harlan~~ Anderson
Stan Olsen

FROM Ted Johnson

I had an opportunity to visit both locations of SDS in Santa Monica yesterday afternoon. This was very interesting and helped bring into prospective the rumors and speculations that have gone on about SDS. They presently employ approximately 130 people. In the old facilities, they now house manufacturing on the first floor and various offices on the second floor. Their new building houses their executive offices, R&D, Marketing and Engineering. This new building is built for expansion and they are planning to add another building on the rear. I was most amazed at the size of their production facilities which didn't appear to be much more than 1600 sq ft. The silk screening and printed circuit board manufacturing area is less than the size of our rear office although my friend at SDS indicates that they are able to turn out a considerable volume of modules. They certainly are not, at this point, in any position to seriously consider marketing commercial digital modules. The assembly and systems test area at the second building (engineering), had one prototype 910, the JPL system due for shipment January 1 (which incorporates a 910 and a 920) and two other computers which I believe were 920's. They also had a 920 in a demonstration window in the lobby which was being used by their programmers. They have 12 full-time programmers. The JPL system was an impressive assembly taking up about 7 racks, three of which were computers. While I was visiting they were using the 910 prototype to check out the mag tapes on their system.

I did get the impression that the people there were quite well organized and moving efficiently toward putting out computers and software support. Certainly in comparison with the tremendous area that we have in the buildings at Maynard, their facilities would not seem to indicate a capability anywhere in line with what they have announced as their production goals but it does look like they are progressing inan atmosphere indicating fairly solid achievement.

Ted

Informatics did programming study for JPL 910-920 system.
See follow-up note on discussion with Butler Sanchez of West Elwell, SDS reps.

dec INTEROFFICE MEMORANDUM

DATE November 30, 1962

SUBJECT EAI HYBRID COMPUTATION SEMINAR

TO K. Olsen
E. Anderson
S. Olsen
N. Mazzarese
J. Koudela
B. Gurley
R. Savell
P. Bonner
J. O'Connel
G. Rice
T. Stockebrand
G. Bell
D. Best
R. Beckman

FROM Robert F. Maxcy
West Coast Office
Washington Office
New York Office

DEC has loaned a PDP-1 to EAI for the purpose of setting up a Hybrid Computation Seminar which will be held at Electronics Associates Inc., Princton, New Jersey on January 28 and 29. General discussion will be on the combined usage of:

General purpose analog computers:

HYDAC Digital expansions:

General purpose Digital computers:

as applied to the aerospace field

Specific topics that will be discussed:

- The essential features of analog computers, HYDAC and digital computers as related to hybrid applications.
- The ways of intercommunication of these machines.
- Problems benefiting from the hybrid approach. (Multiple speed problems, perturbation problems, automatic optimization statistical investigation.)
- Approaches to the programming of each machine and of their linkage operations for different classes of applications.
- Demonstration of a hybrid problem using EAI alalog and HYDAC units in conjunction with a PDP-1 digital computer.
- Discussion of the adequacy of such a system.

This is to be a high level conference, and would be a good opportunity for us to invite some of our best potential customers. If you have any suggestions as to who should attend, let me know, and invitations will be sent to them.

Robert F. Maxcy

RM/ak

MEMORANDUM

DATE: November 29, 1962

SUBJECT: Solder Plating

TO: Methods Committee

FROM: Cy Kendrick

Acceptable machine soldering of solder plated circuit boards has stimulated much interest as to the feasibility of purchasing equipment to solder plate our own boards.

Extensive research has been done on both the Hollis and Compo machines pertaining to the effects of conveyor speed, solder temperature, and various fluxes on purchased solder plated boards and our own copper clad boards. With solder plated boards it was determined that,

(1) a wide range of conveyor speeds has no effect on the quality of soldering,

(2) exceptionally fast conveyor speeds will cause some icycling,

(3) all fluxes work well with solder plated boards,

(4) boards soldered well at temperatures ranging from 425° to 525° F.

With our own copper clad board it was found that,

(1) the results with clean boards having little or no oxidation where comparable to solder plated boards,

(2) when using Alpha 346-35 and other resin base fluxes, as oxidation increased, the wetting problem increased resulting in skips and flats on the circuitry,

(3) when using Lonco 3355 water soluable organic flux with the Hollis machine, the results were the same as (2) above, however, when using Lonco flux on the Compo machine, acceptable results were obtained on heavily oxidized surfaces.

Two field trips were made by Henry Crouse and Cyrus Kendrick, the first to Etcho Matic in Waltham. This was to investigate a commercial solder plating system which is quoted at a cost of $2,200. As there have been none of these units sold in this area, it was impossible to see one in operation or to talk with a firm that has one. This unit is not practical as it will not handle the 18" x 13" board and its capacity falls far short of our requirements.

The second trip was to Electra Labs, one of our suppliers of solder plated boards. We talked with Mr. Larry Litchfield, Sales Engineer, who showed us the company's operation. Mr. Litchfield who advised us of many of the problems and pitfalls encountered in solder plating, recommended that we talk with a consultant or supplier of plating materials. He also estimated that we could install a system that would handle up to 500 boards a day for approximately $5,000.

Conclusion:

If there is no objection to the continued use of the Lonco 3355 organic flux, we have no serious quality problems in machine soldering at this time. However, it is estimated that we could realize an increase of from 25% to 40% in the output of the soldering operation by using solder plated boards. The increase would be accomplished by 100% use of the faster Hollis machine and the simpler cleaning operation used on resin base fluxes. However, labor saved by the increased efficiency in the machine soldering operation would be more than expended by the additional labor required in a solder plating operation.

Ken Olsen

digital MEMO

DATE 11/28/62

TO Stan Olsen FROM Ted Johnson

3C's might make significant inroads with their low cost 200kc line in places where they are fairly well-known and reasonably trusted. Suggest we look into 100-200kc line for educational and low-cost purposes. Sales value might be important, if only to defend our better customers from budgetary and purchasing pressures.

Ted Johnson

Re file

dec MEMO

DATE December 28, 1959

TO Reminder File - July 1 & Dec. 12
H. Anderson/K. Olsen

FROM Kenneth H. Olsen

Let's schedule the work for the company picnic and the company Christmas party so that the officers and senior people will be free of the manual chores and take the opportunity to meet and greet the family of the employees. Because of the nature of our work, we often have very little contact with people and it's a shame not to take full advantage of this opportunity.

Kenneth H. Olsen

Ken Olsen

digital MEMO

DATE 11-26-62

TO Ted FROM Bob

I believe that the 3C's S Pac line of 200KC modules may affect our 500KC line sales to some extent - particularly because of price (they are 30% less).

Bob Swenson of C12L pointed this out to me today and would like us to have a similar line — is this possible — what could I tell Bob Swenson & countenance him re 3C's S Pac's ?

5M9/62

DF100-21

INTEROFFICE MEMORANDUM

DATE November 26, 1962

SUBJECT Summary of ADX-0 Consultation

TO Ken Olsen

FROM Al Blumenthal

At the time of our arrival the system was up and operating. Don Smith and Don Nell of ITT had been in attendance for some days in an attempt to isolate the trouble. They had little to offer in the way of a diagnosis although a feeling that memory was at fault seemed to exist. The infrequency of the breakdowns made a methodical zeroing in on the trouble virtually impossible.

Examining the trouble reports revealed that three of the failures occured with nearly identical outward symptoms, a fact which had escaped the notice of the attending ITT personnel. One of the symptoms was a sequence break request of a supposedly unused channel. Some investigation revealed that this condition was normal. Another symptom was a memory reference to a non-existant field. After much discussion we learned that this was a normal stop which would occur when all message slots were filled. It seemed certain, though, that this was not the condition that led to the stoppage.

Without going into further detail, a great deal of time was spent in looking through the program trying to find ways of diagnosing the trouble.

Some time was spent looking into memory. Noise on the MAD lines was noted although it did not seem to be getting through the read-write switches. This noise was corrected by terminating the MAD lines in 160 ohms. We also found that the MA setup on high speed channel cycles was 150 ns later than on other types of cycles due to circuit delays. A similar situation existed with MB setup. This was corrected by a change of time pulses in the HSC control. A few miscellaneous terminators and diodes were installed in memory extension and HSC control.

The system performed properly when put on line at Tuesday noon, and had been operating for 100 hours continuously at the time I left. We had serious doubts as to whether our work corrected the trouble, and that, indeed, the trouble lay in the hardware rather than the program.

Working with the system made a few things apparent in regard to future maintenance. First, the program must be adequately documented and the attending personnel familiar enough with it so that a more definite plan of attack can be pursued in the event of trouble. This fact is equally important for both hardware and software troubles. The existing program, being the first for a system of this type, has a turbulent history as evidenced by the large number of patches. Rewriting it would certainly make life easier for the troubleshooters and may also reveal some weaknesses. One important consideration in any system of this sort is to write program with many built in trouble shooting aides. This particular system I do not understand well enough to make specific suggestions on, but the general rule would be to have the program leave a trail in the form of data stored in locations assigned for this purpose, which would enable one to trace its activities prior to any stoppage.

The system seems to have one basic weakness. Under conditions of increasing message density it is necessary to devote more and more time to hunting for messages on magnetic tape, and to rearranging messages on the queue tape. This reduces the time available to process the messages, the situation getting regeneratively worse until it is finally unable to handle the traffic.

All of these things indicate that ITT must devote more time and effort to this system before a reasonably good prognosis for reliability can be made.

ANB/nb

digital MEMO

DATE 11/26/62

TO H. Anderson
Gordon Bell

FROM Ted Johnson

I will be receiving a copy of Fred Gruenberger's book in the form of internal chapter-by-chapter Rand documents. Will probably have to treat these as confidential (a friend is getting them for me) but they will be interesting in line with Gruenbergers interest in writing about the PDP-4.

Fred is not considered to be a hot-shot programmer at Rand. His capabilities here are short of the ability to write a college level book, but he is respected for his work in the educational study end of it.

Ted Johnson

K. Olsen

dec INTEROFFICE MEMORANDUM

DATE November 26, 1962

SUBJECT Briefing

TO ALL THOSE ATTENDING THE FJCC FROM Howie Painter

Leo Gossel will explain the demonstration programs to be used at the Fall Joint Computer Conference on Wednesday, November 28 at 3:00 p.m. in the Sales Conference Room.

You are urged to attend.

dec INTEROFFICE MEMORANDUM

DATE November 21, 1962

SUBJECT Obsoleted Transistors

TO K. Olsen ✓
H. Anderson
R. Best
R. Hughes
H. Crouse
G. O'Dea
C. Fuller
J. Trebendis

FROM Maynard Sandler

Transistors which are no longer called out in our products are removed physically from Stock and held in Obsolete Stores. It would be good business to use up these transistors if possible without injury to the quality of our products.

Below is the list of obsoleted transistors and the suggested dispositions:

TRANSISTOR	QUANTITY	DISPOSITION
2N167	485	Hold in Obsolete Stores
2N398A	2000	Hold in Obsolete Stores
2N674	3992	Sell about 2500 - H. Crouse
2N769	616	Sell - H. Crouse
2N1065	6120	Hold in Obsolete Stores
2N1146A	1015	Hold 300 in Obsolete Stores; return balance to vendor - H. Crouse
2N1218	1329	Hold 300 in Obsolete Stores; return balance to vendor - H. Crouse
2N1301	486	Hold in Obsolete Stores
2N1306	495	To Bob Hughes for possible use
2N1427	68 red	
	55 regular	Give to schools
2N1496	62	Hold in Obsolete Stores
2N1719	200	Hold in Obsolete Stores
FSP-2	9	Return to vendor; if not possible, use up per Bob Hughes
2N1305 (G.E.)	4760	Hold in Obsolete stores; use in inverter gates per Bob Hughes
2N2048	104	Sell - H. Crouse
2N1499A	685	Tom Whalen will use up
2N670	3000	Sell - H. Crouse
2N412	8586	Sell - H. Crouse
MA-45	1866	Sell - H. Crouse

TRANSISTOR	QUANTITY	DISPOSITION
2N588	312	Sell - H. Crouse
2N393	470	Sell - H. Crouse
MD-27	2120	Sell - H. Crouse
2N224	680	Give to schools - (Done)
NS 628	19	Hold in Obsolete Stores
2N438	525	Sell - H. Crouse
2N1272	134	Hold in Obsolete Stores
2N599	72	To Bob Hughes
2N1370	29	Give to schools
2N522A	264	Hold in Obsolete Stores

Every attempt should be made to use up Obsolete Stores transistors - they are now free.

dec INTEROFFICE MEMORANDUM

DATE 20 November 1962

SUBJECT Drug Companies & Computer Usage in Testing & Experimentation

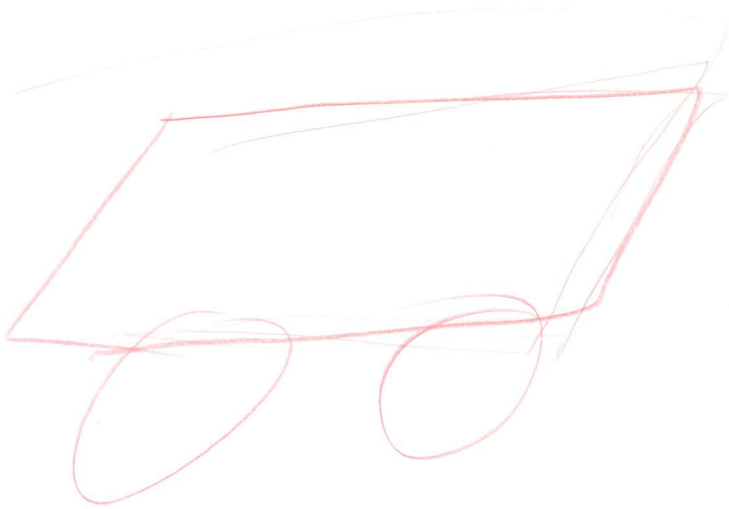
TO Ken Olsen FROM Ted Johnson

There are no large industrial drug research companies out here. An exception might be Riker Labs., a division of Rexall and Cutter Labs. in Berkeley.

There are government research activities and university and hospital activities along this line that could merit exploration. The attached list indicates efforts I have made along this line. We are in a good position to set up demo programs and entice their interest if we have something to offer. These people tend to be an in-group and concentrating on a few leaders such as UCLA and Oregon Primate Center and Stanford should pay off. Dr. Dixon is a key person in medical data processing at this point.

If you have needs of contacts at Schering Corporation, I have a good friend in market research who has done survey work in this area.

Ted



1. Riker Laboratories (Div of Rexall) Northridge, Calif DI 1-130

Contacted Dr. Hayes. He does not consider that his experiments are of a scope to justify computer techniques. Minn-Honeywell, G.E. and IBM have all approached him. IBM did a study. I interested him in further discussion and a visit to our PDP-4 demonstrator.

2. Los Angeles Air Pollution Control (L.A. County) MA 9-471

Mr. Robert J. Bryan, Director of Technical Services Division
Mr. Holland, Animal Testing
USC does their work at medical school. Dr. Chambers is the contact there.

3. University of Southern California RI 8-231

Medical Center - Dr. Chambers & Dr. Wayne x1004 - (Allen Hancock Fdn) Have interest in electronic computation. USC has Honeywell 800 machine. Taking care of problems there. Wants to know more about what we could offer to them. Arranging a demonstration.

Dr. Brady - Pharmacy

4. Huntington Hospital, Pasadena SY 5-869

Institute of Research - Dr. Clinton Thienes, no longer director - Dr. Ralph G. Skillen is new director - no needs at present - not enough scale.

5. City of Hope, 1500 E. Duarte Rd., Duarte EL 9-811

Animal house. Do a few dogs a week. In the small animal lab., mice and guinea pigs. x470 M.C. Moreland, Animal caretaker. No real chance here, I don't believe, but Moreland interested in talking to us and directing us to research people who may have problems.

6. Cedars of Lebanon Hospital NO 2-911

7. University of California - Los Angeles Administration BR 2-616

Labs. of Nuclear Medicine & Rad. Biology BR 2-651

Medical Center BR 2-8911

Biostatistics - We are planning to set up a Dataphone demonstration from our PDP-4 to the Western Data Processing Ctr. Lee Lusted at Oregon wants a link to the UCLA Med. Ctr., and this will be a first feasibility study step. MU

8. California Institute of Technology MU 1-7171

8. California Institute of Technology MU 1-717

Have new 7090 Computer

9. Stanford University

Dr. Keith Killam, Pharmacology

Good future opportunities and current need for LINC computer. He keeps in close touch with Lincoln and Wes Clark who has told him Lincoln would build the LINC with some purchased parts, presumably our tape units and modules.

Ken

Jack Atwood on his string tying machine

Stan and his Portable dictator

} both have agreed to hold off until we book a firm PDP-1 or 4 order

Leo

11/19

K. [redacted]. Olsen

dec INTEROFFICE MEMORANDUM

DATE November 14, 1962

SUBJECT Routing of PDP-1 and ADX Design Changes

TO PDP-1 Distribution List FROM Ed Harwood

ABSTRACT

This memorandum is a description of the routing of all PDP-1 design changes. The names of the persons involved in the routing may be changed at a later date. For the present time, this memorandum will point out the person or department involved in the routing. A design change to the PDP-1 or ADX system may be originated by any person working at DEC. A customer may request a design change and it would be handled in the normal way.

##########

Anyone wishing to originate a design change for the PDP-1 or ADX system should get a white design change sheet. These can be obtained from the Technical Publications Department. The originator will mark up all the appropriate columns on the design change sheet, and fill in all necessary information; such as, nature of change, block schematics involved and effect on programming. After the originator has written up the change, and marked up all the necessary block schematics, wiring diagrams, cable lists, block diagrams and whatever other drawings pertain to this change, he will send them to Nick Mazzarese. Nick will check this change and decide whether it will be performed or not. If he questions the need for the change he will hold it temporarily to discuss with someone else, or perhaps return it to the originator with his reasons for disapproving it. If Nick OK's the design change, he will then give it to his secretary who will hand carry it to Ed Harwood and Jack Shields for their notification. The reason for this path is so that the computer checkout and Customer Relations groups can be notified in advance of the change being considered and should voice their approval or disapproval. If either the Computer Checkout or Customer Relations groups have a question on this change, they will consult with Nick Mazzarese. If it is OK, it will either be routed to the Drawing Control Center or, if the design change is experimental in nature, will be tried on the prototype before it goes to the Drawing Control Center. The person assigned the responsibility of checking out the change on the prototype will see that the design change goes on to the Drawing Control Center if it is OK, or back to Nick if it does not perform properly.

At the Drawing Control Center, Norm Perryman will mark-up the appropriate number of drawings and type the design change on a formal numbered form. He will gather one complete set of drawings, including all block schematics, wiring diagrams and cable lists, and present these with the numbered change to Nick Mazzarese for his signature. When Nick signs the change, it is official and it will be done on all machines designated on the change form. It then goes back to the Drawing Control Center and Norm Perryman issues marked-up drawings to all the people listed on his PDP-1 and ADX design change distribution list.

Some of the people on this list have the responsibility for notifying the Drawing Control Center when the design changes have been done and checked on a particular machine. These groups are as follows:

Barrett Pritchard - When the design change has been done on any machine in the final assembly area.

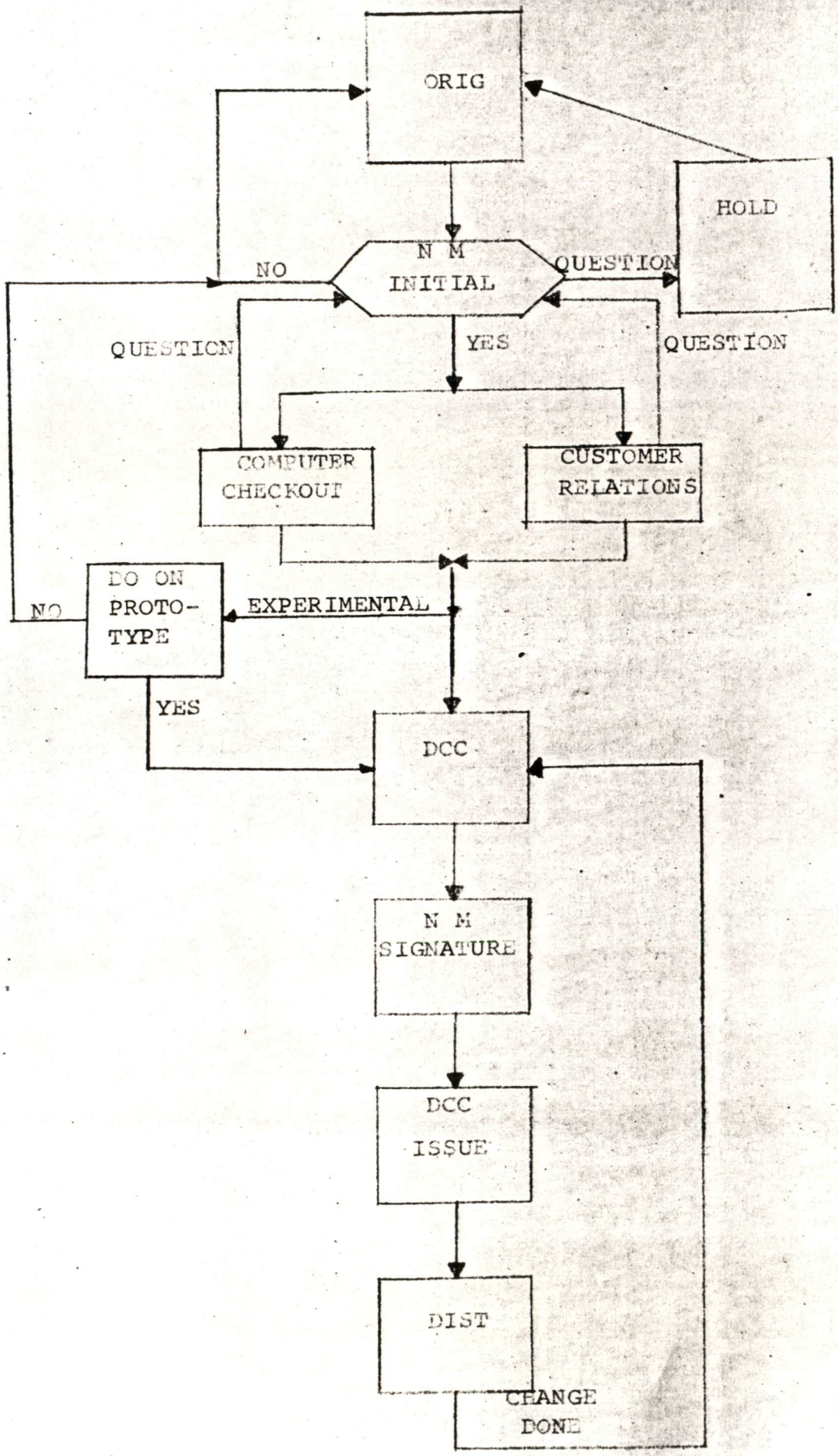
Bob Reed - When a design change has been done on any machine in the final test area.

Bob Beckman - When the design change has been done on any machine in the field.

I must stress the importance of these people sending <u>WRITTEN</u> notification back to the Drawing Control Center when a design change has been completed and checked on any machine in their area, as the files at the Drawing Control Center cannot be kept up to date without this information feedback. See attached flow diagram showing the design change routing.

Edward E. Harwood
Ed Harwood

EH/ak


ORIG
HOLD
N M
INITIAL
NO
QUESTION
QUESTION
YES
QUESTION
COMPUTER
CHECKOUT
CUSTOMER
RELATIONS
DO ON
PROTO-
TYPE
NO
EXPERIMENTAL
YES
DCC
N M
SIGNATURE
DCC
ISSUE
DIST
CHANGE
DONE

INTEROFFICE MEMORANDUM

DATE November 14, 1962

SUBJECT Interview Schedule - Thursday, 11/15/62

TO K. Olsen
H. Anderson
S. Olsen
W. Hindle
N. Mazzarese

FROM Personnel--Bob Lassen

Allan Titcomb - will return for a second interview on Thursday, 11/15/62. He will have lunch with Win and Nick and will meet with Ken and/or Andy at 1:30 P. M. Stan has already met him, and we feel he's worth further consideration for Sales Engineering.

Eugene Brandeis - will come in for his first interview on 11/15/62 at 2:30 P. M. with Stan and myself. If we feel he's a good prospect, we will have him talk with Win, Ken and Andy. He is a high level Sales-Marketing type engineer and is currently Manager, Instrumentation Products Marketing Department, Ampex International Operations, Inc.

RTL/jfr

November 13, 1962

K. Olsen
H. Anderson
S. Olsen
G. O'Dea
W. Hindle
R. Mills

R. Maxcy

The attached list is a composite of the terms and conditions that Sales has been using in proposal writing. If this meets with approval, we wish to continue its use in our new "proposal packaging".

TERMS AND CONDITIONS

A. Prices quoted herein shall remain in effect for 60 (sixty) 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 30 (thirty) 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. A Digital Equipment Corporation (DEC) computer system is defined as consisting of 1 (one) standard DEC PDP-1 or PDP-4 with one or more pieces of standard peripheral equipment. Such a system can be delivered and installed within approximately 6 (six) months after the award of the contract in the case of a PDP-1. A PDP-4 can be delivered and installed approximately 4 (four) months after the award of the contract. A single contract calling for two or more systems will require an additional 2 (two) months for each additional system.

G. All of the equipment quoted herein which is manufactured by DEC is guaranteed to be free from design and manufacturing defects for a period of 6 (six) months following the date of acceptance and delivery (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. Components which are not manufactured by DEC are limited to the warranty provided by the original manufacturer. Original manufacturer warranties commence upon the date of delivery and acceptance of such subject equipment at Maynard, Massachusetts. The equipment subject to original manufacture warranties are Perforated-Tape Reader, Perforated-Tape Punch, and Automatic Typewriter.

H. 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 under standard DEC test procedures applicable to the equipment. Subject to approval by DEC, the buyer may include other test procedures. In such case the buyer shall bear the costs of preparing and checking any special programs, and acceptance testing shall not be delayed because of the nonavailability of such programs or of complications arising from their use. Final agreement between the buyer and DEC on test procedures and programs shall be reached no later than 30 (thirty) days before the scheduled acceptance date.

dec INTEROFFICE MEMORANDUM

DATE November 9, 1962

SUBJECT Open Personnel Requisitions

TO K. Olsen
S. Olsen
M. Sandler
R. Mills
W. Hindle

FROM Bob Lassen

The following are open personnel requisitions. Periodically, the need for these additional people should be re-evaluated by the Personnel Committee. I feel we should discuss it at our next meeting.

Clerk-typist (replace D. Bergeron)	- Accounting
Clerk (replace E. Dacey)	- Accounting
Cost Clerk	- Accounting
Senior Clerk	- Purchasing
Secretary	- S. Olsen
Shipping Clerk	- J. Myers
File Clerk	- J. Myers
Mail Clerk	- J. Myers
Sheet Metal Worker (senior)	- L. Prentice
Sheet Metal Worker (trainee)	- L. Prentice
Technician	- G. Gerelds
Wireman	- R. Boisvert
Repro Machine Operator	- R. Melanson
2 Electrical Draftsmen (trainees)	- R. Melanson
Public Relations Specialist	- J. Atwood

The following are requisitions which Ken Olsen has asked me to hold up:

Art Specialist	- J. Atwood
Mechanical Draftsman	- R. Melanson
3 Technicians	- R. Hughes

After the open requisitions are reviewed and approved, we will fill as many of these jobs with people from within the company as possible.

jfr

INTEROFFICE MEMORANDUM

DATE November 9, 1962

SUBJECT 400 Cycles Motor Generator Set and Power Supply

TO Ken Olsen FROM Dan Wardimon

Gearetor Compnay gave me a quote on a 400 cycle motor Generator in a 2 kw size unit with a rectifier box that will supply the following:

-15 volts: 1kw ripple less than 500 mv
+10 volts: 200 watts
-35 volts: 250 watts

With a ten week delivery time. The price is $1195. for one unit.

The manufacturer claims to achieve regulation at least equal to our specifications (around ±5%) which is surprising due to the fact that the generator itself has no control circuitry. The voltage itself is controlled and generated to permanent magnets which makes the whole idea very attractive because of the simplicity of the construction.

The rectifier box will contain enough capacitors to reduce the amount of ripple to our specification. The dimensions are unknown yet. In short the whole set could save the need for the 728 Power Supplies which make the price look more reasonable. There remains, however, the problem to incorporate the set into the computer with a suitable control circuitry.

In evaluating a sample unit a consideration should be given to whether a 1 or 3 phase motor should be ordered. The latter is smaller in size of course.

cc: Dick Best
Ben Gurley
Gordon Bell

K. Olsen

PERMANENT MEMORANDUM

DATE 2 November 1962

SUBJECT PERMANENT MEMORANDA

TO Personnel in "Work Areas"
(per Attachment 1)

ABSTRACT Explains the rules for the issuance, storage area, control and flow of Permanent Memoranda. Covers authorship, approval, security classification, format, numbering, revisions, attachments and provisions for file copies. Defines security classification terms.

FROM J. Ebner

APPROVED BY R. L. Best

Permanent Memorandum Rules

1. Anyone may issue a Permanent Memorandum on any subject. Approval should be given by the author's supervisor or department head. In some instances another person may approve a Memorandum. For instance, a project engineer may give approval if the memorandum concerns the project of which he is in charge. Be guided here by the fact that the name of the person approving the Memorandum may be taken as an indication of the category of the Memorandum.

2. Each Permanent Memorandum must carry a Memorandum Number. These "M" numbers may be obtained from the DEC Library. The number should appear beside the printed "M" in the upper right-hand corner of the Permanent Memorandum form. It should also appear in the same location on each succeeding page of the Memorandum. (Page 2 and all following pages should be duplicated on the gray boxed form.)

3. Each page of every Permanent Memorandum must be numbered. This number and the total number of pages in the Memorandum should appear in the indicated spaces in the "Page __ of __"printed in the upper right-hand corner of the Permanent Memorandum form. It should also appear in the same location on each succeeding page of the Memorandum.

4. The date of the Memorandum, the subject (typed in all capital letters), and the name(s) of the addressee(s) should appear in the indicated places on the form.

5. The author's name should appear after the word "FROM" and the signature of the person approving the issuance of the Memorandum should appear after "APPROVED BY."

6. A brief description of the information contained in the Memorandum should be inserted after the word "ABSTRACT." This is a summary for the guidance of the reader; it should be neither so short that it fails to adequately describe nor so long that it actually tells all the information the Memorandum itself was intended to do.

7. Each attachment (such as, drawings, prints, etc.) to a Permanent Memorandum should be given a page number, and a list of all attachments together with the page number of each should appear on the last page preceding the attachments.

8. There are 3 classifications of Memoranda:
   a. COMPANY CONFIDENTIAL - Contains information that must not be circulated outside DEC and should be sent to only those DEC personnel who need to know the information.
   b. COMPANY DISTRIBUTION - Contains non-confidential information useful only to DEC staff. Memorandum distributed to DEC personnel as designated by the person approving it.
   c. UNLIMITED DISTRIBUTION - Contains information useful to customers as well as to DEC staff. Memorandum distributed to anyone as designated by the originator.

9. There are three methods of adding to or changing a Permanent Memorandum once it has been issued. (1) If the Memorandum is completely revised, the new version should

be issued the same "M" number as the original but with "-A" suffixed to the number. A second revision would be "-B", etc. (2) A correction should be issued under the same number as the original but with the identification "Correction 1 (or 2 or 3)" typed on the line immediately below the "M" number. (3) An addendum should also be issued under the same "M" number as the original but with the identification "Addendum 1" typed on the line immediately below the "M" number.

10. All copies of "Company Confidential Memoranda" must be numbered, and a list showing the recipients of each numbered copy must be turned in to the DEC Library. Each page of every copy of such Memoranda must be printed on "COMPANY CONFIDENTIAL" paper.

11. All file copies of every Permanent Memorandum and every revision, addendum and correction are to be turned over to the Library.

12. All memoranda are entered in the DEC Library Permanent Memoranda Book. If you wish to check the Permanent Memoranda Book or obtain copies of Permanent Memoranda, contact the DEC Library. A list of Permanent Memoranda by name and number is available in the DEC Library.

FLOW OF PERMANENT MEMORANDA

I Issuer	1. Prepares Memorandum. 2. Obtains Classification from person approving Memorandum. 3. Notes Classification on text of Memorandum. 4. Makes distribution list based on Classification, as defined on Page 2, item 8.
II Issuer	1. Supplies secretary with: a. Text of Memorandum. b. Distribution List. c. Name of Memorandum. d. Name of person approving. e. Quantity required (allowing 25 copies for DEC Library File.)
III Secretary	1. Calls the DEC Library (Ext. 339) for next "M" number. 2. Gives Librarian: a. Name of Memorandum b. Name of Issuer. c. Name of person approving. d. Classification. e. Quantity required. 3. Sends current distribution list to DEC Library.
IV DEC Librarian	1. Assigns "M" number. 2. Records above information.
V Secretary	1. Types Memorandum on paper plate. 2. Delivers plate to Technical Publications (Production Manager) for reproduction. 3. Tells Production Manager: a. Quantity needed. b. Classification.

FLOW OF PERMANENT MEMORANDA (Cont.)

VI Technical Publications (Production Manager)	1. Schedules the Memorandum for printing. (Using "Company Confidential paper when the classification is "Company Confidential." 2. Instructs Press Operator to supply master copy. 3. Arranges for collating and stapling of Memoranda. 4. Arranges for delivery of all copies, including the master copy to the DEC Library.
VII DEC Librarian	1. Records receipt of Memoranda. 2. Numbers all "Company Confidential" Memoranda in numerical sequence 3. Files Memoranda. 4. Files Master Copy. 5. Notifies the issuer's secretary of availability of the Memoranda in DEC Library.
VIII Secretary	1. Withdraws necessary quantity from DEC Library for distribution as per distribution list. 2. Supplies the DEC Library with a list showing the recipients of each numbered copy, when the classification is "Company Confidential." 3. Distributes Memoranda to people on distribution list.
IX DEC Librarian	1. Checks with the issuer as to the need for further copies when the DEC Library supply reaches 10 copies.

FLOW OF PERMANENT MEMORANDA (Cont.)

IX DEC Librarian (Cont.)	2. Asks issuer for: a. Latest distribution list. b. Quantity needed (+15 for file.) c. Checks on any changes in classification. 3. Delivers "master copy" to (if instructed to reproduce) Technical Publications (Production Manager). 4. Gives Production Manager the following information: a. Quantity required. b. Classification.
X Technical Publication (Production Manager)	1. Schedules the Memorandum for printing. 2. Arranges for collating and stapling of Memoranda. 3. Delivers all copies to DEC Library and returns master copy to DEC Library.
XI DEC Librarian	1. Processes per #VII above.
XII DEC Program Library (Tapes & Tape Write ups)	1. Notifies the DEC Library when a Permanent Memorandum is rewritten as a "Program Write Up."
XIII DEC Librarian	1. Dates and marks Memoranda as follows: "Now available as a Program Write Up," and allows it to remain in the file for additional reference.

PERMANENT MEMORANDUM

DATE

SUBJECT ATTACHMENT 1

TO Distrubution List For Above Memorandum
To be distributed to the personnel listed in the following work-areas:

ABSTRACT

MANAGEMENT:

K. Olsen
H. Anderson
W. Hindle
G. O'Dea

Secretaries
M. Rand
N. Survilas

ACCOUNTING

R. Mills, Controller
A. Pontz
R. Dill
F. Mac Lean
F. Mariani
E. Simione -Cost

Secretary
L. White

CHIEF ENGINEERS OFFICE

D. Best

Secretary
R. Alving

CIRCUIT DESIGN ENGINEERING

R. Buyer (Tech. Writer)
E. Chevrier
R. Doane
A. Falco
J. Hamilton
E.T. Johnson
B. Stephenson
D. Wardimon
D. White

FROM

APPROVED BY

COMPUTER ENGINEERING

B. Gurley
C. G. Bell
A. Blumenthal
R. Boisvert
D. Chin
L. Cleary
A. Hall
S. Lambert
R. Savell
L. White
D. Pinckney

Secretaries:
L. Lowe
N. Hughes

SPECIAL SYSTEMS ENGINEERING

J. Fadiman
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