Snyder cc: HEA, KHO, A. Hall, NM, RLS (return to file) gb 3/3/63

December 14, 1962

NSG Junk File Smith 3/22/63

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~~ Central Processor + Bus	3,330.	5,790.00
TOTAL MANUFACTURING COST (Does not Include Checkout)		$24,503.00

Checkout $ 1,

TO: Works Committee FROM: Personnel Committee

SUBJECTS: 1. Proposed 1963 Company Paid Holiday Schedule

2. Establishing an Age Limit for Group Insurance Eligibility (New Employees)

1. Proposed 1963 Company Paid Holiday Schedule

1.	January 1 (Tuesday)	- New Year's Day
2.	April 19 (Friday)	- Patriot's Day
3.	May 30 (Thursday)	- Memorial Day
4.	July 4 (Thursday)	- Independence Day
5.	July 5 (Friday)	- Movable Day*
6.	September 2 (Monday)	- Labor Day
7.	November 28 (Thursday)	- Thanksgiving Day
8.	November 29 (Friday)	- Movable Day*
9.	December 24 (Tuesday)	- ½ day before Christmas
10.	December 25 (Wednesday)	- Christmas Day

In addition to the holidays outlined above, we propose the addition of a third company paid movable holiday*. This would make a total of 10½ DEC paid holidays and would provide a more liberal holiday schedule than the majority of companies in this area.

We feel that the announcement of the additional company paid holiday should be made in conjunction with the recent increase in private room coverage under major medical ($28 limit). This would offer a liberal improvement in company benefits which we feel is well timed.

The following is a recent survey of company paid holiday policies in this area:

Sylvania (Waltham)	-	8 paid holidays
RCA (Burlington)	-	8 " "
Raytheon	-	9 " "
General Radio	-	10 " "
Bradley Sun	-	8 " "
H. H. Scott	-	9½ " "

* Contingent upon obtaining permission to work during SUNDAY LAW holidays.

2. Establishing an Age Limit for Group Insurance Eligibility (New Employees)

The projected effect upon our current life rate of 34¢ per thousand with the addition of people over age 60 would be as follows:

10 (new employees over age 60) - 45¢ per thousand
25 (new employees over age 60) - 48¢ per thousand

The above figures were derived from a base of 450 employees, and it was assumed that the bulk of this group would be eligible for $5000 coverage (hourly). It was assumed also that there would be a concurrent addition of young people as a counterbalance.

We feel that our hiring rate of people in the age 60 bracket will continue to be low and therefore the overall effect on our present life rate will be relatively insignificant. The Personnel Committee therefore recommends that we make no change in our plan with respect to age limitation. We also feel, however, that our rates should be watched carefully and that an age limitation could be introduced at a later date if and when the need arises.

RTL/jfr

cc: K. Olsen
H. Anderson
S. Olsen
M. Sandler
G. O'Dea
R. Best
B. Gurley
W. Hindle
R. Mills

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

TO: Harlan Anderson 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.

dec 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.

dec INTEROFFICE MEMORANDUM

DATE December 27, 1962

SUBJECT

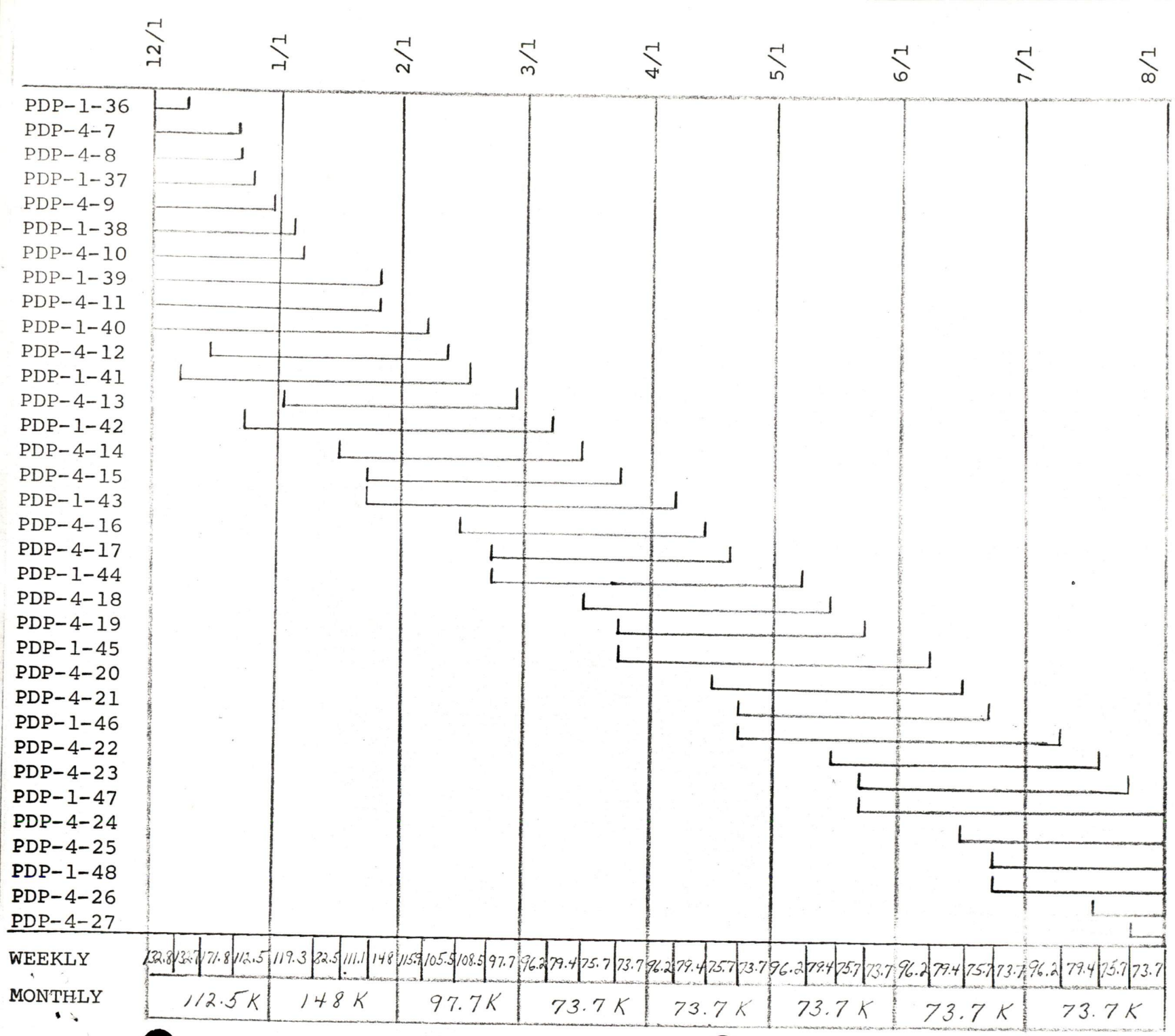
TO K. Olsen
H. Anderson
M. Sandler

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.



WIP COMPUTERS PLANNED SCHEDULE "62 - 63"

PDP-1 | 1.8 | 3.7 | 5.5 | 7.4 | 9.2 | 11.1 | 17.5 | 23.9 | 30.3 | 37K |

PDP-4 | 1.8 | 3.6 | 5.4 | 7.2 | 11.4 | 15.6 | 19.9 | 24K |

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
2	MAG. TAPE 52 LOGIC WITH CABLES 131-70-3390	3658.22	2	MAG. TAPE 52 LOGIC WITH CABLES 131-70-3390	3658.22	PDP-4 SUB ASS'Y. 131-70-3525	33⅓%	1291.00
						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

INTEROFFICE MEMORANDUM

DATE December 28, 1962

SUBJECT Computer Checkout

TO Ed Harwood

FROM Arthur Hall

cc: K. Olsen
H. Anderson
S. Olsen
G. Bell
N. Mazzarese

Starting on January 2nd, Ed Harwood will be responsible for the checkout of PDP-4 as well as PDP-1 computers and computer systems.

I suggest that computer orders be handled as follows;

Sales will;

Notify Production of the order and establish when Computers and Standard Options will be available to checkout.

Notify Engineering of Special Features and establish when these Special Features will be available to Checkout.

Form the primary contact with the customer. (Any one may talk with the customer but he must realize that no estimate of time, price or delivery is official unless the information is supplied or confirmed by the primary contact man in Sales.)

Arrange terms, warranty, service, acceptance, delivery time, etc.

Checkout will;

Assume primary responsibility for the computer system from Final Inspection (following wiring) through installation at the customer's plant.

Negotiate a time with Engineering during which Special Features will be checked out by the computer checkout man and the technician responsible for the Special Feature.

Engineering will;

Be responsible for the design, documentation, construction and checkout of all "first-time" or "one-time" peripheral devices or special features.

Approve all modifications to computers.

Exercise drawing control for computers.

INTEROFFICE MEMORANDUM

DATE December 27, 1962

SUBJECT 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 ~~know~~ 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

#######

dec INTEROFFICE MEMORANDUM

DATE December 26, 1962

SUBJECT PROJECTED TRADE SHOW COSTS FOR 1963.

TO Ken Olsen FROM H. O. Painter

Attached are the projected trade show costs for 17 shows which we are definitely attending. These figures are guesstimates at best, but will give a fair idea of the money involved.

The costs are based on the following assumptions:

1. Use present 20' and 10' self contained booths;
2. Build new 40' booth for SJCC;
3. Use table-top display in Paris;
4. Build new 10' self-contained booth;
5. ACM costs are figured using same people and booths as at WESCON;
6. No air freight shipments are included;
7. Have not included my own nor Advertising's time.
8. Attendants are home office people;
9. Hotel costs based on twin rooms @ $5.25/day.

HOP:vg

cc: H. Anderson ✓
S. Olsen
J. Atwood

SHOW & LOCATION	SPACE	TRANSPORTATION FOR MAT'LS	HOTEL FOR PERSONNEL	AIR FARES	SERVICES: ELECTRIC. PHONE CARPNTRS DRAYAGE	BOOTH CONSTR.- REFURB.	CARPNTR SHOP MAN HRS.	ATTENDNTS # / MAN HRS.	PROGRAMMING MAN HRS.	TOTAL $ / MAN HRS.
E. E. E. N.Y. 4 days	$1200.	$600. 8000#	$100.	$52.	$550.	$100. (refurb.) 20'	20	2-3 / 64	none	$2602. / 84
IEEC Paris 5 days	$ 500.	$600. 1500# 37¢/lb.	$100.	$385.	$300.	$ 50. (refurb.) 10'	10	1 / 40	none	$1935. / 50
IRE N.Y. 4 days	$1100.	$600. 8000#	$600.	$312.	$400. (Dray. inc. in rental)	$250. (refurb.) 20'	40	12 / 384	40	$3262. / 464
FASEBM Atlantic City,N.J. 6 days	$500.	$525. 5000#	$175.	$100.	$300.	$100. (refurb.) 10'	20	2 / 96	none	$1700. / 116
AIEE/IRE MAG.CONF. Wash.D.C. 2 days	$ 400.	$600. 5000#	$ 75.	$100.	$300.	$100. (refurb.) 10'	20	2 / 40	none	$1575. / 60
SWIRECO Dallas 3 days	$ 150.	$1300. 5000#	$100.	$325.	$300.	$1000. (new) 10'	20	2 / 50	none	$3175. / 70
DES N.Y. 4 days	$ 955.	$600 8000#	$250.	$104.	$400. (Dray. incl. in rental)	$100. (refurb.) 12'	30	4 / 160	40	$2409. / 230
SJCC Detroit 3 days	$2000.	$1600. 10,000#	$500.	$730.	$750.	$4000. (new) 40'	50	10 / 250	500	$9580. / 800
AFCEA Wash.D.C. 3 days	$ 350.	$600. 5000#	$100.	$100.	$300.	$100. (refurb.) 10'	20	2 / 50	none	$1550. / 70
WESCON San Francisco 4 days	$1000.	$3000. 8000#	$125.	$600.	$ 550.	$250. (refurb.) 20'	40	2 / 80	100	$5525. / 220

SHOW & LOCATION	SPACE	TRANSPORTATION FOR MAT'LS	HOTEL FOR PERSONNEL	AIR FARES	SERVICES: ELECTRIC. PHONE CARPNTRS DRAYAGE	BOOTH CONSTR-REFURB.	CARPNTR SHOP MAN HRS.	ATTENDNTS # / MAN HRS.	PROGRAMMING MAN HRS.	TOTAL $ / MAN HRS.
ACM Denver 4 days	$400/10' or $800/20'	--- 8000#	$125.	---	$300.	none 10' or 20'	none	2 / 80	none	$825. or $1225. / 80
ISA Chicago 4 days	$1100.	$1400. 8000#	$300.	$ 570.	$550.	$100. (Refurb.) 20'	20	6 / 200	100	$4020. / 320
Canada - IRE Toronto 3 days	$1000.	$1100. 8000#	$150.	$ 255.	$550.	$100. (Refurb.) 20'	20	4 / 100	none	$3155. / 120
NEC Chicago 3 days	$1000.	$1400. 8000#	$225.	$ 570.	$550.	$100. (Refurb.) 20'	30	6 / 175	100	$3845. / 305
NEREM Boston 3 days	$ 800.	$ 100. 8000#	None	----	$400.	$100. (Refurb.) 20'	30	20 / 100	none	$1400. / 130
CMMM Atlantic City, N.J 4 days	$ 400.	$ 525 5000#	$100.	$ 100.	$300.	$100. (Refurb.) 10'	20	2 / 70	none	$1525. / 90
FJCC Las Vegas 3 days -2 booths-	$1000.	$2200. 8000#	$225.	$2040.	$550.	$200. (Refurb.) 20'	50	6 / 250	500	$6215. / 800
Or 4 booths	$2000.	$2800. 8000#	$300.	$2720.	$750.	$300. (Refurb.) 40'	50	8 / 320	500	$8870. / 870
								/		/
								/		/

Harlan Anderson

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
Howard Painter

FROM:

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.

H. Anderson

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 PDP-1C-4	CRC	8
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 PDP-1C-16	BECKMAN	0

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 $\overline{IO \cdot shift}^0$ 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 (LNS)

Troubles with the display would occur from time to time at the LNS 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 +10V 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 20, 1962

SUBJECT Conversation with Mr. John J. White, Jr. Re: Bid For Logical Analyzer

TO Harlan Anderson ✓ FROM George O'Dea

cc: Stan Olsen
Dick Mills

Stan and I hand carried subject bid to the Office of Mr. White and discussed the following points:

1. Base for Application of G & A: He felt that G & A rates should be equated to Cost of Manufacture rather than Cost of Sales. We pointed out that at today's level of operations the Cost of Manufacture and Cost of Sales were very similar and the rate evolving from either would be essentially the same.

2. Inclusion of Unallowable Cost in G & A: We pointed out that the rate of 30% was derived after removing such costs and that the actual rate had been 35%± for the interval in question.

3. Inclusion of Unallowable Costs in Burden: We pointed out that the rate of 130% was derived after removing such costs and that the actual book rate for the period in question had been 140%±.

As regards these three points, he seemed pleased and expressed wonderment as to why there had been ill feeling between CRC and DEC. (Their office had literally shut us off.)

Mr. White was surprised to learn that no government audit agency had been given cognizance over DEC affairs. We pointed out that DEC never handled Cost Type Contracts and the subject had not previously been of significance.

He indicated a necessity for auditing the present contract. Rather than refuse, we pointed out that only $8K, or less than 10% of this contract price was related to overhead and burden rates. He agreed that this made the request for audit seem a waste from their point of view - but pointed out that the decision was up to "the cost people".

As a final warning he put us on notice that ASPRA was being revised, effective 12/1/'62 to give the Government the right to down-price a Fixed Price Contract if the Cost data provided by the Contractor was inaccurate. The exact

text of the new treatment will be in Revision #12. He did not have a copy of the new regulations but felt it would only apply to Contracts of $100K or more and would probably only be implemented in case of suspected gross misrepresentation. We will follow this up independently.

As to the next step Mr. White will attempt to turn the bid over to what he calls Base Procurement since it is primarily a hardware item (his specialty is R&D).

Once the channel of letting is established (and he felt he'd probably wind up handling it himself), we will be contacted - in three or four weeks (because of the Christmas rush).

We're going to have to decide where we stand on this bit about audit. We could open the records to an auditor on:

a) actual direct labor charges

b) overheads (for relation to a)

c) Cost of Manufacture (better than cost of Sales)

d) G & A (for relation to c).

I'm afraid were going to have to choose between this and the Contract if he follows the unreasonable course in the matter.

George O'Dea

GTO'D:ncs

dec INTEROFFICE MEMORANDUM

DATE December 19, 1962

SUBJECT

TO H. Anderson

FROM J. Smith

Schedule for shipment of BERPE 11 punches:

2 shipped	Dec. 17, 1962
2 to be shipped	Dec. 21, 1962
2 to be shipped	Jan, 1963
2 to be shipped	Feb., 1963
2 to be shipped	March, 1963

Present inventory - 1.

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.

dec INTEROFFICE MEMORANDUM

W.S.G

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

dec INTEROFFICE MEMORANDUM

H.B.G.

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.

W. R. Hindle

WRH:ncs

H. Anderson

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 Digital Equipment Pricing Formulas

TO Harlan Anderson FROM Bob Savell

I believe what you had in mind the other day when we talked about using a multiplier for pricing was that the multiplier should only be used with what is called the "Module Formula" on the company confidential pricing sheet, and that when using the alternate formula, a multiplier should not be used. It is my belief that a multiplier can be used in both cases. I will explain below how I use the multiplier and how the multiplier was arrived at for the alternate formula.

The alternate formula is:

list price = installation cost + production cost + engineering cost per unit sales + SGA + profit.

Installation cost, production cost, and engineering cost per unit sales are readily determined. It was your belief, and Dick Mills concurred, that SG&A is approximately .35 times manufactured cost. I assume :

manufactured cost = installation cost + production cost + engineering cost per unit sales.

It was your assumption that we should use a figure of approximately 30% of list price for profit. Dick Mills and I had approximately a two hour discussion on November 21st during which he determined that profit as a percentage of sales was approximately 41% for the past year, and that profits as a percentage of manufactured cost, not including SG&A, were approximately 97% for the past year. Using these percentages, let us now make some substitutions into the formula.

1. Let us lump installation cost plus production plus engineering cost per unit sales into the abbreviation MC, for manufactured cost. Therefore:

list price = MC + SG&A + profit.

SG&A = .35MC and profit = one of three things;

a. .3 LP (list price)
b. Profit equals .41 LP
c. Profit equals .97 MC

Making three substitutions into the formual

1. List price = MC + .35MC + .3 LP

or .7LP = 1.35MC

so $LP = \frac{1.35}{.7MC} = 1.86MC$

So there we have a multiplier of 1.86 times the manufactured cost which has been arrived at using your figures for SG&A, and profit as a 30% of list. I don't see any reason why one can't arrive at a multiplier in this way and use it for quite a while since the percentages used for SG&A and profit are long term figures.

Using Dick Mills' figures, we arrive at the following two formulas:

2. LP = MC + .35MC + .41LP

or .59 LP = 1.35MC

and $LP = \frac{1.35MC}{.59}$

so LP = 2.2 MC.

3. LP = MC + .35 MC + .97 MC

or LP = 2.32MC

which is approximately equal to the multiplier that we have been using all along of 2.32 times manufactured cost.

These three formulas were explained on November 21 to Ken and Ben in connection with arriving at a price for the Type 41 Card Reader and Control. They at that time agreed that the 2.3 multiplier looked as if it was still a reasonable figure to use and instructed me to use it for the calculation of the price on the Type 41.

######

P.S. I suggest that we modify our pricing formula to include an allowance for warranty service. Bob Beckman has suggested an addition to the list price of the unit of 5% of the list price to cover warranty service.

dec 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

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 tum-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'Dsncs
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 of 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.

DIGITAL MAYNAD

DIGITAL WA

TO H. ANDERSON FROM JIM BURLE Y DEC 18

REF URTWX RE GEOL SURVEY IFB.

TALKED WITH THESE PEOPLE AND THEY KNEW WHAT I WANTED BEFORE I TOLD THEM SO APPARENTLY EVERYONE IS ASKING FOR IT NOW. THEY IFB IS OUT OF PRINT NOW BUT THEY SAID THEY WOULD SEND A COPY TO MAYNARD TOMORROW IF THEY ARE REPRINTED BY THAT TIME. IT HAS ALREADY BEEN REPRINTED TWICE.

WE ARE A BIT VULNERABLE HERE IN THE DCO FOR FOLLOWING UP SINCE I AM LEAVG LEAVING IN AN HOUR TO CATCH A PLANE AND BARBARA IS IN BED WITH THE FLU. THEREFORE IF YOU WANT TO STAY ON TOP OF THIS I GUESS ILL HAVE TO ASK YOU TO FOLLOW UP. THE PHONE NUMBER AND EXT ARE AS FOLLOWS

RE7-1820, X2322

SORRY I COULDNT HANDLE IT A BIT MORE EXPEDITIOUSLY.

END OR GA

MIN PLS

THANKS END

DIGITAL WA

ODIGITAL MAYNARD MSG NO 736

TO JIM BURLEY

FROM HARLAN ANDERSON

WOULD YOU GET A COPY OF IFB 3264 FROM U. S. DEPAT OF INTERIOR GEOL. SURVEY PURCH. SECT. ROOM TWQE IN GEN. SERVICES BUILDING AT 18 TH AND F ST WASH AND SEND IT TO ME

THANKS H E A

END GA

MORE SECOND LINE ROOM NO SHOULD BE 5213

END GA

TWX

JIM BURLEY

DEC WASHINGTON

WOULD YOU GET A COPY OF ~~RFP~~ IFB 3264 FROM U.S. DEPT. OF INTERIOR, GEOL. SURVEY & PURCH. SECT. ROOM 5213 IN GEN. SERVICES BUILDING AT 18TH AND F STREET, WASH. AND SEND IT TO ME.

H E. ANDERSON

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

TO: Harlan Anderson 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	"	"	" "

dec INTEROFFICE MEMORANDUM

DATE December 14, 1962

SUBJECT Trip to NSA

TO H. Anderson

R. Best
B. Gurley
G. Bell
N. Mazzarese

FROM Roland Boisvert

CONTROL TO RUN THE IBM TAPE UNITS:

The reason for concern shown on our design and development of a control to run the IBM Tape Units was because of the previous experience that NSA has had with CDC in this same type of endeavor. CDC had four engineers assigned to this project. The general feeling at NSA is that the tape control was never checked out off-lin at CDC, therefore, for six months after delivery had motion control problems. The main reason for difficulties was that the motion portion was not designed to the actual requirements of the tape unit. In the beginning when they told a unit to rewind, the control did not hold the rewind level up for the required 20 milliseconds and the unit would therefore make a short rewind attempt and come to a roaring halt.

Another thing that they did not do was watch specifically for the condition when a tape unit was in the write status and then told to back space N records. They effectively erased everything that they had written on the tape.

I might add that although the motion control on CDC's control to run the IBM tape units is now working properly, that they are still having problems with realibility with this control. The people at NSA felt that the whole control has been a minimum effort on CDC's part as far as expense is concerned. The read section is single channel reading, and they do not change the slicing level when they write verses when they read. They have a fixed set of values which are for both conditions. Subsequently, NSA has requested CDC to come in and add a redundant read channel such as the IBM scheme employs. However, CDC is still a little bit reluctant to set these levels at different settings for reading and writing. Generally overall in this area, we showed that we anticipated many of these type problems that they experienced with CDC, and NSA appeared confident that we do have the right approach from design to delivery.

######

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.

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

cc: H. Anderson

INTEROFFICE MEMORANDUM

DATE 12/13/62

SUBJECT CRC Magnetic Tape Control Exchanges

TO File

FROM P. Bonner

Charlton Walter (Dynamic System Simulator) due to future needs is interested in exchanging his Magnetic Tape Control, Type 51 on PDP1C-3 for a Magnetic Tape Control, Type 52. Thus, a $5,000 credit for the 51 is applied against the purchase price of the 52. The $38,000 price of the Type 52 is further reduced by $9,000 due to the presence of a High Speed Channel, Type 19, thus giving a net purchase price of. $24,000

It is also desired that the following equipment be added:

Two (2) Type 50 Magnetic Tape Units @ $18,000. .	$36,000
One (1) Memory Module, Type 12	30,000
Field installation charges figure on 5% of $24,000 + $5,000 (credit for the Type 51) + $36,000 + $30,000.	4,750
	$94,750

John Mott-Smith of CSL is interested in acquiring a Type 50 and a Type 51 for his upcoming computer which is being purchased in parts (i.e., Binary Storage Rack, The Logical Connector, and the Logical Analyzer). Thus, CSL will receive the following:

One (1) Type 50 Magnetic Tape Unit	@	$18,000
One (1) Type 51 Magnetic Tape Control Unit from Dynamic System Simulator	@	5,000
Field installation of		1,150
		$24,150

Thus, the additional equipment for the Dynamic System Simulator is below their budget ceiling of $100,000.

Also, CSL's equipment is below their budget ceiling of $25,000.

PJB/jr

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 $\approx$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 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
H. Anderson ✓
S. Olsen
M. Sandler
B. Gurley
G. O'Dea
R. Mills
R. Best

FROM J. Smith

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.

dec INTEROFFICE MEMORANDUM

DATE December 11, 1962

SUBJECT

TO Andy

FROM Margaret

Bill Pickett, Purchasing Agent of Bolt, Beranek and Newman called and dictated the following message for your attention:

With reference to our telephone conversation this morning, I wish to order the subject equipment in your quote of December 6, Sequence Break System on a direct BBN purchase order rather than lease. Our purchase order number is 9489 and will be sent out as soon as possible.

Thanks very much for expediting this request.

Bill Pickett,
Purchasing Agent
Bolt, Beranek and Newman

He mentioned that there was some urgency here!

Margaret

Harlan,

Before making the above call please call Peter Bonner in reference to this.

Nancy

SUBJECT: REPAIR OF RETURNED MODULES

DATE: DECEMBER 11, 1962

TO: Harlan Anderson

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, $Q6_0$, $Q7_0$, 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

#.3.G.

DATE December 10, 1962

SUBJECT

TO K. Olsen
H. Anderson
S. Olsen
B. Gurley
N. Mazzarese
E. Harwood

FROM J. Smith

The first PDP-1 for the month of December, PDP-1-36 (9000-5864), was delivered to Checkout this morning.

File

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. ~~He~~ He 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)

PANEL NO.	PINS	GROUND LUGS	OTHERS	REASON FOR REJECT	CORRECTED BY	CORRECTED DATE
0Z	20T, 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				UNCONNECTED WIRE BETWEEN PLUGS #2 + #3		
3Y	6E, 19J			WIRE NEEDS INSULATION		
3Y	11D, 11E, 11K			NEED SOLDER		
3Y	19M			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: 11-29-62

FRONT (WIRING SIDE)

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

DF-22-14

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				
1G			BETWEEN PLUGS #1 + #2	3 WIRES SOLDERED TOGETHER BUT NOT CONNECTED TO A PIN (MUST BE INSULATED)		

DE-22-14

TURN OVER

dec INTEROFFICE MEMORANDUM

File

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

R/ Anderson

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

dec INTEROFFICE MEMORANDUM

H.B.C.

DATE December 6, 1962

SUBJECT Boston Edison Quote for PDP-4 by Foxboro

TO H. Anderson
G. Bell
A. Hall III

FROM R. Mills

I had a call from Bob Smith from Foxboro telling us that he was making a quote to Boston Edison and that they have evidenced an interest in whether or not DEC was a good supplier for Foxboro. He stated that he had a list of our installations and wanted to know if we had made any more installations and I told him that we had recently made one at Massachusetts General Hospital.

# # #

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	

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

FROM: J. Smith

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

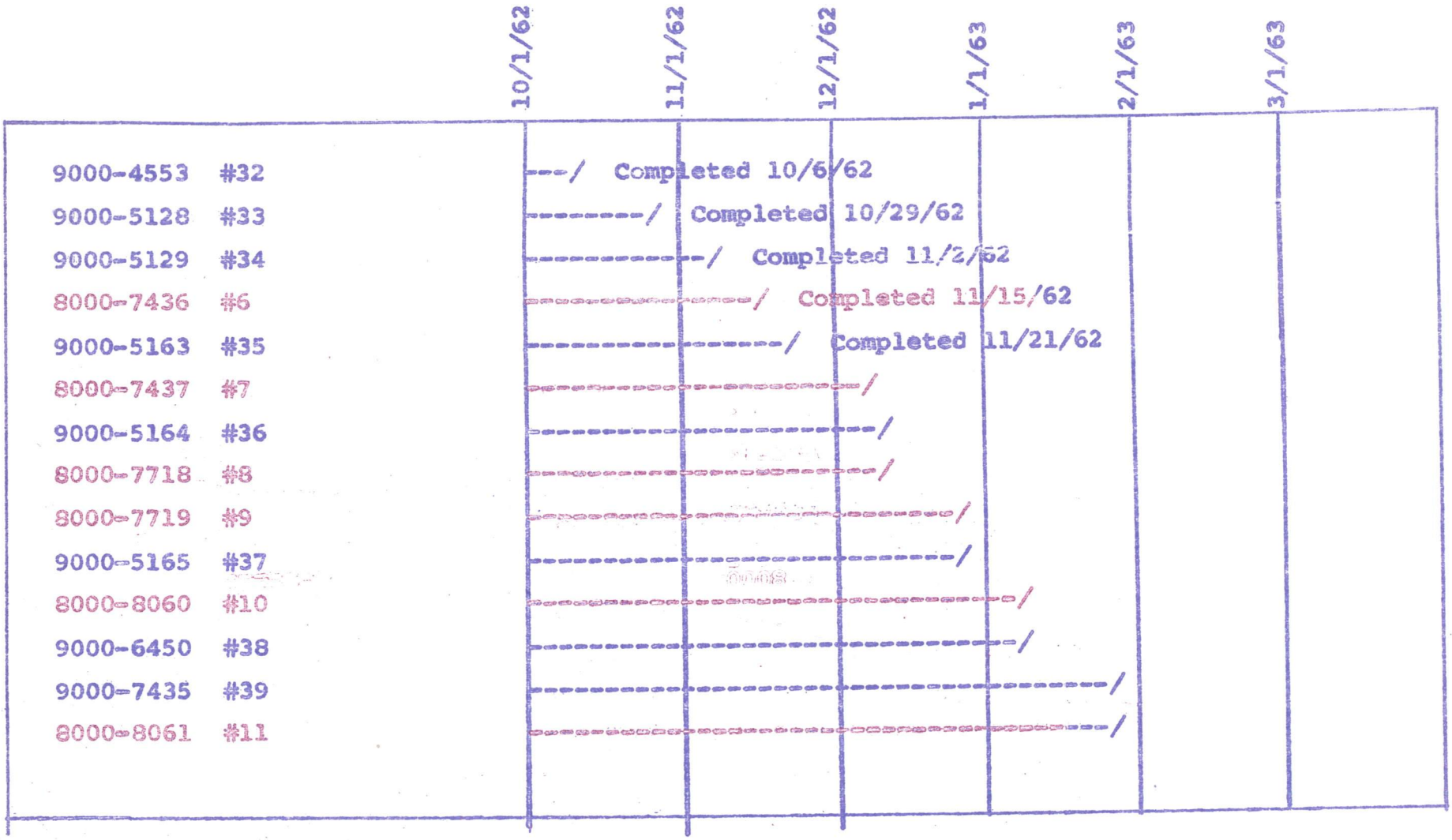
FROM: J. Smith

DATE: December 4, 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	12/31/62
PDP-4-10	1/11/63
PDP-4-11	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

December 4, 1962

dec INTEROFFICE MEMORANDUM

File

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 **MEMO**

DATE 12/3/62

TO H Anderson FROM B. Beckman

There have been some eight calls to Itek on the CRT machine and display. Of these only 2 were due to actual malfunctions in our equipment.

R/B

dec INTEROFFICE MEMORANDUM

DATE September 5, 1962

SUBJECT Itek Computer Installation

TO Ken Olsen FROM Bob Beckman

As you requested, I have looked into the situation at Itek. Their main complaints at this time concern unreliable computer operation over the last few weeks, lack of maintenance programs and other maintenance information, and incorrect drawings and cable schedules.

In regard to computer reliability, I want to re-emphasize the fact that since August 1 Itek has been maintaining the computer on their own. They claim that they have actually been doing most of their own maintenance work since January, but the fact remains that up until August 1 we were averaging at least one call per week at Itek. Since the first of August we've had one or two phone calls asking for advice on trouble shooting and one frantic call at five-thirty in the evening, which was cancelled fifteen minutes later because they managed to get hold of their own technician. On August 24, two of my people went over to replace their old style memory power supply with a new 735 power supply. This is a change that we initiated and did at no charge. After changing the power supplies and readjusting memory currents, the machine did not operate properly. My people stayed until about ten o'clock that night getting back on the air, and the trouble was in no way connected with the power supply change they had made. In fact, one of the Itek people mentioned that they had had this same trouble off and on for some time. To me it's rather significant that they were not complaining about "unreliable operation" until three weeks after they informed us that they would maintain the machine themselves.

The next complaint about not having materials from DEC has been a cronic complaint from Itek. No matter how many sets of prints and sets of program tapes and write-ups you send these people they're continually screaming for more and saying that they haven't got anything. I told Norm Taylor that I myself had prepared a set of tapes for John Bala when he came to the course, and that I knew of other tapes and write-ups that had been sent to Earl Pughe and other people in the company. Earl Pughe and John Bala said they had never received these items and yet less than twenty minutes later I found the very set of tapes that I had prepared for John Bala in

a file drawer in Earl Pughe's office. By the time we got through looking around we found at least two complete sets of every maintenance tape and write-up that has ever been available. I've attached a copy of a letter that I ran across in our files that bears on this particular subject. I'm beginning to think that I should ask for a signed receipt for every piece of paper I give Earl Pughe.

One of Earl's big complaints is that our prints are inaccurate and I must admit that he's right. However, the situation is not as bad as he makes it out to be, and in some cases, it's really his own fault. For instance, while Jack and I were there the other day we started looking for something in the punch control logic. Earl turned to a set of prints on a table in the computer room, obviously his trouble shooting working prints. He turned to the print that covers the punch logic and it was immediately obvious that the print did not match what was physically present in the machine. He threw up his hands and said something about "how can you take care of a machine if you don't even have prints for it". (It seems that his standard trouble shooting practice on the machine is to work until he finds something that doesn't match the print, then he throws up his hands and walks out.) I pointed out that the print he had was for the Tally punch logic and asked him if he didn't have another newer one around. He sent John Bala out and John came back in a moment with a file folder with seven or eight copies of the punch logic prints. One of these in the file folder was a copy of the new logic as it exists in his machine and with a date of April, 1962 compared to the November, 1960 date on the print he was using as a working copy.

This is not to say that we're entirely blameless in this particular area. For one thing, the two prints of the punch logic had exactly the same print number even though they were not identical logic. I have since checked with Roger Melanson and this has been corrected. I am going through the whole list of Itek prints and, if I can get some cooperation instead of just belly-aching from Itek I think we can get the print situation straightened out to our mutual benefit.

As far as the immediate situation is concerned, I am doing everything I can to get them squared away. Even though they had all of the routines and write-ups, I collected another set of those useful for maintenance purposes and personally delivered them to Norm Taylor, along with a copy of the maintenance manual. I also made arrangements

for Jack Shields and John Bala to get together when John returns from vacation next week. Jack will go over all of the maintenance programs and help John set up margin check procedures and records. Most of this is covered in the PDP-1 Maintenance Manual, but since Itek's machine is physically different than the newer machines they'll have to do some translation of logic locations in order to match the margin check set-up in the book to the Itek computer.

In spite of the way they treat their machine I think it's actually in fairly good shape right now. I don't think it will stay that way long though, with the kind of maintenance it's getting. John Bala is a good kid, but he needs a lot more experience. Earl Pughe seems to be in charge of maintaining the machine, and I have no confidence in him at all. I know very little about his technical background and qualifications, but from what I saw of him the other day he doesn't strike me as having the patience and common sense required for this kind of work. He always seems to be more interested in finding a reason why he can't fix the computer than in actually fixing it. It is interesting to note that the prints that are so inaccurate that he can't work on the machine are exactly the same prints that our own people use when they go over there. And after that bit about the tapes and write-ups I wouldn't exactly want to call him a liar, but I get the impression that he has only the barest noding aquaintance with the truth.

Again I want to say that we're not completely blameless here. Many of the things that Norm Taylor thinks we should have are things that I agree with completely. Some of them are being corrected and others need to be worked on. The new maintenance manual will answer many of the problems. The matter of poor write-ups for maintenance routines is gradually being corrected with our new Maindec series, and with a little time and help from Itek we should be able to correct the existing discrepancies in the documentation of their computer. I will continue to do everything I can to help them keep operating, but I'd feel a little easier in my own mind if they were letting us maintain it so I would really know what was being done to the machine.

May 3, 1962

Mr. Earle W. Pughe
Information Technology Laboratories
10 Maguire Road
Lexington, Massachusetts

Dear Mr. Pughe:

Enclosed are copies of test tapes that our technicians use.

There is no write-up for the PPA Test, so I am including instructions for its use in case you are unfamiliar with the program. With these tapes plus the ones you received Wednesday, May 2, you should have the complete set of maintenance programs.

I am looking forward to the addition of your test programs to our library. I am sure they will be of great benefit to us.

If you have questions concerning these programs or any others in the library, I would be most happy to hear from you.

Sincerely,

(Mrs.) Beverly A. Clohset
Computer Sales Programmer

BAC/jr
Enclosures

PPA Test

A list of random numbers is included in the program. After loading the program and pressing "start" these numbers are punched on tape. Upon completion of the punching cycle the new tape is read in by pressing "continue". The bits on the punched tape are compared against the bits in memory with a typeout occurring if there are discrepancies. An example of the typeout format would be:

```
p 1 - 1  (picked up bit 1 once)
p 2 - 3  (picked up bit 2 three times)
d 1 - 1  (dropped bit 1 once)
d 3 - 4  (dropped bit 3 four times)
```

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.

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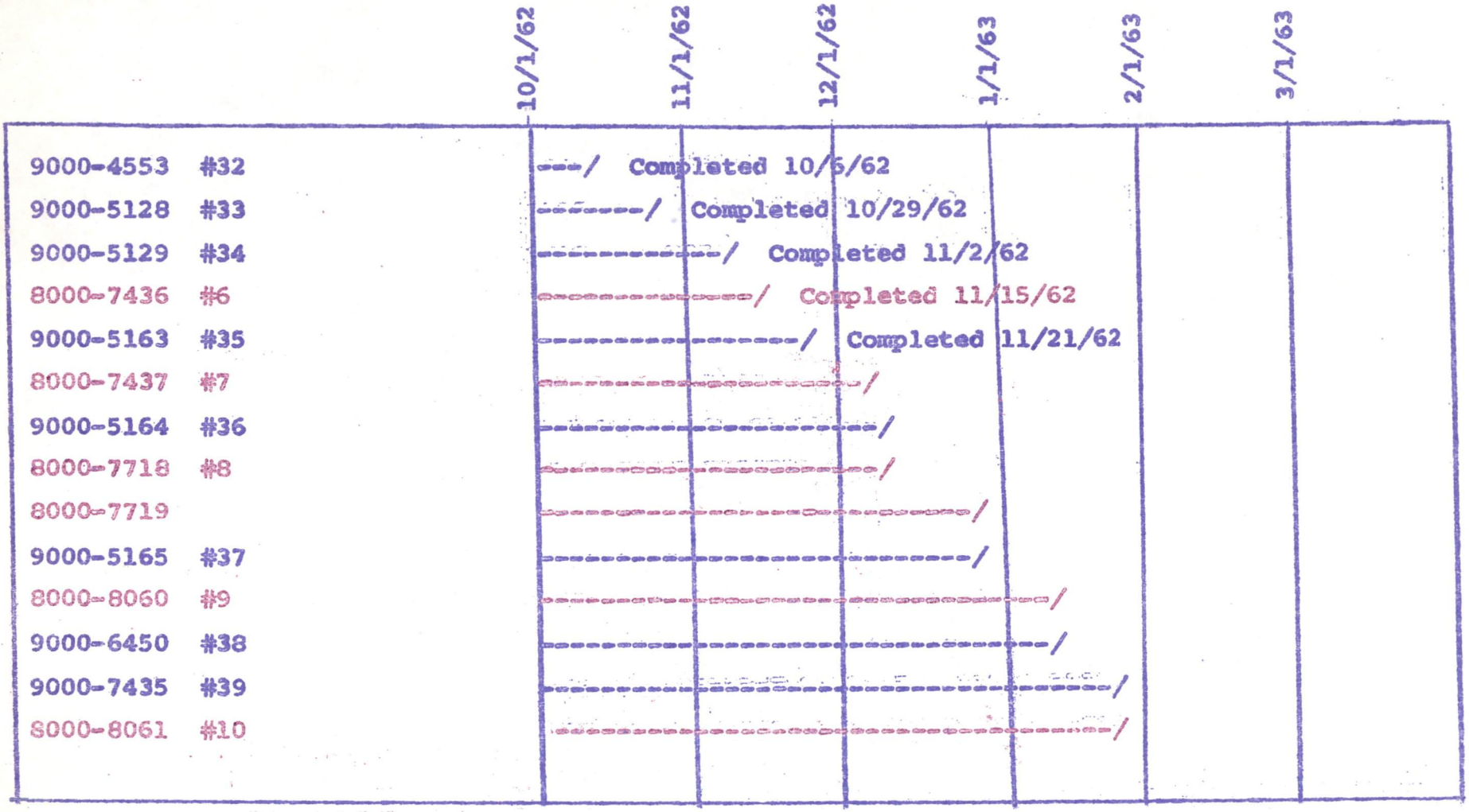
PDP-4-10	1/25/63
PDP-1-36	12/7/62
PDP-1-37	12/21/62
PDP-1-38	1/4/63
PDP-1-39	1/25/63

PRODUCTION SCHEDULE COMPUTERS



9000 series numbers - PDP-1

8000 series numbers - PDP-4

SUBJECT: REPAIR OF RETURNED MODULES

DATE: DECEMBER 3, 1962

TO: Harlan Anderson

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.

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
M. 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

To: Harlan Anderson - Your Comments Please!

H. Thistre - Foxboro

DIGITAL EQUIPMENT CORPORATION

The Digital Equipment Corporation (DEC) of Maynard, Massachusetts, was founded in 1957 by two former employees of the MIT Lincoln Laboratory. A majority-owned affiliate of American Research and Development Corporation of Boston, Massachusetts, the company produces high quality digital electronic equipment of three general types:

1. Solid-State Digital Circuit Modules
2. Magnetic Core Memory Testers
3. General Purpose Digital Computers

Starting from a handful of people and a minimum plant in 1957, the company entered three highly competitive and hazardous fields and has met with notable success. Today DEC is a leader in each of its fields, employing 420 people in a 210,000 square foot plant, with annual sales substantially in excess of $6,000,000. Most significant is the fact that Digital Equipment Corporation is one of the three or four digital computer manufacturers which is operating at a profit.

MANAGEMENT

The directors of the corporation are:

Vernon Alden, President, Ohio University
Harlan E. Anderson, Vice President, Digital Equipment Corp.
John Barnard, Jr., Attorney and Partner, Gaston, Snow, Motley and Holt (Boston, Mass.)
Wayne P. Brobeck, Vitro Corporation of America
William H. Congleton, Vice President, American Research and Development Corp.
Arnaud de Vitry, Trustee
Jay W. Forrester, Professor of Industrial Management, MIT
Henry W. Hoagland, Vice President, American Research and Development Corp.
Kenneth H. Olsen, President, Digital Equipment Corp.
Dorothy E. Rowe, Treasurer, American Research and Development Corp.

The officers of the corporation are:

Kenneth H. Olsen, President
Harlan E. Anderson, Vice President
George T. O'Dea, Treasurer
Dorothy E. Rowe, Clerk

KEY PERSONNEL

The company's strength is largely based on the engineering and management talent of its key personnel some of whom are described below:

Kenneth H. Olsen, President and co-founder of DEC, has a long list of achievements in the field of digital computers. Born in 1926, he is a graduate of MIT with B.S. and M.S. degrees in electrical engineering. While employed at MIT Lincoln Laboratory he played major

KEY PERSONNEL (Continued)

roles in the development of the MIT Whirlwind computer and the SAGE air defense computer. Of more importance, he managed the entire development of the Memory Test Computer, the TX-0 Computer, and the TX-2 Computer. The TX-2 Computer was the largest and fastest computer of its time. In 1961, Mr. Olsen was named Outstanding Young Engineer of the Year by Eta Kappa Nu.

Harlan E. Anderson, Vice President and co-founder of DEC, was also active at Lincoln Laboratory on the same computer projects. Born in 1929 he is a graduate of the University of Illinois with B.S. and M.S. degrees in physics.

Richard L. Best, Chief Engineer, has a long background in computer circuit design beginning at the MIT Radiation Laboratory. He held key design and administrative positions with Lincoln Laboratory, frequently serving as a senior consultant in computer circuits.

Benjamin Gurley, Manager of Computer Engineering, played key roles in the development of computers at Lincoln Laboratory and has unique experience in the fields of magnetic core memories and CRT display devices. He has been particularly active in the design of photo-multiplier devices, such as light-pens for man-machine communication. At DEC Mr. Gurley was responsible for the development of PDP-1 and PDP-4 Digital Computers.

Gordon Bell, Computer Systems Engineer, has been active in the design and programming of systems for real time control applications. A Fulbright scholar he has studied at MIT and abroad. He was the project engineer and designer of the PDP-4 Computer and several large PDP-1 real-time Computer Systems.

PRODUCTS

1. Digital Circuit Modules DEC System and Laboratory Modules have been designed and sold to leading electronic manufacturers and laboratories. They have found their main application in construction of special purpose data handling systems and custom designed testing systems. This is a well accepted product line and has been very successful. This line provides a broad base of regular business for the company's other operations. Today DEC is the leading manufacturer of digital modules in the industry.

2. Memory Testers DEC Memory Testers are in use by virtually all independent magnetic core memory producers. This product line includes several types, such as laboratory core evaluators, automatic production core testers, coincident current memory testers, word address memory testers, and memory exercisers. These testers have become the standard of the industry.

3. Digital Computers Starting in 1959 DEC has produced medium priced, high performance, general purpose digital computers known as Programmed Data Processors PDP-1 and PDP-4. These products have gained the respect of the industry as ideal machines for real-time operation, scientific calculation, and general data handling.

PRODUCTS (Continued)

Over 35 complete computer systems (average cost $250,000) have been put into successful operation, including 30 PDP-1's and 5 PDP-4's. Several more of each type are currently on order. A high level of reliability and performance has been experienced on each installation. Some of the users of these systems are:

Bolt, Beranek and Newman, Inc. (2 systems)
Information Technology Laboratories
Massachusetts Institute of Technology
Geotechnical Corporation
Jet Propulsion Laboratory (California Institute of Technology)
System Research Laboratory
Air Force Operations Laboratory
International Telephone & Telegraph, Inc.
The Foxboro Company
Corning Glass Company
Massachusetts General Hospital

FACILITIES

The company leases 210,000 square feet of space in the former American Woolen Company plant at Maynard, Massachusetts. The company currently employs over 420 people. Sales are handled directly from the home office in Maynard and from field sales offices in Los Angeles, Washington, and Clifton, New Jersey. Sales in the Southwest and Northwest are handled through representatives in Dallas and Seattle.

FINANCIAL

The company is controlled by American Research and Development Corporation of Boston, Massachusetts. It is soundly financed and has extensive unsecured bank credit available if needed for abnormally large activities. The DEC Board of Directors includes several distinguished businessmen and educators who provide sound management guidance. AR&D net assets as of June 30, 1962, were in excess of $27,000,000.

Comparative balance sheets for the last five years are shown on the following page.

THE DIGITAL EQUIPMENT CORPORATION

Abbreviated Balance Sheets
Close of Each Fiscal Year

(Taken from audit reports certified by Lybrand, Ross Brothers, and Montgomery)

($000's Omitted)

	6/30/'62	6/30/'61	6/30/'60	6/30/'59	6/30/'58
Cash	$ 342	$ 21	$ 26	$ 55	$ 38
Other Current Assets	3,503	1,179	626	335	46
Net Fixed Assets	332	125	55	48	11
Total Assets	$ 4,177	$ 1,325	$ 707	$ 438	$ 95
Notes Payable	$ 1,116	$ 16	$ 7	$ 4	$ -
Other Current Liabilities	1,482	563	280	211	7
Long Term Liabilities	87	103	120	51	30
Total Liabilities	$ 2,685	$ 682	$ 407	$ 266	$ 37
Net Worth	1,492	643	300	172	58
Total of Liabilities and Net Worth	$ 4,177	$1,325	$ 707	$ 438	$ 95

dec **MEMO**

DATE 11/30

TO Harlan FROM George

Here is the problem / Ken's Inventory Proposal - as I see it.
What are your ideas?

AP 984

DRAFT 11/30/62

Some Observations on Implementing Ken's Inventory Policy

1. Ken would like to see us keep the inventory at a workable minimum.

2. To accomplish this, the concepts of Individual Responsibility for Procurement should be brought to bear wherever possible. For example, if a special component is needed and the order quantity is increased for purposes of price or other advantage, the entire lot purchased should be charged against the particular work order calling for the first units. Excess pieces, when and if used would be no charge.

3. Starting with the existing inventory Ken is anxious not to have the balance sheet and earnings statement over stated by items in inventory for which there is no forseeable use (or reasonably forseeable use).

4. Writing off costs as described in items 2 and 3 is fairly straight forward. The problem arises of how to recognize items so treated at future use.

5. Future valuation of items thus written off requires recognition of the fact that they are not on the books (otherwise it would become literally impossible to confirm our year end balance sheets.)

6. One way to guarantee such recognition would be to move the items so treated into a special storage area.

7. Serious objections to this treatment are as follows:

   a) Once having taken the units off, the urgency to recover is eased

   b) Individual Cost runs become meaningless (they will depend on the share of charge vs no charge commodities employed.)

8. An alternative solution might be:

   a) If excess inventory occurs, charge it against the appropriate Product but credit an inventory valuation Reserve (this leaves the individual commodities on Maynard's Kardex at original price – but reduces Total Inventory to what is believed to be a reasonable level.

b) At Year end adjust the Valuation reserve in light of the facts as they seem then (to make the Costs allowable Income Tax-wise.)

9. In either case Individual Responsibility rules over the procurement. (i.e. If Fadiman wants 20 and Maynard only sees use for 10, Jon knows in advance that he will receive 10 at the Cost of 20.) If Maynard lets someone talk him into buying more than is currently needed he (Maynard) is taking this risk of the write-off.

10. Obviously, if we really feel a given Commodity is worthless we would write it off (charging it against the reserve developed under 8a; The original cost of the obsolescence having already been borne by the appropriate Product Line.)

11. Still another Solution is the periodic review for obsolescence (as is being done today.) It does not preclude the possibility of charging product lines or individuals - its only deterrent is the timing - it does so after the fact - thereby making it more punitive and less rational.

INTEROFFICE MEMORANDUM

DATE November 30, 1962

SUBJECT Capital Equipment Forecast Form - Dec., Jan., Feb.

TO
K. Olsen
H. Anderson
G. O'Dea
S. Olsen
M. Sandler
R. Best
B. Gurley
J. Atwood
J. Fadiman
H. Crouse
R. Lassen
J. Smith
R. Hughes
A. Blumenthal
E. Simeone

FROM R. Mills

In order that we may properly forecast our cash requirements for December, January and February, would you please complete the below for the Capital Equipment you feel you will require for the above mentioned period and return it to me by Monday December 3rd. If you do not anticipate any Capital Equipment expenditures, please initial and return this form anyway.

Vendor Delivery Time	Date Needed	Quantity	Description	Unit Price	Total

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.

File

INTEROFFICE MEMORANDUM

DATE November 29, 1962

SUBJECT Description of the Holley Line Printer as a result of a conversation with Harrison Craig, Sales Manager, on 11/27/62.

TO Ben Gurley
H. Anderson
G. Bell
A. Hall

FROM Bob Savell

DESCRIPTION OF PRINTER WITH CONTROL ONLY AND NO BUFFER:

The interface is generally described in Holley's blue-covered brochure 62-5M-1 on page 10. The particulars are as follows: The printer prints at a rate of 300 lines per minute. The load time per line is 1 millisecond during which time the column address enable produces a negative signal of -20 volts through 9.1 K and the character sync output produces up to 9 bit coded output where a one equals -20 volts through 7.8 K. The external equipment must then compare the character sync code with the column address/character code stored in the computer and send to the printer control the address of those columns in which the selected character should be printed.

The column address input receives up to 7 bits of information in the form of a single clear pulse which must be a negative pulse which supplies 20 milliamps followed at least .5 microseconds later by up to 7 set pulses, again negative 6 milliamp pulses. Both set and clear pulses must have a flat top time of .5 microseconds exclusive of rise and fall time. A print command must then be supplied to the printer control which consists of a negative 2 milliampere pulse into 500 ohms with a duration of 6 microseconds. The leading edge of this pulse may occur at the same time as the set column address pulse. Column addresses may be given at a rate no faster than 6 to 8 microseconds apart.

The total one millisecond address enable period is used to charge capacitors which are going to be used to turn on the hammer driver thyristors during the following 2 millisecond interval during which printing actually takes place. After a print occurs there is an additional 1/8 millisecond interval during which the thyristors are all reset. The thyristors used are PNPN 3 terminal devices manufactured by RCA.

The start form advance signal is given after all desired characters on the line have been printed and consists of a 7 microsecond 1.2 milliamp negative pulse which must be supplied to the printer control. All 8 format channels can be brought

out channels where a hole output equals 20 volts through 7.8 K. This must be sensed by external circuitry and a stop forms advance signal fed back which consists of a 7 microsecond 1.2 milliamp negative pulse.

The amplifiers for the photo diodes for the 8 format channels and the character sync signals are normally provided only at extra cost on a system consisting only of control without a buffer.

Spacing time for forms advance in terms of number of characters missed on the print drum is 10 characters at 300 lines per minute. For spaces greater than one line, the paper moves at the rate of 6,000 lines per minute after the first line.

PRINTER SUPPLIED WITH BOTH A CONTROL AND A BUFFER:

When a printer is supplied with both a control and a buffer, the interface as specified on page 10 changes. The forms advance and format control remain as with control only but everything above changes. A basic buffer, which is the one they quoted to us at $2657, consists of a magneto-strictive delay line which is separated into two halves which operate independently of each other. The first half is used to receive data from the external equipment. The second half is used to transmit data to the printer control. The basic buffer is either bit serial or character input which can be loaded at a rate of 624 6-bit characters per second, maximum. The basic buffer does not include parity check at the input. Some sort of end of line character must be given to indicate that we have loaded all the characters we desire. At a rate of 200 lines per minute it takes 200 milliseconds per line to print including spacing. Loading the buffer at the maximum rate will take approximately 190 milliseconds so that they just about match.

The contents of the second half of the delay line is being printed out while the first half is being loaded. The second half of the delay line is erased as characters are removed from it and when it becomes empty and the first half becomes full the contents of the first half is shifted into the second half and a signal is sent back to the external equipment saying you may now read in another line of data. The buffer control has a 120 state counter to keep track of the column locations of the data stored in the second half of the delay line. As each character is removed from the delay line, the column counter is advanced by one. The delay line character code is compared with the code presented by the character wheel which contains the code representing the character

now is position to be printed and if these codes are the same, the column address is taken from the column counter and transferred to the printer control.

All one must do in order to print characters on a printer equipped with a buffer is to load characters into this delay line at any rate up to the maximum rate and all synchronizing and column addressing is taken care of by the printer control.

The character input to the buffer must be a 2 milliamp negative level into 3.9 K for a logical one or 0 milliamps through a 3.9 K connected to ground for a logical zero. The buffer in its serial form was designed to be used with Dataphone type input.

When buying a control and buffer together, the character sync amplifiers are included in the price of the entire system as quoted. The amplifiers for the format channel are not. They have had one of these running in the lab for the past two years on life test of their own printers. They are, however, delivering their first one to a customer, GE in Phoenix, in two weeks. GE is going to use it on their data net system.

GENERAL INFORMATION:

Latest price quotes are as follows:

Print Head (quantities of one)	$9,498.
Printer Control	2,258.
Buffer	2,657.
Cabinet	1,065.
Photo Cell Amplifiers - 16 @	76.

Delivery is 3 months and will not be affected by either painting the equipment our color or by specifying our own character set. The extra charge for a new print wheel with our own character set on it is $680. This includes the price of the print wheel itself as well as the initial tooling. The total additional cost for the first one is $680.

They claim 2,000 hours approximate hammer life, a mean free time between failures of approximately 200 hours, but depending upon maintenance they feel this will go up to about 400 hours.

There is no filtering of the AC power into the system. The entire system with control and buffer draws approximately 5 amps.

Holley claims that both Philco and General Electric are going to offer this printer as standard equipment.

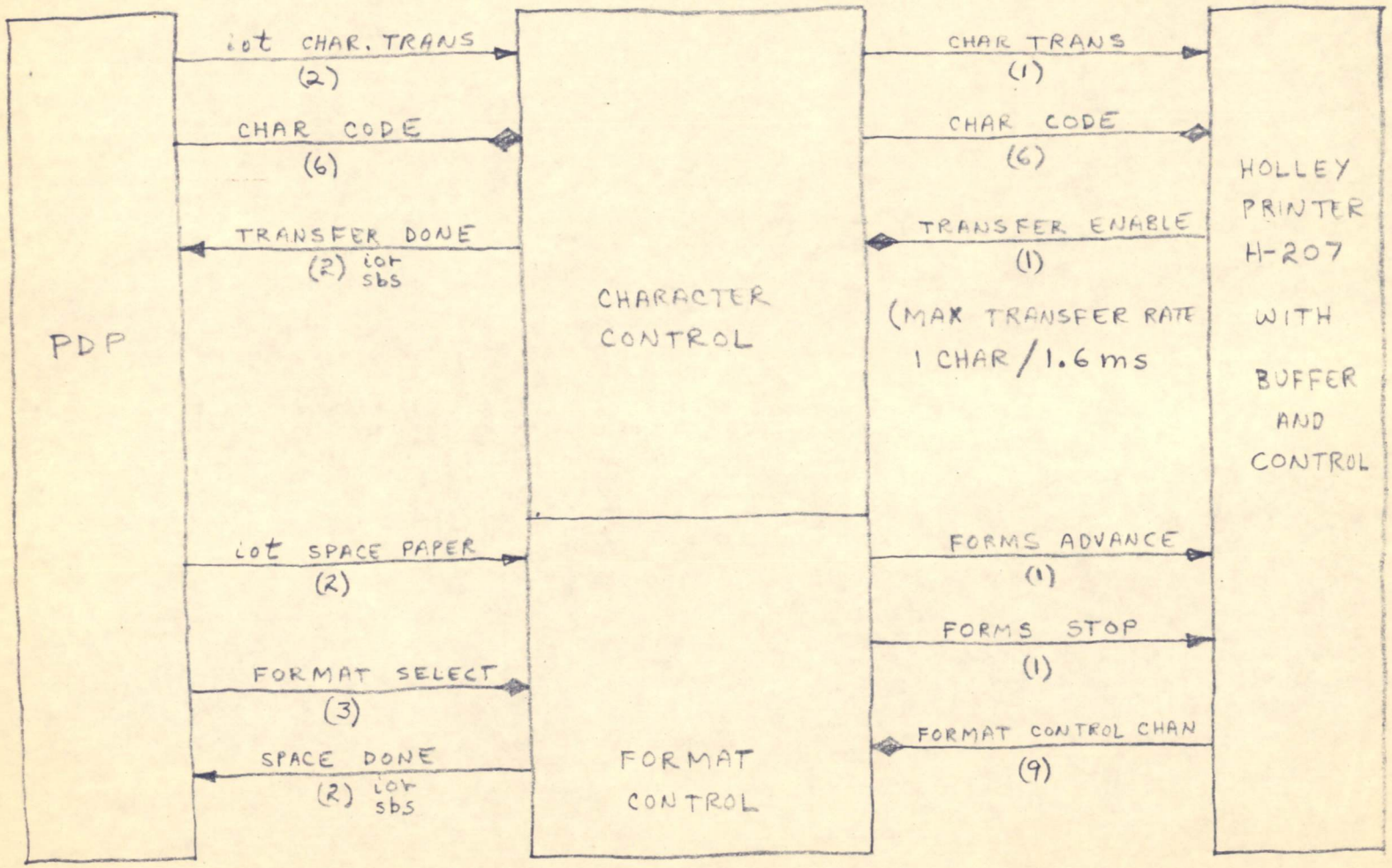
If we will accept a switchable format control selection, in other words select which format channel is applicable by means of a switch on the printer rather than having it under program control, this would be provided for us at no extra cost.

In addition to information on the buffer as a result of a subsequent telephone call to Holley Computer Products, I have found out that the buffer may accept information either as 6-bit parallel words or as true bit serial as was first specified by Holley. In addition to the bit information, we must also provide a print command which is a 7 microsecond duration negative 2 milliamp pulse which strobes the 6 bits into the word. The buffer control takes care of the synchronizing required to get the word into its proper place in the line. Words are loaded from starting with column one proceeding to the right towards column 120. The buffer control sends back a level to us when its ready to load another word. Words may be loaded at any rate up to the maximum rate of 1 word of 624 words per second.

Holley is sending additional specific interface information, upon receipt of which I will prepare a detailed cost estimate. In the meantime, the price quote of $24,800 to Itek sounds quite safe.

( ) INDICATES # LINES

PRINTER CONTROL
TYPE



TENTATIVE INTERFACE
R. SAVELL
11/28/62 X-239

dec INTEROFFICE MEMORANDUM

DATE November 29, 1962

SUBJECT Price Quotations

TO H. Anderson

FROM Bob Savell

I've long had some opinions about price quotations which I told people rather informally, and I thought that maybe this was a good time to put them down more formally.

No formal price quotations should be sent out by anyone except authorized quoters. This list would include you, Ken Olsen, Nick Mazzarese, etc. All people on this list should be furnished by the Sales Department with our standard list of established prices and the paragraphs of warranty information and the rest of the form type mumbo-jumbo that goes with every price quote, so that all quotations will be standard in form. These authorized quoters should be allowed to send out only quotations which are made from the established list. Needless to say, no prices should find their way onto this list without a formally submitted price justification form to back them up.

Any price quotations which involve prices not on our published list of standard prices must have a justification submitted by some responsible person in the company on the standard pricing form to the Sales Department before any quotation can go out. The final quotation should be checked by the Sales Department before it is sent out. This would also apply to non-standard items previously quoted but not on our standard price list.

Even when this procedure is followed, practically every price quotation for a non-standard item, no matter how recently it was quoted should then be checked by the Sales Department with the person who submitted the price justification before the quote is sent out.

All personnel in the company should be cautioned about making verbal quotations so that they inform the customer that they are just what they seem to be, educated guesses, and that they are in no way binding. Any firm quotation must be made by the company in writing.

MEMORANDUM

TO: D.E.C. Works Committee

FROM: Jay W. Forrester

November 21, 1962

SUBJECT: Additional comments on inventory dynamics

At our last meeting I answered some questions about the relationships of inventories and production rates, but feel that I did not sufficiently state some underlying assumptions which make many of the comments inapplicable to the D.E.C. situation.

A situation like that discussed in chapters 17 and 18 of my book includes among other things the following assumptions:

(1) It is expected that all incoming orders for the product can and will be accepted.

(2) As a corollary to the preceeding point, there is the assumption that the potential demand is stable and well defined and can not vary greatly. The possibility of potential demand changing by more than 50% in a period of two years would call for a review of this assumption.

In the above described situation, the purpose of the inventory is to absorb the fluctuations in order rate with a minimum variation in required employment.

The situation at D.E.C. is essentially different. The underlying assumptions would seem to be:

(1) The potential demand of the market is far in excess of the

company's present sales rate.

(2) It is not possible for the company to operate under the policy of accepting all available orders.

(3) Demand can vary greatly. It certainly can increase by a factor of 10 and under adverse conditions of poor deliveries and insufficient sales effort, it can fall by a factor of several.

(4) The products are not a long established design for which production time and effort is precisely known.

In a system such as this the purpose of inventories would seem to be:

(1) To absorb variation in productivity and to give a buffer which can compensate for misjudgments of the size and difficulties of various tasks which are undertaken.

(2) To provide a source from which one can fill a certain small, steady, favored section of the market demand. I have in mind here the desirability of an inventory of building blocks to meet the short term needs of former customers who wish equipment in conjunction with systems they have already purchased.

In a system of the D.E.C. type it is impossible to carry sufficient inventory to stabilize the demand fluctuations which can be created. The average work load on the organization must therefore be controlled in some other way. The most obvious way of doing this is by limiting the acceptance of orders to the rate at which the company on the average can discharge them. Stabilizing the peak demand is accomplished by not accepting more than can be done. Stabilizing the dips is accomplished by performing well enough so that the average potential demand lies above the company capability.

In such a system inventories are then used to compensate for the misjudgments which inherently will go with products in an area of new technology.

dec 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.

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.

INTEROFFICE MEMORANDUM

DATE November 20, 1962

SUBJECT

TO K. Olsen
H. Anderson
S. Olsen
M. Sandler
G. O'Dea
D. Mills
N. Mazzarese
E. Harwood
B. Maxey

FROM J. Smith

PDP-1-35 (9000-5863) was delivered to Checkout today. It is a complete machine with 100% modules. This is the second machine for the month of November and had a scheduled delivery date of 11/21/62. Scheduled completion dates for the December machines are December 7 and 21. Both machines are on schedule.

NOV 21 REC'D

~~Steve, Stuart~~

dec INTEROFFICE MEMORANDUM

DATE 11-19-62

SUBJECT

TO Ben Gurley

FROM Bob Oakley, WCO

The photo copies of notes I have enclosed were prepared by the 3 C's West Coast Office. They were given to me reluctantly by Kengo Kawano, at JPL, because they should not get back to 3 C's in any way but should be used strictly for our internal information.

These notes were probably prepared exclusively for their (3 C's) salesmen for sales pitches. I personally don't believe in this type of approach but do like to have fast answers when customers question our products in respect to what a 3 C's salesman has stated; particularly with this degrading type of evaluation.

I hope you find these notes as interesting as I did.

Regards.

Bob Oakley

Bob Oakley

3C WEST

September 5, 1962

NOTES ON UNIVAC 1218 VS DDP

1. The 1218 has a 4 μsec memory cycle time (DDP: 5 μsec), but it seems very doubtful if this results in faster computations.

   a) Minimum execution time of simple instructions is 8 μsec; the DDP has a number of 5 μsec instructions (when no operand fetch is required).

   b) Non-indexed add, subtract take 8 μsec in 1218, but if indexed these take 12 μsec. The DDP add, subtract and all other non-sequential instructions take 10 μsec, independent of indexing or not.

   c) Non-indexed multiply and divide is 52 μsec in the 1218, and if indexed 56 μsec. In the DDP the average multiply time is 39 μsec; divide time is always 56 μsec. This is valid for both indexed and non-indexed operation.

2. The 1218 has an 18 bit word length, compared to the DDP 19 to 24 bit word lengths. The 18 bits are not adequate for the addressing of their maximum memory size of 32 k words; and the 7 index registers, therefore inconvenient indirect addressing is used in many cases somewhat similar to the 160A although not as bad. The 1218 uses one's complement code vs the more convenient sign-magnitude code of the DDP.

3. The 1218 has 7 index registers, against one (standard) index register in the DDP. These 7 index registers are inconveniently stored in memory rather than being separate, directly accessible registers. The optional IXE-command (index expansion) of the DDP is somewhat comparable to the 1218 setup, but it provides for all memory locations to be effectively usable as index registers.

4. The available software package of the 1218 does not include a compiler; but they do offer an assembler, arithmetic routines, floating point package, etc. This is compatible to the DDP, except for debugging and diagnostic routines which we have not developed yet.

5. Paper Tape: The 1218 has a 100 cps reader (slower than DDP), and 100 cps punch (faster than our standard punch).

6. Input-Output: Up to 8 parallel input channels, and 8 parallel output channels. It seems that the DDP has more variety with character, and word buffers in addition to the parallel channels. The 1218 allows for data block transfer for I/O which we do only optionally (FMB, and DMB commands: Fill Memory Block and Dump Memory Block).

There is not enough information available to compare the I/O capabilities in detail.

Summarizing the Univac 1218 generally appears less powerful than the DDP, but its price of 96 k may offset this. It would be interesting to receive some feedback from customers as to where the 1218 comes out to be stronger than the DDP.

J. F. NIEMOLLER

JFN/ph

cc: RWW
SJH (8)
ALF
WOR
FEB
DLB
IT
W. Wolfson
J. Leabman (8)

NOTES ON CDC 160A VS DDP

The CDC 160 was originally built as a satellite computer to the 1604 and not as a g. p. computer. The 160A was developed as a modified version to better meet g. p. requirements. Its basic disadvantages of very small word length of 12 bits and different addressing modes remain.

The eight addressing modes (ways to specify the address of the operand of the command) make the 160A awkard to program by providing different, but similar instructions to choose from in many cases. (With the DDP the only choice of address mode is indexing or not.) Shift commands in the 160A allow for shifts of 1, 2, 3 or 6 steps only, resulting in more than one instruction for most shift operations. Multiply and divide are available as external options only. Multiply by subroutine (standard) takes 950 μsec, divide by subroutine takes 1800 μsec.

The CDC memory cycle is 6.4 μsec compared to our 5 μsec. Its add time is 12.8 μsec. Standard memory size is 8K core. It is used up very quickly because of the short word length and because multiple precision operations are required in most cases. No index registers are provided, although one addressing mode corresponds to relative addressing, and another one to indrect addressing.

SDS 920 VS DDP

The 920 is a somewhat slower computer, using serial logic, and an 8 μsec memory cycle. (Add command 16 μsec compared to DDP with 10 μsec.) Their command structure is powerful which makes up for the machine speed. Specifically a serial-parallel adder has been added to achieve a multiply speed of 32 μsec.

The 920 has a 3 Mc clock rate to meet the speed requirements for serial logic. Although this is certainly no stretching of the art, it presents more problems of cabling and wiring because stray pulses and rise times become more important, and performance margins smaller. Addition of equipment especially memory will present considerably more problems with the intercabinet cabling required. A two's complement machine code is used which is less convenient than our sign magnitude code.

Certain options in the input-output area are offered but flexibility is not stressed very much. Reportedly a 4 K memory addition is priced at about $30 K. The 920 price has recently been raised from $89,000 to $97,000.

Strong advantages of the 920 are: A smaller, "family related" computer, the 910 is also offered; a powerful software package being worked on, including a Fortran type compiler in the near future. Three index registers and indirect addressing are available.

Silicon circuitry is provided, but its advantage of wide temperature range is only a sales pitch, because the core memory remains temperature sensitive, and this type of equipment normally operates in air conditioned environment.

The SDS command structure is generally compatible with that of the DDP. Several commands make the B register more powerful than ours. Some of the optional DDP instructions are not represented such as BCD, BIN, conditional change of (A) and (EA). The DDP also provides for direct input to and output from the A register to peripheral equipment.

PDP-1 VS DDP

Besides the SDS 920 the PDP-1 is a strong competitor for the DDP. As the first computer in this particular field the PDP-1 is technically less up-to-date, specifically insofar as command structure is concerned. The fact that a number of them have been delivered and are working is their advantage.

Word length is 18 bits, no index registers are provided, but (less convenient and slower) indirect addressing is. Only one I/O register is available which doubles as an arithmetic register. This together with the absence of a character buffer keeps I/O efficiency down. A 16 level hardware priority interrupt is standard though. Machine speed proper is compatible with DDP (5 μsec memory cycle, parallel logic). Not much flexibility in input-output operations is offered, but a range of peripheral devices can be hooked in.

The standard PDP-1 has no single command multiply or divide, but these can be provided as options. Transfer capabilities into or out of the B register are weaker, no normalize and scale commands (important for floating point), no multiple precision command, less powerful subroutine linkage commands (compared to our JUS and JUR) The PDP-1 has slightly more variety in the skip command group.

Although a small version PDP-4 is offered, it does not appear to be successful because capabilities of both command structure and input-output have been stripped down considerably with a price tag not very low. ($65 K with 4 K memory)

Some PDP-1 prices (maybe somewhat obsolete by now).

PDP-1: ~~$120~~ 120 K, 4000 word memory addition: $40 K for first addition, $30 K for following additions. Potter #906 tape handler, 15 kc transfer rate $18 K, tape control unit $7, 500.

NOTES ON CDC 924 VS DDP

The CDC 924 is a strong computer, generally more powerful than the standard DDP-19, particularly insofar as command structure, input-output and word length is concerned. However, in comparing the two the question is: What can 3C offer for the same price as the 924? Because of the options available we should be able to offer a computer better adapted to the specific needs of the customer for less money.

The CDC 924 is a parallel machine, 24 bit word length, with a 15 bit address portion for direct addressing of 32 K of memory (the DDP-24 can directly address up to 16 K, the DDP-19 can address 16 K memory with some extra properly coded OCP commands in the program).

The 924 has 6 index registers available and indirect addressing. (The DDP has optionally up to 7 index registers and indirect addressing option available.) Automatic interrupt is possible. I/O typewriter is not part of standard 924, but is available extra.

The average memory cycle is 5.3 μsec against 5 μsec in the DDP-19. In the DDP-24 the average effective memory cycle would be slightly more and therefore quite comparable to the 924.

The one's complement code of the 924 is somewhat less convenient than our sign magnitude code.

Input-output is with three 48 bit buffer registers for input and three 48 bit buffer registers for output. Up to 100 kc word rate is possible. This is generally faster than the DDP input-output with character buffers, or parallel channels, but the DDP offers the optional FMB and DMB instructions, and also fully buffered channels for up to 200 kc word rate. The DDP has more I/O channels available if needed, also more variety of channels.

The 924 command structure has an edge over the DDP commands including optional ones in the following respects. Their B register (in our notation) is used as a mask for a number of commands, such as selective store and load commands. There are also more instructions for transfer of information into or out of the B register, which makes it very powerful.

The 924 has more variety in conditional jump or skip commands. They have some sophisticated instructions which are useful in certain cases only. (This is true for any command structure!)

More important instructions which the DDP has over the 924 are SMP, for simple multiple precision operation. This is an important point in our favor. No right shift and increment (of index register contents) which is useful in floating point operations. The BCD and binary conversion instructions of the DDP can be important, e.g. with numerical display panels.

The DDP Add and Subtract absolute value instructions may sometimes be an advantage, also the optional conditional interchange of (A) and (EA). (the CAM instruction)

dec INTEROFFICE MEMORANDUM

DATE November 19, 1962

SUBJECT

TO Nick Mazzarese

FROM Gordon Bell

Proposed Ground Support Equipment Checkout System at JPL

While visiting the West Coast Office regarding PDP Sales, I discussed the above subject with the WCO and JPL. The proposal or rather invitation to bid should be available DEcember 1 with bidding closing January 1, 1963. The system is used to do limit checking, log data, and general monitor and assist the checkout of space craft prior to flight. The system includes a PDP-1 with Mag Tapes, etc. and the following special inputs considerations:

1. Approximately 100 analog inputs in ranges of 1, 10, 100 volts with the ability to make 1% measurements at 100 millivolts perhaps. They appear to want 13-14 bit accuracy in A-D conversion.

2. ALL INPUTS (analog and digital) will be of the DIFFERENTIAL type to avoid disturbing any of the other measuring devices (which are in parallel with this proposed system). This requirement is to avoid grounding problems.

3. Telemetry Lines

There are about 200 inputs. JPL was quite concerned about our experience with differential amplifiers, low level signals, A-D multiplexers, etc. They would prefer to buy the system from a company which manufactured all the equipment (A-D included).

PDP -4 Sales at JPL

There appears to be possibilities for 1-4 PDP-4's in the near future at JPL. Hopefully within 2-3 weeks we will have an order for at least 1 computer. We are competing with the SDS 910. The machine seems to be comparable in most respects. They were quite concerned that we do not have a high density, IBM Compatible, tape unit.

SDS

Although the SDS 910 tries hard to sell their I/O Interface, I believe:

1. The I/O Buffering they provide is unnecessary and only serves to tempt people not to buffer the other I/O devices which is disastrous for I/O simultaneity.

2. With the flexibility (lack of definition) only the most straight-forward I/O programs would be able to run between machines. (see PDP-1 serial numbers 1-6 regarding I/O compatability)

3. To use the Interface requires a fair amount of care and each connection seems to be relatively expensive.

Some other considerations pertinent to SDS are:

1. A 41.7KC Tape System (75 ips, 556 bits per inch) at $18,000 per tape unit, and a Tape Control at $15,000. They appear to use the AMPEX TM4.

2. Complete Analog System

3. Pricing of components just slightly less than DEC's.

4. Appearance (as judged by their literature)

   a. Their magazine advertising appear timely and a certain continuity prevails from month to month.

   b. Their programming manual is quite good. (We're just finally getting to describe PDP-1's Mag Tape, if the next revision of F15 ever gets out.

   c. Their I/O manual doesn't say preliminary. DEC had the first IO Manual (CDC and SDS both use our FORMAT), but yet its illustrations and text leave lots to be desired.

   d. There appears to be a continuity of manuals and literature, and each appears to look professional. I count the following manuals:

      i General Systems Brochure (general door open)

      ii Computers (Similar to F11, F41)

      iii Programming Manual (F15, F45)

      iv FORTRAN Manual - actually pretty terrible and useless

      v I/O Interfacing Manual (similar to DEC's)

      vi Computer Applications Manual (a compilations of systems which includes their computers)

      vii A to D Systems Manual

      viii Module Catalog (not similar to our own module catalog because no one could have 300 modules.

      ix IO Equipment Operation Manual

The area which we might most profit is by working on items 5, 9, 6, and 1 (perhaps in that order). Maybe the 200 or so people at SDS are all in sales, marketing and advertising.

In summing up, SDS appears to have a plan and goals and judging from the delivery of their first machines they may even realize some of their goals. I'm not stating that we haven't goals, but are only suggesting that we make some of our goals more public.

Rand Corporation Book

About 2 years ago Fred Gruenberger at Rand wrote a book on the 1620 which would teach computers in the high schools and junior colleges. Gruenberger has written a book with McCraken, and helped with McCraken's FORTRAN Book (which has already sold 40,000 copies). Gruenberger feels there will be a rather large high school market shortly.

Rand now wants to write a similar book teaching binary machine. They want to select a machine, and their criteria are:

1. Price (2K/month maximum rental)
2. Portability
3. Durability (will the design be around in 2 years?)
4. Availability of machine for writing the book. Can Rand borrow a machine during the period of December 15, 1962 to July, 1963?
5. The machines from which the selection will be made are:

   PDP-4, CDS-160, Remmington Rand Instructing Computer (15 bit words, 512 word Memory, generally useless) SDS-910.

The computer on loan would be placed on the 5th floor of the Rand Building in Santa Monica. The book should be in print by June, 1964.

Presumably some committee at DEC may make the decision regarding this computer loan. Unless any others are suggested, I hereby appoint the above memo receivers as committee delegates who in turn have the power to appoint 1/2 each additional delegates. The first and only committee meeting will be held as soon as possible.

Data Phone and IBM 1009 Terminal

UCLA and sundry other customers at WCO and United Aircraft are interested in Data Phone. The format should be IBM compatible.

The most obvious first bite might be to make a box to connect with PDP's which will send and receive with an IBM 1009 Terminal. The 1009 connects to a 7090, 1401 or a Tape Adapter Buffer unit.

We should use the same messgge format (serial by bit and character using a 4 out of 8 bit code to transmit a 6 bit character). The character rate is 75 or 150 characters/second. The exact format can be found looking at a customer engineer's manual on the 1009. The unit which IBM

probably gets $30,000 for looks like about $10,000 according to our pricing (50 ± 5 modules).

cc: Harlan Anderson
Stan Olsen
Dick Best
Ben Gurley
Ted Johnson

SUBJECT: Repair of Returned Modules DATE: November 19, 1962

TO: Harlan Anderson From: Jim Cudmore

The following is a list of modules returned for repair during the week of November 12.

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
1103	0014485	Bendix Corp.	Inverter UVW no output	D001 open MA80 open B - C
1209	0056503K	DEC	No tag with unit	None
1209	0020684K	DEC	No tag with unit	None
1973	91912C	Ft. Monmouth	Misc. transistors claimed to have failed	2N1204's and MD27's replaced
1973	91911C 91909C 91916C 93420C	Ft. Monmouth " " " " " "	Misc. trans. claimed to have failed	Replaced 2N1204's and MD27's with 2N2099's and MD94's
1984	0009829A	MT.1516G	Bad transistor	Motorola 2N398A shorted E to C 1N270 open 2N398A open B - E & C
1984	0009629A	MT 1516G	Bad transistor	Philco 2N674 shorted C to E 1N67A, 1N270 open
1984	011711A	MT1516G	Bad transistor	1N270 open
1984	0013536A	MT1516H	No output	Motorola 2N398A shorted E to C 1N270 open 2N398A open B to C & E
1984	0011707A	MT1516G	Bad transistor	Philco 2N764 shorted E to C 1N270 open
4129	0022976C	I.T.T.	Gate input Pin J Bad	None
4129	0054570C	Venus	For Retest	None
4129	0054805C	J.P.L.	Bent amph. plug	Repaired
4129	0054533C	J.P.L.	Bent amph. plug	Repaired

Repair of returned modules (cont.)

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
4213	0015214E	Bendix Corp.	Flip-flop D No output	None
4215	0008461B	Bendix Corp.	Flip-flop 4 No output	D001 open MD114 open B - E (Philco 6230 2B2)
4301	0046851E	Bendix Corp.	J output goes positive before end of delay	None
6105	0053274F	MIT-Lincoln Lab.	Defective output	MD94 shorted E to C
6401	0018012	IBM Research	Excessive jitter	Circuit modification made
6401	0018007	IBM Research	Excessive jitter	Circuit modification made
6401	0017996F 0018014F 0018003F 0018011F	DEC (Finished Goods)	Four modules from stock to eliminate jitter	Circuit modification made
4129	0052294C	Unknown	None given	None
4129	0052298C	Unknown	None given	None
4129	0052297C	Unknown	None given	None
4129	0052479C	Unknown	None given	1 M.C. output pulse to narrow Replaced Philco MD114
4129	0024574	Unknown	None given	1 M.C. output pulse too narrow Replaced Sprague MD114
4129	0052054C	Unknown	None given	1 M.C. output pulse too narrow Replaced Philco MD114
4129	0052293C	Unknown	None given	1 M.C. output pulse too narrow Replaced Philco MD114
4129	0021301C	Unknown	None given	1 M.C. output pulse too narrow Replaced Philco MD114

Repair of returned modules (cont.)

UNIT	SERIAL NO.	CUSTOMER	COMPLAINT	DEFECT
4129	0023944C	Unknown	None given	1 M.C. output pulse too narrow Replaced Philco MD114
4129	0021303C	Unknown	None given	None
4129	0021027C	Unknown	None given	None
4129	0021051C	Unknown	None given	None
4129	0023951C	Unknown	None given	None
4129	0023962C	Unknown	None given	None
4129	0052064C	Unknown	None given	None
4129	0023955C	Unknown	None given	None
4129	0023957C	Unknown	None given	None
4129	0023950C	Unknown	None given	None
4129	0023949 C	Unknown	None given	None
4209	0028948H	Unknown	None given	None
4209	0063052J	Unknown	No output	D001 shorted

A new column has been added giving the complaints accompanying the returned module. The list has been divided into two categories.

Of a total of 27 returned modules--with known customer--6 had no discernible defects.

Of a total of 21 returned modules--unknown--14 had no discernible defects.

H. Anderson

dec INTEROFFICE MEMORANDUM

DATE 19 November 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 months of August, September, and October, 1962.

SUMMARY OF FIELD SERVICE

August, September, October, 1962

Number of calls: 57
Man hours: 185

Maynard Area		Calls
Prototype		2
PDP-1B	BBN	17
PDP-1C-1	ITEK	3
PDP-1C-3 PDP-1C-4	CRL	16
PDP-1C-5	MIT	2
PDP-1C-6	CRL(OAL)	9
PDP-1C-9	GEOTECH	0
PDP-1C-17	SRL	0
PDP-1C-20	DEC	3
PDP-1C-25	MINN.-HON.	0
PDP-1C-26	MIT(LNS)	2

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

SUMMARY OF FIELD SERVICE

August, September, October, 1962

Bolt, Beranek, and Newman

This summary covers the overhaul and marginal check period on the PDP-1B. The overhaul uncovered some of the more interesting problems which occured in the time covered by this report.

While checking margins on the PDP-1, low negative margins were found on the accumulator during an ADD and IDX instruction. With the use of a module extender, individual margins on the AC_{17} flip flop were found to be only -5 volts with a simple IDX order. The complement input would cause the flip flop to change states before the complement output pulse occured, thereby causing an erroneous computation. Replacement of the flip flop gave ±10 volt margins on the individual module.

Problems would occur on the Mag Tape Type 15 when an octal 75 was written on tape and a read check showed an octal 77 was read from the tape unit. Investigation found that positive margins on the input mixer section of the computer would cause the problem to disappear. The problem was traced to a leaky input transistor in a 4603 pulse amplifier in the input mixer.

Installation of the new Type 30 display uncovered an interesting problem. While displaying a series of points moving from left to right on the X asis, a series of noise lines would be displayed just below the good line as the displayed points passed through zero. Checks showed high frequency noise on the intensity output of the 4688 module. The noise was greatest as the displayed points passed through zero. The cause of the problem was that the switching noise from the left to right deflection coil, was being inductively coupled to the -15 volts D. C. power line for the modules located in the display shroud. The use of a shielded cable for the -15 volt line to the modules in the display shroud corrected this problem.

Marginal checking the Type 20 Sequence Break System found very low positive margin failures. Checks showed the output of a pulse amplifier, which eventually forms the debreak pulse, to be only 1.9 volts in amplitude. It was noted that this was because the input to the Pulse Amplifier was a 70 nano second pulse and the inverter used to regenerate the pulse was a slow speed inverter. A logic change was made, and this is now a modification to the Type 20 Sequence Break.

Itek

Peripheral equipment problems required service calls at Itek. Typewriter problems were traced to a worn permutation bar stop in the computeriter. The part was replaced. An open capacitor in the 1701 switch filter caused erroneous input information into the typewriter buffer. Replacement of the 1701 module corrected this problem.

Cambridge Research Laboratory (PDP-1C-3, PDP-1C-4)

The Hayden time meters on the PDP-1C-3 and the PDP-1C-4 were replaced by Hobbs time meters. This was done as part of the preventative maintenance program.

Depressing the Continue switch would cause ETA $\overline{/\ 1\ \rangle}$ EPC to occur on both CRL computers. This problem had also occured on the PDP-1B. The solution of the problem was to terminate SP-2 at location 3Y8V with an 82Ω resistor and add a load resistor at the collector emittee junction (T-u) of 3Y8. The load resistor was for the logical gating of RIM · SP2 = ETA $\overline{\ 1\ \rangle}$ EPC. The addition of the terminator and load resistor are being checked as a possible modification.

The Divide instruction on PDP-1C-3 would cause the computer to stop with Run^0 and a Divide instruction in the instruction register. A quick check showed the mul/div restart pulse to be 1 volt in amplitude. Replacement of the pulse amplifier associated with the restart pulse corrected this problem.

An attempt to assemble a tape using the DECAL compiler showed intermittent errors on the PDP-1C-3. Application of negative margins on the accumulator caused consistant failures at -2 volts of margin. Subsequent investigation showed that the failure could be reduced to an IDX or an ADD instruction. The trouble was characterized by the failure to carry a simulation of ones into the high order 9 bits of the accumulator. With -2 volts of margin it was found that an AC SH/RO R 0-8 pulse was occuring, which would effectively clear the high order bits of the accumulator. A check of the input to the pulse amplifier for AC SH/RO R 0-8 showed the input to be good. Replacement of the pulse amplifier corrected the problem and restored proper margins.

Various computeriter problems occured at CRC. They were traced to the Ledex solenoids, dirty contacts, decoder adjustments, ect.

Massachusetts Institute of Technology (PDP-1-5)

The computeriter was bound up and it just would not operate. This problem was caused by people striking a series of keys on the typewriter while the power was off. This caused several cams to trip against the power cam. When the computeriter was turned on again the motor could not pull in all the cams at once, so the motor overheated and bound up. The motor was taken apart and a light film of silicon grease was added to the bushings. The motor was reassembled run, an RPM test was made, and it was reinstalled in the computeriter.

Cambridge Research Laboratory (OAL)

Service calls were necessary at OAL for reader, punch, and typewriter problems. A defective feed hole amplifier was replaced in the reader, a Ledex solenoid was replaced in the typewriter, and the punch required adjustment.

New options were added to the OAL installation during the three month period covered by this report. The additions were:

A Mag Tape 50/51 combination
Type 20 Sequence Break
A relay register and associated logic

DEC

Set program flag six instruction was inoperative on the DEC computer. The trouble was traced to an open transister in the 1103 module, which is the inverter input to set program flag six.

Massachusetts Institute of Technology (LNS)

The LNS computer would not transfer from mag tape via the high speed address mixer, into a memory other than zero. The problem was traced to three missing wires from the high speed address mixer to the extended program counter. This error occured because the mag tape diagnostic used for checkout did not check

Massachusetts Institute of Technology(LNS)

transfers to memories other than zero. The diagnostic program has been changed and now checks this transfer.

The 811 power control for the Type 30 display was replaced. The defective power control had two shorted mercury relays, burned relay sockets, a shorted diode and a shorted local, remote switch. This was caused by the grounded 10 K. V. power supply shield, which shorted to the 110V AC power line on relay K2. The new 811 power controls have a back plate on them to protect the power connections on the relays.

Bolt, Beranek, and Newman(PDP-1C-7)

The CRT on the Type 30 display was replaced, and ring magnets were installed on the neck of the tube to reduce pin-cushion.

The mag tape unit would come to a complete halt for no apparent reason. The trouble was corrected by replacing the 8 uf. capacitor C_1 across the servo motor.

The sola transformer in the display was replaced as it had been leaking oil for some time.

Jet Propulsion Laboratory

Problems with the Mag Tape Type 50 at JPL. Replacement of the forward pinch roller solenoid and adjustment of the start time corrected these problems.

dec INTEROFFICE MEMORANDUM

File

DATE November 19, 1962

SUBJECT CORNING'S PDP-4

TO Harlan Anderson
Dick Mills
Arthur Hall
Ken Fitzgerald
Bill Kellicgher

FROM George Rice

It is my understanding that Corning plans to settle its account with us for the PDP-4 before actual shipment is made. Therefore, I suggest we proceed as follows:

1. Clean up the computer and put it through Quality Control's final inspection.

2. Crate the machine and its equipment, then store it in the top of Building 5.

3. Wait for Corning's request for shipment. Corning's expected date of installation is December 10.

INTEROFFICE MEMORANDUM

Date: November 16, 1962

TO: K. Olsen
H. Andersen
Engineers & Technicians

From: Steve Lambert

Wednesday, November 14th I attended the Industrial Advisors Committee Meeting, Wentworth Institute. The agenda of the meeting was first year and second year subjects for the EEE course and the ET course. The difference between the EEE course and the ET course is the gearing of the subjects. A fellow in the ET course accomplishes in two years what normally would be accomplished in one year by the EEE course. Upon graduation from the ET course a certificate is received and upon graduation of the EEE an associate engineering degree is received. It is the opinion at Wentworth that the ET graduate is capable of doing a wireman job whereas the EEE graduate is capable of doing technician work under engineers or work as a junior engineer.

In the past two years more emphasis has been put on mathematics and economics or social studies. Also, in addition for next year's course second semester of the EEE group, a computer course will be given and the laboratory will probably consist of using all DEC modules as they have no other equipment available. We are presently generating a package for Wentworth which consists of two mounting panels of the 3000 series laboratory blocks with a power supply and various sizes of patch cords.

The course outlined provided with this memo describes the subjects that will be ~~used~~ taught next year. The math course the first semester of EEE will be algebra, geometry, trig. The second semester will start off with differential equations. The second year of math is all devoted to calculus both semesters. The economic course in the second year will consist of the study of social sciences. The tubes and circuits class has been cut down in the first year and this time has been alloted to more study in semi-conductor circuits. Measurements and instrumentation take up most of the first semester of the second year. This course has proven to be one of the most important given by Wentworth and prepares the student with the knowledge of most instruments used in the electronics world plus special measuring devices including all of the various types of scopes, bridges and meters that a technician would come in contact with. The textbooks for these courses are continuously up for review and this year it seems that textbooks requiring more analytical thought will be used.

######

Technician

EEE
Course

FIRST YEAR SUBJECTS

First Semester						Second Semester				
Subj. No.	R	L	S	C		Subj. No.	R	L	S	C
	5	0	10	5	Math		4	0	8	4
	3	2	7	4	Physics		3	2	7	4
	3	0	6	3	English Composition					
					Oral Communication		3	0	6	3
	4	3	8	5	Electronic Fundamentals					
	0	5	1	2	Mechanical Drafting					
	0	3	0	1	Shop Techniques					
					Electric Circuits		2	3	4	3
					Electron Tubes & Circuits		3	3	6	4
					Electronic Components & Materials		0	3	0	1
					Electronic Drafting		0	2	1	1
	15	13	32	20			15	13	32	20

SECOND YEAR SUBJECTS

First Semester						Second Semester				
Subj. No.	R	L	S	C		Subj. No.	R	L	S	C
	2	0	4	2	Math		2	0	4	2
	2	0	4	2	Economic		2	0	4	2
	3	0	6	3	Solid State Fundamentals					
					Semiconductor Circuits		3	3	6	4
	2	2	5	3	Special Tubes and Circuits					
	4	3	8	5	Measurements & Electronic Instrumentation					
	0	3	0	1	Electronic Drafting					
	2	2	5	3	Electron Tubes & Circuits					
					Microwave Principles & Measurements		2	2	5	3
					Fundamentals of Computers		2	2	5	3
					Electromagnetic Devices & Controls		2	3	4	3
					Pulse Techniques & Transients		2	0	4	2
					Electronic Production Methods		0	3	0	1
	0	3	0	1	Electronic Fabrication Methods					
	15	13	32	20			15	13	32	20

R = Resitation
L = Laboratory
S = Study at home
C = Credits

Wireman:

ET

Course

FIRST YEAR SUBJECTS

First Semester

Subj. No.	R	L	S	C	
	3	0	6	3	English Composition
					Oral Communication
	3	2	7	4	Physics
	4	0	8	4	Math
	0	4	2	2	Shop Techniques
	4	2	9	5	Fundamentals of Electricity
					Fundamentals of Electronics
					Sheet Metal Shop
	0	6	0	2	Mechanical Drafting
					Electronic Drafting
					Electric Circuits
	14	14	32	20	

Second Semester

Subj. No.	R	L	S	C
	3	0	6	3
	3	2	7	4
	4	0	8	4
	0	3	0	1
	2	2	5	3
	0	2	1	1
	0	3	0	1
	2	2	5	3
	14	14	32	20

SECOND YEAR SUBJECTS

First Semester

Subj. No.	R	L	S	C	
	3	0	6	3	Calculus
	2	0	4	2	Economics
	0	2	1	1	Welding Processes
	0	3	0	1	Chassis Layout & Construction
	2	0	4	2	Electronic Components & Materials
	2	2	5	3	Electron Tubes & Circuits
	3	4	8	5	Electronic Instruments & Measurements
	2	0	4	2	Semiconductor Principles
					Semiconductor Circuits
					Electrical Machinery
					Fabrication Processes & Design
					Electronic Systems
					Machine Processes
	0	3	0	1	Electronic Design
	14	14	32	20	

Second Semester

Subj. No.	R	L	S	C
	3	0	6	3
	2	0	4	2
	2	2	5	3
	2	2	5	3
	2	2	5	3
	0	5	1	2
	3	0	6	3
	0	3	0	1
	14	14	32	20

R = Resitation
L = Laboratory
S = Study at home
C = Credits

HEA Copy.

PROJECT REPORT

MAGNETIC TAPE DEPARTMENT

Engineer: R. Boisvert

Date: November 15, 1962

DIGITAL EQUIPMENT CORPORATION

MAYNARD, MASS.

TABLE OF CONTENTS

DISTRIBUTION:

K. Olsen
W. Hindle
B. Gurley
D. Best
A. Blumenthal
D. White
R. Doane
J. Fadiman
R. Savell

Project: Tape Control 56 development

History: The type 56 control project is the result of a specific request from a customer. Jack Brown was given the project on a consultant basis. I took over the project on a full time basis.in September.

Sales Outlook: There has been considerable interest in this control from both previous and future customers..I have been asked to commit myself to a delivery two months after the prototype. I anticipate the sale of six or more of these controls in 1963..

Status: My target date for completion of this control is April 30, 1963. To date the project is on schedule. I foresee two possible trouble spots in my schedule-Programming and-read circuitry modules.

Schedule: Dates	Manpower	Function
Sept.-Dec.	1 draftsman	draw block schematics, wiring diagrams, and necessary mechanical assemblies
	1 M. Engineer	mechanical assemblies
	R. Boisvert M. Arsenault	redesign, redevelopment of basic ideas, checking of prints and design of off line tester
	B. Gurley R. Boisvert	Skull session before construction
Dec.-Jan.	Production	construction
	M. Arsenault	construction and checkout of off-line tester
	R. Boisvert	Simple diagnostic programs
Jan.-Feb.	M. Arsenault R. Boisvert	Off-Line checkout of the control
Feb.-Apr.	R. Boisvert M. Arsenault	On-Line checkout on prototype
Unknown		Checkout on NSA Computer

Project: Tape unit evaluation

History: After 1 year of experience with the Potter Tape Unit, I decided that there had to be a machine which may not be as good in the start-stop characteristics which would perform, as we use a tape unit, as well as the potter. In addition, I hoped that it would not inherently have many of the problems we have encountered with the potter on a sales, engineering, and customer relations level. Some of these problems are:

a. tension arm breakage

b. friction or mechanical type writelockout switch

c. inability of photosensing circuitry to detect the difference between light colored tapes and the reflective strip.

d. the continual need for adjustment of this photosensing circuitry.

e. local inventory of spare parts by supplier

f. a 1 year warranty on the unit, which would cover our 1 year responsibility.

g. cost of the basic components

Evaluation: The evaluation will be conducted on three tape units, Ampex, Burroughs, and Potter. The tests will be primarily on line performance and reliability, which will be conducted in three stages.

The first stage will be off line testing with our portable tape unit calibrator. The considerations will be mechanical adjustments, electrical calibration, and component replacement.

The second stage will be off line testing with the type 52 control. The considerations here are data reliability and mechanical consistancy.

The third stage will be on line testing with the control 52 and the control 51. The same considerations as in the second stage will be predominant.

Status: The project is presently on schedule and no delays are expected.

Schedule:	Dates	Manpower	Function
	Nov.-Dec.	R. Boisvert M. Arsenault M. Dill	interface and off line testing
	Dec.-Jan.	M. Dill G. Fowler	On line testing

Project: Digital Link Tape Unit

History: We as a company must offer an inexpensive tape system for present and future computers. The answer to an inexpensive and reliable tape system is the Link Tape Unit.

Sales Outlook: I don't think there is any question to the sales possibilities of this unit. I personally have had many previous customers visit me after the Decus meeting to discuss the Link tape unit. I have had calls from such places as the Research Department, U. of Mississippi, inquiring about the link tape unit. My real feeling is that we ought to have 25 units on the shelf when we put it formally on the market.

Status: The target date for this unit is March 15, 1963, so that its grand entrance will take place at the IRE Show. To date, we have been investigating motion and motion control. After about a three day session with Stockebrand, I will begin to formulate control possibilities for use with the PDP-4 and the PDP-1. Major drawback will be programming.

Schedule:

Date		
Nov.-Dec.	R. Best R. Boisvert J. Hamilton	control electronics motion and motors
	T. Stockebrand L. Prentice S. Miller	mechanical problems and design
	B. Gurley G. Bell R. Boisvert T. Stockebrand	tape control, format, specifications, logic design and development
Dec.-Jan.	R. Boisvert 4 draftsmen (2 weeks)	development drawings
Jan.-Feb.	Production	
Feb.-Mar.	R. Boisvert Programmer	on line checkout
MARCH 25		IRE SHOW

Future Projects: Gordon Bell, Jack Brown, and I are all taking a serious look at the high speed channel cycle as a means of bookkeeping for data transfers. In the case of the PDP-1 transfer time becomes 15 microseconds with a maximum time of 55 usec. In the PDP-4 the minimum is 24 usec and maximum must be controlled by the programmer to be 64 usec. The bookkeeping functions are approximately one-half the cost of the 52 control. Thus, a control of this nature would run in the vicinity of 15k and be far superior to the type 51 or 54 simple controls. In addition, a one tape control customer would lose no performance features presently offered in the 52.

There has been some interest in a system that would be approximately the same cost as our present system but of both 200 and 500 characters to the inch. Ben Gurley and I have talked to several tape unit companies about a subsystem to do this. I don't feel we should spend a great dear of time on this until a firm order is placed for such a system.

T. Stockebrand's idea for a reel to reel single motor tape drive intrigues me. I think that this might be seriously considered for a follow-up of the link.

Manpower: In the next year, I foresee many more tape systems which will require more manpower. At the present time, I have managed to take care of development, training, field service, consulting to special systems, customer relations, and a little thought to the future. I hope you are getting the feeling I am being spread a little thin. I feel that I don't have the time to do anything really right and I am relying heavily upon my technicians in many areas of responsibility. I feel that it is time we began to groom an engineer in module design so that by April or March of next year I can have some HELP. Naturally, I would like an experienced man right now; however, I find this from the standpoint of availability a very remote possibility.

H Anderson

INTEROFFICE MEMORANDUM

DATE November 15, 1962

SUBJECT 23rd 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. The 545 oscilloscope in use at BB&N is now 8 months out of calibration. Dave Dubay will make a trip down with an exchange oscilloscope.

2. All of our current probes have arrived, but Bob Beckman needs more--so does Ed Harwood. We will order whatever is required. Ed Harwood needs two current probes and two multimeters for use in a kit to be used for computer installation.

3. The in-circuit transistor tester will be tried out in special systems.

4. Extensive tests with our type 291 Tektronix diode switching time tester show that it is a very useful instrument although it may be difficult to calibrate. However, it is the only method we know of for making recovery time measurements of the order of 1 nanosecond, and therefore, we have ordered one. The price is $250.

5. We will consult Dick Best about buying a type 290 transistor tester which costs $290, and operates in somewhat similar fashion.

6. We will soon get a demonstration of a 10 megacycle, 16 lb. portable oscilloscope made by Avnet, which might be useful for field service.

7. We will soon have a General Radio Limit Bridge on trial. This is a new bridge which has just been introduced by General Radio, and it would be used for incoming inspection of passive components.

8. The Contronics production diode tester is still not delivered but we still expect delivery shortly.

9. We still have not calibrated either the meter calibrator or one of our flukes. The other flukemeter has been recalibrated at no charge by Technical Instruments as has our new Kintel power supply, because of an apparent discrepancy in their readings. After this recalibration some discrepancy still was observed, but apparently this discrepancy was due to thermal potentials which can be avoided by extra care in wiring.

10. Ken Wakeen is our new member of the test equipment committee. He has some experience with calibration setups and will explore our needs in this area. He also knows from experience about production f_t testers and will help investigate our needs in that area too.

11. A tabulation of test equipment needs in areas where the committee did not have adequate first-hand information is attached. As a result of this investigation we decided to order a fluke model 821A which has a .01% absolute accuracy and also to order a Boonton Electronics Model 95A zero center vacuum tube DC voltmeter and DC microammeter. The VTVM has a sensitivity of 10 microvolts full scale which makes it more sensitive by far than even the John Fluke nullmeters, so that it is an excellent bridge balance null indicator as well as being a useful general purpose vacuum tube voltmeter for voltages to 1 Kv. The Flukemeter is similar to our other meters except for the increased accuracy, and its cost is $895. The VTVM will cost $495.

The next meeting of the Test Equipment Committee will be on Tuesday, December 11, at 1:30 P.M. in Bob Hughes' office.

cc: H. Anderson
B. Beckman
B. Burley
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

TEST EQUIPMENT	DAYS PER MONTH NOW AVAILABLE	DAYS PER MONTH NEEDED	NUMBER OF USES	NUMBER OF PEOPLE ASKED
Sampling Oscilloscopes	63	44	4	13
Flukemeters	42	56 1/2	17	23
Kintel 0.01% Programmed Power Supply	21	24 1/2	5	23
DC VTVM	21	43	5	23
Audio Oscillator	21	10	5	14
Dual-Beam Oscilloscopes	63	29	5	13
Resistance Bridge	21	8	6	14
Controlled Temperature Chambers	42	40	10	15

dec INTEROFFICE MEMORANDUM

DATE November 14, 1962

SUBJECT

TO H. Anderson
E. Harwood

FROM J. Smith

I have contacted Jack Atwood in relation to serial number tags for PDP-1 and PDP-4. The tags will be pop-riveted onto the 813 control panel.

dec INTEROFFICE MEMORANDUM

DATE November 14, 1962

SUBJECT

TO K. Olsen
H. Anderson
S. Olsen
N. Mazzarese
G. O'Dea
D. Mills

FROM J. Smith

Our program for the construction of two standard PDP-1 computers is progressing according to schedule. Schedule delivery for the first computer in November was 11/2. This date was met and the computer was delivered to Checkout on 11/2 with 100% modules. The second computer for November is scheduled for delivery to Checkout on 11/23. Presently the machine is completely wired minus major components and modules. There will be no problem in meeting the 11/23 schedule date. Computers for December are progressing according to schedule. They will be completed according to schedule on 12/7/62 and 12/21/62. I am quite satisfied with the progress of the program and cannot forsee any problems that would interfere with the completion of two computers per month. Progress of the program can be readily observed by the number of computers in various stages of construction in Building #5.

H. Anderson

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.

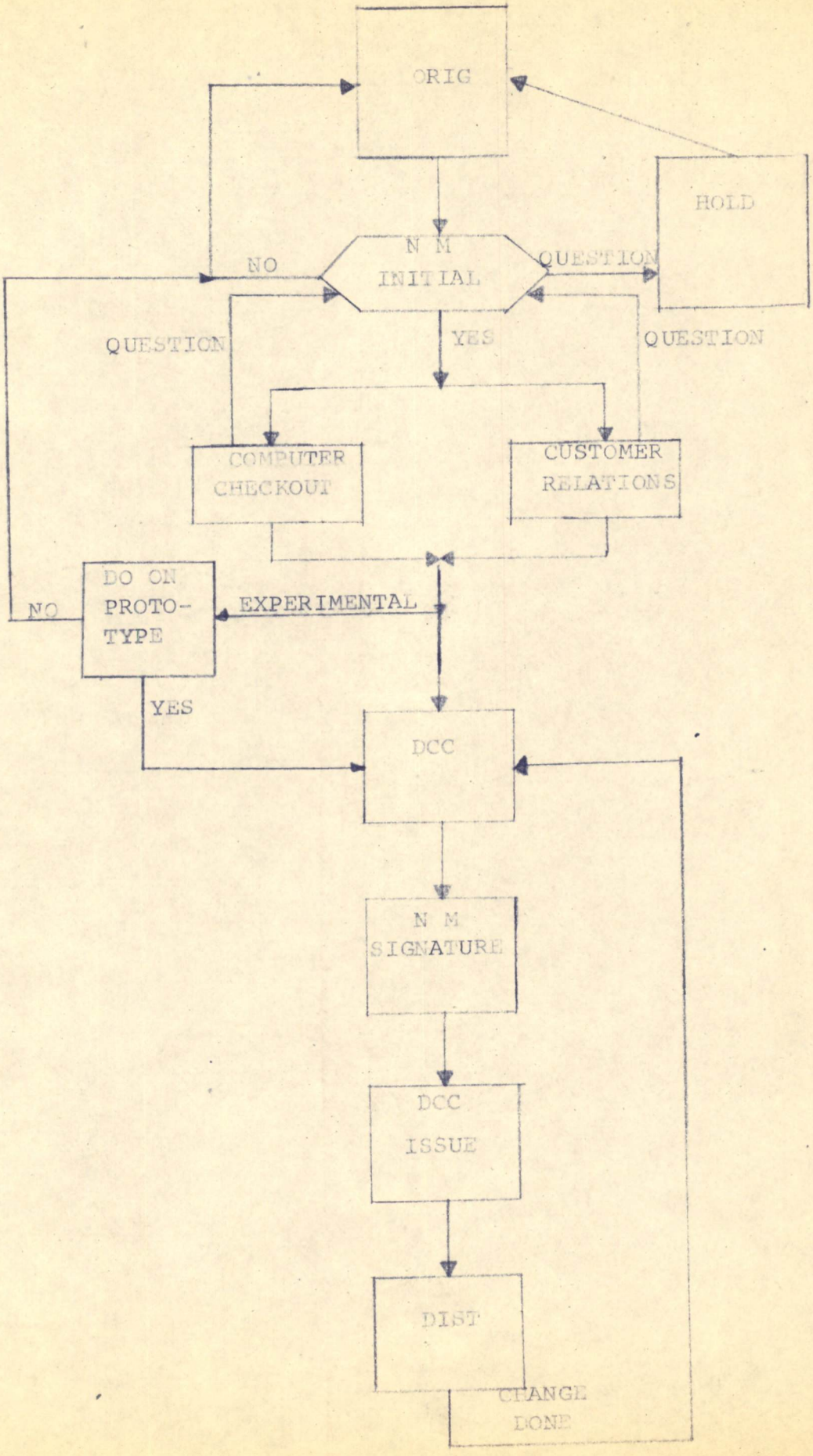
Bob Reed - When a design change has been done on any machine in the final test area.

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 Harwood
Ed Harwood

EH/ak


ORIG
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QUESTION
COMPUTER
CHECKOUT
CUSTOMER
RELATIONS
DO ON
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EXPERIMENTAL
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SIGNATURE
DCC
ISSUE
DIST
CHANGE
DONE

dec INTEROFFICE MEMORANDUM

DATE November 14, 1962

SUBJECT

TO K. Olsen
H. Anderson ✓
M. Sandler
N. Mazzarese
G. Bell

FROM J. Smith

Attached, you will find a copy of the operation number program introduced into the computer group. This is actually a rough draft and more classifications under each digit will be added as the program progresses. The purpose of the program is outlined below.

1. To gather more realistic operation times for scheduling purposes.

2. To evaluate performance.

3. To point out high cost areas.

4. To set a standard of performance without time study.

Ken's suggestion that we have some way to determine our rework cost has been intergrated into the fourth digit. This digit will also supply information on cost of Engineering changes broken down into two phases, mechanical and electrical. The program has been discussed with Dick Mills.

MEMORANDUM

FROM: J. Smith DATE: November 12, 1962

Since the introduction of our computer construction program, our methods of gathering information on operation times has been rather informal and very time consuming. At first the program was small in volume and these methods were adequate. Now that our program has increased in volume and complexity, we must sophisticate our procedures and speed up our information processing. Our mechanical methods of information processing must be abandoned and replaced by data processing through our PDP-4. Of course, in any such program the information out is only as accurate as the information fed in.

In order to gather more realistic information, it is necessary to introduce operation numbers. Most of you are familiar with operation numbers from working in module assembly. Use of operation numbers will enable us to gather information that will be a source of evaluation performance. They will also greatly aid our scheduling efforts.

It is most important that each person take a personal interest in seeing that he or she is using the correct operation number. This in turn will generate accurate and useful information. Your cooperation is solicited in helping to make this program a success.

Attached you will find a breakdown on each operation digit and an explanation of how to use the numbers.

The first half of the job number designates the type of system that is being worked on. 9000 is PDP-1, 8000 is PDP-4, etc. A breakdown of the various types of systems that will be worked on can be found under Illustration I. The second half of the job number is simply a numerical coding. You will always be supplied with a job number when given a job to do. The job number will continue to be placed in the same block you are currently using.

Operation numbers will be placed into the space provided under Operation No. The number will be a four digit number. Below is

an explanation of each digit. Classification under each digit can be found in Illustration II.

1st Digit

Will specify what classification of personnel is doing the work.

2nd and 3rd Digits

Will specify what particular section of the system is being worked on.

4th Digit

Will specify whether the work being done is rework. If so, what type of rework and at what stage of the manufacturing cycle it is taking place. Also, a number is assigned to Engineering Changes.

Illustration I

9000	PDP-1
8000	PDP-4
7000	Magnetic Tape 50
6000	Display 30B
5000	Magnetic Tape 52

Illustration II

1st Digit [1|X|X|X]

1 Systems wiring girls
2 Wiremen
3 Mechanical Assembly (cabinet shop)
4 Inspectors (in-process)
5 Inspectors (Quality Control)
6 Test Technicians (off line checkout)
7 Test Technicians (checkout system)
8 Cable Assemblers (girls)

2nd Digit and 3rd Digit [X|2|3|X]

01 1A - 1B - 1C
02 1D - 1E - 1F
03 1H - 1J - 1K
04 2A - 2B - 2C
05 2D - 2E
06 2F - 2H - 2J
07 11A - 11B - 11C
08 IOT
09 Memory System
10 Multiply - Divide
11 Multiply - Divide Installation
12 High Speed Channel (1Y - 1Z)
13 High Speed Channel Installation
14 Memory Extension (2Y - 2Z - 3Y)
15 Memory Extension Installation
16 Sequence Break Type 20
17 Sequence Break Type 20 Installation
18 Operator Control Assembly
19 Intra-Panel (between mounting panel)
20 Inter-Panel (between cabinets)

21 Cabinet Assembly
22 Final Construction
23 Quality Control
24 System Checkout
25 Other Special Options

PDP-4

01 1A to 1F
02 1K - 1L - 1M
03 2E - 2F - 2H
04 Inter-Panel
05 Cabinet Assembly
06 Final Construction
07 Quality Control
08 System Checkout
09 Intra-Panel

Magnetic Tape 52

01 1B - 1C
02 1D - 1E - 1F
03 1G - 1H
04 Intra-Panel
05 Logic Cabling
06 Cabinet Assembly
07 Final Construction
08 Quality Control
09 Off Line Checkout
10 On Line Checkout

Magnetic Tape 50 & 51

01 Logic Sub Assembly with Slice Gain Panel
02 Cabinet Assembly
03 Mechanical Assembly
04 Control Panel Assembly
05 Final Construction
06 Quality Control
07 Off Line Checkout
08 On Line Checkout

Display

4th Digit (Rework) XXX4

1 Electrical, before Checkout
2 Mechanical, before Checkout
3 Electrical, after Checkout
4 Mechanical, after checkout
5 Engineering Change Mechanical
6 Engineering Change Electrical

Examples

Example #1

Girl is wiring panels 1H - 1J - 1K for PDP-1

job number 9000-1234

operation no. 1030

Example #2

Girl is correcting mistakes made on above panels

operation no. 1031

Example #3

Girl is making engineering changes on above panels

operation no. 1036

Example #4

Girl is wiring Memory Extension option

operation no. 1140

November 14, 1962

Interview Schedule - Thursday, 11/15/62

Personnel--Bob Lassen

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

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

dec INTEROFFICE MEMORANDUM

DATE November 13, 1962

SUBJECT Transistors MD-114, 2N1754 and obsolete stock.

TO K. Olsen
√H. Anderson

FROM H. Crouse

cc: D. Best
R. Hughes
G. O'Dea
M. Sandler
K. Wakeem

A meeting was held last Thursday to decide on the action to be taken regarding MD-114, 2N1754 and obsoleted transistors.

The MD-114 was priced at $0.85 from Philco and $0.92 from Sprague and was an outgrowth of the standard 2N1499A and 2N1754. Sprague notified Digital Equipment Corporation of the change in demand for MD-114 type transistors going from the TO-9 to the TO-18 package with a subsequent price increase to $1.25. While negotiating another contract with Sprague, Philco abruptly cut the supply of the TO-9 package. A quantity of 2N1499A's and 2N1754's were ordered to maintain production.

Philco has a stock of forty-one thousand, five hundred 2N1754 transistors in TO-9 packages available for $0.75 each.

Maynard indicated MD-114 usage to be approximately one hundred thousand units per year with adequate inventory to last three months at the rate of six thousand transistors per month.

Some fifty per cent of the 2N1754's will pass the 20 volt MD-114 specification, ten per cent will be MD-114R at 40 volts and forty per cent less than 20 volts which can be used at 4 volts which is the bulk of applications.

A commitment for one hundred thousand MD-114's at $1.25 each from Sprague was contracted on September 29th.

We briefly discussed the transistor pricing structure as used in all modules. The 5 megacycle line has $2.20 transistors, 10 megacycle $1.00 transistors, and 500 kilocycle a $0.34, and

$0.75 - $1.25 transistors. In light of this the $0.25 NPN Planar Silicon Epitaxial appears attractive. A price quote on a 2N995, which is the Silicon Epitaxial Planar PNP type came in from Fairchild at $7.00 each. Further investigation will be made on a Germanium Epitaxial Mesa transistor as a low cost replacement type.

The direct financial considerations are the increased cost of the MD-114 to $1.25 and the available 2N1754's at $0.75. The $0.75 will apply against sixty thousand units since we have received eighteen thousand, five hundred pieces on individual orders. The forty-one thousand, five hundred balance can be scheduled. Savings possible in buying 2N1754's - $30,000.00.

CONCLUSION: Order the balance of 2N1754's from Philco at $0.75 with scheduled deliveries against production releases, tentatively to begin in February.

Delay delivery on the Sprague commitment.

Each transistor in Production's obsoleted inventory was discussed and evaluated in light of status, possible usage and quantity. Most will be made available for sale or return to vendors. Maynard is to publish a complete list of all units in surplus stock.

INTEROFFICE MEMORANDUM

DATE November 13, 1962

SUBJECT

TO K. Olsen
H. Anderson
S. Olsen
M. Sandler
G. O'Dea
D. Mills
G. Bell
A. Hall

FROM J. Smith

I have been notified by A. Hall to stop construction of all logic wiring for PDP-4. An extensive Engineering Change could be generated because of the introduction of the 4606. A new Production Schedule will be issued as soon as the system is again released to Production.

SUBJECT: REPAIR OF RETURNED MODULES

DATE: NOVEMBER 12, 1962

TO: Harlan Anderson

FROM: JIM CUDMORE

THE FOLLOWING IS A LIST OF MODULES RETURNED FOR REPAIR DURING THE WEEK OF NOVEMBER 5.

UNIT	SERIAL NO.	CUSTOMER	DEFECT
1103	0038502 H	UNKNOWN	NONE
1103	0038494 H	UNKNOWN	NONE
1103	0035905 H	UNKNOWN	NONE
1103	0035904 H	UNKNOWN	NONE
1103	0035921 H	UNKNOWN	NONE
1103	0025903 G	UNKNOWN	NONE
1103	0057510 G	I.T.T.	PHILCO MA90 (1K4 6301) OPEN BASE TO EMITTER
1103	0042345 H	I.T.T.	PINS X Y Z NOT SOLDERED SECURELY IN BOARD
1104	0053933 E	UNKNOWN	NONE
1104	0053179 E	UNKNOWN	NONE
1104	0053181 E	UNKNOWN	NONE
1104	0054890 E	UNKNOWN	NONE
1104	0053923 E	UNKNOWN	NONE
1104	0040268 D	UNKNOWN	NONE
1105	0055778 E	UNKNOWN	NONE
1105	0026676 E	UNKNOWN	NONE
1105	0053678 E	UNKNOWN	NONE
1110	0011152 E	UNKNOWN	NONE
1110	0011140 E	UNKNOWN	NONE
1110	0021412 E	UNKNOWN	NONE
1110	0021539 E	UNKNOWN	NONE
1110	0045312 E	ADX-8	NONE
1111	0035614	SPEC. SYSTEMS	NONE
1111	0034642 D	I.T.T.	NONE

REPAIR OF RETURNED MODULES (CONT.)

UNIT	SERIAL NO.	CUSTOMER	DEFECT
1404	0021233 E	Q.C.	RESISTOR OUT OF TOLERANCE
1607	0039055 B	I.T.T.	NONE
1607	0027149 B	UNKNOWN	MD95 HIGH ICBO (SPRAGUE 2-07)
1669	0026040 C	D.E.C.	NONE
1669	0034467 C	D.E.C.	NONE
1669	0038832 C	D.E.C.	NONE
1669	0034475 C	D.E.C.	NONE
1669	0016619 C	D.E.C.	4JX IC741 OPEN BASE TO EMITTER(G.E. 239)
1677	0049270 C	30-B DISPLAY	NONE
1677	0029182 C	30-B DISPLAY	NONE
1677	05726 C	30-B DISPLAY	NONE
1684	0028724	ADX-3	MA90 - SPRAGUE 2-19 OPEN BASE TO EMITTER
1685	0029283 B	MAG. TAPE	NONE
1685	0020765 B	MAG. TAPE	NONE
1685	0020630 B	MAG. TAPE	NONE
1685	0020635 B	MAG. TAPE	NONE
1685	06246 B	MAG. TAPE	NONE
1685	0030835 B	MAG. TAPE	NONE
1685	0031836 B	MAG. TAPE	NONE
1685	0020322 B	MAG. TAPE	NONE
1685	0009329 B	MAG. TAPE	NONE
1685	0035079 B	MAG. TAPE	NONE
1685	0035082 B	MAG. TAPE	NONE
1685	0035078 B	MAG. TAPE	NONE
1685	0020315 B	D.E.C.	NONE
1685	0035085 B	D.E.C.	NONE
1685	99341 B	D.E.C.	NONE

REPAIR OF RETURNED MODULES (CONT.)

UNIT	SERIAL NO.	CUSTOMER	DEFECT
1685	0020783 B	D.E.C.	NONE
1685	99562 B	D.E.C.	2700 OHM RESISTOR MARKED WRONG. READ 3800 OHM.
1685	0017801 B	UNKNOWN	NONE
1685	0012273	PDP-1	D003 OPEN - 2N1304 SHORTED COLLECTOR TO EMITTER - D001 OPEN
1703	0049583 A	UNKNOWN	NONE
1703	0049585 A	UNKNOWN	NONE
1703	0049324 A	UNKNOWN	NONE
1703	0049597 A	UNKNOWN	NONE
1703	0049584 A	UNKNOWN	NONE
1703	0049586 A	UNKNOWN	NONE
1703	0049587 A	UNKNOWN	NONE
1703	0049591 A	UNKNOWN	NONE
1972	92492 B	UNKNOWN	NONE
1972	76873 B	UNKNOWN	NONE
1972	0028881	ADX-8	MD-114 (SPRAGUE 2-38) HIGH LEAKAGE
1972	0049762 B	ADX-7	NONE
1972	0045139 B	I.T.T.	MD-114 (SPRAGUE 2-26) HIGH LEAKAGE
1972	0047000 B	I.T.T.	MD-114 (SPRAGUE 2-26) HIGH LEAKAGE NO OUTPUT ON Z - 2N1065 MISSING FROM BD.
1972	0038050 B	I.T.T.	MD-114 (SPRAGUE 2-26) HIGH LEAKAGE
1973	72853 C	D.E.C.	NONE
1973	93417 C	D.E.C.	PHILCO 2N1204 1J56224 OPEN B - E PHILCO 2N1204 1J6220 OPEN B - C WRONG TRANSISTOR PHILCO 2N599 SPRAGUE 2N2099 SHORTED E - C
1973	0056344	D.E.C.	PHILCO 2N2099 1J46220 PHILCO 2N2099 2K46301 SHORTED EMITTER TO COLLECTOR
1973	91917 C	D.E.C.	ALL 2N2099 TRANSISTORS MISSING LIFTED COPPER

REPAIR OF RETURNED MODULES (CONT.)

UNIT	SERIAL NO.	CUSTOMER	DEFECT
1973	0051324	GUIDED MISSILE SCHOOL	SPRAGUE 2N2099 SHORTED EMITTER TO COLLECTOR
			" " " " " "
			" " OPEN BASE TO COLLECTOR
1973	05148 C	B.B.&N.	2N1204 PHILCO(1J5, 1K1, 1J4) (6224, 6225, 6220)SHORTED EMITTER TO COLLECTOR -- D001 DIODE IN PLACE OF D003 10 OHM RESISTORS BURNED OUT C6 .01 CAPACITOR SHORTED
1973	0055798 C	D.E.C.	NONE
4105	0051330 E	I.T.T.	NONE
4105	0027014 E	M.I.T.	NONE
4105	0027663 E	UNKNOWN	NONE
4105	0060115 E	UNKNOWN	NONE
4105	0060117 E	UNKNOWN	NONE
4105	0034017 E	UNKNOWN	NONE
4105	0026637 E	UNKNOWN	NONE
4105	0060120 E	UNKNOWN	NONE
4105	0060146 E	UNKNOWN	NONE
4105	0026634 E	UNKNOWN	NONE
4105	0026783 E	UNKNOWN	NONE
4105	0026780 E	UNKNOWN	NONE
4105	03721 E	UNKNOWN	NONE
4105	0026645 E	UNKNOWN	NONE
4105	03721 E	PDP-4	NONE
4106	0010962 G	PDP-4 FOXBORO	NONE
4106	0046217 H	UNKNOWN	NONE
4106	93290 F	UNKNOWN	NONE
4106	0010956 G	UNKNOWN	NONE
4110	0043102 E	UNKNOWN	NONE

REPAIR OF RETURNED MODULES (CONT.)

UNIT	SERIAL NO.	CUSTOMER	DEFECT
4110	0043364 E	UNKNOWN	NONE
4110	0043114 E	UNKNOWN	NONE
4110	0043367 E	UNKNOWN	NONE
4110	0043108 E	UNKNOWN	NONE
4110	0050988 E	UNKNOWN	NONE
4110	0043166 E	UNKNOWN	NONE
4110	0019891 E	UNKNOWN	NONE
4110	0043171 E	UNKNOWN	NONE
4110	0043105 E	UNKNOWN	NONE
4110	0043360 E	UNKNOWN	NONE
4110	0035680 E	UNKNOWN	NONE
4110	0050996 E	UNKNOWN	NONE
4110	0051988 E	UNKNOWN	NONE
4110	0043170 E	UNKNOWN	NONE
4110	0043366 E	UNKNOWN	NONE
4110	0043351 E	UNKNOWN	NONE
4111	0042863 D	UNKNOWN	NONE
4111	0042852 D	UNKNOWN	NONE
4111	0061912 D	UNKNOWN	NONE
4111	0036472 D	UNKNOWN	NONE
4111	0035785 D	UNKNOWN	NONE
4111	0027090 D	UNKNOWN	NONE
4111	0017498 D	UNKNOWN	NONE
4111	0035222 D	UNKNOWN	NONE
4113	0025789 A	UNKNOWN	MD-114 REPLACED
4113	0030445 A	UNKNOWN	MD-114 REPLACED
4113	0010030 A	UNKNOWN	MD-114 REPLACED

REPAIR OF RETURNED MODULES (CONT.)

UNIT	SERIAL NO.	CUSTOMER	DEFECT
4113	0010042 A	UNKNOWN	MD-114 REPLACED
4113	0010586 A	UNKNOWN	MD-114 REPLACED
4113	0055937 A	UNKNOWN	MD-114 REPLACED
4113	0055947 A	UNKNOWN	MD-114 REPLACED
4115		I.B.M.	MD-114 OPEN BASE TO EMITTER MD-114 SHORTED EMITTER TO COLLECTOR
4128	0054416 A	D.E.C.	NONE
4128	0057795 A	UNKNOWN	NONE
4128	0057348 A	D.E.C.	NONE
4128	0053842 A	D.E.C.	NONE
4128	0057082 A	D.E.C.	NONE
4603	0049695	D.E.C.	G.E. 2N1305 ID HIGH LEAKAGE
4603	53223	I.T.T.	D001 IN BACKWARDS
4603	53833	I.T.T.	NONE
4603	0049212 D	D.E.C.	NONE
4603	0062605	D.E.C.	NONE
4603	0049208	D.E.C.	NONE
4603	0062352	D.E.C.	NONE
4604	0008973 A	PDP-4	NONE
4681	0055894 F	D.E.C.	NONE
4681	0057052 F	D.E.C.	NONE
4681	0055363 F	D.E.C.	NONE
4681	0034757 F	D.E.C.	NONE
4681	0034754 F	D.E.C.	NONE
4681	0034756 F	D.E.C.	NONE
4681	0034746 F	D.E.C.	NONE
4681	0034755 F	D.E.C.	NONE
4681	0035241 F	D.E.C.	NONE

REPAIR OF RETURNED MODULES (CONT.)

UNIT	SERIAL NO.	CUSTOMER	DEFECT
4681	0035250 F	D.E.C.	NONE
4681	0035249 F	D.E.C.	NONE
4681	0034759 F	D.E.C.	NONE

OF A TOTAL OF 155 RETURNED, 122 HAD NO DISCERNIBLE DEFECTS.

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.

H. Anderson

dec INTEROFFICE MEMORANDUM

DATE 12 November 1962

SUBJECT PDP-1 Programming Course

TO PDP-1 Distribution List

FROM Bob Beckman

The first of a series of one week courses on PDP-1 programming will start on December 10. Attached is a tentative schedule for this first class.

Although the course is intended for customers, DEC employees are welcome on a "space available" basis. Almost all of the students for this "pilot" course will be DEC employees.

This is not intended as a basic programming course. It has been layed out with the assumption that the students will be programmers who wish to learn the specifics of PDP-1 programming.

PROGRAMMING COURSE SSM

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
0900	CHECK IN INTRODUCTION	MACRO SYMBOLIC ASSEMBLY	INTRODUCTION TO CODING	BASIC INSTRUCTIONS OPERATE GROUP	BASIC INSTRUCTIONS INPUT-OUTPUT
1000	ENTRANCE EXAM	↓	BASIC INSTRUCTIONS DATA HANDLING	BASIC INSTRUCTIONS SHIFT/ROTATE	↓
1100	PDP-1 DESCRIPTION	↓	↓	INPUT- OUTPUT INTRODUCTION	↓
1200	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1300	DIGITAL COMPUTER MATHEMATICS	DEBUGGING TAPE ANALYSIS	BASIC INSTRUCTIONS PROGRAM TRANSFER	BASIC INSTRUCTIONS INPUT-OUTPUT	REVIEW
1400	↓	PROGRAM WRITING TAPE ANALYSIS	↓	↓	EXAM
1500	OPERATIONAL ANALYSIS (CYCLES)	PROGRAMMING TECHNIQUES	PROGRAMMING TECHNIQUES	PROGRAMMING TECHNIQUES	↓
1600	↓	↓	↓	↓	CRITIQUE
1700					

dec INTEROFFICE MEMORANDUM

DATE November 12, 1962

SUBJECT

TO Jack Atwood

FROM Kenneth H. Olsen

Now that we are getting more and more interested in the process control field, I think that we should consider having an exhibit at the Chemical Engineers Show. Will you look up the details of this and put it on the list of shows which we consider for the Trade Show Schedule.

Kenneth H. Olsen

cc: Gordon Bell
Stan Olsen
Harlan Anderson

dec INTEROFFICE MEMORANDUM

DATE November 12, 1962

SUBJECT PDP-4 Programming Business Schedule

TO Members of PDP-4 Programming Group

FROM R. Mills

A discussion was held Friday with Gordon Bell, Dit Morse and myself regarding the short-term and long term plans for business programming and business operations on our present PDP-4. This is only meant to be an initial report in most content, not going beyond one month on the short-term basis and long range items being of a general nature.

Short-term:

It was decided that Dit Morse will work directly with Fred MacLean and George Breen in programming applications for the PDP-4. Time available in the coming week is November 12, 15 and 16th and we will endeavor to have almost all of Fred MacLean's time available to work with Dit Morse during that time. Their project is to finish programming the payroll. The next application is tentatively set as Accounts Payable and the next one, Accounts Receivable, leaving Material and Labor to the end. The problem for the next programming meeting will be to develop a program for use with the Line Printer to print out the payroll register and Cost Center listings.

Long range:

We expect that after the Payroll is completely programmed that the run of 450 employees will take approximately 30 minutes. Gordon Bell and Dit Morse are preparing a permanent schedule of available PDP-4 time and current plans call for assigning blocks of time at 8:15 a.m. and 1:00 p.m. for Accounting use. Days of this use are not yet known. The weekends are generally free for anyone from Accounting to use the computer. After the payroll program is completed and we get into December for Dit Morse's time, it is expected that one full day weekly, as a minimum, will be available for Accounting use.

The Programming Meetings are off to a good start with interest high and giant steps of progress on an individual basis being made with each meeting.

# # # #

c.c. KHO, HEA, WH

dec INTEROFFICE MEMORANDUM

DATE November 7, 1962

SUBJECT PDP Standard Paper Tape

TO Ben Gurley

FROM Klaus Doering
Frank Kalwell

On our grey fanfold type paper tape, we have experienced a few difficulties:

1. Excessive variation in width
2. Rough edges at the outside
3. Too sharp folds (paper broken)
4. Extra folds close to the main fold (crinkled and crumpled)

On October 30, we had representatives of the Paper Manufacturing Company in and talked to Mr. Charles Weber. He gave us the following information:

1. Tape width specification: 1" ± .005

This is the closest tolerance they can maintain. As per Mr. Weber, we and two other companies are the only ones being fussy with these tolerances. As they are in a somewhat monopolistic position in this business, they seem to be reluctant or just unable to tighten tolerances. As per Mr. Weber, their processes on tape width is in perfect control. Their paper is supplied to them by a vendor. At acceptance of this paper, they inspect at random 10% of the received shipments.

This paper comes in 26" wide rolls and is cut into 26 equally wide (1" ± .005) pieces. He says if we have a certain amount oversize, there must be the same amount of undersized pieces because of the certain location of the cutting knives, but we have never complained about undersize. The question is: Can we rather tolerate undersize or oversize (in width) or neither one?

They have a very tight control system at the different production stations. Mr. Weber did not believe (I could not present him any rejected tape) that there were any tapes out of the above tolerances. Ed Fredkin, as well as our engineering department, had formerly rejected quite a few of these tapes as far as I know. They had found the width exceeding the nominal dimensions by more than .012 of an inch. According to Mr. Weber, this excessive width is because of storing these tapes in very humid areas. At excessive humidity the paper tape expands in width ten times more than in length because the grain of the paper goes parallel to the tape length. He claims the relative humidity should be between 45 and 55% and the temperatures between 65 and 75° F. He believes that during the past summer months we did not maintain this condition. He did not feel responsible for the excessive width under these conditions.

He would like us to check the next shipments carefully right after receiving, and then once more at the point when the tapes are put into computers, in order to find out whether these tapes were too wide in the beginning or only after a certain time of storage under humid conditions.

2. The cutting tools are in very good control, and he cannot understand that we found the outside edges of the tape being rough (due to dull tools). He admitted, however, that they had this problem sometime ago but eliminated it completely.

3. Specification on paper thickness: .0038"
.0043"

This is the closest possible tolerance, but if paper stock is being folded and during a run the thickness varies by .0005, then the folding tools have to be reset. If this resetting is done too late, and the thickness has increased, the paper can break at the folding edge. This is something difficult to control.

4. Extra folds and crinkles near the main fold were due to too loose unrolling of the paper. This is in control now.

It looks to me as if people from engineering, production, and quality control, should get together to specify the loosest possible tolerance, and purchasing might possibly have to look for an alternate paper tape supplier. Could you please call a meeting?

Incoming paper tape will be inspected from now on. Tape width can only be checked with rather expensive instruments, which we don't have yet.

Enclosed is a list of the specifications available.

cc: B. Beckman
H. Crouse
B. Hughes
D. King
J. Myers
J. Rutschman
B. Savell

Q. C. Manual

INTEROFFICE MEMORANDUM

DATE November 7, 1962

SUBJECT Computer Tape, Amendment to Memo dated 11/7/62 from Klaus Doering

TO Henry Crouse
Ben Gurley
Jim Myers
Bob Hughes
Bob Savell
Joe Rutschman
Bob Beckman

FROM Frank Kalwell

SPECIFICATIONS ON PERFORATOR COMPUTER TAPE

Composition	100% Chemical Wood Pulp
Basis Weight	24 X 36 - 50 Pounds
Mullen	40 - 50 Pounds*
Densometer	60 - 80**
Tensile	MD 70 - 75***
	CD 80 - 85****
Tearing	MD 70 - 75***
	CD 80 - 85****
Width	1 Inch
Tolerance	Plus or Minus - .005
Thickness	0038 - .0043

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*Mullen: Is a test performed when a 1" diameter ball is used to apply pressure, which determines the ability to fracture the paper.

**Densometer: Is the ability of air to pass through paper.

***MD: Signifies machine direction (Long way)

****CD: Signifies cross direction (Short way)

MEMORANDUM

DATE: November 7, 1962

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

FROM: J. Smith

Attached, you will find a composite situation planning chart. The purpose of this chart is to determine what steps must be taken in order to ship a machine at a given time. It will also point out how much money must be expended to support the program. In order to layout a chart of this type, it is necessary to know the present status of each major component (see attached copy). We are assuming that shipments will depend on major components and that all other items will be available, such as wiring and modules. The chart does not include the PDP-4 for production test.

In our present situation, we would be able to ship one PDP-4 in January and none thereafter. The reason for this is that our present inventory and on order status of Readers is two.

Under Plan #1, Readers would be ordered. The various situations are shown if the order is placed this month or subsequent months. If the order is delayed until December, we will not be able to ship a computer during the months of February and March. Shipping time will move out to March and April. Under Plan #1, only three machines can be shipped. At this point, we will run out of Printers.

Plan #2 will require the ordering of Printers.

Under Plan #2, you can take the various situations in Plan #1 and add on Plan #2. I have assumed the November situation in Plan #1 and added on the various situations that would arise if Printer orders were delayed until December, January and February. Of course, any combination of the two plans can be plotted.

What this chart points out is that in order for us to ship a PDP-4 during the month of February, we will have to expend $745.00 for a Reader. If we want to ship another PDP-4 in March, we will have to expend an additional $745.00. An additional $745.00 will be required for April plus $1,240.00 for a Printer. To gather all these figures together, an expenditure of $3,475.00 spread over a three month period will be required to ship PDP-4 during January, February and March. All months thereafter will require expenditures of $2,745.00 per month, which is the cost of a Reader, Printer and Typewriter.

November 7, 1962

Assignment of Printer 28-C PDP-4

NUMBER	PRESENT STATUS	DELIVERY DATE	
#1	in stock (repairs)		DEC #6
#2	on order	January	DEC #7
#3	on order	February	DEC #8
#4	on order	March	DEC #9

Current delivery lead time 4 months.

Assignment of Reader 2500 PDP-4

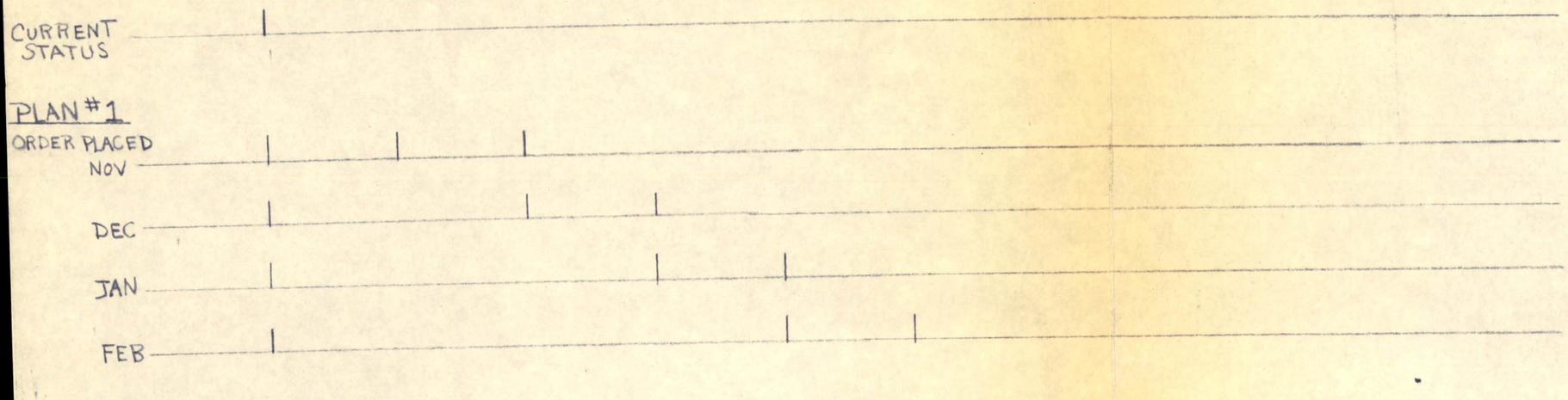
NUMBER	PRESENT STATUS	DELIVERY DATE	
#1	on order	November (11/16)	DEC #6
#2	on order	January	DEC #7

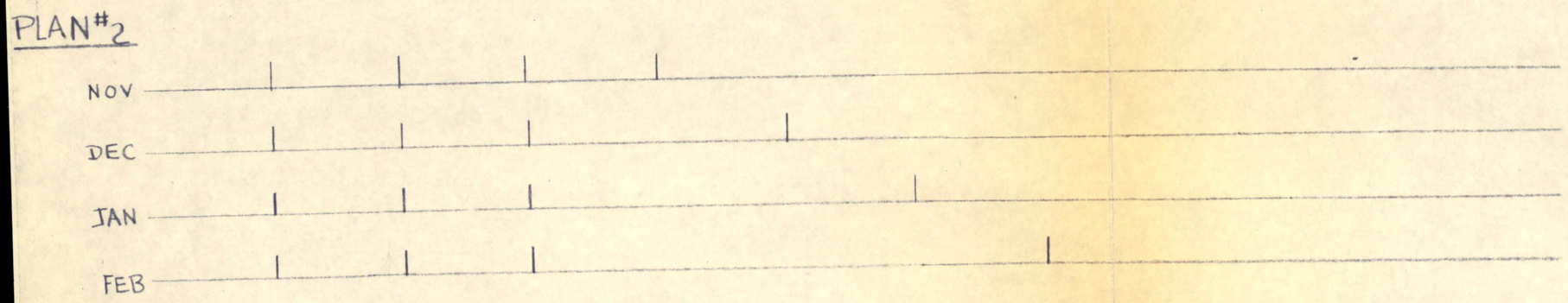
Current delivery lead time 6 - 8 weeks.

PDP-4

11/7/62

COMPOSITE SITUATION PLANNING CHART
GOAL - SHIPMENTS





SUBJECT: REPAIR OF RETURNED MODULES DATE: NOVEMBER 6, 1962

TO: Harlan Anderson FROM: JIM CUDMORE

THE FOLLOWING IS A LIST OF MODULES RETURNED FOR REPAIR DURING THE WEEK OF OCTOBER 29.

UNIT	SERIAL NO.	CUSTOMER	DEFECT
53	4222	D.E.C.	Q3 SHORTED COLLECTOR TO EMITTER 2N1204 PHILCO
1201-D	25290 D	R.C.A.	TRANSISTORS CHANGED FROM SPRAGUE 2N393 TO MA89 & 90
1204	0035194 B	UNKNOWN	NONE
1204	0035208 B	UNKNOWN	NONE
1209	0016233 K	UNKNOWN	NONE
1209	0018271 K	M.I.T.	SHORTED CAPACITOR--ELMENCO-1000 PF
1538	0043389	J.P.L.	NONE
1562	0049315	DISPLAY 308	NONE
1607	0051429 C	UNKNOWN	NONE
1607	0027148 B	UNKNOWN	NONE
1607	0051583 C	UNKNOWN	NONE
1607	0035771 B	UNKNOWN	NONE
1607	0035779 B	UNKNOWN	NONE
1607	0027154 B	UNKNOWN	T2 REPLACED -- T2003
1607	0039057 B	I.T.T.	MD95 OPEN COLLECTOR TO EMITTER
1976	0058438 C	J.P.L.	COLD SOLDER JOINT
4203	0029709 D	FOXBORO	TRANS. CHANGED TO 2N1309 - RESISTOR CHANGED TO 1.5 K
4204	0044177	D.E.C.-W.C.O.	2N1305'S REPLACED WITH 2N1309'S 6-1500 OHM RESISTORS ADDED
4214	0043061	MAG. TAPE	NONE
4214	0039758	E.A.	NONE
4215	0055151 B	VENUS	NONE
4301	0020918 E	D.E.C.	NONE

REPAIR OF RETURNED MODULES (CONT.)

UNIT	SERIAL NO.	CUSTOMER	DEFECT
4301	0041976 E	D.E.C.	NONE
4301	0022165 E	D.E.C.	NONE
4301	0019988 E	D.E.C.	NONE
4301	0019984 E	D.E.C.	NONE
4301	0019986 E	D.E.C.	NONE
4301	0019990 E	D.E.C.	NONE
4301	0019994 E	D.E.C.	NONE
4301	0042868 E	D.E.C.	NONE
4301	0020909 E	D.E.C.	NONE
4301	0020000 E	D.E.C.	NONE
4410	81587 G	UNKNOWN	C3, C4, C5 WERE CHANGED FROM AC TO SPRAGUE
4410	81586 G	UNKNOWN	NONE
4410	0039823 H	I.T.T.	NONE
4410	81595 G	UNKNOWN	C3, C4, C5 FROM AC TO SPRAGUE
4603	0049535 D	D.E.C.	NONE

OF A TOTAL OF 37 MODULES RETURNED, 23 HAD NO DISCERNIBLE DEFECTS.

dec INTEROFFICE MEMORANDUM

DATE November 5, 1962

SUBJECT

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

FROM J. Smith

Attached you will find a status report on each major component for computers PDP-1 and PDP-4. The below listed components should be considered for reordering.

1. Model 11 punches will be used on both PDP-1 and PDP-4. There are presently four in stock and none on open order. Delivery lead time is three months.

2. Printers 28C for PDP-4 have a very long delivery lead time of four months. Presently there is one in stock and 3 on open order for delivery in January, February and March.

3. Reader 2500 for PDP-4. Presently there are two in stock, none on open order.

Recommended actions

Due to the cancellation of the four ITT inventory typewriters plus ADX-9, 10, and 11 we are left with quite a large inventory of 12" typewriters. Also on open order are seven 16" typewriters with a delivery of schedule of one per month starting in January. It is my intension to convert the 12" typewriters currently in stock to 16" and move out the delivery dates of the typewriters on open order.

At the present time, we have five tape units type 50 wired up and in checkout with dark blue (ITT) potter units. Three are duplex and two are simplex. These units could replace gray type units we have spread throughout the plant and the gray type units in turn could be sold to Customers. With this in mind, we can more or less assume we have five completed tape units Type 50 available for sales. There are ten potter units on open order with a delivery schedule of 2 per month starting in December. Presently there are no customer orders for Mag. Tape units. We should watch this situation very closly because of the large cost of the potter units. It may become necessary to cancel out or move out delivery dates if possible.

November 5, 1962

STATUS OF PDP-1 MAJOR COMPONENTS

Memory Stacks

NUMBER	PRESENT STATUS	DELIVERY DATE
Ampex #26	in stock	
Ampex #27	in stock	
RCA #2	in stock	
RCA #3	in stock	
RCA #4	in stock	
RCA #5	in stock	
RCA #6	in stock	
RCA #7	on order	November
RCA #8	on order	December
RCA #9	on order	January
RCA #10	on order	February
RCA #11	on order	March
RCA #12	on order	April

The above average inventory of stacks in stock is due to the cancellation of 14 memory systems by ITT.

Readers

NUMBER	PRESENT STATUS	DELIVERY DATE
#1394	in stock	
#1392	in stock	
#1391	in stock	
#1390	in stock	
#1382	in stock	

25 on open order, delivery schedule is for 1 unit per month starting in January.

Typewriter 16"

NUMBER	PRESENT STATUS	DELIVERY DATE
	on order	January
	on order	February
	on order	March
	on order	April
	on order	May
	on order	June
	on order	July

Typewriter 12"

NUMBER	PRESENT STATUS	DELIVERY DATE
	in stock	
	in stock	
	in stock	
	in stock	
	in stock	
	in stock	
	in stock	
	in stock	

Four of the 12" typewriters in stock were ordered for ITT inventory. ITT has since cancelled this order. The 12" typewriters can be converted to 16" typewriters at a small cost. With this in mind we can assume that we have 8 typewriters in stock.

Punches

NUMBER	PRESENT STATUS	DELIVERY DATE
#17	in stock	
#18	in stock	
#19	in stock	
#20	in stock	

Potter Units

NUMBER	PRESENT STATUS	DELIVERY DATE
#12 (ITT Blue)	in checkout*	
#13 (ITT Blue)	in checkout	
#14 (ITT Blue)	in checkout	
#15 (ITT Blue)	in checkout	
#16 (ITT Blue)	in checkout	

*All of the units are assembled in cabinets and wired up as tape units Type 50. Three are duplex units. Two units are wired up as simplex units. These units could replace five gray tape units we have spread throughout the plant. With this in mind, we can more or less assume we have five units in stock.

10 on open order with a delivery schedule of 2 per month starting in December.

November 5, 1962

Assignment of Printer 28-C PDP-4

NUMBER	PRESENT STATUS	DELIVERY DATE	
#1	in stock (repairs)		DEC #6
#2	on order	January	DEC #7
#3	on order	February	DEC #8
#4	on order	March	DEC #9

Current delivery lead time 4 months.

Assignment of Reader 2500 PDP-4

NUMBER	PRESENT STATUS	DELIVERY DATE	
#1	on order	November (11/16)	DEC #6
#2	on order	January	DEC #7

Current delivery lead time 6 - 8 weeks.

dec INTEROFFICE MEMORANDUM

DATE November 5, 1962

SUBJECT CONSUMER PANELS

TO K. H. Olsen
H. E. Anderson
S. C. Olsen

FROM J. L. Atwood

I would like to propose the appointment of 10 "consumer panels" to facilitate the flow of work through our group and to make our Works Committee sessions all the more profitable.

These panels would have the authority to: (1) propose advertising and technical publications projects in their stated areas, (2) review any such proposals which we or anyone else might make, (3) recommend to the Works Committee those projects they consider worthwhile, and (4) oversee the completion of the projects approved by the Works Committee. They would be responsible for the appropriateness and accuracy of any material prepared under their supervision, and they would determine a proper apportionment of charges among the various cost centers involved in any given project.

The creation of these panels would allow us to move ahead on many projects which would otherwise be held up for days or even weeks pending high-level decisions on low-level questions. It would also permit the Works Committee to let other responsible persons in the company do much of the initial groundwork and detailed follow-up while the committee concentrates on making the key decisions.

I propose that the panels be organized as outlined below and that their membership be substantially as shown:

SALES PROMOTION
(3000 Series Jobs)

Modules	Computers	Systems
Stan Olsen	Nick Mazzarese	Jon Fadiman
Dick Best	Bob Savell	Dick Whipple
Jack O'Connell	John Koudela	Pat Greene

TECHNICAL INFORMATION
(5000 Series Jobs)

Modules	Computers	Systems
Barbera Stephenson	Bob Beckman	Dick Tringale
Russ Doane	Gordon Bell	Ed deCastro
Don White	Arthur Hall	Lee Butterworth

PUBLIC RELATIONS
(0-1000 Series Jobs)

External	In-Plant
Harlan Anderson	Dick Mills
George O'Dea	Maynard Sandler
Win Hindle	Bob Lassen

INDUSTRIAL DESIGN (6000 Series Jobs)	GRAPHIC ARTS (7-8-9000 Series Jobs)
Ken Olsen	Jack Smith
Loren Prentice	Henry Crouse
Ed Harwood	Brad Towle

Naturally these panels would not be permitted to infringe on the prerogatives of the officers of the company or of the cost center managers. They would instead serve to assist each of these individuals by weighing possible courses of action and submitting carefully considered and reasonably detailed proposals for final review.

Neither would these panels be in any way committed to employ our group to perform any or all of the projects they undertake. On the contrary, we might often recommend the use of outside sources for reasons of economy, expediency or party harmony.

Nor would they necessarily meet on any set schedule. In many instances, one member or each member individually could take whatever action is required to move a project toward completion.

INTEROFFICE MEMORANDUM

DATE November 5, 1962

SUBJECT 1959 EJCC PROCEEDINGS

TO H. E. Anderson FROM J. L. Atwood

Our first voucher for precancelled stamps used in the mailing of the "Proceedings" was dated March 4, 1960. However, my Day Book indicates that the stamps were actually received on March 8 and that the first mailing was made on March 9.

Nancy
Call Frank Heart
at Lincoln Lab and tell him this.
Cindy OK

dec INTEROFFICE MEMORANDUM

DATE November 5, 1962

SUBJECT

TO K. Olsen
H. Anderson
S. Olsen
M. Sandler
N. Mazzarese
E. Harwood
G. O'Dea
D. Mills

FROM J. Smith

The first computer in our two computer per month program had a delivery to Checkout schedule date of 11/2/62. This schedule date was met and the system is currently in Checkout. Schedule date of the next computer to checkout will be 11/23/62.

INTEROFFICE MEMORANDUM

DATE November 5, 1962

SUBJECT Flexowriter - Friden, Inc.

TO √H. Anderson
S. Olsen
N. Mazzaresse
R. Savell
R. Beckman

FROM Henry Crouse

77 I ordered a F10DEC Flexowriter for Bob Beckman Friday, ~~October~~ November 2, 1962.

The following proposed modifications should be considered so that an updated specification may be issued to Friden, Inc.

1. Standardize on Friden Flexo Feed Assembly in lieu of Standard Register pin feed platen. Friden Flexo Feed will accept all paper sizes, within sixteen inches.

2. Install slug No. 1082741 in key lever position "U". Quote mark (") over one (1).

3. Standardize on Digital Equipment Corporation blue 5150-S65 for additional $25.00 (Digital Equipment Corporation supplies paint).

Frank Cadarella of Friden, Inc. knows of approximately twenty-four F10-DEC Flexowriters that have been sold to date. He had proposed at an earlier date that Digital Equipment Corporation buy an additional quantity of Flexowriters so that we may rent or loan as a convenience to our customers while they wait the one hundred and fifty day delivery schedule.

The price of the Flexowriter has increased $450.00 effective November 1, 1962. We paid the old price for the machine just ordered.

OLD	NEW
$3,240.00	$3,690.00
194.40-6% Tax	221.40
$3,434.40	$3,911.40

To keep the delivery within the one hundred and fifty day schedule it's advisable to firm up the specifications as rapidly as possible.

Henry Crouse

INTEROFFICE MEMORANDUM

DATE November 2, 1962

SUBJECT Anelex

TO G. Bell
H. Morse

FROM Stan Olsen

I received a call from a Herb Kugell of Anelex. He expressed interest in the PDP-4 and his background was mainly from the Adams Report.

I really couldn't get out of him what his interest was and how it would fit into Anelex's needs, but he was talking about how it operated with a line printer and what the quantity discounts were. He would like to have more information as to how we programmed the PDP-4 to operate the line printer and so I invited him to come out and also stop to see us at the NEREM Show.

I would suggest that either Gordon or Dit talk to him about the ease or difficulty of operating the line printer which is his main interest at this time.

cc: N. Mazzarese
H. Anderson
K. Olsen
B. Gurley
R. Savell

dec INTEROFFICE MEMORANDUM

DATE November 2, 1962

SUBJECT Present Delivery Schedule of PDP-4 Major Components

TO G. Bell
A. Hall

FROM J. Smith

Printer 28C

There is one printer in stock in need of repairs. Two printers are on order. One will be delivered during January and one during February.

Current delivery lead time is 4 months.

Reader 2500

Two are currently on open order. The first is due on November 16. The second is due during the month of January.

Current delivery lead time is 8 weeks.

CC: K. Olsen
H. Anderson
S. Olsen

dec INTEROFFICE MEMORANDUM

DATE November 1, 1962

SUBJECT PDP-4 for Prince Albert Radar Station in Canada

TO

K. Olsen
H. Anderson
G. Bell
B. Gurley
N. Mazzarese

FROM Stan Olsen

I just called Mr. Seamans at Shirley Bay in Ottawa to verify our position on the PDP-4. Although our machine was very favorable in price there were a few lower priced machines in the same category as ours.

We are very definitely not in the running because they feel they can, for a few dollars more, get a machine with better specifications, more reserve speed. Our machine very definitely met the specifications they called for.

He implied that the computer they are considering is not the DDP 19 but declined to tell me which one it was. He also verified that it is very close to the classification of a paper computer but that this in no way bothered them.

Stan

Andy -

SALES CALL REPORT

DIGITAL EQUIPMENT CORPORATION — MAYNARD, MASSACHUSETTS

FIRM: University of Wisconsin	DATE: 11/1/62
DIVISION: Physics Dept.	SALESMAN: P. Bonner
STREET:	METHOD OF CALL: his ☐ TWX ☒ PHONE ☐ OTHER:
CITY: Madison	STATE: Wisconsin

CONTACTED

xxx Dr. Myron Good

MR.

MR.

MR.

MR.

MR.

SUBJECT

REMARKS (CONTINUE ON BACK OF SHEET)

Dr. Good has read about and thus he called regarding MIT's PEPR system. Specifically he was interested in price, our rental policy, and DEC's discount policy.

I gave him various prices and also DEC's position regarding rental and discount. Dr. Good felt under these conditions they would be interested in purchasing a system, and that they would probably apply for a discount. They're purchasing a system and the expense involved did not appear to be a stopping factor.

Since I could not answer all of his questions on 11/1, I sent PDP-1 and PDP-4 literature and recontacted him on 11/15, at which time, after checking with MIT, I referred him to Bernie Wadsworth in the

PROMISED

F-15B, F-41B, PDP-1 and PDP-4 Price Lists SENT

FOLLOW-UP DATE	PHONE NUMBER	AREA CODE
11/15	AL 5-3311 Ext. 4513	608

PERTINENT FACTS FOR LOCATING PLANT

DF 404

Nuclear Sciences Lab. for specific information on PEPR. I passed the following information along in my call of 11/15 to Dr. Good.

3 Parts of the PEPR System

1.	PDP-1 System	~~$282,650~~
2.	PEPR Control	92,000
		~~$374,650~~

Not final price

3. Electrical circuits for CRT, optical equipment and photographic equipment being designed by Dr. Pless. At present, costs not available because work not complete.

Also pointed out PDP-4 too small to be used as computer with PEPR controller.

Whether its good or bad I don't know, however, Dr. Good has been visiting Argone National Labs.

According to Dr. Good they're studying their system needs and also financing.

As a side application, they would like whatever computer they purchased to be able to sense and check their CDC 1604. Also they would like to do miscellaneous calculation with the purchased computer.

Possibly it would be wise for someone to give them a call soon with the idea of possibly visiting them to discuss our machine.