



INTEROFFICE MEMORANDUM

SUBJECT Cables for PDP-6 Memory

TO Al Blumenthal

DATE April 10, 1963

FROM Gordon Bell

cc: J. Smith
E. Harwood
✓ K. Olsen
R. Best
H. Crouse
B. Scudney

The PDP-6 memory system is shown in the enclosed sketches. These present problems, since a great deal of coax cable will be needed on a per memory module, per processor basis $4 \times (26 \text{ conductor})$ cables are needed. For a memory system we have $4 \times p \times m$ 26 conductor coax cables, where p = number of processors, m = number of memories. This gives a cost of 2.9K for connectors on a per memory/per processor basis, (i.e. cable $4 \times 50 + 4 \times 4 \times 168$ for connector installation).

I feel the following probabilities for number of cables exists:

<u>Size</u>	<u>Probability</u>	<u>No. of Cables</u>	<u>Present cable price including connectors</u>
Maximum	.05	$4 \times 4 \times 8 = 128$ cables	92K
Minimum	.2	$4 \times 1 \times 1 = 4$ "	2.9K
Most Likely	.4	$4 \times 2 \times 2 = 16$ "	11.5K
Next most likely	.25	$4 \times 2 \times 3 = 24$ "	17.3K

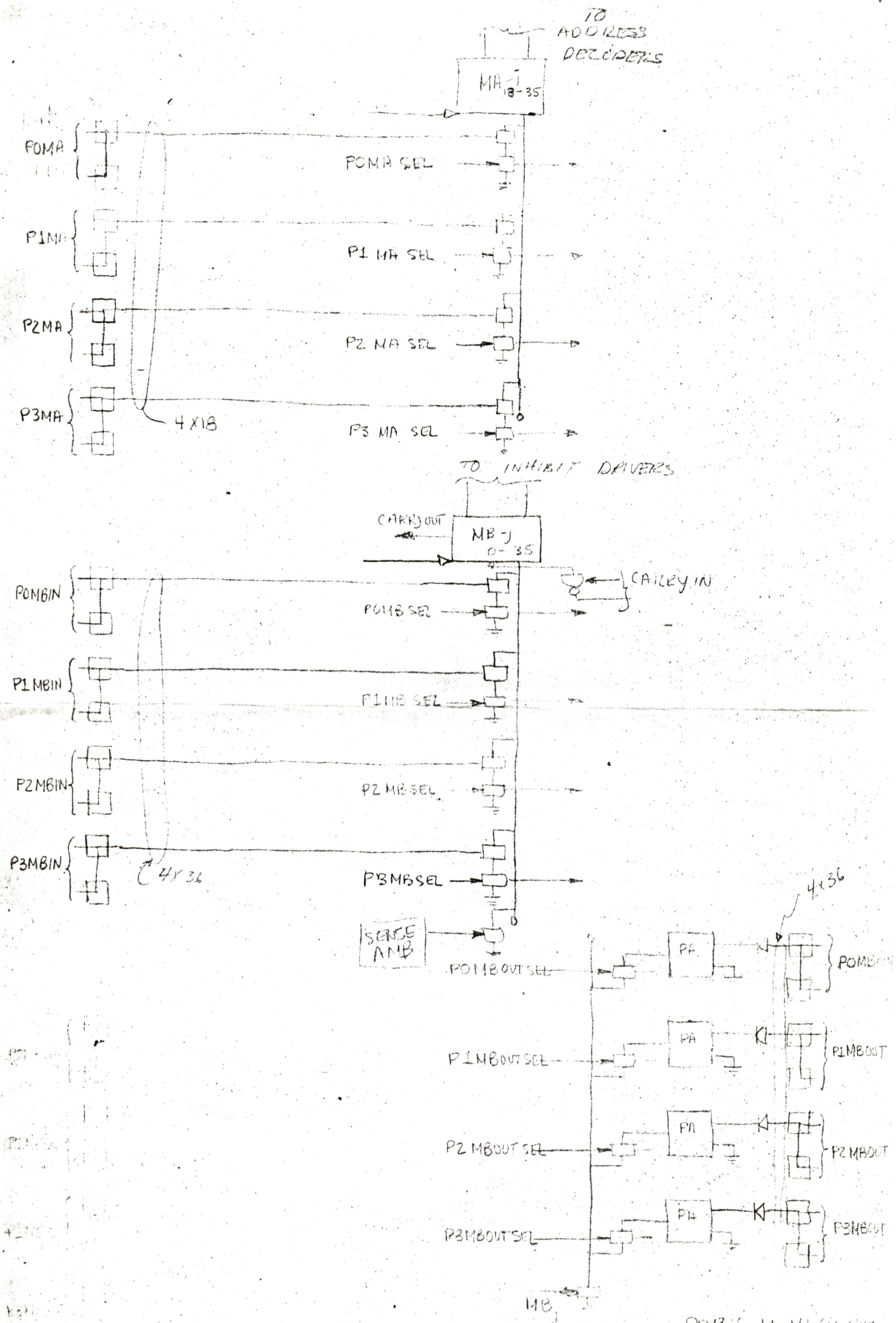
Our present coax connectors, and cables cost too much to produce! I would like the following explored:

- A. Different cable connectors, using different cables if necessary..
- B. Some discussion of costs associated with present cables, and methods of decreasing the costs.

Some suggested list prices for memories have been:

4K - \$(40 - 60)K
8K - \$(80 - 100)K
16K - \$(120 - 140)K

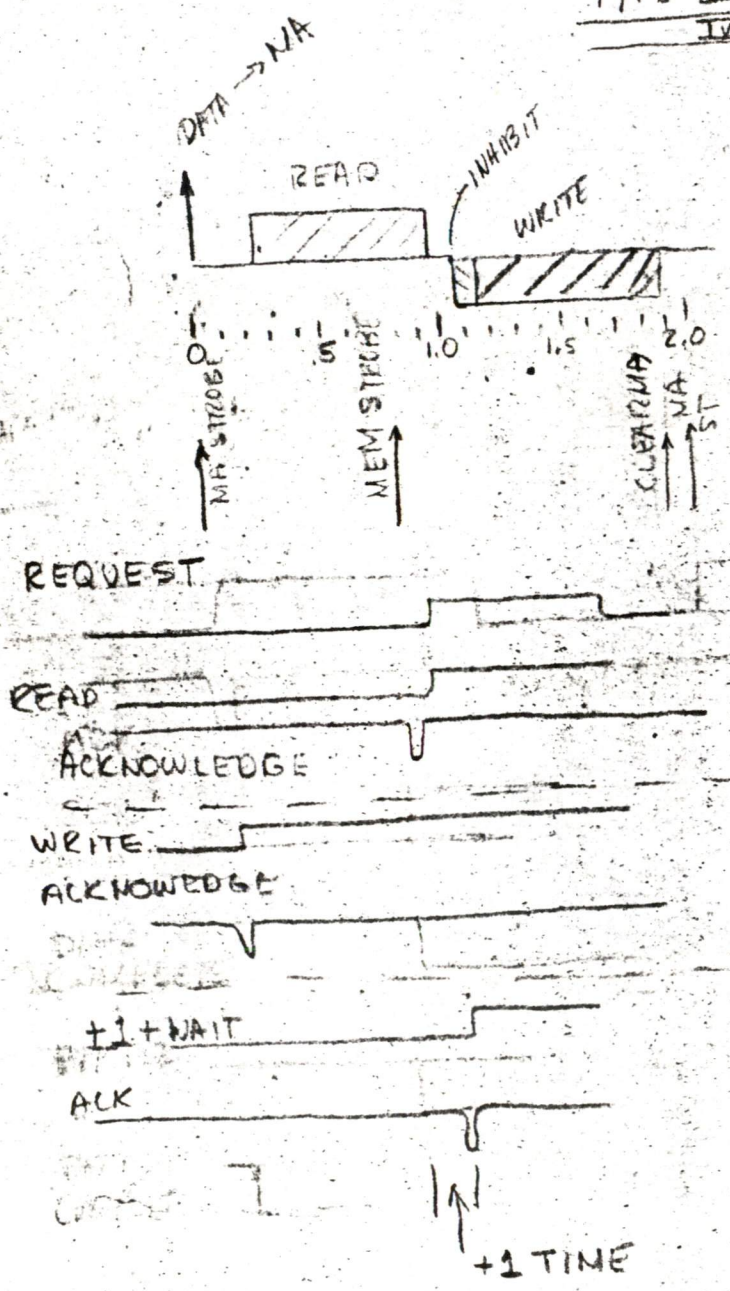
So cable costs are significant.



PDP-6 MEMORY BUS
FOR DATA
96 4/8/63

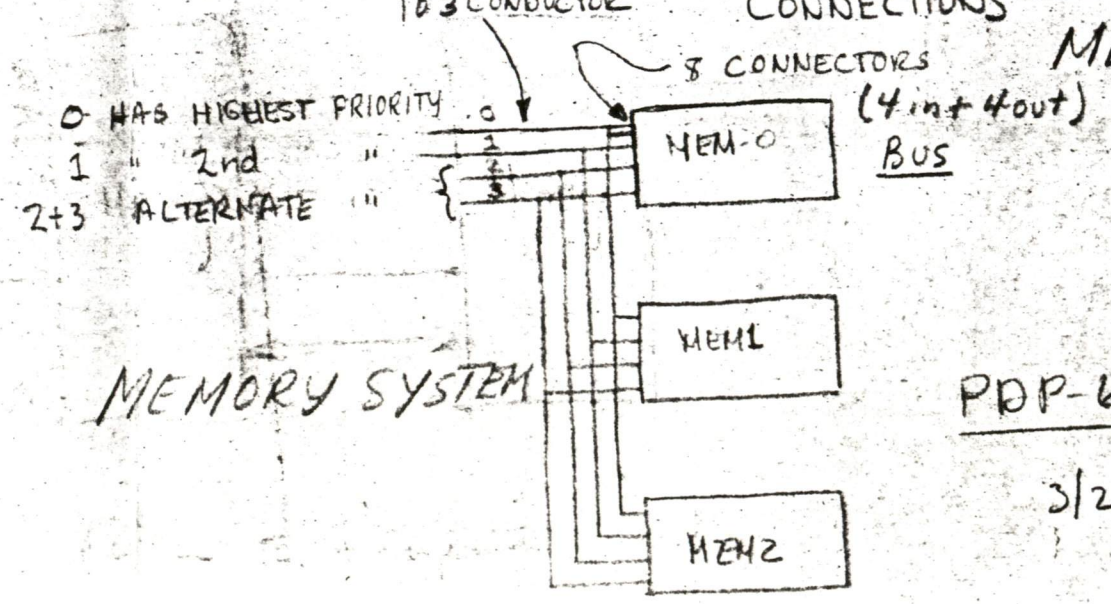
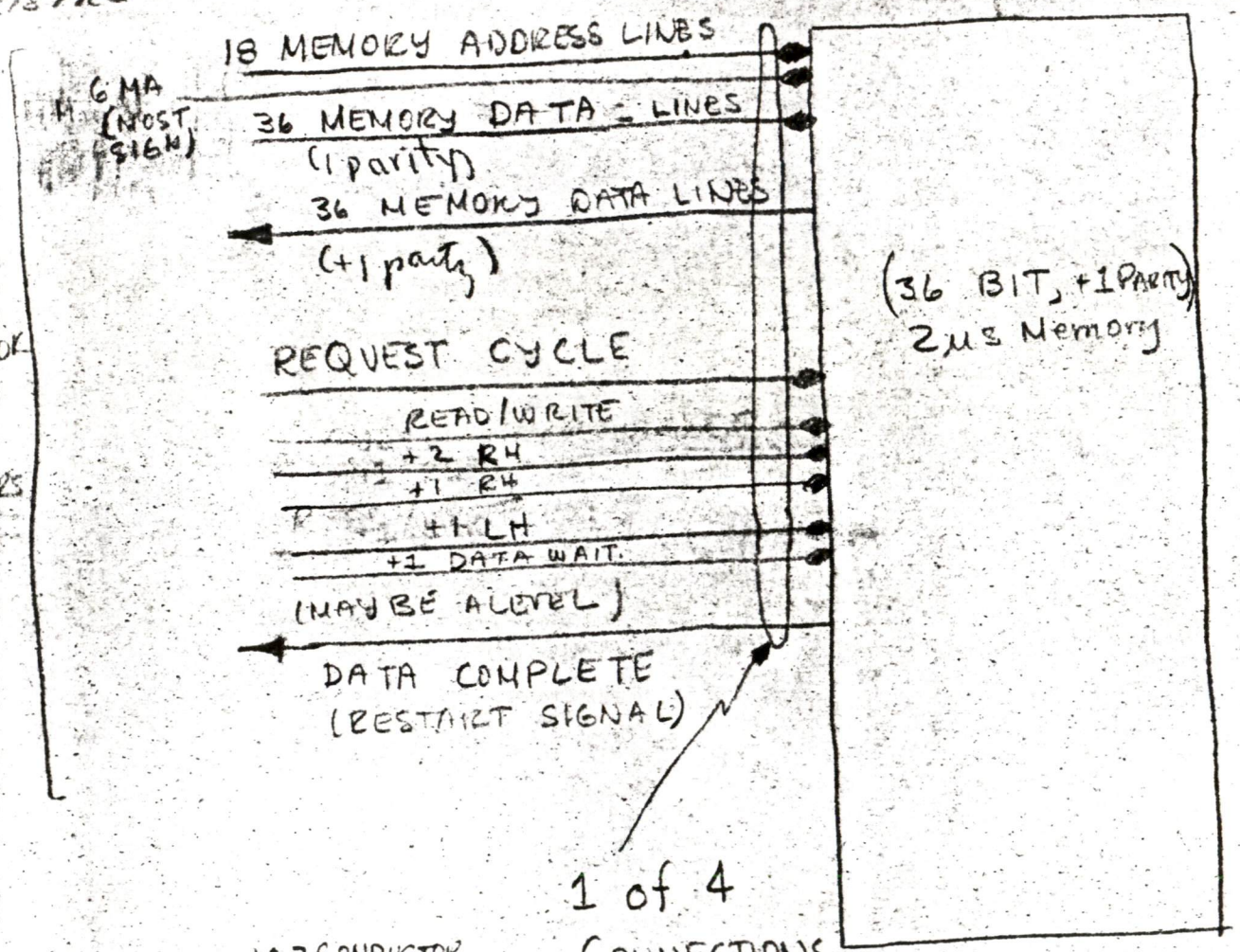
	MEM. TYPE	CYCLE TIME		WORD CAPACITY		NO. USED
		MIN.	MAX.			
TYPE I	CORE	2 μ s	6 μ s	8K	32K	8 MAX
TYPE II	CORE	.5	1.0	128	1024	1
TYPE III	FAST F/F	.5	1.0	10	32	1
IV		7	20 μ s	216K	262K	

CHART OF MEMORY CHARACTERISTICS



MEMORY TIMING INFO

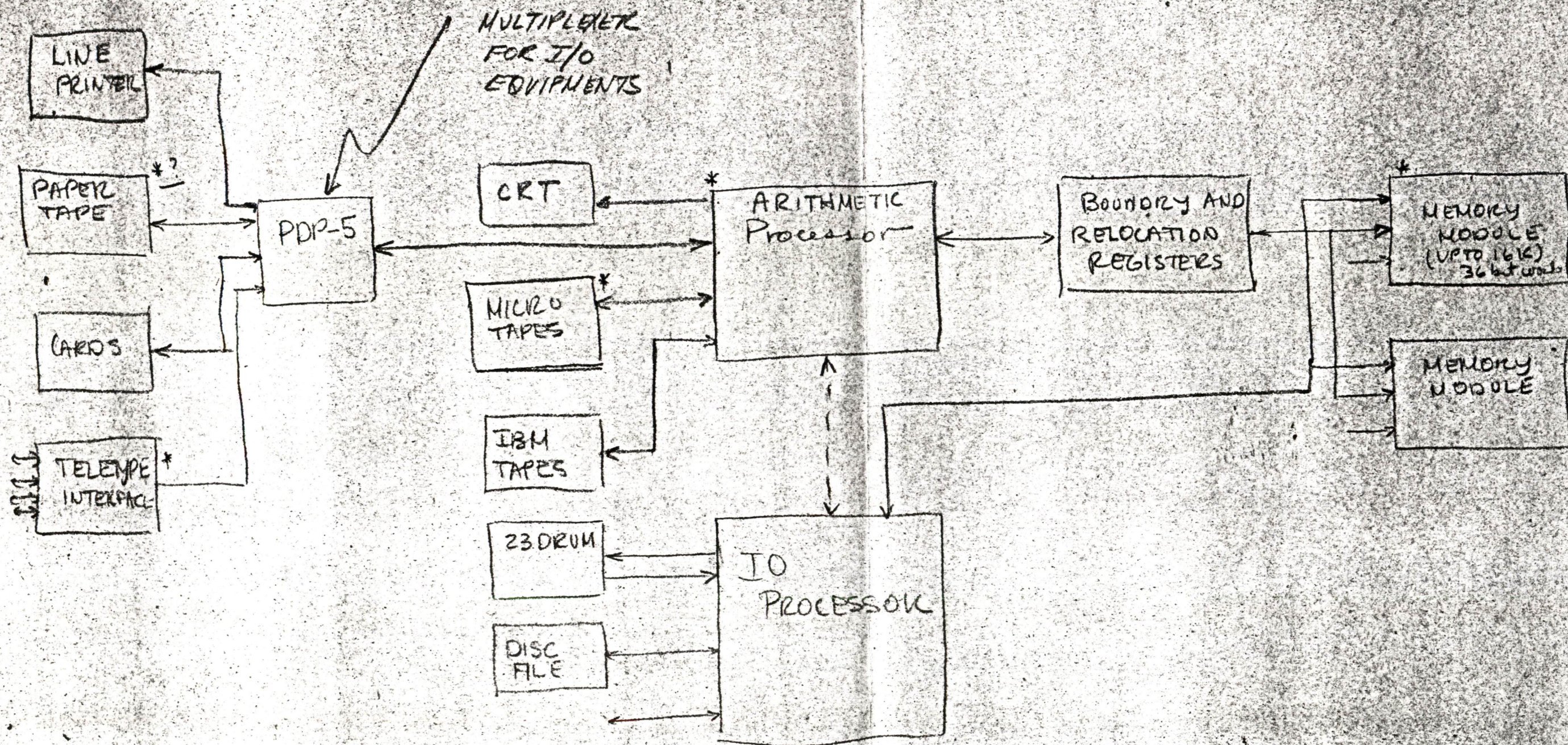
TO PROCESSOR
96+7 CONDUCTORS
(4 cables)



MEMORY SIGNALS

PDP-6A Memory System

3/26/63, 4/8/63



* MIN. CONFIG

MARCH 28, 1963



INTEROFFICE MEMORANDUM

4/9/63

DATE

Computer Sales Forecast

SUBJECT

✓ K. Olsen

N. Mazzaresse

TO H. Anderson

FROM

S. Olsen

G. O'Dea

W. Hindle

D. Mills

D. Best

M. Sandler

G. Bell

PDP-1	Quantity	Value	Probability	When
CRC	1	97K	100%	0-3
BBN	1	600,000	75%	0-3
Lincoln Labs.	1	216,600	100%	0-3
Princeton	1	250K	100%	0-3
		100 more	95%	3-6
Stanford	1	280K	75%	0-3
Yale	1	200K	90%	0-3
SDC	1	250K	90%	0-3
PDP-4				
Foxboro (Fitchburg)	1	160K	50%	0-3
Foxboro (Westinghouse)	1	120K	50%	0-3
JPL	2	200K	100%	0-3
AECL	1	230K	75%	0-3
Worcester Foundation	1	80K	50%	3-6
Bell Labs.	1	80K	50%	3-6
JPL	2	200K	75%	3-6
Michigan Univ. (Physics Dept. Psychology Dept. Radio Astronomy)	1	155K	50%	3-6

	<u>Less than 50% 0-6 Months</u>	<u>Type of Machine</u>
Univ. of (Physics Dept. Rochester	200K	PDP-1
Sylvania	Rental	PDP-1
Litton Systems	80K	PDP-4
Maryland Univ. (Physics Dept.)	120K	PDP-1
Raytheon Co. (Bedford Norwood)	120K	PDP-1
Rutgers Univ. (Physics Dept.)	250K	PDP-1
V. P. I.	50K	PDP-4
Foxboro	90K	PDP-4
Data Trends	250K	ADX
Northwestern Univ. (Dearborn Observatory)	253K	PDP-4
Harvard (Psychology Dept. Physics Dept. (CEA)	120K	PDP-4
Wisconsin (Chemistry Physics)	120K	PDP-1
Minn-Honeywell (Brighton)	300K	PDP-1

4702 TELEGRAPH RECEIVER

The 4702 Telegraph Receiver is basically a serial to parallel converter. Data consisting of seven elements (7.0 unit code, 7.5 unit code, 8 unit code) is received in serial form. A five bit data character is assembled in the shift register. Two and one-half units (start 1, stop 1.5; 7.5 unit code) accompanying each character are removed.

The receiver flag is turned on when the fifth element of the data character is in the shift register. The flag indicates to an external device that a data character has been assembled in the shift register and that the shift register outputs may be sampled. The time allowed to sample the shift register (7.5 unit code) is 25.0 milliseconds for 75 baud and 37.5 milliseconds for 50 baud. Bit 5 is the least significant bit.

The shift register is reset when the start element of the next character is received. If an internal jumper is connected, the flag will be turned off at the start element of the next character. The flag may also be turned off (DC or pulse input on Pin P) by the external device (computer, etc.).

The enable input (Pin U) must be at ground if the receiver is to be activated by the start element (data on the telegraph line). This connection permits the receiver to be de-activated when the receiver and transmitter are on the same telegraph line (simplex operation). A negative level applied to Pin U while the transmitter is sending prevents the receiver from accepting the transmitted telegraph signals.

The receiver examines the telegraph line eight times per unit. When the start element is recognized, the receiver locks onto the signal. At the first one-half unit, the start element is gated into the shift register. From this time on, the data elements are gated into the shift register at full unit intervals. When the last element of data, element 6, (1 start, 5 data) is gated into the shift register, the flag is turned on, and the receiver waits one more unit before attempting recognition of the next start element.

The clock input (Pin S) is such that eight pulses occur each element time.

4702 TELEGRAPH RECEIVER

(continued)

Clock pulses for telegraph speeds are as follows (7.5 unit code):

- a. 100 words per minute (75 baud) ----- 600 pulses/sec.
- b. 66.6 words per minute (50 baud) ---- 400 pulses/sec.

It should be noted that the receiver will accept data at rates (450 baud) up to 642 words per minute using 7.0 unit code, or 600 words per minute using 7.5 unit code. Only the clock pulses change.

The receiver may be connected to devices other than telegraph, i.e., interface between two computer systems, input from measuring device, etc.

The data input (Pin T) requires that ground be present during the mark (idle, one, closed circuit, stop) and negative 3 volts be present during the space (run, zero, open circuit, start).

An indicator light mounted on the handle provides a means of observing the state of the flag. A switch mounted on the handle opens the flag output circuit.

Don Smith
Communications Applications Engineer

May 7, 1963

4-7-63-A

4703 TELEGRAPH TRANSMITTER

The 4703 Telegraph Transmitter is basically a parallel to serial converter. Data consisting of seven elements (7.0 unit code, 7.5 unit code, 8 unit code) is transmitted in serial form.

A five element data character is gated into the shift register (bit 5 is the least significant bit) by an external device (Pins F, H, J, K, L; gate pulse on Pin N). The start input must be ground at the time of the gate pulse in order to start the transmitter sending (Pin E). The transmitter will send out the start element (one element) followed by the five data bits (five elements). At the completion of sending the sixth element (1 start, 5 data) the flag is turned on. The flag indicates to an external device that the character has been sent, and that a new character may be set into the shift register for transmission. The flag must be turned off (DC or pulse input on Pin S) by the external device (computer, etc.).

The length of the stop element is determined by jumpers on the module (one unit in length for 7.0 unit code, 1.5 units in length for 7.5 unit code, or two units in length for 8.0 unit code). As previously indicated, the flag is turned on at the completion of sending the sixth element, indicating that the shift register can be reloaded. The start element of the next character will not be transmitted until the stop element time of the previous character has elapsed. A pulse on Pin S will delay the sending of a character .5 units (7.0, 7.5 unit codes). A negative DC level will inhibit sending while present on Pin S.

For maximum transmission rates using the 7.5 unit code, the time allowed to reload the buffer after the flag is turned on is 18.0 milliseconds for 75 baud, 27.5 milliseconds for 50 baud.

The output of the transmitter (Pin W) is ground during the mark (idle, one, closed circuit, stop) and a negative 3 volts during the space (run, zero, open circuit, start). Pin V is opposite. The clear input (Pin M) is used to insure the state of the transmitter output when power is turned on (idle).

The active output (Pin U) is negative from the start of transmission until the transmission of the sixth element (1 start, 5 data) has been completed. This level may be connected to the receiver (enable input, Pin U) to inhibit the receiver while transmitting on simplex lines.

4703 TELEGRAPH TRANSMITTER

(continued)

The clock input (Pin T) is such that two pulses occur each element time.

Clock pulses for telegraph speeds are as follows (7.5 unit code):

- a. 100 words per minute (75 baud) ---- 150 pulses/sec.
- b. 66.6 words per minute (50 baud) -- 100 pulses/sec.

It should be noted that the transmitter will send data at rates (450 baud) up to 642 words per minute using 7.0 unit code, or 600 words per minute using 7.5 unit code. Only the clock pulses change.

The transmitter may be connected to devices other than telegraph, i.e., interface between two computer systems, output to recording device, etc.

An indicator light mounted on the handle provides a means of observing the state of the flag. A switch mounted on the handle provides a means of opening the flag output circuit.

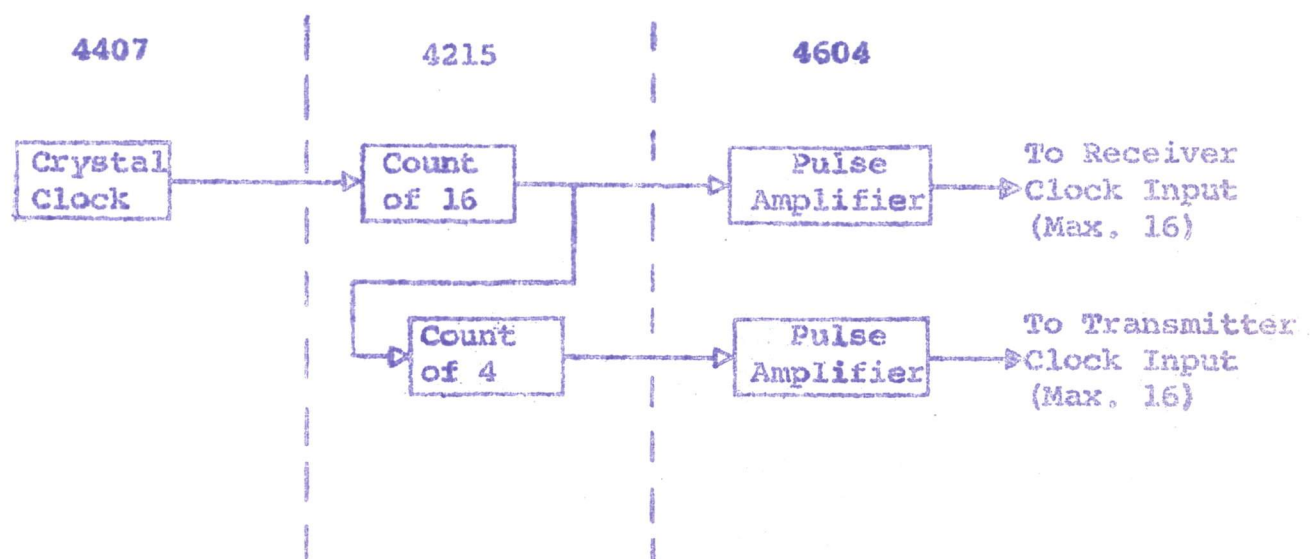
Don Smith
Communications Applications Engineer

May 7, 1963

4-7-63-B

4702 AND 4703 TELEGRAPH MODULE SUGGESTIONS

A. Generation of clock pulses:

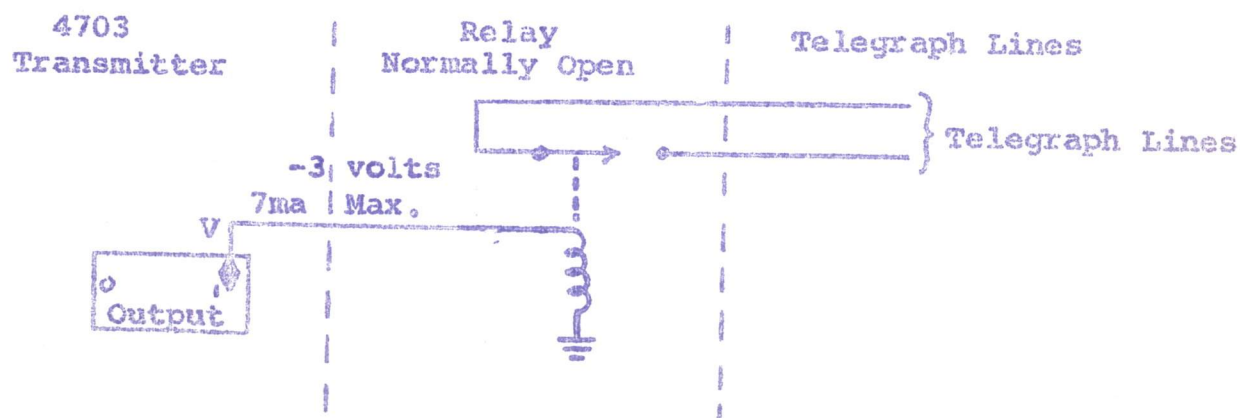


- 1 each- 4407 Crystal Clock
- 2 each- 4215 Counters
- 1 each- 4604 Pulse Amplifier

CRYSTAL CLOCK FREQUENCY

1.	6.4 KC	50 baud	66.6 wpm	7.5 unit code
2.	9.6 KC	75 baud	100 wpm	7.5 unit code
3.	57.6 KC	450 baud	600 wpm	7.5 unit code

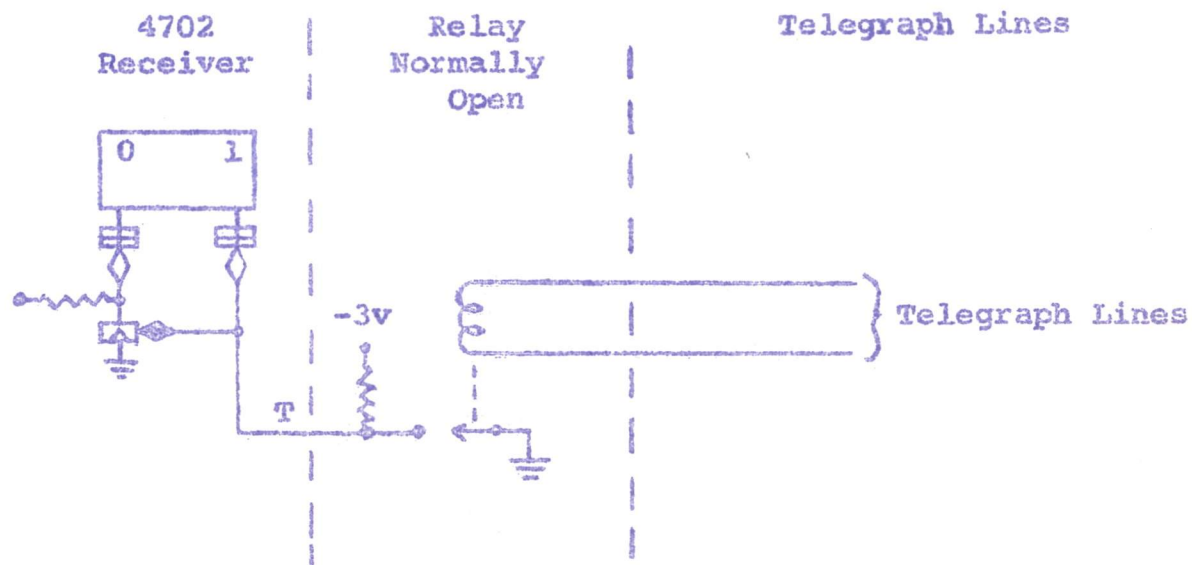
B. Transmitter output (4703)



Pin W output may use a normally closed relay.

4702 AND 4703 TELEGRAPH MODULE SUGGESTIONS (continued)

C. Receiver Input (4702)



DON SMITH
Communications Applications Engineer
May 7, 1963

4-7-63-C

SALES CALL REPORT

FIRM Leeds and Northrup		DATE April 1, 1963
DIVISION		SALESMAN George Rice
STREET		OFFICE Maynard
CITY North Wales	STATE Penn.	NATURE OF CALL phone
PHONE NUMBER 699-5353	AREA CODE 215	FOLLOW-UP DATE
CONTACTED Norm Brown		
SUBJECT PDP-4		
REMARKS (CONTINUE ON BACK OF SHEET) <p>Called Norm Brown because he had failed to call me back as promised in previous correspondence.</p> <p>Norm stated that they reviewed our new prices and feel that their original decision still holds. Thus, they are now terminating their evaluation of the computers and will start concentrating on fitting the 910 into their systems.</p> <p>Norm said he had high respect for our company and that he would send us a full report on why L&N made the decisions they did. This might help us in our future thinking and possibly we can break in with some future machine. He felt that the present set-up would commit them pretty strongly to SDS for a year to a year and a half,</p>		
PROMISED		
HOW TO LOCATE PLANT		

but by then they would certainly be ready to make a change if
there was reason to.

Ken Olsen

SALES CALL REPORT

FIRM Leeds and Northrup		DATE March 14 & 15, 1963
DIVISION Main Manufacturing		SALESMAN George Rice
STREET Sumneytown Pike		OFFICE Maynard
CITY N. Wales	STATE Penn.	NATURE OF CALL Visit & Phone
PHONE NUMBER 600-5353	AREA CODE 215	FOLLOW-UP DATE
CONTACTED		
Tom McLaughlin Visit		
Norm Brown Phone		
SUBJECT PDP-4		
REMARKS (CONTINUE ON BACK OF SHEET)		
<p>Called and made plans to visit with Norm and discuss the outcome of L & N's computer evaluation.</p> <p>When I arrived for the visit, Norm had been called to the V. P. 's office for a meeting so Tom met me. We discussed at great length the comparison between PDP-4 and 910. Tom also took me on a plant tour. They had two Philco computers in house. One was an old one and not operating, the other was one going through checkout. The L & N control console was quite large and impressive, the computer run of the mill. After looking at the back of the Philco computer, I understand why people are impressed by ours.</p>		
PROMISED		
HOW TO LOCATE PLANT		

Below is some of the information I got from Tom. Some of the information was given to L & N in confidence by SDS, therefore, it should be treated so:

1. SDS gives official discounts of 15% on orders of 5 computers or more.
2. The following are L & N's estimates of computer systems:

	<u>910</u>	<u>PDP-4</u>
1/year	166,000	206,000
5/years	155,000	175,000

3. In the 910 L & N figured the price of their own drum which cost about 20K less than our type 24.
4. The actual hardware differences were about 10K for the computer configurations.
5. SDS offered Selectrics on-line for 5K while we offered the modified Soroban for 7.9K.
6. L & N figured about 7K more programming or software development per machine with ours, than SDS. This is not the systems programming cost. They estimate about 5 man years of programming per system.
7. The 910 took about 1K more of interface hardware than the PDP-4.
8. L & N made up a big chart and compared the 910, PDP-4, and DDP-24. The DDP-24 wasn't taken very seriously since many of its spaces in the chart were left blank. Tom said 3C's took a different approach to their selling. Instead of telling what they had, they asked what do you want. Whenever L & N would ask a question about some output

pulse shape or etc., they never knew the answers, but would instead ask what shape do you want? The chart listed just about everything pertaining to a computer evaluation and different point weights given to each category. DEC generally beat out SDS in all things except programming. In a total of approximately 300 points the PDP-4 was about 30 points behind the 910. The PDP-4 was actually ahead in all other categories by around 5 points and then behind in programming by about 35.

9. It was due to the simpler programming and less core storage required that tipped the 910 in favor of the PDP-4. The index register was the important difference in programming. Silicon Transistors and 24 bit words obviously played a part in the decision, but not the major one. L & N felt that the 910 would save them considerably when it comes to systems programming, also there probably would be more software support from SDS.

MEMO

~~Andy~~
DATE

8/7/63

Ken

TO

Ken Olsen

FROM

Jack Harold

This is the overdue information you asked for on the cost of the library bulletin. It got stuck in the middle of a pile.

Feb. 4, 1963

ESTIMATED COST ON LIBRARY BULLETIN

Masthead (1000 copies)

Labor

Layout and fin. art	\$19.26
Photography	9.33
Offset	3.50
Deliver	<u>.85</u>

Total Labor \$ 32.94

Materials

Stock	5.72
Negative and plate	<u>.65</u>

Total Materials 6.37

Total cost for Masthead \$ 39.31

Bulletin

Labor

Just. typing 40 hrs. @ 2.00/hr. done by R. Alving	\$80.00
Layout and fin. art	1.80
Photography	6.23
Offset	5.00
Collate & Staple (R. Alving) 3 hrs. @ 2.00/hr.	<u>6.00</u>

Total Labor \$ 99.03

Materials

Paper Plates	2.52
Negative and plate	<u>.65</u>

Total Materials 3.17

Total cost for Bulletin \$102.20

To: Engineering Committee

From: D. Smith

Subject: Proposed Data Channel

A. The purpose of this memo is to describe the operation of a data channel and how that channel would appear to a programmer. It should be noted that the sole purpose of the mnemonics used herein are for discussion and example purposes only. It should also be noted that a tape control is used as an example only and is considered to be connected to the channel as device number zero. There are three fixed memory locations associated with each data channel. For discussion purposes, let us assume they are locations 4, 5, and 6.

B. General Specifications:

1. Eight in/out controls may be connected to each channel.
2. Channel connects to PDP-1 and PDP-4 (slight modifications).
3. At the present, two channels may be connected to a machine. Possibly more at low data transfer rates.
4. Each channel requires two IOT instructions.
5. Only one of the devices connected to the channel may operate at a time.
6. Approximate number of modules is 100. 125 for 800 bit tape.
7. Interconnections between channel and PDP is approximately 80.
8. Interconnections between a device and the channel are approximately 50.
9. Three fixed memory locations are required for each channel.
10. The following major registers are associated with the channel.

a. Channel Location Register (CLR) 16-bits

The contents of this register indicate where in memory the next channel command is to be found. It is to the Data Channel what the program counter is to the PDP.

b. Channel Command Register (CCR) 3-bits

The commands which instruct the data channel how to perform operations on data and what action to take when sufficient data has been acted upon is contained in this register.

c. Channel Word Counter (CWC) 12-bits

A step down counter which counts data entering or leaving the channel. It is also used to count external pulses when data trans-

mission is not required. (Spacing records)

d. Channel Address Register (CAR) 16-bits

The address to or from where data is to be transferred in memory.

e. Channel Data Buffer (CDB) 19-bits

Contains data received from or being sent to the connected devices.

When using tape with density of 800 bits per inch, 3 of these buffers are required (57-bits).

C. Operation

1. The programmer sets into location 4 a memory address indicating the location of an external device command.
2. The programmer then selects and tests (1 IOT instruction) the channel and external device to determine if they are ready.
3. If the channel and device are not ready the next instruction is taken (1 is not added to the program counter).
4. If the channel and device are ready a 1 is added to the program counter (IOT skips). At this point the channel is "connected" to PDP. The contents of memory location 4 are placed into the channel location register. The channel then operated independently of the PDP (except for synchronizing commands).
5. The Data Channel extracts from memory the device command and presents that command to the device. The location register is stepped 1.
6. If the device does not accept the command, it disconnects the channel and turns on a flag to indicate that a problem exists for that device. (This may occur if the programmer tried to write on a file protected tape).
7. If the command is accepted the data channel then extracts from memory a channel command. The location register is again stepped 1. The channel command indicates how the channel should handle the data transferred to or from the external device. Contained in the same word is a Channel Word Count. This value generally indicates the number of data words that the channel will transfer. In some cases it may be used to count external pulses from the external device. Also included in the word are 2 additional control bits.

8. The Data Channel then extracts a data address from the next sequential memory location. The Location Register is stepped 1. This address is the location to or from which data will be transferred in memory. Also included in the word are 2 additional control bits.
9. Generally data is transferred until the word count equals zero. At that point the channel examines the channel command and possibly will extract from memory a new channel command, word count, data address, and control bits.
10. Basically all the programmer must do is:
 - a. load memory location 4 with address of command.
 - b. Select channel and device.

The hardware will then perform the task of obtaining a device command, channel command, word count, and data address.

D. PDP Instructions

The execution of these instructions may clear the AC on PDP-4.

1. CADL Y Channel A Device Load

PDP-1	PDP-4
720YXX	70XXy1

This instruction selects data channel A and the device assigned to Y (where Y is a device number 0-7). If the channel is ready and the device is ready (not sub-units connected to the device) a plus 1 is added to the program counter and the channel is "connected" to the PDP. The PDP programming sequence continues whether or not a 1 is added to the program counter. If both channel and device are ready all static registers and flags are reset in the channel and device. Memory location 4 is examined by the channel (note that contents of location 4 must be DCDT instruction) to determine the location where the channel will find a device command. The contents of location 4 are placed in the CLR and the device command is extracted from memory. The CLR is incremented and the device command is presented to the device. The device will take two program cycles to examine the command. If the device command is not accepted by the device (write on file protected tape, tape units not ready, etc.) the device will "disconnect" the channel and set a flag (may cause break) to indicate that a problem exists for that device. If the device command is accepted by the device the channel will remain

"connected". The channel then extracts from storage a channel command and word count. The CLR is incremented by 1. The channel then extracts from storage an address from or to which data will be transferred. The CLR is incremented by 1.

2. CADR Y Channel A Device Register

PDP-1	PDP-4
721Yxx	71XXY1

This instruction selects data channel A and the device assigned to Y (where Y is a device number 0-7). The status register of the external device is read into memory location register 6. If the device selected is ready when using CADR a plus 1 will be added to the Program Counter. In the case of tape control where sub-units are connected and the status bits include information from the sub-unit and information about a particular sub-unit is desired, the following method is suggested to obtain information from that sub-unit.

- a. Give an illegal device command to the device using CADL when the channel and device are not busy. Following this instruction (perhaps a 2 program cycle delay) give the CADR instruction.

3. CADT Y Channel A Device Test

PDP-1	PDP-4
722YXX	72XXY1

Each device has 1 flag by which it can communicate to the PDP that it has a problem or that it accomplished an operation. The flag may be an "or" of several conditions. This instruction tests the flag for device Y (where Y is a device number 0-7) and if the flag is off a plus 1 will be added to the program counter. Note that in the case of tape where the command is not accepted, this flag would probably be turned on.

4. CADF Y Channel A Device Flag

PDP-1	PDP-4
723YXX	73XXY1

This instruction turns off the flag described in CADT for device Y (where Y is a device number 0-7). The flags may be connected to the sequence break system.

5. CACT W Channel A Channel Test

PDP-1	PDP-4
722WZZ	72ZZW1

There are 4 flags in the Data Channel that may convey information to the PDP. The channel commands may request the setting of these flags under various conditions. This instruction the status of these flags (W is a flag number 0-3). If the flag is off, a plus 1 is added to the program counter.

6. CACF W Channel A Channel Flag

PDP-1	PDP-4
723WZZ	73ZZW1

This instruction turns off the flags described in CACT (W is a flag number 0-3). The flags may be connected to the sequence break system.

7. CACR W Channel A Channel Register

PDP-1	PDP-4
721WZZ	71ZZW1

There are 4 registers in the Data Channel. This instruction selects register W (where W is a register 0-3) and reads that register into memory location 6. If the Channel is ready when using CACR a plus 1 is added to the program counter.

1-Channel Location Register

2-Channel Address Register

3-Channel Word Counter

4-Other Information

8. CACS W Channel A Channel Sync.

PDP-1	PDP-4
720WZZ	70ZZW1

There is a flag in the Data Channel that permits the programmer to synchronize a PDP program with the Data Channel and also allows the programmer to modify the sequence of channel commands under certain conditions.

- The programmer first sets into location 5 an address where the channel can find a series of channel commands. He then turns on the sync flag using CACS with W equal to 1.
- The programmer can test the state of the sync flag using CACS with W equal to 0. If the flag is off a plus 1 will be added to the program counter.

- c. When the data channel has completed a synchronizing command (DCRS, DCCS, DCSS) the channel will test the status of the flag. If the flag is off the channel will disconnect and set a sync error flag. If the sync flag is on, the channel will set the CLR to the value contained in location 6 and get its next command from that location. At the same time the channel will turn off the sync flag. Location 6 should contain either a DCDT or DCCT command.
- d. The sync. error flag may be tested with CACS with W equal to 2. If the sync error flag is off a plus 1 will be added to the program counter.
- e. The sync error flag may be turned off using the CACS instruction with W equal to 3. The sync error flag may be connected to the sequence break system.

E. Data Channel Command Words

Once the first Data Channel Command word is found the next sequential location must be DCAR instruction.

1. DCCD WC,P,N Data Channel count and Disconnect

0	3	4	5	6	17
1000	N	P	WC		

- a. Count each data transferred to or from the external device and when the word count (WC) goes to zero, "disconnect". When the device indicates that the channel should count external pulses (space records), data will not be counted.
- b. When N is equal to 1 the data will not be transferred to or from storage. The word count will be effective. In the case of writing on tape, a word of zeros will be presented to the tape control for each count. When spacing records the value of N is not considered.
- c. If P is a 1 and parity is experienced while this command is in control the channel will disconnect and a break will be requested.
- d. This command may be used to disconnect the channel after the completion of other data commands by indicating a word count of zero.

2. DCCK WC,P,A Data channel check and skip

0	3	4	5	6	17
1001	A	P	WC		

- a. This command performs an exclusive "OR" of data received from the external device and memory locations.

- b. If P is a 1 and parity is experienced while this command is in control the channel will disconnect and a break will be requested.
- c. When comparing words they may be considered as being composed of 3-6 bit characters (A,B,C).

0	6	12
A	B	C

The character A will be compared if A is a 1 in the DCCK command. Because of insufficient bits available, the control of comparing characters B, and C is found in the DCAR command.

- d. If the characters specified do not compare, the control adds 1 to the location register (skips a location) and takes its next command from that location.
- e. The characters are compared in each word until the word count goes to zero. At this point the channel continues to the next sequential location. The command found there will probably be DCCT.
- f. The programmer would have told the device to read.

3. DCRC WC,P,N Data Channel Record and Continue

0	3	4	5	6	17
1010	N	P	WC		

- a. The function of N and P are as in DCCD.
- b. This command counts each data transfered to the external device.
- c. If the word count goes to zero prior to the end of record, data transfer to or from storage is stopped. The channel will wait until the external signal (tape end of record) is received. It will then continue to the next sequential channel command.
- d. If the external signal (end of record) is received prior to the word count going to zero the channel will continue to the next sequential channel command.

4. DCRS WC,P,N Data Channel Record and Sync

0	3	4	5	6	17
1011	N	P	WC		

- a. This command is identical to the operation of DCRC except that instead of continuing to the next command, the channel will examine the sync flag. (see CACS)

5. DCCC WC,P,N Data Channel Count and Continue

0	3	4	5	6	17
1100	NP		WC		

- a. The function of N and P are as in DCCD.
- b. This command counts each data transfered to or from the external device. When the word count (WC) goes to zero the channel will continue to the next sequential command.

6. DCCS WC,P,N Data Channel Count and Sync

0	3	4	5	6	17
1001	NP		WC		

- a. This command is identical to the operation of DCCC except that instead of continuing to the next command, the channel will examine the sync flag (see CACS)

7. DCSC WC,P,N Data Channel Signal and Continue

0	3	4	5	6	17
1110	NP		WC		

- a. This command is the "OR" function of DCRC and DCCC in that which ever occurs first (end of record or word count equal to zero) will cause the channel to continue to the next command.

8. DCSS WC,P,N Data Channel Signal and Sync

0	3	4	5	6	17
1111	NP		WC		

- a. This command is the "OR" function of DCRS and DCCS in that which ever occurs first (end of record or word count equal to zero) will cause the channel to examine the sync flag (see CACS)

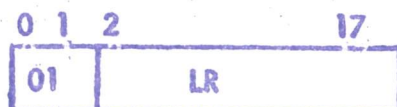
9. DCDT LR Data Channel Device Transfer

0	1	2	17
0	0	LR	

- a. Encountering this command causes the channel to set the channel location register (CLR) to the value of LR and indicates that a device command is required. The channel will wait until the device connected to the channel (was initially selected by the PDP program) comes to a complete reset. The channel will then present the command to the device. From here on operations are exactly as if the programmer had selected the device (CADL).

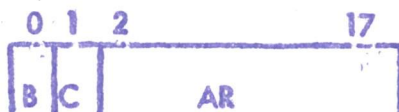
- b. This command must be in location 4 when the programmer uses the CADL instruction.
- c. The contents of LR may point to another DCDT instruction. If it points to the DCCT instruction, the DCCT instruction will appear as a DCDT instruction.
- d. This command can only follow the DCAR command unless it was entered from another DCDT command or the DCCT command.

10. DCCT LR Data Channel Control Transfer



- a. Encountering this command causes the channel to set the channel location register to the value of LR and indicates that a channel control command is required. The channel proceeds to get the channel command.
- b. The contents of LR may point to a DCDT command.
- c. The contents of LR may point to another DCCT command.
- d. It is suggested that no more than two DCCT commands be connected (one level of indirect addressing) although more may be connected.
- e. This command may follow the device command or the DCAR command.

11. DCAR AR,C,B Data Channel Address Register



- a. After the channel receives a channel command (other than DCCT DCDT, DCAR) this command will be the next sequential location.
- b. The contents of AR are set into the Channel Address Register (CAR). The Channel Address Register indicates the location in memory where data transfer occurs.
- c. The AR may not be used under certain conditions (spacing records, N equal to 1 in channel commands).
- d. The bits B and C are used in conjunction with DCCK command to indicate the characters to compare. When they are 1 that character will be compared.
- e. For the other commands bits B and C have the following meaning.
 - 00 no effect
 - 01 Break on first word transfered
 - 10 Break on last word transfered
 - 11 Break on completion of this command

F. Load Tape Button

- a. The load tape button selects channel A, and device number \emptyset (tapecontrol).
- b. A read command and a unit number \emptyset are given to the tape control.
- c. The word counter is set to 4. Circuits will cause 5 words to be read in.
- d. The location register and address register are set to \emptyset .
- e. A DCCC command is forced into the channel.
- f. It is suggested that the first five words be as follows. They will be loaded into memory starting at location \emptyset .

0	DCCD	Number of words in Program
1	DCAR	Start of Program
2	CADR	
3	JMP	2
4	JMP	Start of Program

- g. At the completion of the DCCC command (with the word count of 4) the channel will go to location \emptyset (CLR = \emptyset) and get the next command. The rest of the record will be read into memory as designated.
- h. When the channel obtains the command at zero it will also start PDP at location 2.

G. Tape commands for Examples.

1111	TRFB	Tape read forward binary
1101	TRBB	Tape read backward binary
1100	TRB	Tape read backward decimal
1110	TRF	Tape read forward decimal
1000	TSF	Tape space forward decimal
1010	TSB	Tape space backward decimal
1001	TSFB	Tape space forward binary
1011	TSBB	Tape space backward binary
0011	TWRB	Tape write forward binary
0010	TWR	Tape write forward decimal
0110	TWF	Tape write forward End of FILE
0100	TRW	Tape rewind forward

A density indication, unit number, and possibility a break on motion stopped will also be included in the command.

Notice that bit \emptyset must be 1 for all device commands.

The tape control will examine for End of File conditions and signal the channel to disconnect.

H Programming examples

a. Write 4096 words on tape unit 3.

PDP PROGRAM

4 DCDT X

5

6

START CADL

HLT , ERROR

"

"

"

CHANNEL PROGRAM

X TWRB 3

DCCC 4095

DCAR 0

DCCD 1

DCAR 4095

THE DIGITAL EQUIPMENT CORPORATION

Statement of Inventory Policies

I. Inventory Mechanism

Our stated goal is to keep finished goods (Modules) inventory as an aid to customers and as a buffer against demand fluctuations. We plan to provide stock quantities of each module type to cover all orders (external and internal) AND to cover all expected orders; the company aim is to fill any order "off-the-shelf".

We maintain a stock list of approximately 250 module types. The addition of new modules types is a continuing result of our design improvements and our expanding markets. The raw material components in stock number approximately 1300, and manufactured parts in stock total approximately 1500.

- A. Raw Material Inventory includes material, equipment, and components used directly in our products. We maintain Kardex perpetual inventory records for each part, recording receipts and issues of material. Raw material parts are classified and coded into categories which enable us to analyze the structure of this inventory. Classes 10-18 list those materials which are used in module manufacture (Resistors, Capacitors, Transistors, etc.), Classes 30-36 list those materials used in Systems and Computers (Readers, Punches, Tape Units, Cabinets, etc.).
- B. Manufactured Parts Inventory includes parts and subassemblies manufactured and stocked by DEC. Kardex perpetual inventory records are maintained for these parts and the parts are classified and coded for analysis. Classes 50-54 list those parts and subassemblies used in module manufacture (etched boards, Panels, Fabricated Metal, etc.), and Classes 70-74 list those materials used in Computer manufacture (Wired Subassemblies, Memories, Fabricated Metals, etc.).
- C. Open Jobs Work-In-Process Inventory includes Module Job Orders in process, Manufactured Parts Job Orders in process, and Special Systems and Computer Jobs Orders in process.
- D. Finished Goods Inventory is modules in stock at manufacturing cost. Normally there will not be any Special Systems or Computers finished goods inventory.

II. Inventory Delineations

<u>Modules</u>	<u>Systems and Computers</u>
Raw Material (Class 10-18)	Raw Material (Class 30-36)
Mfd. Parts in Stock (Classes 50-54)	Mfd. Parts in Stock (Classes 70-74)
Work-In-Process (Open Jobs)	Work-In-Process (EN Open Jobs)
In Test	---
Finished Goods (Stock Room)	---

Inventories are planned in response to actual and anticipated demand. Inventory levels and demand flows are both conditions of and determinants of procurement and production activities.

Inventory values flow from purchase orders to receipts into Raw Material Inventory, to issues of Raw Material and Labor and Overhead to Work-In-Process Inventory, to completion of WIP Inventory to Finished Goods Inventory, to shipment or Cost of Goods Sold.

The determination of what to produce and what to buy flows in the opposite direction. Usage and sale of modules determined need to restock, orders written into Work-In-Process determines the need to procure Raw Material and Manufactured Parts Inventory.

III. Mechanics of Determination

A. Modules - Finished Goods:

We maintain both an Actual Balance and an Available Balance record for each module type.

Available Balance is Actual Balance plus Balance In Process less Usage and Sales Orders. When Available Balance drops to or below one-

month supply, Manufacturing Orders are written to replenish Finished Goods Stock. This list of proposed Starts is forward to the Sales Department for approval or for amendment. Usage records are maintained for each module type, one-month supply being the quantity used during the past three months adjusted by past historical records. Future order information is entered into the availability determination when available. It must be noted that demand for each module type varies an average of 50% over or under in any given month. Adjustments of monthly average usage also are made to reflect whether we are on an increasing or decreasing slope in rate of new orders.

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

B. Modules - Raw Material and Manufactured Parts:

The need for Components is determined by a similar basic availability mechanism.

Actual module Manufacturing Orders and expected future Module Manufacturing Orders are exploded into required types and quantities of components. We use the PDP-4 Computer to process the data:

1. A complete, current listing of all Raw Material and Manufactured Parts Components is maintained on punched cards and tape.
2. Complete, current Parts Lists for each module type is maintained on punched cards and tape.
3. Required production quantities of Modules for Finished Goods Stock is fed to the Computer monthly for explosion of required Components.
4. The Need for each component is deducted from the Actual Balance to give On-Hand Availability.
5. Open Purchase Orders, or Open Manufacturing Order quantities for each Component are added to On-Hand Availability to give a To-Be-Available Balance. A minus balance here will be the initial determinant to place a Purchase Order or Manufacturing Order.

6. The value of these orders are then calculated to give us a prediction of Raw Material Receipts in dollars.
7. Minimum levels of available stock for each module and each component are determined by exploding the desired level of module unit production, the specific quantity of each module type being calculated by the ratios of average usage mix.
8. If actual module usage is lower than minimum production level, the level of module unit production will be the minimum required available stock.

The unpredictable mix of types in module orders urges us to add a safety factor to the minimum level of availability of each component.

C. Computers and Systems:

Finished Modules are a large part of the Bill of Materials for each Computer or Special System, and the procurement of these Modules is a requirement input to Modules Finished Goods Inventory and Availability.

Raw Material and Manufactured Parts Components unique to Computers and Systems are maintained on perpetual inventory record cards and the levels for each component are calculated on an availability balance. The historical background, however, is not yet trustworthy as the final designs of each Computer and System are still in a condition of change. Basically, we try to insure that material be available for production of actual order machines.

Peripheral Equipment (Readers, Punches, etc.) is expensive, but delivery is long. Need is determined on the basis of orders, but quantity ordered is usually determined by discount and vendor considerations.

IV. General Determinations

Input rate of new orders, production capacity, and inventory levels are periodically reviewed to determine what production starts are to be undertaken.

If required production starts are higher than present capacity, we seek to increase our labor capacity by subcontracting operations to close the gap. If the increased demand is deemed to be a new level rather than merely a fluctuation, we seek to add people and are alert to increase individual productivity by better planning and methods changes.

If required production starts are lower than present capacity, we seek to loan people to other departments and manufacture those units and subassemblies which will use the least amount of materials.

V. Future Plans

Component lists and product parts list are being handled by our PDP-4 Computer. We plan to process our receipts and issues and procurement orders through the Computer to give us instantaneous Availability information. We plan to program usage calculations to give us fast, accurate trend data.

Our components explosions now are in quantity; we will next add standard costs and prices to this calculation.

Standard labor hours and dollars are now available, and we plan to program this data to give us scheduling and definitive inventory value predictions.

It will be noted that we have not specifically introduced the time or timing dimension into the above discussion. Faced with sharply increasing demand, we issue Manufacturing Orders and Procurement Orders to meet that increasing demand, often at a rate greater than our labor capacity to absorb. Faced with sharply decreasing demand, we issue fewer orders, and suffer a time lag. It is hoped that certain Computer programs can be devised to signal earlier action.

VI. Inventory Valuations

It is the Company's intention to evaluate each commodity in its inventory at actual cost, consistent with the "Lower of Cost or Market" concept and to include in inventory only commodities for which current usage is indicated.

VII. Obsolescence

Consistent with the Company's desire to produce a current quality Product, Engineering changes are to be expected and as a direct consequence thereof a certain amount of obsolescence is inevitable.

To minimize the obsolescence factor it shall be the responsibility of the Chief Engineer to consult with the Production Manager before authorizing changes in design in order that the phasing out of old commodities can be realized to the fullest extent possible.

It shall be the responsibility of the Production Manager to advise the Chief Engineer of the probable obsolescence cost of any proposed Engineering change.

Obsolescence shall call for the removal of the commodity from Inventory and instigate efforts to recover such salvage value as can be realized.



INTEROFFICE MEMORANDUM

File

DATE March 19, 1963

SUBJECT VISITATION TO MIDWEST ELECTRONICS, FRIDAY, MARCH 15th

TO Ken Olsen
Tom Stockebrand
Roland Boisvert

FROM Loren Prentice

On Friday, March 15th, I visited the Midwest Electronics office in Natick Industrial Park to make a survey of the features of their tape transport. We were escorted by a Mr. Piarre Fogre. I believe he was formerly employed by both General Electric and Sylvania in this field of tape transports. He spent from 10:00 to 12:00 explaining the basic operations of the machine and answering Roland's questions. The machine is designed conservatively not to exceed the physical limitation of the tape. That is, stretch beyond the elastic limit or permanent deformation of the tape in any section. The machine has the usual lamb servo motors the same as a normal potter transport connected directly to the reels. The reels were arranged for Ampax Tape Reels but can be converted to the standard IBM format. They use two capstans driven counter rotating, and the tape is floated from these capstans by air being introduced down a hollow shaft and exhausted about the periphery of a sintered stainless steel casing. This floats the tape off the capstan so it does not touch it. They have two arms which come down over the tape with individual shoes which can be retracted for loading and engaged for driving the tape. Air is brought down through these at a higher pressure than that being delivered from the periphery of the capstan pinching the tape against the capstan and driving it in the direction of that particular capstan. They use vacuum buffering for taking up the tape loop. Air control is by a diaphragm read type valve which they have spent considerable time developing. The first valves are very carefully made and assembled and were almost impossible to service in the field plus the size and tolerances made them expensive to make and the amount of current needed to operate them was so great that they could not stand continuous duty operation. The new valve has been redesigned to a much smaller size,

more open tolerances and has been satisfactorily cycled one billion times at 120 cycles per second. The present machine on the floor in Natick is approximately two years old and has been run approximately 360 hours. The service engineer claimed that any part could be replaced including the main casting in approximately half an hour. The vacuum buffer motor is guaranteed for 2,500 hours and they recommended replacement at the end of 2,500 hours and the replacement cost is \$7.50. End of tape sensing from reflective strip is conventional. The unit is housed in one of the arms that control the air pinch over the capstan. Roland questioned them extensively on this operation which they admitted had the same type of failure he had encountered in the field and he made suggestions for its improvement. The brake is housed in one of the arms and consists of bringing air through one of the tape guides at one side of the capstan and pinching it against a rubber cork composition disc. Air is brought through shear type orifices into the arms for pinching the tape. This is a somewhat doubtful principle but seems to work well for them. The pinch shoes are adjustable and are brought down over the capstan and locked with a single screw then a stop screw is adjusted to give the proper clearance between the arm and the capstan. They can accommodate either .001" or .0015" thickness of tape without readjustment. That is, they can be used interchangeably. One faulty part of the design is that they attached their drive motor to one side of the cabinet and not to the main casting. While no doubt this motor can be brought into proper alignment with the two spindles driving the capstan and the spindle pulleys, I would much prefer to see this motor mounted on an extension from the main casting of the machine. This would be number one in my objections to the concept of design. They do provide for easy change of speed by removal of the pulley with no change of belt as they use a spring idler to change the belt length between the various pulley changes. I believe they provide or can provide four different speeds over a considerable range by simply changing the pulleys on the main drive motor. This is simple, straight forward, and a foolproof spring loaded idler has been included

which seems to work very well. It is only a matter of a very few minutes to change the speed of the unit. A few other items that I would be critical of as far as design is concerned is the cabinet, it's not stiff enough. They have lost the main castings from these being dropped the distance of four feet off the back of a truck. The method of mounting the front casting for the machine should be improved and the accessibility of the buffer chambers for cleaning and no attempt has been made to prevent or provide for abrasion wearing of the sides of the buffer units. Diaphragm type transducers are used in the feedback loop for the servos tensioning the tape for sensing the end of tape and for the brake. Rotary type tachometers driven by rubber cork composition capstans sense the tensions for the lamb servo motors. The main spindles for the two main capstans are made up with preloaded angular barden ball bearings preloaded to 800 pounds which seems unusually high and could be an error. The capstans are attached to the spindle and the capstans are ground in place on the spindle. The capstan run out is held to approximately .0002" run out. The tachometers are driven through a rubber coupling and are instantly removable and replaceable. The spindles serving the tachometers appear to be built exactly in the same manner as a larger spindle except on a good deal smaller scale. The air transfer bearings which are attached to the rear or opposite end from the capstans appear to possibly be a source of maintenance headaches and I was able to learn very little about them. This may be a good sign as apparently the service engineer had no occasion to remove them in the 360 hours the machine had run.

The luncheon period was spent discussing the stability and financial background of the company. Midwest Electronics is a subsidiary of Telex Inc. and we were assured that both companies had made a profit for the past year. They have sold approximately 50 of these tape units throughout the country. I gather mostly to the military. The military

desires them because of the 1" width of tape and the packing density available with this unit. At the present time, they have three trained service engineers and expect to train and put in the field more people in this category. The Natick office serves a territory from Maine to Washington and as far west as the western borders of New York and Pennsylvania. One of their three service engineers is stationed here at Natick and they expect him to be augmented shortly by more people.

#

jf

K. Olsen



INTEROFFICE MEMORANDUM

DATE **March 14, 1963**

SUBJECT **Meeting #10 - March 7, 1963**

TO **Engineering Projects Committee**

FROM **Drawing Standard Committee**

Attendance:

**D. Smith
P. Barber
R. Savell
F. Fadiman
A. Blumenthal**

Continuing the redesign of symbols to eliminate dotted enclosures where possible we completed the work on delays, clocks, pulse generators and pulse amplifiers. A. Blumenthal and J. Fadiman will prepare a summation of all decisions thus far.

The preliminary draft will be reviewed at the next meeting before circulation.

A. N. Blumenthal

ANB/nbh

<u>Cost Center Code</u>	<u>Description of Center</u>	<u>Cost Center Manager</u>
AX	ITT	N. Mazzaresse
SA	Sub System Assembly	J. Smith
SS	Silk Screening	M. Sandler
SC	Field Sales - California	S. Olsen
SM	Sheet Metal	L. Prentice
SN	Field Sales - New Jersey	S. Olsen
SW	Field Sales - Washington	S. Olsen
SH	Home Office Sales	S. Olsen
TE	Test Equipment	R. Hughes
TP	Technical Publication	J. Atwood
MA	Module Assembly	M. Sandler
MS	Machine Shop	L. Prentice
MT	Mag. Tape Systems	R. Boisvert
ME	Maintenance	J. Culkins
MO	Model Shop	K. Olsen
DR	Drafting	R. Melanson
ES	Systems Engineering	J. Fadiman
EC	Computer Engineering	G. Bell
EM	Modules Engineering	R. Best
NP	Computer Development	A. Blumenthal
FT	Final Test	M. Sandler
P1	PDP-1	N. Mazzaresse
PC	Production Control	M. Sandler
P4	PDP-4	G. Bell
GE	General Administrative	R. Mills
PG	Programming Group	H. Morse
PH	Purchasing	H. Crouse
PR	Personnel	R. Lassen
QC	Quality Control	R. Hughes
IO	In Out Equipment	R. Savell



INTEROFFICE MEMORANDUM

DATE March 20, 1963

SUBJECT Contractual and Blanket Order Agreements

TO Works Committee

FROM Henry Crouse

Contract buying and blanket ordering, the two variations of long term buying agreements are proposed herein.

The primary intent of these procurement tools are to take full advantage of a vendor's operational efficiencies gained by planned production techniques, applied to non-inventory as well as inventory materials.

These approaches to material procurement insures; lowest possible material cost, availability of material for a specified time, shortest possible lead time, reduction of inventory levels by sharing actual materials with vendor, and effective control over large purchases.

Buyers are able to concentrate on negotiating, analysis of quality performance, service, and potential new vendors, rather than restricted by clerical functions.

I BLANKET ORDER PURCHASES

APPLICATION:

Materials of the expense element category are to be purchased within the scope of this system when consistency of use is indicated, ie. fasteners, hardware, metal parts, wire, etc.

OPERATION:

A Purchase Order is issued on the first of each month to the approved vendor.

A copy of the following "Blanket Order Agreement" shall be included with the Purchase Order:

1. Only items that appear on attached list are authorized to be procured against this order. All others will be returned to seller at seller's expense.

2. Only approved Digital Equipment Corporation personnel as indicated may request releases against this Purchase Order.
3. Seller to invoice on a monthly basis, invoices to list purchase order number and release number assigned.
4. This agreement may be cancelled upon thirty (30) days written notice by either party.
5. Any substitution of material listed will require prior approval.
6. Approved Digital Equipment Corporation personnel are as follows: _____.

II CONTRACT PURCHASES

APPLICATION:

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 Contractual Purchasing System. Only those materials with a proven record of acceptance, specifically 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 Contractual Order will have an acknowledgment copy signed by the vendor and any revisions of the order signed by the vendor.

The 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 with no cancellation cost."
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 exceeded 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. The total dollars invoiced are not to exceed_____dollars.

6. Protective Clauses:

- A. Termination: The following clause shall 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 shall give notice of material availability change thirty days prior to the effective date of change.
 - 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.
7. Warranties of material shall be specifically stated if not covered by general terms and conditions.
8. 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:

An 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 by the Purchasing Department.

Page 5
March 20, 1963

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 specific "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 J. Crouse

dec

INTEROFFICE MEMORANDUM

DATE March 18, 1963

SUBJECT PHOTOGRAPHIC, PRINTING AND AUDIO-VISUAL EQUIPMENT

TO Kenneth H. Olsen

FROM Jack Atwood

The attached list covers the photographic, printing and audio-visual equipment requirements which I discussed with you briefly today.

The desirability of this equipment is a product of several factors:

1. Our present photographic and printing equipment is not equal to the volume of work we are handling, the quality standards we would like to maintain or the capabilities of the personnel concerned. In some cases, this is because we have outgrown existing equipment; in others, it is due to the selection of equipment which has not proved sufficiently useful.

2. Our major expenditures for outside services, other than type-setting, are for photography and printing. Last year we spent an average of \$1008 a month for "professional services" (mainly photographic) and \$5126 a month for printing and binding (exclusive of the catalog printings). Both types of expenditures could be reduced to a marked degree by the provision of more adequate in-plant facilities.

3. There is not at present any indication that the requirements for either type of service will diminish. On the contrary, we are now able to turn out the steady flow of engineering bulletins, application notes, new product bulletins, and equipment manuals which have been in demand. In addition, the amount of house printing and photography ordered by other departments continues to increase as new projects are undertaken and new personnel are added.

4. Our people are confident that, with better equipment, they can handle not only much of the work now being farmed out but also much of the new brochure and booklet work which would otherwise have to be turned over to our suppliers. They realize that it means extra preparatory work in the camera room, extra materials handling and an extra burden on the bindery. However, they feel that they can manage nicely with the proper equipment, which would, in turn, allow everyone involved to make better use of his time.

5. As for audio-visual equipment, it now seems firmly established that a slide projector and a 16 mm. sound projector would indeed be put to good use, both with employees and with customers. The initial few attempts with slides, projecturals and training films have proved to be of significant value.

The various pieces of equipment are listed within the three categories in what I consider to be the proper descending order of importance. There is nothing listed which is not needed. On the other hand, there is nothing on the list which we can continue to do without if necessary.

None of the items is a spur-of-the-moment proposal. All are based on continuing requests on the part of the personnel immediately concerned, on careful appraisals of present equipment limitations and proposed equipment advantages, and on a conscientious mating of equipment proposals to current and predictable work requirements.

The prices shown are mostly list prices. The trade-in allowances are almost all educated guesses. I have chosen not to excite either our own personnel or our suppliers by shopping for discounts until we were in a position to take positive action. Consequently, the net cost figures are probably somewhat on the high side of the prices we would be able to negotiate.

Thank you for the opportunity to bring our requirements to the attention of the Works Committee.

(If Florence did not have so much better luck with this typewriter of hers than I do there might be one more piece of equipment listed.)

PHOTOGRAPHIC EQUIPMENT NEEDS

1. Kodak Commercial Iktar Lens, f6.3, 10", with Ilex shutter, to replace portrait lens in 5" x 7" view camera or in new 4" x 5" view camera	\$ 230
Less trade-in on Dagmar 7" portrait lens	<u>35</u> 195
2. Rolleiflex 2.8F Camera with Xenotar lens to replace Optika single-lens reflex camera	336
Less trade-in on Optika	<u>180</u> 156
3. Omega Autofocus Enlarger with three lenses, negative carriers and tracks for 35 mm., 2 1/4" x 2 1/4" and 4" x 5" negatives to replace 5" x 7" Bessler portrait enlarger	575
Less initial discount	58
Less trade-in on Bessler enlarger	<u>117</u> 400
4. Colortran Lights, including control, 2 main lights, 2 fill-in lights, 4 stands, and accessories	430
No trade-in, but can be ordered in segments	
5. Brown Cadette Copy Camera, 19" x 23" image area, to replace 12" x 15" Clydesdale for 11" x 17" paste-ups, 19" front panel shots and precision circuit work; including installation charge	3630
Less trade-in on Clydesdale camera	400
Less trade-in on 12" and 14" process lenses	<u>130</u> 3100
6. Graphic View Camera, 4" x 5", to replace B&J 5" x 7" view camera	260
Less trade-in on B&J camera	<u>75</u> 185
Subtotal	\$4466

PHOTOGRAPHIC EQUIPMENT NEEDS
(Continued)

Subtotal	\$4466
7. Polaroid MP-3 4" x 5" Industrial Copy Camera for slides, close-ups and copy work	499
Less trade-in on Polaroid Copy Stand	<u>85</u> 414
Total Photographic	\$4880

PRINTING EQUIPMENT NEEDS

1. Heidelberg Offset Press, 15-3/4" x 22-1/2" to handle full 11" x 17" bleed and two-up 8½" x 11" jobs without limitations in image area encountered on Davidson 241W	\$ 9900
Less trade-in on Davamatic 9" x 14" press	<u>1700</u> 8200
2. Challenge Power Paper Cutter, 23" capacity, to replace Triumph 19" Hand Cutter	2600
Less trade-in on Triumph cutter	<u>200</u> 2400
3. Baum 17½" x 22" Folder to replace one of the smaller folders	800
Less trade-in on Martin Yale folder	<u>300</u> 500
4. ITEK Platemaster Automatic Offset Platemaker	3995
Total Printing	\$15,095

AUDIO-VISUAL EQUIPMENT NEEDS

1. Sawyer Slide Projector, 35 mm. to 2¼" x 2¼"	\$150
Less trade-in on Polaroid projector	<u>55</u> 95

AUDIO-VISUAL EQUIPMENT NEEDS
(Continued)

2. Bell & Howell Autoload 16 mm. Projector to replace rental machine	\$576
Less discount	<u>58</u>
	518
Total Audio-Visual	\$613

RECAPITULATION

	<u>Non-Capital</u>	<u>Capital</u>	<u>Total</u>
Photographic Equipment	\$ 966	\$ 3,914	\$ 4,880
Printing Equipment		15,095	15,095
Audio-Visual Equipment	95	518	613
Total	\$1,061	\$19,527	\$20,588

INTEROFFICE MEMORANDUM

COMPANY CONFIDENTIAL

DATE 3/11/63

SUBJECT Computer Sales Forecast

TO

FROM N. Mazzaresse

K. Olsen
H. Anderson
S. Olsen
G. O'Dea
W. Hindle
D. Mills
D. Best
M. Sandler
G. Bell

PDP-1	Quantity	Value	Probability	When
CRC	1	97K	100%	0-3
BBN	1	600,000	50%	0-3
Lincoln Labs.	1	200K	75%	0-3
Princeton	1	250K	100%	0-3
		100 moqe	95%	3-6
Stanford	1	280K	75%	0-3
PDP-4				
Foxboro (Fitchburg)	1	160K	98%	0-3
Foxboro (Westinghouse)	1	120K	50%	0-3
JPL	3	250K	90%	0-3
AECL	1	200K	75%	0-3
Worcester Foundation	1	80K	50%	3-6
Bell Labs.	1	80K	50%	3-6

	<u>Less than 50% 0-6 Months</u>	<u>Type of Machine</u>
Univ. of Rochester	200K	PDP-1
Systems Development Corp. (Info. International)	300K	ADX
Sylvania	Rental	PDP-1
Litton Systems	80K	PDP-4
Michigan Univ.	120K	PDP-1
Maryland Univ.	120K	PDP-1
Raytheon Co.	120K	PDP-1
Rutgers Univ.	250K	PDP-1
V. P. I.	50K	PDP-4
Foxboro	90K	PDP-4
Data Trends	250K	ADX

NM/jb



INTEROFFICE MEMORANDUM

DATE March 7, 1963

SUBJECT

TO K. Olsen

FROM Arthur Hall

cc: H. Anderson R. Hughes
R. Best J. Cudmore
D. White E. Harwood
A. Blumenthal N. Mazzaresse

The Foxboro Company has requested that DEC raise their temperature guarantee for the PDP-4 above the present level of 105 degrees F. Their declared motive is the competition from people using the SDS-910 computer which has a guarantee of 120 degrees F. In view of the (apparent) fact that Foxboro has for the past week been talking with SDS about replacing our computer with the 910, we should quickly decide whether or not we wish to undertake the tests necessary to determine how much we can raise our temperature guarantee.

Following are some pertinent facts:

Our module models are tested to 55 degrees C (131F) but only for brief periods of time. We have, thus, a reasonable assurance that the modules made after the models will operate at 131F but we do not know for how long.

Tests made by Al Blumenthal some time ago on a PDP-1 memory suggest that the temperature at which the memory stack's reliability becomes suspect is in the range of 105 to 115F. Stacks have improved since the tests were made. Also the cores are not interrogated as frequently in the PDP-4 as they are in the PDP-1. Therefore, while we know that a reasonable memory stack temperature guarantee is better than 105F, we do not know how much better.

Heat tests accomplished on the PDP-4 now at Foxboro, Natick demonstrated that the computer could operate for at least short periods of time at around 115 degrees with short heat excursions higher. For one short period the temperature at parts of the memory was an estimated 120-125F. The only failure noted was that a 1973 went into oscillation and had to be removed. At no time was a stack failure noted.

We do not know if SDS guarantee of 120F is for steady-state operation or for only a limited period of time. If (or when) we arrive at a new guarantee, should it be for steady-state operation or for a limited period of time?

Tests to determine a reasonable upper temperature guarantee should involve running at least three computers at the proposed temperature limit for at least three consecutive 24-hour periods. Detailed temperature measurements should be made at all crucial circuit points. Margins should be run before, during the first part, during the last

part and after the heat test. The memory sense amplifiers should be properly adjusted before the test and the degree of re-adjustment after the test should be recorded. A computer test program such as contest should be run during the tests.



INTEROFFICE MEMORANDUM

DATE 2-28-63

SUBJECT Heat Peaks in PDP-1 at JPL

TO Ed Harwood

FROM Bob Oakley

The correlation of failures to power turn-on during a heat peak in a PDP-1 is of a low percentage. Therefore, it is highly improbable that a series of tests would give substantial evidence of semi-conductor deterioration or failure.

The failures encountered at JPL, which could possibly be attributed to this heat peak situation, occurred primarily when high ambient temperatures were present. The exact figures are not known to me at this time. However, I would guess the temperature to be 80° F, or greater. JPL has since increased their air conditioning to the computer room to provide approximately 70° room temperature.

Jerry Murphy, of JPL, who originally brought this matter to my attention, is in charge of maintenance of the PDP-1-13C. He still believes the heat peak and power turn-on situation to be a matter which they should not disregard and which they will try to avoid. The figures which he gave me during a conversation recently were not very substantial but did indicate 10% rise in temperature within some physical areas of JPL's machine.

Since JPL has access to a great deal of instrumentation, I suggested to Jerry that he run some curves with a thermocouple and strip chart recorder on several physical areas of the machine to verify the problem and also to record some of the actual temperature maximums. I also requested that he relay any data to you as well as to the West Coast Office.

Any data you might have available on this type of problem would be appreciated. I am not sure if the JPL problems were coincidental or if the heat peak merely hastened the failure of a few elements which may have been marginal in the first place. However, I personally have not yet disregarded the possibility of damaging semi-conductor elements (particularly Germanium) by turning power on during a heat peak condition.

cc: Ken Olsen ✓
Nick Mazzaresse
Jack Shields
Dave Pinkney



INTEROFFICE MEMORANDUM

DATE February 25, 1963

SUBJECT Proposal for Authorization of Purchases

TO ✓ K. Olsen
H. Anderson
W. Hindle

FROM H. Crouse

Purchases by categories and dollar values shall need approval of the following:

1. Capital Equipment - K. Olsen and H. Anderson
for the Works Committee.
2. Purchases above \$5,000 - K. Olsen and H. Anderson.
(except inventory material)
3. Standard Inventory Materials - M. Sandler.
4. Purchases \$200.00 to \$5,000.00 - K. Olsen
H. Anderson
S. Olsen
D. Best
J. Fadiman
N. Mazzaresse
J. Atwood.
5. Purchases below \$200.00 - Cost Center Managers.

Henry J. Crouse



INTEROFFICE MEMORANDUM

DATE February 22, 1963

SUBJECT Meeting #3 Feb. 22, 1963

TO Engineering Projects Committee

FROM Drawing Standards Committee

Attendance:

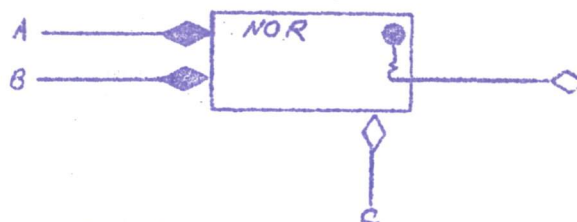
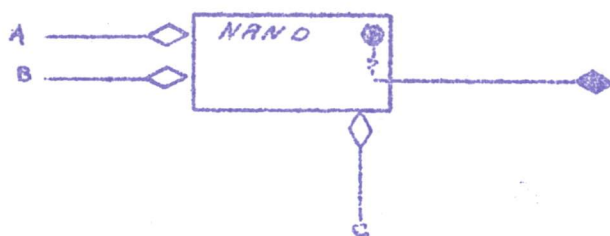
P. Barber

D. Smith

F. Fadiman

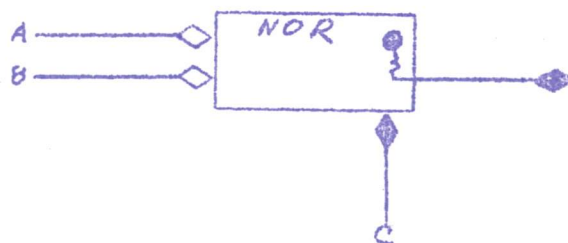
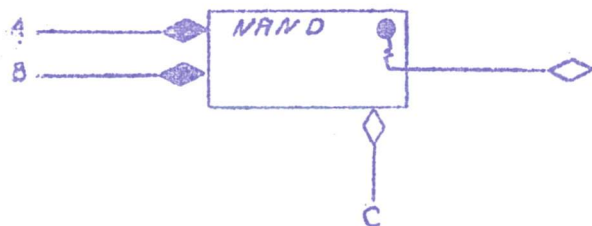
A. Blumenthal

Re-examination of the nand, nor symbology generated in the last meeting revealed some vagaries. In the following symbols:

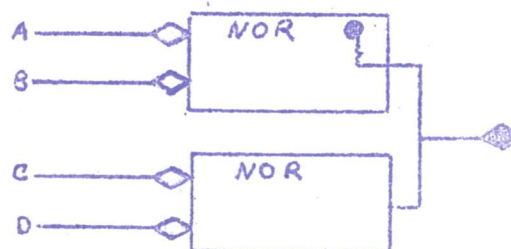
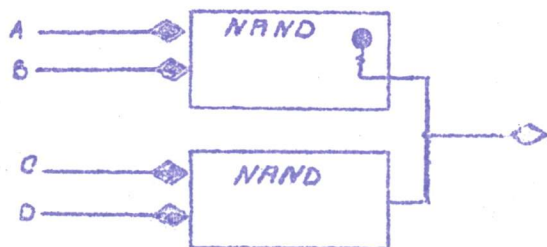


One may assume that for the nand the equation for the output level is $A.B.C.$, and for the nor the equation is $A+B+C$. In reality the nand equation is $(A.B) + \bar{C}$, and the nor is $(A+B).C$.

The C input is, of course, the emitter. For the following, however, the assumptions would be correct:

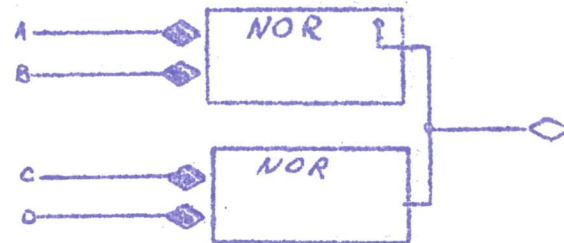
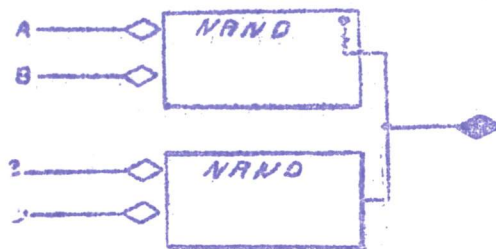


In the following symbols:



February 22, 1963

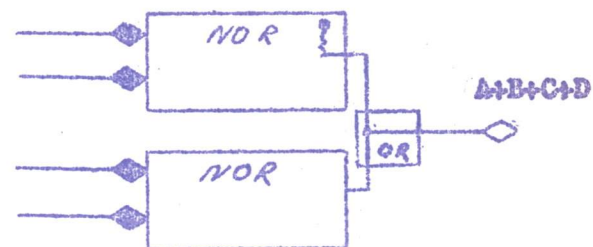
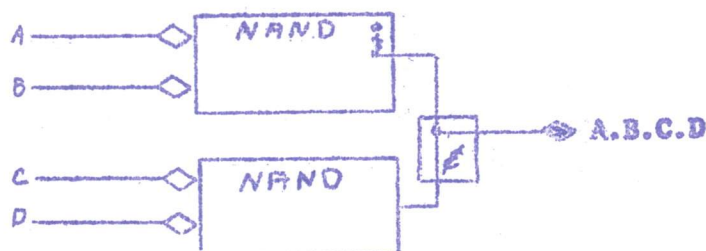
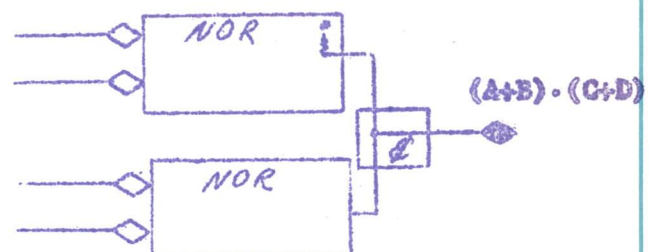
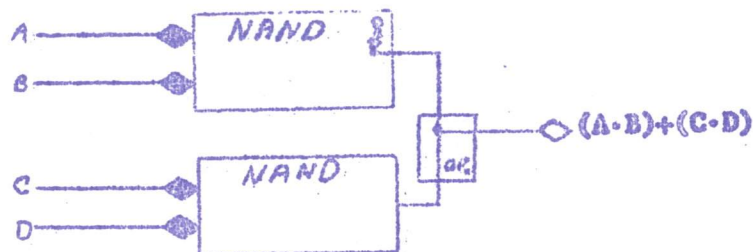
One may assume the nand equation to be $A.B.C.D$ and the nor $A+B+C+D$. The correct equations are $(A.B) + (C.D)$ for the nand, and $(A+B).(C+D)$ for the nor. The assumptions would be correct in the following cases:



Obviously the junction connecting the two outputs performs a logical function in itself.

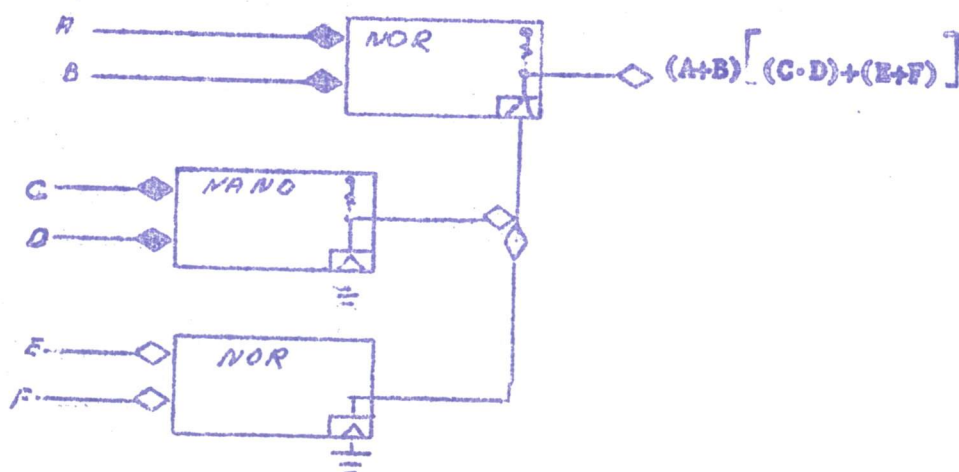
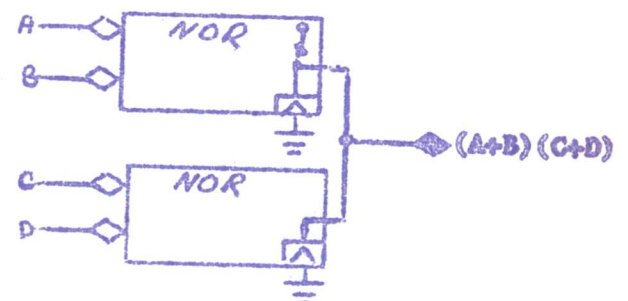
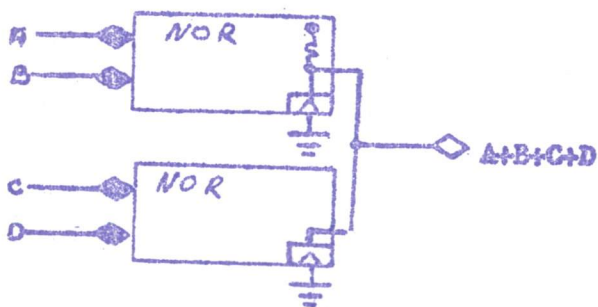
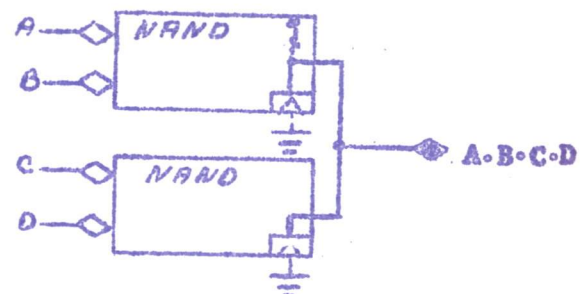
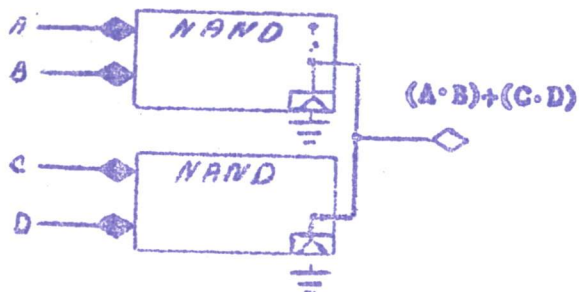
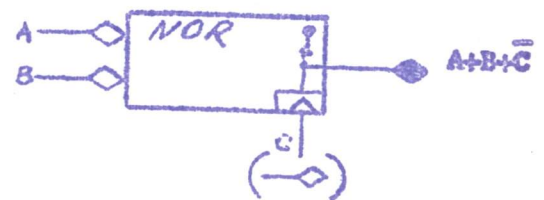
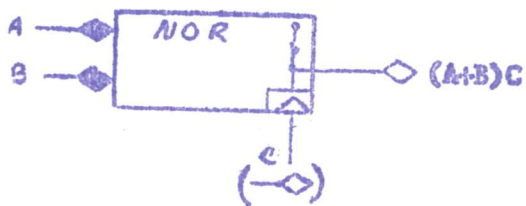
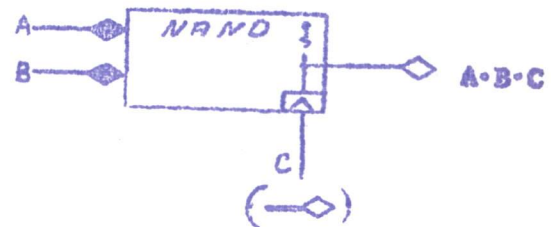
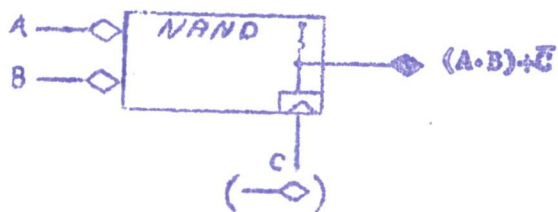
The interplay between combinations of the foregoing examples can make logical understanding difficult for those unaccustomed to our methods. Apparently a need exists to show more information.

The junction case could be covered thusly:



February 22, 1963

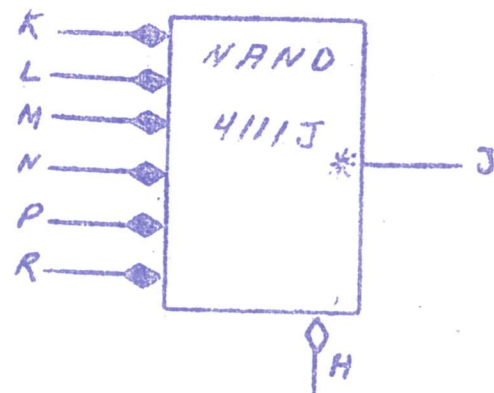
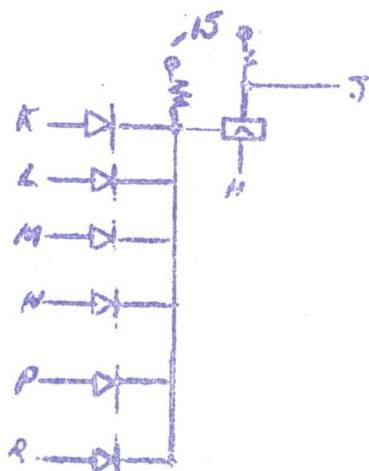
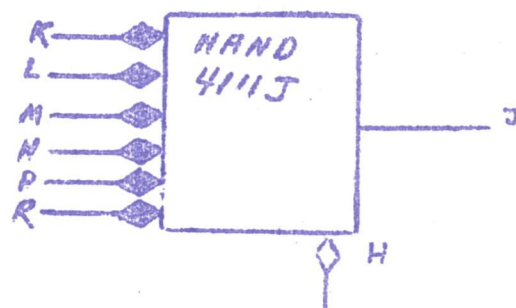
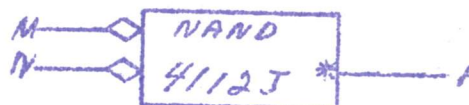
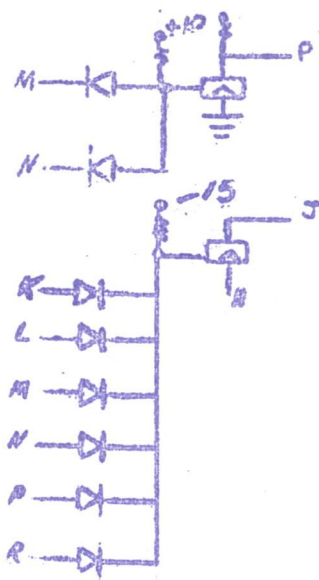
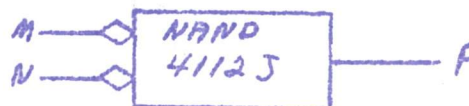
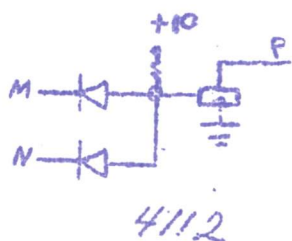
This, however, would not clarify the function of the emitter inputs in the first two cases. Showing the output transistor as follows should clarify all cases:

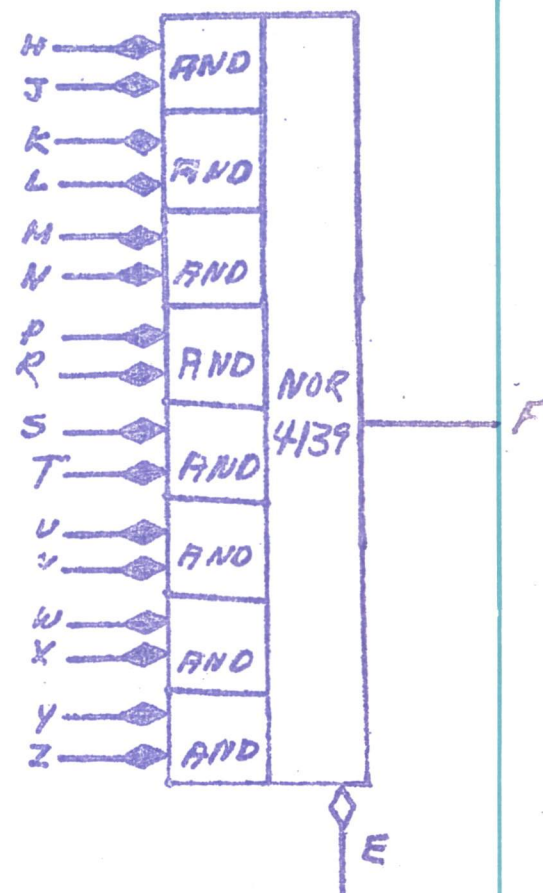
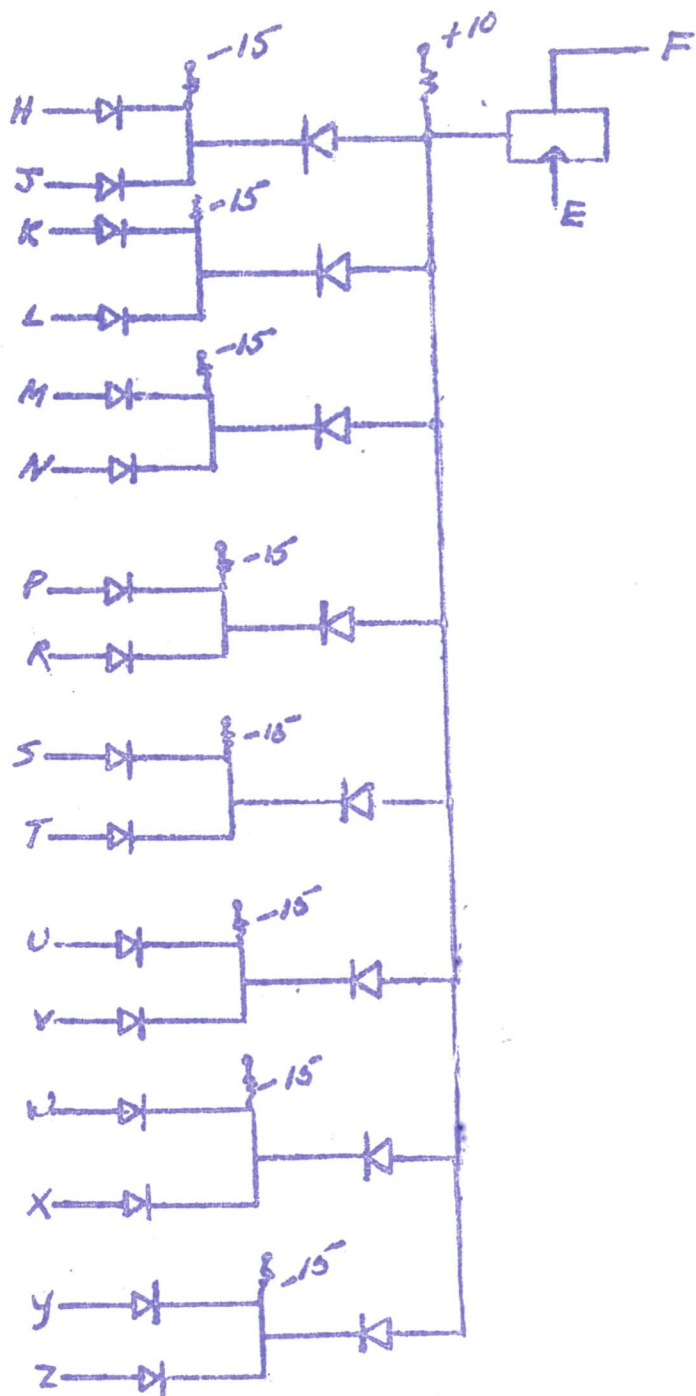


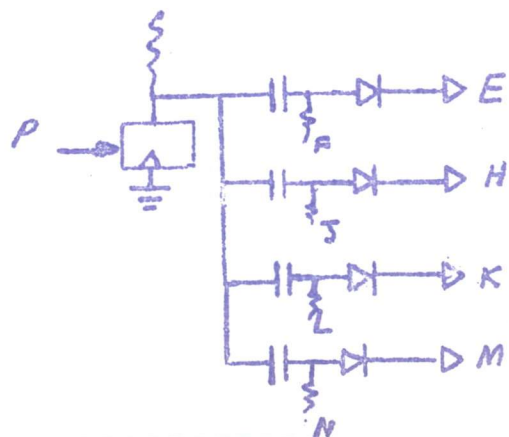
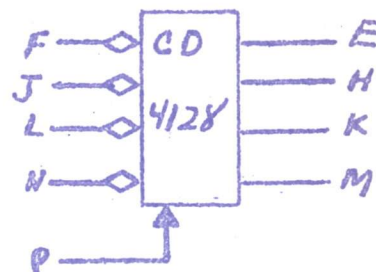
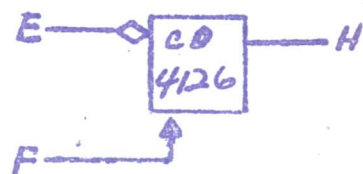
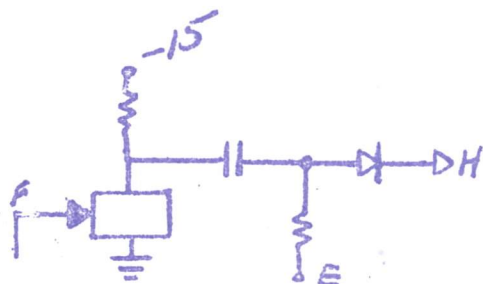
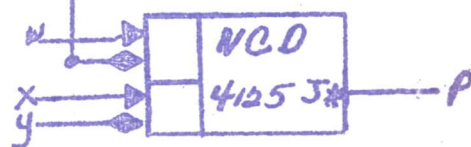
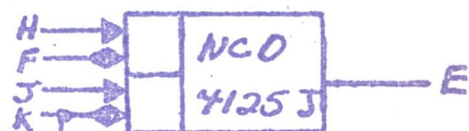
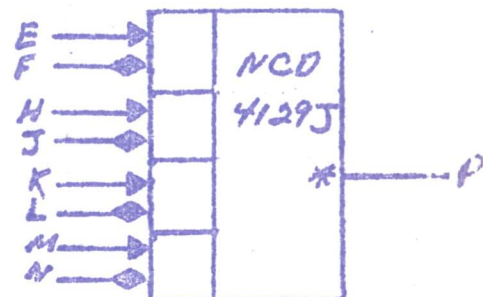
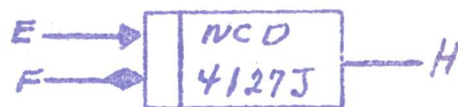
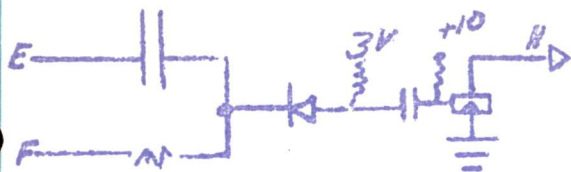
February 22, 1963

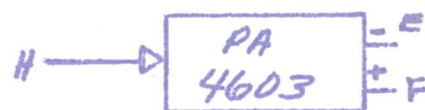
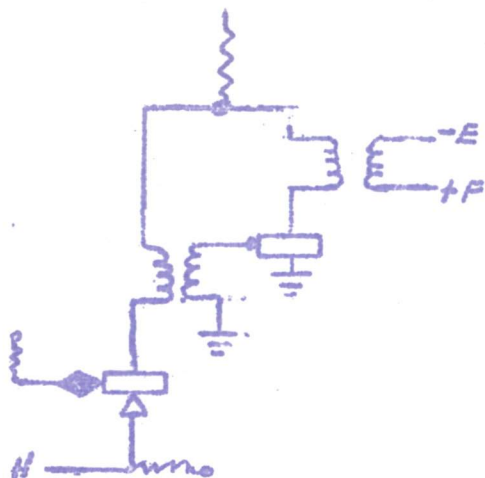
LOGIC SYMBOLOLOGY

1. The basic logic functions of a module will be represented by rectangular boxson logic diagrams. Size and relative side lengths are unimportant. The important feature is that the fixed format assigned to the boxes be adhered to.
2. Some general representations are as follows:









3. Information in boxes would contain, function type, location, jumpers used, internal resistor (*), delay time,
4. If the above could not be contained in box then dotted lines would be used to enclose information.
5. The boxes would be all connected on a page. All incoming lines being on left of page and being named as to function and page from which line came, All outgoing lines to be on right of page and labeled as above.

MEMORANDUM

DATE: February 22, 1963

TO: K. Olsen

FROM: J. Smith

In reference to your memo of February 21, in relation to the estimated cost per indicator, estimated manufacturing cost per indicator is \$.80.



INTEROFFICE MEMORANDUM

DATE 2/22/63

SUBJECT

TO ✓ K. Olsen D. Morse
H. Anderson S. Grover FROM B. Maxcy
W. Hindle S. Lambert
R. Best R. Boisvert
S. Olsen All Sales Personnel
N. Mazzaresse

The following prices are now in effect:

Ultra Precision Display	Type 31.	\$41,200
Remote Computeriter and Control		7,730
Precision Display	Type 30C	19,460
Soroban Punch Including:	GP2-300.	26,600
Punch		
Control		
Cabinet		
Echo Checking		



INTEROFFICE MEMORANDUM

DATE February 21, 1963

SUBJECT Status of Renegotiation Board - Exemption Filing

TO Ken Olsen ✓
H. Anderson
R. Best
G. O'Dea

FROM R. Mills

Yesterday I called Matt Chick in an effort to determine the status of our Module Exemption Filing with the Renegotiation Board. Matt told me he had talked with Alex Watt, who is on the staff of the Renegotiation Board and Watt stated that they expected to get to our filing within two (2) weeks, with an answer to DEC in about a month, which will bring us to the middle of March.

After we receive an answer from the Renegotiation Board, as to the allowance or disallowance of the exemption, we will have about thirty (30) days within which to make our regular filing, whether it be on a Statement of Non-Applicability, i.e., without the detailed Profit and Loss information or on an RB-1 form, i.e., including detailed information.

#



INTEROFFICE MEMORANDUM

DATE February 19, 1963

SUBJECT Fortran Status Report

TO Ken Olsen
Harlan Anderson
Stan Olsen
Nick Mazzaresse
Gordon Bell
Steve Piner
Ted Johnson, West Coast Office
Ken Larsen, West Coast Office
Ron Coleman, West Coast Office
Dave MacAvin, Foxboro Co.

FROM Dit Morse

Work on Fortran began in earnest during the first week of February. At the present time Steve Piner and myself are working essentially three-quarters time on it.

The work on Fortran can be divided into three portions:

- 1) The Fortran compiler which accepts a Fortran program as input and produces a symbolic assembly language as output.
- 2) The routines and subroutines which form the operating system.
- 3) Modifications to the assembler to permit relocation and linking.

The parts of the program which we now have written are as follows: The floating point arithmetic routines have been written and debugged along with the floating point input and output routines. Steve Piner has written the routines which handle the compiler's symbol tables and punch out the constant and variable data storage and array storage at the termination of compilation.

In the process of being coded are the following routines: Examine the input string and separate pseudo instructions and operators. Symbols and floating point constants are distinguished from fixed point constants and stored in a table for punching out at the end of compilation. Also in process are the routines which move pointers up and down the stack. The algorithm for processing algebraic statements and most of the other statements in Fortran has been flow charted but not coded.

A very rough schedule for the generation of the PDP-4 Fortran is:

The next two weeks will be used to get the basic input and output portions of the compiler and a simple form of the algorithm working. At the end of this stage we will have a program which will accept as input algebraic statements and produce assembly language output. Barring unforeseen disasters, a version should be ready for the March IRE show.

The month following this will be spent incorporating the other features of Fortran into the compiler and in writing the operating system (which includes the floating point subroutines, the floating point interpreter, and routines to permit the calling of Fortran subroutines and the use of subscript variables). At the end of this period we should have a complete Fortran compiler and operating system.

Not included in this particular operating system are facilities to permit assembly of subroutines separately from main programs. This feature requires rather extensive additions to the PDP-4 assembler which will not be undertaken until late in the Spring.

The other area which will be considered later in the Spring is the Fortran in-out facility. We cannot possibly hope to reproduce the system used in 7090 Fortran, but may possibly use a subset of that system. Otherwise we will have to define an independent in-out system for use on the PDP-4.



INTEROFFICE MEMORANDUM

DATE February 18, 1963

SUBJECT Munich Office - Next Steps

TO Ken Olsen ✓
Harlan Anderson

FROM George O'Dea

cc: Stan Olsen
Win Hindle
Dick Mills

To bring the problems of opening the Munich office more sharply into focus it might be desirable to spell out the way we'd like to see things going after they have been in operation for a while in order to point out the gaps in reaching these goals.

For purposes of this memo let's assume Stan and Harlan have worked out all of the marketing matters (foreign list price, GmbH discount structure, Duty, Sales Policies, objectives, etc.) We will only concern ourselves here with fiscal matters.

To begin with let's agree to treat Digital Equipment GmbH as a separate entity on our General Ledger. Their operations can be consolidated into our own on a work-sheet basis after the fact. If we attempt to consolidate in our regular closing it will lead to pointless delays.

Consistent with this policy the DEC General Ledger need only be expanded to include an Investment Account (subject to Valuation reserve) and an Inter-Company account for current transactions.

As regards the latter it would at least include:

Debits for: Billings to GmbH for direct shipments to customers (list less 20%)
Billings to GmbH for direct shipments to them (list less 20% if
consignment treat)
Billings to GmbH for services rendered (at cost.)

Credits for: Money received from GmbH
Commissions earned on Billings direct to end user.

Shipments to the GmbH would net out at list price less 20%, minus job cost to leave a residual gross profit on the DEC statements.

So much for the Books at Maynard.

We would then look to the GmbH for monthly reports in much the same detail as the present DEC reports. (Balance Sheet, P&L and Statistical Info.)

As a first requirement the Capital and Inter Company Accounts on the GmbH Statements would have to carry reciprocal balances with the same items on the DEC books. This assures that they have picked up all transactions originating in Maynard.

The GmbH could have an inventory balance if Maynard ships to them directly. This they would price from our billing to them. Cost of Sales on their billings to customers would either come out of their inventory or come directly from our billing to them (if the shipment to the end customer went directly from Maynard.)

Gross Income for the GmbH would, of course, arise from their billings to customers plus commission credits from Maynard for shipments directly to customers by Maynard. Independent Income would probably be generated by Service billings (as long as the staff is only two people it probably would not be worth trying to strike an individual cost of Sales on such service billings).

The G.m.b.H. would have to effect their own collections so we would expect them to carry a Receivables Balance.

While the operation is small, expenses could pretty much be on a cash basis. Payroll would have to be modified to comply with West German regulations as would the calculation of turnover tax and all of the other Foreign Taxes. Presumably the Secretary can be coached to comply with local requirements but the Books of the G.m.b.H. must be set up to tell us what's happening in the American concept of Profit and Loss.

Obvious expenses such as travel, rent, supplies, etc. should be fit into our chart of accounts on their books. No doubt the chart of accounts will have to be expanded to include transactions peculiar to the West German Economy.

To accommodate the setting up of the Books of the GmbH we will work with Coopers and Lybrand to guarantee compliance with German regulations.

As to cash - we will make the original capital investment out of funds in the DEC Bank Accounts in Munich. (These will no doubt have to be replenished for money spent in the interim. This replenishment may be taken up on the DEC books).

From that day on, the GmbH is expected to live on its 20% (or such other rate schedule as may be evolved) commission. As the GmbH collects from customers it will remit the 80% portion to Maynard. (sole exception - billings for services rendered out of Munich; here they keep it all)

If the GmbH cannot live on its commissions additional capitalization may be pumped in by DEC. There will be no loans made, either in Munich or out of Maynard.

As to the supporting detail we might ask of the GmbH, I would think we'd at least want the following:

1. Copy of all billings - to tie in with net sales per P&L
2. Receivables detail at close of each month - to tie in with Balance Sheet
3. Inventory detail at close of each month - to tie in with Balance Sheet
4. Short term cash forecast at close of each month.

The last thing any of us want to see is Guenter burdened down by a bunch of accounting. On the other hand, he will be committing the Company on a daily basis and there are minimum requirements from our point of view.

Now for a timetable to achieve these goals:

1. Obtain charter as G.m.b.H.
We're all pretty much agreed that Dr. Strobl should represent us here. The Board of Directors has approved a capitalization of 160 shares, DM500 = DM80,000 (initial paid in of 25%) and a charter calling for Marketing, Servicing, and Manufacturing Capabilities. As soon as we have Fadiman's opinion on the man, and the estimate of his fees I'll write and authorize him to proceed with the incorporation. No doubt this will involve some exchange of correspondence so the sooner we get this going the quicker we will be done.
2. Establish set of Books consistent with German Legal Requirements and DEC minimum requirements. Mr. Herbert Schueller of the International Division of Lybrands has given us the names of two of his colleagues in Frankfurt with the recommendation that we work through them. I'll write them and explain what we have in mind and get this going (once the company is set up the Munich office of Lybrands can take over - but Schueller specifically recommended that we do the setting up through Frankfurt). The hope here would be that they can devise a system which can be run by the Secretary. The question of whether or not we wish a year end audit can be left open for now.
3. Learn about German Taxation - particularly turnover tax. The same gentlemen referred to us for setting up the Books of Digital Equipment G.m.b.H. are reportedly keen in this area. Will explore the subject in letter regarding Books.

Any suggestions as to other matters to be scheduled at this time will be appreciated.

George T. O'Dea

GTO'D:ncs



INTEROFFICE MEMORANDUM

DATE

February 14, 1963

SUBJECT Doing Business in Japan - First Impressions

TO

Ken Olsen ✓
Harlan Anderson

FROM

George O'Dea

cc: Stan Olsen, Win Hindle
and Dick Mills

As a result of a meeting with Dr. James Abegglen of Arthur D. Little we have the following first impressions of where we would stand if we went into Japan and began doing business.

A. As a Branch of DEC - Without a Place of Business in Japan:

To us this may seem incongruous - doing business in Japan without an office in that country. To the Japanese Tax Authorities, not necessarily so. We were shown correspondence surrounding an ADL contract with a Japanese client whereby they first became aware of the Japanese Tax Authorities views on the matter when the Japanese client withheld 15% of the bill as payment of the Japanese income tax due! In this case, the Japanese position was predicated on the fact that the ADL consultant spent time with the client in Japan and therefore the income was earned in Japan and subject to withholding tax. (To make matters even worse, the ADL billing had been cost plus a fee- while the Tax was 15% of the total bill; and there was no guarantee that IRS would agree with the Japanese that indeed this was foreign income hence subject to special credit on the ADL domestic tax return.)

To prevent this revolting development we would have to make certain that any orders taken in Japan were accepted here - and probably backed up by letter of credit for the gross amount. This of course makes the selling job more difficult.

B. As a Branch of DEC with a Place of Business in Japan: We did not explore this avenue extensively as Dr. Abegglen felt our chances of staffing such a "temporary" entity with competent Japanese Nationals would be poor at best.

He felt strongly that, as a minimum, we would need a Japanese National as a number two man (preferably number one) and he suspected that as an American Branch in Japan we would run into discrimination particularly in the areas of Tax assessment and obtaining government approval of various actions. (He particularly mentioned the position of a Neisei in Japan. It would be more difficult than that of an American).

C. As a Japanese Corporation owned Wholly or Otherwise by DEC:

Virtually anyone can obtain a license to open a business venture as a Japanese Corporation. With the exception of a few industries there is no legal discrimination against foreigners.

The big problem arises when you try to get your money out of the country. If you wish to withdraw funds from Japan you petition the government (each time) and may or may not be granted the license to proceed depending on how they happen to feel about things at that particular moment.

If you are not willing to run for luck you can take certain steps in advance of your investing and be granted varying degrees of security depending largely on what you have to offer to the Japanese economy. These degrees of security are:

1. Validation: This is tantamount to an unconditional guarantee on the part of the Japanese Government that dividends earned on Japanese stocks purchased with American currency, will be payable in American currency whenever declared; and that the basic principal investment may be withdrawn in three equal yearly installments any time after the investment has become two years of age.

Since the guarantee is "unconditional" the Japanese Government will only grant it if they need you badly.
2. Conditional Validation: Differs from full Validation only to the extent that one condition is not guaranteed - namely Japan's foreign exchange position. If in the Government's opinion they are in dire need of Yen, they may defer payments.
3. Recognition: Similar to Conditional Validation in that the guarantee is subject to the Japanese foreign exchange position at the time of petition for withdrawal. Differs from Validation in that Recognition is granted more from the point of view of its influence on the Japanese foreign exchange position than from the broader effect on economy position. (Granted under a different Law than Validation.)

There was no question as to Dr. Abegglen's recommendations. In our particular field there would only be a handful of potential customers. Make the first contact by an American to sample interest. Follow up with correspondence then a second call some four months later. At this point decide whether or not the Japanese market is worth pursuing. If the answer is yes, form a Japanese Corporation - preferably with a Japanese National as partner; even better, go into an existing Japanese Corporation as partner. If the DEC interest is in the area of 1/3rd, Validation is highly likely. As it approaches 1/2 the likelihood goes down.

As to Taxation, we have already seen that Americans doing business in Japan (in the opinion of the Japanese Tax Officials) are subject to a 15% withholding tax on all billings. This tax is final - there are no returns to be filed or expenses to be argued. The rate is simply 15% of gross. It is entitled to full special credit on a U.S. Tax return if the IRS agrees the income belonged in Japan (seems unlikely).

As a Japanese Corporation with place of business in Japan the basic Corporation would be subject to regular Japanese Tax provisions (basically same rate as here - no haven. Special credit applicable in U.S.) Monies taken out of the Corporation however are subject to some interesting differential treatments.

Dividends: carry a special 25% extra tax credit in U.S.

Interest on Loans: 15% Japanese Surtax - full special credit in U.S.

Royalties: same as interest.

In contrast to our conversations about a Munich Office one has the feeling that there are a great deal more imponderables surrounding the Japanese office.

Dr. Abegglen's suggestion makes good sense. Give it a try with a Travelling American. If the interest is there and its worth pursuing, Incorporate. If not, write the trip off with no obligation to the Japanese Government.

George T. O'Dea

GTO'D:ncs

Ken Olsen



INTEROFFICE MEMORANDUM

DATE February 14, 1963

SUBJECT TECHNICAL PUBLICATIONS STATUS REPORT - WEEK ENDING 2/16/63

TO S R List FROM Jack Atwood

This is the first of a regular series of status reports on Digital technical information publications.

We have filled in all the significant details immediately available to us. A short, straight line indicates either that there is no entry to be made or that the entry would not be significant at this point. A long wavy line indicates that the job is either completed or so far along that the preceding detail would not be significant.

I would like to check with you at the beginning of next week to see what additional information or what changes you have to suggest. You may be able to help us with such information as appropriate EN numbers, engineer names, dates for technical specifications, and target dates.

You will notice a number of entries without Tech Pub or Bulletin Numbers. These cover equipment which we know or think may require documentation but which we have not yet been asked to handle.

TECHNICAL PUBLICATIONS STATUS REPORT - WEEK ENDING

2/16/63

PAGE 1 OF 2

EN#	MACHINE / SUBJECT	CUSTOMER	ENGINEER	TECH PUBS #	BULLETIN #	WRITER	SECTION	TECH SPECS		DRAFT TEXT		TECH ILLUST		PHOTOS		DRAFT REVIEW		REPRO TYPING		PRINTING		TAR- GET DATE
								START	DONE	START	DONE	START	DONE	START	DONE	START	DONE	START	DONE	START	DONE	
—	LAB MODULE HANDBOOK	SALES	—	5524	B-55	PAINTER	—	—	—	2/5												3/15
—	PDP-1 INPUT-OUTPUT	SALES	BELL	5509	F-15(1)	GROVER	—	—	—	—						1/11						3/15
	CRT DISPLAY 30B																					
	CRT DISPLAY 30C	LRL	SAVELL	5505	F-15(30C)	BARBER	—	—	10/17	1/-	95%	1/-	40%	—	—	2/-	40%	1/-	20%			
2455	CRT DISPLAY 30D	MGH	CHIN	5511	F-15(30D)	BARBER	—															
	CRT DISPLAY 30E																					
	CRT DISPLAY 30F																					
	CRT DISPLAY 30G																					
	CRT DISPLAY 31A	LRL	CHIN	5506	F-15(31)	BARBER	—	—	1/-													
	SYMBOL GENERATOR 33																					
	OSCILLOSCOPE DISPLAY 34																					
	THREE-COLOR DISPLAY																					
	LINE AND CURVE GENERATING DISPLAY																					
	CARD PUNCH CONTROL 40	LRL	SAVELL	5507	F-15(40)	BARBER	—	—	10/-													
	CARD READER AND CONTROL 41B	LRL	BELL	5508	F-15(41B)	BARBER	—	—	12/1													
	MAG TAPE 50/51/52	SALES	BECKMAN	5513	F-15(50)	CYBURTEK	—															
	TAPE CONTROL 57	SALES	LAMBERT	5536	F-15(57)	GROVER	—	—	12/-	1/31	2/6	1/31	2/6	—	—	2/6	2/11					
	LINE PRINTER 62	LRL	HALL	5504	F-15(62)	BARBER	—															1/23
	PDP-1 INSTALLATION	SALES	HARWOOD	5521	F-18	GROVER	—															2/12
	REVISED DECAL	SALES	MORSE	5529	F-35A	BBN	—	—	—													
	REVISED MACRO	SALES	MORSE	5530	F-36B	DENNIS	—	—	—													
	MAINDEC 2	SALES	BECKMAN	5532	F-39-2	CYBURTEK	—															2/12
	MAINDEC 3	SALES	BECKMAN	5533	F-39-3	CYBURTEK	—															2/6
	MAINDEC 11	SALES	MIKULSKI	5537	F-39-11	CYBURTEK	—	—	—	—	—	2/8		—	—	—	—	2/13				
	MAINDEC 12	SALES	GOSSEL	5531	F-39-12	GOSSEL	—	—	—	—	2/8	2/8		—	—	—	—	2/14				

TECHNICAL PUBLICATIONS STATUS REPORT - WEEK ENDING

2116163


PAGE 2 OF 2

[illegible]

INTEROFFICE
MEMORANDUM

DATE 2/14/63

SUBJECT Computer Sales Forecast

TO  K. Olsen
 H. Anderson
 S. Olsen
 G. O'Dea
 W. Hindle
 D. Mills
 D. Best
 M. Sandler
 G. Bell

FROM N. Mazzaresse

PDP-1	Quantity	Value	Probability	When
CRC	1	97K	100%	0-3
Raytheon	1	200K	100%	0-3
BBN	1	600,000	85%	0-3
Lincoln Labs.	1	200K	50%	0-3
Princeton	1	250K	100%	0-3
LRL	1	350K	50%	0-3
Stanford	1	280K	75%	0-3
ADX				
S.T.C.	1	300K	50%	0-3
PDP-4				
Foxboro (Fitchburg)	1	160K	85%	0-3
Foxboro (Westinghouse)	1	120K	50%	0-3
Foxboro	2	120K	50%	3-6
JPL	3	250K	90%	0-3

PDP-4	Quantity	Value	Probability	When
AECL	1	200K	75%	0-3
Worcester Foundation	1	80K	50%	3-6
Bell Labs.	1	80K	50%	3-6
Leeds & Northrup	1	80K	50%	0-3
<u>Less than 50% 0-6 Months</u>				
Univ. of Rochester		200K		<u>Type of Machine</u> PDP-1
Systems Development Corp. (Info. Inter- national)		300K		ADX
Sylvania		Rental		PDP-1
JPL		120K		PDP-1
Beckman Instruments		120K		PDP-1
Litton Systems		80K		PDP-4
Michigan Univ.		120K		PDP-1
Maryland Univ.		120K		PDP-1
Raytheon Co.		120K		PDP-1
NM/jr				



INTEROFFICE MEMORANDUM

DATE February 14, 1963

SUBJECT University of California (Berkeley)

TO Ken Olsen ✓
Dick Best

FROM Harlan E. Anderson

Present Situation (2-14-63)

Tentatively decided on SDS 920. Total price of \$183K. This includes 8K memory, 3 Tapes and Typewriter. Equivalent configuration of PDP-1 comes to 231K.

Ted is scheduling visit to Howard White who is the key man at Berkeley. This week Jerry Russell, the other key man at Berkeley is visiting on the East Coast. Present schedule is as follows:

Thursday, February 14	with Jim Kiseda of IBM in Pough.
Friday, February 15	with Dr. John Calkin at Brookhaven. Tel. Ya-4-6262 Ext. 417 or 409

Russell is thinking of coming to Boston next week if the weather is good and would probably respond to a telephone call from Ken or Dick Best.

It may end up that we are simultaneously talking with key groups from Berkeley on the same day and we should be careful to be coordinated.

H.E. Anderson

HEA:ncs



INTEROFFICE MEMORANDUM

DATE February 13, 1963

SUBJECT General Electric Low Cost Transistors

TO ✓ Ken Olsen

FROM Bob Hughes

cc: Dick Best
Henry Crouse

General Electric plans to add some transistors to the line that they are now making. The following is a list of their plans:

Designation	Type	Features	Samples	Production
16A (2N2711)	Standard Radio Business	General Purpose V_{CE} (SAT) 0.8V @ 50 MA	Now	Now
16B (2N2713)	Epitaxial Amplifier	Low V_{CE} (SAT) 0.3V @ I_C 50 MA	Now	Now
16C	Epitaxial Switch	High Speed Low V_{CE} (SAT)	2/63	3rd quarter '63
16D (2N2715)	Low Capacitance	Cob 5 pF	Now	4/63
16E	Power	750 MW @ 25°C	2/63	4/63
16F	Very low Capacitance Small geometry	Cob 2 pF	3/63	6/63
16G	VHF amplifier Small geometry	Similar to 2N918 (600 MC)	5/63	6/63

For any particular device that is listed, it is possible to get a little more specific information.

One hard to understand thing about these transistors, is that we are classified as an industrial account, and as such, the following prices apply to us for purchase of the type 16B1 and 16B2 transistors.

Price Projection		16B1	16B2
1963	First 100K	45¢	48¢
	Next 100K	43-40¢	46-43¢
1964	Next 250K	40-35¢	43-38¢
	Next 500K	37-32¢	39-35¢

Price Projection (Cont.)		16B1	16B2
1965	Next 1 million	35-28¢	37-32¢
1966	Next million	33-25¢	35-28¢

Here are today's prices to the entertainment industry:

		1-99	100- 999	1K-10K	10K Up	10K Up *
2N2711	16A1 Low Beta	1.13	.75	.50	.40	.25
2N2712	16A2 High Beta	1.20	.80	.55	.43	.27
2N2713	16B1 Low Beta	1.50	1.00	.75	.50	.30
2N2714	16B2 High Beta	1.65	1.10	.80	.53	.32
2N2715	16D1 Low Beta	1.13	.75	.50	.40	.25
2N2716	16D2 High Beta	1.20	.80	.55	.43	.27
2N2711 and 2N2712		.25¢	**			
2N2713 and 2N2714		.30¢	**			
2N2715 and 2N2716		.25¢	**			

** Applies when customer purchases both types at same time with low to high Beta ratio of 65% to 35%.

* Entertainment accounts only.

There is no difference between the transistors shipped to us and the transistors shipped to the entertainment accounts. The local salesman decides whether to classify us an industrial account or an entertainment account. To be an entertainment account, you must either manufacture radios, Hi-Fi sets, T.V. sets, home intercom systems, mobile radios, etc. From what the salesman has told us about entertainment account vs. industrial account assignments, this was a policy decision that was made by General Electric some years ago, and can't be altered.



INTEROFFICE MEMORANDUM

DATE February 13, 1963

SUBJECT Determining Current and Future Manpower Requirements

TO ✓ K. Olsen
H. Anderson
S. Olsen
R. Best
M. Sandler
R. Mills
E. Harwood
W. Hindle

FROM Bob Lassen

I am quite concerned over the increasing number of open personnel requisitions. Most of these requisitions have been submitted to me on an "apparent urgency" basis. I feel we should review not only our current open requisitions but also future manpower requirements. This meeting will be held in Ken Olsen's office on Friday, February 15, 1963, at 1 P.M.

*OPEN PERSONNEL REQUISITIONS - 2/14/63

Signed Requisitions

1 Secretary	- R. Best
1 Clerk-typist	- N. Mazzaresse
1 Secretary	- Programming
1 Clerk-typist	- R. Beckman
3 Technicians	- R. Savell
5-10 Field Technicians	- R. Beckman
1 Sheet Metal Mechanic	- L. Prentice
1 Sheet Metal Mechanic (A)	- L. Prentice
1 Wireman	- R. Boisvert
1 Expeditor (repl.)	- H. Crouse
1 Electro-Mech. Draftsman	- R. Melanson
3 Electrical Draftsmen (repl. 2 job shoppers)	- R. Melanson
1 Printed Circuit Layout Man	- R. Melanson
1 Clerk-typist	- R. Melanson

Unsigned Requisitions

1	Sheet Metal-Machinist (repl.)-	L. Prentice (OK - KHO)
1	Clerk-typist	- R. Mills
1	Secretary (repl.)	- E. Harwood
1	Secretary (repl.)	- J. Koudela
1	Secretary (repl.)	- S. Olsen
1	File Clerk	- J. Myers
1	Switchboard-Clerk (repl.)	- B. Towle
2	Silk Screen (1 repl.)	- M. Sandler
1	Spray Painter (repl.)	- L. Prentice
1	Sheet Metal Operator (repl.)	- L. Prentice
1	Wireman	- E. Harwood/N. Mazzaresse
2	Technicians	- E. Harwood/N. Mazzaresse
2	Wiring Inspectors	- R. Hughes
1	Drafting Illustrator	- R. Melanson
1	Mechanical Draftsman	- R. Melanson

* Total addition to payroll would be \$4000 per week.



INTEROFFICE MEMORANDUM

DATE February 13, 1963

SUBJECT Meeting #6

TO Engineering Projects Committee

FROM Drawing Standards Committee

Attendance:

P. Barber
R. Savell
D. Smith
A. Blumenthal

It was pointed out that module types exist that are not shown in the catalog. R. Savell will search out these types so that symbology can be assigned.

The symbology for diode gates has been re-examined, at D. Smith's suggestion, with a view toward simplifying it. We now recommend that no diodes be drawn but that a rectangular box be used with an "G" or "or" within. The associated transistor will still be shown.

A. N. Blumenthal

ANB/nbh



INTEROFFICE MEMORANDUM

COMPANY CONFIDENTIAL

SUBJECT Computer Control Company
Preliminary Prospectus Issued 2/7/'63

DATE February 13, 1963

TO Ken Olsen ✓
Harlan Anderson

FROM George O'Dea
Dick Mills

By backing up to DEC's position at October 31, 1963, we can make the Balance Sheet, P&L and Statistical comparisons between ourselves and CCC. (See attached worksheets).

Since October 31, 1962, DEC has gone on to earn another \$100K in net profits, retire \$300K of bank loans, and pile up \$1,000K in short term paper.

All we know for sure is that CCC increased their bank loan by \$177K during the period 11/3/'62 thru 1/25/'63 - and apparently had to revise their thinking on the number of shares to offer.

In order to get completely out of their Bank loan they would need \$1,648K ÷ 130K shares or about \$12.80/share or 40 times their fiscal '62 earnings per share.

George T. O'Dea

GTO'D:ncs

Comparative Balance Sheets
October 31, 1962 (11/3/'62 for CCC)

Exhibit A
(\$000's Omitted)

	<u>DEC</u>	<u>CCC</u>
Cash	\$ 331	\$ 39
Receivables	2,114	1,707
Inventories	2,275	1,603
Prepaid Expenses	24	19
Total Current Assets	<u>\$4,744</u>	<u>\$3,368</u>
Notes	\$ 616	\$1,471
Trade Payables	264	395
Accruals and Withholdings	301	324
Provision for State & Federal Income Tax	1,477	313
Total Current Liabilities	<u>\$2,658</u>	<u>\$2,503</u>
Net Working Capital	\$2,086	\$ 865
Fixed Assets	378	316
less Reserve for Depreciation	-85	-127
Net Fixed Assets	<u>\$ 293</u>	<u>\$ 189</u>
Leased Equipment	\$ 100	\$ -
less Reserve for Depreciation	-49	-
	<u>\$ 51</u>	<u>\$ -</u>
Leasehold Improvements	\$ 42	\$ -
Other Assets	-	9
Excess of Assets Over Current Liabilities	\$2,472	\$1,063
Less Long Term Debt	87	-
Net Worth	<u><u>\$2,385</u></u>	<u><u>\$1,063</u></u>

Comparative Statements of Profit and Loss
Twelve Months Ended October 31, 1962 (11/3/'62 for CCC)

Exhibit B
(\$000's Omitted)

	<u>DEC</u>	<u>CCC</u>
Net Sales	\$10,005	\$8,669
Cost of Sales	<u>4,414</u>	<u>5,155</u>
Gross Profit	\$ 5,591	\$3,514
% G.P.	56%	41%
SG&A	1,725	1,936
Development	<u>760</u>	<u>894</u>
Total Operating Expenses	\$ 2,485	\$2,830
Operating Profit	<u>\$ 3,106</u>	<u>\$ 684</u>
Other Expense (incl. interest)	<u>76</u>	<u>134</u>
Pre Tax Profit	\$ 3,030	\$ 550
Federal Income Tax	<u>\$ 1,576</u>	<u>\$ 268</u>
Net Profit	<u><u>\$ 1,454</u></u>	<u><u>\$ 282</u></u>
Percent Net Profit	14.5%	3.2%
Shares of Common Outstanding	<u>49K</u>	<u>880K</u>
Earnings per Share	<u><u>\$29.70</u></u>	<u><u>32¢</u></u>

(Note: 193K of Mass. Tax Reclassified to SG&A on DEC statement to render comparable to CCC).

Statistical Comparisons

	<u>DEC</u>	<u>CCC</u>
Portion of CPFF Business (12 Mos. Ended October 31, 1962)	None	87%
Backlog at 1/25/'63		
Government Terminable	\$ - K	\$2,000K
Other	1,237	221
Total	<u>\$1,237K</u>	<u>\$2,221K</u>
Employees	450	600
Profit Sharing Plan	No	Yes
Leased Property		
Home Office	\$ 208K sq.ft.	\$ 92K sq.ft.
Annual Rent	\$ 90K	\$ 190K
Leased Equipment—Annual Cost (Not Including IBM Equipment)	\$ 28K	\$ 154K
Current Ratio	1.8 to 1	1.3 to 1
Inventory to Working Capital	1.1 to 1	1.9 to 1
Total Debt to Net Worth	1.2 to 1	2.4 to 1
Receivables Age ($\frac{\text{Yr. end Rec. Bal.}}{\text{Av. Mo. Sales}}$ for CCC)	57 days	70 days
Inventory Turnover ($\frac{\text{Yr. end Inv. Bal.}}{\text{Av. Mo. c/s}}$ for both)	188 days	114 days
Return on Investment Net Profit <u>Mean Net Worth (Est. for CCC)</u>	94%	30%

Notes: A 30% annual return on investment would ordinarily be regarded as quite good. This should prove that no one index is meaningful. CCC disipates their inventory turnover advantage in lesser gross margins. Presumably our advantage in Receivables turnover springs from a lesser portion of Government Business. (This would be an even more dramatic advantage if we limited our turover rate to module business only. To a first approximation I would guess it would be about two weeks shorter).



INTEROFFICE MEMORANDUM

DATE Feb. 12, 1963

SUBJECT

TO Ken Olsen

FROM H. O. Painter

In reply to your memo of February 8, we discussed the exhibit for the American Research and Development Annual Meeting of this year. We are planning to have on display the following:

PDP-1, Type 30G-CRT (With Character Generator)

DEC Tape Unit (Operating if possible)

Space War will be available for use with the PDP-1.

A handwritten signature, likely of H. O. Painter, consisting of a stylized 'H' followed by a large loop and a trailing flourish.



INTEROFFICE MEMORANDUM

DATE February 12, 1963

SUBJECT MODULE WRITE-UPS

TO Bob Savelli

FROM Jack Atwood

CC: ✓ Ken Olsen Gordon Bell
Stan Olsen Don White
Dick Best Stu Grover

Thank you for the information copy of your memorandum on module write-ups. Since this project is under my direction as cost center manager, I may be able to help you.

At the first meeting of our "Module Project Review Panel" on Dec. 27, we discovered that Sales and Engineering each thought the other department was responsible for generating information on new modules and accessories. Consequently no one was getting this information.

At our suggestion, it was agreed that Don White obtain from the engineers concerned the basic specifications on any new modules or accessories, that he forward this data to Sales and that Sales, in turn, make it available to Technical Publications. We would then produce product bulletins on each item.

At the next meeting on Jan. 2, Velma Grassler's list of uncataloged items was reviewed. Decisions were made on which items were for sale and which were not, and prices were entered on the list wherever possible. You will find a copy of this list attached.

Bob Graham went to work on the project immediately thereafter, obtaining from Sales information on the items to be sold and arranging for these units to be photographed. Bob also got together with Bob Buyer, who will do the draft text of the product bulletins, to review the information and to set up a schedule for producing the bulletins in groups of five - with the earliest to be for those units with reasonably complete specifications.

The units on which Bob & Bob are presently working are:

1161 BCD Decoder	4505 IBM 7090-DEC Converter
1536 Mag Tape Sense Amplifier	4506 IBM 7090-DEC Converter
1537 Drum Sense Amplifier	4518 Drum NRZ Writer
1538 DC Sense Amplifier	4606 Pulse Amplifier

1572 Difference Amplifier
4205 Flip-Flop Dual
4217 4-Bit Counter

4669 DEC-IBM Converter
4671 BCD Light Driver
4673 NIXIE Driver

While your memorandum specifies modules which "have not yet found their way into the catalog," I wonder if you and others in the Engineering Department might not also find it helpful to have some type of internal product bulletins prepared on the items which are not for sale. These bulletins would be relatively simple to produce in our established format since they could contain only the readily available specifications and would not have to go through technical copywriting or draft review.

We will be glad to help any way we can.



INTEROFFICE MEMORANDUM

DATE February 11, 1963

SUBJECT

TO Stan Olsen
Stu Grover

FROM Bob Savell

cc: ✓ Ken Olsen
Dick Best
Gordon Bell
Don White
Jack Atwood

For sometime now a number of us have felt that not enough information is being distributed on modules, to the engineering staff in particular, which are available for use, but have not yet found their way into the catalog. Usually one hears about the availability of these modules by the grapevine. Then, in order to find out anything about the module, it is necessary to peruse either Don White's or Dick Best's schematic book, draw out one's own block schematic and quiz Don or Dick about the driving capabilities, etc., etc.

Don has told me in the past that most of this material is in the hands of either the Sales Department or the Technical Publications Department. If this is true, I feel very strongly that it should be distributed, at least internally, in whatever rough draft form it is in so that good use may be made of it.

The Drafting Standards Committee, of which I am a member, is presently attempting as part of the standard project to design symbols for every module that we have available. We are stymied to some extent in this task by not knowing what modules are available that are not listed in the catalog. I would appreciate receiving from either Sales or from Technical Publications before Thursday, February 14 at least a list of all modules not presently included in the catalog and block diagrams and specifications if available. Would these departments please contact me if this material is not available in their department.



INTEROFFICE MEMORANDUM

DATE February 11, 1963

SUBJECT IEEE SHOW LITERATURE

TO Kenneth H. Olsen

FROM Jack Atwood

CC: Harlan Anderson Bob Savell
Stan Olsen Stu Grover
Dick Best Helene Shebak
Gordon Bell Bob Graham

With the help of the people to whom your memorandum of February 7 was addressed and of the people they supervise, we hope to have some two dozen pieces of new literature ready by or before IEEE show time in March. This material, agreed on by the several "project review panels" and outlined to the Works Committee, includes:

1. Computer Price Lists
2. CRT 31 Brochure
3. Line 8 Curve Drawing Display Bulletin
4. LINC Tape Bulletin
5. Tape Control 54 Bulletin
6. Tape Control 57 Bulletin
7. BBN Drum System Bulletin
8. Drum System 24 Bulletin
9. Data Channel Multiplexer Bulletin
10. Clock Multiplexer Bulletin
11. A-D Converter Bulletin
12. Extended Arithmetic Control 18 Bulletin
13. Revised DECAL Manual
14. PDP-1 Installation Planning Manual
15. Revised PDP-1 Instruction Card
16. Time Sharing Application Note
17. BBN Application Bulletin
18. New Module Price List
19. Lab Module Handbook
20. Memory Tester 1521 Brochure
21. Special Systems Brochure
22. Introductory (Facilities) Brochure
23. March ON LINE
24. New Employee Handbook

Obviously it will be impossible to produce this quantity of material in the five remaining work weeks without the cooperation of everyone concerned. And by "cooperation," I mean:

- a. That we must have reasonably complete information on any new products or techniques within the next two weeks, and
- b. That we must be free from undue disruption of our production schedule.

The second item is of particular concern to me, since there seems to be a growing tendency to hand out assignments to or seek the assistance of Technical Publications personnel without first determining whether we are in a position to provide the requested service. It is heartwarming to know that our people are considered this competent and desirable, but this situation is not necessarily conducive to the operation of the cost center to the best interests of the company as a whole.

I think that during the past four years we have proved our willingness to be of service in any way possible, and I do not intend to interfere with the ability of anyone in the group to operate independently - once an assignment has been agreed upon. On the contrary, I have forewarned new people coming in that, in view of the overall work load, they would be expected to carry out their duties with a minimum of supervision.

However, we do have many of the same operational problems as other departments in the use of our time and facilities. It would hardly be reasonable, for example, to expect Dick Best to meet his R&D goals or Maynard Sandler to have modules ready to ship or Dick Mills to get out a payroll every Thursday if their key people could be drawn off or new projects could be introduced in their cost centers without prior consultation and approval. (Nor is there reason to expect that I, with some sixteen years of productive advertising, public relations and sales promotion experience, am not as aware as other staff members of many worthwhile new projects which can be undertaken whenever time, budgets and company policies permit.)

Consequently I have instructed my group not to work on any assignment unless it is covered by a departmental job sheet which I, as the person responsible for the proper operation of the cost center, have approved as feasible, appropriate and capable of completion in the time allowed. I trust that you understand the reason for this restriction and that it meets with your approval.

K. L. Wakeen
February 8, 1963

SUMMARY OF MODULE TESTING COSTS

Present Costs

Flip-Flops	3.50 ea.	\$35,000 annual
Others	.87 ea.	<u>\$35,000</u>
		\$70,000

Future Costs

Flip-Flops	1.89 ea.	\$15,000 annual
Others	.38 ea.	<u>\$18,900</u>
		\$33,900

Annual Savings

\$70,000
- <u>\$33,900</u>
\$36,100

COST OF MODULE TESTING AUTOMATIC vs. PRESENT

Present Costs

Inv. & F.F.

No. Modules Tested	50,000/yr.
Total Test Time	10,000 hrs./yr.
Test Time (incl. 5 min/bd repair time for F.F.)	.2 hrs./module
Unit Cost 7.00/hr. (.2)	1.40 each

Annual Cost 50,000 (1.40)	<u>\$70,000</u>
---------------------------	-----------------

Future Costs

Inv. Etc.

Load & Unload Time	6 sec. ea.
Test Time (30 tests)	3 sec. ea.
Tyo Rej. only	1 sec.
Repair Time	<u>10 sec/bd</u>

Unit Cost 7.00 (.055)	20 sec/bd (.0055 hrs.) \$0.38 each
-----------------------	---------------------------------------

Annual Cost 40,000 (.38)	<u>\$15,000</u>
--------------------------	-----------------

F.F. Only

Load & Unload	6 sec./bd
Test Time (50 tests)	5 sec./bd
Tyo Rej. only	1 sec./bd
Repair Time	<u>120 sec./bd</u>

Unit Cost (7.00 x .027)	132 sec./bd (.027 hrs.) \$1.89 ea.
-------------------------	---------------------------------------

Annual Cost 10,000 (1.89)	<u>\$18,900</u>
---------------------------	-----------------

Added Costs to tyo All Info. (1.5 sec./meas.)

Inv. Etc.

30 Tests @ 1.5 sec./test	\$.09 ea.
Added Annual Cost	\$4,000.

F.F.

50 Tests @ 1.5 sec.	\$.14 ea.
Added Annual Cost	\$1,400.



INTEROFFICE MEMORANDUM

DATE February 7, 1963

SUBJECT Bus/Pac - Programming for DEC

TO

K. Olsen ✓
H. Anderson
G. Bell
H. Morse
M. Graetz

FROM

R. Mills

As a result of our meeting on February 4, 1963, the following items were proposed as a way to implement the phase-over of all of our DEC business applications from IBM machines to the PDP-4 installation:

1. That Martin Graetz from the programming group, will start on the Bus/Pac February 5, 1963 to work two weeks learning the operation of the package with Dit Morse and Fred Mac Lean.
2. That a requisition be entered for (1) interpreter, which appears to be an absolute must, if we cancel out our other IBM equipment.
3. Request an order for (1) - IBM - 1440 Power Head and (1) - 1440 Disc Pac. This was to be ordered for Gordon Bell on an experimentation basis, for evaluation, etc., at a total cost of \$1,140.00.
4. Enter a requisition for business programmer at once. The basis here is a well known one, being that once a company is committed to computerize its accounting operations, this becomes a continuing refining evaluation process.

#



INTEROFFICE MEMORANDUM

DATE February 5, 1963

SUBJECT OAL Display

TO Bob Savell

FROM Harlan Anderson

cc: Dick Best
Ken Olsen ✓

I have just finished speaking with John Shelderuck at OAL at Bedford and I established a time of 2 p.m. on Tuesday, February 5th for us to meet with them. He indicated to me that the name of the manufacturer of the monitor scope they are using is Electro-mec and that the Type Number is 2120. The way they have connected this to our Type 30 is by taking the output of the digital-to-analog converters and tying it into the horizontal and vertical amplifier inputs of the Electro-mec unit. This unit has magnetic deflection and they, indeed, turn the intensity on and off. Right now they turn it on and off at the same time as the Type 30 so the two displays have the same information. It requires a 50 volt positive pulse to do this. The Electro-mec unit requires a separate power supply which is rack mounted.

To-date they are reasonably pleased with how this has worked out, although they do have some jitter. He indicated that on large characters (1/2 inch or 3/8 inch) the picture looks quite good. Also geometric shapes have worked out quite well.

H.E. Anderson

HEA:ncs

Ken Olsen



INTEROFFICE MEMORANDUM

DATE February 3, 1963

SUBJECT Type 24 drum (Pondoro) Schedule

TO Computer Guidance Committee

FROM E. T. Johnson

R. Best
G. Bell
A. Blumenthal
L. Conley
A. Hall



FINISH LOGIC

TEST MODULES

ORDER MODULE
LPG. PARTS

PRODUCE MODULES

ASSEMBLY

CHASSIS LAYOUT
WIRING SCHEM.

RECORD
CLOCK

OFF LINE TESTING

ON LINE TESTING

WIRE PDPA
INTERFACE

← DELIVERY →

Report on the Bio-Medical Market

Robert F. Maxcy

February 5, 1963

Outline

Report on the Bio-Medical Market and its use of EDP Equipment

I Introduction

II Divisions

A. Hospital Use

1. Statistics
2. Research by AHA
3. Funds
4. Problems

B. Biological

1. Statistics
2. Research Use
3. Funds
4. Problems

III Role of Government

IV Role of Private Industry

V Common Problems of EDP User's in Bio-Medical Field and Communication Problem of Science and Industry

VI Evaluation of the Market Re: DEC

Report on the Bio-Medical Market

The information pertaining to the use of Electronic Data Processing Equipment in the Bio-Medical Field is not well documented. The following information was gathered largely as a result of telephone and mail contact with persons actively engaged in Biological and Medical Research. A small amount of information was gathered from government statistics.

The users of EDP Equipment in the Bio-Medical Field are divided into two broad groups: (1) Hospital Use and (2) Use by Research Organizations.

Hospitals

There are 6,923 hospitals in the U. S. Of these, 6.3% (437) are Federal, 3.2% (222) are Tuberculosis, and 7% (483) are psychiatric. The remainder fall under the heading of "general short and long term".

Excluding Federal, in 1956 these hospitals had total assets of \$8,300,000,000. In 1961 the figure was \$12,775,000,000 or an increase of 1.3 times. Expenses for the same period were up 1.7 times.

According to the American Hospital Association, only twelve (12) of these hospitals are known to be using EDP Equipment. This equipment is being used for the following purposes:

- A. Prescription Monitoring
- B. Patient Monitoring
- C. Records Keeping
- D. Pure Research
- E. Combinations of the Above

Because of the lack of information on this subject, the AHA formed a special group and has undertaken a study on EDP use in hospitals. This study has been going on for several months and should be completed in March.

Their primary goal is to provide their member hospitals with up-to-date information regarding EDP use. The data collected in this study will be tabulated by type, brand, and model of EDP equipment used in hospitals. This will be further analyzed by geographic area and characteristics of hospitals using this equipment.

They have not decided if and how they will offer this information to EDP manufacturer's. They have had offers to buy this information on an exclusive basis, but they are hesitant to do this as they do not want any one manufacturer to gain a large advantage in the market.

The financial ability of hospitals to purchase EDP equipment is low.

The National Institute of Health is unwilling to grant hospitals funds to purchase equipment for accounting and record's keeping purposes. They will, however, grant funds for Medical Research by hospitals. Only a few of the large hospitals have the facilities and personnel for research on any appreciable scale, so the basic problem of funds remains.

Bio-Medical Research Organizations

The information regarding this class of EDP user's comes mainly from the Federation of American Societies for Experimental Biology. These societies are generally a part of some large university, some are private, and some are associated with the Department of Health on state or federal levels.

Information regarding Bio-Medical studies being done by industry is not available as companies generally try to keep their research efforts confidential.

At the present time, 416 research organizations are under grants from the National Institute of Health for the use of EDP equipment in Bio-Medical studies.

In awarding these grants, the NIH must be convinced of the following facts:

1. That the research team is highly competent and that they are aware of present medical breakthroughs.
2. That the research will produce results beneficial to the national health.

Before any organization can receive a grant, it must describe to the NIH the type and cost of the EDP equipment that is needed. This means that at least 416 research organizations have, or are presently buying, EDP equipment.

The Federation of American Societies for Experimental Biology is now undertaking a study to determine the feasibility of setting up a computing center for use by their members. Such centers are already in existence. Dr. Walter Rosenblith from MIT has been responsible for establishing two or three centers and is now working confidentially on a new center.

Role of Government

At the present time, the government, or specifically, NIH is financing an estimated 80% of all Bio-Medical Research. Their grants are for pure research applications only. Requirements for grants are tough, and hundreds of organizations are turned down each year because of lack of government funds or because the organizations do not meet NIH standards.

The government has made a half-hearted attempt to document some of the information regarding EDP use in the Bio-Medical Field. There are various fact-finding organizations that are part of NIH. The information gathered by them is offered in its pure form to the scientifically-interested, non-profit organization only. This same information is turned over to the Department of Commerce and consolidated into general statistics which prove of little value to DEC.

Role of Primate Industry

Primate industry plays its biggest role by performing its own research. Large drug and chemical houses are actively engaged in Bio-Medical Research. There is a strong probability that a considerable amount of EDP equipment is used. Much of this may be called "process control equipment". The research and development activities of primate industry are generally very confidential, and information is difficult to obtain.

General Problems

There are some general problems which affect both hospitals and research organizations. One of the major problems is ignorance of the proper use of EDP equipment. Too many organizations obtain a computer with three or four programs and then make no effort to extend the use of their equipment through additional programming. One reason for this, which was used many times, was the expense of programming. The result is that researchers teach themselves to program, but it is a long process, and in the meantime the computer is being used unsatisfactorily.

Another major problem is equipment and prices. In general, manufacturers are not willing to design new EDP research equipment for a single user if future sales are uncertain. The cost of such one-customer designs puts them out of the range of most research organizations and of almost all hospitals.

EDP equipment, in general, is priced beyond the reach of the research team unless the government is enlisted for financial support.

Communication between various Bio-Medical groups is poor. Much of this is due to poor documentation of existing practices, and some is due to secrecy of the research team. For about the same reasons, the communication between science and industry is poor.

Many researchers regard industry as an outsider whose interests are mainly profit making rather than scientific.

Evaluation of the Market and DEC's Position

The Bio-Medical market appears to be still in its infant stages. Leaders of Research Organizations, The American Medical Association, and the American Hospital Association have become aware of the great future in EDP use and are conducting studies to gather data and explore future possibilities.

It appears that the companies that will offer some flexibility of design, a wide variety of software packages, reasonable prices, and a close awareness of customer needs will be the future suppliers of EDP equipment to the Bio-Medical Field.

The leaders in the Bio-Medical Field are well aware of DEC's contribution to Massachusetts General and we should make the best use possible of this installation.

If we wish to continue in this field, we must become aware of not only Massachusetts General's needs, but of the general needs of all research and hospital groups. More software and customer education regarding machine use is needed. The market is there, but we will have to concentrate our efforts in order to enter it on any appreciable scale.



INTEROFFICE MEMORANDUM

DATE February 5, 1963

SUBJECT Results of the Meeting Concerning Future Tape Units

TO K. Olsen
H. Anderson
D. Best
G. Bell
W. Hindle
T. Stockebrand

FROM Roland Boisvert

The following are the conclusions which were drawn from the tape from the meeting concerning future tape units, and the action to be taken.

1. Order a MT120 Transport from Potter capable of both 75 and 120" per second.
2. To prepare the engineering change over and make all future tape unit orders the MT120.
3. Development of 200/556/800 cpi read-write circuitry.
4. To make sure that we get a one year warranty on the MT120.
5. From the manpower viewpoint, we cannot consider a slow inexpensive tape unit with a low transport character rate at this time. There is a strong feeling our present line plus the linc tape system will eliminate a need for this type of transport.



INTEROFFICE MEMORANDUM

DATE February 4, 1963

SUBJECT Additional Personnel to Handle PDP-1, 4 changes

TO Computer Guidance Committee

FROM Gordon Bell

I would like to borrow Don Smith from the Sales Department for a six month period. The projects I presently contemplate are:

1. Design of Data Channel for Type 59 Magnetic Tape Control.
2. Modify PDP-1 Central Processor for BBN job and design Memory Switching.
3. Design Teletype Line Scanning Processor for BBN System.
4. Assist on BBN System.
5. Assist on PDP-1A design changes:
 - a) Reversal of polarity of AC outputs.
 - b) Modify shift/rotate instruction.
 - c) Install exchange AC/IO instruction.
 - d) Install normalize instruction.
 - e) Install exchange memory instruction.
 - f) Install character processing instruction.
 - g) Install index instruction.



INTEROFFICE MEMORANDUM

DATE February 5, 1963

SUBJECT Present & Future Plans & Requirements of the Peripheral Equipment Department

TO Ken Olsen

FROM Robert Savell

Harlan Anderson
Dick Best
Gordon Bell
Nick Mazzaresse

Personnel Needs:

Our needs for the immediate and foreseeable future, which I consider to be the next six months are listed below.

1. Sales engineer in the Sales Department

This man should have a good engineering background with preferably some CRT work so that he can handle 90% of the work connected with customer's display inquiries of which a considerable portion at present are referred to the Peripheral Equipment Department. I believe that locating this man in the Sales Department will tend to keep him doing selling whereas if he were located in the Peripheral Equipment Department the temptation would be very great to steal some of his time for engineering projects. I believe that the cathode ray tube display field is just beginning to get off the ground and that so far we have a good position in that field which we should strive to keep and improve by selling enough displays so that when people think of displays they think of Digital Equipment Corporation. I further believe that the majority of displays which we sell will differ from one another in various ways so that in many cases individual price quotations and special engineering will be required.

2. Field service personnel

The field service personnel must be better educated about displays in particular and also other peripheral equipment. I have suggested to Bob Beckman that his field service people be scheduled through display checkout one at a time as part of this education process.

3. One circuit engineer

This engineer should, I believe, preferably be located in the Circuit Group under Don White and Dick Best as I believe that most module circuit work can best be done by circuit specialists who are designing circuits day in and day out and designing testers and test procedures for modules day in and day out. I plan to have almost all my module

circuit work done by the circuits department from now on. We must by all means keep our hands in the circuits business, and as long as we design displays especially we most certainly will be doing so.

I have immediate needs for a faster intensification amplifier 4688, a faster light pen amplifier, a light pen amplifier tester and test specifications, a light pen circuit tester, a feed forward circuit for the Incremental Display, testers and test specifications for the sample and hold module 1575, testers and test specifications for the cathode ray tube protection module 1708 and power control 826.

Note:

Bill Long, who is presently an engineer with Contronics and has some cathode ray tube experience, will be out on February 4th for an interview and might possibly fill number one or number three but if number three in my department. He has had character generating experience so would be an asset in that end of our activity.

4. Engineering assistant or junior engineer

If the line and curve generator is to be done anywhere near IRE show time, work must be immediately started but in parallel with the work Jim Sullivan is doing on the Incremental Display.

5. Technician Personnel

Three are required as soon as possible for work on displays, paper tape readers and punches, medium speed printers, line and curve generators and further work to be described later on in this memo.

6. Future technical personnel

I believe that within six months to a year the display business in particular, and to some extent the special input-output equipment activity, may increase to the point where we would require two to four more technicians. I will discuss possibilities for such people with Bob Lassen and stake an early claim to those who look promising.

7. Future engineering personnel

I believe we have suffered somewhat by not having a better engineer to technician ratio in the past. The present complement including myself is five engineers and engineering assistants and only three technicians. This ratio will be remedied by the addition of the three technician personnel requested above.

The addition of a sales engineer as requested in number one and of a circuit engineer requested in number three will relieve some of the load now carried by members of the Peripheral Equipment Department. There are, however, a number of projects that have been discussed recently on which a decision to proceed as fast as possible should be made as soon as possible. These projects are:

1. Eyeball Design, both Digital and Analog, including selection of both 16 and 35 mm film transport mechanisms. Estimate 2 to 5 man weeks engineering.
2. A fast character generators - estimated 6 to 10 weeks engineering.
3. Fast Display probably electrostatic deflection - I estimate 6 to 10 weeks engineering.
4. Cheap monitor display - I estimate 2 to 3 weeks engineering.
5. Projection TV - I estimate an initial one week engineering for tests to prove feasibility for continuing further with the project. An uneducated guess for projection TV system might be 3 to 7 weeks engineering time.

If it is desired that these projects proceed as fast as possible, ie, have work begin on all of them before the middle of February without setting back other projects already scheduled, I would assume the addition of between one and three additional engineers.

Status of Peripheral Equipment Projects as of January 1, 1963

In general, with the exception of Jim Sullivan, we were approximately 2 months behind as of January 1st on projects scheduled to be finished by that time. This does not mean that all projects up to that time were two months late in completion. The lag in time is due to various reasons. On my own projects it has been due mainly to much more time spend on unscheduled projects, new projects and sales, including proposal writing, than I had estimated. In the case of Derrick Chin it is due in part to under-estimation on both his part and mine as to time required to complete his various projects, plus more time than we had allotted spent on routine display checkout assistance when John Duffy was still with us. This has been remedied by transferring display checkout to a location physically removed from us over in production under the supervision of the Production Department.

With Jay Cleary it was primarily a case of extra work which was assigned to him by me after his schedule was made out which caused previously scheduled projects not to be commenced.

Larry White was late primarily due I think to his newness. He has been with us since August and the Symbol Generator Type 33 was his first logic design project.

Jim Sullivan was caught up primarily due to the fact that most of his projects were clearly defined and he has few interruptions in his schedule.

I believe that I can improve this situation in the future by closer checking on the progress of projects delegated to those under me. I plan to achieve this by delegating some of the work I am presently doing myself. It will be possible to delegate this work providing we obtain more technical assistance in the department as requested above so that the other engineers may in turn delegate as much as possible to the technicians

under them commensurate, of course, with the technician's capabilities. I believe we have not made as full use of technicians in the past as we should have.

Project Assignments:

Following are a list of project assignments within the Peripheral Equipment Department. Both present and future suggested projects are listed according to the engineer they are assigned to.

1. Derrick Chin

Present projects scheduled for completion approximately February 28th:

- a) Completion of immediate development problems on Type 31 Display including cathode ray tube beam protection circuit, drift of S300 power supply focus coil and yoke alignment problems, coil coupling, recovery time, setup time, and focusing circuit check, checkout procedures established, prints completed and up to date, and measurements completed.
- b) Color display #2 completely installed and checked. Prints brought up to date and an outline of a checkout procedure established.
- c) Selection of a thermal switch to replace the air-actuated sail switch in the deflection output amplifier heat sink assemblies.
- d) Supervision of measurements of stability of 00 point gain and repeatability on all available in-house units of Type 30 Display.
- e) Completion of portable display tester manual.

Future Projects

- a) Further Type 30 and Type 31 developments not scheduled as yet.
- b) Advertising brochures for Type 31.
- c) Completion of maintenance manual for Type 31.
- d) Proposal writing for special 31 systems.
- e) Education of field service and customer personnel for both Type 30 and 31, customer.
- f) Initial investigation into the feasibility of construction electro-statically deflected displays, estimated one week.
- g) Initial tests to determine feasibility of proceeding further with projection television approach to large screen display, estimate one week.

h) Initial efforts to determine feasibility of producing a cheaper display, estimate one week.

i) ~~Possible further color display work.~~

j) ~~Possible line, curve and conic generating displays.~~

k) Cheap monitor display.

2. Jay Cleary

Present projects to be finished approximately February 7th.

- a) Potter paper tape reader and spooler evaluation.'
- b) Completion of reader, punch and typewriter incoming inspection, modification and test procedures for both reader, punch, and typewriter equipment for PDP-1 and PDP-4.
- c) Incorporation of redesigned reader, punch, typewriter and punch motor control logic into PDP-1 and completion of price quotation for L. Buckland for addition of a Soroban high-speed 300 character per second punch to a PDP-1.

Future Projects

- a) Completion of IBM Selectric input-output writer logic, and initial tests, two to three weeks.
- b) Design of DEC paper tape reader?
- c) Further investigation of Kleinschmidt medium speed printer.
- d) The possible design of IBM equipment control units for Shelly Boillen at BBN.
- e) Evaluation of Omnitronics, Rheem, and possibly Photo-circuits, paper tape readers for possible savings of approximately 1,000 dollars per PDP-1. Estimate two to three weeks.
- ~~f) Tally Punch evaluation.~~
- g) Eyeball circuits?

3. Larry White

Present projects scheduled for completion February 1, 1963.

- a) Digital Symbol Generator Type 33.

Future Projects

- a) An estimate for interfacing display 30 to a CDC 160A, estimated 3 days.
- b) Interfacing Display 30 to IBM 7090 and 1410. I estimate one week on each design.
- c) Various Symbol Generator modifications to install the generator in various customer's displays?
- d) Special Display for AECL, two to four weeks.
- e) Interface for Display Type 31 to Control Data Corporation 924 for MIT, estimated 3 weeks.
- f) Fast character generator, estimate 6 to 10 weeks.
- g) Assisting Derrick Chin with various Type 30 problems.

4. Jim Sullivan

Present projects scheduled for completion March 18.

- a) Type 34 oscilloscope display tests.
- b) Control for 35 mm camera for Type 31 Display.
- c) Camera equipment for Type 30 Display.
- d) Incremental Display.
- e) Display 30 test programs - Microscope, Decoder Adjustment writeups.
- f) High speed printer test programs and alignment improvements measurements.
- g) Card Reader Test Programs and test runs.

Future Projects

- a) Dataphone
- b) Holley Printer interface for NSA, estimate two to three weeks.



INTEROFFICE MEMORANDUM

DATE February 4, 1963

SUBJECT Computer Production Construction Plan for March and April

TO K. Olsen ✓
H. Anderson
S. Olsen
M. Sandler

FROM J. Smith

First effort will be given to customizing customer configuration machines that are presently in Checkout. If possible, we will continue to construct at our previously determined schedule of one PDP-1 and two PDP-4's. I am quite confident that schedule dates will continue to be met.

Each machine constructed will continue to receive a full complement of modules. However, customer shipments will be given first priority on all module issues. A line of communication will be set up between Jim Myers and myself where modules can be removed from computers in order to meet commitments to customer orders.

R. Olsen

dec

INTEROFFICE MEMORANDUM

COMPANY CONFIDENTIAL

DATE February 1, 1963

SUBJECT Meeting #3, Jan. 31, 1963

TO Engineering Projects Committee

FROM Drawing Standards Committee

Attendance: John Fadinan
Paul Barber
Al Blumenthal

Gordon Bell has found it necessary to resign from the committee because of the heavy demands on his time. He will, however, attend meetings at the request of the committee in order to make use of his ideas on the subject. He will, probably, request his attendance each time a new phase of the task is open.

There were no comments on old business so we proceeded with the task of selecting symbols for each module type. We are currently working on flip-flop modules. The usual symbology covers the majority of these units. Special cases to be considered are:

- (a) The pulse inverter symbol for units having CD gates. We decided against the triangle presently used in favor of the usual inverter symbol.
- (b) 4204 symbol was changed radically from that shown on the catalog. Pulse inverters were eliminated entirely, the direct sets are drawn in the usual fashion, the carry outputs emerge from the sides of the flip-flop symbols.
- (c) It was felt that the inhibit gate in the 4215 should be shown in a more standard fashion. The method decided upon involves two (2) diodes and the level is now referred to as an enable rather than an inhibit.

We have completed flip-flop symbology and John Fadinan will prepare a summation of all symbology recommendations to date for presentation to the projects committee. This will be completed for the February 11, meeting.

Allan N. Blumenthal

ANB/abh



INTEROFFICE MEMORANDUM

DATE January 31, 1963

SUBJECT Munich Office - Summary of Advice to Date

TO Ken Olsen ✓
Harlan Anderson

FROM George O'Dea

cc: Stan Olsen
Win Hindle
Dick Mills

1. As of this writing it appears that our best bet is to go G.m.b.H (As a Branch we would be subject to harassment and arbitrary tax determination). For purposes of a time table it would seem the day Guenter starts in Munich would be the ideal date of the incorporation. Expenses up to that date would be borne in Maynard and fully deductible on our fiscal '63 tax return. Particularly this should include the cost of bringing Guenter back here in April.
2. Do we run any risk in operating a branch in the interim (w/o approval of the Bavarians)? Probably not - we can establish good faith by the existence of our two bank accounts, lease, and employee. As long as no income accrues we have been advised that the lag in incorporating should not involve penalties.
3. As an G.m.b.H, here are our Tax Problems: (Other than Turn Over Taxes)
 - a) Property Taxes: 1% per annum on negotiated net worth (determined every four years). This is not deductible from "pre tax profit" for purposes of determining German Income Tax. The "negotiations" here are critical and apparently involve bargaining. They would best be conducted by local tax specialist.
 - b) Trade Taxes: of which there are three (Trade Property, Trade Income, and Trade Payroll). These taxes are at a Federal rate - but modified within the Various States of Germany by a Hebungsfactor (or multiplier, intended to equalize the economics of Various parts of the Republic.)
 - 1) Trade Property Tax: at 0.2% per annum of the business assets permanently used in business. The normal Hebungsfactor here is 300%. This tax is deductible from "pre tax income" for purposes of German Income Tax - but not for special credit in U.S.
 - 2) Trade Income Tax: at 5.0% per annum of the pre tax income with a normal Hebungsfactor range from 200% to 350%. This Tax is deductible from "pre tax income" for purposes of German Income Tax - and is eligible for special credit on U.S. Tax.

- 3) Trade Payroll Tax: at 0.2% per annum of Gross Payroll - the Munich area does not presently exact this tax. If they ever do, it would be deductible from pre tax income for purposes of German Income Tax - but not eligible for special credit in U.S.
- c) Income Taxes: The "Federal" Income Tax is 15% on distributed earnings and 51% on retained earnings.

A sample calculation on the above factors, assuming DM100,000 "pre tax" net profit with Property Value of DM100,000 and negotiated net worth of ~~DM50,000~~ is as follows:

"Pre Tax" Profit	DM100,000
Less Trade Taxes	
Income 5% x H factor of 3	15,000
Property 0.2% x H factor of 3	600
Payroll (none presently in Bavaria)	-
Total Trade Tax	<u>15,600</u>
Profit before German Income Tax	84,400
(Assume 100% distribution to U.S.)	
x German Tax rate on dividends (15%)	<u>12,660</u>
	<u>71,740</u>
Less Property Tax	<u>1,000</u>
Net Profit in Germany	<u><u>DM 70,740</u></u>

This profit, on being taken up on American Tax return, would fall out as follows:

Net profit from Germany	DM 70,740
Add Back German Income Taxes	
(gross-up)	<u>27,660</u>
	<u>98,400</u>
American Tax	
52% of gross up	51,168
less tax credit	<u>27,660</u>
U.S. Tax due	23,508

Thus, the net profit on this situation would be

Profit in Germany	DM 70,740
Less U.S. Income Tax	<u>23,508</u>
Net Profit	<u><u>DM 47,232</u></u>

Germany would impose a 25% withholding on the dividend subject to final tax determination.

- d) Capital Transaction Tax: One shot proposition: $2\frac{1}{2}\%$ of the Value of Shares issued.
- 4. Profit determination in Germany is a many sided thing. The directors meet annually and based on the ending net worth (not the income statement) declare the profit. This determination is normally made for the purposes of establishing the company's minimum value in the eyes of its creditors. Inventories are greatly devaluated, Depreciation is accelerated etc. On the strength of this determination a dividend is declared. Since the German Tax rate on distributed profits is 15% (vs. 51% on undistributed), this Annual meeting is important. Subsequent dividends out of the same year's profit are not exempted from the 51% tax rate!
- 5. Taxable Profit more closely equals what we would think of as net profit in this country - but it is still determined on a "change in net worth" basis. Inventory devaluations while permitted, are limited (usually up to 10%), Depreciation must be taken per Federal Schedule, etc.
- 6. Technicality regarding Stock. A GmbH is a limited liability company whose ownership is evidenced by shares whose American equivalent would be certificates of participation. The term stock as such is restricted to shares of the A.G. corporate structure only.
- 7. Turn over Tax. This is the most important tax in Germany and, understandably complicated. Basically, it calls for a 4% add on to all billings between business entities. We have learned the following about this tax.
 - a) Under the doctrine of Organschaft, DEC Sales to its own GmbH are exempt.
 - b) The GmbH sales outside of Germany are exempt.
 - c) If manufacturing is done in Germany, using components on which TO Tax has been paid, then a refund of this tax is available on Shipments out of Germany.
 - d) Equalization Factors apply to this tax - and in some circumstances the rate can be other than 4%.
 - e) This tax is added to the billing much like a domestic Sales Tax. Of itself, it costs the Company nothing - but, of course it raises the landed cost to the customer. *Not shown separately on face of invoice*
 - f) There is a technique called Box Privilege - which could help on export.

There are two big areas where the advice to date has been fragmentary. This is one of them. Mr. Schueller has recommended that we contact the Frankfurt office of Coopers and Lybrands (not the Munich Office) and speak to Mr. Holterman or Dr. Weheler for good information on how to approach turn-over tax.

8. Duty. This is the second area in which advice has been fragmentary. All concerned agree that duty should be negotiated by a German Customs Broker. Mr. Hill at the Morgan Guarantee has offered to send us the name of such a man. Mr. Schueller of LRB&M has suggested that his colleagues in Frankfurt can recommend such a man.
9. Sub Part F Income. Every single person to whom we have spoken has brought up this subject. The name comes from the U.S. Tax regulations which say that income of a Foreign Controlled Corporation whose Sales are 30% or more outside of its own country, shall be regarded, for U.S. Tax purposes, as having distributed its profits to its American Parent (this is an over simplified definition but will serve for our purposes.)

This means that if our GmbH sells outside of Germany to the extent of 30% of its total Volume, then the profit of the GmbH is taxable here (pro-rata from 30-70%: entirely if over 70%).

Such a determination can be avoided by having the GmbH declare an Export Trade Corporation. (To qualify it must show that 75% of its Sales are of U.S. made products).

We have not pursued this declaration because our primary motivation is to increase business, not defer taxes. The German Tax rate of 51% on Undistributed earnings is so close to the U.S. rate of 52% that we will probably want to distribute 100% of the GmbH profits (on which the rate is only 15%).

10. Quirk in Corporate Structure. In this country if you wish to start a Corporation you authorize a great many shares and issue only what you need.

In a GmbH all shares are issued - but need not be fully paid-in (minimum of 25% must be paid - on at least DM20,000. Shares cannot be for less than DM500)

Charter changes are expensive and hard to get. Be sure the original Charter covers all reasonably likely Corporate Activities (i.e., manufacturing) and provides for sufficient shares to get the company going. The German Tax authorities view loans to subs very critically and if they are of any substantive duration, reserve the right to regard them as added capitalization.

Mr. Schueller pointed out that repayments of loans by subs literally come out of the 49% profit after Taxes - while dividends come out of the 85% profit after taxes.

11. Miscellaneous advice.

- a) Freeports exist - at least in Bremen and Hamburg.
- b) Trade marks should be registered.
- c) Cash Flows between Germany and U.S. completely without restraints.
- d) The Mark is stable.
- e) Turnover Taxes may be revised to an "added value" basis in the next few years.
- f) To the extent of Governmental requirements, Accounting procedures are not difficult and, once set up, could probably be run by the secretary. Will arrange to have Coopers and Lybrand do the setting up - and instructing of the Secretary.
- g) As regards DEC accounting requirements, its too soon to say for sure. We are going to want to know what is going on in the American sense of Profit-Loss which is apparently a third "set of books" in contrast to Director Declared Profits and Taxable Profits. This will evolve as other decisions are made, (i.e., who bills, who collects, is the GmbH merely an agent of DEC or is it the Principal in relation to the customer).
- h) Settle legal fees in conjunction with Incorporation in advance.

So much for the advice - now to the time table.

We have several months in which to form the GmbH. In the meantime we are in a potentially dangerous position as regards payroll taxes on our Secretary.

As a matter of immediate action we will write Dr. Strobl and announce our decision to become a GmbH but state that it will not be possible to complete the action until May 1. Point out the fact that we are in default as regards payroll taxes in the interim and ask his advice on what to do (We may or may not wish to retain Dr. Strobl later on - but today he is our best bet).

Next we will need some estimates of activity in order to establish capitalization.

As soon as we have the name of a capable custom Broker from Mr. Hill we should proceed to determine duty - and therefrom, make a decision on Agent vs. Principal.

Next, we will have to arrange the Accounting set up with Coopers and Lybrand.

Some place along the way, we will have to give our GmbH a name.

Once you have had the opportunity to digest some of these complications lets get together and assign names and dates to these responsibilities.



INTEROFFICE MEMORANDUM

DATE January 31, 1963

SUBJECT Stanford University

TO File

FROM Harlan E. Anderson

I just spoke with John McCarthy at Stanford to see how their plans were coming along. He indicated that now that the money was available within Stanford for this teaching machine project of Professor Suppes, they were now taking a very close look at exactly what they should do. He indicated that this more detailed evaluation would probably take an additional week at least. He hastened to point out that this is not his money but is to be used by quite a group of people.

In the meantime, John has also gotten some funds from the Advance Research Project Agency (Licklider's organization).

He related to me his investigations of the quality of displays that could be generated for a multiple student teaching system. He assumed use of the character generator and that each scope would require 100 characters. He further assumed that there would be six scopes. He then assumed that there would be a display program involved in the time sharing and that it would not act like a typewriter but would take command four times each second for generating the complete displays for all scopes. This means that 600 characters would have to be generated. He figures this will take 72 milliseconds and an additional 30 milliseconds are required for the drum field swap. This total of 102 milliseconds has to be multiplied by four and gives you approximately 4/10ths of a second for the display.

They are concerned as to whether this much flicker is more than could be tolerated. Therefore, they are setting up a test program to see how a scope would look with this flicker on it. A man named Steven Russell is writing the program and they would like to have a spot where they could debug this program. The problems of access to the Livermore Lab are sufficiently great that they do not feel it is practical to do it there. Therefore, he was asking me if I knew of any computer setup in Los Angeles that they could use. I told him that our machine was a PDP-4 in our office and that other machines in the Los Angeles area belong to various customers. He thought he might contact BBN to see if he could get time there.

They are contacting Ampex for the audio portion of this teaching machine setup.

As a separate thing, John talked with Ben Gurley when Ben was in California recently about a display computer whose full-time job would be the refreshing of scopes. Ben had estimated that something like this could be built for \$50,000. If this were available to operate on six bit characters and automatically make the scope character, John figures this would give him a 40-fold increase in speed. He forgot to mention increase over what.

John indicated that Control Data Corporation has come out with a new little console unit including a 7-inch scope using an electrostatic deflection. This scope requires 6 microseconds per character and mounted on the same table is a keyboard for use as an input to a computer. The whole thing is an attachment to a computer and the price is somewhat uncertain at this point.

My conclusion is because there is competition of one kind or another and John is only one person involved in this overall activity, we must do some aggressive selling here in order to get this job. I plan to contact John and perhaps go out to San Francisco in the next several weeks.

H.E. Anderson

HEA:ncs

cc: Ken Larsen

Stan Olsen

Ken Olsen ✓



INTEROFFICE MEMORANDUM

DATE January 31, 1963

SUBJECT 16 MM. SOUND PROJECTOR

TO Cost Center Managers

FROM Personnel Committee

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

The company has rented a 16 mm. sound projector for the month of February to determine how much such a machine might be used if we were to purchase it.

There is a good selection of training films available on loan or rental from various organizations and commercial film libraries. Many of these could be used to advantage with our personnel.

A film catalog is being prepared by the Personnel Office and the Technical Publications Department. This catalog will be kept in the Personnel conference room.

The projector and screen will be stored in Technical Publications. John D'Orsi will schedule the use of the equipment and instruct in its proper operation.

If you feel it would be worthwhile to show your personnel a film on a given subject:

1. Check the catalog for available films (unless you already know where to obtain the film you want).
2. Arrange with the Personnel Office to secure the film or films you select.
3. Call John D'Orsi (Extension 366) to reserve the projector and screen.
4. Have your "projectionist" see John for instruction on the operation of the machine (a Bell & Howell Filmosound Specialist).
5. Have someone pick up your film at the Personnel Office and return it to the Personnel Office after the showing.
6. Be sure to review the film before showing it to your group. You may find that it is not suitable or worthwhile.

NOTE: If you have any information on films suitable for inclusion in the film catalog, please pass it along to the Personnel Office.

CAUTION: Make your plans well in advance. Otherwise you may find that the film you want is not available when you want it or that the projection equipment is already reserved for another user.



INTEROFFICE MEMORANDUM

File Copy
K. Olsen

DATE **January 28, 1963**

SUBJECT **Tape Controls 57 and 54**

TO **Roland Boisvert**

FROM **Gordon Bell**

cc: **Steve Lambert**
Dick Best
Stu Grover
A. Titcomb
Nick Mazzaresse
Arthur Hall

57 System Description

According to my schedule of November 30 from Steve Lambert for the Tape Control 57, it is four weeks overdue. Fortunately the purchase order from JPL has not arrived, and as such their machine probably won't be late. There may be some correlation between JPL not receiving specifications on the 57 and our not receiving their purchase order.

The most significant error made so far with the 57 is that a write-up has not been presented for outside comment resulting in a tape control design that may be weak. It may not be too late for such a review.

A description of the control (programming and system viewpoint) must be sent to JPL by Friday, February 1, 1963. The preliminary draft should be submitted for my approval on Wednesday, January 30, 1963.

A description of the control in a form suitable for publication should be available within the next month for marketing use.

57 Maintenance Description

Steps should be initiated now to provide a maintenance manual with the first delivery. If the project leader can not make these arrangements, we should meet immediately to remedy the situation.

54 Control

This control was originated by me in August, 1962 and turned over to Steve Lambert. The description of the control is not available in a semi-professional looking document.

The programs which operate the control though partially described are not ready for distribution. These routines will be distributed through the Program Library, and as such can have a second or third write up. Here, the routines and their listings are the most important thing.

A control is to be delivered to Foxboro on Wednesday, January 30. Both the control and the program description should be ready by then.

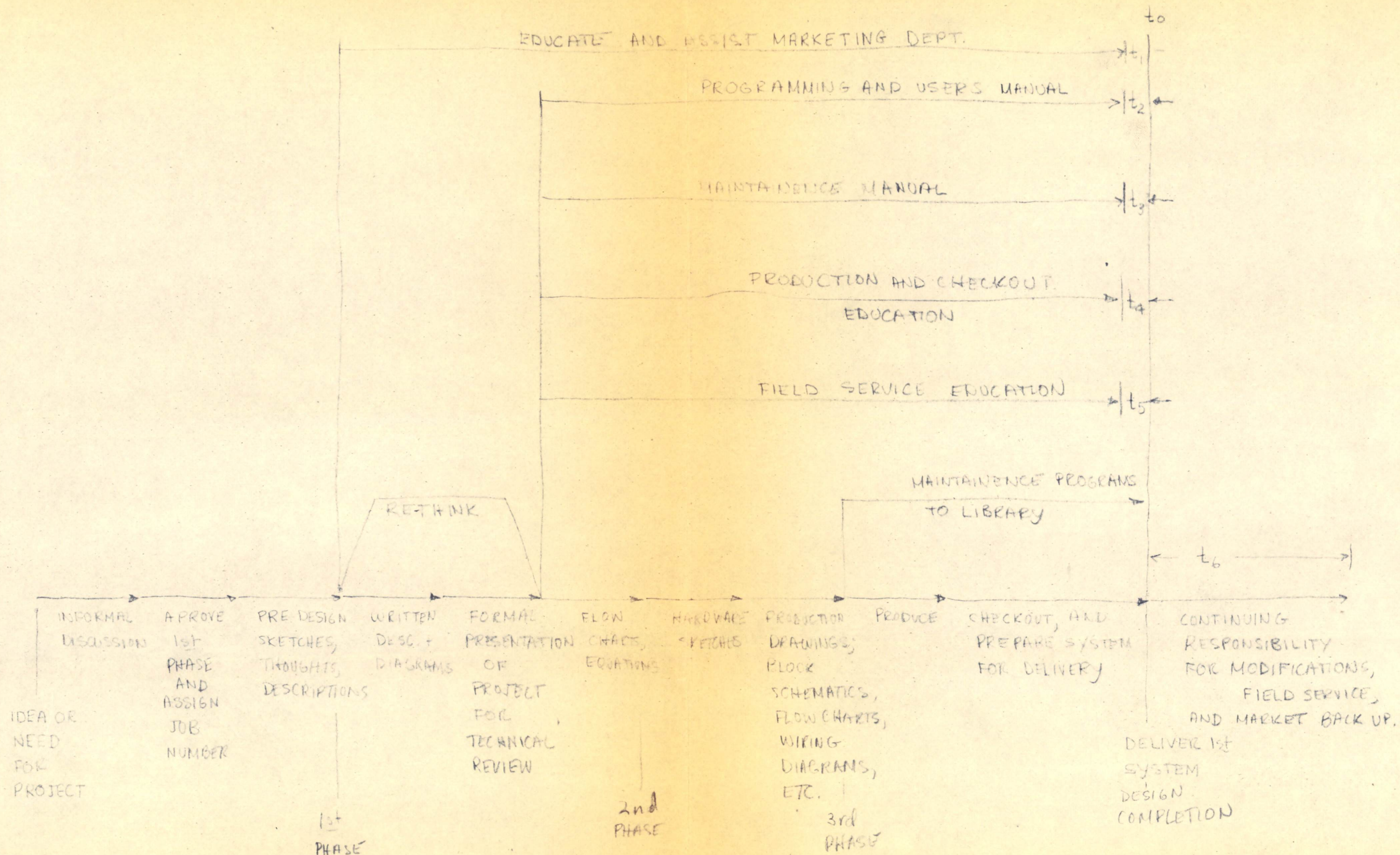
Future Development

The enclosed figure outlines the procedure to be carried out by project engineers. While there are many new and interesting projects upon which to embark, this must not be allowed to confuse the development of any single project.

Following an outline for each project accomplishes:

1. Success for the engineer (new projects, better projects, more advancement, etc.)
2. Better products which combine talents of more than a single individual.
3. Freedom for contemporaries (people using the design do not have to make excuses for poor design.)
4. Freedom for the engineer. Once the unit is properly designed, he no longer is part of it. No engineer service calls, etc.

The project engineer must be aware of the considerations shown in the following figure. There are too many new and interesting developments and projects upon which we are to embark to allow sloppy planning to shackle us. This not only shackles the project engineer, but his contemporaries who use his sub-system design in their system. An engineer should be prepared to assist customer service, but in most cases, continued service calls by a project engineer merely indicates incompetent or understaffed field service, poor design or documentation, or improper training of technicians or incompetent technicians. All these situations can be avoided by some planning. Hardwork in the design area is necessary, and is certainly appreciated, but project planning is necessary too.



IDEAL PROJECT ENGINEER: $|IDEA - t_0| = \text{small}$
 $t_6 = 0$; t_1, t_2, t_3, t_4 , and t_5 are all large pos. #'s

ENGINEER PROJECT RESPONSIBILITY

96 1/29/63



INTEROFFICE MEMORANDUM

DATE January 24, 1963

SUBJECT American Psychology Association Exhibit

TO Ken Olsen ✓

FROM Harlan E. Anderson

cc: Nick Mazzaresse
Bob Savell

Today I was visited by Charlie Brown and Jim Duva of the Operations Analysis Laboratory at Bedford. They came to try and convince us to cooperate in staging a demonstration of computer control psychology testing at the technical meeting of the American Psychology Association. This meeting will be held around the Labor Day week-end in Philadelphia and will be attended by about 3,000 to 4,000 psychology people. There are normally commercial exhibits and non-commercial exhibits associated with this convention. The non-commercial exhibits are rent free but are normally very limited in space. They would like to show a basic computer with three or four scopes with light pens and at least one character generator. They would treat each scope as if it were a test station for psychological testing of subjects. They would also like to have at least one magnetic tape unit.

We have worked out a system for slaving scopes to the DEC Type 30 scope. These scopes are manufactured by a company whose name they were not sure of but it was something like Typetronics. The slave scopes cost about \$1700 each and are 14 inches. We already have one of these attached as a slave to the scope at Bedford. Their ultimate plan would be to drive them in parallel and to put a switching box in front of each scope so that it could be turned on or off; thus, giving the impression of different information on each scope. This would be equivalent to sequentially illuminating the scopes and when coupled with a character generator they hope to have virtually flicker-free operation for reasonable amounts of information on the face of the tube.

In addition to the above equipment, they would like to have the psycho acoustics lab that BBN has been developing for them attached to the PDP-1. This work is being done by Gerry Elkind and it is about equal in size to a PDP-1. It does such things as automatic calibration of audio oscillators, etc. It has devices called knob twisters which work directly from the PDP-1 and have flexible cables that attach mechanically to knobs of some of the instruments that they use.

These people have a nine minute film describing in general terms this psychology laboratory approach they are using. They would be willing to loan this to us if we would like to see it, or they would be willing to demonstrate their present state of activity. I said we would call them about the 1st of February to make a date for the following week to come see them. I have made no commitments other than to declare that we are interested in pursuing the discussion further. If they are going to have space at this show, they must put in their request before March. I believe we should look into the approach for slaving scopes to the PDP-1 scope to see if it is really desirable. I would like to have Bob Savell contact Charlie Brown and perhaps go over to see the demonstration.

They have built all of their utilization of the computer around Decal and are very pleased with it and apparently are making very good use of it. They apparently have used the instruction generator feature extensively to develop special language symbols for their application. They also have made extensive library tapes that allows non-programmers to utilize the whole system with great ease.

One of their demonstration programs involves using the scope as a typewriter. In this they show the keyboard at the bottom of the scope and the typed information at the top. This pseudo typewriter, of course, has many extra flexible features such as when you change to upper case all the keys take on the new symbols automatically. It will also modify our light pen in some way which I do not understand.

They also indicated to me that the Air Base plans to fund a contract with Ward Edwards at the University of Michigan so that he can purchase a PDP-1 computer for use in decision making research. We should figure out how to follow up on that one in the near future.

In addition they plan to order a significant amount of new equipment including the following:

- Extra Core Memory
- Memory Extension Control
- Type 52 Tape Control
- Two Additional Type 50 Tape Units
- Magnetic Drum

The summary of all the above ramblings is that their work looks interesting and we should send a delegation of 4 or 5 people over to see a demonstration the first part of February.

H.E. Anderson

HEA:ncs

To:

From: Kenneth H. Olsen

Subject: The Institute of Radio Engineers

Following are the membership qualifications for the I.R.E. If you qualify, I would strongly urge that you join immediately. To encourage you to make this step, the company will pay the entrance fee and first year's dues for all those joining prior to June 1, 1962.

Membership Qualifications

ASSOCIATE MEMBER:

For admission or transfer to the grade of Associate, a candidate shall be interested in the theory or practice of electronics, radio, allied branches of engineering or the related arts and sciences.

MEMBER:

Member is a professional grade limited to those who have demonstrated professional competence in the fields of electronics, radio, allied branches of engineering or the related arts and sciences. For admission or transfer to the grade of Member, a candidate shall be either:

- a. An engineer or scientist in the fields of electronics, radio, allied branches of engineering or the related arts and sciences, who shall have had at least three years of professional experience.
- b. A teacher of electronics, radio, allied branches or engineering or the related arts and sciences, for at least three years, who shall have held the rank of instructor or higher, and shall have participated in planning and conducting courses.
- c. A person regularly employed in the fields of electronics, radio, allied branches of engineering or the related arts and sciences, for at least six years who, by experience, has demonstrated competence in work of a professional character.
- d. An executive who, for at least six years, has had under his direction important technical, engineering or research work in the fields of electronics, radio, allied branches of engineering or the related arts and sciences.

After you have determined which classification you fall in to, application forms may be obtained from my secretary.

Kenneth H. Olsen

MSGM TO. WC-552

TO GORDNXXX GORDON BELL
FROM TED JOHNSON

RECEIVED

1962 DEC 27 AM 3:33

VED
1 AM 3:31
DEPARTMENT

RAND TENTATIVELY DECIDED ON CDC160A PRICIPALLY BECAUSE OF SIZE OF
COMPANY AND EXTENT FX OF SERVICING. NOW LOOKING TO US AGAIN. CDC NOT
VERY INTREXX INTERESTED . PRINCIPAL PROBLEM NOW WHAT FINANCING WE
MIGHT OFFER IN THE FUTURE TO PROSPECTIVE HIGH SCHOOLS. WHAT IS CURRENT
AVAILABILITY OF MACHINE FOR RAND. RECOMMEND GIVE THEM ONE FOR ON TO
XXX ONE TO TWO MONTHS AND TEHXXX THEN SWAP TIME ON OURS. WOULD NOT
WANT TO FIXX GIVE UP OUR PDP-4 AT THIS TIME. CAN WE SAY ANYTHING
ABOUT LEASE- RENTAL POSSIBILITY IN 1964 FOR HIGH SCHOOL USES. COULD
THEY CONSIXX CONSTITUTE A MARKET TO WHICH WE COULD OFFER SOME SORT OF
A DEAL. RSVP.

CC: Ken Olsen ✓
Stan Olsen
H. Anderson
N. Mazzaresse



INTEROFFICE MEMORANDUM

File

DATE January 31, 1963

SUBJECT Connectors, Amphenol

TO Ken Olsen

FROM Frank Kalwell

1. The following prices have been obtained on Amphenol's 36-pin male and female connectors:

#143-036-01 (Female)

1-49	\$3.63
50-99	3.03
100-249	2.54
250-999	2.18
1000-2499	1.90
2500-4999	1.74
5000-9999	1.64
10,000 & over	1.56

Delivery on item 1 is 2 to 3 weeks.

2. The partial tooling cost of the male connector is \$3850.00.

Piece price as follows:

1,000	\$4.92/ea
5,000	2.57/ea

The 5000 piece price with tooling amortized is \$3.34/ea.

Delivery on item 2 is 8 to 10 weeks.

Amphenol's terms are N/30, FOB: Chicago, Illinois.

cc: Henry Crouse.



INTEROFFICE MEMORANDUM

SUBJECT Information on SDS

TO Ken Olsen ✓
Harlan Anderson
Stan Olsen

DATE January 30, 1963
(dictated 1/29/63)

FROM Win Hindle

Bill Congleton called today to report that he had been in Chicago last week and met Edgar Greenebaum, who is an independent electronics consultant. Bill was exchanging information with Greenebaum about small companies, and mentioned DEC. Greenebaum did not know us, but reported that he was one of the founders of SDS. Since Bill refused to give him any factual data on DEC, he did not receive much information on SDS except for the fact that they now claim to be shipping two computers per week.

Bill suggested that any time we wanted to get information on SDS from a source outside the company, we might approach Greenebaum for this information. However, I am sure that we would have to divulge information on DEC before receiving any useful data from him.

Win Hindle

File



INTEROFFICE MEMORANDUM

DATE January 23, 1963

SUBJECT PDP-4 at Itek

TO Nick Mazzaresse

FROM Gordon Bell

cc: Ken Olsen ✓
Harlan Anderson

Norm Taylor called Ken in regard to a computer costing under \$100,000 for their drafting machine (A PDP-1 less 25% is less than \$100,000.) In order to complete the job, a special block transfer instruction should be added.

The Block Transfer Instruction on PDP-1

The machine is stopped. Words come from memory into the IO and out, or words enter the IO and are placed in memory. External timing determines words timing. A block of 512 words is transferred beginning at one of 8 fixed core locations. The word transfer rate may be 200,000 words/sec.

A Block Transfer Instruction for PDP-4

Without special consideration a similar instruction could be installed on PDP-4 providing a transfer rate of 125,000 words/sec. Perhaps something could be done to allow a destructive read from memory or a write into memory (assuming memory is 0) at a 200 KC word rate.

Gordon Bell



INTEROFFICE MEMORANDUM

DATE January 22, 1963

SUBJECT Progress Report PDP-1 and PDP-4 Construction (Nov. and Dec.)

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

PDP-1

<u>System No.</u>	<u>Schedule Date</u>	<u>Date Complete</u>
PDP-1-34 9000-5129	11/2/62	11/2/62
PDP-1-35 9000-5863	11/21/62	11/21/62
PDP-1-36 9000-5864	12/7/62	12/10/62
PDP-1-37 9000-5865	12/21/62	12/21/62
PDP-1-38 9000-5850	1/4/63	1/4/63

PDP-4

PDP-4-7 8000-7437	12/14/62	12/17/62
PDP-4-8 8000-7718	12/18/62	12/21/62
PDP-4-9 8000-7719	12/31/62	12/31/62
		(Module Test)
PDP-4-10 8000-8060	1/11/63	1/15/63



INTEROFFICE MEMORANDUM

DATE January 21, 1963

SUBJECT DESIGN CHANGE PROPOSAL

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

FROM J. L. Atwood

I should like to propose the following product design change.

Product: DIGITAL CLASSROOM MODULES

Design Change: Modules to be completely encased, including front and back panels. Casing to be approximately 12-1/8 inches high, 4-5/8 inches wide, 2-1/2 inches deep.

Board to be mounted inside the casing and front and back panels to be attached to the casing in same general manner as Digital Laboratory Modules. (Classroom Modules would become very tall, very wide, but very shallow Lab Modules.)

Casing seams to be rounded inside and out. Front and back panels to be round-cornered to fit. Standard Lab Module receptacle to be incorporated in center of back panel for power connections.

Mounting panel to be approximately 48 inches wide by 12-1/4 inches high with 1-1/2 inch lips extending forward at top and bottom. Holes to be provided in lips for bolting on additional panels.

Nine standard Lab Module mounting panel pin connectors on mounting panel to provide power connections and to hold modules in place. Back of connectors to be shielded.

Module casings and mounting panel to be Digital Blue Tweed. Module front and back panels and mounting panel pin connector bases to be white. Symbology to be blue, with unit designation at top and Digital logo at bottom.

Purpose: To increase the visual appeal of the product line and provide greater protection for the front panels.



INTEROFFICE MEMORANDUM

DATE 1/15/63

SUBJECT

TO Win Hindle
George O'Dea
Dick Mills

FROM Stan Olsen

Notes on Establishing a Branch or Subsidiary in Germany

Basically, one consideration is that the taxes on the GMBH or subsidiary show more consideration than for a branch. The tax is a profits tax, and therefore, a lot of companies register with a branch first and then organize as a GMBH when they start making profits. They usually become a GMBH within one to two years.

Profits, as I understand it, are the normal percentage and equal type sales office would make on the sale of the products. This is a fairly vague statement but then this whole area is quite vague.

Now the basic thing that must be accomplished in either registering a branch or establishing a GMBH is to show that DEC exists and to what extent.

First of all you must recognize that the German Notary is of a fairly high status, equal probably to a lawyer, and he makes a 100% business of being a notary. The three steps to establishing a GMBH are:

1. A Notary Public here states that Kenneth Olsen is President and is lawfully authorized to sign for DEC.
2. The County Clerk certification of the Notary Public to be certified by the German Consulate.
3. The President's Authorization of someone (Huewe or the lawyer) to open office with power of attorney. This information is then taken to a German Notary and then taken to the Commercial court.

Most German companies have one or two people who have this power of attorney and are called chief clerks or the German word is Prokurist. He has power of prokura. This can be limited by a dollar amount and has no power over real estate.

Now to those first three items for our establishment as a GMBH to establish a branch there are three more things which have to be done. They are:

4. The articles of association or we would probably call them the articles of incorporation. These papers show the establishment with all changes in the corporation up until now and properly notarized.
5. List of all the signatures of officers who can represent the American corporation and sign on its behalf.
6. Permit of the Bavarian Ministry of Economics.

One other thing on the establishment of a GMBH, the capitalization is a minimum of \$20,000 Deutschmark or \$5,000.

As I understand it the establishment of a GMBH should take something less than a month because it is fairly simple. The establishment of a branch takes up to three months as there are several go arounds between the attornies, the Ministry of Economics, and the Commercial court.

It would then seem, from this information, that establishment of a GMBH would be by far the easiest and best method in the long run. We should probably now contact an American Attorney with experience in the German affairs of commerce.

I feel that Dr. Strobl is very good and quite competent but also very expensive and we should probably check with our attornies as to how reasonable his rate is of \$150. per day. He has an office for which probably rents for \$100-125 a month. He has one assistant and about three secretaries. I expect to receive a bill for his services up to date for \$70.

Dr. Strobl gave me an 18 page document entitled Tax Problems of U. S. Enterprises in Germany. This is an address he delivered to the American Chamber of Commerce in

Munich on March 22, 1961.

cc: ✓ K. Olsen
H. Anderson



INTEROFFICE MEMORANDUM

DATE 1/15/63

SUBJECT

TO Dick Mills
George O'Dea

FROM Stan Olsen

Tax Attorney - Dr. Jacob Strobl
15 Brienner Strasse
Telephone 290745

Notes on Checking Account in the German Bank

The cancelled checks are not returned from the bank and there is no monthly statement. Statements are either semi-annual or annual, and statements come out when there is a change in the balance.

There is a copy of the checking account form to be made out here with the signature of the President and the list of people authorized to sign and whether it requires one signature or two signatures and the amount for such. Also, we must send along a copy of the official articles of incorporation to apply for the checking account.

The German checks are different than ours, and they may be cashed by the bearer not just the person designated.

Also, the bank will not return the checks, therefore, a receipt is necessary because the checks cannot be used as a receipt.

A good method of payment to people and suppliers in Germany is to send the check to our office and then our office deliver it in person and get a receipt for the check.

One method of protecting a check is to put two lines diagonally across the check which essentially means for deposit only. This qualifies the check and then it can only be deposited in that specified person's bank account. Also, this is an International symbol, the two lines, but we might also put the words Nur Zur Verrechnung. These words go between the two lines.

-2-

Of the bank accounts we have, the petty cash account is under bank no. 328447 Munich, under the name of Lieselotte Siebert. The personal account of Lieselotte Siebert is no. 1469488 Munich.

cc: K. Olsen
H. Anderson



INTEROFFICE MEMORANDUM

DATE January 14, 1963

SUBJECT LEEDS AND NORTHRUP

TO K. Olsen ✓ H. Anderson
S. Olsen N. Mazzaresse
G. Bell D. Morse

FROM George Rice

Leeds and Northrup is coming very close to making the final decision as to which computer they will standardize on. I feel that a final decision will probably be made in the next week or two. This coming Wednesday, January 16, three men from Leeds and Northrup will be visiting our plant. These three will probably be the same three who met with some of us during the FJCC.

The particular configuration which L and N is interested in is:

PDP-4B
AU - Type 22
Real Time Option - Type 25
Paper Tape Punch and Control - Type 65
Printer-Keybaord and Control - Type 75

L and N wants formal quotes on the above equipment, the drum system, and the cost to extend the information collector in groups of 4 x 18 and 8 x 18. They may possibly want information on extending other parts of the Real Time Option and they certainly will want more firm commitments on our discount schedule.

L and N is very interested in parity. They know that we have offered parity on the PDP-1 and want to know if we will do likewise on the PDP-4. They say this will be important since if they use our machine they will be competing against others who use parity. The difficulty will come when L and N has to convince their customers that their machine (PDP-4 no parity) is better than somebody else's which has parity. We will have to convince them that parity is not only unnecessary on the PDP4, but give them some sort of figures (confidence) so they can present this to their potential customers.

During the visit by L and N I am sure they will want to have some time on one of our machines. We should have one available and in top condition. They probably will also want some explanations on programming techniques, in other words a short programming course.

We should also be prepared to talk about the following:

1. Field Service
2. Guarantee
3. New Products - to show future with DEC
4. Gordon's Automatic Counting Module
5. Software support - special programming assistance (?)
6. DEC's A-D's, or what we can offer.

Photocopy to Nick Mazzarese



INTEROFFICE MEMORANDUM

DATE January 14, 1963

SUBJECT Burroughs 800 cpm Card Reader

TO Ken Olsen

FROM Dit Morse

Attached to this sheet is the pricing sheet for the Burroughs 800 cpm Card Reader. I believe we should offer this reader as part of our optional I/O equipment for the following reasons:

1. It is compatible with the Burroughs 200 cpm Card Reader which we now offer. We can use the same control logic and, in fact, the reader plugs into the same socket.
2. The 800 cpm reader will quadruple the card processing capability of an installation of approximately only twice the cost.
3. The device is extremely easy to use from both a card handling point of view and a programming point of view.
4. We should have a complete line of card equipment available for the machines for both the installation which are card oriented and as necessary optional equipment if we wish to sell the machines in a 1401 application such as LRL is now using our PDP-1 machine for.

In addition to the above reasons for offering this reader as part of our optional I/O equipment, it would be extremely useful internally. We are doing more and more card processing on the PDP-4 and the reader would greatly increase our card processing capabilities. In addition, there are definite advantages to trying out a piece of equipment before we offer it as an option.

HRM/mr

SPECIAL INSTALLATION COSTS

LABOR

1. Engineer
2. Technician

Hours

Rate

Cost

Total

Subtotal

OVERHEAD

TRAVEL

TOTAL INSTALLATION COST

MARKETING FACTORS

Estimated Unit Sales: 1st Year 1 2nd Year _____ 3rd Year _____

Product to be similar to following DEC product(s) Included in Type 41 estimate.

Competitive considerations _____

FORMULA PRICES

MODULE FORMULA

List Price = 3 X Production Cost See below.

ALTERNATE FORMULA

List Price = Install. Cost + Prod. Cost + $\frac{\text{Eng. Cost Est.}}{\text{Est. Unit Sales}} + \text{SG\&A} + \text{Profit}$

AGREED PRICE

Date _____

Limited: ☐ Yes ☐ No

Price _____

APPROVED BY

Signed

Date

Signed

Date

- | | | | |
|----------|---------------|----------|-------|
| 1. _____ | <u>1/3/63</u> | 5. _____ | _____ |
| 2. _____ | _____ | 6. _____ | _____ |
| 3. _____ | _____ | 7. _____ | _____ |
| 4. _____ | _____ | 8. _____ | _____ |

Eng. cost/unit Sales = 125 so $125(2.3) = 288$ added to list price of Type 41
 $17,550 \text{ minus } 7,930 = 9,620$ added to list price of Type 41

1) list price based on 2 units total = 15,703

288

9,620

25,611

2) list price based on 3 units total = 14,033

288

9,620

23,941

3) list price based on 4 unit total = 13,193

288

9,620

23,101

DIGITAL EQUIPMENT CORPORATION • MAYNARD, MASSACHUSETTS

COMPANY CONFIDENTIAL

DEC PRICING FORMULA

NAME Card Reader and Control TYPE _____

Item to be: ☒ Standard product ☐ Special job ☐ Combination

Customer Reference: _____

Technical Description Reference: All logic and operation is exactly identical to Card Reader and Control Type 41 except 800 cpm instead of 200 cpm.

The only logical ENGINEERING COST ESTIMATE change is the time of a variable delay package.

MAJOR MATERIALS		Cost	Total
1.	All costs except those noted below will be the		
2.	same as those for Type 41.		
3.			
4.			
Subtotal			

LABOR		Hours	Rate	Cost
1.	Circuit design	1/2 day	40/day	20
2.	Logic design			
3.	Mechanical design	1/4 day	40/day	10
4.	Checkout			
5.	Technical writing			
6.	Technician			
7.	Drafting	1 day	20/day	20
8.	Other			
Subtotal				50

ENGINEERING OVERHEAD 1.5 (50)

75

TOTAL ENGINEERING COST 125

PRODUCTION COST ESTIMATE

(Lot size assumed 1)

MATERIALS		Cost
1.	DEC Catalog Items (attach list)	
2.	Other Parts (attach list) <u>Burroughs Reader BC-124</u>	13,500
Subtotal		13,500 (1.3) = 17,550 list

LABOR		Hours	Rate	Cost
1.	Assembly			
2.	Shop			
3.	Testing			
4.	Other			
Subtotal				

PRODUCTION OVERHEAD

TOTAL PRODUCTION COST

COMPANY CONFIDENTIAL

Price Justification for Card Reader and Control Type

Engineering Cost Estimate

- | | |
|--|---------|
| 1. Check drawings for compatibility with 200 cpm | 1/2 day |
| 3. Locate connector | 1/4 day |
| 7. Mechanical drawings for connector bracket | 1 day |

Stone - Nick - Don - Andy

1/2/63
Fun: CDP

Mailing List App - GR & Others

Assume:

- ① GR likes PDP-7 & Bus. Poc.;
- ② Arrangement can be worked out to use PDP-7 in their app., without fouling up their system, until they get 1770;
- ③ We want to get more data (other than our own) re bus. appo. of PDP-7;
- ④ we want to eventually attack the small engineering company computer market, i.e., those cos. who could use a PDP-7 for Eng., Acc't., mailing list, etc.;

Would DEC be willing to ^{rent} ~~lend~~ a PDP-7 to GR for one year.



INTEROFFICE MEMORANDUM

DATE January 11, 1963

SUBJECT Visit to Electronic Associates, Inc.

TO File

FROM Harlan E. Anderson

On Wednesday, January 9th, Gordon Bell and I visited Electronic Associates to make a presentation about our computer and company organization to their management group. This group included the following people:

- L. F. Christianson, President
- R. R. Farreau, Vice President, Res. and Comp. Div.
- T. D. Truitt, Director, Advanced Study Group, R and C Div.
- O. J. Sullivan, Product Manager, Hydac, Marketing Division.
- R. Haffa, Contracts Administrator, Marketing Division
- P. Phillipi, Market Services
- D. Wilkinson, Assistant to President
- J. Curtis, Vice President, Marketing
- F. Martinson, Vice President, Engineering and Manufacturing.

We found this group of people to be very attentive and interested. This briefing was the first of five that they have scheduled. The other four are Computer Control, Advanced Scientific Instruments, Packard Bell, and Scientific Data Systems. Of these four, SDS appears to be the most serious competitor. This group of people appear to be quite price conscious. This was probably the most serious area of concern to them about DEC. Certainly our strongest asset in their eyes at the moment is the enthusiasm that exist among the people from the Princeton Computation Center who are presently using the borrowed PDP-1 in preparation for the seminar at the end of this month on Hybrid Techniques.

Within the next week, I think we should send a letter probably addressed to Mr. Curtis emphasizing why they should buy from Digital Equipment Corporation. They were very interested in having us draw comparative conclusions about our equipment and the competition. We told them that we did not want to do this and that we thought this was something that they should do since we could only give them a bias opinion on this end, also we might have poor information about details of the competition on such matters as price, etc. The tone of our letter should, in my opinion, dwell on the importance of developing a working relationship between two companies. We should maximize the seriousness of their decision and emphasize DEC's wide range of experience in making special options, etc. We should particularly dwell on things like the scope and the possible roles they might play in hybrid systems. We should also point out that their people are already making a significant investment in time by preparing this hybrid demonstration. They are also familiar with our equipment so they know what the weak points are. Whereas starting off with a new company there may be subtle weak points

that will not be apparent until they use the equipment. We should also emphasize that there are advantages to being in business with a stable company that will be here several years from now to continue doing business with. We should also impress on them the importance of machines in the field having been proven in terms of reliability of operation, etc. They anticipate that their evaluation will be going on for at least three weeks and we should continue to urge them to visit us here at Maynard and should try to have Ken Olsen have some contact with them in order to assess the situation.

About one-third to one-fourth of their business is outside of the country. The U.S. business however I would suspect would have a high degree of renegotiation involved in it and we should take this into account. They seem to have a rather strong marketing organization and have done an excellent job as far as I can tell of training customers how to use their equipment. They operate four computation centers: one in Princeton, one in Los Angeles, one in Brussels, and one in London. They presently have 65 to 70 percent of the analog computer market and their key competitor apparently is Beckman Instruments.

In addition to the factors mentioned above for the letter to them we should also mention that we are selling to EA customers already and will develop some degree of acceptability for our products. The ones that come to mind are Minneapolis-Honeywell, United Aircraft, Lawrence Radiation Laboratory, Foxboro and there are probably more.

H. E. Anderson

HEA:ncs

January 11, 1963

Prepared for discussion at
Works Committee Meeting
on January 14, 1963

Sales Plan Outline

Assumption about Company

I Goals and Objectives

The ideas in this sales plan are based on the following assumptions concerning DEC:

- a) Sound growth - Slow and with diversity of customers, products, marketing.
- b) Self financing - Implies sizeable profits and non-explosive growth.
- c) Products based principally on in-house capabilities.
- d) New ventures are expected to return an early profit.
- e) Commercial products principally.
- f) Non-renegotiable business principally.
- g) Develop unique products, technical capabilities and application know how.
- h) Go into markets which are potentially very profitable.
- i) Close customer contact and strong sense of loyalty.
- j) DEC will be a user of its own products (particularly PDP's)
- k) High ethics must prevail throughout the company.
- l) Plans will use current techniques to a large extent.

II Market

a) Present DEC Markets

Computer Markets

- 1. Scientific - Describe a few sales and why customer bought DEC. AFCRL, BBN, ITEK.
- 2. Communications - ITT
- 3. Process Control - Foxboro
- 4. Data Collection - JPL and Beckman
- 5. Hybrid Analog - Digital - Simulation etc.
- 6. Physics
- 7. General - (Miscellaneous)

Module Market

1. Government
2. Universities
3. Small Industrial User

b) New DEC Markets (Some commitment already made, no significant sales.)

1. Medical Research and on line data processing (MGH and BBN)
2. Computer Aided Design (Line drawing scope)

c) Markets to be evaluated

1. Drug Research
2. Automatic Control
3. Printing Business
4. Oceanography
5. Geoscience
6. Hotel and Department Store
7. High Schools
8. Engineering (Small computer for small company concept)
9. Teaching Machine Use
10. Business Applications - (Secondary use perhaps)

d) Market Evaluation Techniques

Before expending time, effort, and money on a new market for computers, DEC must evaluate that market based on the following criteria:

1. Market Characteristics - What is the most realistic estimate of the total number of computers that can be sold in this market? Over how many years will the sales last? How many organizations are likely to buy a computer? What kind of computers will be needed in the market?
2. Market Saturation - How many computers have already been sold and how many companies have already committed themselves to a portion of the market? If the competition has already committed itself to cover the market and DEC has nothing unique to contribute, the company should not concentrate its efforts here.
3. Saturation by DEC - Is this a market which DEC can potentially saturate? If not, what percent of the market could DEC realistically obtain?

4. Financial Support of the Market - Is this market supported by government or private industry funds? What is the prospect that this financial support will be increased, and how far into the future is support guaranteed? If the financial support is quite shaky, the risk to DEC of investing time and money in selling to this market is considerably higher.
5. Stage of Development of Market - If DEC can enter a market in the early stage of its development and participate in this development, we are more likely to be in a position to contribute something unique, thus insuring a solid base for future sales. If the market has already reached its peak of development and present activity is confined to refining techniques, it is likely that DEC's influence on the market will be inconsequential and we should not enter the field.
6. Investment Required - In order to investigate and make a contribution to the market, how much money and time would have to be invested by DEC? How many people would have to be committed to the development of the market (or new people hired)?
7. Unique Contributions by DEC - In a market where DEC has especially useful equipment or techniques, the prospect for sales is much higher. Consequently, DEC's effort should be directed primarily to markets where a unique contribution is present or can be developed.
8. DEC Volume - How many computers could DEC expect to sell to the market in relation to the amount of time, money and effort exerted in developing the products and training people? How many different customers could we expect? If the market were confined to a few large users, DEC would have to be careful not to become dependent on one customer.
9. Present Staff Interest - Is there anyone now at DEC who is enthusiastic about working on the new market? Would we have to hire a new man to work on this market, and if so, how long would it take us to find such a man? In line with developing our own people's potential along the lines of their interest, the company would be more likely to succeed in markets where a man is now available to provide leadership.
10. Profitability - Could we expect the products sold in the market to be as profitable as our present products? If the market appears to be geared to a lower rate of profit, it may not be suitable for us to spend time and effort.

11. Type of Customer - Are the customers likely to be military and thus renegotiable? If so, DEC must be assured that the sales to this market can be balanced by non-renegotiable sales of similar products in other markets.

e) OEM Market

A number of advantages can accrue from having a portion of DEC's business in the OEM market:

1. The customer's sales force is an extension of the company's sales force and does active selling of DEC Products.
2. The equipment sold to an OEM customer is repetitive business, thereby making our production and checkout problems simpler.
3. Customer service is concentrated in one location (in the long run such service may have to be expanded to the ultimate customer, thus removing this as a decided advantage).
4. The ultimate customer is, in most cases, aware of DEC and in some instances will deal with us directly in future purchases.

At the same time the OEM market has inherent disadvantages that cannot be overlooked:

1. DEC has less control over the uses and servicing of its products.
2. The business can evaporate rapidly and cause extreme fluctuations in DEC sales.
3. DEC can come to depend too heavily on one customer.
4. The customer may decide to make its own product after several years of buying from DEC.

Taken on balance, however, the OEM market has enough advantages so that DEC should consider this method of entering a market in each of the new market areas investigated.

Even if the OEM sales to one customer last for only a few years, the advantage of multiple sales outweighs the risk of losing the customer. At the same time, the amount of OEM business with one customer ought to be limited to 10% of DEC's annual sales so as to limit the repercussions of cancellations. Thus, before entering an OEM relationship with the customer, DEC ought to assure itself that the total business with this customer will not exceed 10% of annual sales.

- f) Foreign Markets - Develop like U.S.

III New Product Development

a) Principles rapid

1. Importance of product development
2. General purpose products mainly
3. Must have a market in mind
4. Sell what we have now vigorously

b) Modules -

1. VHF - Need for speed
2. Silicon - Need for
3. Educational

c) Computer

1. New systems
2. New peripheral - opportunity for uniqueness lies here
 - (1) LINC Tapes
 - (2) High Density Tapes
 - (3) Mass Memory
 - (4) Scopes
 - (a) Line Drawing
 - (b) Flicker Free
 - (c) Projection
 - (d) Film Reading
 - (5) Card Reading and Punching
 - (6) Low Cost Line Printers
 - (7) Paper Tape Reader
 - (8) Typewriters
 - (9) Communication Terminals
3. Hybrid Analog
4. Software

d) Special Systems

1. Must look for new areas like core memory testers
 - e.g. a) Thin films
 - b) Physics - PEPR
2. Need for specialized components such as fast current drivers

IV Marketing Policies

1. DEC marketing efforts should be directed toward generating long-term customer loyalty. This means assuring that DEC is loyal to its good customers.
2. Marketing effort should concentrate in selected fields and not be diluted by attempts for broad coverage of many fields.
3. DEC should develop customers who appreciate high quality and are willing to pay a premium price for this quality.
4. DEC should attempt to work with a customer in the early phases of his need.
5. Sales engineers should be especially sensitive to the special requirements of each customer.
6. All sales engineers must be able to exhibit technical competence in all phases of the sales process.
7. Application capabilities should be developed in fields which support good customers.
8. DEC will provide computer customer training in:
 - a. Programming
 - b. Maintenance
9. New product development should be flexible so as to meet customer's changing needs effectively.
10. New markets should be found for older products in preference to reducing prices.
11. Each branch office will be equipped for sales and service of all DEC products.
12. New branch offices should be established as soon as these offices are needed to exploit a particular market.
13. Marketing expense information should be readily available and broken down by:
 - a) Product line
 - b) Major customer
 - c) Warranty
 - d) Selling function (i.e. shows, sales literature, customer service, customer training, etc.)
 - e) Branch Office

14. Price should be high enough to permit a quality job to be done and earn a significant return in investment.
15. Frequent sampling of customer satisfaction by management and others will be done.
16. The marketing activity has an important obligation to inform engineering and management of quality, customer attitudes.

V Sales Organization

1. Sales Engineers

- a) All who are hired should be engineers by background and training.
- b) All must be familiar with full product line, though each may have a speciality.
- c) Training of new sales engineers in DEC techniques and philosophy is vitally important. Typically a new employee will first be assigned to an engineering project for 3 - 6 months.

2. Organization (See attachment 1)

- a) Sales are organized by small applications groups for specific markets and by branch offices. It is possible for a person to be simultaneously in a branch office and a member of an applications group.
- b) Applications groups for specific markets will be formed when a particular field appears to provide a significant sales potential.
- c) Branch offices will be opened in a sequence which depends on availability of sales engineers to staff the office and on the urgency of serving particular customers in the area.
- d) Customer - sales engineer continuity should be stressed, particularly in the branch offices.

3. Communications between branch offices and slant must be excellent

- a) All communication devices (i.e. Bi-weekly, sales literature, On-Line, etc.) should be used.
- b) Branch office personnel (including a California representative) should spend at least one day per month at the plant.

4. Sales Staff Expansion (see attachment 2)

VI Financial aspects of sales plan (see attachment 2)

VII Plan of Action for Next 12 Months

1. Hire 4 Computer Application Engineers by 1 May 1963.
2. Assign 2 present DEC engineers to branch office work by 1 July 1963.
This probably means hiring replacements in present work.
3. Hire 1 new module application engineer by 1 July 1963.
4. Hire 4 new field service technicians by 1 June 1963.
(Assumes 2 present technicians will move to engineering etc.)
5. Hire 1 new technical person for training.
6. Open Munich Office.
7. Open San Francisco, Chicago and Ottawa offices before September 1963.
8. Formalize the evaluation of new markets such as medical electronics.
(Need a good sample of how to do it).
9. Include the multiply and divide option in the basic PDP-1 system price.
10. Establish a rental plan to be used where we wish to encourage a customer to experiment in unique new applications.
11. Prepare application notes and demonstration of the scope.
12. Provide the engineering department with the desired characteristics from a marketing standpoint of the next computer by 1 April 1963.
13. Develop a formalized field office maintenance reporting system to minimize the communication problem with the customer.
14. Control delivery commitments on computer systems by careful quotations particularly when large engineering content is involved.
15. Initiate job cost system for sales department 1 April 1963.
16. Initiate plan for 1 representative of the California office to visit DEC each month.

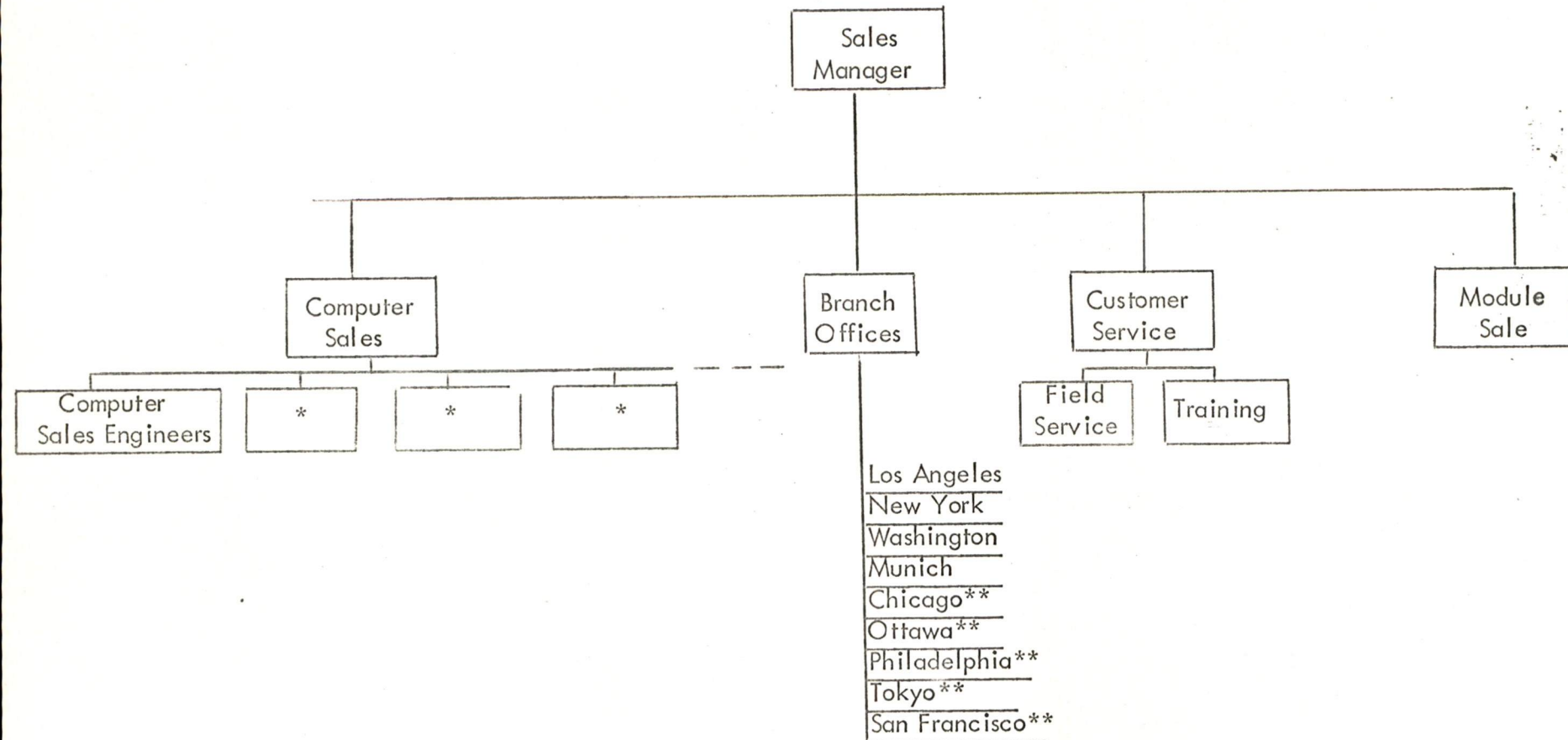
17. Formalize our management review of quality of products and service with customers at least once every three months.
18. DEC should start a physics application group for computers before 1 March 1963.
19. DEC must settle on performance specifications for the new high density magnetic tape system by 1 March 1963.
20. DEC must settle on price, performance and promotional literature for the "DEC Tape" by 1 March 1963.
21. Action should be initiated to insure that DECAL is completed by April 1, 1963.

Harlan E. Anderson

Winston R. Hindle

HEA/WRH/ncs

Basic Sales Organization of DEC



* Application Group for Specific Markets

** New Offices to be Established.

Attachment 2Total Technical Sales Staff at the End of Each Fiscal Year

	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>
Module Sales	2	3	4	5	6	7
Branch Offices	4	9	14	17	20	23
Computer Sales —						
General	2	3	4	5	6	7
Physics		2	3	4	4	4
Medial		1	2	2	2	2
Process Control	1	2	2	2	2	2
Communications		1	2	2	2	2
Scope Application		2	3	4	4	4
New Areas			2	4	8	12
Customer Service —						
Field Service	6	10	15	22	30	40
Training	2	3	4	6	8	10
Sales Management	<u>2</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>5</u>	<u>5</u>
Total Technical Sales Staff	<u>19</u>	<u>39</u>	<u>59</u>	<u>77</u>	<u>97</u>	<u>118</u>
<u>Annual Sales Costs</u>		\$700K	\$1,440K	\$2,180K	\$2,840K	\$3,580K
(Based on present ratio of technical sales staff to sales costs)						
<u>Annual Sales Volume Forecast</u>		\$10,800K	\$14,000K	\$18,200K	\$23,600K	\$30,600K
<u>Sales Costs as percent of Annual Sales</u>		6.5%	10.4%	12.1%	12.0%	11.7%

digital MEMO

DATE 1/10/63

TO Ken Olsen

FROM Ted Johnson

Subject: SDC

Discussed time-sharing projects and Liklider with Lou Gallenson of SDC. Fredkin happened to be in the area at that time. Will keep in touch. Fredkin has been selling DEC to them and apparently are on fairly good terms.



Date: January 10, 1963

To: DEC Traveling Employees

Travel and Entertainment Expense - Rules and Regulations

Introduction:

The new law passed this fall gives the Internal Revenue Service complete authority to require that a corporation keep detailed records of its Travel and Entertainment Expenses. What this means to each and every corporation, is a tightening up of all expense account reportings. The Internal Revenue approach has been to make each company substantiate each deduction regardless of amounts, by keeping a business diary on a daily basis for those amounts less than ten dollars (\$10.00) and all amounts of ten dollars (\$10.00) or higher, to be substantiated with receipts or bills. You should remember that if the company deduction for your expenses is disallowed, this amount becomes taxable income to you.

Effective January 1, 1963, the following rules and regulations will govern the payment by DEC, of all travel and entertainment expenses due to proposed changes in the law by the Internal Revenue Service.

1. Travel Expenses:

Anyone claiming travel expenses while on company business will have to prove each one of the following elements:

- a) Cost - This includes cost of transportation, meals, lodging and miscellaneous expenses such as telephone, cab fare, etc.
- b) Time - Date and hour of departure and return, total days away from home, and total days or hours spent on business at each destination.
- c) Place - Each place that you have visited, which should be a customer, will require the name and location in order that this can be substantiated at a later time upon examination by the Internal Revenue Service.
- d) Business Purpose - This is the real meat of the law, in that, any travel expense must be directly related to a business purpose. What this means, in effect is, that all of your travel expenses will be for business and there will be no partial trips - part for business and part for pleasure, because there are other stringent regulations which apply in this case.

Date: January 10, 1963

To: DEC Traveling Employees

- e) Mileage - Under the new proposed regulations, automobile mileage expenses will have to be supported by a detailed record of the companies called on, where they are located and how much mileage was expended going to and from each customer called. What this means, of course, is that no longer will the Internal Revenue Service allow taxpayers - both individual and corporations, to take a gross deduction for mileage and just call it for "business purposes".

2. Entertainment Expenses:

Any one of you claiming an expense for entertainment expenses must prove all of these elements:

- a) Cost - You have to be able to substantiate the total cost for the entertainment and this means, bills, receipts, invoices for all of the cost - not just for a portion of it. The entertainment section is where the Internal Revenue is going to be most restrictive.
- b) Time - You must have the date, the hour and the duration of time spent at this entertainment.
- c) Place - You must have the name and address of the establishment and also describe the entertainment.
- d) Business Purpose - You must put down the purpose of the meeting - if you are there to sell the man a PDP-1 or PDP-4, or modules or a system - put it down that way, with the expected result, hopefully, that he will sign an order or that this meeting came just before a business conference or just after a business conference, concerning the purpose.
- e) Business Relationship - The relationship of each person entertained for whom you are going to claim an entertainment expense - must be listed. This will include the person's name, his activity in his company, or his occupation and the total number entertained. I want to repeat, that the cost of entertainment that directly precedes or follows substantial and bona-fide business discussions, are deductible - even though they are just to generate goodwill. What this means is, that if you are not there on a bona-fide selling mission but are doing some missionary work with the customer and that particular missionary trip is not directly related to the active conduct of a sale of a piece of equipment to the customer, it is still deductible, when so stated.

Date: January 10, 1963

To: DEC Traveling Employees

In relation to the business discussions mentioned before, in order that we may claim a deduction for the entertainment cost associated with the time preceding or following the entertainment, we must have the time (this means the date, hour and duration) and the place (the name and address) or location, the nature of the discussion, and the name and business relationship to DEC, of each customer or each person participating in the discussion. This is indeed getting down to unusual detail, but is required under the law and must be instituted.

It should be pointed out here, that DEC will not be able to reimburse anyone submitting a travel expense voucher that is not supported with sufficient detail in the above mentioned categories. The enclosed expense books are for this purpose.

Summary of Changes:

1. General Comment:

All this means, that you will have to keep an extremely detailed record of what you do each day, by way of business calls, cost to get to and from that call, conferences or discussions - preceding or following any meals or entertainment, and a careful record made of auto mileages on a daily basis.

Travel - Our current documentation of traveling expenses which includes, stubs of Airline tickets, auto rental slips, hotel and motel bills will be continued, with the additional use of the attached travel expense booklet, until the final regulations are issued by the Internal Revenue Service so that we can then proceed to prepare our own forms. As you will see, this calls for a breakdown of breakfast, lunch or dinner and gives a section for each day for entertainment, listing firm, person, title and place and amounts spent. I want to re-emphasize, that no payment will be made to anyone unless this detail is completed since DEC will not be able to take the deduction unless this is done.

Entertainment - The entertainment comments are as made previously but would add, that it is significant that in the case of an entertainment, the cost of your meal should be deducted from the total charge and shown separately under breakfast, lunch or dinner.

Meals - The primary change here is to recording individual meals, breakfast, lunch or dinner by the day, rather than as a total number of meals for a trip.

Traveler's Expense Books - The enclosed four (4) Traveler's Expense Books will take care of you for a month. Additional books are available locally or through the Sales Department. The making out of this expense book does not change the submission of our regular Travel Vouchers at all, since the book, together with

Date: January 10, 1963

To: DEC Traveling Employees

receipts, will be attached to the Travel Voucher and will constitute a basis for payment. If there is no Traveler's Expense Book attached to the Travel Voucher - no payment will be made.

General Note:

The Internal Revenue Service has not published final regulations for travel and entertainment expenses, since there has been considerable objection from business - due to the extra record keeping involved. At the time that the final regulations are issued, it is probable that DEC will issue a new form and you will be so informed of any changes at that time.



Richard F. Mills
Controller

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 overstated by items in inventory for which there is no foreseeable use (or reasonably foreseeable 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.

FIELD MAINTENANCE SERVICES AVAILABLE

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

The services discussed here are available anywhere within the continental limits of the United States. For convenience, two "areas" are defined: Area 1 is everything within a fifty (50) mile radius of a DEC service center. Area 2 is everything outside this 50 mile radius. At the present time, DEC service centers are located at 146 Main Street, Waynard, Massachusetts, and 5620 Sepulveda Boulevard, Los Angeles, California.

PER CALL BASIS

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

1. \$20.00 per hour of actual on-site work (minimum charge, \$20.00).
2. Transportation at \$.15 per mile (automobile) or actual cost of commercial transportation.
3. Cost of replacement parts.
4. Additional charges for installations in area 2.
 - a. \$20.00 per day (including travel time).
 - b. Minimum charge \$100.00 plus transportation.

MAINTENANCE CONTRACTS

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

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

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

PLAN NUMBER 1

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

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

PLAN NUMBER 2

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

ADDITIONAL PROVISIONS

All service is on a "working hours only" basis. Working hours are defined as 0800 to 1600, Monday through Friday, (Excluding holidays). The calls must be placed within these hours. Work once started will continue as long as necessary.

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

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

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

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

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

Ken Olsen



INTEROFFICE MEMORANDUM

DATE January 7, 1963

SUBJECT PDP's for Physics

TO Computer Guidance Committee

FROM Gordon Bell

A. Introduction

It seems that the computers will be used in increasingly larger quantities in all areas of non-negotiable physics research:

1. Film Analysis (MIT PDP-1)
2. Experimental data reduction in real time
(Chalk River PDP-1)
3. Process Control
 - (a) Control of Accelerators, Reactors (CEA, Chalk River)
 - (b) Power Plants
 - (c) Monitor larger systems of detectors, etc.
4. 1620 Fortran - types of environment

With the larger accelerators (costing \$.3-2.0 K per hour to operate) better control is required. The advantage of this field over business or medical, is that the people are scientists, and most places already have a strong group of engineers working with instrumentation.

I think we must, immediately, get physic people with the right slants, give them the necessary guidance and freedom and get moving. Even take the computer away from MGH and give it to CEA.

We have something of a start in this area, and by continuing our present course, we will be surprised when it's lost.

B. Some Current Prospects

1. Rutgers
2. Cambridge Electron Accelerator

B. Some Current Prospects (Cont'd)

3. Package of 3 Hi-voltage Engineering Tandem Van de Graafs (delivery 1965)
 - (a) Yale
 - (b) Chalk River
 - (c) U. of Minnesota
4. Yale - with Rosner
5. Princeton
6. Scopes to UCLA Physics Dept. for 7090
7. Chalk River Nuclear Reactor (save sale of 2 - FDP-4's, some A-D equipment, a drum and a display)

C. Basic Team Approach to Marketing for Physics Applications

I would like to assemble several people together as a team within Digital who work solely on marketing for physics applications. I would like to see the area exist as a sub-groups of John Fadiman's group. The new people he might use be:

1. Sales - Marketing - Engineering type
(eg. John Leng at Chalk River)
2. Programmer (co-ordinate users programs, do new applications, and generally help with Systems and Sales (eg. Steve Piner)
3. Logic Designer - Hardware - Assembler and Co-ordinator for delivery of equipment.
The area the group would cover includes small special systems and computer systems.
(not including manufacturer of computers)

GB/nbh

M E M O

January 10th, 1963

TO: ALL DEC OFFICES

FROM: DAVE DENNISTON, NYO

Within the last few weeks a good many people have called this office from Maynard only to get our answering service, and we have then had to call back again. In many cases it takes our Answering Service some time to convey the message. So, not only is a long distance call wasted, but in some instances important time has elapsed before we return the call.

The purpose of this memo is to acquaint you with the telephone set-up here in the New York Office. We have two telephone lines coming in Tel: 473-7800 and 473-7801. Our answering Service is only connected to 473-7800. Thus, 473-7801 rings only here in this office. If you are calling here station-to-station, I strongly recommend you call us on 473-7801. In this way, you can be assured of actually reaching us. If you find that neither Millie or I is in the office, you can always place a person-to-person call on 473-7800 and leave a message with our Answering Service. If we are out of the office for any period of time, we will surely check with Answering Service just as soon as we return here. We can then return the "No Charge" call you placed as soon as possible, and in a good many cases eliminate any confusion.

Date: January 10, 1963

To: DEC Traveling Employees

Travel and Entertainment Expense - Rules and Regulations

Introduction:

The new law passed this fall gives the Internal Revenue Service complete authority to require that a corporation keep detailed records of its Travel and Entertainment Expenses. What this means to each and every corporation, is a tightening up of all expense account reportings. The Internal Revenue approach has been to make each company substantiate each deduction regardless of amounts, by keeping a business diary on a daily basis for those amounts less than ten dollars (\$10.00) and all amounts of ten dollars (\$10.00) or higher, to be substantiated with receipts or bills. You should remember that if the company deduction for your expenses is disallowed, this amount becomes taxable income to you.

Effective January 1, 1963, the following rules and regulations will govern the payment by DEC, of all travel and entertainment expenses due to proposed changes in the law by the Internal Revenue Service.

1. Travel Expenses:

Anyone claiming travel expenses while on company business will have to prove each one of the following elements:

- a) Cost - This includes cost of transportation, meals, lodging and miscellaneous expenses such as telephone, cab fare, etc.
- b) Time - Date and hour of departure and return, total days away from home, and total days or hours spent on business at each destination.
- c) Place - Each place that you have visited, which should be a customer, will require the name and location in order that this can be substantiated at a later time upon examination by the Internal Revenue Service.
- d) Business Purpose - This is the real meat of the law, in that, any travel expense must be directly related to a business purpose. What this means, in effect is, that all of your travel expenses will be for business and there will be no partial trips - part for business and part for pleasure, because there are other stringent regulations which apply in this case.

Date: January 10, 1963

To: DEC Traveling Employees

- e) Mileage - Under the new proposed regulations, automobile mileage expenses will have to be supported by a detailed record of the companies called on, where they are located and how much mileage was expended going to and from each customer called. What this means, of course, is that no longer will the Internal Revenue Service allow taxpayers - both individual and corporations, to take a gross deduction for mileage and just call it for "business purposes".

2. Entertainment Expenses:

Any one of you claiming an expense for entertainment expenses must prove all of these elements:

- a) Cost - You have to be able to substantiate the total cost for the entertainment and this means, bills, receipts, invoices for all of the cost - not just for a portion of it. The entertainment section is where the Internal Revenue is going to be most restrictive.
- b) Time - You must have the date, the hour and the duration of time spent at this entertainment.
- c) Place - You must have the name and address of the establishment and also describe the entertainment.
- d) Business Purpose - You must put down the purpose of the meeting - if you are there to sell the man a PDP-1 or PDP-4, or modules or a system - put it down that way, with the expected result, hopefully, that he will sign an order or that this meeting came just before a business conference or just after a business conference, concerning the purpose.
- e) Business Relationship - The relationship of each person entertained for whom you are going to claim an entertainment expense - must be listed. This will include the person's name, his activity in his company, or his occupation and the total number entertained. I want to repeat, that the cost of entertainment that directly precedes or follows substantial and bona-fide business discussions, are deductible - even though they are just to generate goodwill. What this means is, that if you are not there on a bona-fide selling mission but are doing some missionary work with the customer and that particular missionary trip is not directly related to the active conduct of a sale of a piece of equipment to the customer, it is still deductible, when so stated.

Date: January 10, 1963

To: DEC Traveling Employees

In relation to the business discussions mentioned before, in order that we may claim a deduction for the entertainment cost associated with the time preceding or following the entertainment, we must have the time (this means the date, hour and duration) and the place (the name and address) or location, the nature of the discussion, and the name and business relationship to DEC, of each customer or each person participating in the discussion. This is indeed getting down to unusual detail, but is required under the law and must be instituted.

It should be pointed out here, that DEC will not be able to reimburse anyone submitting a travel expense voucher that is not supported with sufficient detail in the above mentioned categories. The enclosed expense books are for this purpose.

Summary of Changes:

1. General Comment:

All this means, that you will have to keep an extremely detailed record of what you do each day, by way of business calls, cost to get to and from that call, conferences or discussions - preceding or following any meals or entertainment, and a careful record made of auto mileage on a daily basis.

Travel - Our current documentation of traveling expenses which includes, stubs of Airline tickets, auto rental slips, hotel and motel bills will be continued, with the additional use of the attached travel expense booklet, until the final regulations are issued by the Internal Revenue Service so that we can then proceed to prepare our own forms. As you will see, this calls for a breakdown of breakfast, lunch or dinner and gives a section for each day for entertainment, listing firm, person, title and place and amounts spent. I want to re-emphasize, that no payment will be made to anyone unless this detail is completed since DEC will not be able to take the deduction unless this is done.

Entertainment - The entertainment comments are as made previously but would add, that it is significant that in the case of an entertainment, the cost of your meal should be deducted from the total charge and shown separately under breakfast, lunch or dinner.

Meals - The primary change here is to recording individual meals, breakfast, lunch or dinner by the day, rather than as a total number of meals for a trip.

Traveler's Expense Books - The enclosed four (4) Traveler's Expense Books will take care of you for a month. Additional books are available locally or through the Sales Department. The making out of this expense book does not change the submission of our regular Travel Vouchers at all, since the book, together with

Date: January 10, 1963

To: DEC Traveling Employees

receipts, will be attached to the Travel Voucher and will constitute a basis for payment. If there is no Traveler's Expense Book attached to the Travel Voucher - no payment will be made.

General Note:

The Internal Revenue Service has not published final regulations for travel and entertainment expenses, since there has been considerable objection from business - due to the extra record keeping involved. At the time that the final regulations are issued, it is probable that DEC will issue a new form and you will be so informed of any changes at that time.



Richard F. Mills
Controller

Ken Olsen



INTEROFFICE MEMORANDUM

DATE January 7, 1963

SUBJECT Meeting #2 Jan. 4, 1963

TO Engineering Projects
Committee

FROM Drawing Standards Committee

It was discovered that an important area which lacked representation on the committee was that of the technical writing arm of the advertising department. Their interest stems chiefly from their task of making drawing manuals for the PDP options. To fill in the gap Paul Barber will become a member of the committee.

A review of the minutes of the last meeting led to the following elaborations of previously discussed matters:

1. An input to a diode gate coming from a collector in the same module and drawn within the same dotted lines will have no arrow. This is because the line for this input never crosses the dotted line where the arrow would normally be shown.
2. Diodes will be drawn hollow.
3. Arrows can be shown at emitters when the polarity of the signal is not obvious. This can be true when the signal comes in from another drawing.
4. Upside down ground symbols are illegal.

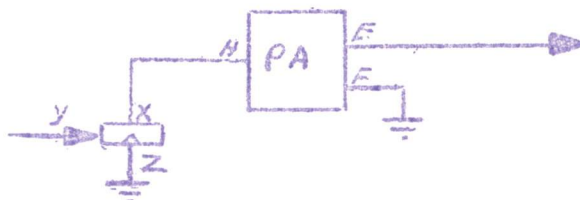
New business:

1. Except at diode gates all inverters and capacitor diode inputs will have arrows.
2. The following generalities apply to pulse amplifiers, pulse generators, and delay symbols:
 - (a) Inputs are always on left.
 - (b) Pulse outputs are always on right; both ends of transformer secondary are shown, one above the other, with no polarity implied by their positions.
 - (c) Level outputs are always on top.

- d. Jumpers are always on bottom.
- e. The letters PA, PG or DE will identify the unit with no subscripts shown to identify the particular circuit within the module.

Symbols:

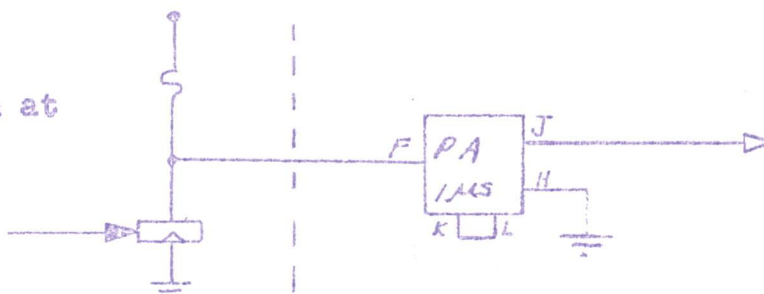
Pulse amplifiers
1607, 4603



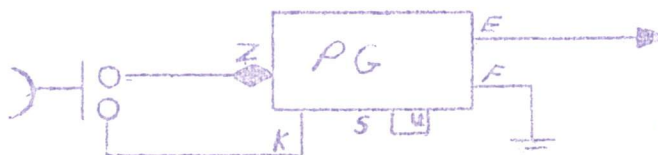
4604
1μs notation shown only
if external jumper K to L
is shown



_____ can be shown at
pin F if necessary

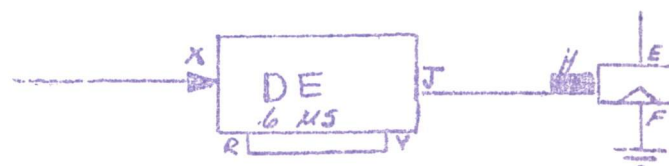


Pulse generators
1410, 4410

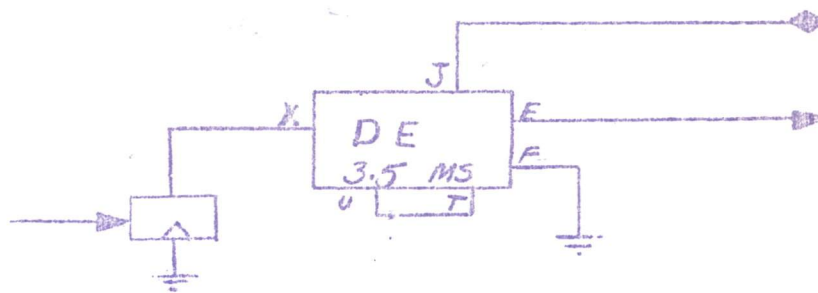


Delays

1310, 1311

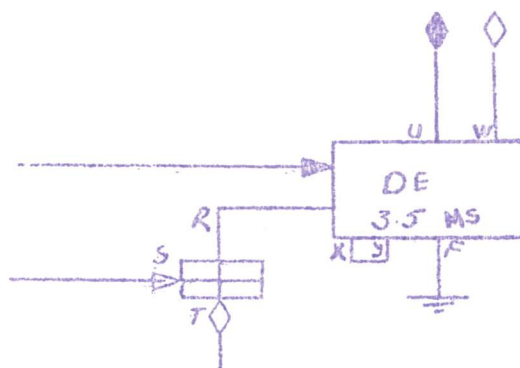


4301



4303

The word "var" will
replace the time notation
when an external pot. is
used.



ANB/nbh



INTEROFFICE MEMORANDUM

DATE January 4, 1962

SUBJECT PDP-4 Construction Progress

TO K. Olsen ✓
H. Anderson
S. Olsen
G. Bell
N. Mazzaresse
K. Wakeen

FROM J. Smith

PDP-4-9 (8000-7719) was delivered to Checkout today. This is the machine that is assigned to K. Wakeen for module test. In addition to this system, two additional PDP-4's were completed during December, PDP-4-7 on December 17th and PDP-4-8 on December 21st. In keeping with our planned schedule, two PDP-4's will be completed during January, PDP-4-10 on January 11th and PDP-4-11 on January 25th.



INTEROFFICE MEMORANDUM

DATE 1/11/63

SUBJECT Telephone Conversation with John Curtis of EAI
TO File FROM Nick Mazzaresse

cc: H. Anderson
→ K. Olsen
S. Olsen
G. Bell

John Curtis is the new Marketing Vice-President at Electronic Associates. He is somewhat of a fireball and is presently evaluating a number of computer vendors to determine whom they shall enter the Hybrid market with on a joint venture basis.

They are presently evaluating the DDP-19, the SDS-920, the PDP-1, and the Packard Bell 440.

It is interesting to note that two of our competitors, at least, are offering a 30% quantity discount; however, John Curtis did mention that our machine is in a favorable position as regards quality, capability, and general performance. They are somewhat disturbed at our high price.

They have invited me to present our case to their management and engineering (engineering is already on our side).

There are some rather subtle things going on here; in that John Curtis implied that they are looking for more than the usual customer vendor relationship. I am not quite sure how far he plans to go in this.

He did mention that, off the record, he was thinking as far ahead as possible mergers. At this time he mentioned that he wasn't sure that he was willing to go this far with some of our competitors.

To this end, he requested that an officer of our Company come along to discuss our corporate set-up, long term technical skills, and future plans.

Harlan Anderson and myself will be visiting them January 9, 1963.

NM/jr

R. Olsen

dec

INTEROFFICE
MEMORANDUM

COMPANY CONFIDENTIAL

DATE January 3, 1963

SUBJECT Meeting #1, Jan. 2, 1963



TO Engineering Projects
Committee(see dist. list)

FROM Al Blumenthal

The following generalities were agreed upon:

1. Standards which emerge will apply to all drawings produced by DEC regardless of department involved.
2. The symbols chosen will agree with those presently used in the module catalog whenever possible but deviations will probably be fairly common since many of the catalog symbols are complicated by the need to show detail not necessary in system schematics.
3. We recommend that this committee be perpetually active so that a central advisory board will be available to answer drafting's problems, thereby preventing the growth of individual standards. Also will enable prompt and automatic handling of need to expand or alter existing standards.



Specific problems attached and conclusion drawn:

1. Units within a given module will still be enclosed by dotted lines. However, the drawing appearance can be improved considerably by (1) using a single border line between modules instead of two and (2) arranging these lines in a more regular fashion.
2. Standard symbols have yet to be chosen for many module types. J. Fadiman will peruse the module catalog and come up with suggested symbols for these.
3. Individual transistors will be shown thusly:
 = PNP  = NPN Emitters will be down except when clarity of drawing will be improved significantly by showing them up.
4. The mainstream of signal flow will progress from left to right and bottom to top, whenever possible.
5. Diode gates will show all diodes and input arrows will be at dotted lines.

6. Existing pulse and level arrows will be retained for standard signals only, as defined in the module catalog. The open pulse arrow which is for positive pulses from ground can therefore be used only for pulses emanating directly from pulse amplifiers and other circuits have transformer output. Flip-flop inputs coming from inverters or capacitor diode gates will have no arrows.
7. No arrows will be shown at emitters.
8. Non-standard signals will use the following arrows when deemed necessary:

_____  = positive going _____  = negative going

No distinction is made between pulses and levels nor are absolute voltages implied.

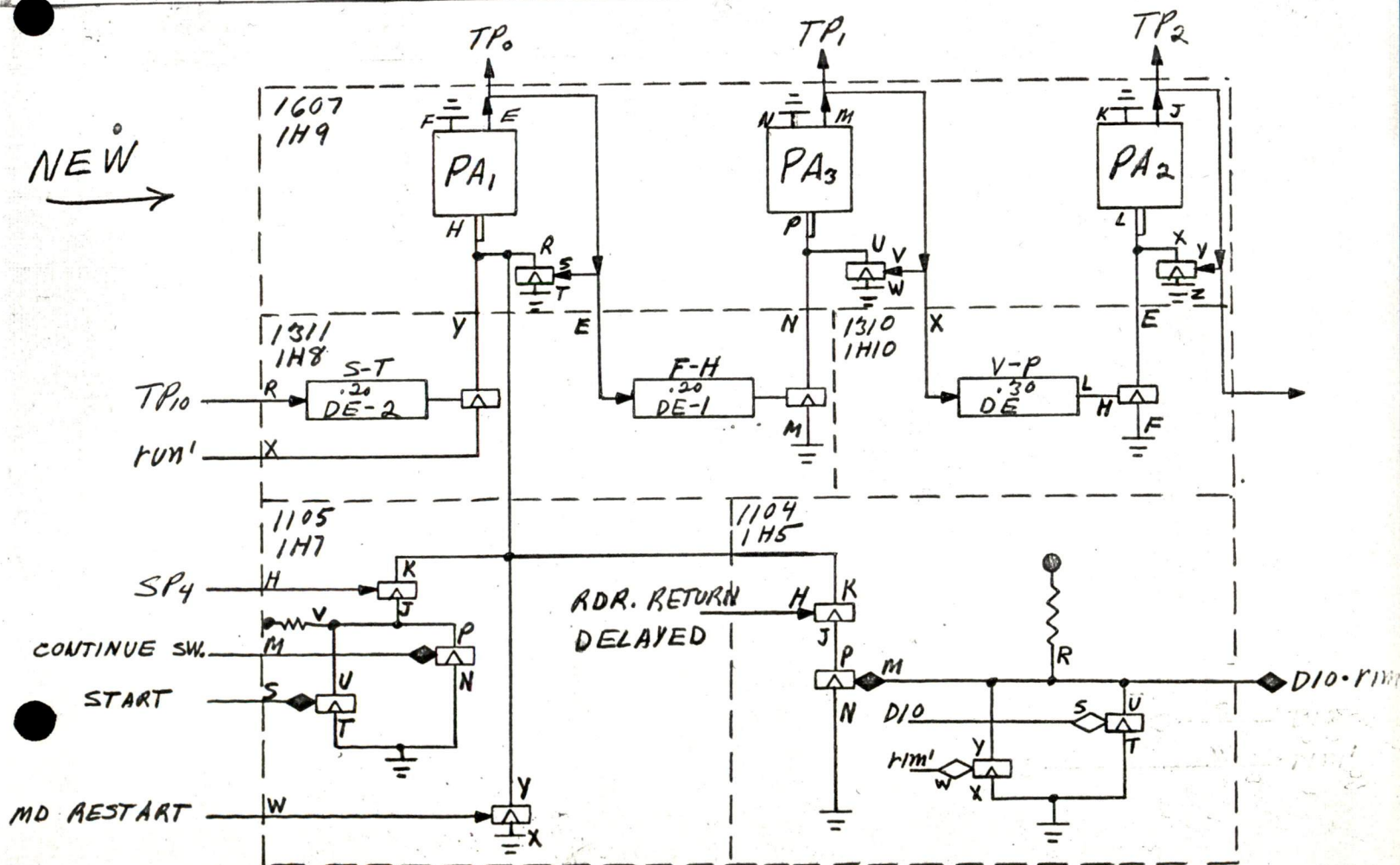
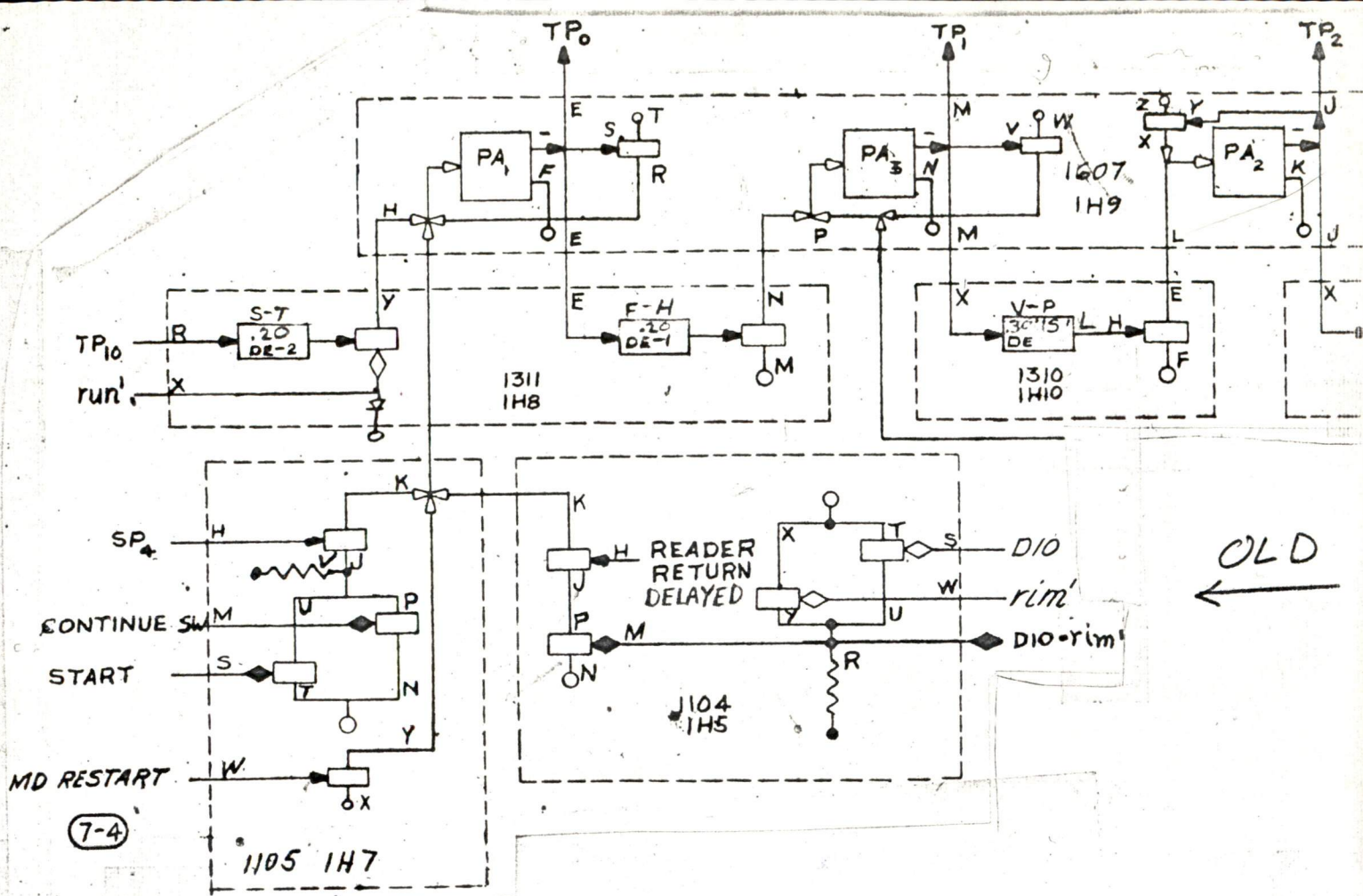
9. The ground symbol is :  or 
10. An A size drawing should be generated showing the drawing conventions. Also a small transparent sticker, showing the important symbols, which can be attached to a vellum may also be desirable.

The above decisions were weighted heavily by the necessity for having the drawings easily understood by outsiders. Sacrifices in drawing ease are considered worthwhile toward this goal. The attached drawing shows examples of many of the items above, comparing the existing system with the new.

ANB/nbh

Dist. List

J. Fadiman
T. Stockebrand
G. Bell
R. Best
K. Olsen
W. Hindle
R. Hughes
A. Blumenthal
R. Doane
D. White





INTEROFFICE MEMORANDUM

DATE January 3, 1963

SUBJECT Sprague Ceracircuits - Quote

TO Dick Best

FROM Henry Crouse

Flip Flop, RC network ceracircuit part No. EC231-264 (tentative).

	10,000	25,000	50,000	100,000	250,000
Without Crossover	\$513.00/M	\$476.00/M	\$444.00/M	\$417.00/M	\$392.00/M

With Crossover	\$580.00/M	\$540.00/M	\$503.00/M	\$472.00/M	\$444.00/M
-------------------	------------	------------	------------	------------	------------

	1 Million	1 Million
Without Crossover	\$350.00/M	
With Crossover		\$397.00/M

Delivery - six weeks ARO

Sample order for 100 pieces \$100.00.

This quote was received from Mr. Arch Martin at North Adams, Telephone 413-664-4411. A formal quote and print will be submitted by Sprague per Jack Driscoll.

Henry Crouse

CC: K. Olsen /

INTEROFFICE
MEMORANDUM

DATE 3 January 1963

SUBJECT PDP-1 Programming Course

TO PDP-1 Distribution List FROM S. Mikulski

Purpose: To inform distribution list that a programming course is being held at Digital to familiarize users with the PDP-1 computer and the basic programs furnished with the machine.

- Scope:
1. Prerequisite for the course is a basic understanding of programming and familiarity with programming routines.
 2. The course length is 1 week. People planning to attend should attend every day, as the contents of any day are generally dependent upon the previous.
 3. Description: The course starts with a description of the central processor and all available options. The course itself deals only with the programming of the standard machine. Immediately after the description of the machine is a description of the MACRO assembler, as it is used throughout the course in the writing of the programs. Expensive typewriter and DDT are also described as they will be used by the students in the labs. The remaining portion of the course is devoted to the detailed description of the instructions stressing the flexibility of the input-output abilities and the sequence break system.
 4. Anyone interested in attending should contact me as far in advance as possible to allow for scheduling. The course is principally for the customers and rescheduling of DEC people may become necessary but I am trying to save a couple of spots in each class specifically for DEC.
 5. The classes will be limited to 8-10 people which will allow a large amount of computer usage by each person.
 6. The next class will convene the week of the 28th of January, and classes will be scheduled at about six-week intervals.