

January 14, 1966

C
Mr. Alec Kyle
Managing Director
Rocappi Consultants, Inc.
4 East State Street
Doylestown, Pennsylvania 18901

O
Dear Mr. Kyle:

Thank you for your invitation of December 31, 1965 to attend your
Symposia on "Computers in Marketing". Unfortunately, I will be unable to
attend but appreciate your invitation.

P
Sincerely,

Harlan E. Anderson
Vice President

Y
HEA:ncs

January 14, 1966

C
Mr. William W. Ramage
Director of Equipment Technology
Learning Research and Development Center
University of Pittsburgh
Pittsburgh, Pennsylvania 15213

O
Dear Mr. Ramage:

Enclosed you will find our latest PDP-7 Interface and Installation Manual as promised by Harlan Anderson in his letter of November 9th. Please excuse our delay in sending this sooner due to publication tie-ups.

P
If you would like additional copies or other literature, please do not hesitate to contact us.

Sincerely,

(Mrs.) N. Survilas, Secretary to
Harlan E. Anderson, Vice President

Y
HEA:ncs

Enc: F-78 - 1/66

bcc: Nick Mazzaresse
Ray Lindsay
Stan Olsen

January 5, 1966

C
O
P
Y

Mr. John H. McAdoo
121 1941 Hall
Princeton University
Princeton, New Jersey

Dear Mr. McAdoo:

I have received your letter of January 3, 1966 inquiring about the availability of summer employment at Digital Equipment Corporation. We do not have a formalized summer program but occasionally hire a small number of people usually from the local area. Our Personnel Department has more information on this subject and processes all applicants interested in these possibilities. Therefore, I am turning your letter over to Mr. Robert Lassen who is head of our Personnel Department and I am sure you will hear from him in the near future.

Thank you for your interest in DEC and good luck in your school program at Princeton.

Sincerely,

Harlan E. Anderson ✓
Vice President

HEA:ncs
cc: R. Lassen

Bob:

I would like to see your response to Mr. McAdoo.

Andy

HEA:ncs

January 5, 1966

C
O
P
Y

Mr. D. E. J. Rawlings
Managing Director
Dynamco Systems Limited
Govett Avenue
Shepperton, Middlesex, England

Dear Mr. Rawlings:

Your letter of November 1, 1965 to Mr. Kenneth Olsen, President of Digital Equipment Corporation, has been referred to me for answer.

As you know, our operation in the U.K. is limited to sales and service with no manufacturing. For the future we anticipate continuing this mode of operation with practically all manufacturing done in the United States. If we did find it advantageous to have a manufacturing facility in Europe or the U.K., we would most likely do it as an extension of our wholly-owned subsidiary.

Nevertheless, I would like to thank you for your interest in contacting us and will keep your suggestion in mind should our thoughts concerning the U.K. change in the future.

Sincerely,

Harlan E. Anderson
Vice President

HEA:ncs

January 14, 1966

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Doylestown, Pennsylvania 18901

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HEA:ncs

Reservation No. EQ-12

RESERVATION FORM

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TITLE

COMPANY

ADDRESS

DATE CHOICE

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CHICAGO	January 27	_____
NEW YORK	January 31	_____

RELEVANT INFORMATION ABOUT RESPONSIBILITIES OR
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SPEAKERS' PANEL
SHIRTSLEEVE SYMPOSIUM ON COMPUTERS IN MARKETING

Five men from the panel will be at each session:

William Ashley, Vice President, *Mauchley Associates*

Milton Bauman, Exec. Vice President, *ROCAPPI, Inc.*

Alex Bernstein, *Simulmatics, Inc.*

Donald Blumberg, Manager, Operations Research and
Long Range Planning, *Philco Corporation*

George Craighead, Manager, Marketing Group,
Touche Ross Bailey & Smart, Detroit

Alec Kyle, Managing Dir., *Rocappi Consultants, Inc.*

R. R. Maffei, Director of Marketing Applications,
Auerbach Corporation

Noel Mirasol, Manager, Marketing Section, Advanced
Systems Planning Division, *IBM*

Nathaniel Morgan, Director of Research,
Gray & Rogers, Inc.

Fred Pohl, Coordinator, Data Processing Systems,
NCR

Jack L. Ray, Senior Specialist, Sales Forecasting,
Price Waterhouse & Company

Corinne Silverman, Director of Company Information,
Marketing Science Institute

Hugh G. Wales, Professor of Marketing, University
of Illinois, and Director of Management Education,
Rocappi Consultants, Inc.

TOPICS

How a computer works.
 Computers in marketing. Trends. Implications of
 "public utility" computers.
 Computers in industrial marketing...Pinpointing
 sales messages by profile matching.
 Computers in consumer marketing.
 Retail and point-of-sale automation.
 Measuring advertising effectiveness.
 Time series sales forecasting.
 Models and simulation in market testing and
 distribution planning.
 Return on marketing investment.
 Media mix by computer.
 Automating the advertising agency.

DATES & PLACES

BOSTON - *Ritz Carlton* - Mon., January 24
TORONTO - *Royal York* - Tue., January 25
DETROIT - *Sheraton Cadillac* - Wed., January 26
CHICAGO - *Wellington Club* - Thu., January 27
NEW YORK - *Advertising Club* - Mon., January 31

All sessions start at 10 A.M. and end at 6 P.M.
 (buffet luncheon in conference room)

PRIOR PARTICIPANTS

Prior participants in these
 management education activities have included
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Presidents of companies like...
 Rollins, Inc. *William B. Kessler Co.*

Vice Presidents of companies like...
 Union Bag-Camp Paper *Technitrol, Inc.*

Advertising managers of companies like...
 TWA *Sperry-Rand*

Executives of advertising agencies like...
 Ted Bates & Company *Michener Advertising
 (Harrisburg, Pa.)*

Market research managers of companies like...
 The Borden Company *Yale & Towne*

Sales managers of companies like...
 United Airlines *Datex Corporation*

Systems/EDP managers of companies like...
 The Mennen Company *Sun Oil Company*

Budget managers of companies like...
 Schering Corporation *White Laboratories*

Consultants like...
 Arthur D. Little, Inc. *Marketing Evaluations*

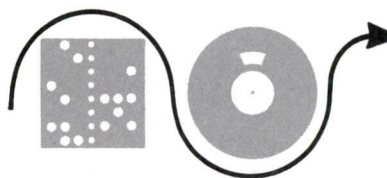
Executives of media like...
 CBS Television *Time, Inc.*

Executives of retail organizations like...
 Genesco *Rockower Brothers*

Executives of trade associations like...
 Glass Container Mfrs. *Institute of Outdoor
 Institute Advertising*

ROCAPPI CONSULTANTS

I N C O R P O R A T E D



Management Consultants
on the twin impacts
of the computer and the
information explosion.

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- 4 East State St., Doylestown, Pa., 18901 215-Fillmore 8-2324
- 217 Second St., San Francisco, Calif. 415-362-5526

December 31, 1965

Mr. Harlan E. Anderson
Digital Equipment Corporation
Main Street
Maynard, Massachusetts

Dear Mr. Anderson:

This is an invitation to participate in one of our Shirtsleeve Symposia: on COMPUTERS IN MARKETING. (A Shirtsleeve Symposium consists of five brief talks by top-echelon "resource men" who then participate in discussions applying concepts to actual situations of the participants).

This session is concerned with how the computer revolution is beginning to affect marketing. Many executives have not yet had time to find out what they should be doing about the new technologies, and how their responsibilities may change. We are therefore putting on these sessions both for those who are neophytes in computer technology, and also for experienced data processing managers who want greater depth in marketing applications.

Your fellow participants will all be men with responsibilities equal to yours (a partial list by title and company of participants in prior sessions is enclosed).

We hope to have the benefit of your experience at this Symposium. We would appreciate your advising us promptly whether or not you can come so that, if you cannot, we may invite someone else. We are trying to keep each session to the optimum size for fruitful discussion. If you wish us to extend an invitation to an associate, please call us and give details of his responsibilities. The cost is \$60. A thirty-minute reading kit will be sent you before the meeting.

Yours sincerely,

Alec Kyle
Managing Director

ms



INTEROFFICE MEMORANDUM

SUBJECT Worthwhile Reading

DATE January 18, 1966

TO Sales Newsletter - Ted Johnson

FROM Harlan E. Anderson

Worthwhile Reading (Harlan Anderson)

"Comparing the Compacts" - The article in the December 1965 issue of DATAMATION having this title is a must for anyone selling DEC computers in the field. It is worthy of some special study since it presents the considerations involved in short word length computer designs rather carefully. A copy of this article is available from Ted Johnson's office in case you don't have access to DATAMATION. Incidentally, there appears to be a mistake in the article. Let me know if you spot it and agree.

COMPARING THE COMPACTS

a careful dissection

by EDWARD O. BOUTWELL, JR.

Computer word length has become an important parameter to designers, users, and others interested in evaluating computer performance. To the manufacturer, word length has a direct bearing on cost and indirectly determines the programming features of the machine. The specific user is additionally interested in comparing word length to the characteristics of his data and is concerned with computational accuracies, efficiencies, and the frequency of double precision operations.

From a chronological viewpoint, one might make the following generalizations about fixed word length machines:

1. Prior to 1961, the most common word lengths were 36 and 48 bits.
2. During the period 1961-1963 many computers having word lengths ranging from 18 to 30 bits were introduced, including several 24-bit machines.
3. Since 1963, a significant number of 12 to 18-bit word length "small" computers have been successfully marketed, many of these machines having been announced only within the past year.

It might seem curious at first that the computer industry developed the relatively complex, longer word length machines in its infancy and waited until maturity (?) to produce the shorter word length machines with simpler instruction sets. There are at least three reasons for this seeming anomaly.

1. Early computers were largely devoted to scientific problem solving which required the greater accuracy provided by longer words.
2. The long memory access times associated with early memories made it important to accomplish as much with each instruction and to bring as much data from memory with each operand access as possible.
3. Development experience, large volume production economies and advancing component technology have recently made low-cost, high-performance computers possible and there are an increasing number of applications requiring such computers.

A sub-set of the most recent category, those machines with random access memories and characterized by parallel, binary internal organization, form an important class of computers. This class has attracted considerable interest and is receiving growing customer acceptance because of the economy and performance of its members and because its machines are finding use in new application areas which are themselves interesting and profitable.

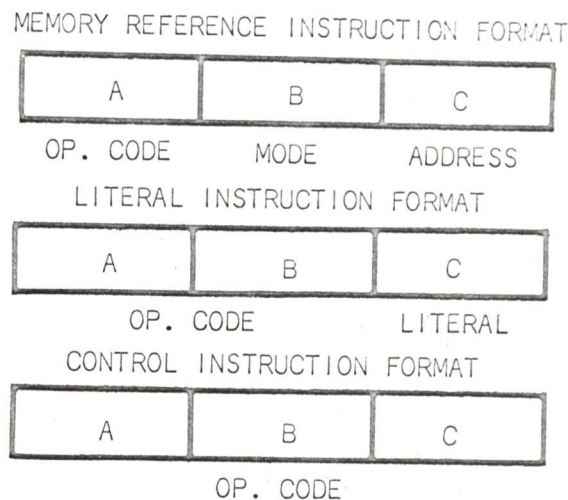
These application areas include: data acquisition, as encountered in the operation of wind tunnels, static test stands and general research instrumentation; industrial control, in which set-points may be computed for analog loop controllers or the process devices may be directly controlled by the computer (direct digital control); and other forms of on-line real-time processing, such as automatic checkout, telemetry data reduction, and communications control.

The following discussion considers those programming characteristics which are imposed by a short word length, their effect on use, and identifies some of the newer features which have begun to appear in computers of this class.

effects of short word length on instruction format

A generalized instruction word format for a typical "single address" machine includes an A-field, which identifies the operation to be performed; a B-field, which specifies indexing, indirect, relative, or other forms of address modification, and a C-field, which contains address information, a literal, or an extension of the operation code. Instruction word formats for three basic categories of instructions are presented in Fig. 1. From the standpoint of control simplicity the machine designer would normally

Fig. 1. Instruction word formats for three basic classes of instructions.



prefer that fields A, B, and C always have the meaning ascribed to them above, that is, all instructions having the format of memory reference instructions. The effect of decreasing computer word length, however, is to place a greater premium on encoding efficiency and to force the recognition of the two remaining categories.

To illustrate this problem, consider the allocation of instruction word bits in an 18-bit machine, at the upper end of our short word length class. If as few as four bits are assigned to specify the operation code (field A) and only a single bit to designate some form of address modification



Mr. Boutwell is vice president of Compata, Inc., consultants in design and application of computer systems. Active in machine organization, logic design, and programming for the last nine years, he has been affiliated with NCR, Aeronutronic, and Packard Bell. He holds BS and MS degrees in engineering from UCLA.

(field B), the remaining 13-bit C field is sufficient to directly address a maximum of 8192 memory locations. Thus, not only will indexing or indirect techniques be required to address typically larger memories, but if more than 16 instructions are to be provided, bit positions outside of the A field must be used to extend the operation code. This difficulty becomes more severe as instruction word length approaches 12 bits, the lower limit of the class. To meet the addressing problem, a variety of addressing modes have been conceived by computer designers. At the same time, the availability of and reliance on two-word instructions is noticeable in several of the 12- and 16-bit machines. In summary, the machine characteristics dictated by short word length are:

1. Inability to directly address total memory
2. Use of special addressing modes to obtain fast access to operands
3. Occasional reliance on two-word instructions
4. Small number of index registers
5. Use of address field as a secondary or extended operation code

In (see p. 70) a number of the short word length class computers are characterized by their addressing techniques, I/O methods, and special features. The significance and utility of these characteristics is discussed below.

direct addressing

The principal classifying features of the short word length computers are those which describe available addressing modes. Because the short address field of a memory reference instruction usually does not contain enough bits to uniquely describe a general memory location, some form of relative addressing must be used. Three approaches are employed by the machines of Fig. 2:

1. The short address is added to the contents of the instruction location counter (A,E,G,H).¹
2. The more significant bits are supplied by the location counter, that is, the short address is relative to the beginning of the memory "sector" from which instructions are currently being executed (B,D,F,K).
3. The more significant bits are supplied by an address extension register whose contents are program alterable (A).

Both the first and second approaches require that constants and working storage used at each point in the program be located within the short address "span" of the associated instruction sequence. In the first case, they always lie "in front" of the program counter up to a certain maximum distance; in the second case, they can be placed either above or below the instruction sequence. In both cases the program must periodically jump around these areas. The second method is simpler from an implementation standpoint, however, in that no addition is called for in forming the direct address.

The provision of a common scratchpad region in several machines avoids the need to duplicate this function in each program sector. On some of the 16-bit machines the scratchpad region is simply the first sector of memory (E,F,G,K). It is frequently large enough to permit direct addressing of limited data tables.

The third approach, in which a program alterable address extension register supplies the more significant bits of the address, appeared in a restricted form in one of the early short word length machines (A). Storage bank control registers indicated which memory modules were to be

referenced by the short address, according to the addressing mode specified in the instruction.

An additional form of direct addressing is available on two machines by setting the short address field to all 0's (C,E). This mode, often referred to as "immediate addressing," implies that the operand is located immediately following the instruction.

indirect addressing

Most of the short word length machines provide an indirect addressing capability. In indirect addressing, the effective address is used to locate not the operand but the address of the operand. If the address found by this means is itself provided with an indirect indicator, the process may be continued through several levels. Indirect addressing is useful in picking up main program parameters or tables of data by subroutines, and for use where program relocation or operation on multi-dimension data is involved.

Usually an instruction word bit or combination of mode bits signals the indirect mode. In one instance the indirect mode must be established by a previous instruction prior to each use (L). The memory location containing the operand address is typically accessed by one of the direct addressing means provided on the particular machine (i.e., relative, scratchpad, or address extension), adding one memory cycle to the execution time of indirect mode instructions.

In one 16-bit computer, indirect addressing may be specified only by using a two-word instruction word format (H). In another machine, with a 12-bit word length, the indirect word (operand address) itself occupies two successive memory locations (C). Indirect addressing in these machines carries a two-memory-cycle penalty.

The machines of Fig. 2 differ considerably in the number of levels of indirect permitted and in the ability to combine indexing with indirect addressing. If both are allowed, indexing usually precedes multiple level indirect and follows single level indirect.

indexing

The use of index registers in address modification and in counting program iterations has become common in larger computers and their availability is generally taken for granted. The necessity for cost consciousness in the short word length class, however, has resulted in index registers being completely eliminated in some instances and has produced interesting "implementations" of the indexing concept in several others.

Three of the machines considered in Fig. 2 have hardware index registers which may be used for this purpose alone (G,H,L). In three other machines, the accumulator extension register performs this function when indexing is indicated (C,E,K). This approach requires some "house-keeping" operations to preserve and re-establish the index register contents when indexing is interspersed with MULTIPLY or other "double length" instructions. For moderately long sequences of single length manipulative and control instructions, however, it provides indexing with no time penalty and at little hardware cost.

In another group of the short word length class, one or more memory locations are set aside by the designer for use as index registers, to be read automatically when indexing is indicated by the current instruction. A one-memory-cycle time penalty is incurred for each use but there is no program overhead as in the time-shared-register approach described above. One of the machines of this class offers two index registers, one in memory and the second an arithmetic register (E). With the dedicated memory location approach, one is limited in the number of

¹ Alphabetic characters enclosed in parentheses refer to specific computers in Fig. 2 as examples of the characteristic being described.

index registers principally by the number of instruction word bits available for register specification. A further benefit which derives from locating index registers in memory is the ability to initialize and modify their contents by using the ordinary LOAD and STORE memory instructions. Thus, the necessity to assign some of the limited number of instruction codes to special index register instructions is avoided. A related instruction, INCREMENT (DECREMENT) MEMORY-CONDITIONAL JUMP, has often been included, however, to facilitate the iteration counting function and, in fact, lessens the need for a large number of formal index registers.

An interesting variation on the above use of memory located index registers, referred to as "auto-indexing," has been employed by one manufacturer and appears in two machines of Fig. 2 (B,M). In auto-indexing, no instruction bits are allocated for index register control. An indirect reference to one of a number of predetermined memory locations, however, causes the contents of that location to be incremented, replaced, and the result taken as the effective address. This may be viewed as a form of indirect addressing with automatic incrementing of the indirect word, or as a combination base register-index register. In any case, each auto-indexing location is dedicated to a particular data table and a somewhat larger number of them is required to compensate for this fact. Although an arbitrarily large number of locations could be assigned to function in the auto-indexing mode without contributing to instruction encoding problems, the principal drawback to this method is the two-memory-cycle penalty incurred for each auto-indexing operation.

general addressing

An important insight into the utility of the machines of the short word length class can be gained by noting the ease with which a general (or arbitrary) memory location may be referenced. Because of the typically small size of the program sector and any scratchpad region, it will be necessary in many applications to operate on data stored outside of these areas. This requirement presents no great difficulty in the machines with good direct addressing facilities (e.g., with 13-bit short address fields or address extension registers) and serves only to introduce a one-cycle time penalty for machines which provide two-word instructions for full memory addressing.

On those machines lacking both the above facilities and indexing, indirect addressing offers the only means for accessing generally located data. If data from several tables are involved in the processing, a corresponding number of indirect words may be established with their contents being periodically incremented under program control. Machines equipped with several full-address-length index registers can access as many data tables as there are registers by dedicating each register to a data table so that it becomes, in effect, an incrementable base register (cf. pseudo-indexing). For the several machines which offer combined indirect and indexing, the contents of a single index register may be used to modify a number of indirect words, without suffering the program overhead of the straight indirect approach, but with more economy than the multiple index register approach.

new features and trends

In addition to somewhat unusual addressing characteristics, a number of new or novel features are discernible among the machines of the short word length class. Some of these are more or less peculiar to the small machines and are attributable to the specialized requirements of particular applications. Others are expressions of what seem to be trends (or perhaps vogues) in the internal organization of digital computers in general.

Arithmetic and CPU Features. An interesting general trend towards multiple accumulators and a companion feature, inter-register operations has evidenced itself in several machines of this class. In programming a typical single accumulator machine it is found that a number of the LOAD and STORE instructions arise from the periodic need to preserve intermediate results while some related, intervening series of operations is performed, then temporarily store those results and reload the previous result in order to proceed with the next phase of the problem, etc. (as in the evaluation of a general polynomial).

The availability of multiple accumulators and instructions to combine their contents logically and arithmetically, reduces the number of superfluous memory access instructions otherwise required. An analysis performed by one manufacturer indicated that about 30% of the LOAD and STORE operations occurring in representative code were redundant in the above sense.² It was further observed that approximately 80% of these redundancies could be eliminated by the provision of as few as three accumulators, with the value of additional accumulators diminishing rapidly.

Although none of the short word length machines contains a complete implementation of features described above, a number of them are equipped with some of the desirable elements. Two of the machines considered exhibit dual, single length accumulators with many of the arithmetic and logical instructions being applicable to either register (C,K). In both cases the second register also functions as the accumulator extension for double-length operations and is time-shared as a hardware index register. The machines thus benefit from the ability to apply the general arithmetic operations to the index

² G. M. Amdahl, "The Structure of the System 360—Processing Unit Design Considerations," *IBM Systems Journal*, Vol. 3, Nos. 2, 3.

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CIRCLE 29 ON READER CARD

FIG. 2 SUMMARY OF FEATURES OF SHORT WORD LENGTH COMPUTERS

CHARACTERISTIC	A CDC 8090	B PDP 8	C SDS 92	D PRODAC 50	E CDC 1700	F DDP 116	G DMI 620	H IBM 1801	J MARK I	K SEL 810	L H 22	M PDP 7
INSTRUCTION WORD	LENGTH (Bits)	1. 12 2. 24	12	1. 12 2. 24	14	1. 16 2. 32	16	1. 16 2. 32	1. 16 2. 32	16	16	18
	OP. CODE FIELD (Nominal) (Bits)	6	3	5	5	4	4	4	5	4	4	4
	ADDRESS FIELD (Bits)	1. 6 2. 12	7	1. 3 2. 15	8	1. 8 2. 16	9	9	1. 8 2. 16	11	9	13
MEMORY	WORD LENGTH (Bits)	12	12	12	14	18	16	16	18	16	16	13
	CYCLE TIME (μ sec.)	6.4	1.6	1.75	4.5	1.1	1.7	1.8	2	3	1.75	1.75
	CAPACITY (Words)	8-32K	4-32K	2-32K	4-16K	4-32K	4-32K	2-32K	4-32K	2-16K	4-32K	2-16K
	PARITY CHECK	No	Optional	Optional	No	Yes	Optional	Optional	Yes	No	Optional	Yes
PROTECTION FEATURE	No	No	No	No	Yes (Prog. Estab.)	No	No	Yes (Manual Estab.)	No	No	Optional Yes	Optional No
INDEX REGISTERS	None	8 "Auto-Index" Loc. In Mem.	1, Accum.	None	2, Accum. Ext. Reg., Mem. Loc.	1 (Mem. Loc. 0)	2, One is Accum. Ext.	3	1 for each of 8 Memory-Stored Processors	1, Accum. Ext. Reg.	1	8 "Auto-Index" Loc. in Mem.
ADDRESSING FEATURES	INDIRECT	Single Level to One of 8K Loc.	Single Level	Multi-Level, Indexable at Any Level	Single Level	Multi-Level, Indexable at First Level Only	Multi-Level	Multi-Level	Single Level, Indexable, Two Word Inst. Format Only	No	Multi-Level, Indexable at Any Level	Single Level, Indexable, Req. Set-Up Inst.
	SCRATCHPAD (Words)	64	128	31	No	256	512	2048	No	No	512	No
	EFFECTIVE ADDRESS	1. Rel. to P.C. 2. Direct to 8K Bank	1. Rel. to Sector Loc. 0	1. Scratchpad 2. Direct to 32K	Rel. to Sector Loc. 0	1. Rel. to P.C. 2. Direct	Rel. to Sector Loc. 0	Rel. to P.C.	1. Rel. to P.C. 2. Direct	Direct within 2K Basic Mem.	Rel. to Sector Loc. 0	Direct within 8K P.C. Sector
	ACCESS TO GENERAL LOCATION	1. Indirect 2. Two Word Inst.	Indirect, Auto-Index	1. Indirect 2. Two Word Inst.	Indirect	Indirect, Two Word Inst., Index	Indirect, Index	Indirect, Index	1. Index Reg. 2. Two Word Inst.	Index Reg.	Indirect Indexing	Indirect Index
ARITHMETIC FEATURES	NO. ACCUMULATORS	1	1	2	1	1	1	1	1 per Processor (In Memory)	2	1	1
	REGISTER OPERATIONS	No	No	No	No	No	No	Yes	No	Yes	Yes	No
	ADD TIME (μ sec.)	1. 12.8 2. 19.2	3.2	3.5	18	2.4	3.4	3.6	1. 4.5 2. 6.25	15	3.5	4.9
	MULTIPLY TIME (μ sec.)	Subroutine	15.2 Optional	7.0 Optional	Subroutine ~ 1 ms.	7.0	Subroutine 9.5 Opt.	18 Optional	1. 14.25 Std. 2. 17.0 Std.	Subroutine	17.5	25.6
	DATA REPRESENTATION	1's Comp.	2's Comp.	2's Comp.	1's Comp.	1's Comp.	2's Comp.	2's Comp.	2's Comp.	2's Comp.	2's Comp.	2's Comp.
I/O FEATURES	WIDTH OF DATA PATH (Bits)	12	12	6 12 Opt.	14	16	16	16	16	16	8, 16	18
	PARITY TRANSMITTED?	Yes	No	Yes	Yes	No	No	No	No	No	Optional	Yes
	MAX. DEVICES	64	64	30	64	8 Prog. Contr. 8 Buffered	64	64	32	128	128	4096
	BASIC I/O DATA PATH	CPU, Single Word & Block Transfer Inst.	CPU Accum.	Mem. Buffer Reg.	CPU Accum.	CPU Regs.	CPU Accum.	1. CPU Reg. 2. Mem. Buffer	Memory via CPU Reg.	CPU Regs.	1. CPU Reg. 2. Mem. Buffer	Mem. Buffer Reg.
DIRECT MEMORY ACCESS WORD RATE	70 KC	625 KC	114 KC Single Word, 572 KC Burst	N.A.	900 KC	145 KC Single Word, 580 KC Burst	550 KC	500 KC	Prog. Block Transfer 100 KC	570 KC	568 KC	570 KC

FIG. 2. SUMMARY OF FEATURES OF SHORT WORD LENGTH COMPUTERS

CHARACTERISTIC	A CDC 8090	B PDP 8	C SDS 92	D PRODAC 50	E CDC 1700	F DDP 116	G DMI 620	H IBM 1801	J MARK I	K SEL 810	L H 22	M PDP 7
DMA CONTROL WORD LOC.	Channel Hdwe.	I/O Device Hdwe.	A. Memory B. Channel Hdwe.	N.A.	Channel Hdwe.	A. Memory B. Channel Hdwe.	Channel Hdwe.	Channel Hdwe.	Index	Channel Hdwe.	Channel Hdwe.	I/O Device Hdwe.
MAX. BLOCK LENGTH (Words)	8K	Limited by Mem. Size	512	N.A.	Limited by Mem. Size	16K	Limited by Mem. Size	16K	Limited by Mem. Size	Limited by Mem. Size	4K	Limited by Mem. Size
COMMAND, DATA CHAINING?	No	No	2 Blocks Max.	No	No	No	No	Data Chaining	No	No	No	No
PRIORITY INTERRUPT LEVELS	4	1 Common Int. Line	256 Opt.	14 Basic 50 Opt.	2 Basic 13 Opt.	1 Common Int. Line, 256 Opt.	1 Common Int. Line 256 Opt.	12 Priority Levels, up to 16 Lines Each	7	1 Common Int. Line Basic, 96 Opt.	32 Levels, up to 144 Lines Each	1 Common Int. Line, 16 Opt.
UNIQUE MEM. LOC. FOR EACH INT. SOURCE?	Yes	No	Yes	Yes	Yes	Optional	Yes	1 Loc./Level, Subroutine Ident. Line	Yes	Yes	Yes	Yes
ASCII COMPATIBLE?	No	Yes	No	?	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
APPROX. PRICE: CPU, TYPEWRITER, P.T.R., P.T.P., 4K Words MEMORY	35K	18K	35.5K	27.5K	28K	28K	30K	54.3K	23K	29.5K	32K	45K
IMPLEMENTATION	Discrete	Integrated	Flip Flops Integrated	Discrete	Discrete	Discrete	Discrete	Discrete	Integrated	Integrated	Hybrid	Integrated

register. These machines are not equipped, however, with extensive sets of inter-register operations. Unfortunately, one machine which has been equipped with a commandable set of inter-register operations does not permit the registers to function as independent accumulators.

Three of the machines considered contain some type of microprogramming facility (B,G,M). This takes the form of a non-memory-reference type of instruction in which all bit positions outside of the primary operation code are each used to control some simple CPU or I/O function (e.g., clear, complement, increment). The functions are typically independent and more than one may be specified in a given instruction. A microprogramming capability generally simplifies the programming of those larger functions which are not provided as instructions. In a sense it compensates for a limited instruction repertoire at little increase in control complexity or cost.

Memory Features. In addition to demonstrating generally improved memory cycle times (as low as 1.1 usec.), a number of the short word length machines are distinguished by memory features which are related to their size or intended application. Memory capacity is an example of the former. Maximum capacities typically range to 16K or 32K words. Because the cost of even 4K words of random access memory may represent a significant part of a computer's total cost, however, the basic configuration of several machines contains less than this amount. For a similar reason, incremental expansion of the memory system using modules as small as 1024 and 2048 words is offered in some cases (C,F,J,L). As another example of extreme cost consciousness, parity checking is frequently offered as an extra cost option. Here, the opportunity to reduce the cost of the memory by $\frac{1}{2}$ to $\frac{1}{4}$ in a 12-bit to 16-bit unit is a principal motivation. Memory reliability is also cited as justification for this approach.

The use of short word length computers in real-time

CPFFF
OR
FFP

DESIGNING/PROGRAMMING/DOCUMENTATION/CHECK OUT

PRRC
APPT
COMPIERS



PLANNING RESEARCH CORPORATION
Home office: 1100 Glendon Avenue, Los Angeles, California 90024

applications involving relatively high I/O data rates and in industrial control applications has led to the inclusion of two additional important memory features.

The first, direct memory access, is available as an option on most of the computers in the class. This permits program initiated data transmissions to proceed concurrent with program execution at rates approaching the maximum memory transfer rate.

A second relatively new feature protects certain regions of memory against inadvertent alteration due to machine fault or operator error. Coupled with a safeguard against loss of memory information during power transients, memory protection guarantees the integrity of control programs in critical on-line industrial applications. In each of the computers offering this feature, protection is on a word-by-word basis and involves the use of an additional bit per memory word for this purpose. In one instance, the state of the protection bit is established under operator supervision and may not be altered by the program during subsequent unsupervised operation (H). In two other cases, protected words may be altered by instructions which are themselves protected (E,L). Thus, protection bits may be used to identify monitor or executive programs as well as the operating programs. With this provision, the computer may be used for program debugging from the console concurrent with the operation of an on-line control program.

Input/Output and Special Features. A number of classifying I/O features are listed in Fig. 2 for the computers of the "compact" class. As was the case in the previous consideration of arithmetic capabilities, some of these features are characteristic of the short word computers and others represent more general trends.

The width of the I/O data path typically corresponds to the word length of the central processing unit, although some of the computers also offer a half-word mode for communicating with character-oriented devices. In at least four cases, manufacturers have seen a need for including parity information in the I/O data channel. One of these manufacturers, however, offers memory parity only as an option. The number of devices or controllers which can be attached to the typical short word length computer is generally limited by the structure of its I/O command and in most cases exceeds a practical number (e.g. 128, 4096).

A significant characteristic of the computers under consideration is their widespread use of the accumulator in the I/O data transfer path. Although this practice was motivated earlier by reasons of economy, the need to inspect and process input data in real-time in on-line applications is probably equally responsible for this approach in recent computers. Nearly all of the computers of Fig. 2 also offer a direct memory access (DMA) option to permit simultaneous I/O transmissions and processing. Thus, word rates of 500KC to 1MC are possible using today's one-plus microsecond memories.

In most instances the registers holding current storage address and block length count information are contained within the DMA channel hardware. Two manufacturers offer lower cost versions of DMA, however, in which the channel control words are stored in pre-assigned memory locations (C,F). The number of additional memory cycles devoted to reading, modifying and restoring these words for each data word transmitted degrades performance but permits a large number of data transmissions to be buffered at rates well above those possible using the straight programmed approach. The length of the data block which can be DMA buffered varies from a few hundred words to a complete memory module, and in some instances includes the maximum size memory.

A fairly powerful approach to controlling a series

of data transmissions where only short intervals or response times are permitted, involves the concepts of command or data chaining. In data chaining, each buffer region of memory points to another (perhaps non-contiguous) region for storing or unloading the subsequent block. With this feature, data block rates which preclude program intervention can be handled comfortably. In the more complex notion of command chaining, each channel is equipped to call from memory and decode subsequent instructions which may perform certain status tests or remedial actions before proceeding with the sequence of transmissions.

A program interrupt capability with some method for establishing priorities among several interrupt request lines has become a necessity in many of the small computer applications. In the machines of Fig. 2, interrupt facilities range from a common interrupt line, with programmed determination of the source and cause of the interruption, to many individual interrupt lines. A variation groups a number of lines into several levels having established priorities. A common method for handling program interruptions is to provide a unique memory location for each interrupt source where the initial instruction or the starting address of the desired program may be found.

Two further characteristics tabulated in Fig. 2 are compatibility with the American Standard Code for Information Interchange (ASCII), which is growing in importance, and the use of integrated circuits in implementing the computer. Although several of the machines listed use integrated circuits in some form, a few of the more recently introduced models still use discrete component circuit modules. In at least one instance this is due to the manufacturer's desire to use an existing high speed line of circuits previously designed for a larger model. In other cases the decision was based on the conclusion that the required performance was not yet available in commercial integrated circuit form at competitive prices.

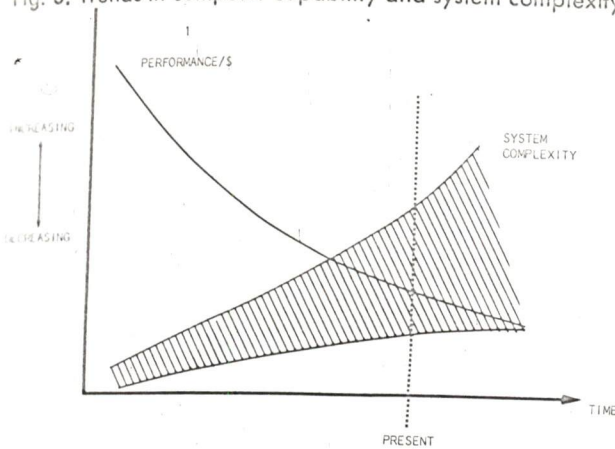
Additional features that are required to qualify for some areas of application are a real-time clock or interval timer and an automatic shut-down/restart capability where power transients must be accommodated. Each of these features is typically connected to a high priority interrupt request line.

Also included in Fig. 2 for each computer is the approximate price of a "basic" system which usually contains the CPU, typewriter, paper tape reader, paper tape punch and 4K words of memory. These figures should be taken as guides or indications only because of the difficulty in finding a "common denominator" configuration. Many of the features discussed above are standard on some machines and are options (or not available) on others. Furthermore, since the memory may contribute almost half of the cost of a small machine, differences in word length produce significant effects. For example, the 18-bit memories of the larger machines provide 50% greater storage capacity than those of the 12-bit smaller machines with a less than proportionate increase in price. Similarly, the information presented on memory cycle and instruction execution times should be considered only as a general indication of machine performance.

impact on industry

Because of their low cost and flexibility the "compact" computers are being used in a large number of special purpose applications where the previous generation of fast but large or small but slow machines was inadequate. This point is illustrated in Fig. 3, which shows concurrent trends in the performance/dollar of system computers and in the complexity of special purpose systems. On the one hand system complexity has appeared to increase with time because of man's desire to undertake

Fig. 3. Trends in computer capability and system complexity.



larger tasks, because an expanding technology has provided the means to solve the related problems, and because succeeding "generations" of system designers have developed confidence in their ability to solve such problems and have learned how to use the available technological tools. At the same time, the cost of computers with the necessary performance and real-time features has

been decreasing because of improvements in memory and component technologies and because of larger volume production efficiencies.

Some time ago, it became economically feasible to use the then available digital computers in lieu of special purpose digital designs in the larger, more complex systems. A continuation of the trends noted has resulted in a situation where a majority of the medium to large electronic systems specified today contain one or more digital computers. It is to be expected, however, that there will always remain some relatively small number of system requirements which can be best met by a special purpose design.

The "compact" class of computers has had an undeniable impact on industry. This impact can be measured by the number of small computer manufacturers who have risen to meet the occasion—between one and two dozen, by the annual sales volume of this class of computers—currently in excess of \$25 million, and by the variety of tasks to which these computers are being applied. It is in this latter area, with an as yet unrealized potential of computers in industrial applications, that the "compact" computers promise to outlive their four-wheeled counterparts and to have a lasting impact upon industry and society. ■

SYSTEM/360 ASSEMBLY LANGUAGE

preview of
a new book

by MARTIN E. HOPKINS

The following article is to be chapter 2 of a book titled "Programming the IBM System/360," being published by John Wiley & Sons. At the time of its inception, each of the 20 authors—all on the staff of Computer Usage Company—had already had one full year of experience with the machine. This book represents an effort to capture the early experience of these programmers and to disseminate it in printed form. It is aimed at experienced application programmers who wish to program System/360 routines in assembly language. Naturally, all who will be working with the machine will find much helpful material in the book.

Ascher Opler, Editor

This chapter is intended only to familiarize the reader with the Assembly Language so that coding examples written in it can be understood. The Macro Language is not discussed.

The Assembly Language of IBM System/360 is similar to those used by other computers. Typical assembly languages are: "Operating System/360 Assembler Language," Form No. C28-6514; "IBM System/360 Special Support Basic Assembler Language," Form No. C28-6503; and "IBM System/360 Basic Programming Support Assembler," Form No. C24-3355. The last two are declared to be a subset of the first. More limited language versions are desirable for efficiency of assembly programs on smaller machines. In general, the examples in this book use Operating System/360 Assembly Language.

Input to the assembly program is called a source language program and is usually punched on 80-column cards. The assembler translates this source language to object code, which executes on System/360.

Source language statements may be punched in a relatively free format subject to certain restrictions. The statement itself may use columns 1-71. When column 72 is not blank, the next card is a continuation of the current statement. Continuation cards do not use columns 1-15;

they begin with column 16. Columns 73-80 are the identification field and may be used for identification-sequence numbers or left blank. This basic framework can be varied by a special assembly control instruction, ICTL (input control).

A statement consists of name, operation, operand, and comments fields separated from each other by at least one blank. The name field may contain any legal symbol (to be described later) beginning in column 1. A blank in column 1 indicates the absence of a name field. The operation field contains a mnemonic, representing either a machine instruction or an assembler instruction. The operand field consists of one or more subfields or operands that supply whatever information, symbolic or absolute, is needed by the assembler to assemble the machine instruction or to act on the assembly control instruction.



Mr. Hopkins is a senior analyst with Computer Usage Company. For the last two years he has supervised the design and implementation of various compilers, operating systems, and other software for the IBM System/360 and 9020. He has also designed RCA Spectra 70 systems and is a consultant on problems associated with new computers.

January 21, 1966

Mr. Richard F. Mills
Vice President - Controller
Computer Control Company, Inc.
Old Connecticut Path
Framingham, Massachusetts 01702

Dear Dick:

I was pleased to receive the 3C's Annual Report and must congratulate you on a successful year.

DEC has also had a good year and I am enclosing our annual report in case you have not had an opportunity to see it yet.

Sincerely,

Harlan E. Anderson
Vice President

HEA:ncs
Enclosure

C

O

P

Y

3C

COMPUTER CONTROL COMPANY, INC.

OLD CONNECTICUT PATH, FRAMINGHAM, MASS. 01702

BOSTON (617) 235-6220, FRAMINGHAM (617) 879-2800

TWX 617-872-0653

January 19, 1966

Mr. Harlan E. Anderson
Vice President
Digital Equipment Corporation
146 Main Street
Maynard, Massachusetts 01754

Dear Andy:

Enclosed is a copy of 3C's Annual Report which I think will be of interest to you. 1965 was a good year in general for Computer Control, and 1966 promises to be even better.

I hope that 1966 will be a prosperous year for DEC, and for you as well.

Best regards.

Very truly yours,

COMPUTER CONTROL COMPANY, INC.



Richard F. Mills
Vice President - Controller

Enclosure: (1)

/o

January 21, 1966

C
O
P
Y

Mr. B. O. Evans
Office of the President
Federal Systems Division
International Business Machines Corp.
326 East Montgomery Avenue
Rockville, Maryland

Dear Mr. Evans:

Enclosed please find a signed copy of the Information Disclosure Agreement transmitted to me with your letter of January 19, 1966.

Sincerely,

Harlan E. Anderson
Vice President

HEA:ncs
Enc: Information Disclosure
Agreement

*copies sent to Dick Morrison
& Bob Caswell*



326 East Montgomery Avenue, Rockville, Maryland

Office of the President
Federal Systems Division

January 19, 1966

Digital Equipment
Corporation
Maynard
Massachusetts

Attention: Mr. Harlan E. Anderson
Vice President

Subject: Information Disclosure Agreement

Gentlemen:

On December 23, 1963, Digital Equipment Corporation and IBM entered into an information exchange agreement to provide access to IBM to data on the PDP-1 Processor. The data was to be used in the maintenance of the PDP-1 interconnected with the AN/FSQ-32 (XD-1A) at Systems Development Corporation, Santa Monica.

Since the use of this data is still required, it is suggested that the expiration date of the above agreement be extended to December 23, 1966. It is requested that Mr. K. Munsterman be recognized as the individual authorized to receive confidential and/or proprietary information. All other terms of the agreement would remain unchanged.

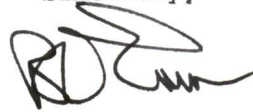
Digital Equipment
Corporation

-2-

January 19, 1966

If this proposed extension is satisfactory to you, please indicate your acceptance by signing one copy of this letter and returning it to the above address.

Sincerely,



B. O. Evans

BOE:111

ACCEPTED

Digital Equipment Corporation

By

Harlan E. Anderson

Title

Vice President

Date

21 January 1966

January 25, 1966

C
Mr. Charles H. Standish
Standish Space-Age Consultants
20310 Chagrin Boulevard
Cleveland, Ohio 44122

O
Dear Mr. Standish:

P
Your letter of January 20, 1966 to Mr. Olsen has been referred to me for answer. We appreciate your interest in suggesting possible acquisitions for DEC. However, we are not presently interested in this subject and as you may or may not know, we have never been involved in any acquisitions in the history of the company. Therefore, I consider it very unlikely that we would be a likely partner.

Y
Thank you for calling to our attention the services of your organization and we will keep them in mind should we wish to utilize the services you offer.

Sincerely,

Harlan E. Anderson
Vice President

HEA:ncs

STANDISH SPACE-AGE CONSULTANTS

20310 Chagrin Boulevard • Cleveland, Ohio 44122 • (216) 751-7652

January 20, 1966

Mr. Kenneth H. Olsen, President
Digital Equipment Corporation
146 Main Street
Maynard, Mass.

Dear Mr. Olsen:

We have followed with great interest the tremendous success of your company and would like to have you as a client, without cost or obligation, unless we are successful in assisting you to achieve your long range objectives.

We have two possible acquisitions we would like to propose for your consideration, both of which produce plotting equipment with which a computer must be used.

One of these companies with sales of about \$5million is listed on American Stock Exchange, the other is privately held, and we are assured by both companies that they would seriously consider merger by acquisition by a larger company which is compatible.

Kindly sign one copy of the enclosed agreement and forward it with two or three copies of your product literature and latest financial data so that we can proceed.

Sincerely,



Chas. H. Standish

cc: Dwight C. Arnold
New England Associate
7 Elkins St. So. Boston

WHAT'S MY BUSINESS

The business of STANDISH SPACE-AGE CONSULTANTS involves the application of science, technological skill, and sound business judgement to the problems of its clients. It is a business operated for profit and devoted to making a profit for its clients.

Standish Space-Age Consultants offers a consulting and brokerage service to industrial and commercial organizations, both large and small, domestic and foreign, in the areas of GROWTH.

Consultants on "State-of-the Art" to keep clients informed of the latest world-wide developments and trends in their technical-scientific areas of interest; and of the new or unique products, processes and services in such areas which appear to have a growth potential.

Consultants on "Commercial Exploitation of Technical Developments" through marketing and market research to assess the market possibilities of selected products, to evaluate a new merchandising approach, or to discover new uses and new applications for selected products.

Consultants on "Long-Range Planning" to provide the foundation for successful growth and diversification, to accomplish systematic and comprehensive pre-planning for mergers, or to facilitate postmerger integration of personnel and operations.

Fees for Consulting Services are based on the scope and character of the services provided, either on a fixed price or per diem, plus costs.

Corporate Acquisition, Merger, Licensing and Financing Services are performed on a contingency basis. There is no expense whatever until we are successful. The dynamic growth of new products and industries in recent years has involved the technically oriented manager in marketing and financial matters, particularly as related to acquisitions, mergers and licensing; resulting in the utilization of our specialized services as intermediaries.

For example, introductions to investment banking houses, potential lenders, and other financial institutions are vital to a firm in need of capital. In merger situations, a person is frequently required to be in the right place at the right time to catalyze a transaction which otherwise might never have taken place. We, as negotiators, thus occupy a necessary place in business.

Foreign Operations can be established or expanded by our organization through assistance in establishing a subsidiary or a joint-venture company in a foreign area; by licensing an existing manufacturer in the area to produce the product on a royalty basis; by establishing an exclusive sales agency in the area; or by other similar forms of collaboration with companies of other countries. On the other hand you may desire our assistance to find a suitable foreign product or company to collaborate with your company in this country.

Our Founder and Board Chairman, Charles H. Standish graduated from the University of Pennsylvania with a B.S. in Economics degree, acted as Planning Engineer for Goodyear Tire & Rubber Co. and Naval Aircraft Factory, Factory Manager of Unit Construction Co., General Manager of Aero Transport Co., President of Enterprise Electric Co., and of Sound Recorder, Inc., President of Designers for Industry, Inc., and of Frontier Electronics Co. He is a trustee of Standish Research Foundation and of the Cleveland Memorial Medical Foundation.

STANDISH SPACE-AGE CONSULTANTS, INC.

20310 Chagrin Blvd. Cleveland, Ohio 44122

IN ACQUISITIONS AND MERGERS

KNOWING WHAT IS REQUIRED IS ONE THING---

GETTING IT IS SOMETHING ELSE AGAIN.

Many prominent companies in the United States have strengthened their corporate planning activities by arranging with Standish Space-Age Consultants, Inc. to survey the available opportunities and chart a recommended course of action.

Most of these companies have executives assigned to corporate planning activities but have found they have little if any time available to go out and hunt for the jewel they would like to acquire or to find the buyer for the product line they would like to spin-off

We have utilized our long product research and development experience, knowledge and contacts to build a professional staff of Associates located in every important industrial area in the United States, Canada, Mexico, South America, Europe and Asia.

Mostly engineering-trained, with years of industrial or executive experience, these Associates are personally acquainted with the owners and managers of the industrial companies in their respective areas. Time and money is saved by eliminating travel, while the timing is improved and fast response given your requests.

Should you consider a new product area, whether related or unrelated to your present activities, our central office will, without cost or obligation to you, prepare a program and carry out a preliminary search. On-the-site investigations by the personnel; local evaluations which you can't get from financial reports.

With a knowledge of the needs and marketing resources of your company we will be in position to suggest an acquisition or merger which would achieve objectives for both companies which cannot be achieved independently without great difficulty and economic risk, and which might have the immediate, or near immediate, effect of greatly increasing the value of the pooled assets.

Perhaps the greatest value of our organization to your company would be the thorough coverage of our preliminary surveys without necessity of divulging the name of your company; the intimate contacts we have established; the knowledge we have of advanced or "Space-Age" developments and how they might effect the future of your business and determine your growth as compared with that of your competitors.

Your Director of Corporate Planning, your executive staff, your attorneys and accountants will find our services of great value to them when they come to analyze the prospective deal and to establish its value and earning power.

STANDISH SPACE-AGE CONSULTANTS, INC.

20310 Chagrin Blvd. · Cleveland, Ohio 44122

Phone Chas. H. Standish (216) 751-7652

DESIRED ACQUISITION AND CONDITIONS

(Confidential Information)

COMPANY INFORMATION

Name _____ Contact _____ Title _____

Address _____ Phone _____

Products _____

Size: (19__) Sales \$ _____ Net Worth \$ _____ Net Profit _____

Ownership: No. Stockholders _____ Market _____

ACQUISITION CRITERIA

Minimum Sales Volumes (in thousands) \$ _____

Minimum Return on Investment (in thousands) \$ _____

Supply own technical/management needs _____

Capitalize on our Distribution _____ Have own marketing organization _____

Match our skills: Customers/Distribution() Manufacturing Skills() Engrg. "Know How"()

Product with a measurable, Demonstrable Economic Advantage _____

Good Potential Growth _____

Purchase for: Cash ___ Cash & Stock ___ Com. Stock ___ Pref. Stock ___ Debentures _____

Other _____

Amount Available for Investment (in thousands) \$ _____

DESIRED CHARACTERISTICS

Types of Companies and/or Products Desired? _____

Other Areas of Interest if Related to Following Industries: _____

Especially Interested In: _____

Preferred Location _____

Present Management of Company to stay on? _____

Your Investment: 100% purchase ___ 51% ___ Minority Interest _____

Patent Protection ___ Advanced Research Talents ___ Unique Designs _____

Production to fill seasonable valleys in months of _____

Other Policies with regard to an acquisition or merger _____

REASONS FOR ACQUIRING

DESIRED ACQUISITION AGREEMENT

(Confidential)

Date _____ 196__

Mr. Chas. H. Standish, Chairman
Standish Space-Age Consultants, Inc.
20310 Chagrin Boulevard
Cleveland, Ohio 44122

Dear Mr. Standish:

We are interested in arranging the possible acquisition through purchase or merger, of products, assets or companies, which meet the qualifications set forth on the reverse side of this agreement, and we hereby appoint your company, to find, survey, analyze and negotiate with such companies in such a manner as to make said companies available to us on terms satisfactory to our Board of Directors. Should you submit a company previously identified to us, we will immediately notify you by telegram at your Cleveland office; hence relieving us of further liability.

It is understood and agreed that we will not be obligated for any retainer, expenses or other fee, but that the seller or merging company will normally compensate your company in cash or in kind, should you effect such a purchase or merger under the terms of this agreement. It is further understood that your compensation will be based on the purchase price or consideration as follows: 5% of the first million, 4% of the second million, 3% of the third million, 2% of the fourth million and 1% thereafter; and 10% if the price or consideration is \$50,000 or less. The said compensation will be due and payable on the day of closing the deal.

In the event your company is not able to obtain a signed agreement from the selling or merging company wherein they agree to pay the afore said compensation and we are so advised by you in writing during the course of the negotiations, this Corporation will assume full liability for payment to your company of the fee set forth in the paragraph next preceding, should the deal be consummated.

Unless extended by mutual agreement, this understanding shall terminate twelve months from the date of this letter; provided that if we reopen negotiations after the termination date, we shall be obligated to pay you the compensation provided for herein during the ensuing twelve month period. On the termination date you will furnish us with a list of the actively interested parties and should we conclude a deal with any listed company during the twelve months following the termination of this agreement, we will pay your company the compensation called for in this agreement, if the selling or merging company fails to do so.

If this agreement sets forth our mutual understandings, please sign the attached copy and return it for our files.

Approved and accepted
at Cleveland, Ohio
Date: _____

STANDISH SPACE-AGE CONSULTANTS, INC.

By: _____

Very truly yours,

Company: _____

By: _____

Title: _____

PLEASE ATTACH: Company catalogue(s) or descriptive product literature
Recent Financial Statements (5 years)

DESIRED ACQUISITION AND CONDITIONS

(Confidential Information)

COMPANY INFORMATION

Name _____ Contact _____ Title _____

Address _____ Phone _____

Products _____

Size: (19__) Sales \$ _____ Net Worth \$ _____ Net Profit _____

Ownership: No. Stockholders _____ Market _____

ACQUISITION CRITERIA

Minimum Sales Volumes (in thousands) \$ _____

Minimum Return on Investment (in thousands) \$ _____

Supply own technical/management needs _____

Capitalize on our Distribution _____ Have own marketing organization _____

Match our skills: Customers/Distribution() Manufacturing Skills() Engrg. "Know How"()

Product with a measurable, Demonstrable Economic Advantage _____

Good Potential Growth _____

Purchase for: Cash ___ Cash & Stock ___ Com. Stock ___ Pref. Stock ___ Debentures _____

Other _____

Amount Available for Investment (in thousands) \$ _____

DESIRED CHARACTERISTICS

Types of Companies and/or Products Desired? _____

Other Areas of Interest if Related to Following Industries: _____

Especially Interested In: _____

Preferred Location _____

Present Management of Company to stay on? _____

Your Investment: 100% purchase ___ 51% ___ Minority Interest _____

Patent Protection ___ Advanced Research Talents ___ Unique Designs _____

Production to fill seasonable valleys in months of _____

Other Policies with regard to an acquisition or merger _____

REASONS FOR ACQUIRING

DESIRED ACQUISITION AGREEMENT

(Confidential)

Date _____ 196__

Mr. Chas. H. Standish, Chairman
Standish Space-Age Consultants, Inc.
20310 Chagrin Boulevard
Cleveland, Ohio 44122

Dear Mr. Standish:

We are interested in arranging the possible acquisition through purchase or merger, of products, assets or companies, which meet the qualifications set forth on the reverse side of this agreement, and we hereby appoint your company, to find, survey, analyze and negotiate with such companies in such a manner as to make said companies available to us on terms satisfactory to our Board of Directors. Should you submit a company previously identified to us, we will immediately notify you by telegram at your Cleveland office; hence relieving us of further liability.

It is understood and agreed that we will not be obligated for any retainer, expenses or other fee, but that the seller or merging company will normally compensate your company in cash or in kind, should you effect such a purchase or merger under the terms of this agreement. It is further understood that your compensation will be based on the purchase price or consideration as follows: 5% of the first million, 4% of the second million, 3% of the third million, 2% of the fourth million and 1% thereafter; and 10% if the price or consideration is \$50,000 or less. The said compensation will be due and payable on the day of closing the deal.

In the event your company is not able to obtain a signed agreement from the selling or merging company wherein they agree to pay the afore said compensation and we are so advised by you in writing during the course of the negotiations, this Corporation will assume full liability for payment to your company of the fee set forth in the paragraph next preceding, should the deal be consummated.

Unless extended by mutual agreement, this understanding shall terminate twelve months from the date of this letter; provided that if we reopen negotiations after the termination date, we shall be obligated to pay you the compensation provided for herein during the ensuing twelve month period. On the termination date you will furnish us with a list of the actively interested parties and should we conclude a deal with any listed company during the twelve months following the termination of this agreement, we will pay your company the compensation called for in this agreement, if the selling or merging company fails to do so.

If this agreement sets forth our mutual understandings, please sign the attached copy and return it for our files.

Approved and accepted
at Cleveland, Ohio
Date: _____

STANDISH SPACE-AGE CONSULTANTS, INC.

By: _____

Very truly yours,

Company: _____

By: _____

Title: _____

PLEASE ATTACH: Company catalogue(s) or descriptive product literature
Recent Financial Statements (5 years)

January 25, 1966

C

Courts and Company
11 Marietta Street NW
Atlanta, Georgia

O

Gentlemen:

According to an article in today's issue of the Wall Street Journal, you are preparing a report on the Foxboro Company of Foxboro, Massachusetts. Would you kindly send us a copy of this report when completed.

P

Thank you for your service.

Sincerely,

Y

(Mrs.) N. Survilas, Secretary to
Harlan E. Anderson, Vice President

copy to Ruderman
Ling

January 25, 1966

Professor C. J. Birkett Clews
Deputy Vice-Chancellor
The University of Western Australia
Nedlands
Perth, Australia

C
O
P
Y

Dear Professor Clews:

I was pleased to receive your letter of January 7th indicating that the PDP-6 system has worked out satisfactorily at the University of Western Australia.

I have asked Mr. Morton Ruderman, our Bio-Medical Computer Marketing Manager to suggest sources of information that might be useful to you in the planning for the new major medical center on the University land. A new two volume book entitled, "Computers in Bio-Medical Research" has been published this year by the Academic Press, 111 5th Avenue, New York, New York 10013. This was edited by Dr. Ralph Stacy and Dr. Bruce Waxman, two leaders in this field in the United States. There is a heavy emphasis on research use of computers or experimental uses. Much of the work has been sponsored by the National Institutes of Health which are an important U.S. government agency. We, at Digital Equipment Corporation, are proud to have played an important hardware role in the work of Dr. Jordan Baruch in hospital automation and also the LINC computer program.

Since you will be in England for the next seven to eight months, there is an important conference which you may want to consider attending. This is the Automated Data Processing meeting to be held in Elsinore, Denmark, from April 20 to 23, 1966. Many of the leading research people who contributed to the book will be taking part in this important conference. Digital Equipment Corporation will have an exhibit at the conference and I am sure that our people in attendance would be pleased to discuss these subjects with you further.

I hope the enclosed information is quite informative and of interest to you.

Sincerely,

Harlan E. Anderson ✓
Vice President

HEA:ncs
cc: M. Ruderman
Enc: Automated Data Processing
in Hospitals Article
Contents of "Computers in Bio-Medical Research"



JAN 18 1966

The University of Western Australia

TELEPHONE
WM 2481

Nedlands

7th January, 1966.

Mr. Harlan E. Anderson,
Vice-President,
Digital Equipment Corporation,
Maynard,
MASSACHUSETTS 01754, U.S.A.

Dear Mr. Anderson,

I am sure you will have had reports on the operation of our PDP-6 from Dr. Smart and Mr. Moore. So far everything seems to have been entirely satisfactory and the machine is very nearly flat out. It is evident that we shall have to try to find money from our Universities Commission for additional core memory and for a fairly large backing store if development of research and other activities are not to be hampered.

The University and the State Government are at present in the preliminary planning stage for a major medical centre to be established on University land. There is already a 200 bed hospital that will be expanded as quickly as possible to 400 beds and could ultimately reach 800 beds. Placed as it will be, within five minutes of the main University site it will become the main teaching hospital, and the University Medical School will move there from its present cramped site in the City of Perth. We are anxious that this shall be one of the most efficient and up-to-date University Medical Centres.

We have had preliminary discussions on the part that computers will or should play in such a centre. There seem to be three main uses for computers in such a situation : (a) for accounting and administrative procedures; (b) for diagnostic purposes, and here I believe a certain limited amount of work has been done; (c) in relation to a central, automated laboratory for biochemical, haematological, etc. tests.

I shall be leaving Perth next month to spend seven or eight months in England when I hope to see what little is being done there, e.g. at University College Hospital, but unfortunately it has not been possible to arrange to visit the United States this time where I understand a great more of this sort of thing is being done. However, any information on these matters that you may have would be most valuable. My address from 1st March will be -

C/- Rev. Dr. Demant,
Christ Church,
OXFORD, ENGLAND.

With kind regards,

Yours sincerely,

C.J. Birkett Clews,
Deputy Vice-Chancellor.

c.c. Dr. R.G. Smart,
General Manager,
Digital Equipment Australia Pty. Ltd.



INTEROFFICE MEMORANDUM

DATE January 27, 1966

SUBJECT Applied Dynamics and Adage

TO John Leng

FROM Harlan Anderson

I understand that you have some thoughts on the desirability of the products of Applied Dynamics and Adage. If you have any particular ideas on how we should cooperate with either of them, I would appreciate an opportunity to review your thoughts. If convenient, write me a short note about them.

HEA:ncs

Andy

dec

INTEROFFICE
MEMORANDUM

SUBJECT Dr. Bernice Lipkin

DATE January 28, 1966

TO Bill Long

FROM Harlan Anderson

Dr. Bernice Lipkin of Washington will be here to see you on Tuesday,
February 1, 1966 at 10 a.m. Her phone number is AC 703 351-4374.

HEA:ncs

Andy

digital MEMO

DATE January 11, 1966

TO Dick Best FROM Harlan Anderson

Dean Wanlass from Santa Ana, California called for you while you were away and spoke to me. He said that he submitted a proposal to you for some kind of a power supply or regulator of sometype and he was calling to see what you thought of it. He said he would appreciate your reaction whether it was negative or positive either one.

Andy

HEA:ncs

February 3, 1966

C
O
P
Y

Mr. Lawrence C. Snyder
Room 1A360
Bell Telephone Laboratories
Murray Hill, New Jersey

Dear Mr. Snyder:

Thank you for your telephone inquiry today regarding the availability of Digital Equipment Corporation stock. As stated by my secretary, the majority of DEC stock is held by American Research and Development Corporation of Boston and the remainder is held by DEC management and employees. American Research and Development Corporation is presently being traded on the New York Stock Exchange.

I am enclosing for your interest our Annual Report covering the Fiscal Year Ended July 3, 1965.

We appreciate your interest in DEC and trust the enclosed information will be useful to you.

Sincerely,

Harlan E. Anderson
Vice President

HEA:ncs
Enc: Annual Report

February 4, 1966

C
Dr. Sullivan G. Campbell
Assistant Vice President
Technical Planning
Xerox Corporation
6 Haloid Street
Rochester, New York 14603

O
Dear Sullivan:

I have talked with our people concerning the computers in engineering conference that you called about recently. We would be very pleased to accept your invitation to participate in the round table discussion on April 22 at the University of Illinois in Chicago. Mike Ford will represent DEC.

P
When you called I seem to remember you mentioned the availability of some background information on the conference. If there is material of this kind available, would you please send it directly to Mike.

Thank you for thinking of us in connection with the conference.

Sincerely,

Harlan E. Anderson
Vice President

Y
HEA:ncs
cc: Mike Ford
Nick Mazzaresse

February 4, 1966

Mr. Emile A. Dumas
212 Main Street
Maynard, Massachusetts 01754

Dear Mr. Dumas:

I was very pleased to receive your letter of January 29th and to hear your good wishes for Digital Equipment Corporation. As you probably are aware, success requires the cooperation of others and we, at Digital, feel the people of Maynard have been very beneficial to us.

May I extend to you an invitation to visit our facilities some time in the near future. Please call me before time so I can schedule your visit.

Thank you for expressing your enthusiasm and good wishes.

Sincerely,

Harlan E. Anderson
Vice President

HEA:ncs

C
O
P
Y

212 Main Street,

Maynard, Mass.

Jan. 29, 1964

-01754-

Mr Harlan Anderson, Vice President
Digital Equipment Corp.
Maynard, Mass.
-01754-

Dear sir: -

As one who has been fortunate in receiving your "On line" digital Report, from time to time and for some time past, I am taking the liberty of writing these few lines in behalf of my family and my more than a dozen grand and great grand children, to congratulate your company, of your presentation of 100 Mass. Industry text books to the Maynard High School. That they will be of great help to our High School students goes without saying and the results in the further education of these students will with question be of great value. This is a fine gesture on the part of Digital, and I am sure that the folks in our neighboring town of Stow, also will appreciate the gift.

I have always felt from the first, that your company coming here was very fortunate for us all in Maynard, and at this time let me wish you all at Digital a continued huge success, and believe me I am glad that I have read your reports from cover to cover since first having received them, and this gives me the incentive to writing you, as I have wanted to do, for a long time.

Best regards to all at Digital

Sincerely yours
Emmett Thomas

Marie Curie
assembly

Herman Curie - general
notes

23 Hubbard Street
Concord, Massachusetts

February 4, 1966

Mr. Harlen Anderson, Vice President
Digital Equipment Corporation
Maynard Mills
Maynard, Massachusetts

Dear Mr. Anderson:

I am writing to inquire whether you have need for an administrator with a depth of experience in planning and organization, including management controls.

Much of my business career has involved work with technical and manufacturing organizations. My administrative work, therefore, has dealt with projects, cost controls, and the allocation of resources. In addition, my work in management consulting has given me experience in presenting studies, program plans and recommended action to senior level executives.

I am leaving consulting and am looking for a position in industry in which my background will enable me to make a substantial contribution as an internal consultant or in a forward planning capacity. If there is a need at Digital Equipment Company in which this type of ability would be applicable I would appreciate an opportunity to discuss it with you.

Very truly yours,

William B. Seiniger
William B. Seiniger

PERSONAL RESUME

WILLIAM BRECK SEINIGER

Address: 23 Hubbard Street, Concord, Massachusetts Telephone: CL9-8922
Area Code: 617
Birthplace: Ottawa, Canada Citizenship: U. S.
Marital Status: Married, 4 children

OBJECTIVE

A senior management position requiring abilities and experience in administration, analytical ability, problem determination and solving. Strong interests in business planning and/or operation of a management services group.

EXPERIENCE

Management Consulting and Systems Planning
Associated with Dyer-Lundberg Associates, Inc., 129 Concord St., Framingham, Massachusetts.

1962

As an associate consultant, participate in comprehensive management surveys, several of which have been conducted for a large, international corporation. Duties in these assignments encompass:

- New business development
- Survey planning and supervision
- Fact finding and determination of concepts
- Systems and/or organization planning
- Definition of problems and solutions thereto
- Presentation of recommended action and proposals to clients
- All phases of report writing

Client assignments included experience in the following areas:

- Operations audits
- Formulation of objectives, plans and policies
- Organization structure and requirements
- Operating controls
- Management systems
- Budgets and performance controls

This work requires substantial contact with chief executives and other top management through personal interviews, discussions, and presentation of survey results.

1959 -
1962

Manager - Management Information Services, Itek Corporation, 10 Maguire Road, Lexington, Massachusetts.

Directed management information services group including management systems analysis (systems and procedures, records management, organization planning, computer programming) and central data processing.

- 1957 - Staff Consultant - Systems, Catalytic Construction Company,
1959 1528 Walnut Street, Philadelphia, Pa. (a subsidiary of Sun Oil Co.)
- 1955 - Executive Secretary, Management Committee, Teleflex, Inc.
1956 North Wales, Pa. manufacturers of remote controls.

Teaching and industrial training

- 1952 - Divisional Personnel Supervisor - Technical Education and Training,
1955 Sylvania Electric Products, Inc., 1740 Broadway, N. Y.
- 1947 - Teacher (classification of lecturer), University of Buffalo, School
1952 of Business Administration. At time of resignation to join Sylvania
I was Assistant Dean of the business school.

Additional teaching experience

- 1949 - On staff of New York State Extension Service, Cornell University
1952
1958 - On staff of Temple University, Management Institute

Military Experience

- 1943 - Management Methods Officer, U. S. Army, Quartermaster Corps.
1946 Worked on QM Depot organization and procedures problems in
headquarters in Washington, D. C., Atlanta ASF Depot, Fort Worth
QM Depot, Pacific and Middle East areas. Was Chief of the
Organization, Planning and Control Division at Fort Worth QM
Depot at time of separation from service.

EDUCATION

- 1940 B. S. Degree, Boston University
- 1943 M. B. A. Degree, Harvard Business School

PUBLICATIONS

A number of publications on management procedures and practices

REFERENCES

Full references furnished on request, including present associates,
clients and previous employers.

February 10, 1966

C
Mr. William B. Seiniger
23 Hubbard Street
Concord, Massachusetts

Dear Mr. Seiniger:

O
Thank you for your letter and resume of February 4, 1966 outlining your background and plans to return to industry. At the present time, we do not have an opening which could utilize your extensive training and experience. However, I appreciate your thinking of Digital Equipment Corporation.

Sincerely,

P
Harlan E. Anderson
Vice President

HEA:ncs
Y

February 10, 1966

C

Mr. Anthony F. Rode
Worden and Risberg
Fidelity-Philadelphia Trust Building
Philadelphia, Pennsylvania 19109

Dear Mr. Rode:

O

I have received your letter of February 3, 1966 concerning your Personnel Specification No. 51211. I do not personally know of anyone meeting the requirements that you have outlined.

Sincerely,

P

Harlan E. Anderson
Vice President

HEA:ncs

Y

WORDEN & RISBERG

Management Consultants

Industrial Managers

FIDELITY-PHILADELPHIA TRUST BUILDING

PHILADELPHIA, PA. 19109

AREA CODE 215

PENNYPACKER 5-3300

February 3, 1966

Mr. Harlan E. Anderson
Vice President and Treasurer
Digital Equipment Corp.
Main Street
Maynard, Massachusetts

Dear Mr. Anderson:

As management consultants and industrial managers, our clients on occasion call upon us for assistance in locating qualified candidates for attractive career opportunities. Currently, we have been asked to locate an outstanding executive who, because of proven technical competence and displayed administrative ability, would be capable of performing successfully as Director, Management Services for a long-established and highly regarded manufacturer of metal goods.

In an effort to locate outstanding candidates, we are contacting a number of key executives like yourself who, we feel, because of general industry experience, would be in a position to suggest an individual or individuals who, because of ability, background, and performance, would warrant consideration. The scope of this outstanding opportunity and the requirements are outlined in the attached Personnel Specification No. 51211.

If, after reviewing the requirements, you recall a former associate or an acquaintance who you feel should be considered, we would appreciate hearing from you. We will, of course, hold your name in confidence if you so desire.

Thank you for your cooperation.

Very truly yours,

WORDEN & RISBERG



Anthony F. Rode

AFR/mam
enclosure

1. The Position

Director, Management Services

2. The Company

A major, well-established, international corporation which is highly respected and enjoys an excellent reputation for the quality of its products. A progressive Company with steady and substantial growth, holding a position of leadership in its field.

3. The Products

A wide variety of wire and metal formed products, specialty steels, and metal stampings serving all consumer metal products industries.

4. The Responsibilities

To direct and maintain the corporate management information system and related services, including the development and installation of economically sound systems and processing equipment and services as technological and corporate advances in the art warrant.

5. The Qualifications

- Age: 38 - 50
- Education: Degree in Business Economics preferred.
- Experience: Minimum of fifteen years' business and industrial background, more than five of which will have been in close association with computerized systems. The applicant must be of a thoroughly practical, common sense, profit-conscious nature. He should have had at

5. The QualificationsExperience:
(cont'd)

least three years of direct profit or line responsibility plus a deep and thorough exposure to the operating problems and systems encountered in sales, marketing, industrial engineering, production, accounting, and general management. Personal performance should indicate consistently successful accomplishments, particularly where a high degree of coordination was essential during occasionally adverse circumstances.

Personal:

The successful candidate should make an above-average appearance. Personal characteristics should indicate high qualities of inspirational leadership, understanding, tact, patience, and the determined ability to get things done through teamwork.

6. The CompensationSalary:

Consistent with experience.

Other
Benefits:

Attractive fringe benefits.

February 11, 1966

C

Mr. William H. Congleton, Vice President
American Research and Development Corp.
200 Berkeley Street
Boston, Massachusetts 02116

O

Dear Mr. Congleton:

Per Andy's request, I am enclosing two reprints from the HARVARD BUSINESS REVIEW - Nov-Dec, '65 entitled, The R&D Entrepreneur: Profile of Success by Harry Schrage and Who is to Blame for Maladaptive Managers? by Harry Levinson.

P

Sincerely,

Y

Nancy Survilas

February 11, 1966

C
Mr. William H. Congleton, Vice President
American Research and Development Corporation
200 Berkeley Street
Boston, Massachusetts 02116

O
Dear Bill:

I have reviewed the material which you sent me on Information Displays, Inc. Their corporate capabilities are so similar in the graphic display area to those of DEC that I do not see a mutual interest.

P
I appreciate your calling it to our attention and I am returning the material with this letter.

Sincerely,

Y
Harlan E. Anderson
Vice President

HEA:ncs

AMERICAN RESEARCH AND DEVELOPMENT CORPORATION

THE JOHN HANCOCK BUILDING · BOSTON · MASSACHUSETTS 02116

AREA CODE 617 426-7060

February 8, 1966

Mr. Harlan Anderson
Digital Equipment Corporation
146 Main Street
Maynard, Massachusetts

Dear Andy:

Regarding our recent telephone conversation, I am enclosing the information pertaining to Information Displays, Inc. which recently was sent me by a good friend named Frank Bonsal who is associated with Alex. Brown & Sons in Baltimore. Frank is a very competent growth capital investment specialist who reportedly knows this company quite well and has a modest investment in it. He believes that it is a first-rate outfit, but he speculates that the company probably should merge itself into a larger organization rather than continue as an independent entity. With this thought in mind, he wonders if DEC would be interested in looking into the matter.

I realize that this matter may not be of interest to DEC but, even so, it appears to be worthy of careful thought. Please let me know your corporate decision at your convenience and, if you are not interested, please return the enclosed material so that I, in turn, might return it to Mr. Bonsal.

Cordially yours,

Bill

William H. Congleton
Vice President *wj*

whc/mj
enc.



INTEROFFICE MEMORANDUM

DATE February 11, 1966

SUBJECT G.E. Core Estimate

TO Harry Mann

FROM Harlan Anderson

The attached table shows my estimate on the number of cores that G.E. has in the field. The sources of numbers and estimates are indicated. These numbers have not been adjusted for government or international sales.

I am sending you a copy of the Bureau of the Budget 1964 Inventory of Automatic Data Processing Equipment for your information. We are trying to determine if there is a more current issue available.

The G. E. numbers could be made more accurate if we wished by getting the names of customers and exact configuration from the marketing survey available from Pat McGovern's company in Newton. This service is probably expensive if this is the only use we have for it. Nick Mazzaresse and Win Hindle have had contact with him.

Another avenue would be a sales dollar comparison with the UNIVAC portion of Sperry Rand. The Dec. 30, 1965 Findings and Forecasts Newsletter put out by Arthur Wiesenberger and Company has some useful data for this.

Andy

HEA:ncs
Attachment

G.E. Core Estimate

<u>Type</u>	<u>Bits/Word^{1/}</u>	<u>Ave. Words^{2/}</u>	<u>Bits/Install. ^{x10³}</u>	<u>Number Install. ^{3/}</u>	<u>Total Bits ^{x10³}</u>
G.E. 115	-	-	-	0	0
205	20	8,192	160	40	6,400
210	6 D&S/25	6,000	150	54	8,100
215	20	6,000	120	53	6,360
225	20	8,192	160	140	22,400
235	20	8,192	160	58	9,260
415	24	8,192	192	80	15,300
425	24	8,192	192	42	8,050
435	24	8,192	192	19	3,640
625	37	65,000	2,405	10	24,050
635	37	65,000	2,405	11	26,500
G.E./PAC					
4020	24	8,192	192	} 46 ^{4/} 5 ^{5/}	8,832
4040	24	8,192			
4050I	24	8,192			
4050II	24	8,192			
4060	24	8,192			
G.E. 412	20	8,192	160	27 ^{2/}	4,320
				Total	143,212

- 1/ Adams Associates' Computer Characteristics Quarterly January 1966.
- 2/ HEA Estimate
- 3/ Computers and Automation Magazine, December 1965, P. 54.
- 4/ Roy Fine, Foxboro Company
- 5/ Control Engineering, August 1965, P.55

	BITS/WORD	AVE WORDS	BITS/INSTALL. $\times 10^3$	NUMBER INSTALL. $\times 3$	TOTAL BITS $\times 10^3$
G.E. 115				0	0
205	20	8,192	160	40	6,400
210	6DHS/25	8,000	150	54	8,100
215	20	6,000	120	53	6,360
225	20	8,192	160	140	22,400
235	20	8,192	160	58	9,260
412	20	8,192	160		
415	24	8,192 32,000	192 768	80	15,300 61,400
425	24	8,192 32,000	192 768	42	8,050 32,200
435	24	8,192 32,000	192 768	19	3,640 14,600
625	37	65,000	2405	10	24,050
635	37	65,000	2405	11	26,500
DATA NET-30				↑	211,270
GE/PAC 4020	24	8,192	192	} 46 45	8,832
4040	24	8,192			
4050 I	24	8,192			
4050 II	24	8,192			
4060	24	8,192			
DATA NET-30	18	8,192			430,060
GE					
GE 412 (DRUM)					
GE 412	20	8,192	160	27 ^{xx}	4,320

NOTES

- 1) ~~ADAMS ASSOCIATES~~
- 2) ~~HEA ESTIMATE~~
- 4) ~~ROY FINE - FOLBORO~~

PROCESS CONT.	13,152
	130,060
	211,270
	<hr/>
	224,422
TOTAL	143,212

3.) "Computers & Automation Mag."
Dec. 1965 p. 54

1) Adams Associates
Computer Characteristics Quarterly
Jan. 1966

5. Control Engineering
Aug. 1965 p. 55

(INTERNATIONAL GOVERNMENT)
RECORDER



INTEROFFICE
MEMORANDUM

DATE February 14, 1966

SUBJECT Morgan Guaranty Trust Co. Visitors

TO Ken Olsen

FROM Harlan Anderson

The men from the Morgan are David Dyche of the investment side of the bank and Herbert Ayers of the Operation Research Office of the bank. They are interested in the question of time sharing a large computer vs. individual use of a small computer. They have had a lot of information provided to them on time sharing and would like some information on the individual approach. They are particularly interested in any description of DEC's future role in the computer industry.

Per our discussion, I have asked them to contact you when they arrive at 11 a.m. on Monday, February 21. I would suggest that Nick might be able to contribute to the discussion.

Andy

HEA:ncs

February 14, 1966

Mr. David B. Dyche, Jr.
Investment Research Officer
Morgan Guaranty Trust Company
23 Wall Street
New York, New York 10015

Dear Dave:

I wanted to confirm that Ken Olsen is expecting you and Mr. Ayers on Monday, February 21, at 11 a.m. My own plans have changed so I will not be with you, but Ken is looking forward to your visit.

Sincerely,

Harlan E. Anderson

HEA:ncs

cc: K. Olsen

February 18, 1966

Mr. William H. Congleton, Vice President
American Research and Development Corp.
200 Berkeley Street
Boston 16, Massachusetts

Dear Mr. Congleton:

Per Andy's request I am enclosing literature on the Electronic Associates, Inc.
680 Scientific Computing System.

Sincerely,

Nancy Survilas

C
O
P
Y



INTEROFFICE MEMORANDUM

DATE February 21, 1966

SUBJECT Preparation for Board Meetings

TO Ken C Isen FROM Nancy Survilas

Three days prior to meeting:

1. Call ARD for response from those who plan to attend the meeting.
2. Send memo to Alma Pontz with the names of those planning to attend in order for Alma to prepare the fees.

Day of meeting:

3. Type up large white envelopes for each director even the ones who do not plan to attend the meeting.*

This envelope contains:

- Agenda for Meeting
 - Fees for the attending directors
 - The following from Accounting: (Harry Mann)
 - Financial Statement
 - Balance Sheet
 - DEC Standings - New Orders and Backlog
 - Cover Letter from Harry Mann
 - Any material which is necessary for background on an agenda item.
4. Prepare a draft copy of Agenda for Andy to add to.
 5. Receive final draft copy of Agenda from Andy - retype in final form and pass on to the Press Room for printing.

*Directors not attending meeting receives same information - envelopes are mailed to them.

digital MEMO

DATE 3/3/66

TO Harry Doyle FROM Harlan Anderson

Harry,

I suggest you might look into the attached as a possible customer for DEC.

Andy

H. E. ANDERSON

copy add on p. 73
and send to Washington office
with suggestion that they might
be a customer for DEC.

Will EMC ever become no. 2?

Not jolly likely!

We're not even trying. We're too busy working on special application computer control systems to try selling general purpose computers.

Fact is, we'd like your help in keeping EMC out of the Top Ten. Buy an IBM ready-to-wear computer and let your company tailor worry about the alterations and the interface problems.

Don't get us wrong. We're not knocking the general purpose computers. We suggest them in a lot of applications. But only when a general purpose computer solves your *whole* problem.

Your big concern when you consider an electronic detection and control system is the interface between your operation and the computer that will

run it. That's where EMC enters the loop. Because we are not selling general purpose computers, our engineers can study your problem, then develop a system to suit the problem.

If you have a tough control problem, call EMC.

You'll jolly well be pleased with the results!

**ELECTRONIC
MODULES
CORPORATION**

Electronic Modules Corporation • SYSTEMS DIVISION

1949 GREENSPRING DRIVE • TIMONIUM, MD. • TEL. (301) 252-2900 • TWX-301-252-0723



INTEROFFICE MEMORANDUM

DATE March 4, 1966

SUBJECT Harvard Business School Applicants

TO Ken Olsen Ted Johnson FROM Harlan Anderson
Stan Olsen Win Hindle
Nick Mazzaresse Bob Lassen

The following Harvard Business School Applicants have contacted me and are coming to DEC for interviewing on the following dates:

Monday	March 7th	9:00 a.m.	Ronald Siders	
Tuesday	March 8th	10:00 a.m.	T. Richard Morris	
Wednesday	March 9th	10:00 a.m.	Rudy Ruggles	
Friday	March 11th	9:00 a.m.	Bruce Anderson	(must leave by noon)
Monday	March 14th	9:00 a.m.	Fred Luedke	(must leave by noon)

If you are interested in talking with any of the above please call me to schedule a definite time.

Andy

HEA:ncs



INTEROFFICE MEMORANDUM

DATE March 11, 1966

SUBJECT PROFESSIONAL RECRUITING

TO ✓ K. H. Olsen
H. E. Anderson
S. C. Olsen
N. Mazzaresse
W. Hindle
R. Best
H. Mann
T. Johnson
J. Jones
M. Ford

FROM Bob Lassen

L. Portner
M. Ruderman
L. Hantman
E. De Castro
W. Long
E. Harwood
L. Prentice
J. Atwood

In order to improve our technique for attracting senior technical people I would like to initiate the following procedure:

1. Each morning a member of the Personnel Department will distribute resumes which I feel are applicable to your current needs (or possible future needs). A copy of the resume will be kept in a follow-up file in the Personnel Office.
2. I would urge you to consider the resumes as quickly as possible and immediately notify me of your interest in seeing the applicant. Good people are available for only a very short time.
3. If the applicant of interest is a senior man, I will ask him to telephone you directly so that you can discuss the assignment with him prior to his visit. This will help to determine both your further interest and the applicant's desire to visit the plant. You can then either make arrangements to see the applicant personally or you can turn the arrangements over to me indicating the names of others in the company with whom you wish the applicant to meet.

I suggest that you ask your secretary to set up a resume follow-up file so that she will be able to recognize applicant telephone calls that should be referred directly to you.

4. I would also suggest that you set aside a portion of your time for senior applicant telephone interviews.

March 11, 1966

Senior applicants are more easily attracted if they are able to first discuss the job with the manager who is directly responsible for the assignment.

Many larger companies use this personal approach, and I feel that it would be wise to follow suit. As you know, it will take an all out effort to attract the calibre of people we want to bring into the company.

I do not feel that it is necessary to use this approach for junior level people except when we make special efforts to attract outstanding students.

Lastly, I urge all of you to ask your people to actively refer technical people (sales engineers, applications engineers, circuit and logic design engineers, programmers, etc.) to us whenever possible. 50% of all professional people in the company were brought in as a result of a referral.

RTL/jfr



INTEROFFICE MEMORANDUM

DATE March 15, 1966

SUBJECT RAND PDP-6

TO Win Hindle

FROM Harlan Anderson

Keith Uncapher of Rand called and made an appointment to see you and me in Maynard on Thursday, 17 March to discuss their PDP-6. He will arrive between 8:30 and 9:00 a.m.

He would like us to treat him as an unbiased interested party in this subject. Chuck Baker's attitude toward the PDP-6 is quite bad. He is very concerned over the maintainability of the computer. Keith feels this question should be answered first, "Is the machine maintainable?"

It seems that something is always coming up when the machine is turned on.

I told Keith we would have available, if needed, people like Bob Savell, Gordon Bell and Jack Shields.

Andy

ecc

March 15, 1966

Mr. David A. Hill
Associate Director of Licensing
Hughes Aircraft Company
International Airport Station
Post Office Box 90515
Los Angeles 9, California

Dear Mr. Hill:

Thank you for your letter of 4 March 1966 concerning a license opportunity for Digital Equipment Corporation with the Hughes developed SESAC. This unit, based on the information you sent me, does not appear to be compatible with our normal products and markets. Therefore, I do not see any potential applications for it in our work. I appreciate your calling it to our attention.

Sincerely,

Harlan E. Anderson
Vice President

HEA/pam

C
O
P
Y

March 16, 1966

C
O
P
Y

Dr. David R. Wolf
3 M Company
Building 209
Department FDI-36
St. Paul, Minnesota 55119

Dear Dr. Wolf:

I read with interest the 3M Task Force Report in the "Communications of the ACM" March 1966 issue. I would appreciate receiving the more complete discussion of this subject referred to.

Sincerely,

Harlan E. Anderson
Vice President

HEA:ecc

dec

INTEROFFICE
MEMORANDUM

SUBJECT Interviews of Harvard Business
School Students

TO Bob Lassen

cc: Win Hindle

DATE March 22, 1966

FROM Herlan Anderson ✓

During the week of 28 March we have three H.B.S. students scheduled
for interviews:

Stewart Ogden	Monday, March 28th	10:00 a.m.
Griffith Resor	Tuesday, March 29th	2:00 p.m.
<u>Alan B. Smith</u>	<u>Thursday, March 31st</u>	<u>*</u>

*He will call to settle time on Monday, March 28th after he knows his new
class schedule.

Andy

HEA:ncs



INTEROFFICE MEMORANDUM

SUBJECT Item for Sales Newsletter

DATE April 1, 1966

TO Ted Johnson

FROM Nancy Survilas

The La Petite Auberge has been closed on Mondays since November and I was just recently informed of it. They plan to continue being closed on Mondays until they can hire a cook to fill in on that day.

I think it might be a good idea to publish this bit of news in the Sales Newsletter to save our salesmen the embarrassment of finding them closed and then walking our customers to the Pizza House..... ugh!

Nancy



THE STANFORD EXECUTIVE
DEVELOPMENT PROGRAM
GRADUATE SCHOOL OF BUSINESS

STANFORD UNIVERSITY
STANFORD, CALIFORNIA 94305

April 8, 1966

Mr. Harlan E. Anderson
Rollingwood Lane
Concord, Massachusetts 01742

Dear Mr. Anderson:

It is a pleasure to advise you of your admittance to The Stanford Executive Program to be held this Summer here on the campus during the period June 19 through August 11.

Within the next two months I shall write you on several occasions concerning some of the details, and shall send you certain information relative to your participation. Please advise if your address will be the same as used for this letter.

At your earliest convenience, I would like you to send to me a passport-type photograph of yourself, $2\frac{1}{2}'' \times 2\frac{1}{2}''$, black and white, please.

With cordial good wishes,

Sincerely yours,

A handwritten signature in blue ink that reads "James T. S. Porterfield". The signature is written in a cursive style with a large, prominent "J" and "P".

James T. S. Porterfield
Director, The Stanford Executive Program

JTSP-ae

c.c. Mr. Kenneth H. Olsen

April 14, 1966

Professor James T. S. Porterfield
Director, The Stanford Executive Program
Graduate School of Business
Stanford University
Stanford, California 94305

Dear Professor Porterfield:

I am pleased to learn from your recent letter of my admittance to the Stanford's Executive Program for this summer. My home address shown above will be correct for any future correspondence concerning the program.

Enclosed please find the photograph you requested.

I look forward to meeting you this summer and to participation in the program.

Sincerely,

Harlan E. Anderson ✓

HEA:ncs
cc: K. Olsen

C
O
P
Y

April 15, 1966

Mr. J. D. Madden, Executive Director
Association for Computing Machinery
211 East 43rd Street
New York, New York 10017

Dear Don:

I have your letter of April 13 concerning DEC's decision to discontinue its ACM corporate membership. This decision was reached after internal review of the type of applications for which DEC's products are used. Scientific computations represent a relatively small portion of our users. Therefore, it was felt that ACM sponsorship by DEC was not justified even though ACM is a fine organization rendering an important service.

After May 1, I will no longer be affiliated with Digital Equipment Corporation; therefore, I have referred your letter to Ken Olsen, who is President of DEC. If there is any change in this decision I am sure he will contact you.

Sincerely,

Harlan E. Anderson

HEA:ncs
cc: Ken Olsen

C
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May 2, 1966

C
Mr. Robert Forest
DATAMATION
141 East 44th Street
New York, New York 10017

Dear Mr. Forest:

O
Harlan Anderson requested that I write to you just as a reminder of your kind offer to send his free subscription of DATAMATION to his home address after May 1st. His address is Rollingwood Lane, Concord, Massachusetts.

Thank you for your service.

P
Sincerely,

Y
(Mrs.) N. Survilas, Secretary
Administrative Department

May 2, 1966

American Management Association, Inc.
135 West 50th Street
New York, New York 10020

Gentlemen:

Mr. Harlan E. Anderson, Vice President of Digital Equipment Corporation, Maynard, Massachusetts has resigned from his position effective May 1, 1966. Would you kindly see that his membership in the AMA is terminated and the proper paper work forwarded to Miss Alma Pontz of our Accounting Department.

Thank you for your cooperation.

Sincerely,

(Mrs.) N. Survilas, Secretary
Administrative Department

cc: A. Pontz

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May 2, 1966

C
American Management Association, Inc.
135 West 50th Street
New York, New York 10020

Gentlemen:

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Mr. Harlan E. Anderson, Vice President of Digital Equipment Corporation, Maynard, Massachusetts has resigned from his position effective May 1, 1966. Would you kindly see that his membership in the AMA is terminated and the proper paper work forwarded to Miss Alma Pontz of our Accounting Department.

Thank you for your cooperation.

P
Sincerely,

(Mrs.) N. Survilas, Secretary
Administrative Department

Y
cc: A. Pontz

May 2, 1966

C

Miss Phyllis Huggins, Editor
COMPUTING NEWSLINE
Box 335
Venice, California 90293

Dear Miss Huggins:

Would you kindly change the subscription to COMPUTING NEWSLINE
from:

Harlan E. Anderson
Digital Equipment Corp.

to: John Jones, Building #5
Digital Equipment Corp.
Maynard, Massachusetts

Thank you for your cooperation.

Sincerely,

(Mrs.) N. Survilas, Secretary
Administration Department

cc: J. Jones

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P

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May 2, 1966

C
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P
Y

ELECTRONIC NEWS
Fairchild Publications, Inc.
7 East 12th Street
New York, New York 10003

Gentlemen:

Would you kindly change the subscription to ELECTRONIC NEWS from:

Harlan E. Anderson (137 1213 012 EI 06060)
Digital Equipment Corp.
Maynard, Massachusetts

to:

Nicholas J. Mazzaresse
Digital Equipment Corp.
Maynard, Massachusetts

Thank you for your service.

Sincerely,

(Mrs.) N. Survilas, Secretary
Administration Department

cc: N. Mazzaresse

May 2, 1966

C
EDP WEEKLY
Industry Reports, Inc.
514 10th Street N.W.
Washington, D. C. 20004

O
Gentlemen:

Would you kindly change the subscription to the EDP WEEKLY from:

Harlan E. Anderson
Digital Equipment Corporation
Maynard, Massachusetts

P
to:

Mr. Theodore Johnson, Sales Manager
Digital Equipment Corporation
146 Main Street, Building 12
Maynard, Massachusetts

Y
Thank you for your service.

Sincerely,

(Mrs.) N. Survilas, Secretary
Administration Department

cc: T. Johnson