

MINICOMPUTER ARCHITECTURE

Gordon Bell
Vice President, Engineering
Digital Equipment Corporation
& Professor of Computer Science
& Electrical Engineering
Carnegie-Mellon University (on leave)

Abstract

Minimal cost computer designs (i.e. minicomputers) are predicated on using technological cost-performance improvements which occur at an annual rate of 25-30%. New applications are thereby feasible with the decreasing costs.

A significant number of minicomputers are manufactured in which the cost is constant (or rising), thereby providing more performance (capabilities).

The higher performance machines "take" their characteristics from the larger, general purpose computers (e.g. floating point arithmetic, multiprocessors, cache memories and memory management).

The origin and evolution of the minicomputer will be discussed with regard to technology and applications.

7/7/78

THE PDP-11 FAMILY AND VAX-11/780 FOR A LARGE VIRTUAL ADDRESS

Gordon Bell
Vice President, Engineering
Digital Equipment Corporation
& Professor of Computer Science
& Electrical Engineering
Carnegie-Mellon University (on leave)

Abstract

In the eight years the PDP-11 has been on the market, more than 50,000 units in ten different models have been sold. Although one of the system design goals was a broad range of models, the actual range of 500 to 1 (in price and memory size) has exceeded the design goal.

The PDP-11 was designed and first implemented to be a small minicomputer. Its first extension was to a bigger physical address, memory segmentation for multiprogramming and for higher performance. This part of the talk will briefly reflect the experience in the design process, comment on its success from the point of view of the goals, and its use of technology.

The main presentation will be on the VAX-11 architectural extensions, including: goals and implementation.

7/7/78

Summer of 1978

Japan → Australia

d i g i t a l

ID#0176
I N T E R O F F I C E M E M O

SUBJ: THE JAPANESE MARKET AND COMPONENTS--AN OPPORTUNITY

Date: 7/26/78 Wed

From: Gordon Bell ✓

TO: Marketing Committee
Don Frost, Carl Jansen
Ron Smart

Dept: Office of Development

MS: ML12/A51 Ext: 2236

Follow up 8/9/78

Although we may do all right in this market alone, it's hard to believe we'll do very well without a Japanese partner (or front---super OEM). The market feels bigger than Europe because it has: a more technical user base, a weak IBM, a homogeneous population, competitors working mainly on large machines, and needs for relatively undiscovered small machines which may better match the organizations problems (i.e. minis). On the other hand, I believe the society (business) is relatively closed to U.S. companies operating as we have been. Certainly we'll not get in the door of most large corporations.

I had lunch with Mr. Iwama, the President of Sony, and he mentioned discussing a joint venture with Ted several years ago. Also they have a venture with Tektronix--which we might check out. Since I don't see Sony as an ultimate competitor, it would certainly be worth exploring such a scheme provided we want to bother with this market. Sony is a potential supplier. Given their very strong technology in semiconductors, magnetics and TV (e.g. color), we could build some truly unique (great) products based on parts I saw--they pride themselves on their research (which I found very impressive).

We need them as a supplier--given our dedication to now move to end user products. (Also, I would believe European Engineering must be Tokyo.) I would hope that we would explore something like this.

What you think?

GB/mjf

+-----+
| d i g i t a l | i n t e r o f f i c e m e m o r a n d u m
+-----+

Subject: Our Commitment to NEC; Future Dealings with them as an OEM

To: Don Frost, Yu Hata,
Carl Jansen, Ted Johnson,
Julius Marcus

Date: July 28, 1978
From: Gordon Bell
Dept: OOD
Loc.: ML12-1 Ext.: 2236

CC: Ron Smart

We had cordial meetings with NEC regarding our supply of 11/70's for what seems like a joint venture into minis into the NTAA (IRS). As an Operations Committee member I voted to support this. Now, I hear us weaseling out of this and it seems like we can jeopardize the success of the system because they can easily misapply IAS, DBMS and DECnet. We have to keep close enough to know when this is happening and we must inform their management too!

I invited Dr. Ishii, the head of this group, to visit Carl and Julius and Ken in Maynard to confirm the support and reaffirm/clarify the commitment we have. We also have to discuss any concerns vis a vis their plan to take our technology (DECnet, IAS, the 11/70). I suspect their only interest is in DECnet...and that should be copyable from the published documents.

I also suggested they simply buy 11's (for their mini) and backward integrate using the 11 by making memory, attaching their peripherals, etc. This gets them a full mini line quickly without the expense of manufacture. Currently they build Level 6, and this seems like a waste of resources when they could buy cpu's from us. It's possible this could be another Plessey, but I doubt it. Instead, we get a supplier of 11s in end use.

As an aside, I suggested we tell MITI to adopt the 11 as a standard, just as they have with the 320 for minis. This is clearly intriguing.

GB:1jp

Gordon

ID#0178

+-----+
! d i g i t a l ! i n t e r o f f i c e m e m o r a n d u m
+-----+

Subject: Low Power Bipolar Gate Array

To: Bob Armstrong, Jim Cudmore,
Bill Demmer, Bill Green,
George Hoff, Alan Kotok

Date: July 28, 1978
From: Gordon Bell
Dept: OOD
Loc.: ML12-1 Ext.: 2236

follow up 8/11/78

The Japanese did what seems like an incredibly clever thing in developing a low power gate array. They simply use only a fraction of their regular large gate array that has a heat sink. This means only one part, one design system etc. Can we learn from them? (Let's not develop the smaller bipolar gate array -- have everyone use the current one.)

Can the ECL array be used in a similar way?

Fujitsu has bipolar arrays. Can we use them? They also have 8ns RAMs.

GB:ljp

04#
DIGITAL AA30700
DIGITAL AA62621



COULD YOU PLS GIVE GORDON BELL THESE TELEXES HE WILL BE C/-
F DQ DAVE BALLANTINE THESE ARE HIS COPIES TKS

Jim Bell received

ZCZC
AAAA
C927 MP30
BBBB

3 AUG 78

MSG NO 927

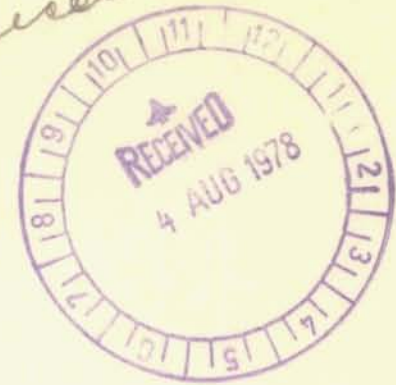
TO: JIM BELL / ML3-2/E41/MAYNARD
FR: GORDON BELL / CANBERRA AUSTRALIA

PLEASE LOOK AT CDC PROGRAM UPDATE. MEET DR. PALANDRI AT CSIRO
DECUS. SEE PROGRAM/PROJECT MANAGEMENT SYSTEM OPERATE. CDC HAS
BETTER INTERNAL ONE. JOHN JONES WILL SEND MANUAL. SHOULD EARL
AND KEATING DO THIS?

REGARDS
NNNN

ZCZC
AAAA
C926 MP30
BBBB

Partner received



3 AUG 78

MSG NO 926

TO: LARRY PORTNER / ML12-3/A62 MAYNARD
FR: GORDON BELL / CANBERRA AUSTRALIA

PLEASE RELEASE MUCH FIELD SWS MANPOWER. DO THE FOLLOWING IMMEDIATELY:

1. UNLESS THERE IS AN AUTOMATIC PATCHING FACILITY IN A SYSTEM, DISTRIBUTE SOFTWARE WITH ZERO (0) PATCHES ON THE SAME TAPE.
2. VERIFY (Q/C) PATCHES BEFORE DISTRIBUTION.
3. LETS GET KNOWN INTERNAL FACILITIES THAT RUN THE CURRENT VERSION AND THEIR PATCHES FOR ALL SYSTEMS

REGARDS
NNNNNN

⊕
DIGITAL AA3)'0

FOR LARRY PORTNER/JIM BELL

From: Gordon Bell

1. AM REALLY IMPRESSED BY MIS COMPANY MFG BUSINESS PROGRAMMING LANGUAGE THAT COMPILES INTO BASIC + WITH 5:1 COMPRESSION AND OFFERS VERY HIGH PROGRAMMER PRODUCTIVITY. THEY SEEM TO HAVE ELIMINATED PROGRAMMING IN THEIR APPLICATIONS. GIVES 200+ SOURCE X 5 BASIC LINES/DAY. GO THROUGH OUR MELBOURNE OFFICE TO SEE IT WHILE AT DECUS; LET'S BUY IT AND RESELL IT AND USE IT FOR INTERACTIVE COMMERCIAL APPLICATIONS.
2. HEAR BAD QC ON RT EXTENDED MEMORY, ALL FORTRAN IV AND MULTIUSER BASIC RTV2?
3. WHAT RIGHT STORY ON DBMS-11 QUERY UTILITY SPD OR MKT GUIDE?
4. LARRY/JIM PLEASE ORGANIZE A SEPT OR OCT SEMINAR I CAN ATTEND ON THE METHODS FOR BUSINESS APPLICATION SW. HAVE GREAT PRESENTATIONS ON APPROACHES. (BIG TURNKEY PACKAGES, LITTLE COMPONENTS, STD LANGUAGE, POL, PROG. GEN, DBMS WITH UTILITIES, TRAX ETC.). GET STD BENCHMARK TO TRY ON ALL. LET'S GET AN UNDERSTANDING.

8/4/78

Subj.: ESG Brochure

0002 0851 04-AUG 00210 0104 04-AUG
M962 MP30

AUG-78

AUG 4 1978

AUG 1978

VIC 9675 1125

From: TO GORDON BELL ML12-1
FOR SEAFORTH LYLE/JOHN LENG

GOT BASICALLY UNCHANGED BROCHURE AND MESSAGES
FROM COHEN AND LAMB.

1. THERE ARE ONLY 2500 IN ENGINEERING, NOT 2500 ENGINEERS.
2. ONE SENTENCE HAS 2 STRONGLYS.
3. LAST SENTENCE UNDER LIST PROCESSING IS WRONG, I DON'T USE THIS MARY JANE DOES.
4. NEEDS WHAT THE OPTIONS ARE: BASIC, FORTRAN, DIBOL, DX, ETC. SHOULD DESCRIBE PRODUCT HARDER.
5. WHY CLUTTERED RANDOM CRAP ON LAST PAGE?

HAVE HEIDI BALDUS AND MARY JANE FORBES EDIT AND CHECK THIS IF IT IS TO STAY IN FIRST PERSON. INTRO OK AS FIRST PERSON.

STILL CANT ORDER FROM THIS. FIND IT UNORGANIZED, LACKING PUNCH. WILL REGIVE ANOTHER DOCUMENT TO INFORM AND SELL. THE ANTITHESIS OF THE BROCHURES I (AN ENGINEER?) WANT TO SEE.

STILL PLAN TO HELP YOU ENTER (DOMINATE) ENGINEERING MARKET. CAN YOU HELP ME?

TO: DEMMER, LACROTE, WITMORE, LONG

From: Gordon Bell

WE'RE SELLING VAX'S IN AUSTRALIA AT THE UNIVERSITIES.
THEY APPRECIATE IT. WE'LL REALLY DO WELL PROVIDED
WE SUPPORT THEM, LET'S MAKE SURE THEY ARE INSTALLED
QUICKLY (IN A DAY) AND WELL. THE MONASH AND ANU
SITES ARE CRITICAL. WE OUGHT TO FIND OUT HOW
THESE WERE SOLD AND REPLICATE THE RESULTS.

8/4/78

REGARDS

digital

DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

all photos were sent. ID#0193
Hold for action/resume

Mr. Iwama,
President,
Sony Corporation,
7-35 Kitashinagawa 60 Chome,
Shinagawa-Ku, Tokyo 141 Japan.

Dear Mr. Iwama,

Thank you for the hospitality extended to me by your company. Mr. Miya did an excellent job of answering questions and showing me the Atsugi VTR plant and the Sony Research Center. From the little I could see, the Research Center is doing quite interesting work.

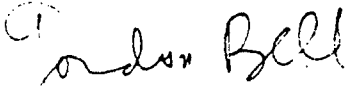
I have looked over the information on the higher resolution color CRT (330JB22) and would like information on a complete video monitor using the tube.

The various small disk recorders are also interesting, and I would like to get interface and performance information on the video copier, MAVICARD, MAVICARD Selector (50 card), the small disk, and the large disk which is being introduced within a TV set as a training device. All of these devices look quite interesting for computer / word processing/office products applications.

We would therefore like to pursue evaluating them as quickly as possible. I believe the evaluation of the current video tape units modified for digital recording, will be carried out effectively by us. Videotape and other video storage media have the potential for replacing nearly all mass storage in a computer systems.....I hope this can be realized quickly.

Again thank you for the hospitality and I hope we can do business with Sony.

Sincerely

A handwritten signature in cursive script that reads "Gordon Bell". The signature is written in dark ink and is positioned above the typed name.

GORDON BELL

VICE PRESIDENT - ENGINEERING

PROFESSOR OF COMPUTER SCIENCE AND ELECTRICAL ENGINEERING -

CARNEGIE-MELLOR UNIVERSITY.

c.c Don Frost, DEC Japan

Yu Hata

Mike Riggle, Advanced Development Disks

John Kevill, Mass Storage Development

Dick Clayton, Small Systems Development

digital

ID#0194

DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Mr. R. Yen,
Digital Equipment Taiwan Ltd.,
Manufacturing Plant,
13-2 Nan Hsin Li
Tachi, Taoyuan,
TAIWAN.

Dear Dick,

Thank you for the hospitality extended to me in Hong Kong. I'm terribly sorry I missed being able to see the Taiwan Plant and meet your people there. As you see in the letter to K. L. Cheung, I'm very impressed with the lack of indirect labor. The intensity of the labor and the quality of the process together with the final product. I certainly see no problem in making nearly any other of our products there. Since we're eliminating F.A. and T., then certainly building many of the systems for Japan and Australia is feasible.

I would guess that building terminal and system products up to and including 11/34's would make sense provided the volume, etcetera is right.

As for the CRT Monitor manufacturing which you start in December, I feel you should go ahead to obtain engineers capable of engineering monitors. While we have some expertise in monitor design, it would seem pointless for us to carry out the design in Maynard (since the manufacturing will be done there). Also, we must have the black/white, and color design capability to get the cost as the experience with the VT100 has shown. This also makes sense since nearly all tube, monitor and TV set manufacturing is in the Far East. (The 2 color monitors we're looking at are both Japanese). Also, in order to get us thinking about our low cost terminal/system, Dick Clayton should have sent you the design to put together a model there. In this way we can begin thinking about the personal computer - in the event we chose to enter this market.

Again, thanks for the hospitality. I look forward to you coming to Maynard and to work with you there.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Gordon Bell', with a long horizontal flourish extending to the right.

GORDON BELL
VICE PRESIDENT - ENGINEERING

CC: Jack Smith, Maynard.
Dick Clayton, Maynard.



DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Mr. K. L. Cheung,
Plant Manager,
71 Catchick Street,
KENNEDY TOWN HONG KONG.

Dear Mr. Cheung,

Thank you very much for showing me the Hong Kong plant.

Needless to say I am very impressed with our ability there to manufacture, whether it be core or modules, I see no problem in being able to manufacture systems there when it is necessary to.

I certainly agree with the philosophy used in terms of doing a great deal of inspection during the process. The final product has a high quality and is more likely to work instead of testing at the end as is commonly done in most DEC manufacturing facilities.

The design of the production test equipment and the test equipment was extremely creative and I would hope that you continue to build a Manufacturing-Engineering staff there to continue this work after we progress to other products.

It is also appropriate to comment on the efficiency there. I am really quite impressed by the lack of indirect staff, and the efficiency and worker density.

If there is anything I can do to make products more produceable, please do not hesitate to call me.

I enjoyed meeting with your staff and look forward to continued interaction.

Sincerely,

GORDON BELL
VICE PRESIDENT - ENGINEERING

c.c. Jack Smith
Jim Cudmore
Dick Yen, Taiwan.



Digital Equipment
Australia Pty Limited

SALES & SERVICE

51-53 CHANDOS STREET
ST. LEONARDS NSW 2065
TELEPHONE 439 3400
TELEX 20740

ID# 0196

OTHER BRANCHES AT
ADELAIDE, BRISBANE,
CANBERRA, HOBART,
MELBOURNE, PERTH.

5 AUGUST, 1978

MR. YU HATA
DIGITAL EQUIPMENT CORPORATION INTERNATIONAL-JAPAN
KOWA BUILDING NO. 25 (THIRD FLOOR)
8-7 SANBAN-CHO, CHIYODA-KU
TOKYO 102, JAPAN

DEAR YU HATA,

HERE I AM IN AUSTRALIA HAVING SPENT A RELATIVELY RELAXING WEEK AND READY TO GO ON TO TAHITI. THIS RELAXING HELPED ME RECOVER FROM THE INTENSIVE, BUT THOROUGHLY ENJOYABLE AND INFORMATIVE 10 DAYS I SPENT IN JAPAN UNDER YOUR GUIDANCE. YOUR ARRANGEMENTS WERE SUPERB AND I ACCOMPLISHED MORE IN A RELATIVELY SHORT TIME THAN IN ANY OTHER ENVIRONMENT.

I ESPECIALLY ENJOYED THE SIGHTSEEING AND THE FOOD, BOTH OF WHICH WERE NEW TO ME AND BRIG. WE CONTINUE TO THINK ABOUT THE VISIT THERE. I HAVE WRITTEN AN ESSAY ABOUT MY OBSERVATIONS ON JAPAN AND HOW IT WILL BE A MAJOR PART OF THE COMPUTER INDUSTRY IN THE NEAR FUTURE. A COPY OF THIS REPORT WILL BE SENT TO THE OFFICE SOON.

I TALKED WITH DICK YEN ABOUT A POSSIBLE ROLE FOR YOU IN MANUFACTURING AND THERE SHOULD BE A MEMO OUTLINING/PROPOSING THIS IN HIS HANDS AT ABOUT THE SAME TIME YOU GET THIS LETTER. YOU WILL ALSO RECEIVE A COPY OF THE MEMO.

I SENT THANK YOU NOTES TO THE OTHER PEOPLE INVOLVED (SHIMAMURA, NARUI, AND TOMIOKA) AND WHO MADE OUR STAY THERE SUCH A MEMORABLE ONE. I WILL SEND COPIES OF THE BOOK ON COMPUTER ENGINEERING WHEN IT BECOMES AVAILABLE.

PLEASE GIVE MY REGARDS TO YOUR WIFE ALSO AND THANK HER FOR THE LOVELY DINNER. I HOPE SOMETHING CAN BE WORKED OUT IN REGARD TO YOUR STAYING AT DIGITAL AND I'LL DO WHAT I CAN.

THANK YOU AGAIN.

SINCERELY,

GORDON BELL
VICE PRESIDENT OF ENGINEERING

digital

DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Mr. M. Shimamura,
LCG Sales Unit Manager,
Kowa Building No. 25
8-7 Sanban-cho, Chiyoda-Ku,
Tokyo. Japan.

Dear Mr. Shimamura,

Thank you for setting up the various lectures for me at the Kieo University, the University of Tokyo and at the ELECTRO Technical Laboratory.

I hope that in the future we can do more business with them and if there is anything I can do please feel free to write to me. When the book on Computer Engineering is available I will send several copies to you so that you can personally distribute them to members of the University as you see fit.

Sincerely,



GORDON BELL
VICE PRESIDENT - ENGINEERING

digital

DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Miss Tomioka,
Digital Equipment Corporation,
4F, Umeshion-Highashi Building,
6 Chome Nishilemma,
KILA-KU OSAKA 530 JAPAN.

Dear Miss Tomioka,

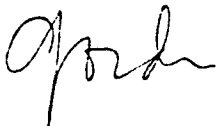
Please accept the thanks for Brigham and I for the wonderful hospitality and sightseeing scheduling you provided in Kyoto and Nara. We thoroughly enjoyed our stay at the Tawaraya Inn. The high point of the trip was the sight seeing, particularly the palace and the trip down the Hozu River and the Niji castle of the Shogun.

The Japanese food was indeed exceptional both at all of the restaurants and we especially enjoyed the lunch along the river at the Arashi-Tei. The Sunday trip was also lovely and even nicer because your friend was able to show us the Toshodarji Temple and the Yakushiji Temples and we especially enjoyed photographing the new west pogoda that was under construction at the temple site. We enjoyed having tea with the priests there, and the gifts and photographs they presented we will always cherish.

I will try to send some photographs of the temple site and temple construction when we return.

Again thank you for making our trip such a memorable one. I hope we were of assistance to you in the sales office.

Sincerely,



GORDON BELL
VICE PRESIDENT - ENGINEERING.

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DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Mr. Gen Narui,
Digital Equipment Corporation,
4F, Umeshion - Higashi Building,
6 Chome Nishilemma, KILA-KU
OSAKA 530 JAPAN.

Dear Gen,

Let me take this opportunity to thank you for the sight seeing that you planned for me at Kyoto and at Nara. It was really delightful to see this part of Japan, to attend the Osaka year end office party at Digital, meet you and your co-workers, and to address them.

I especially enjoyed the time we had talking with the University of Kyoto, the University of Osaka and Kyoto Sangyo University group for dinner. As usual the food was wonderful and the hospitality impeccable.

I was intrigued by the Sumitomo electrical electro-optical transducers at Kyoto University. Can you please, since they are located in Osaka, call them and have them to send me literature on the various Fiber Optical Couplers, Connectors, Transducers, Cables, etc. and what their electrical output characteristics are, prices and so on.

I will send books to you as they become available for distribution as necessary.

Sincerely,



GORDON BELL,
VICE PRESIDENT - ENGINEERING.

digital*Japan Ext
Thurs*

DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

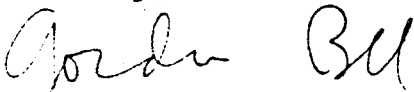
Professor Hiroshi Inose,
Director of Computer Centre,
University of Tokyo,
Bunkyo-Ky, Tokyo.

Dear Dr. Hiroshi,

Please allow me to thank your Faculty for the opportunity to discuss computer architecture and applications with you. I had a thoroughly enjoyable time learning about the computation there and I am sorry we could not spend longer and learn about some more of the work that is going on there. I hope we can be of service to you in the future by supplying various forms of computing that you might be interested in. I think both our DECSYSTEM 20 and VAX-11/780 computer (this is a machine with a 32 bit virtual address) could be of really significant importance for the Information Science work in your department there.

I hope that if there are any questions you have about Digital, you will contact either Mr. Shimamura, our people in our Tokyo office or me.

Sincerely,



GORDON BELL
VICE PRESIDENT - ENGINEERING
PROFESSOR OF COMPUTER SCIENCE AND ELECTRICAL ENGINEERING,
CARNEGIE-MELLOR UNIVERSITY.

CC: Mr. SHIMAMURA



DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Professor Ishida,
Computer Centre,
University of Tokyo,
Bunkyo-Ku. Tokyo.

Dear Professor Ishida,

Thank you for arranging the visit and my presentation at the University of Tokyo.

I enjoyed being with you and your colleagues and seeing the Computer Center and actual running of a problem (in basic on the Hitachi 8800 system there).

I do hope that you will look more into some of the Digital products including the DECsystem 20 and our new Vax-11 with its very large address space because I think they might provide excellent departmental research instruments for you.

Again if there is anything I can do to help, please let us at Digital know.

Sincerely,

A handwritten signature in cursive script that reads "Gordon Bell".

GORDON BELL

VICE PRESIDENT - ENGINEERING

PROFESSOR OF COMPUTER SCIENCE AND ELECTRICAL ENGINEERING,
CARNEGIE-MELLOR UNIVERSITY.

c.c. Mr. Shimamura.



DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Dr. Nishino,
Electro Technical Laboratory,
2, Nagata-Cho, Chiyoda-Ku,
Tokyo. Japan.

Dear Dr. Nishino,

Thank you very much for the opportunity to present the discussion of the mini-computer and the VAX-11 to you and your staff.

I enjoyed seeing the work that is going on there at Electro technical Laboratory and I hope that we may be able to supply products to you there in the future.

If there is anything that we can supply please don't hesitate to call me or other members of the staff of Digital, Japan.

Sincerely,

A handwritten signature in cursive script that reads "Gordon Bell".

GORDON BELL

VICE PRESIDENT - ENGINEERING

PROFESSOR OF COMPUTER SCIENCE AND ELECTRICAL ENGINEERING,
CARNEGIE-MELLON UNIVERSITY.

c.c. Don Frost
Mr. M. Shimamura, Digital, Tokyo.



DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET,
MAYNARD MASS 01754

Dr. R. Mori,
Professor,
Tsukuba University,
Sakura-Mura, Niihari-Gun,
Ibaraki-Ken Japan 300-31.

Dear Dr, Mori,

I was glad to meet you at the Electro Technical Laboratory and enjoyed seeing the PDP15 used in the Parallel Processing project that you started. I look forward to hearing more about it as more results become available.

I hope the talk on VAX-11 is useful to you and the members of the Electro Technical Laboratory staff. Please consider it.

Sincerely,

A handwritten signature in cursive script, appearing to read "Gordon Bell".

GORDON BELL
VICE PRESIDENT - ENGINEERING
PROFESSOR OF COMPUTER SCIENCE AND ELECTRICAL ENGINEERING,
CARNEGIE-MELLOR UNIVERSITY.

CC: Mr. Shimamura



DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Professor N. Tokura,
Information & Computer Science Department,
University of Osaka,
Machikaneyama-Cho,,
Toyonaka City. Osaka. Japan.

Dear Professor Tokura,

Thank you for the opportunity to visit the University of Osaka and to present the VAX-11 780 Architecture to your students and other members of the Faculty.

I enjoyed the interaction and am sorry we could not have had a longer time to discuss more of the kinds of work that is going on which we are both interested in.

Sincerely,

A handwritten signature in cursive script that reads "Gordon Bell".

GORDON BELL

VICE PRESIDENT - ENGINEERING - PROFESSOR OF COMPUTER SCIENCE
AND ELECTRICAL ENGINEERING, CARNEGIE-MELLON UNIVERSITY.



DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Professor Shuzo Yajima,
Kyoto University,
Yoshida Honmachi,
Sakyo-Ku,
Kyoto 606. Japan.

Dear Professor Yajima,

Thank you very much for the opportunity to give a lecture to you and the Faculty of the University on the VAX-11 Architecture. I especially enjoyed inter-acting with you and your students and discussing various aspects of the architecture and seeing the work that is going on at Kyoto. The tour of the Computation Center was quite interesting and you indeed have a very impressive Center there at Kyoto.

I hope somehow that we can better assist you so that you will consider and continue to use more Digital computers. If there is any questions please contact either Mr. Narui or other members of DEC Japan, and if there is anything I can do please feel free to write to me.

Thank you for the hospitality extended to me in Kyoto.

Sincerely,

A handwritten signature in cursive script that reads "Gordon Bell".

GORDON BELL
VICE PRESIDENT - ENGINEERING - PROFESSOR OF COMPUTER SCIENCE
AND ELECTRICAL ENGINEERING, CARNEGIE-MELLON UNIVERSITY.

c.c. Mr. Narui - Osaka Office.

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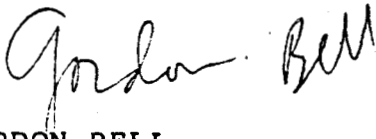
Mr. F. Iwao,
Chief Engineer,
100, Yahatamachi,
Okinawa,
KUMAMOTO JAPAN

Dear Mr. Iwao,

Thank you for the hospitality extended to me in visiting the NEC semiconductor facility at Kyushu. Okinawa seems like an altogether different part of Japan and it was very good to visit there, having seen Tokyo, Osaka, Kyoto and Nara.

As we said before, it is very hard to compare the semiconductor operations. I am certainly very impressed with the NEC operation that you run, because of the efficiency, the cleanliness and especially the effort that goes into maintaining the high quality. As a customer, I thoroughly appreciate quality of products.

Sincerely,



GORDON BELL
VICE PRESIDENT - ENGINEERING

CC: Yu Hata
Don Frost



DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Dr. Yugo Araki,
Koyoto Sangyo University,
KYOTO. JAPAN.

Dear Dr. Araki,

I was delighted to meet with you and the other members of the Kyoto Sango University on July 25. I feel that you appear to have a very active Faculty and Information Science programme and I am happy that we could supply computers to serve you.

I will contact Tom Marill in CCA in the United States and get information on whether the Ampex Videotape Recorder (called the Terabit Memory) can be obtained.

Again, thank you for the interesting evening and I thoroughly enjoyed the exchange of information.

Anything I can do to help you in your work, please feel free to call me.

Sincerely,

GORDON BELL
VICE PRESIDENT - ENGINEERING - PROFESSOR OF COMPUTER
SCIENCE AND ELECTRICAL ENGINEERING - CARNEGIE-MELLON
UNIVERSITY.

CC: Ken Naroui
Mary Jane Forbes



DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Mr. Takuo Kitamura,
Systems Development Department,
10, 1-Chome, Nisshin-Cho,
FICHU CITY, TOKYO 183 JAPAN.

Dear Mr. Kitamura,

Thank you for the hospitality extended to me both at your computer factory and in the evening at a dinner with Dr. Ishai.

I have been extremely impressed with the fabrication there and the capabilities in Japan for manufacturing computers. Seeing the plant at closer range merely confirmed the fact that you are very advanced in this regard. I am sorry that we have not worked closer with you in the past because I think it could have been beneficial to both of us. On the other hand I hope that there is some way that we can have a closer association, whether it be that you buy disks, computers or basic computers from us and attach them to your disks to form systems, or whether we buy various peripherals from you.

In this regard your Spinwriter is certainly worth looking into and I will see that we evaluate it.

As I may have mentioned to you in our meeting, I have seen a number of the technology displays at the various computer centres provided by Japanese Companies. I am wondering if you had a display of NEC logic hardware over the last few generations that we might have for our museum on computer technology. We would be willing to trade a piece of the MIT Whirlwind Computer Logic which is one of the first US vacuum tube machines in return for various technologies that you have used at various times.

Sincerely,

A handwritten signature in cursive script that reads "Gordon Bell".

GORDON BELL
VICE PRESIDENT - ENGINEERING - PROFESSOR OF COMPUTER SCIENCE
AND ELECTRICAL ENGINEERING, CARNEGIE-MELLOR UNIVERSITY.

CC: Mr. Shimamura

digital

DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Professor Noridi Doi,
University of Keio,
Mita, Minato Ku
TOKYO JAPAN.

Dear Professor,

I was pleased to see the work at Keio and talk with your colleagues, especially Professor Tokoro who is working on projects that are similar to those at CMU.

Thank you for the opportunity to give a lecture to you and members of the institute and I look forward to our continued interaction.

Thank you again.

Sincerely,



GORDON BELL
VICE/PRESIDENT - ENGINEERING - PROFESSOR OF COMPUTER
SCIENCE AND ELECTRICAL ENGINEERING, CARNEGIE-MELLON
UNIVERSITY.

c.c. Mr. Shimamura.



DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Professor Tokoro,
University of Keio,
Mita, Minato Ku
TOKYO.

Dear Professor Tokoro,

I enjoyed interacting with you and your students at Kayo and giving a lecture there. Thank you for the papers on the work you are doing there. It looks quite interesting. I hope that in your future considerations you will look at using the various computers that we supply.

If there is any information you need from us I am sure Mr. Shimamura of Digital can supply it or if necessary, we can get the information here.

Sincerely,

A handwritten signature in cursive script that reads "Gordon Bell".

GORDON BELL
VICE PRESIDENT - ENGINEERING - PROFESSOR OF COMPUTER
SCIENCE AND ELECTRICAL ENGINEERING, CARNEGIE MELLOR
UNIVERSITY.

CC Mr. Shimarumara.



DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Dr. Doe,
Director,
University of Keio,
Mita, Minato Ku TOKYO.

Dear Dr. Doe,

I was pleased to meet you and to see the work at Keio and talk with your colleagues, especially Professor Doi who, of course, is working on projects what are similar to those at CMU.

Thank you for the opportunity to give a lecture to you and members of the Institute and I look forward to our continued interaction with Mr. Tokoro.

Thank you,

Sincerely,

GORDON BELL
VICE PRESIDENT - ENGINEERING - PROFESSOR OF COMPUTER
SCIENCE AND ELECTRICAL ENGINEERING, CARNEGIE-MELLON
UNIVERSITY.

C.C MR. SHIMARUMARA

digital

Digital Equipment
Australia Pty Limited
DIGITAL EQUIPMENT CORPORATION
146 MAIN STREET
MAYNARD MASS 01754

Dr. F. Kurosaki,
Director,
Fujitsu Limited,
1015, Kamikodanaka
Nakahara-Ku, Kawasaki-Shi,
Kanagawa-Ken, 211, Japan.

Dear Dr. Kurosaki,

Thank you very much for making the visit at Fujitsu a productive, interesting and memorable one for me. I especially enjoyed seeing the M200 and then seeing the manufacturing plant at Numazau, including the software works there. The M200 looks like an outstanding machine in terms of performance, reliability and availability. It is something I think all users will appreciate.

At the Numazua Factory we were particularly thrilled to see the first Fujitsu relay computer operate which is really quite impressive, considering its age. I hope that our own computers will operate in such a state when they are 30 years old.

Since I am interested in the historical aspects of computers, I would certainly like to have anything that you have, which might include your old annual reports or other material that describe the various computers that Fujitsu has made.

In particular I would like to be able to trace the time line and structure of the various machines in a form like was used at the Numazua display. I would also of course be interested in getting any part of historical significance, including the early relay and parametron circuits, if these are available. In return, we could supply the same kind of information and parts that would be suitable for a museum display. I think it is important that one is able to keep a record of our history and I hope that you can supply pieces and information for me.

Thank you again for the hospitality.

Sincerely,



GORDON BELL
VICE PRESIDENT - ENGINEERING
PROFESSOR OF COMPUTER SCIENCE/ELECTRICAL ENGINEERING -
CARNEGIE-MELLOR UNIVERSITY.



Digital Equipment
Australia Pty Limited

5 AUGUST, 1978

PROFESSOR REX VOWELS
PRO VICE CHANCELLOR
UNIVERSITY OF NEW SOUTH WALES
KENSINGTON, AUSTRALIA

*Just
Ext.
Thnx.*

DEAR PROFESSOR VOWELS,

PLEASE ACCEPT MY SINCEREST THANKS FOR THE HOSPITALITY EXTENDED TO ME AND BRIGHAM LAST MONDAY AFTERNOON AND EVENING.

IT WAS VERY NICE TO TALK WITH YOU AGAIN AFTER SO MANY YEARS. SOMEHOW IT DOESN'T SEEM LIKE SUCH A LONG TIME, HOWEVER. I CERTAINLY SYMPATHIZE WITH YOUR INFORMATION PROCESSING ADMINISTRATIVE PROBLEMS THERE, AS THEY ARE VERY NEARLY LIKE OUR OWN WITHIN DIGITAL. I HOPE WE CAN RESPOND TO YOUR REQUEST FOR ASSISTANCE. IN MELBOURNE, I VISITED A COMPANY CALLED MIS AND WAS IMPRESSED AT A LANGUAGE (MPG) THEY USE FOR ON-LINE TRANSACTION PROCESSING SYSTEM BUILDING. IT IS BASED ON OUR RSTS SYSTEM AND AIMED AT HIGH PRODUCTIVITY. ALSO, I MET THE PRESIDENT OF COMPUTER POWER IN MELBOURNE, AND THEY SEEM CAPABLE OF BUILDING SYSTEMS OF THE TYPE YOU NEED.

THANK YOU AGAIN FOR THE HOSPITALITY, AND I HOPE THAT WHEN YOU VISIT THE U.S., YOU WILL BE SURE TO CALL ME...OTHERWISE I'LL SEE YOU IN A FEW YEARS HERE IN AUSTRALIA.

SINCERELY,

GORDON BELL

P. s. I'll drop a note / say thanks to Ron Smart.



Digital Equipment
Australia Pty Limited

5 AUGUST, 1978

PROFESSOR MURRAY ALLEN
DEPARTMENT OF COMPUTER SCIENCE
UNIVERSITY OF NEW SOUTH WALES
KENSINGTON, NEW SOUTH WALES

DEAR MURRAY,

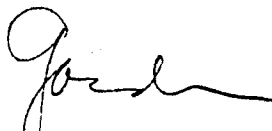
THANKS FOR THE HOSPITALITY AND SIGHTSEEING AT THE UNIVERSITY LAST MONDAY AND THE INTERACTION AT THE HILTON ON TUESDAY. IT WAS GOOD TO SEE THE ACTIVITIES AT THE UNIVERSITY AND TO INTERACT WITH YOU AND YOUR STUDENTS AND YOUR COLLEAGUES.

I HAD A GOOD SESSION WITH PROFESSOR VOWELS AND SAW THE COMPUTATION CENTER AND GOT A FEELING ABOUT THE PROBLEMS OF ADMINISTERING A LARGE UNIVERSITY. HE HAS A VERY HARD JOB.

I TRUST THAT YOU WILL VISIT ME AT DEC IF YOU COME TO THE U.S. IN THE NEAR FUTURE BUT OTHERWISE I'LL MAKE SURE I CAN SPEND MORE TIME THE NEXT TIME I VISIT SYDNEY.

IF THERE IS ANYTHING THAT I OR OTHERS AT DIGITAL CAN DO TO MAKE COMPUTING MORE PLEASANT THERE, PLEASE FEEL FREE TO CALL ON THE OFFICE HERE, OR ME.

SINCERELY,


GORDON BELL



Digital Equipment
Australia Pty Limited

5 AUGUST, 1978

MR. PAT WRIGHT
DIRECTOR OF COMPUTING
A.C.T. ELECTRICITY AUTHORITY
CANBERRA, A. C. T.

DEAR MR WRIGHT,

THANK YOUR FOR SPENDING THE TIME WITH ME ON LAST WEDNESDAY AND DESCRIBING YOUR ACTIVITIES IN REGARD TO ON LINE BILLING FOR POWER UTILITY. I WAS MOST IMPRESSED WITH THE WORK YOU AND DAVE MITCHELL ARE DOING THERE AND IT WILL GREAT TO SEE IT REACH THE ON LINE STATUS YOU PREDICT IN OCTOBER. THE DOCUMENTS YOU GAVE ME ON THE BILLING PROGRAM STRUCTURE WERE HELPFUL AND I HAVE GOTTEN AT LEAST A RUDEMENTARY UNDERSTANDING OF THE PROBLEM AND YOUR SOLUTION.

THANKS AGAIN FOR THE TIME.

SINCERELY,

GORDON BELL
VICE PRESIDENT OF ENGINEERING



Digital Equipment
Australia Pty Limited

5 AUGUST, 1978

DR. PETER CLARINGBOLD
CSIRO COMPUTING CENTER
CANBERRA, A.C.T.

DEAR DR CLARINGBOLD,

I'M SORRY I MISSED YOU IN CANBERRA. JOHN JONES INTRODUCED ME TO YOUR
ABLE DEPUTIES DRs. PALANDRI AND AUSTIN. WE TALKED ABOUT THE NETWORK YOU HAVE
BUILT AND HOW IT MIGHT BE EXTENDED AND I WAS QUITE IMPRESSED AT THE SERVICE
CURRENTLY BEING DELIEVERED THROUGH YOUR FACILITY.

I F THERE IS ANYTHING THAT WE AT DIGITAL CAN DO TO PROVIDE BETTER PRODUCTS
PLEASE FEEL FREE TO CALL ON US.

SINCERELY,

A handwritten signature in cursive script that reads "Gordon Bell".

GORDON BELL
VICE PRESIDENT OF ENGINEERING

CC: JOHN JONES



Digital Equipment
Australia Pty Limited

ID#0217

5 AUGUST, 1978

DR. MARK PALANDRI
CSIRO COMPUTING CENTER
CANBERRA, A.C.T.

DEAR DR. PALANDRI,

I WAS GLAD TO VISIT THE CENTER IN CANBERRA AND MEET WITH YOU ON WEDNESDAY. SINCE DECUS IS HELD IN CANBERRA THIS YEAR I APPRECIATE THE EFFORT THAT WILL NO DOUBT BE SPENT IN HAVING TOURS AND PLAYING HOST. JIM BELL, WHO'S HEAD OF OUR RESEARCH AND DEVELOPMENT GROUP WILL VISIT YOU AND LOOK AT THE CDC UPDATE PROGRAM FIRST HAND DURING THE DECUS MEETING (I HOPE).

IT WAS GOOD TO MEET YOU AND I HOPE THAT IF YOU ARE IN THE U. S., YOU'LL DROP BY AND SEE ME. IF THERE IS ANYTHING I CAN DO TO BUILD IMPROVED PRODUCTS, PLEASE DON'T HESITATE TO CALL ON ME.

SINCERELY,

A handwritten signature in cursive script that reads "Gordon Bell".

GORDON BELL
VICE PRESIDENT OF ENGINEERING



Digital Equipment
Australia Pty Limited

5 AUGUST, 1978

PROFESSOR CLIFF BELLAMY
DIRECTOR OF COMPUTING
MONASH UNIVERSITY
MELBOURNE, VICTORIA

DEAR DR. BELLAMY,

I WAS DELIGHTED TO SEE YOU AGAIN AND TO INTERACT ON MATTERS OF COMPUTING. MOST IMPORTANT, I AM GLAD THAT YOU HAVE ORDERED THE VAX-11 MACHINES AND I WILL DO EVERYTHING I CAN TO MAKE SURE THEY LIVE UP TO YOUR EXPECTATIONS IN TERMS OF QUALITY AND PERFORMANCE AND FUNCTIONALITY. I CERTAINLY HAVE HIGH EXPECTATIONS OF THIS MACHINE AND WANT TO DO EVERYTHING POSSIBLE TO SEE THAT IT LIVES UP TO ITS POSSIBILITIES AND POTENTIAL.

ON RETHINKING YOUR NETWORK, I HAVE TWO OPINIONS:

1. USE DECNET IN ITS ENTIRITY TO DEAL WITH THE INTERCOMMUNICATIONS AMONG SYSTEMS. NEARLY ALL THE FACILITES YOU NEED AT THE USER PROGRAM/OPERATING SYSTEM ARE IN THE ARCHITECTURE AND MOST OF THEM HAVE BEEN IMPLEMENTED IN CURRENT RELEASES. (VIRTUAL TERMINAL CAPABILITIES WILL SOON COME.)
2. START WITH A SMALL, CENTRAL SWITCHING COMPUTER (E.G. 11/34 WITH 128 KWORDS) AND WITH MOSTLY RADIAL LINES TO ALL COMPUTERS. WE SHOULD SOON HAVE A MULTI-DROP VERSION OF THE 1 MHZ DMC-11, ALTHOUGH IT WILL BE FUNDAMENTALLY RADIAL WITH A SINGLE POINT OF ARBITRATION AND ONLY COMMUNICATION FROM THE MASTER TO ANY OF THE NODES. THIS CAN BE USED ON A SEND TO MASTER/SEND FROM MASTER TO THE SPECIFIED SIGHT BASIS, ENABLING COMMUNICATION TO TAKE PLACE AMONG ANY OF THE NODES. BY HAVING A SWITCHING MACHINE, YOU CAN DO SOME OF THE PROGRAMMING NECESSARY TO DEAL WITH PROTOCOL CONVERSION AMONG YOUR MULTIPLEXORS, THE BURROUGHS MACHINES, AND ANY OTHER SYSTEMS YOU MIGHT BUILD.

THIS APPROACH WILL GET THE NETWORK UP AS QUICKLY AS POSSIBLE, AND I THINK AS CHEAPLY AS POSSIBLE WITH OUT THE TIME-CONSUMING PROGRAMMING AND HARDWARE DEVELOPMENT. WHEN YOU HAVE USED THE SYSTEM FOR A WHILE, AND TRAFFIC BEGINS TO BUILD UP, REQUIRING MORE SWITCHING, YOU CAN GO TO EITHER MULTIPLE SWITCHING MACHINES, A HIGH SPEED DISTRIBUTED LINK LIKE YOU ARE ADVOCATING OR A HARDWIRED CIRCUIT SWITCH. THIS IS AN EVOLUTIONARY APPROACH DESIGNED TO GET THE SYSTEM OPERATING AS QUICKLY AND AS CHEAPLY AND FLEXIBLY AS POSSIBLE. IT NEEDN'T BE A BIND ON THE ULTIMATE STRUCTURE.

BELIEVE THAT U. OF EDINBURGH IS USING THIS STRUCTURE AND WE ARE STARTING THIS WAY AT CARNEGIE-MELLON. I THINK IT HAS MERIT.

ANYWAY, IT'S SOME FREE ADVICE AND PROBABLY NOT WHOLLY RELEVANT. I HOPE THAT IF YOU ARE VISITING THE U. S., YOU'LL CALL ON ME. THANK YOU FOR THE LUNCHEON, AND GIVE MY REGARDS TO CHRIS WALLACE AND LEN WHITEHOUSE.

SINCERELY,


GORDON BELL
VICE PRESIDENT OF ENGINEERING
PROFESSOR, COMPUTER SCIENCE/ELECTRICAL ENGINEERING CARNEGIE-MELLON UNIVERSITY

CC:

JOHN WINTER



Digital Equipment
Australia Pty Limited

Interoffice Memo

SUBJECT: COMMON EDITOR; (THE ANNUAL
(BIANNUAL) FLOGGING) and COMMON
MANUALS.

DATE: 78 AUG 14

FROM: GORDON BELL

TO: PORTNER, OLEH KOSTETSKY, BILL JOHNSON
BILL KEATING, DEL LIPPERT, BRUNO DURR,
GEORGE PLOWMAN, BILL HEFFNER, ED FAUVRE,
RON HAM, DON FROST, RON SMARK,
J.C. PETTERSCHMIDT, M. DEPEYROT.

LOCATION ML12-1/A51

I just was asked by a user of RT and the DECsystem 20 (in Japan) why we don't have a good common, efficient editor? They say the 20 Editor is very good, and the RT Editor is reasonably bad.

They're very much aware of standards and commonability and support them.

Although I've pushed to have single language manuals and standards from an engineering goodness, testing, quality, efficiency point of view, the real reason we must have them is for our customers and for software support as an aside, in the subsidiaries such a Japan, the GIA countries and many of the smaller European countries, having a single manual means only one translation - or profit/understanding versus needless loss and customer misunderstanding.

Larry, on the plan for language use for the various levels, please include a plan (policy) for documentation that reflects a standard. Our training manuals should also reflect this too.



Digital Equipment
Australia Pty Limited

Interoffice Memo

SUBJECT:

TRADING (VERSUS) SELLING IN JAPAN

DATE: 78 AUG 14

FROM: Gordon Bell

TO:

LOCATION ML12-1/A51

Dick Yen, Henry Crouse,
Ted, Jack MacKean, Puffer, Clayton,
Bill Green, Kevill,
Yu Hata, Don Frost, Jack Smith, Bill Long.

It feels like we should at least be investigating the purchase of Japanese products more aggressively. Since we have assembly in Taiwan and Hong Kong, it might make sense to also get semiconductors (especially memory) locally.

I saw a number of components, including NEC printers, disks, CRT's monitors, semiconductors and fiber optics transducers that could be interesting. If the Sony video tape recorder becomes suitable for data recording (like I suspect), there will be a need for a close interface in Tokyo.

On the other hand, many of the would be sellers could be volume buyers of our products (LA36, RL01, basic CPU's) for their computers.

Watanabe, of CSS, suggested we use local disks to reduce the system price and get Japanese content - this is questionable when the disk is such a large fraction of the system price and we sell so few. On the other hand, we should be selling basic CPU's, Operating Systems and have Japanese companies attach as much of their own disks, memories and terminals so they can sell systems.....which we're not so good at (translating manuals, targetting markets, writing specific applications software that's probably quite local - especially commercial software).

All this leads to our taking on a trader role rather than either a buyer/seller (competitor) role.

This total role would then be: buyer, buy out technology gatherer, seller and competition analysis data gatherer, and tracker of Japanese ?? exports.

While the role isn't needed right today, I think it will be essential in 2-4 years! Since Yu Hata has such high credibility in Japan could he work into this? What do you think?

Page 1 of 4

DATE: 78 AUG 14

MEMO: Don Frost - C/- GIA Maynard

FROM: Gordon Bell

SUBJECT: Japan Issues

LOC: ML12-1/A51

CC - Carl Janson
Ted Johnson

Thanks for the hospitality in Japan extended by yourself and especially Yu Hata.

Needless to say I was impressed with the Japanese and the potential of doing business. Although prepared to dislike them, I came away with an appreciation of their culture and motivation. However, it is clear to me that they are going to be the most aggressive competitor that we have ever seen, just as soon as their own market begins to be somewhat more satisfied. Also to fear is when the people working on large machines turn attention to smaller machines ... which they eventually will. For this reason it is essential that we establish ourselves in the Japanese market as firmly and as quickly as possible. My gut feel says it is still the best way is to use some form of distributor or some form of joint venture in order to get market share as quickly as possible.

It is ironic that in fact in the Universities we really are not selling computers at this point, the only machines are old machines that were sold before the Japanese had their own mini-computer. Therefore I question whether or not this is a worthwhile area of endeavour. On the other hand, VAX is going great in the Australian Universities and thus may be a good approach to gaining a foothold.

I had an interesting discussion with Gen Narui, who I found very impressive, about the problems of doing business in a subsidiary area and somehow it seems to me that we ought to make life a lot easier in the offices and establish something better than the normal sales attitude towards supplying bodies for money. For example, it is hard to see just how anyone can make money selling all the DEC products in a subsidiary area, given the high cost to translate manuals to train people, and to simply learn to sell this myriad of products.

In enquiring about various products I could not find anything, perhaps with the exception of the DECsystem 10 that we don't sell in Japan. Thus with the amount of your software support people, this amounts to having one support person per product, which I consider deadly thin. I think it would be a good start if we should simply not make a lot of the products available to Japan if they cannot decide on what is a sensible thing to do. Again this comes back to subsidiary product line relationship which I consider deadly. I would almost prefer to have the subsidiaries buy direct from Central Engineering and they choose what they are going to do on their own. It seems the product lines don't add a hell of a lot here except overhead. I hope that with the new structure things will be cleaned up quite a lot better.

As a strategy for Japan I would certainly wonder whether we have any business in there in the commercial area versus the technical products group that John Leng has and the components group including say, selling RL01 disks. The main reason is that the technical community is based on English and evaluated technical specs, and detail. In the commercial part all has to be translated and requires a high content of support, probably more than we can afford and in fact, from this stand point, we might even go the route of having a support organisation that would sell basically what are our commercial products in this market place. I noted that the word processing system which the Japanese aren't into yet has just been introduced into Japan by Xerox and their Japanese partner. Therefore as a strategy I would think we probably ought to stick to scientific technical base unless we can figure out how to get into this other part.

I told Yu Hata I would speak with Henry Crouse, Jack Smith and Dick Yen about him joining manufacturing. Having someone who would acquire technical products from Japan for evaluation seem vital. Before going to Japan I did not see the merit in this, but now with the amount of work that is going on there in the semiconductors, computers and peripherals, and especially terminals, I have changed my mind. With the interface that we are trying to establish, I think it would be nice if we had somebody like this, but right now the effort would probably be less than full time. It would ultimately be full time in two years, particularly if we do more work in the Far East. A separate memo covers this.

I had an incredible time and the visit within Kyoto, Osaka was especially interesting because it showed another part of Japan that we did not see in Tokyo. I don't think I could have squeezed much more in. Yu Hata did an excellent job of scheduling all of the sightseeing and the only thing I really missed was seeing the manufacturing of minis. I hope that some of the sales, some of the talks will pay off, but I am a little sceptical here, probably because of the way the Government treats the Universities and the difficulty of buying VAX should be in there other than Japanese products.

I think the other thing I am especially troubled about is our ability to sell VAX 11 in Japan right now because I think, given the strong Japanese mini-computer part, it's the strongest product we have got. I note that the Japanese are big main frame orientated and are working like hell on big machines like the M200 Fujitsu, the 370 and 3330 to 3033. The mini-computer makers aren't very serious about making very hot machines and in fact still have basic address problems. I think we have got to move in very rapidly with the VAX 11 and it also could get us back into the Universities, but to me what is required is to get a demonstration machine. I don't think we can effectively sell VAX until the machine exists in Japan, and right now the first one scheduled is in March, which means we lose effectively about nine months selling.

I would certainly support getting any kind of an arrangement whereby VAX were available by September even if it has to be a demo unit. In the case of VAX it is absolutely essential we do have a demonstration unit in order to show how fast it is, the virtual memory aspect, the ease of the programme/conversion benchmarking, and the ease of use with the command language. These do not come across without machines. VAX is our hard technical product and I don't see them having a competitive product. They respect technology!

As separate products, I would certainly like to know whether we have solved the 100 volt problem in Japan. I know we are trying hard at this point. I understand some of our products still require step-up transformers but we ought to move to eliminate this restriction. Tell me the products you believe there is a problem with and I will try to see what I can do in making this problem more visible.

TO: Don Frost
FROM: Gordon Bell

Page 4 of 4

As a separate issue I have been talking with Bill Davis. I tried to find out how we were doing with respect to reliability and availability. He is concerned that in fact if anything, because the Japanese are so proud and so bright they absolutely will never admit they cannot fix anything. He believes there is an uncovered abnormally high unreliability in the 11/70 which might be attributed to training.

I would submit that it is very likely it could also be a hardware/software problem because we are supporting too damn many operating systems, all of which have varying degrees of software enhancement for reliability, availability and maintainability. As a separate issue since we believe we have very high hardware reliability world-wide I think it would be good for us to get some national data and if we do have the substantially better reliability then we could advertise it. To me this would require however, having data on a world-wide basis on all our machines so that we could see how well we are doing in Japan versus the rest of the world. This would also let a subsidiary and group know just how effectively they are with respect to corporate average.

We really ought to be selling greater than 256K systems, because the only mini that seems to be available that could attach 11/70 sales, is the NEC level 6, and I doubt if they can support that yet. We really ought to be using the mini address space limit that all the Japanese machines have and go and clobber them at the half megabyte and above level.

I got comments from GenNaroui that we needed to have competitive analysis on Japanese machines. I certainly am not going to provide that and I don't think the product lines should provide that until the Japanese become more of a threat on the world wide market. I believe that this is clearly a Japanese subsidiary responsibility and I would certainly like to see competitive analysis, I would like to see that analysis done, but in English, and sent back to us at the corporation because I think it might serve as a model for other subsidiaries e.g. Europe, which keeps us totally in the dark about whether there is any competition or not. It would also guide you in marketing.

Thanks again. I enjoyed the visit although it scared the hell out of me.

GORDON BELL
VICE PRESIDENT - ENGINEERING

MEMO: ANDY KNOWLES

SUBJECT: INFORMATION ON THE CORPORATION AND PRODUCTS FOR VISITORS

CC - Dick Berrube
Ken Olsen
Ted Johnson
Julius Marcus
John Leng
Carl Janson

DATE: 78 AUG 14

FROM: Gordon Bell

LOC: ML12-1/A51

Everywhere I went in Japan, Sony, NEC, Fujitsu, even the Universities, all had a great deal of information about their organisations. Even the Universities had performance data in terms of students, of our departmental organization etc.

Since I never see this seemier side of our corporate life, I never quite see the need for it. I do have visitors from outside, good information about the Company would be useful. The Annual Report is a starting point because it usually has the last five years and occassionally we do a very good job in terms of putting a report together with has information in graphical form so that one can see the exceptional growth and something that tells the DEC story (which the Japanese are impressed with because all they care about is growth).

In addition to this aspect of the company they usually mention the people in an organisation which we normally don't put in any documents, and they plot everything especially productivity measures. In fact some of the financial people who analyse DEC do a lot of this based on our data. In many of the cases we also have very good documents on the products; the sales literature for PDT did a very good thing in putting together the corporate family tree showing the roots of our machines and what products are available.

As a separate issue, I think we need a corporate catalogue which puts in all products starting with the base component products like CPU's and terminals, and goes up to system products which includes the operating systems application areas and specially application hardware - e.g. industrial terminals that we supply and the Turn Key services would go in two or three group level catalogs. Finally, specific product lines would have their applications sections. I tried to make a single catalog for Eng. P/L and it was too expensive. I think these five categories would provide an excellent product book and we could get rid of the unbound disjoint literature which is by now something in the order of three inches thick, each about eight sheets, and impossible to read.

TO: Andy Knowles
FROM: Gordon Bell

Page 2

The other thing that I found at NEC and Fujitsu was that both of them had movies or slide presentations on their divisions that described their philosophy in product. These were done very well and, of course, in English. They do an excellent job in selling.

In particular NEC was pushing the notion of world trade and helping various developing countries. I think we actually have a much better story to tell in this regard, and GIA should try to promote that image. I have never seen any since I don't see the GIA literature. This may already be available but my occasional trips to the outposts indicate there is nothing.

What do you think?

GORDON BELL
VICE PRESIDENT - ENGINEERING

↑-----↑
d | i | g | i | t | a | l i n t e r o f f i c e m e m o r a n d u m
↑-----↑

Subject: Sony Video Storage Technology

To: John Kevill

Date: 78 AUG 14

From: Gordon Bell

**CC: Jim Bell, Dick Clayton,
Bob Glorioso, Grant Saviers**

Dept: OOD

Loc.: ML12-1 Ext.: 2236

Sony has an incredible array of small video recorders and transducers. We have got to learn how to operate with respect to these video devices. One device is a small 3" video cartridge, I think actually a tape, although it could have been a disk, in which a few frames of video are stored. I am not sure what they are going to do with it.

The second is a video disk which stores 10 seconds of video. It is used as a teaching device and will be marketed early this Fall. We have to find out what the interface is and how we can use it. Yu Hata should be requested to get us this information immediately. I am writing to Dr. Iwama about it.

The third thing is called a MAV card which is a magnetic video recording card and is scanned vertically. They also had a cartridge which could be used as a carousel for the card which allowed the user to select any one of I think, 50 of the cards on a random access basis, and display the video images so there was a digital selection by keyboard for these image displays.

They also had a video input device which looked like a copier that took in what looked exactly like a copier and put an image down and the image was then transferred to video or to an image card.

All in all, one has to be impressed with the video and with the Sony technology there -- all emphasis on research -- and I would certainly like to get closer to them.

GB:ljp

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+-----+

Subject: AUSTRALIA -- RMS Feedback

To: Bruno Durr, Ed Fauvre,
Bill Heffner, Larry Portner

Date: 78 AUG 14
From: Gordon Bell
Dept: OOD
Loc.: ML12-1 Ext.: 2236

follow up 8/28/78

I got a fair amount of feedback here that RMS is too slow. Is it? What are we doing on it? Are we putting a cache structure into it for speed?

I got comments from a very bright programmer in Melbourne on Datatrieve. He'll send critiques. Somehow we need to get people like this to review products before they are implemented, not after they're distributed!

GB:ljp

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Subject: AUSTRALIA -- Clocks on 11's

To: Dick Clayton, Bill Demmer,
Bill Johnson, Jim Marshall,
Larry Portner, Wayne Rosing

Date: 78 AUG 14
From: Gordon Bell
Dept: OOD
Loc.: ML12-1 Ext.: 2236

I got another input for good clocks that run forever and can't be tampered with because they enable software to be rented! In this way software destroys itself at the right time. Monash University has apparently built such a device.

A customer would also like a good clock which gives consistent measures of cpu use versus elapsed time so that constant bills result.

GB:ljp

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Subject: AUSTRALIA -- Testing in the Load Determination of VMS

To: Terry Potter

Date: 78 AUG 14
From: Gordon Bell
Dept: OOD
Loc.: ML12-1 Ext.: 2236

follow up 8/28/78

Could you please send a copy of how the testing is done in the load determination of VMS to Dr. Ian Jackson, Sydney University, Sydney, New South Wales, Australia? He's interested in how many terminals the machine will run and how we are going about testing it? Since this is sensitive as to future sales, you'd better let me see it first.

GB:ljp

+-----+
| d | i | g | i | t | a | l |
+-----+

i n t e r o f f i c e m e m o r a n d u m

Subject: AUSTRALIA -- Bad Report on 310's

To: John Clarke, Dick Clayton,
John Kevill, Chuck Youse

Date: 78 AUG 14
From: Gordon Bell
Dept: OOD
Loc.: ML12-1 Ext.: 2236

Got a bad report on 310's here. Thirty percent still apparently arrive DOA!
In this low end, the successful supplier will build SONY consumer-like
products. They work the first time and run forever.

GB:ljp

0001 0307 01-AUG 26848 0253 01-AUG
S127 MMC1

0 127
1 AUGUST 1978

ID#0234

TO: M.J.FORBES
FR: GORDON BELL / CARE SYDNEY BRANCH

FOR: M/C, OOD, BRUNO, JACK SHIELDS, PEARSON, JANSEN

SOMEHOW ENGINEERING NEEDS A BETTER FIELD CHANNEL IN REGARD TO STRATEGY AND FOR SPECIFIC PROBLEMS. STRATEGY INPUT PROBABLY NEEDS TO BE DOWN BY PRESENTING THE RED BOOK AND GETTING FORMAL FEEDBACK (THE RED BOOK IS UNKNOWN IN AUSTRALIA AND JAPAN)

SOME OF THEIR IMMEDIATE PRODUCT STRATEGY CONCERNS:

1. DBMS IS TOO COMPLEX FOR AUSTRALIAN CUSTOMERS (AND OTHERS TOO - BUT THE AUSSIES ARE THE ONLY ONES OPEN ENOUGH TO ADMIT IT). THEY'D LIKE MULTI-KEY ISAM
2. THE COMMERCIAL SYSTEMS ARE I/O (IE, DISK) BOUND. WHEN WILL WE GET A DISK CACHE? THIS IS MORE IMPORTANT IN THE COMMERCIAL MARKET THAN A NEW CPU, THEY FEEL

WHY CANT WE PUT CACHES IN MEMORY LIKE TRAX FOR ALL SYSTEMS?
(WATCH THEM FROM BECOMING CPU-BOUND)

3. THEY ARENT SELLING 11/34'S BECAUSE THE MEMORY IS TOO SMALL. IS IT ANY WONDER WE AINT MAKING OUR BOOKINGS? WHEN DO WE SOLVE THIS? THIS IS REGARDED AS MAJOR STRATEGY SCREW-UP
4. 2040-50 NEEDS MOS. CORE IS PERCEIVED AS BAD..
5. HP HAS LOWER MEMORY PRICES. BIG SURPRISE.. WE KNOW THEIR PRICING ALGORITHM PRECISELY
6. COBOL SHOULD EXIST END-TO-END.. (LIKE DG)
7. WHY DID WE DO THE 11/60?
8. THE MULTI-USE LICENSE STILL HASNT BEEN SOLVED FOR UNIVERSITIES.. (THIS DROVE MANY TO UNIX)
9. WHEN WILL WE HAVE POLLED SYNCHRONOUS TERMINALS?
10. WHEN WILL WE USE ROM FOR BASIC AND FORTRAN SYSTEMS TO GIVE A CHEAPER, EASIER TO USE SYSTEM?

SOME PRESENT (AND PAST) CONCERNS:

1. THE KL10 HAS POOR AVAILABILITY. THIS IS A DESIGN PROBLEM. (UF PLEASE GET A THERMAL MAP. GET DAN SIEWIOREK TO RUN THE RELIABILITY CALCULATIONS FOR THIS HEAT LEVEL. ASSUME ITS POORLY COOLED, AND GET A FIX)
2. THERE'S BEEN POOR RK06 SHIPS. FOUR OUT OF FOUR DOA RECENTLY IN NEW ZEALAND. ALSO ITS TAKEN A LONG TIME TO FIX THE END-OF-LIFE PROBLEM WITH PLASTIC IN THE RK05
3. THERE MAY BE TROUBLE BREWING IN AUSTRALIA P.O. WHO APPARENTLY SPECIFY AN ELECTROSTATIC SHIELD BETWEEN PRIMARY AND SECONDARY. THERE'S NONE IN SOME EQUIPMENT, ESPECIALLY VT78
4. THE 310 IS STILL A PROBLEM
5. THE 310 LP HANDLER FOR DIBOL BOMBS. CANT IT RUN ATTENDED??
6. FLOPPIES ARE STILL A PROBLEM, IF FOR NO OTHER REASON THAN PEOPLE USE THEM CONTINUOUSLY (IE. ALL NIGHT) AS A SYSTEM DEVICE. DO WE HAVE TO HAVE A WARNING ON HOW THEY CAN BE USED?
7. VT52 (WITH 40+ SCREWS) IS THE TOP OF THE HIT LIST
8. DO WE REALLY UNDERSTAND THAT THERE IS BOTH 50 AND 60 CYCLE 100 VOLTS IN JAPAN? WHEN WILL WE HAVE PRODUCTS SUITABLE FOR JAPAN? (SHOULD WE?)
9. COMMUNICATIONS OPTIONS ARE STILL A NIGHTMARE TO INSTALL AND WIRE.. THE SAT CHIP PROBLEM DISCOVERED HERE IN OCTOBER ON THE DV11 AND USED ON OTHER OPTIONS STILL ISNT FIXED.. (THEY ASK IF THERE ARE ANY ENGINEERS WORKING ON THESE PRODUCTS)

OTHER

1. THE AUSTRALIANS BELIEVE WE STILL NEED A COMMUNICATIONS P/L TO HANDLE THESE SALES (ABOUT 3M DLRS IN AUSTRALIA)
2. SALES IS CURRENTLY ESTIMATING THE NUMBER OF USERS VAX WILL HANDLE ON A STRICTLY AD HOC BASIS. THERE ARE NO TESTS OR GUIDELINES. THIS IS CLEARLY SUICIDAL.. BILL PLEASE FIX NOW

NOTE HOW STRAIGHT-FORWARD THIS LIST IS. THEY DO TAKE A LONG TIME TO FIX

AT A PERSONAL LEVEL, MANY OF THE LARGE PROBLEMS WERE DETECTED/KNOWN EARLY ON... BUT FOR VARIOUS REASONS WEREN'T FIXED THEN. SUBSEQUENTLY ORGANISATIONAL CHANGES WERE MADE THAT ADDRESSED MANY OF THEM. SHOULD WE MOVE MORE RAPIDLY TO MAKE ORGANISATIONAL CHANGES WHEN THERE ARE MAJOR PROBLEMS - WE ULTIMATELY MAKE THESE CHANGES ANYWAY?

REGARDS

K



Digital Equipment
Australia Pty Limited

0233

5 AUGUST, 1978

JOHN WINTER, MELBOURNE OFFICE

DEAR JOHN,

THANKS FOR THE INPUT ON HOW TO SELL VAX. I WILL TRY TO USE IT TO GET OUR ACTIVITIES TOGETHER BETTER IN THE U.S. AND IN EUROPE. YOUR PERFORMANCE HERE IS TRULY OUTSTANDING. IT WAS GOOD TO MEET A REAL SALESMAN.

IF THERE IS ANYTHING YOU NEED, OR YOU HAVE ANY SUGGESTIONS ON HOW THE PRODUCTS OR SELLING PROCESS CAN BE IMPROVED, PLEASE DON'T HESITATE TO CALL ON ME.

SINCERELY,

A handwritten signature in cursive script that reads "Gordon Bell".

GORDON BELL

CC;

MAX BURNET, DAVE BALLANTINE, BILL DEMMER, AND CARL JANSEN

P.S.

KEEP UP THE GOOD WORK.




Digital Equipment
Australia Pty Limited

5 AUGUST, 1978

BLUNDEN BUTT

THANKS FOR THE OPPORTUNITY TO MEET WITH YOU AND THE SLAES PEOPLE IN THE
CANBERRA OFFICE. I GOT SOME VERY USEFUL PRODUCT FEEDBACK FROM MEETING
WITH THE CUSTOMERS AND YOUR STAFF.

SINCERELY,


GORDON BELL

P.S.

Let me know when you visit
"The Maynard".

0232



Digital Equipment
Australia Pty Limited

0231

5 AUGUST, 1978

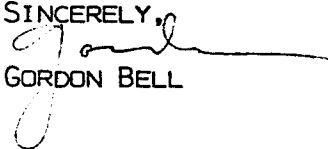
JOHN JONES

THANKS FOR SETTING UP THE VISIT TO CANBERRA TO VISIT THE CUSTOMERS AND TO HAVE A LOOK AROUND AFTER SO MANY YEARS. I SHARE YOUR ENTHUSIASM FOR THE CITY AND CAN UNDERSTAND WHY YOU HAVE CHOSEN TO SPEND THE TIME THERE. IT WAS GOOD TO SEE YOU AFTER THESE PAST MONTHS AND TO TALK ABOUT YOUR PLAN TO WRITE THE DEC BOOK. I HOPE I WAS OF SOME HELP HERE IN HOW TO APPROACH IT. I'VE ALSO TWX'D MARY JANE AND ANNE IN ORDER TO GET A START AT LOCATING SOME OF THE DOCUMENTS YOU NEED. HOPEFULLY THERE WILL BE SOMETHING TO REFERENCE WHEN YOU ARRIVE.

THE DISCUSSION WITH YOU, YOUR COLLEAGUES THERE AND WITH THE CUSTOMERS WAS EXTREMELY HELPFUL. I HOPE TO PUT THE INFORMATION TO GOOD USE, BUT I WILL SUPPORT YOUR PUSH IN TERMS OF THE WORD PROCESSING PRODUCTS. I'VE PUSHED THEM A LOT, AND A FIELD/CUSTOMER VIEW WOULD PROBABLY DO MORE GOOD...PARTICULARLY IF IT IS ADDRESSED TO STAN, TED, JACK AND PERHAPS THE WHOLE MARKETING COMMITTEE.

PLEASE LET ME KNOW WHEN YOU ARRIVE, AND I HOPE THAT I CAN HAVE YOU AND YOUR FRIEND AND THE BURNETS TO DINNER AT MY HOUSE.

SINCERELY,


GORDON BELL



0230

Digital Equipment
Australia Pty Limited

5 AUGUST, 1978

MAX BURNET

I AM CERTAINLY GRATEFUL FOR THE OPPORTUNITY TO VISIT AUSTRALIA AGAIN AND TO VISIT WITH OUR CUSTOMERS. THANKS FOR SETTING ALL THIS UP FOR ANOTHER PERSON FROM °THE MAYNARD°. HOPEFULLY I HAVE BEEN OF SOME HELP IN PROMOTING OUR PRODUCTS AND DEC AUSTRALIA. THE TIME HAS BEEN WELL-SPENT FROM MY VIEWPOINT.

I'LL SEND SOME COPIES OF COMPUTER ENGINEERING WHEN IT BECOMES AVAILABLE. HOPEFULLY THESE WILL BE OF USE TO SOME OF THE CUSTOMERS/EMPLOYEES HERE.

PLEASE ALSO ACCEPT MY THANKS FOR BRIG TOO, AS PAUL WAS VERY KIND TO TAKE HIM TO A RUGBY GAME AND HAVE HIM FOR DINNER. OF COURSE YOU AND JOY DESERVE OUR SPECIAL THANKS FOR TAKING US AROUND AND FOR THE FINE MEALS AND A CHANCE TO SEE OLD FRIENDS AND TO MEET THE WILLIAMSES. WHEN YOU AND JOY COME TO THE U.S. IN SEPTEMBER, I HOPE THAT YOU CAN VISIT WITH ME AND MEET THE REST OF MY FAMILY AND HAVE DINNER WITH US THERE.

AGAIN, THANKS.


GORDON BELL



Digital Equipment
Australia Pty Limited

0229

5 AUGUST, 1978

DAVE BALLANTINE,

THANKS FOR MAKING ALL THE ARRANGEMENTS TO SEE THE CUSTOMERS IN MELBOURNE AND TO DISCUSS COMPUTING WITH THEM AND OUR STAFF THERE. IT WAS GREAT TO SEE SOME OF THEM AGAIN. MOST OF ALL, I ENJOYED THE INTERACTION ON PRODUCTS AND ON THE PROCESS WE CONTINUE TO EVOLVE THAT RUNS DIGITAL.

IT WAS ESPECIALLY HELPFUL TO TALK WITH JOHN WINTER WHO HAS BEEN SO SUCCESSFUL AT SELLING VAX. HE PROVIDED USEFUL INSIGHT AS TO HOW WE MIGHT GIVE IT A PUSH IN OTHER AREAS.

I ESPECIALLY ENJOYED THE FOOD AND DRINK THERE AND YOUR HOSPITALITY.

SINCERELY,

A handwritten signature in cursive script, appearing to read "Gordon Bell".

GORDON BELL

PS

IF THERE'S ANYTHING I CAN DO TO MAKE PRODUCTS FLOW BETTER OR BE BETTER, PLEASE DON'T HESITATE TO CALL ON ME.



Digital Equipment
Australia Pty Limited

5 AUGUST 1978

0028

PAUL WILLIAMS

THANK YOUR VERY MUCH FOR THE HOSPITALITY EXTENDED TO ME AND BRIG IN SYDNEY.

BRIG WAS ESPECIALLY GRATEFUL FOR DINNER AND THE OPPORTUNITY TO SEE THE RUGBY MATCH...ALSO THE GUIDANCE IN WHAT/HOW TO SEE.

I HOPE ALL GOES WELL IN THE SELLING OF VAX'S HERE (AS WELL AS OUR OTHER COMPUTERS.

I LOOK FORWARD TO COMING BACK AGAIN AND HOPEFULLY IT WON'T BE QUITE SO BRIEF OR SO HURRIED.

PLEASANT REGARDS/

A handwritten signature in cursive script, appearing to read "Gordon Bell".

GORDON BELL

P.S. PLEASE STOP AND SEE ME IF IN MAYNARD. I AM THANKFUL FOR THE SECRETARIAL ASSISTANCE FROM KAY.

5 AUGUST, 1978
SYDNEY

RON SMART

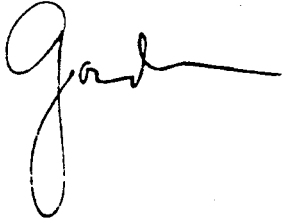
THANKS FOR THE ADVANCE WORK IN JAPAN AND AUSTRALIA. I'VE HAD A THOROUGHLY ENJOYABLE AND PRODUCTIVE TIME ON THIS TRIP.

REX VOWELS SENDS HIS REGARDS AND THANKS YOU FOR THE FLUTE DELIVERY SERVICE. HE ADMITTED THAT HE MADE A GRAVE MISTAKE IN LETTING YOU LEAVE THE UNIVERSITY.

YOU'LL READ SOME COMMENTS ON THE JAPANESE WHICH SHOULD GET AROUND SOMETIME. I HOPE TO GET YOUR REACTION (TO MY REACTION).

I INTEND TO HAVE YOU AND CATHERINE TO DINNER WITH J JONES (AND FRIEND), AND THE BURNETS WHEN THEY ALL ARRIVE IN SEPTEMBER. SO WILL SEE YOU THEN, PROVIDED I GET THE WHOLE THING ARRANGED.

GORDON

A handwritten signature in cursive script, appearing to read 'Gordon', with a long horizontal flourish extending to the right.

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↑-----↑

interoffice memorandum

Subject: KIVIAT Graphs

To: Terry Potter

Date: 78 AUG 15
From: Gordon Bell
Dept: OOD
Loc.: ML12-1 Ext.: 2236

KIVIAT Graphs are used in real time display in the Fujitsu computers in order that the operators can control the utilization of resources. They're impressive. Somehow your work has to get into the field. People are benchmarking and configuring VAX by the seat of their pants.

GB:ljp

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Subject: Site Preparation Guide

To: Don Busiek

Date: 78 AUG 15

From: Gordon Bell

CC: Jack Shields

Dept: OOD

Loc.: ML12-1 Ext.: 2236

follow up 8/29/78

I just had some discussion with Bill Davis and he informs me that the site preparation guide is not a corporate publication, but rather is done on a product line by product line basis.

What in the world is the rationale for this? Why can't we put together a good guide which could be used for all products.

Is that your responsibility, or engineering's, or whose? (I trust it would be sufficiently good to cover various special cases of the subsidiaries.)

GB:ljp

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interoffice memorandum

Subject: CPU/System Upgrades and H/S Bus

To: Dick Clayton, Bill Demmer,
Ulf Fagerquist

Date: 78 AUG 15
From: Gordon Bell
Dept: OOD
Loc.: ML12-1 Ext.: 2236

Users certainly like the notion of Field/CPU upgrades. The 34-->34/A is an example they'd have liked. The answer may be a trade in. Clearly they want to use all peripherals, etc. Make minimum changes to get the new capability.

People say look at the Datapoint Serial Bus. That's the way to interconnect peripherals!

GB:1jp

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i n t e r o f f i c e m e m o r a n d u m

Subject: RSTS Upgrade with VAX

To: Joe Carchidi, Ed Favre, Bill Heffner, Date: 78 AUG 15
 Bill Johnson, Bernie Lacroute, From: Gordon Bell
 John Leng, Julius Marcus, Dept: OOD
 Larry Portner Loc.: ML12-1 Ext.: 2236

CC: Marketing Committee follow up 8/29/78

The message is very clear in Australia. The users who have RSTS would like some way of upgrading their current systems to VAX. This could be as weak as a link (DECnet) for current 11/40 - 11/70 systems, but there has to be a plausible, attractive product.

Could we explore what such a product might look like?

GB:ljp

Gordon

ID#0237

d	i	g	i	t	a	l
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interoffice memorandum

Subject: Administrative Unit

To: Ted Johnson

Date: 78 AUG 15
 From: Gordon Bell
 Dept: OOD
 Loc.: ML12-1 Ext.: 2236

follow up 8/29/78

Don't you think it's time to establish an administrative unit that worries about processes, efficiency, communications, etc. These poor sales managers are dying of trivia. Every unit (e.g., Australia) does its own programming. There are no standards of office efficiency. The secretaries in Australia are bored and generally incompetent, etc. Please assume this is being said nicely. I mean you no harm. How about giving this part to Jack Shields?

GB:ljp

REPLIES



INTEROFFICE MEMORANDUM

TO: Bob Armstrong
cc: Bill Walton Jack Bittner
Jim Cudmore Jack Schneider
Bill Demmer George Hoff
Bill Green Alan Kotok
Suresh Dave

DATE: 16 AUG 78
FROM: Rony Elia-Shaoul
DEPT: Microproducts
EXT: 295
LOC/MAIL STOP: WZ2

AUG 21 1978

SUBJ: SMALL GATE ARRAY (200)

This is a brief summary covering the rationale behind the small gate array project, as you requested (refer to attached memo by Gordon). The main objective is to provide the following benefits with low risk, low investment methods (i.e., no new circuits, cell layout design, or new CAD tools development).

1. Use standard package both Plastic and Ceramic and no heatsink. Package sizes 40,28, and 24 pins are achievable.
2. +5V supply only. The power for the 2.5V input is generated from an outside resistor to +5V.
3. Low cost part for the low functionality markets ~ 250 gates or below.
4. Simplified application rules if that is helpful to users.

The alternative of using the Comet existing chip as is was considered. However, since a major cost savings per part can be achieved by using a smaller size chip (40% smaller, keeping the circuit and layout design of the cells intact), the 200 gate approach was chosen over the existing Comet chip. It is estimated based on the committed FY79 Comet price list and comparing apples to apples, i.e., same complexity comparison, that an average of \$6.50 will be the savings achieved by using the 200 gate array instead of the same Comet chip with 200 gates. This difference will decrease, however, in future years and so will the product cost. A copy of the cost analysis comparison is available if you need it. Also, the small array will provide us with the higher operating temperature capabilities needed for standard package requirements, without performance degradation.

Total project cost related specifically to the layout, checking, and tooling of the virgin array, and the associated minor modification to the existing layout, and testing CAD tools plus documentations is estimated to be \$20-25K. Most of that cost (2/3) has been spent already. About 5K volume of this part will be the break even point, and it is estimated the usage for such a small array will be in the tens of thousands per year.

Our first user for this array is the Terminal Advanced group. This chip is about 170 gates, 40 pins, and replaces ~ 10 SSI chips. Cost and space savings are the major reasons for this chip. I believe other groups within the corporation will consider this tool once we have it fully built and proven (i.e., within the next 3 months).

The 200 Gate Array development represents a small investment and low risk to plug a hole for low complexity applications. Further Bipolar gate array development will not be activated without a thorough investigation and understanding of outside vendors' plans and capabilities in those areas (i.e., Fujitsu's arrays and the like will be looked into).

Finally, Microproducts also recently made a commitment to provide later in this fiscal year the existing Comet chip with standard packages, +5V only with almost all, if not all, of the functionality of the chip. Some degradation in the specifications will be determined by this new project.

WR

+-----+
d i g i t a l i n t e r o f f i c e m e m o r a n d u m
+-----+

ID#0178

Subject: Low Power Bipolar Gate Array

to Ronnie E.S.

from ~~To:~~ Bob Armstrong, Jim Cudmore,
Bill Demmer, Bill Green,
George Hoff, Alan Kotok

Date: July 28, 1978
From: Gordon Bell
Dept: OOD
Loc.: ML12-1 Ext.: 2236

follow up 8/11/78

The Japanese did what seems like an incredibly clever thing in developing a low power gate array. They simply use only a fraction of their regular large gate array that has a heat sink. This means only one part, one design system etc. Can we learn from them? (Let's not develop the smaller bipolar gate array -- have everyone use the current one.)

Can the ECL array be used in a similar way?

Fujitsu has bipolar arrays. Can we use them? They also have 8ns RAMs.

GB:ljp

Ronnie -

you may want to distribute to at least the above people (if only Gordon) the rational behind doing a smaller array

At one time I would have argued that your new array fits in a 16 pin package (plastic) - now I can't think of a single good reason to do it - (and I doubt that lower \$ really is a good reason - using 1/2 the array should double yield)

AUG 10 1978

ID#0184

d i g i t a l

interoffice memorandum

Subject: AUSTRALIA -- Clocks on 11's

To: Dick Clayton, Bill Demmer, Bill Johnson, Jim Marshall, Larry Portner, Wayne Rosing

Date: 78 AUG 14
From: Gordon Bell
Dept: OOD
Loc.: ML12-1 Ext.: 2236

I got another input for good clocks that run forever and can't be tampered with because they enable software to be rented! In this way software destroys itself at the right time. Monash University has apparently built such a device.

A customer would also like a good clock which gives consistent measures of cpu use versus elapsed time so that constant bills result.

GB:ljp

Handwritten notes: DAVE HILE - ON BLUEFISH CONSOLE MP. LOOK INTO COUNTING THE CPU RTC + HAVING AN ELAPSED TIME FROM THE CPU INTERRUPTS TO THE CONSOLE. 'REQUEST'. WE COULD GET A TOD - LET ME KNOW. B: CAT -> GBELL -> J.M. -> D. IVES. AUG 13 1978 W. ROSH...

AUG 17 1978

SHF79/39

| d i g i t a l | i n t e r o f f i c e

 m e m o r a n d u m

Subject: Fujitsu's M-200

✓ To: Gordon Bell

Date: 14 August 78

From: Sam Fuller *SA*

cc: Alan Kotok
Dave Rodgers
Bill Strecker

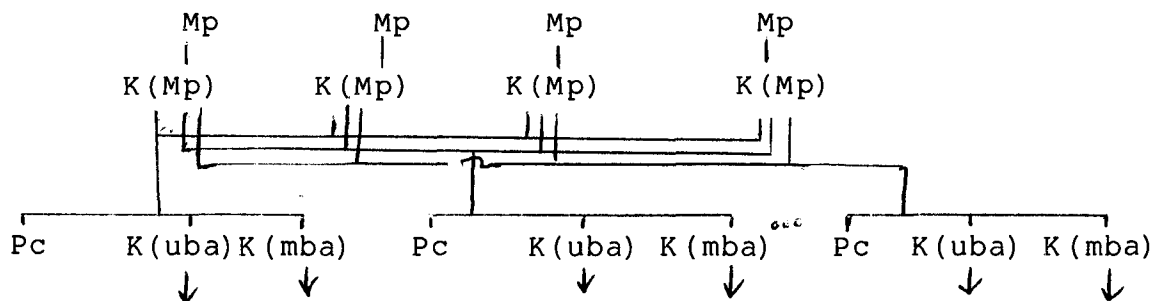
Dept: VAX/PDP-11 Sys.
Arch.

Peter van Roekens

Loc.: TW/A08

Ext.: 247-2131

I've read your note on the M-200 and below I have tried to draw a comparable diagram for the approach being taken on the 11/74 and the multiprocessor 11/780. It seems to me that if anything, the DEC structure has the potential of having an even higher hardware reliability than the Fujitsu machine.



The place where the Fujitsu configuration may beat the DEC configuration is in intrinsic performance. As you describe it, Fujitsu does not have to explicitly turn off caching on pages that might potentially be shared between processors. DEC could use this strategy if we were willing to design the multiport memory controllers to broadcast all writes over the buses - though Fujitsu's scheme with several ports into all the Pc's looks like it will still give higher performance.

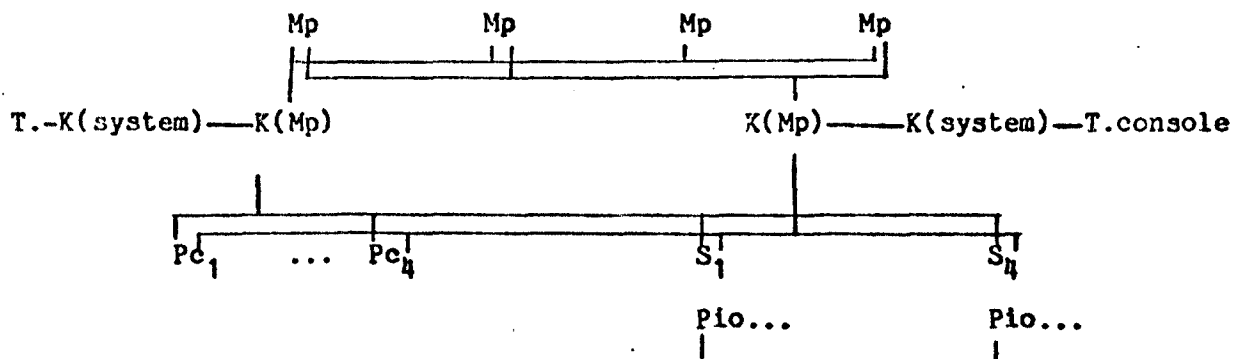
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 | d i g i t a l | i n t e r o f f i c e m e m o r a n d u m
 +-----+

Subject: Fujitsu's M-200 (Compatible with 370)

To: OOD, Sam Fuller,
 Alan Kotok, Dave Rodgers,
 Bill Strecker, Pete vanRoekens

Date: July 28, 1978
 From: Gordon Bell
 Dept: OOD
 Loc.: ML12-1 Ext.: 2236

I've just seen what I think is a decent 370. It's supposed to be the highest performance one (1.3-1.5) x 3033 as a single processor. The beautiful part is how they do 2-4 processors. Two memory controllers arbitrate requests on two separate buses for the 16 Mbytes in the memory modules. The memory controllers multiplex requests from 4 processors and 4 multiplexors from the I/O channel groups as follows:



A failure anywhere can be tolerated. The K(Mp)'s have separate power. T.console communicates to all modules. Pc has a cache (write through) and each K(Mp) broadcasts writes to all Pc's on a physical memory basis. They're after reliability and incremented upgrade (since their customers buy and want more capability). They're also going after the performance title! The O/S modification was very hard, due to the structure of IBM's system.

GB:ljp

AUG 17 1978

d i g i t a l

interoffice memorandum

Subject: KIVIAT Graphs

To: Terry Potter

Date: 78 AUG 15
From: Gordon Bell
Dept: OOD
Loc.: ML12-1 Ext.: 2236

Gordon
The tuning of the system is done by most of our large mainframe competitors. I agree we need to provide a set of tools (service) in this area. The investment is not small maybe Software Service or such an effort.

KIVIAT Graphs are used in real time display in the Fujitsu computers in order that the operators can control the utilization of resources. They're impressive. Somehow your work has to get into the field. People are benchmarking and configuring VAX by the seat of their pants.

GB:ljp

not via KiviAt graphs

note that IBM has automated some of this in a feedback control op. system.

GORDON

KiviAt graphs named after Phil KiviAt (after he suggested an approach to using medical multidimensional display tools in the field of performance) have been studied over & over and the results tend to indicate they are very misleading, very difficult to interpret and the US is not using them anymore. They are not the way to configure VAX since KiviAt graphs tend to be utilization oriented - you really need service oriented indicators (like load-service curves). ~~load-util curves~~ are useful in identifying bottlenecks when used in conjunction with load-service curves.

P.S. KiviAt thinks the KiviAt graphs are a bunch of @%\$%\$. In essence he does not support their use. Note: they are very pretty, though.

Terry

Japan (My Personal Diary)

Our seat mate, Anthony Geber, Director of Ec. Policy, Bureau of East Asian Affairs (State Dept.) -- 202-632-9690 illicited some argument from me. (He opened.) We exchanged business cards (I'm practicing for Japan) as it's the only time I've carried cards. (This, according to Reischauer, is the thing to do.) At any rate, his concern is simply that Americans are too lazy to compete. Also it's too hard for us to go after their small markets. Mine is more fundamental: Japan's growth versus return on investment; the availability of capital; Japan's trade barriers and language/cultural barriers; and the way the Japanese focus on winning in trade -- all serve to scare the hell out of me. Throw in our waste, vis a vis energy, too. I also attribute our regard for science over engineering and engineering over manufacture as key. The fact that we no longer use tape recorders (esp. videotape) build radios, tv, high quality cameras (we only built a few - Kodak 35), small cars, is cause for concern.

July 16th

Here we lie, watching the news (in English) after a day of running around like mad. Our host, Yu Hata, picked us up at 9, took us to the DEC office, gave us a one hour briefing on computers in Japan (a brief history) and then I gave a two hour seminar on the DEC Products and Engineering organization. There was an hour of questions on everything from 50 hertz 100 volt power to multiprocessors. It's clear we have inadequate planning of products for this market. Engineering makes its plans clear. Who's got the responsibility? (GIA-Jantzen, CSS-Holman/Martin/Watanabe???, the product here VT100 - Halio, or DEC Japan or some ?? P/L) for character sets? -- This is a mess! For starters, I say GIA had better drive this issue! We went to a nearby hotel and had to have an international style lunch (versus Japanese) because the Japanese part was full.

We left at 1 for a ride to Keio University (CMU affiliate) where I gave a talk on minicomputer architecture which prompted lots of questions. We left at 5 after interaction and view of their predominately batch 1106. Professor Toroko is an assistant professor in hardware. We were shown around by Professor Nori Doi; they would very much like to visit DEC. There was interest in architecture, as they wanted to build a large multiprocessor. Funding is tight as they're a private university with no NSF, ARPA or real industrial support. The main professor, ____, wasn't there.

Toroko gave me some papers which I'm sending internally and Doi gave me a paper on the Fortran they built for the 1108 patterned after Waterloo's WATFIV. On the return, Hata finished his lesson vis a vis the 3rd pair of groups (Fujitsu - Hitachi who make 370 compatible),

(NEC - Toshiba who're looking for a mini in Honeywell and used to be with GE) and (Mitsubishi - Oki). Univac (Nippon) is a dominant supplier somehow, based on Mitsui's earlier impetus! (Sept. 76 Datamation explains this quicker and better.)

We were dropped off at the Okura, I wandered around checking out the baths, water etc. and finally settled on a swim indoors with Sauna. This let me shed a kilogram quick plus earn dinner. We went to a nearby restaurant Hata recommended and got a reasonable meal for only \$30 each. It was quite good, not great and we muddled through as I almost drank the tempura sauce versus wait for food to dip it in. We returned about 8:30 and I called Don Frost about our visit tomorrow to NEC. I'm set to see the Director plus the technical management. Since I have a strategy to get a large share of the market, I wanted to check it out. Don said I, objective technocrat, should try it out with them! Basically the theme is: Buy any or all of DEC hardware/software; use it as a standard (just as Fujitsu-Hitachi do with the 370); sell in any/all Japanese/world markets and build a huge 11-based computer business! The Ministry of Trade/Industry (MITI) who controls all should absolutely love it. The only trick is to get them to invent the idea!

July 16th - NEC

We had enjoyable talks/visits to NEC. The main purpose was to assure them we'd support them in their effort with the distributed system for the IRS (NTAA) using our machines (DECnet, 11/70, IAS). This was needed because they may view us as a source of technology (DECnet, minicomputers, interactive systems). Actually, technologically they're quite advanced, but probably in the wrong direction as their machines are ECL-based; the high ends are a takeoff of the Honeywell ceramic modules. They've affiliated with Honeywell for 10 years, and next year the affiliation will be reviewed again. (Honeywell doesn't offer them anything.) The hi-end is 635 based, the mid is on some earlier (2000?) and the low is on their earlier machines. Their office machines (100-series) are based on their earlier machines. Their office machines (100-series) are based on their version of the 8080--note it's an upward-compatible (one-way) version! Their factories (computer and TV) were immaculate. People seem to move around faster than in ours with more to do. The designs and quality of workmanship were quite beautiful. They commented on our reputation for quality and reliability -- which I think we have ... but we have to get these better. It's the one sure way to sell in Japan. They like quality/reliability; probably our other customers do too). I hadn't visited a TV factory; it's like I expected. They make 1500/day - 300K/year. They have to make subassemblies because of US import quotas. Their 5 Japanese competitors for US market now have US factories, which means the issue of Japanese products (TV) is solely a capital, manufacturing and design issue -- not high labor, for example. Again, I remember buying and giving away a large Zenith portable color and replacing it with a Sony Color! (The Zenith replaced an old GE B/W which was never particularly good.) So in essence, I believe our ability to compete with the Japanese is:

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1. A product design: quality/functionality (they adore ^{Stocky}~~crappy~~ gadgets just like we do)/reliability.
 2. Ability to manufacture it cheaply (and in volume).

As long as we don't forget this, we have a market; when we do forget, we'll be a distributor, just like GE and Zenith! (Incidentally, recall that as engineers we felt sorry for the 100 TV engineer on Zenith's research group...why didn't they design better products? Why not a tape recorder? No American company produces a VTR (yet it was a US invention). This gets back to emphasis of research (science) vs engineering vs manufacturing. I hope we're doing the right thing by pushing more on engineering and -- manufacturing (to a lesser degree) versus research at DEC.

In the afternoon I met with a number of their people from central research. They're largely American trained where the cost is lower and training is supported by US government. One was trained on MIT multics. We had no trouble in communicating! My earlier frustration that they wouldn't talk wasn't true -- I did have to control the flow. Otherwise they'd clean me out of information! The affiliation with CMU turns out to be good, cause I can merely quote work there and stay out of DEC's work. The central (non-product specific) R&D is 100 people versus 50 for us...or they have 4 x the R&D per NOR since they have roughly 750M in sales! They're building a very high speed cobol engine, multiprocessors (just as we're fascinated by them for production reasons), and doing a mass store subsystem. It's hard to compare us cause they're more into batch. They build bigger machines but they'll soon learn as they build Honeywell's Level 6 Mini under license. I sense they have a fairly muddy strategy, building product-by-product as ideas seem to be good. (With our hi end VAX/10/20 machine, I think will be a long way to having a clearer product strategy -- although we'll have more products!) The person from R&D was amazed at VAX, and what it had, what it cost...he said all those ideas came from large machines. Surprise! I said this in a paper in 1971 on minis!

Speaking of ideas. The Japanese (and we) have about the same regard for ideas...they're useless until applied. Once applied, fair game to be modified, taken, etc. Within the limits of the law and morality (e.g. patents). It think we need to state as a policy that we do want patent protection on ideas whenever possible and that we'll take ideas from any source subject to moral/legal constraints! Here's what struck me:

1. The semi automatic wiring machine that Stocky designed wasn't patented. We gave it away to be manufactured locally. It was manufactured here as a copy by a Japanese firm. (I suspect they've improved it and maybe we should look into purchasing them here.)

DIARY CONTD: Tuesday and NEC

2. Their low cost Teleprinter was adapted from Extel.
3. Their high speed laser printer was mainly IBM based using some Honeywell ideas.
4. The CML logic on ceramic modules came from Honeywell - although they made them manufacturable.
5. They use Gardner-Denver wirewrap machines and Universal inserters.
6. Manufacturing tools seem to be adapted from Macrodata, Universal, Teradyne (the wirewrap/backplane tester).
7. Their printer came from Versetec, though in a different package!
8. Their Fax machines probably have similar origins!
9. Their new Spinwriter is an adaptation of Interdata's Carousel - I have some printout samples. The quality may not be high enough for word processing use. They're stressing reliability, speed (50 c/s) and quality!
10. Cables/Connectors come from the U.S. (maybe under license).
11. There are copies of the Tektronix scopes.

On the other hand, aside from our development and dedication to interactive and real time computing, many ideas of our products came from someplace outside (e.g. DEctape, 3M tape, cassette tape, the RK05, the DECwriters, the CRT's, the cache) various CPU implementation organisations, APL, Basic, Cobol, Fortran, Wirewrap, various LSI and Mfg. Tools). We did contribute to computer structures more. In many ways we resemble them.

in the evening we had dinner at a posh, continental style restaurant with Dr. Ishii and Mr. Kitamura of NEC. I reaffirmed our support to them to make the NTAA (IRS) project a success...without this MITI will clobber us and our name will be mud. This is merely a reaffirmation of the Operations Committee decision requested by Marcus, GIA, and DEC-Japan.

Ishii was relatively speechless when I laid out the proposition that they standardise on 11's and drop the manufacture of the Honeywell Level 6. This gets them a mini right now, without continued investment, and they can backward integrate as they see fit. This theme for the GIA nationalistic companies is the right way to approach the market place. Somehow, we have to convince them that we're sincere and believe it to be the way to get into computers. This "sales approach" isn't widely understood/used. We need to formalise it. Japan would be the ideal place to start.

In the afternoon we went to the NEC computer factory and I talked with a number of very bright people from their central research lab. Fortunately they don't understand minis or they put on a good act (they had xerox copies of our VAX documents). Research has 100 people for a company half our size (4 x the effort). We saw a TV factory complete with multi-height rack burn-in (which we should use for disks).

Wednesday

We visited the central lab of Fujitsu at Kawosaki. (Mr. Kurosaki and Mr. Sato), and then went to Numazau near Mt. Fuji where the computers were built. Fujitsu is the most computer oriented of all the companies because their founder, ?, who died a few years ago built one of the first relay computers. They ran the relay machine for me at Numazau while it calculated several common functions. They're not especially profitable, but they make beautiful computers and have the necessary technology. We saw their newly announced M200 (1.3 - 1.5 x 3033) and multiprocessor using a dual cross-point for reliability. It appears superior to both Amdahl V7 and IBM (neither of which believe in multiprocessors (see the memo).

Yu Hata and I could have easily had an argument on the relationship between Amdahl and Fujitsu. My view is simple: at IBM, Amdahl had developed a significant set of ideas on how to build 360's/370's. He left there, further enhanced the ideas in the circuits, design aids, packaging, small components assembly and testing areas. He got into financing trouble and Fujitsu bought a significant amount in return for the technology. Fujitsu put up the capital for the factory and made the assembly line work - no trivial feat because there's so much small assembly work. Fujitsu's first machine was not better than Amdahl's but they took a longer term view (they are not that profit oriented) and produced better design aids and semiconductors, etc., so that their circuit M200 will probably beat Amdahl's V7. The workmanship and detailed engineering is really fantastic. They have a very good master-slice (gate arrays) and fast (8 nsec) RAMs. In the terminal work, they have an anechoic chamber to get noise level down. They have some colour CRT's, and a floppy based intelligent terminal and are working on high level forms languages to make them easier to use. Of course, their disks are reverse engineered copies of IBM's.

Overall, Fujitsu seems the most frightening because of their dedication to quality, and winning. They have the strongest engineering and so far haven't been interested in mini's (PANA FACOM is their brand - a joint venture of PANASONIC (Mitsubishi) and Fujitsu). Also, given their disinterest in profit, they'll be doubly hard to beat.

Probably more importantly, Amdahl understands IBM mentality and how they strategise. This clearly influences Fujitsu and MITI. In fact, I believe Amdahl influenced MITI at least indirectly to build the plug compatible systems!

In visiting the Fujitsu factory we saw one of the floors of the factory was devoted to programming and they had set up something that was very much like an assembly line for programmers. I would love to have our programmers look at this kind of environment because, in effect, there was really a sea of programmers and probably the most impressive part was that they had a great number of line printers all backed up to a conveyor and as each line printer finished its output, it was cut and stacked. It was cut into the appropriate pile, the pile was put on the conveyor and the conveyor ran it off and the whole thing appeared on a carousel so that in fact all the programming listings were delivered stacked automatically. Of course, there were no individual carousels or offices for the programmers, only a sea of desks.

I guess the other thing that was impressive about the Fujitsu factory meant that it was good for making small assemblies was the very clean atmosphere. The custom of removing shoes is very helpful; this is done on entry to computer rooms, temples and tea rooms. It was the cleanest of all the computer companies that we saw. This really pays off when dealing with the large number of contacts and with the small coaxial cable and the way the multi terminal integrated circuits are sorted at that point under the board. The Fujitsu M190 and M200 computers also used colour CRT's for controlling the computers and in order to understand what is going on KIVIAT graphs are displayed on the consoles so that one can get an idea of what's happening to the various resources. KIVIAT graphs are used in real time display in the Fujitsu computers in order that the operators can control the utilisation of resources.

THURSDAY

We visited Dr. Nishino and Dr. Mori of the Electro Technical Lab which is run by MITI. This is a Central Research group responsible for computer research, the nearest equivalent of ARPA. The lab in a sense looked like many Government Labs a series of dusty old equipment with experiments which can be put into service for visiting dignitaries, some good and some bad work and a bunch of reasonably intense PHD's. They asked all kinds of questions at the seminar. I gave a talk on the VAX design and it elicited a number of interesting questions.

They're doing a large number of computer structures related work, several projects on multi processors and on micro programming and various things on language translation. On Dr. Nishino's desk was a well worn copy of the Quantam Sciences forecast on office automation, and I asked to see stuff on Word Processing but the stuff I saw was not particularly useful or impressive.

The ETL does have one interesting virtue in that it does very little hardware building and in fact its main function is to fund various industry groups to do design so that had a lot of the Japanese mini computers. Anyway the one that is the equivalent to the DG mini looked exactly like the DG framework except the workmanship on the console was much better than Data General's.

went to the Tokyo Hilton and fortunately had Tempura which is sort of batter fried fish, shrimp, vegetables which is probably the easiest thing for Westerners to accept and digest. It was about our second Japanese meal because all the other meals were given to us assuming that we could not eat Japanese food and we had sandwiches (with bread crusts remove and delicately made and presented) at the various companies and had continental food when we went out (especially the elegant NEC meal which was really heavily influenced by French cooking).

In the afternoon we went over to the University of Tokyo where I gave a lecture on mini computer architecture in a very formally decorated room which held about thirty. They apologised for the small crowd because it was vacation. I was with Professor Ashida and Professor Inose, both of which had spent a great deal of time at BTL. Inose is the father of the timesort algorithms for ESS no. 4 time division multiplex switching which he did about twenty years ago. The talk was supposed to take one and a half hours and a half hour questions and the talk ended up taking about one hour and there was roughly about 45 minutes of questions and we went to Prof. Inose's office and were formally received and discussed various types of things. The two Profs. had to leave because they had a dinner meeting of some sort.

We were then shown around the large Hitachi machines by one of the students. It was the Hitachi 8800 and he lamented the fact that Hitachi now was making IBM compatible computers which he considered inferior to the ones they had currently made. Their other line is almost IBM compatible derived from the Spectre 70 unit but has special supervisory call instructions which makes them incompatible. We looked around the computer which is really a monstrous machine because it was made out of MECL 10K, I believe, but the machine was water cooled and since to get the power on it was incredibly large, like 8MBYTE of core memory and this was very large. There was a four processor system, three fast processors and a slower processor. The load was not very heavy and we went over to look at the system resources and I ran a BASIC and a FORTRAN programme. The BASIC programme, null programme really bombed out so I have a feeling the Null programme took a good deal of time showing that they had some kind of interpretive compiler. The FORTRAN produced good quality code and ran very rapidly.

We left there about 6.00 p.m. and finally ended up having dinner with Yu Hata, his wife and Don Frost at his apartment. Spent a thoroughly enjoyable evening looking at his airplanes. Because he is an avid photographer. He got into building model airplanes for aerial reconnaissance photos. He also built some helicopters. All of this was indeed incredibly impressive and these airplanes are very detailed and take something in the area of six months to one year to build.

ere picked up early at the hotel and checked out and went to the Sony Corporation Central Research Lab. where we were given a brief introduction to what Sony is working on but on the other hand I was able to get no information from the Central Research Lab. group. I asked about what was going on in the Systems Research Group and the only thing we saw was a Sony TV tube which I have the specifications on that was used for Graphics.

They also demonstrated with characters but the interlace problem created incredible flickers. I asked about buying monitors but they said I would have to see Mr. Iwama. Having got no information from the Central Research Lab we then went to the Atsugi plant, Sony's plant, where we saw the video tape recorder being made. In contrast to the NEC TV plant the Sony plant did not do any burn in of parts but in fact used testing to ensure that the product worked when they were all put together.

A large number of the parts were done outside this plant and sub assemblies were brought to the plant for fabrication. In fact in all the plants that we saw only about half of the work is inside the plant. The rest is done by sub assembly or contract labour. In the factory only 40% of the 1100 people in the factory were workers. Of course, this was reasonably high considering that in that factory that about 250 out of the 1100 were in the engineering group. This is where they made so many semis. The semi conductor part used three micron channel width for NMOS. They were the first in Japan to use the Bell Lab license of the transistor and Mr. Iwama, the president, the technical person at the top insisted that a large number of engineers be hired to do semiconductors and in fact he backed Dr. Esaki. Sony has an electron beam mask maker which they got from Japan Electric Corporation which is of course, a copy of the American electron beam mask maker and we saw one of the AM 2900 ion implanters. It was just the fourth or fifth installed there. They pride themselves in owning a great number of the key semiconductor patents and in fact have a high voltage 10,000 volt transistor patent which is very key to making all solid state TV sets.

We left the factory in time to have lunch with Mr. Iwama, the President, who of course took us to an hotel where we had a western meal but before this, we looked at three very interesting video recorder projects all of which we have got to be interested in.

The MAVICARD recorder which I have brief info on and a carousel version that allows up to fifty other cards to be loaded automatically, is a scanned device and the card holds up to one hundred images. There was a small video disk which held ten seconds of video on a frame by frame basis, and could be used in freeze frame applications and that system will be introduced this year for sports teaching and I am asking Yu Hata to go ahead and get information on these products.

The third device was a small tape recorder, a tiny video disk about three inches in diameter that can store only a few frames of video.

All these products I find extremely intriguing and all we have to do is figure out how to couple them to DIGITAL recording. Iwama talked about the various forms of pulse code formulation for audio and video and they have got to get into it so that in fact, we would automatically end up with tape and disks that will allow us to use the video technology in computers.

They make it a point of their advertising of trying to stay away from anything that other people are doing. One can see by their various products and images, just how their approach to life is and in fact, their model is "Research makes the day."

After lunch with Mr. Iwama we then drove to the train station where we got on the bullet train for Kyoto and actually arrived in Osaka at about 7.15. We were met by the Software specialist and were taken to the Osaka Hotel where Dec Japan, Osaka Branch, were having its end of the year party. There were like 75 people there. Don Frost gave a good speech calling for plenty of openness and then I followed up by saying how glad I was to be in Japan, about how impressed I was with the Japanese, and our need for quality.

We finally got back to Kyoto and the Tawaraya, an old-style Japanese Inn at 11 or so, and was glad to lay on a mattress that was flat on the floor and very comfortable, after having lived so soft in Tokyo.

SATURDAY

We had breakfast, Japanese style, in our room at about 8.30 and then Gen Narui and Miss. Tomioka then came for us to go sight seeing.

In the morning we went to the summer detached palace of the Emperor Shugakuin outside of Kyoto, which included many temples, houses and rice paddies in an extremely beautiful setting. We were extremely fortunate to get there, and the fact that I was a visiting dignitary, were allowed to go there. I was glad that neither Yu Hata or Gen Narui had seen the palace so it was a treat for all of us. Miss Tomioko was in a traditional, elaborate Kimono and kept being stopped by U.S. photographers at each site.

We then took off on a tour, which was about a two mile walk in reasonably warm climate, up and down the hill in an almost Greek-like setting. Then we left for Arashi-Tei, a restaurant I think attached to a hotel that overlooked the Hozu River and there we had a typical Japanese, probably nine course, luncheon, starting off with beer because we were so thirsty after the walk. After lunch we then went up the Hozu River and then rode the boat down the Hozu for about 10 miles back to the landing of the restaurant.

We then went off to visit the Nijo-Jo castle in the centre of Kyoto which was a castle of the Shogun built to impress the Emperor to put him in business and neither of them spent that much time in Kyoto because they both lived in Tokyo. The castle was of course extremely impressive with moats all made of wood and bamboo.

We came back to the Tawaraya and then cleaned up a bit and then went out to dinner at a very nice restaurant. It is hard to remember which is the memorable parts of it, given that there were so many courses. After dinner we then went down the main street of Kyoto looking for various souvineers.

I found only a few things that could be useful as gifts. I spent most of my time looking for a knife, having been intrigued with the possibility of slicing vegetables very thin, which is one of the specialities of the Japanese salads. I found one and got a few other odds and ends as presents and some more ideas for presents and returned to the Hotel about nine or so, quite ready to konk out so I could go the next day.

SUNDAY

On Sunday morning we were trying to sleep late, given that we were going to take off at 9.30, but our maid/attendant unfortunately decided that we should get up about the same time as the day before and we were out by about 8.30. Met Gen and Miss Tomioka at the railway station and caught the 10 o'clock express train to Nara. The train is run by a private company and was extremely comfortable and cool as are all the Japanese trains, and we all got to the Todaiji Temple about 10.30.

we went on to visit the Taishi Shrine at the same location and walked around and then had lunch at an old Inn called Tonochaya which was a fairly heavy nine-course lunch. We were off by 2 and went to visit both the Toshodaiji Temple and the Yakushaji Temple and these were sort of the high points of our trip because we were met by a lady who is on the staff there. Miss Tomioka knows her very well and we had an incredible walk through the various temples, the latter temple was probably most impressive because there was a fire destroyed west temple and they are building a new temple and we got to talk to the engineer who is in charge of the new temple. He showed us around and we ended up going up in the construction of the temple. This temple is made of wood with no metal and is about 30 - 40 metres tall. We also went to the site where the wood was being prefabricated for this. This is being done by a bunch of scholars and an old carpenter. The whole temple is of course designed to last 1000 years and with the care they are taking should easily accomplish this. There are about around twenty carpenters working on the building and it is thought it will take about three years or about sixty man years of work to go into this temple.

The superstructure of the building is built around a wood pole and the temporary structure is made of steel and is quite a permanent structure. After we got through climbing around the temple we were also taken up in another temple that houses some of the Buddas. All these temples, of course, house Buddas of various sizes and shapes. The first one is to house the worlds largest Buddha made of bronze and sort of 12th century bronze.

We were presented with various photographs, gifts, good luck charms, and goods to help us on our way and we had tea and cakes with one of the monks at the temple before we left at about 5.15. We got the 5.30 from the station near the temple and then we got the express at Nara and was back to Kyoto by six and were having dinner at seven.

The five of us had dinner at the Tawaraya and the dinner was eleven courses. A magnificent dinner starting with raw fish, vegetables, soup. Along about the eighth course we were served with a very heavy tempura as batter-fried shrimp, vegetables, potatoes, fish and I was hoping things would be over, but in walked the next course which consisted of very heavy Hibachi. We were all presented with small Hibachis and everybody had steak on Hibachis and steak and various vegetables. Somehow I managed to get through that course, but skipped the next two courses because it is probably thought bad luck to have an even number of courses. We finished dinner about quarter of nine which is not necessarily typical because for some reason even though food is very lovely and things are in small servings, the Japanese eat very fast. While I am here I am trying to eat slower than normal otherwise we would finish the meal in probably an hour. I do enjoy the food and the time spent very sociably.

MONDAY

Gave lectures at Kyoto and Osaka Universities. Had dinner with people from Kyoto Sanyo University. (Tape is apparently lost).

TUESDAY 25th

We visited NEC in Kyushu which is on the island of Okinawa, a place where NEC makes almost 80% of its semi conductors. It is there because of the labour force and because of the supply of water. They make about 5 million pieces a month or 60 million per year, and about 80% would give the total NEC IC"s at 75 million per year.

If each is selling for maybe \$3.00 because they have a large amount of LSI, NEC's total sales would be at about quarter billion dollars, which is what we think they are.

Mr. Iwao who took us around. His title is Chief Engineer, but he is actually the operator of the plant, and he is interested in high volume manufacture. The brochure has all of this anotated that I took back. They started there 15 years ago with very little capitalisation in fact in September - they started there in September 1969, the capitalisation was only 400 million yen or at todays prices, about \$2,000,000. There are about 1750 people employed there - 1250 although are direct labourers.

They operate two shifts from 5.30 to 1.45 and then the second up , 10,30. Their history there is really one of starting out to do semi conductors for NEC's, NTT business telephone telegraphic business, so that they have a fundamental interest in quality. Subsequently when they got into the N MOS P MOS calculator cash register and computer business, they then changed the emphasis to all volume, which they have now. In doing this they have never left their concern for quality.

All products are burned in and the NTT products are sometimes burned in for as much as a week, and some products are only burned in half a day. 80% of NEC's total sales go outside and it is building that as much as 15 or 20% of these sales for export, probably a larger amount are to the United States , although we don"t know. They are making all P MOS 4 calculators and cash registers and N MOS computer memories, including the 4K plus 16 K RAM and they are doing a lot of C MOS for watches, calculators and radio equipment. In addition this plant also makes the BI POLAR CML logic for the high speed computers than NEC buildsthat are based on the Honeywell CML logic.

We had initially, a lot of concern as to whether we could visit there and they reluctantly agreed to let us visit there.

person who took us around was not that keen on having us, but was certainly cordial after we arrived. They tried to keep their labour force flat and they have taken all of their plating and marking equipment for the two in line packs outside so that all of this is done in local shops outside. They start with silicone wafers and go through and test and ship and they have a very nice process chart in there, in fact virtually like every Japanese company we were handed a brochure that clearly describes their whole process. In this case there are 15 steps and the 16th is shipment which is by air in specialised containers. From a semi conductor stand point they used the 4" wafer there on one line in the large building which is 240 x 40 metres - they have about 4 lines and at the one end is the new 4 inch line. It is a two story building.

In a small building they have the bipolar line which is a low volume line for all of the processing areas and the second floor is the pellitization through testing processes, excluding the part that is outside.

Mr. Iwao wanted to know how this compared to TI and to INTEL. I could not tell him (probably because I don't understand semi connectors that well) but frankly I was quite impressed, simply because of the incredible cleanliness and the well designed lay out that they have.

Somehow, the pressure of the Japanese custom of taking shoes off to enter a building and leaving your shoes at the door is really helpful to a semi conductor process, because it means that you don't carry a lot of dirt around. All of the areas that were part of the factory were marked in terms in class. The workers and the back of the equipment was class F and then everything else was in class C and they had class B and class A rooms.

In the burning in they end up with getting a failure rate of 1% at burn in so that they have a very high overall volume rate at customer acceptance of much less than 1%.

They have mask making equipment in Tokyo which is an EB machine which they own, and all of the work is done by the design and manufacturing production equipment design is done in Tokyo.

NEC itself has processed SOS wafers but is not interested in it because of the low volume, low yield, high cost nature of it. They are also looking at and they made JIL parts; he is not clear how but apparently for the NTT. (NTT wants it). Unlike many of the other semi conductor companies, especially Sony, NEC believes that it must bring all of the manufacturing equipment along and in fact has formed a wholly owned subsidiary tester company called ANDO, and of course, they being very patriotic to Japan and themselves, they use the NEC M4 mini computer which is a conversion of the Varian machines. The manufacturing complaint about the difficulty of maintenance of the tester, is traditional with every manufacturing group I have heard.

In regard to the 4 inch line this is one area that we weren't allowed to see, in fact he studiously avoided us looking at their wafer lines although there were windows into all of the other lines. In the case of the new 4NC wafer line there weren't any windows there and there was no hint as to what was inside. He did say, however, that in fact they used automatic aligners and that though the process up to diffusion, everything was handled as a continuous process so that in fact I would guess they have a highly automated function as the TI's we saw several years ago. Diffusion and some of the other processes are batch. In production, and he longs to have the whole thing to be a continuous process.

I was incredibly impressed with the fact that there were graphs of everything everywhere and I suspect even some graphs on semi log papers somewhere. The graphs were used to plot everything against everything else so that they really knew what their process was doing and the output. In the case of the secret process I asked about that and he said that it had considerable computer control and the main reason for doing this was to know what the various steps of the process was doing and what the productivity was. As a manager since he is not given that much control over his own destiny he is very concerned about productivity, which he does by moving some of the simple parts outside but also is concerned with automating as much as possible and keeping the cost of all the labour force flat while maintaining the various steep increase in volume. He did not say when the 65 K/RAM would be built but they are being produced now in Tokyo.

Hawaii

9:45 AM
July 14, 1978 - Arrived

Turned keys of el cheapo Avis Toyota over to faithful chauffeur, companion Kato (Brig) and he drove us like a mad man to Kuilima Hyatt Resort Hotel, Kahuku, Oahu, Hawaii 96731, through the pineapple fields. The time was 7 local and 1 AM (Boston). Had our fourth meal of the day and crumped out at 8. Rose at 6 (Brig at 7), had a camping breakfast, did the news, read the rest of Dan's work he sent, went swimming/snorkling (visibility poor, scenes dull), got set for visit to Kahuka Farms - a place I have some (ill-fated tax-deducted) \$'s in which is supposed to raise oysters/clams, to form plankton they farm by the ton. Set for scuba this afternoon if we have the time.

Airplane ride ridded me of 1/2 the paper in my briefcase (gift to United) and obsolete book on Japan that Clayton loaned me, an outline of a paper about the future of computers (2, 5-10) in case I write it for Justice Department, and allowed reading 100+ pages of Reischauer - The Japanese. The later seem most fascinating. It was necessary to watch a movie (House Calls - Walter Mathau) to break the monotony of 11 hours of flying and now have only a little more industrial background information to read. (The Reischauer book is a "must read" for everyone whose life the Japanese impinge).

7:30 PM

We visited the Kahuka Farms Agriculture Farm where we saw plankton being harvested and many oysters growing in what used to be an airfield. The engineering problems of sea farming are enormous -- the old problem: everything corrodes. We were impressed at the progress, delighted to hear that the president now has a chief executive, who's a construction engineer, to run the place and worried about the same old issue. The dream expands faster than their ability to get the profit and make a go of it. I have no doubt that the scheme will work very well. It will, but the ability to manage the dream is the problem. I reviewed a consultant's report which was favorable; but even I, dumb engineer, could poke holes in the financial part (consistency, depreciation, maintenance). Somehow there needs to be more of a hard-ass financial person closer to this. The flaky tax situation of tax write offs for farms places an unrealistic magnet for capital -- this is wrong. It ultimately has to fly on its own. The government playing god ~~messes~~ again ~~and~~ makes for more unrealism.

The windmill I recommended he not get has run one year and fallen apart with corrosion. I recommended he not get a computer to control the water flow into the plankton. Somehow, there needs to be a first rate intellectual attached to the project who worries about the engineering (i.e., hours off (sun light)=plankton/liter, the diffusion equations for oysters, clams, prawns, etc. when fed this way.) I recommend that Rod Harrington at Purdue (the only Ag. Engineer I know) come get involved. It's a beautiful problem. (We topped morning off with two each, very fat oysters!) We ate buffet at lunch and fully stuffed ourselves after the spartan breakfast and oyster appetizers.

In the afternoon Brig and I went to another unspellable, unpronounceable, 20-minute away tour, rented scuba gear and drove back about 1/2 way and had a nice long dive. We got out of the water - he had 1200# left, I about 600. We were somewhat cold; I was tired since it was first dive in two years. The place was Bojacs in Haleiwa. It's an easy dive off the beach. No colored coral, some urchins, many of the fish of the caribbean, but lots of nice caves to swim in and out of. Took the equipment back, got our dive cards back, which they kept as equipment deposits, got an ice cream cone (reasonable quality - about Brigham's level) and then started back. Stopped at a local place (previously recommended) and had an earlier dinner -- which we shouldn't have. (We should have got our bodies to an 8+ (5 in Japan) dinner hour. We'll pay tomorrow! Shopped for fresh pineapple which we bought at slightly higher than mainland prices; got Brig some milk for breakfast. This time a pretty elegant one.

The main thing we can be thankful about is the lack of sunburn -- we got some fancy (expensive) filter water-insoluble cream. We were only in water/sun a couple of hours.

The hotel is the usual American obsenity (could be anywhere) -- a real energy pig. Lots of architeccty incandescent lights, fully air conditioned even though its only 70-80, and lots of wind. (We've kept our room open) it overlooks a gorgeous cove and the noise is great as waves break on the beach.

July 15th

We had a mad dash around the island out to Makii Pier -- to pick up the camera I left in TAP's car. We spent 1/2 hour on the pier and viewed the Plankton that's now growing almost without bound since the 1st of July. There wasn't time for a snorkel or swim, so we went on to Honolulu and we got there only to wait an extra hour. The ~~4~~7 hour flight and 5 hour time change gets us there by 4+ pm.

July 16th - Arrive Tokyo

My seat mate from Honolulu, Anthony Geber, Director of Economic Policy, Bureau of East Asian Affairs (State Dept., 202-632-9690) illicited some argument from me. (He opened.) We exchanged business cards (I'm practicing for Japan) as it's the only time I've carried cards. (This, according to Reischauer, is the thing to do.) At any rate, his concern is simply that Americans are too lazy to compete. Also it's too hard for us to go after their small markets. Mine is more fundamental -- Japan's growth versus return on investment; the availability of capital; Japan's trade barriers and language/cultural barriers; and the way the Japanese focus on winning in trade -- all serve to scare the hell out of me. Throw in our waste, vis a vis energy, too. I also attribute our regard for science over engineering and engineering over manufacturing as key. The fact that we no longer build, but use tape recorders (especially videotape), radios, TV, high quality cameras (we only built a few - Kodak 35), small cars, is cause for concern.

July 17th - DEC Office + Keio University

Here we lie, watching the news (in English) after a day of running around like mad. Our host, Yu Hata, picked us up at 9:00 AM, took us to the DEC office, gave us a one hour briefing on computers in Japan (a brief history), and then I gave a two hour seminar on DEC products and engineering organization. There was an hour of questions on everything from 50 hertz 100 volt power to multiprocessors. It's clear we have inadequate planning of products for this market. Engineering makes its plans clear. Who's got the responsibility? (GIA-Janzen, CSS-Holman/Martin/Watanabe, the VT100 product here -- Halio, or DEC Japan or some P/L for character sets?) This is a mess! For starters, I say GIA had better drive this issue!

We went to a nearby hotel and had to have an international style lunch (versus Japanese) because the Japanese part was full. I intend to assimilate everything -- just like the Japanese, so the food is paramount.

We left at 1:00 PM for a ride to Keio University (CMU affiliate) where I gave a talk on minicomputer architecture, which prompted lots of questions. We left at 5:00 after interaction and a view of their predominantly batch 11/06. Professor Toroko is an assistant professor in hardware. We were shown around by Professor Nori Doi. They would very much like to visit DEC. There was interest in architecture, as they wanted to build a large multiprocessor. Funding is tight as they're a private university with no NSF, ARPA or real industrial support. The main professor wasn't there.

Toroko gave me some papers which I'm sending internally, and Doi gave me a paper on the Fortran they built for the 11/08 patterned after Waterloo's WATFIV. On the return, Hata finished his lesson on the Japanese computer industry vis a vis the 3rd pair of groups (Fujitsu - Hitachi, who make 370 compatible), (NEC - Toshika, who're looking for

a mini in Honeywell and used to be with GE) and (Mitsubishi - Oki). Univac (Nippon) is a dominant supplier somehow, based on Mitsui's earlier impetus! (Sept. '76 Datamation explains this quicker and better. The article is attached.)

We were dropped off at the Okura Hotel, I wandered around checking out the baths, water, etc. and finally settled on a swim indoors with a sauna. This let me shed a kilogram quick plus earn dinner. We went to a nearby restaurant Hata recommended and got a reasonable meal for only \$30 each. It was quite good, not great, but we muddled through as I almost drank the tempura sauce versus wait for food to dip it in. We returned at about 8:30 and I called Don Frost about our visit tomorrow to NEC. I'm set to see the Director plus the technical management. Since I have a strategy to get a large share of the market, I wanted to check it out. Don said I, objective technocrat, should try it out with them! Basically the theme is: Buy any or all of DEC hardware/software; use it as a standard (just as Fujitsu-Hitachi do with the 370); sell in any/all Japanese/world markets and build a huge 11-based computer business! The Ministry of Trade/Industry (MITI), who controls all, should absolutely love it. The only trick is to get them to invent the idea!

July 18th - NEC

We had enjoyable talks/visits with NEC. The main purpose was to assure them we'd support them in their effort with the distributed system for the IRS (NTAA) using our machines (DECnet, 11/70, IAS). This was needed because they may view us as a source of technology (DECnet, minicomputers, interactive systems). Actually, technologically they're quite advanced, but probably in the wrong direction as their machines are ECL-based. The high ends are a takeoff of the Honeywell ceramic modules. They've been affiliated with Honeywell for 10 years, and next year the affiliation will be reviewed again. (Honeywell doesn't offer them anything.) The high-end is 635 based; the mid is on some earlier (2000?); and the low is on their earlier machines. Their office machines (100-series) are based on their version of the 8080 -- note it's an upward-compatible (one-way) version!

Their factories (computer and TV) were immaculate. People seem to move around faster than in ours, with more to do. The designs and quality of workmanship were quite beautiful. They commented on our reputation for quality and reliability -- which I think we have ... but we have to get these better. It's the one sure way to sell in Japan. They like quality/reliability (probably our other customers do too).

I had visited a TV factory; it's like I expected. They make 1,500/day - 300K/year. They have to make subassemblies because of U.S. import quotas. Their 5 Japanese competitors for U.S. market now have U.S. factories, which means the issue of Japanese products (TV) is solely a capital, manufacturing and design issue -- not high labor, for example. Again, I remember buying and giving away a large Zenith portable color and replacing it with a Sony color! (The Zenith

replaced an old GE B/W which was never particularly good.) So in essence, I believe our ability to compete with the Japanese is:

1. A product design: quality/functionality (they adore knobby gadgets just like we do)/reliability.
2. Ability to manufacture it cheaply (and in volume).

As long as we don't forget this, we have a market. When we do forget, we'll be a distributor, just like GE and Zenith! (Incidentally, I recall that as engineers we felt sorry for the 100 TV engineers on Zenith's research group...why didn't they design better products? Why not a tape recorder? No American company produces a VTR (yet it was a U.S. invention). This gets back to emphasis of research (science) vs engineering vs manufacturing. I hope we're doing the right thing by pushing more on engineering and manufacturing (to a lesser degree) versus research at DEC.

In the afternoon I met with a number of their people from Central Research. They're largely American trained, where the cost is lower and training is supported by U.S. government. One was trained on MIT Multics. We had no trouble in communicating! My earlier frustration that they wouldn't talk wasn't true. I did have to control the flow, otherwise they'd clean me out of information! The affiliation with CMU turns out to be good, because I can merely quote work there and stay out of DEC's work. The central (non-product specific) R&D is 100 people versus 50 for us...or they have 4 x the R&D per NOR since they have roughly 750M in sales!

They're building a very high speed COBOL engine, multiprocessor (just as we're fascinated by them for production reasons), and doing a mass store subsystem. It's hard to compare us because they're more into batch. They build bigger machines, but they'll soon learn as they build Honeywell's Level 6 mini under license. I sense they have a fairly muddy strategy, building product-by-product as ideas seem to be good. (With our high end VAX/10/20 machine, I think will be a long way to having a clearer product strategy -- although we'll have more products!) A person from R&D was amazed at VAX, and what it had, what it cost...he said all those ideas came from large machines. Surprise! I said this in a paper in 1971 on minis!

Speaking of ideas. The Japanese (and we) have about the same regard for ideas...they're useless until applied. Once applied, fair game to be modified, taken, etc., within the limits of the law and morality (e.g. patents). I think we need to state as a policy that we do want patent protection on ideas whenever possible, and that we'll take ideas from any source subject to moral/legal constraints! Here's what struck me:

1. The semi-automatic wiring machine that Stocky designed wasn't patented. We gave it away to be manufactured locally. It was manufactured here as a copy by a Japanese firm. (I suspect they've improved it and maybe we should look into purchasing them here.)

2. Their low cost Teleprinter was adapted from Extel.
3. Their high speed laser printer was mainly IBM based using some Honeywell ideas.
4. The CML logic on ceramic modules came from Honeywell - although they made them manufacturable.
5. They use Gardner-Denver wirewrap machines and Universal inserters.
6. Manufacturing tools seem to be adapted from Macrodata, Universal, Teradyne (the wirewrap/backplane tester).
7. Their printer came from Versetec, though in a different package!
8. Their Fax machines probably have similar origins!
9. Their new Spinwriter is an adaptation of Interdata's carousel - I have some printout samples. The quality may not be high enough for word processing use. They're stressing reliability, speed (to c/s) and quality!
10. Cables/connectors come from the U.S. (maybe under license).
11. There are copies of the Tektronix scopes.

On the other hand, aside from our development and dedication to interactive and real time computing, many ideas of our products came from someplace outside (e.g., DECTape, 3M tape, cassette tape, the RK05, the DECwriters, the CRT's, the cache) various CPU implementation organizations, APL, BASIC, COBOL, FORTRAN, wirewrap, various LSI and manufacturing tools). We did contribute to computer structures more. In many ways we resemble them.

In the evening we had dinner at a posh, continental style restaurant with Dr. Ishii and Mr. Kitamura of NEC. I reaffirmed our support to them to make the NTAA (IRS) project a success...without this MITI will clobber us and our name will be mud. This is merely a reaffirmation of the Operations Committee decision requested by Marcus, GIA, and DEC-Japan.

Ishii was relatively speechless when I laid out the proposition that they standardize on 11's and drop the manufacture of the Honeywell Level 6. This gets them a mini right now, without continued investment, and they can backward integrate as they see fit. This theme for the GIA nationalistic companies is the right way to approach the marketplace. Somehow, we have to convince them that we're sincere and believe it to be the way to get into computers. This "sales approach" isn't widely understood/used. We need to formalize it. Japan would be the ideal place to start.

In the afternoon we went to the NEC computer factory and I talked with a number of very bright people from their central research lab. Fortunately they don't understand minis or they put on a good act

(they had xerox copies of our VAX documents). Research has 100 people for a company half our size (4 x the effort). We saw a TV factory complete with multi-height rack burn-in (which we should use for disks).

July 19th - Fujitsu

We visited the central lab of Fujitsu at Kawosaki (Mr. Kurosaki and Mr. Sato), and then went to Numazau near Mt. Fuji where the computers were built. Fujitsu is the most computer oriented of all the companies because their founder, who died a few years ago, built one of the first relay computers. They ran the relay machine for me at Numazau while it calculated several common functions. They're not especially profitable, but they make beautiful computers and have the necessary technology. We saw their newly announced M200 (1.3 - 1.5 x 3033) multiprocessor using a dual cross-point for reliability. It appears superior to both Amdahl V7 and IBM (neither of which believe in multiprocessors (on M200)).

Yu Hata and I could have easily had an argument on the relationship between Amdahl and Fujitsu. My view is simple: at IBM, Amdahl had developed a significant set of ideas on how to build 360's/370's. He left there and further enhanced the ideas in the circuits, design aids, packaging, small components assembly and testing areas. He got into financing trouble and Fujitsu bought a significant amount in return for the technology. Fujitsu put up the capital for the factory and made the assembly line work - no trivial feat because there's so much small assembly work. Fujitsu's first machine was not better than Amdahl's, but they took a longer term view (they are not that profit oriented) and produced better design aids and semiconductors, etc., so that their circuit M200 will probably beat Amdahl's V7.

The workmanship and detailed engineering is really fantastic. They have a very good master-slice (gate arrays) and fast (8 nsec) RAMs. In the terminal work, they have an anechoic chamber to get noise level down. They have some color CRT's and a floppy based intelligent terminal and are working on high level forms languages to make them easier to use. Of course, their disks are reverse engineered copies of IBM's.

Overall, Fujitsu seems the most frightening because of their dedication to quality, and winning. They have the strongest engineering and so far haven't been interested in mini's (PANA FACOM is their brand - a joint venture of PANASONIC (Mitsubishi) and Fujitsu). Also, given their disinterest in profit, they'll be doubly hard to beat.

Probably more important, Amdahl understands IBM mentality and how they strategize. This clearly influences Fujitsu and MITI. In fact, I believe Amdahl influenced MITI, at least indirectly, to build the plug compatible systems!

In visiting the Fujitsu factory, we saw one of the floors of the factory was devoted to programming. They had set up something that

was very much like an assembly line for programmers. I would love to have our programmers look at this kind of environment because, in effect, there was really a sea of programmers. Probably the most impressive part was that they had a great number of line printers all backed up to a conveyor; and as each line printer finished its output, it was cut and stacked. It was cut into the appropriate pile; the pile was put on the conveyor; and the conveyor ran it off. The whole thing appeared on a carousel so that in fact all the programming listings were delivered stacked automatically. Of course, there were no individual offices for the programmers, only a sea of desks.

I guess the other thing that was impressive about the Fujitsu factory was the very clean atmosphere. The custom of removing shoes is very helpful; this is done on entry to computer rooms, temples and tea rooms. It was the cleanest of all the computer companies that we saw. This really pays off when dealing with the large number of contacts, the small coaxial cable, and the way the multi-terminal integrated circuits are sorted at that point under the board.

The Fujitsu M190 and M200 computers also used color CRT's for controlling the computers. KIVIAT graphs are displayed on the consoles so that one can get an idea of what's happening to the various resources. They are used in real time display in the Fujitsu computers.

July 20th - Electro Technical Lab and University of Tokyo

We visited Dr. Nishino and Dr. Mori of the Electro Technical Lab, which is run by MITI. This is a Central Research group responsible for computer research (the nearest equivalent of ARPA). The lab in a sense looked like many government labs - a series of dusty old equipment with experiments, which can be put into service for visiting dignitaries; some good and some bad work; and a bunch of reasonably intense Ph.D's. I gave a talk on the VAX design and it illicited a number of interesting questions. They're doing a large number of computer structures related work, several projects on multiprocessors and on microprogramming, and various things on language translation. On Dr. Nishino's desk was a well worn copy of the Quantam Sciences forecast on office automation. I asked to see stuff on Word Processing but the stuff I saw was not particularly useful or impressive.

The ETL does have one interesting virtue in that it does very little hardware building. In fact, its main function is to fund various industry groups to do design for a lot of the Japanese minicomputers. Anyway the one that is the equivalent to the DG mini looked exactly like the DG framework, except the workmanship on the console was much better than Data General's.

We went to the Tokyo Hilton and fortunately had Tempura, which is sort of batter fried fish, shrimp, and vegetables (probably the easiest thing for Westerners to accept and digest). It was about our second Japanese meal, because all the other meals were given to us assuming that we could not eat Japanese food. We had sandwiches (with bread

crusts removed, delicately made and presented) at the various companies and had continental food when we went out (especially the elegant NEC meal which was heavily influenced by French cooking).

In the afternoon we went over to the University of Tokyo where I gave a lecture on minicomputer architecture in a very formally decorated room (held about thirty). They apologized for the small crowd because it was vacation. I was with Professor Ashida and Professor Inose, both of whom had spent a great deal of time at BTL. Inose is the father of the time sort algorithms for ESS No. 4 time division multiplex switching, which he did about twenty years ago. The talk was supposed to take one and a half hours with a half hour of questions, but ended up taking about one hour with roughly forty-five minutes of questions. We went to Professor Inose's office, were formally received, and discussed various types of things. The two professors had to leave because they had a dinner meeting of some sort.

We were then shown around the large Hitachi machines by one of the students. It was the Hitachi 8800 and he lamented the fact that Hitachi now was making IBM compatible computers, which he considered inferior to the ones they had currently made. Their other line is almost IBM compatible, derived from the Spectre 70 unit, but has special supervisory call instructions which makes them incompatible. We looked around the computer, which is really a monstrous machine because it was made out of MECL 10K, I believe; but the machine was water cooled.

There was a four processor system, three fast processors and a slower processor. The load was not very heavy. We went over to look at the system resources and I ran a BASIC and FORTRAN program. The BASIC null program really bombed out so I have a feeling the null program took a good deal of time showing that they had some kind of interpretive compiler. The FORTRAN produced good quality code and ran very rapidly.

We left there about 6:00 PM for dinner with Yu Hata, his wife and Don Frost at Yu Hata's son's apartment. We spent a thoroughly enjoyable evening looking at his airplanes. Because he is an avid photographer, he got into building model airplanes for aerial reconnaissance photos. He also built some helicopters. All of this was indeed incredibly impressive. The airplanes are very detailed and take something in the area of six months to one year to build.

July 21st - Sony

We were picked up early at the hotel, checked out, and went to the Sony Corporation Central Research Lab where we were given a brief introduction to what Sony is working on. Other than that I was able to get no information from the Central Research Lab group. I asked about what was going on in the Systems Research Group, but the only thing we saw was a Sony TV tube (used for Graphics) for which I have the specifications.

They also demonstrated with characters but the interlace problem created incredible flickers. I asked about buying monitors but they said I would have to see Mr. Iwama. Having gotten no information from the Central Research Lab, we then went to Sony's Atsugi plant, where we saw the video tape recorder being made. In contrast to the NEC TV plant, the Sony plant did not do any burn in of parts but in fact used testing to ensure that the product worked when they were all put together.

A large number of the parts were done outside this plant and subassemblies were brought back for fabrication. In all the plants that we saw only about half of the work is done inside. The rest is done by subassembly or contract labor. In the factory only 40% of the 1,100 people were workers. Of course, this was reasonably high considering that in that factory about 250 out of the 1,100 were in the engineering group. This is where they made so many semis.

The semiconductor part used three micron channel width for NMOS. They were the first in Japan to use the Bell Lab license of the transistor, and Mr. Iwama, the President and technical person at the top, insisted that a large number of engineers be hired to do semiconductors and, in fact, he backed Dr. Esaki.

Sony has an electron beam mask maker, which they got from Japan Electric Corporation, which is a copy of the American electron beam mask maker. We saw one of the AM 2900 ion implanters. It was just the fourth or fifth installed there. They pride themselves in owning a great number of the key semiconductor patents and, in fact, have a 10,000 volt transistor patent which is very key to making all solid state TV sets.

We left the factory in time to have lunch with Mr. Iwama, who of course took us to a hotel where we had a western meal; but before this, we looked at three very interesting video recorder projects all of which we have become interested in.

The MAVICARD recorder, which I have brief information on and a carousel version that allows up to five other cards to be loaded automatically, is a scanned device and the card holds up to one hundred images. There was a small video disk which held ten seconds of video on a frame by frame basis, and could be used in freeze frame applications. That system will be introduced this year for sports teaching. I am asking Yu Hata to go ahead and get information on these products. The third device was a small tape recorder, a tiny video disk about three inches in diameter that can store only a few frames of video.

All these products I find extremely intriguing, and all we have to do is figure out how to couple them to DIGITAL recording. Iwama talked about the various forms of pulse code formulation for audio and video (they have got to get into it). We would automatically end up with tape and disks that will allow us to use the video technology in computers.

They make it a point in their advertising of trying to stay away from anything that other people are doing. One can see by their various products and images, just what their approach to life is. Their motto is, "research makes the day".

After lunch with Mr. Iwama, we drove to the train station where we got on the bullet train for Kyoto arriving in Osaka at about 7:15 PM. We were met by the software specialist and were taken to the Osaka Hotel where DEC Japan, Osaka Branch, were having their end-of-the-year party. There were about 75 people there. Don Frost gave a good speech calling for plenty of openness and then I followed up by saying how glad I was to be in Japan, about how impressed I was with the Japanese, and our need for quality.

We finally got back to Kyoto and the Tawaraya, an old-style Japanese Inn, at 11:00 or so. I was glad to lay on a mattress that was flat on the floor and very comfortable, after having lay too soft in Tokyo.

July 22nd and 23rd - Sightseeing at Kyoto and Nara

We had breakfast, Japanese style, in our room at about 8:30 AM and then Gen Narui and Miss Tomioka came for us to go sight-seeing. In Tokyo we had home-made coffee and fruit in the room to gain time, decrease interaction, write, and it's awfully cheap.

In the morning we went to the summer detached palace of the Emperor Shugakuin outside of Kyoto, which included many temples, houses and rice paddies in an extremely beautiful setting. We were very fortunate to get there, and because I was a visiting "dignitary", we were allowed to go. I was glad that neither Yu Hata nor Gen Narui had seen the palace so it was a treat for all of us. Miss Tomioko was in a traditional, elaborate, beautiful Kimono and kept being stopped by U.S. photographers at each site.

We took off on a tour, which was about a two mile walk in reasonably warm climate, up and down the hill in an almost Greek-like setting. Then we left for Arashi-Tei, a restaurant I think attached to a hotel that overlooked the Hozu River. We had a typical Japanese, probably nine course, luncheon starting off with beer because we were so thirsty after the walk. After lunch we went up the Hozu River and rode the boat down for about 10 miles back to the landing of the restaurant.

Off we went to visit the Nijo-Jo castle in the center of Kyoto. This was a castle of the Shogun, built to impress the Emperor to put him in business. However, neither of them spent that much time in Kyoto because they both lived in Tokyo. The castle was, of course, extremely impressive with moats all made of wood and bamboo.

We came back to the Tawaraya, cleaned up a bit, and went out to dinner at a very nice restaurant. It is hard to remember which is the most memorable part of it, given that there were so many courses. After dinner we went down the main street of Kyoto looking for various souvenirs.

I spent most of my time looking for a knife, having been intrigued with the possibility of slicing vegetables very thin which is one of the specialties of the Japanese salads. I found one, got a few other odds and ends as presents, some more ideas for presents, and returned to the Hotel about 9:00 or so, quite ready to konk out so I could go the next day.

On Sunday morning we were trying to sleep late, given that we were going to take off at 9:30, but our maid/attendant unfortunately decided that we should get up about the same time as the day before and we were out by about 8:30. We met Gen and Miss Tomioka at the railway station and caught the 10:00 o'clock express train to Nara. The train is run by a private company and was extremely comfortable and cool, as are all the Japanese trains. We all got to the Todaiji Temple at about 10:30.

We went on to visit the Taishi Shrine at the same location, walked around, and had a fairly heavy nine-course lunch at an old inn called Tonochaya. We were off by 2:00 and went to visit both the Toshodaiji Temple and the Yakushaji Temple. These were high points of our trip. We were met by a lady who is on the staff there. Miss Tomioka knows her very well and we had an incredible walk through the various temples. The latter temple was probably most impressive because a fire had destroyed the west temple and they are building a new one. We were able to talk to the engineer who is in charge of the new construction. He showed us around and we ended up going into the construction of the temple. It is made of wood with no metal and is about 30 - 40 meters tall. We also went to the site where the wood was being prefabricated. This is being done by a bunch of scholars and an old carpenter. The whole temple is, of course, designed to last 1,000 years and, with the care they are taking, should easily accomplish this. There are about twenty carpenters working on the building. It is thought it will take about three years, or about sixty man years of work, to complete this temple.

The superstructure of the building is built around a wood pole and the temporary structure is made of steel and is quite permanent. After we got through climbing around, we were taken up in another temple that houses some of the Buddhas. All these temples, of course, house Buddhas of various sizes and shapes. The first one houses the world's largest Buddha made of 12th century bronze.

We were presented with various photographs, gifts, good luck charms, and goods to help us on our way. We had tea and cakes with one of the monks at the temple before we left at about 5:15. We got the 5:30 from the station near the temple, transferred to the express at Nara, were back to Kyoto by six, and had dinner at seven.

The five of us had dinner at the Tawaraya -- eleven courses. It was a magnificent dinner starting with raw fish, vegetables, and soup. Along about the eighth course we were served with a very heavy tempura as batter-fried shrimp, vegetables, potatoes, and fish. I was hoping things would be over, but in came the next course, which featured the hibachi. Everybody had steak and various vegetables. Somehow I

managed to get through that course, but skipped the next two because it is probably thought bad luck to have an even number of courses. We were all presented with small hibachis. We finished dinner at about quarter of nine which is not necessarily typical, because for some reason, even though food is very lovely and things are in small servings, the Japanese eat very fast. While I am here I am trying to eat slower than normal, otherwise we would finish the meal in probably an hour. I do enjoy the food and the time spent very sociably.

July 24th - Talks at Kyoto, Osaka, and Kyoto Sanyo University

I gave lectures at Kyoto and Osaka Universities and had dinner with people from Kyoto Sanyo University. (The tape is apparently lost in the Sydney secretarial pools).

July 25th - NEC

We visited NEC in Kyushu, which is on the island of Okinawa, a place where NEC makes almost 80% of its semiconductors. It is there because of the labor force and because of the supply of water. They make about 5 million pieces a month, 60 million per year (at 80%, this would give the total NEC IC's at 75 million per year). If each is selling for maybe \$3.00, because they have a large amount of LSI, NEC's total sales would be at about a quarter billion dollars (which is what we think they are).

Mr. Iwao, Chief Engineer, took us around. He is actually the operator of the plant and is interested in high volume manufacturing. The brochure I took back has all of this annotated. They started there in September 1969, with only 400 million yen capital, or at today's prices, about \$2,000,000. They employ about 1,750 people there -- 1,250 are direct laborers. They operate two shifts -- 5:30 AM to 1:45 PM, and then the second up to 10:30.

Their history there is one of starting out to do semiconductors for NEC's NTT telephone business, so they have a fundamental interest in quality. Subsequently when they got into the NMOS PMOS calculator, cash register, and computer business, they changed the emphasis to volume, which they have now. In doing this, they never left their concern for quality.

All products are burned in. The NTT products are sometimes burned in for as much as a week, and some products are only burned in half a day. Eight percent of NEC's total sales go outside. It is building as much as 15 to 20% of these sales for export. Probably a larger amount is to the United States, although we don't know. They are making all PMOS 4 calculators and cash registers, and NMOS computer memories, including the 4K plus 16K RAM. They are doing a lot of CMOS for watches, calculators and radio equipment. In addition this NEC plant makes the BIPOLAR CML logic for the high speed computers based on the Honeywell CML logic.

We initially had concern whether we could visit there and they reluctantly agreed to let us. The person who took us around was not

that keen on having us, but was certainly cordial after we arrived. They try to keep their labor force flat. They have taken all of their plating and marking equipment for the two in-line packs to local shops outside. They start with silicon wafers, go through test, then ship. They have a very nice process chart. In fact, virtually like every Japanese company, we were handed a brochure that clearly described their whole process. In this case there are 15 steps. The 16th is shipment, which is by air in specialized containers. From a semiconductor standpoint, they used the 4" wafer on one line in a large two-story building (240 x 40 meters) -- they have about 4 lines and at the one end is the new 4 inch line.

In a small building they have the bipolar line which is low volume for all of the processing areas. The second floor is the pellitization through testing processes, excluding the part that is done outside.

Mr. Iwao wanted to know how this compared to TI and to INTEL. I could not tell him (probably because I don't understand semiconductors that well). Frankly I was quite impressed simply because of the incredible cleanliness and the well designed layout they have.

Again, the pressure of the Japanese custom of taking shoes off (leaving them at the door) to enter a building is really helpful to a semiconductor processor, because it means that you don't carry a lot of dirt around. All of the areas that were part of the factory were marked in terms of class. The workers and the back of the equipment was class F and then everything else was in class C. They had class B and class A rooms. They end up with a failure rate of 1% at burn in, so that they have a very high overall volume rate at customer acceptance.

They own mask making equipment in Tokyo, which is an EB machine. All of the work done by the design and manufacturing production equipment design is done in Tokyo.

NEC has processed SOS wafers, but is not interested in it because of the low volume, low yield, high cost nature of it. They are also looking at and made (it is not clear how) JIL parts apparently for the NTT. (NTT wants it.) Unlike many of the other semiconductor companies, especially Sony, NEC believes that it must bring all of the manufacturing equipment along. It has formed a wholly owned subsidiary tester company called ANDO. Of course, being very patriotic to Japan and themselves, they use the NEC M4 minicomputer, which is a conversion of the Varian machines. The manufacturing complaint, about the difficulty of maintenance of the tester, is traditional with every manufacturing group I have heard.

The 4 inch line is one area that we weren't allowed to see. In fact, he studiously avoided us looking at their wafer lines although there were windows into all of the other lines. In the case of the new 4NC wafer line, there were no windows and no hint as to what was inside. He did say, however, they use automatic aligners, and that through the process up to diffusion, everything was handled as a continuous process. I would guess they have as highly an automated function as

TI's we saw several years ago. Diffusion, and some of the other processes, are batch in production. He longs to have the whole thing be a continuous process.

I was incredibly impressed with the fact that there were graphs of everything everywhere and I suspect even some graphs on semi-log paper somewhere. The graphs were used to plot everything against everything else, so that they really knew what their process was doing and the output. In the case of the secret process I asked about, he said that it had considerable computer control and the main reason for doing this was to know what the various steps of the process were doing and what the productivity was. As a manager, since he is not given that much control over his own destiny, he is very concerned about productivity. He does move some of the simple parts outside, but also is concerned with automating as much as possible, and keeping the cost of all the labor force flat while maintaining the various steep increases in volume. He did not say when the 65K/RAM would be built but they are being produced now in Tokyo.

ESSAY

I was a ~~constraint~~

Relevance: - Learning for doing our work +
Glad this is Eng. School... ^{for reminder} Robotics are key to cost/quality
problem is ^{but} business schools ^{to train} do discourage innovation.
② - Robotics + take bright eng. out of svc.
creat. skill

Irony -
the undesert
will be out in a
year or so, +
Knowledge will be forgotten.

Believe the best way to understand is by example.
the topic is on Japan ③ - attitudes we need to ^{no ext.}
Here we have a paradox ^{or a recursion} (for
Rise in computers) namely where do
they get their ideas ^{They get} from the rest of
the world - so ~~it's~~ it's hard to think
that we can study them.



④ - People: in industry; there's work to do.

Even though they capture ideas, the process is UNIQUE
Robotics: Training

My point is there's not a death of ideas or #'s, but
we just have to learn (from the Japanese) how to
manag. them. Otherwise the ideas will dry up
because they generators will forget how from
because ideas come from prob. solving + need.

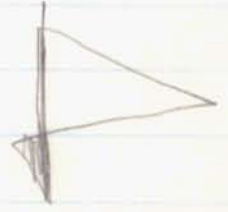
∴ Idea conservation; not idea generation

If energy then it'd be on conservation.

Observation come about by 1, first + last
trip to Japan - followed by a trip to Australia.

- Recog. / Def.
- Change Behavior

→ 551



Lawyers

- R+D measured as a % GNP isn't very good -
absol. more import because of society mix - more lawyers

- Point is probably there's enough R+D \$.

Lessons from Japanese

Societal

- more control / less control. yes.
- more spendy / less spendy, yes.
- better mgmt
- right allocation of resources

Overview Strat. + tactics

Using acculturated designs as the base
Prod. design is ^{their manuf. output} med, quality, long term - based
^{their output} Prod. result from managing a complete process
J based on our greed + values.
J has priorities for trade
~~J keeps out / has a closed~~ so ^{their} ~~so~~ ^{than}
J high labor cost, ltd pop, full emp.
+ lack of nat. resources creates by-products
to further stimulate

greed

J AND AMERICAN BUYERS HAVE CHANGED FROM INVENTOR - MFG. -
DISTRIBUTOR

TO DISTRIBUTOR



NO WAY FOR US TO RE-ENTER LOST BUSINESS.

(TEXTILES, STEEL, RADIOS, SEWING MACHINES, TYPEWRITERS,
CAMERA/OPTICS, SMALL CARS, TV, TAPE RECORDERS, WATCHES,
CALCULATORS, VIDEOTAPE, SEMICONDUCTORS, COMPUTERS.)

and built a technology process base — ~~micro~~

AMERICAN REGARD (WORSHIP) OF MBA. *and* *law* *degree*

71	<u>Law</u>	C. Eng
79	34	17.

AMERICAN BUSINESS FOCUS ON ROI

precision
Optics for
nearly all
modern mfg.

Grades

all are based
on underlying

Control | *precision*

in: optics
.. mechanical
.. elect.

INDUSTRY, GOV'T, ACADEMIA, ... SOCIETY CONSPIRE TO AID THE JAPANESE.

THEY HAVE SYSTEMATICALLY DOMINATED TRADE BY:

1. DEVELOPMENT OF DOMESTIC INDUSTRY
2. ESTIMATED EXPORT BASE
3. MARKET PENETRATION
4. MARKET EXPLOITATION

STRATEGY & TACTICS OF THE JAPANESE

• INDUSTRY, GOV'T, ACADEMIA OPERATE AS TEAM.

• MITI IS AUTOCRATIC - CREATES JAPAN CLUB.

• WE HAVE NO MITI TO PROTECT AND BUILD TRADE RESOURCES.

• THE INTENT IS TO DOMINATE SEMIS + COMPUTERS.

• U.S. DEPT'S OF LABOR & COMMERCE AREN'T SKILLED & AREN'T TOGETHER.

+ NO ONE HAS LASTING RESP. —

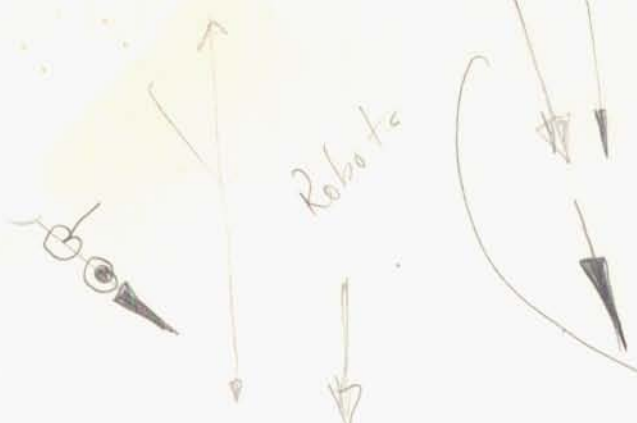
+ THEY ARE ADVERSARIES OF
EACH OTHER & OF ~~THE~~ INDUSTRY —

(Commerce)

fierce competitors
talk.

Show when important

Comput. Segment
get base
tech.



- gen. th. orientatn: make / Buy
 - custom
 - mfg. Capab.
 - antouate
 - mfg. processes
 - css-
 - Senis
 - edish
 - OSes 11/21/24
 - graphics
 - pru
 - too many
 - no hr
- Overd

 - V560
 - V7125
 - V7105
 - Megatech
 - Caltech
 - TW

J - "KNOW HOW" FOR DESIGN/TECH. ACCULTURATION

- PROCESSES ARE ORIENTED FOR COMPETITION, QUALITY, GROWTH, FLEXIBILITY.
- ACQUIRED COMPUTER TECH. FROM WORLD, (U.S.) - BUT IMPROVED ON IT.
all companies
- DESIGN INCLUDE: LOOK-ALIKE, LICENSE, REVERSE - ENGINEERING.
⇒ 3340, 50, etc.

ENGINEER/DESIGN FOR LONG-TERM/NEEDS.

- DON'T DO MARKETING.
- GO FOR QUALITY VS. THROW-AWAY
LONG-LIFE CYCLE
incapable of Timex, Polaroid,



J - UNDERSTAND AND MANAGE A COMPLETE PROCESS

- INVEST LITTLE IN RESEARCH - THE U.S. DOES IT FOR 'EM.
COUPLING TO ARPA
- MITI HAS FEW LABS, BUT FUNDS (CONTROLS) WORK.
by creating buyer/seller roles!
- ENGINEERING VS. SCIENCE
- UNDERSTAND GROWTH, VOLUME, DEMAND, ETC.
- THEY GIVE UP PROFIT FOR GROWTH (IN SHORT TERM)

AT A SOCIETY LEVEL THEY'RE TOGETHER

ENGINEERING & SCIENCE VS. LAW AND BUSINESS TRAINING

LOWER TAXES.

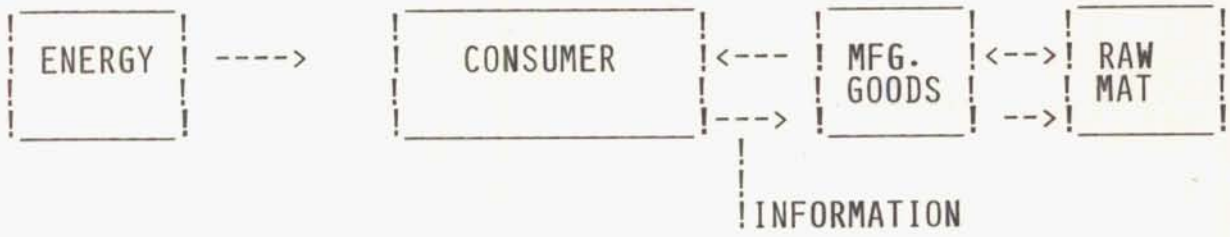
LESS MILITARY, NIH, NASA EXPENSES.

COMPUTING IS SUPPORTED.

THE JAPANESE "LIVE TO WORK VS. WORK TO LIVE"

- FOCUS IS ON WORK + LOYALTY.
- RISK TAKING IS POSSIBLE (WITH SECURITY).
- QUALITY CONTROL IS AT WORKER LEVEL.
- KNOW-HOW FOR TEAM (INTER-DISCIPLINARY) WORK.
- WORK IS THE GOALS VS. FREEDOM (NON-WORK).
- People stay in org. longer - govt.
security

BAD? PICTURE 3 ISLANDS:



Dartmouth

INNOVATION IN JAPAN--A LESSON FOR US?

The Japanese, are innovating in the right way. How can Japan be the model if their new ideas come from other places? Especially because many ideas probably come from the US, a lot can be learned about their processes of innovation that lead to success. This process takes ideas from research through manufacturing and into the market. In dealing with making prototypes and then developing production capabilities, the Japanese are solving the problems that will lead to more innovations. In the meantime, US industry has been transformed into warehouses, managed by purchasing agents, and I haven't noticed how many ideas come from them. Selling ideas to Japan and then buying back the products that incorporate the ideas will lead only to fewer innovations and to industrial decay in the US.

JAPAN'S STRATEGY AND TACTICS

With 100,000,000 people and virtually no natural resources, Japan has progressed from manufacturing low technology commodities such as textiles to complex machinery, such as the micro-miniature areas employing precision optics and precision mechanics in video tape recorders and television. High skill, low cost level technology work is being concentrated in Japan while low skill work such as assembly of things like television sets are done in appropriate off-shore low skill areas such as San Diego.

The overall approach to market domination comes in a four phase attack starting from the development of a domestic industry, often using borrowed technology but controlling imports until it is established. Their second phase is to establish the export base with a reputation for quality and reasonable prices. The third step, major market penetration, depends on cooperation among Japanese companies with respect to their models and using marketing muscle, mass volume, and low prices to rapidly gain market share and knock-out the competition. When there is sufficient market penetration they finally move into market exploitation and totally dominate, for example, in precision cameras.

In Japan, government and business work together in a team sense unlike the highly adversary relationship existing in the US. The group called MITI, (Ministry of International Trade and Industry) with almost an autocratic power, helps amalgamate strategies commonly referred to as Japan Inc. Digital Equipment Company has had experience in terms of exporting a particular product called MUMPS, a data-base operating system for interactive data-base problems. After six sales of MUMPS in Japan, interpreted by MITI as lost sales, the development of a Japanese mini-computer version was funded. In mid-1978 a Japanese researcher at Carnegie Mellon University asked me for the internal structure of DEC's implementation of MUMPS from a so-called computer science viewpoint. This particular episode shows me how they really have

Integrated academic research with industrial goals. The US certainly does not have the equivalent of MITI, protecting and aiding major corporations as national resources. In particular the US Government seems to be determined to break up corporations such as IBM, capable of undertaking innovative projects.

The Japanese strategy to win domination is hidden. Their behavior is open: they combine and in computers, different companies position the machines to provide a full line from Japan. They have won the advantage of providing a range of machines so the software runs across that system and avoiding redundant, costly development. Also, this work is based on IBM emulation. Such industrial collusion is not acceptable in the US: when people meet in a hotel room, talking about prices or positions, they often end up in jail. Yet neither the US Commerce Department or the Labor Department appear to have a plan or personnel to maintain dominance in high technological fields that is important to economy and security. More important, both these departments behave as adversaries to each other and to industry.

Japanese industrial tactics focus is on the centrality of work and loyalty to the company. The work ethic at work is an incredible thing to see. A highly stable work force promotes a certain amount of risk-taking because there is little fear of job termination. In the US, with threats of unemployment, risk-taking keeps declining, and with it innovation. In some groups in US companies, it is difficult to find out who can take a risk. For example, a very nice memory component was developed in a large corporate lab, under DOD sponsorship and I tried to buy it but found that the Defense Department was bidding against me. All this little lab really wanted to sell was about one a year to the Defense Department to keep their research group going. I wanted 10,000 a year. We just couldn't find anyone within the structure of the large organization who wanted to manufacture the product. It was really tragic, a very good product that could be useful to society and the economy. But I really couldn't even find out who it was who made the decision. Why is research funded in the first place if the goal is not to produce a useful device? The group is still doing research in the same area, and the Defense Department is still buying prototypes and there is absolutely no way that the device can ever get out of that laboratory through the divisional bureaucracies and into industry. This really points out the poor coupling between the development of ideas and the mechanisms for exploiting them. Our present government/industrial bureaucracy might well have throttled Edison to one light bulb had he lived one hundred years later.

Quality control has been delegated to the worker as opposed to being managed. This participation provides a key to the devotion to the workplace and a sense of achievement within the fabric of societal goals. Incompetent workers become wards of the organization and not wards of the state, such as the 300,000

ired, handicapped federal workers. This provides much local pressure to not be a ward. In the US, the freedom of the individual not to contribute to national goals has undermined the work ethic.

USING ACCULTURATED DESIGNS

If you look in the sixteenth century, it only took the Japanese 18 months to acquire the manufacture of guns and gunpowder from the Portuguese. For any product, they consider quality first, then volume for growth and flexibility to allow for the fast turn around needed to maintain full-production capacity in shifting markets.

They do a superb job of being able to orient their production line with quality and flexibility. The whole issue of semi-conductor quality necessary for building computers seemed to come from the fact that the telephone company buys from other sources, acting as a quality filter. Once you've got volume it is not so easy to get quality. The fact that the Japanese have this separate organization buying and selling really has helped their semi-conductor industry. If you contrast this with our situation, the telephone industry is its own captive supplier. They have quality, of course, but they don't have the technology incentive or cost goals because of the long amortization period.

All the Japanese computer manufacturers have acquired their technology within the past ten years by dealing with US manufacturers, either as a joint venture or under license, including: Fujitsu (Amdahl/Siemens) and Hitachi (RCA); NEC (Honeywell, GE, Varian) and Toshiba (Honeywell, GE, Interdata); Mitsubishi (Xerox) and Oki (with Univac joint venture); Yokosawa (HP); and Nippon Minicomputer (DG). In all cases, the Japanese have improved the technology in terms of perceived quality, performance and manufacturability.

In addition, Japanese computer manufacturers have a complete line of peripherals and test and manufacturing equipment, much of which is based on counter-parts invented in the US. The designs range from "reverse engineered", to look-alike copies, to radically improved products based on Japanese inventions. With "reverse engineering" a product is dissected with micrometers, special gauges, etc, and made compatible in nearly every respect. The Japanese make only products for export to the US market that do violate patents. Tektronix look-alike scopes and reverse engineered IBM disks are common. In 15 months, Nippon Peripherals Limited produced a disk that was mechanically identical to the IBM 3340. From comparing the two drives, one might even conclude that they were made from the same drawings.

LONG-TERM THINKING

Product design based on need, quality, and long-term projections can lead to innovation. But product design derived from the very thick marketing survey only extrapolates straight line trends in a self-perpetuating fashion. US industry has gotten into the habit of short-term thinking, epitomized by these surveys whose currency drops off rapidly in weeks after

lication. Japanese companies, with long-term goals and commitments, have little need for marketing surveys and the energy and money they waste, partially because U.S. buyers do their market work for them.

NEC, Fujitsu and Hitachi, unlike Xerox, GE, Westinghouse, and RCA, have all persisted with computer manufacturing and after years of investment have established successful products. Their long-range thinking from the outset allowed them to invest in long lasting quality. NEC was no different in terms of corporate structure than the large U.S. companies that went out of the computer business. But the notion that success follows if one sticks to a fundamental idea has been lost in U.S. corporate thinking.

Isn't it amazing that Japan has been able to focus on quality, sophistication, rather than throw-away products: Seiko vs. Timex watches and Nikons vs. Polaroids. In fact, given their approach to man/machine interaction, it is probably impossible for a Japanese designer to come up with a one-step camera. However, it may be that the overall concern for quality also comes into play.

When considering innovation it is important to distinguish items with a lasting value from just another piece of injection molded plastic, something that will soon be thrown away. The life cycle of industrial products is something that we do not pay enough attention to. We are not trained to think about investment evaluation for any long period of time, and that leads to worrying about the wrong characteristics and the wrong problems. Each new product should be evaluated in terms of maximizing its life, minimizing the cost to use, and maximizing productivity. For example, in Japan, all line printers had paper cutters and paper sorts on them.

UNDERSTANDING COMPLETE PROCESSES

The successful production of competitive performance products in high technology industries depends on understanding a complete process that includes basic research, going through applied research and advanced development, to product development. In addition, a parallel and equally complex process is required to design and build the process that manufactures such products. After a new product is introduced, it may then be necessary to modify and enhance it to adapt it to the real or changing market, and finally to eliminate it when it is no longer effective.

The Japanese need invest little in basic and applied research because they are effectively coupling the U.S. laboratories into their advanced development. In contrast, aside from the direct hiring of students and researchers, there is very little flow of ideas from our public laboratories into our own industry. As Over Mead of Cal Tech points out, "I like the Japanese. They listen. Also unlike American industry, they're willing to build from our ideas." The university laboratories at Stanford, MIT,

Presie Mellon, the University of Illinois, receiving significant (\$20-30 million per year) Advanced Research Projects Agency (ARPA) funding for Computer Science, have post-doctoral Japanese visitors. The university and industrial laboratories of Japan are headed and staffed by researchers who've spent their research years in key American laboratories such as MIT Multics. The flow of ideas from these centers to the Japanese is better than from these centers into American computing companies. Many of our companies don't even know these centers exist or that money is being poured into them.

Most recently, Japan has offered to spend one billion dollars in the U.S. for research, predominately for energy conversion. By accepting these funds, the Japanese can be even more effectively coupled to U.S. research and can "learn" to research, just as they've learned manufacturing, design and advanced development.

MITI, in contrast to the U.S. government, has few laboratories. They do research by funding and promotion of technical interchange. The Japanese have a good set of techniques for managing the flow of ideas back and forth across boundaries based on industrial need.

The Japanese orientation is clearly based on engineering and design for manufacturing rather than on science. In contrast, manufacturing technology in the U.S. has gone out of the engineering school and into the business school. But there is more to manufacturing than the machine shop scheduling problem. Quality control is often not taught! The invention that can come out of a manufacturing operation (often equalling the amount in the product design itself) is being ignored. Manufacturing engineering is segmented in U.S. colleges and in business. In contrast, in Japan people are rotated among the various processes and disciplines, making it equally desirable to carry out any function. But more significantly, this reinforces the understanding of innovation feeding backward and forward in affecting total processes.

The Japanese have shown that they are willing to give up profit for growth. For example, RCA is now a rug maker (or distributor), car renter, publisher, television component distributor; it hardly resembles the electronics company that pioneered televisions. RCA's role is that of a banker and such a conglomerate is no match for a serious manufacturer. Whereas there is extreme pressure on our business for profit and return on investment, these factors are less important to the Japanese companies. In computing, NEC or Hitachi computer divisions took a long time to become profitable. Japanese companies are buying market share. Given the growth phase, these companies would not compete for capital in the U.S. stock market where return-on-investment is the key criterion.

A gradual erosion of carrying out whole processes in the U.S. through a series of incremental decisions has led to the erosion

(U.S. industry as a whole. Not only has control and market share been lost, but also the whole process that lead to coming up with good ideas. The people who really have the vision to come up with the good ideas are those actually carrying out the totality of the manufacturing process and deal with issues of quality day in and day out. Today, these are the Japanese. We are fools if we think that U.S. industry will be healthy only playing the role of a distributor.

TECHNOLOGY AND THE FUTURE

An overriding element of time and patience is the key to the long term success of the Japanese. They have been willing to wait for a whole variety of material goods, but they really work at obtaining up-to-date information relative to developing innovations. They are impatient with trivial nuisances, inventing and using automatic taxi door openers for example, but have been patient in achieving quality performance prior to going into a field.

The Japanese, as I do, believe computers are fundamental for the long term and they are prepared to invest in them and wait. Not only are machines used in all products they build for export, but they save labor too. Labor is both precious and expensive in Japan! There are only about one hundred million people with two percent unemployment. They must have computers to raise productivity; computers are vital to their continued domination of manufacturing. As a separate research area robots are an important component of manufacturing domination. While much of the pioneering work was done in the U.S., the continued work to make robotics practical takes place in Japan.

In the U.S., in contrast, the role of the computer and robot is still debated, while our disgruntled workforce grows impatient carrying out meaningless work on throw-away items. We must return to valuing the understanding of our technology so that we stop being the slaves of Japanese enterprise.

Acknowledgment

The author is especially indebted to his wife, Gwen Bell, who took the transcribed talk, notes and ideas for the talk, and converted them into the current paper.

Pat McGuire, Mary Jane Forbes, and Sue Hunt typed and edited the final document.

Dartmouth

C. GORDON BELL, VICE PRESIDENT
DIGITAL EQUIPMENT CORPORATION

The Japanese, from my view, are innovating ⁱⁿ the right way. I wanted to discuss the topic of innovation really from an example standpoint and that example being Japan because I think they are doing things right. I am a self-styled expert in Japan, I have made one and probably last trip to Japan in August followed by a trip to Australia where I saw an incredible contrast. Australia being somewhere to the right or left depending on your orientation of England, halfway between England and Japan on the scale of things. In some sense there is ^{The} a paradox in talking about Japan dealing with the problem of recursion which ~~is~~ ^{is} how can you talk about Japan ^{be the model if their new} because Japan's ideas come from other places? On the otherhand while I believe their ideas come ^{Especially because many ideas} from other sources and probably ^{come from} the U.S., I think there is probably a lot we can ^{be} do ^{ed} to learn about what they do in terms of their over-lead to success. This process takes ideas through manufacturing and ^{into marketing} all process. My point also, in a sense, is not that there is a ^{In dealing with making prototypes and} of ideas or possibly even a dollar but we may just have ^{then developing production capabilities, the Japanese are solving the} to learn from the Japanese how to manage them because while we ^{problems that will lead to more innovations. In the meantime,} say there are a large number of ideas the process engaged in now which I believe is transforming ^{has been transformed} U.S. industry into warehouses, is ^{managed by purchasing agents} going to get us into a position where we do not have those ideas because I think ideas come from solving problems and I haven't noticed how many ideas come from purchasing agents. ^{them. Selling ideas to Japan and then} Buying things ^{the products} in Japan and reselling them have ^{will lead only to fewer innovations in the U.S.} . My point here is there is an equation covering the best way to get the I or Y is to minimize I and the best thing you can do in that regard is

~~to become a distributor or purchasing person.~~

~~I've got about 40 points from a paper which I am trying to get published.~~

First I would like to talk about Japan and how they do it. It is an overview with some strategy and tactics and then I want to talk about using aculturated designs that is how does one cap a design and improve on it. I want to talk about their output which I think is very clearly based on need at least on quality and their attitudes towards time, that is, time is a recurrent theme in dealing with the Japanese. I think that from a process standpoint they really understand a complete process, I don't think ~~talk~~ talk in business schools doesn't understand that as a process, maybe it is like a six year old or younger and asking where babies come from I think we are in fact very naive particularly naive about managing processes. In some sense I think ~~our~~ ^{their} success is made and based upon our greed based upon the whole business of our ~~and what we hold to be really~~ JAPAN'S STRATEGY AND TACTICS important. Having priorities I think is important too and at a country level I think they know what the priorities are and trade is clearly not first ^{Japan's} priority. ^{although it may seem so to others.} It doesn't mean they will totally produce for profit but they will certainly make some trade-offs. I think their high labor costs, their lack of resources certainly stimulates further growth. Those are the main topics and I am going to cover about 40 points within that set of topics. I think we have to be really impressed with what is accomplished ^P with 100,000,000 people and virtually no natural resources,

In the area of computing and semi-conductors the Japanese have really come in in a significant way where a number of large corporations have been there and basically had to get out. On the otherhand that is really no surprise either in terms of when you look at old closets you might ask why were they there in the first place but they have progressed from ^{Japan has} low technology commodities ^{such as} textiles ^{manufacturing} up to great complex ^{machinery, such as} manufacturing dominating the micro-miniature area with precision optics and precision mechanics which you find in video tape recorders and certainly high volume manufacturing of tele-

vision manufacturing. Their high technology work is probably being concentrated ^{in Japan} there on a high skill level while they are ^{low skill work} doing off-shore ^{such as} assembly of things like television sets ^{are done in} in low skill areas like San Diego. If you look at the overall structure

^{appropriate off shore low skill} of how they do it it turns out that there is a formula 4-phase ^{to market domination comes in a four} attack ^{starting} going from ^{the} initial development of a domestic industry ^{often} using ^{borrowed technology} by a control by you put that bucket in that physical goods and you simply cut off that and you start with that valve off and that valve off and that is sort of the first phase in the domestic industry.

^{phase is to establish the export base with a reputation for quality and reasonable prices. The third step, major market penetration depends on cooperation among Japanese companies with respect to their models and using marketing muscle, mass volume and low prices to rapidly gain market share and drive out the competition.} Then they open up the bottom valve and start an export phase and when there is sufficient market penetration they finally move into market exploitation ^{and} where they totally dominate, ^{for example} a market, ⁱⁿ such as precision cameras.

^{In Japan, government and business work together} It seems to me the key thing which I was happy to hear ~~Jordan~~ talk about, a little more behavior in a team sense but to me the Japanese and the Government operate as a team unlike what we have here which is ^{the} a highly adversary relationship. ^{existing in the U.S.} The

The group called Miti, (Ministry of International Trade and Industry,)

with seems to have almost an autocratic power and they help amalgamate strategies which are often called Japan, Inc. The competition is

the same. Digital Equipment Corporation has We have had experience in terms of exporting a particular product called, MUMPS, which is a data-base operating

system for interactive data-base problems, and on seeing After about six lost sales we found that Miti has now funded a Japanese mini-computer and in mid-1978 a Japanese researcher at Carnegie Mellon

University asked me for the internal structure of our implementation of MUMPS, from a so-called computer science viewpoint, and I guess we expect

to catch from Japan soon. This particular episode showed me how they really have things together. The U.S. certainly

does not have the equivalent of Miti, to protect major corporations as national resources, and in particular seem to be held for breaking up corporations such as IBM and it seems to be one of the Government's goals, to kill IBM and somehow get rid of that tax bill that they

pay. And wonder why how they can put in more committees to stimulate

HP Japanese They have a strategy to win domination and one can see it. You can see the way they behave, they team together, and in computers, different these are two companies who in fact know and bargain and

position the machines to provide a full line. The important thing in computing is to provide a range of machines so the software runs up and down that range and in this case these two companies

by teaming up one can essentially position the machines so essentially to avoid going after the same wire and doing redundant development.

Such industrial collusion That is purely not acceptable when people need a hotel room here they often end up in jail, either by talking about prices or by positioning

positioning. Yet neither the U.S. I think the Commerce Department or the U.S. Labor

Department do not appear to have a plan or personnel to maintain dominance in high technological fields ~~which I think are impor-~~^{that} tant to ~~the~~ economy and security, and in security you get the Department of Defense and I think it is important to note that Commerce and Labor are fundamentally adversary and both of them are adversary to the business and the Defense Department gets in there somehow and there are five there full-time to help us. I don't know how we can so much help. We don't even have enough people

It is clear that the Japanese ^{industrial tactics} focus is on the centrality work and loyalty ^{to the company,} which is certainly different from what we have in some of our industries. Certainly ^{at work} the work ethic is an incredible thing to see and ^{although known as a workaholic here,} after I visited Japan I am not sure I want to work there, but they certainly are productive. In some sense, one of the things that ^{they} a highly stable work force ~~would get~~ would get no output but on the otherhand that it does promote a certain amount of risk-taking ^{because there is little fear of job termination,} that I think appears to me does not exist so much at least what I have had ^{declining, and with it innovations,} the whole idea of risk-taking keeps going down. In some organi-^{groups in} zations even finding out who can take a risk, that really bothers me. ^{For example} There was a very nice piece of technology that was developed in one of our labs ^{a U.S. government} and I tried like hell to buy those things ^{them but} and I found that the Defense Department was bidding ^{against me,} too and this ^{this} little lab ^{about} all it really wanted to sell was like one a year to the Defense Department to keep their ^{group going,} research lab and I wanted

In the U.S.,
US companies

like 10,000 a year, and we just couldn't find anyone within the structure of the organization who wanted to go into the manufacture of this product. It was really tragic, a very good

product ~~and if I had anywhere near that kind of thing in a lab that could be useful to society and the economy.~~ we would be building them today but here it was we really couldn't

even find out who it was who made the decision on an item like that ^{to limit production,} as it was inside a division of divisions and all I asked

is why they went ^{is} into research ^{in the first place} if there was ^{the goal is not} no output, and the irony of it is that they ^{group} are still doing re-

search in that area, and the Defense Department is still doing ^{buying} things and there is absolutely no way that that thing can get

and out of that laboratory ^{the device} through these divisional bureaucracies ^{and into industry} in different towns and this really points out the poor coupling

between, particularly large organizations, ^{the development of} between ideas and mechanisms for

the notion that one could ever exploit ^{ing them. Our present} those ideas. ^{had he lived one hundred years later.} The issue of quality is one they are making too because

they have essentially done something like delegating ^{control has been} quality. ^{ad}

Quality is down ^{to} at the worker level as opposed to its being managed, in and that is a management function as opposed to a

worker function. ^{This participation provides a key to the} Anyway, in following up on the work essentially ^{devotion to the workplace and a sense of achievement} since everyone is working the notion of non-work is really socially

unacceptable and really ^{within the} as a fabric of society ^{iel goals.} Incompetent workers become words of the organization and ^{not words of the state,} and as opposed to the situation you see when the unemployed gets

a little bit high here when non-work people will leave their jobs to become one of the non-work force when it gets to be

the employment gets to be a wee bit high. I think in some sense ^{in the U.S.} we have really exceeded, the freedom of the individual ^{not to contribute to national goals} has really

^{undermined the} superceded work ^{ethic.} here as a goal.

USING ACCULTURATED DESIGNS

I want to talk here now about using aculturated design as a basis to dominate. There are a lot of stories and I hate to use a source, my knowledge about Japan is extremely limited - it is limited to Lighthart's book on Japan which I have read going over on the plane

I got some idea of how things were built and saw a lot and they allowed me to take my camera to the factory. I watched them build things and I talked with a lot of people. If you look at their aculturated customs, in the sixteenth century it took them ^{Japanese} 18 months to acquire the manufacture of guns and gunpowder

from the Portuguese. ^{For any product, they} They really do a fabulous job on processing

and it seems to be considered for quality first, ^{then} volume ^{for growth} and certainly flexibility ^{to allow for the fact we around} knowing in fact that one of the key things

^{needed to maintain full-production capacity in shifting} ~~is I don't think they have marketing people and that is one of~~ ^{markets.}

the reasons why they are so successful. They have a lot of flexibility in terms of how they move from a particular item into some other item very rapidly and in fact if you look at what they do have if you divide this right here (description on board)

The big ^{are really here, these don't cost that much,} we simply do the marketing

option and use. We minimize

Namely, they provide all the frontend money and all we do is essentially say what we want to buy through a market by surveys and provide the initial [.] The big ^{is there}

and we act as a target market in that structure. If you can fill this thing very, very good and if you make errors here

In addition, if you look at some of the other things they have built a very good structure for reversing

some of the patents with reverse engineering what you use to engineer is you use micrometers and special gauges and one captures, you do reverse molds and things of that sort. In fact in some of the look-alike which is a Jujitso, Hatachi combine after the IMB 33-40 disc was announced they had engineered a look-alike for that. The look-alike was so good that more than likely it was concluded that it even came from the same drawings in terms of specs.

LONG-TERM THINKING

~~I think there is something we might look at in terms of this whole process. If you look at the product design based on need, quality and long-term~~ *projections = ~~costs~~ lead to innovation.* ~~I think more than ever we look toward this kind of thing forcing back through this cycle to generate division. It does not mean that they operate that way.~~

~~I guess another source of non-productivity which bothers me~~ *But product design derived from* ~~right now is the marketing we do through the very thick marketing survey.~~ *only extrapolates straight line trends in a self-perpetuating fashion.* ~~We buy marketing surveys - they used to buy them by the pound, now they buy them by the foot, and you pay about \$1,000 per pound for market surveys in a computer industry depending upon what it is and the problem is that basically this takes some analytical creative people out of service that could have been doing something but worse yet the organizations have to read that stuff. I had occasion to meet one of those in looking at an area and I got it and I literally got about 7 separate studies and there wasn't enough data - it was an absolutely~~

incredible thing, on ACF telephone switching system. There hadn't been that much published, out of the telephone company there came that much data and that generated to feed-out speculation about what it was going to do and mostly it was absolutely pure garbage and I shudder to think about all the people who are thinking about using that. The nice thing about it is that if any decision makers read that and go ~~and~~ they are going to be totally off base when they read that. ^{the habit of short term thinking} Some-
~~how we have~~ ^s gotten into something which is really very short-term that I say is really epitomized by these surveys, ^{whose currency drops off in weeks after publication} Invari-
 ably if its new market is not there, if there is an old market you simply get out your semi-log charts and go from there. There is one rule of market survey and that is semi-log paper. I don't like markets that go that way, this is - I like these. There is no way if it is that great and over a time you may lose and only have 50% of the market.

That's the good product. Everybody reads the same market survey. ^{Japanese companies, with long-term goals and commitments have no need for marketing surveys and the energy they waste.}

I think that in fact that in the case of the computing what we saw with NEC, Jujitso, Hatachi unlike Xerox, GE, Westinghouse, RCA who have gone out of computer business, NEC, Jujitso and Hatachi didn't make that much money but in fact they stayed in there because of their long term commitment but it doesn't mean that I think these others should have been in or out - they shouldn't have been in it in the first place but at ~~the~~ least

~~they were equivalent.~~ NEC was no different in terms of corporate structure than these others ^{V.S. companies that went out of business, reinforcing the notion} but they are making it now in those industries and all this says is that ^{if} one sticks to it when one

U.S. industries

para 3 p. 6

~~has a fundamental idea. I think the other thing which is really~~
~~amazing to me is the focus on quality~~ ^{that Japan has been able to} ~~rather than throwing away~~ ^{sophisticated} ~~products.~~
~~I think if you compare the Seikos~~ ^{vs.} ~~Timex, Minolta or Nikon~~
~~versus a Kodak or Poloroid, or the one-step cameras,~~ and in fact
~~given their approach to man/machine interaction,~~ it is probably impossible for
~~a Japanese person to design a Poloroid one-step camera.~~ The
~~other thing which is probably ironic about that is if you look~~
~~at the quality you get out of that versus say a comparable~~ ^{However, it may be their Japanese overall concern with quality.}
~~35 MM,~~ ^{For example} ~~at least I haven't been able to operate one to get the~~ ^{a Polaroid}
~~same quality/~~ ^{picture I can from} ~~I guess I must confess I have a Nikon.~~ ^{even} ~~I always~~
~~buy one of the latest cameras because they look so great on~~
~~television~~ ^{though I fall for the} ~~but I've never taken a picture that has remained~~
~~with me very long.~~ ^{Polaroid} ~~So, quality to me is an important thing.~~ ^{ads and buy their cameras, knowing}
~~We shouldn't forget when working with all these factors what~~ ^{Polaroid}
~~is it about quality that in fact when~~ ^{considering} ~~getting into this idea~~
~~of innovation are we really building things with a lasting value~~
~~or are we just inventing another piece of injectional plastic -~~
~~something which is going to get thrown away.~~ I think also
~~when you look at the quality issue that is just a superficial~~
~~thing but behind that you see the whole business of long life~~ ^{The}
~~cycle~~ ^{of industrial products that} ~~and that is something I think we do not pay enough~~
~~attention to in our own world.~~ ^{how not} ~~Really, how much does it cost~~
~~to use it?~~ ^{amortized over its life.} ~~This is a hard thing, actually I fight tooth and~~
~~nail every time a new product comes out and in fact there is~~
~~a classical thing in computers if you look at price in dollars~~
~~improves the computing with a given~~
~~machine you can follow a curve here and it is by the way about~~
~~30% per year decline.~~ ^{after a computer is announced} ~~Two or three years later you can buy~~

it is effectively 30% and can reach

~~cheaper which in fact is a totally different market, one's fixed costs when one buys a computer are established. I'll be damned if I can hire marketing people who understand the value of different markets in buying this machine which in fact a few years later - you can take 26% per year - this thing is 2 times that machine in terms of performance but is it the same price. We have these options and from an existing market structure this thing invariably looks better from a cross performance standpoint. Once a thing goes in and starts to be used a factor with computers anywhere from 2 to 3 times the purchase price of the machine gets spent in the use of the ~~computer~~ machine. ~~XXXXXX~~ Anything~~

~~things we can do to improve productivity, once you bought a machine, giving them the computer really doesn't change cost performance that much if you continue giving them the same old machine at the same performance level. That's why when people say sometimes do you worry much about what in 1960 a 4,000 word PDP 1 was available at \$300-\$500. I said I am not worried yet because I know, it doesn't mean I won't be worried in 3 years, but I won't be worried this year because I remember what that did and we had to work like hell and I don't think people can spend that amount of time to get that amount of computing engine like that. My point is that the~~

it is because the new machines start at a higher level.

~~Japanese seem to build - have a good notion of long life-time.~~

UNDERSTANDING COMPLETE PROCESSES

~~The next point is that in fact that they seem to have a very good understanding of a complete process. One of the most ironic things is that they really don't have that much~~

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to p. 7

invested in basic and applied research. The reason is simple, we do all the basic research for them. Why the hell should they. A friend of mine at Cal Tech said I like the Japanese as they listen, also I like the American industry as they are willing to build for my ideas. The Japanese are there, they are very good if you want to transfer your ideas to them. I had a moritorium when I was at Carnegie, I stopped seeing them I didn't even get my ego stroked that way. If you look at where they set, spends about \$30,000,000 a year in computing and they are staffed by researched, actually advanced development people from Hatachi and all the Japanese computer companies. ~~Now I would point out that there is a~~

~~much better~~ ^{The} flow of ideas ~~to the Japanese~~ from those centers ~~than there is~~ ^{better than} from those centers into American computing companies. Many of our companies don't even know those centers exist or that money is being poured ^{them by the U.S. government,} ~~into there or there may or~~ may not be a set of ideas coming out of those environments.

In visiting Japan, I noted in fact the key researchers, the directors in the research labs, one of them was trained at Maltex ^{(5) p.7} I am glad to say so I think he may have led them down a dark alley. That was an in-computer joke. That was one of the many ideas in computing that didn't work and to have people trained for some of those things isn't all bad but in fact if the notion if to exploit ideas verbatim but in fact we do an expert job of training Japanese heads of researchers and using that as a conduit for . I don't object to the little hole, when it really is is a big hump there.

Anyway, I would invite all of his here in research laboratories to throw some ideas around and maybe we ought to look at some of them. Some of the ideas really try to force the others out. Probably one of the most ironic things there is an offer to spend about a billion dollars over the next 4 years in energy related things by the Japanese. That turned out to be a reciprocal trade kind of agreement. That is something that Secretary _____ and the latest group had negotiated. I must admit that is precisely - what has really put a really big pump on that thing rather than just a trickle - it would have been a hell of a time in getting those ideas out the way research is done in such a relatively casual way but with funding with a billion bucks in through that thing what they are effectively doing is letting the Japanese manage that research and are educating them on how to do research. The Japanese are really weak, they only have 2 or 3 Nobel prizes and basically not that much basic research. What they need to know now is how to do basic research. Putting money in there will essentially teach them. So, the scientific community is, of course, of which many of us are members, I have been an upper contractor, we are happy as hell to get money anywhere we can so that billion bucks looks awfully but by the time one gets squared around it probably won't be that much, nevertheless, it is an attitude which I think is quite an interesting one, one really advanced development

getting a little more into the research basic applied research domain. I think the way they manage in contrast with some of the laboratories that I think are really corporate conscience from the views I've gotten from visiting a number of the research labs and in seeing demonstrations where one has to blow the dust off and/or on the federal laboratories where the same equations are on the board - I remember going to one of the federal labs and seeing the same equation on the board for 5 years - nothing had changed. I guess the generic problem was being solved but you'd think there was a little progress in the reformulation in five years. Somehow we use the U.S. laboratories as far as I can tell for conscience money for the scientists to say that we ought to be doing research and in reality nothing really comes out of it - it isn't coupled very well. I may just come out of it but certainly the coupling device for my experience based on this particular memory there was no way to couple so I asked why do it in the first place.

If you look at MIT, ^{in contrast to the U.S. government doesn't} one thing you'll notice is that they don't ^{research} seem to have any laboratories and they do a lot of this by ^{and promotion of technical interchange.} funding. ~~They do a lot of cross-funding of organizations to~~

^{distinct} ~~and really build that thing back from a development. If you look here, development, you could have vision here in one and maybe basic research and applied research - there are ideas here with cross-development to be done. The Japanese seem to have a good set of techniques for managing this flow of ideas so ideas flow back and forth across these boundaries really based on need. There is a consumer-producer relationship~~

that really keep the ideas flowing. If you get something for nothing and that's how we really treat research - a bunch of basic ideas. In fact, I think from a development standpoint we tend to not think of it as worth very much. There isn't

a proper flow from an information standpoint. ^{Japanese} Their orientation is clearly based on ^{engineering and innovative design based on manufacturing goods} ~~trade really being a science based, their~~ ^{that are needed rather than on Science} ~~orientation is really based on manufacturing, not just design.~~

^{In contrast} If you look at what has happened to our manufacturing technology, ^{in the U.S.} ~~it has gone out of the engineering school~~ ^{and} into a business school.

^{But} ~~I think~~ there is more to manufacturing than the machine shop scheduling problem. ^{The} ~~I think there are creative things to be done there,~~ ⁱⁿ a lot of innovation - there is as much invention ^{The} that can come out of a manufacturing operation ^(often squalling the amount) as out of the

^{in the} product design in the first place) ^{is being ignored.}

manufacturing ^{es} processor are intricately entwined ^{with} and somehow ~~by~~ ^{but the engineering schools supported by} engineering schools getting out of manufacturing engineering

~~not fit for academic consumption because it turns out that NSF funding~~ ^{have moved toward "Science"},

also funds engineering and NSF has an S in the title and engineers have tried to get into the science funding thing and by the time the Science Board meets to allocate these funds we use anything that is innovative in the way of manufacturing or even training people who could be used in manufacturing. The NSF goal is pretty much to win field medals. They are by themselves in funding and mathematics to get a medal. They are cheap. All you have to do is put 10 or 15 million bucks into math and you can get a tangible piece of results, never mind the fact that we've probably got enough mathematics to carry us for another century already. We could probably do some work in some of these

other areas but certainly manufacturing engineering is nowhere

now, it is totally out of the picture. ^{academic} Manufacturing is segmented in

U.S. colleges and in business, in contrast, in Japan people are notated among engineers I talked with there is a very great concern, they
the various processes and disciplines, making it equally desirable to be in any function. But more significantly reinforcing the understanding of

really understood the basic concepts of the ^{curve,}

the man curves and the quantity called gross orientation trade-

offs as quoted by Fred in the '70

annual report. The big difference is that is the

first major non-Japanese company they have run into that under-

stands and uses the line curve. I hope it is not that bad but

it may be. I haven't seen evidence that a lot of people use

that. I think that over a long term they are willing to give

off profit for . They really understand market

I also made the claim that their domination is predicated on our

breed of values and I think what has happened is that they are

transforming us, inventor-manufacturer-distributor to simply

distributors and to me the thing is clear because all the

measures that all products get tested on is return on investment.

A big filter, the better the company is the

better the filter to keep products that potentially might not

make our line are in there and ultimately that has a cycling

effect of getting out of manufacturing - out of innovation be-

cause the big bucks you recall are all in this cycle and if you

can make that zero - it's crazy to make that zero if we can

get somebody to put up a tape factory for us then we don't have

to invest in that technology and that seems to be what is happening

in television, a gradual erosion of all these other things and

the U.S., as they seek to do in Japan, through incremental decision-making
~~you simply say well, we'll buy it there, well, we'll buy our parts~~

innovation feeding backward and forward in affecting total process

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~~from them, we really know what is happening, we've got the~~
~~idea.~~ *leads to an erosion of ideas.* Suddenly you find out that after you've been making
~~a while~~ your ideas aren't quite so good, ^{anymore} the vision isn't
 quite so good, ^{and} the people who really have ^{the vitality} are
 those actually having to live with ^{the totality of manufacturing} those problems and produce ^{quality}
~~them~~ ^{Items} day in and day out. ^{U.S. industry is a fool} It takes a lot to think that ^{they} you
 can operate ^{healthily only} a long time in this cycle as a distributor.

Another thing I would do in terms of high on the list, I
 would cut out ^{because they are really nothing more}
 than banks and banks are a useful and interesting part to our
 society and certainly invention isn't one of them and in fact
 by using conglomerates one in fact gradually recycles every
 piece of manufacturing, just look at what is happening to some
 manufacturers who used to be dominate. In fact even the in-
 ventors of television - where are they buying their sets now,
 where are they buying their tape records as we don't make video
 tape recorders. Every significant idea in television has been
 made and taken over.

The other thing is with that strategy of not having
 to put your big bucks here you have suddenly gotten rid of
 the major ^{problem,} all you have to do is say, well,
 gee since there are two of you out their building all you have
 to do is buy from them versus them and you may make a 2 or 3
 million dollar decision on who to buy it from and say gee, that's

big bucks in making that decision and in the meantime you get both of those buyers in a very sharp way. I think that in fact the return on investment is really a significant thing that business schools have taught us that it really helps ~~fix~~ cycle American business although I don't have that much faith that business schools have taught it that well. A financial person said we really have to work on ROI and I said OK, let's test this product on it. He said, well, that was something a couple of my men were asleep at when they took the course and that was all academic at that point in time. Maybe that was the secret of our success, that fact that we didn't know what our was at one point. So, I got busy and I spent several months writing a program to calculate ROI so you could show the effects of risk and go through a 'what if' and what happened if an engineering project was late by six months, that never happens, of course. What if we missed our cost estimates and all this kind of thing. I have noticed the better ROI the fewer products we get out, maybe we will make more money, I don't know. I guess what really bothers me is in fact that people who are in the computing part think that they are successful

That also brings me to this point about the I think we can also make a case for the law degree. In the case of the law degree we have a factor of 20 lawyers per capita more than the Japanese. That has to take something out of productivity. The nice thing is that lawyers spend

half of their time talking with each other so we got one thing going for us but we ought to put a bound on it, we can't have more than half of the population becoming lawyers otherwise our production would be really low and would go down even lower. I guess there are a whole bunch of things in terms of what these things really do, not only is taking people out of productivity and talking with them having to discuss with them but they certainly create a self-perpetuating non-productive body in society in which we will have to support in another way and if you look at pure productivity it is all in the overhead sector. The other unfortunate part of it is that some of these people who go into it and if they weren't doing that they could do something else that I think would be a lot more productive in our society but accounts like this ought to really be of concern what we can do for innovation.

Jordan had said that there really isn't any discretionary funding and I guess I believe that if you assume everybody has a piece of the budget pie there are all these people who are retired and these guys get squeezed a little bit, everybody and all these things grow linearly with time, No, there is no discretionary money in the federal budget but in fact if you look at what happens with what we spend we could reorient some of our stuff. Certainly in contest with the Japanese they only spend about 2% of their budget on military, they spend virtually nothing on NIH and NASA kinds of things and they have healthier people by the way. I think in some sense

they spend a lot more money on computing and basic research. While there isn't any money if you assume everyone is taking the same piece of the pie we certainly have a lot of room we could change, I don't think we can change.

I am up to the last part which is on how I think the fact they have such a constrained society by limited population really acts to improve their notions in efficiency in physical resources. Lots of interesting observations there. I guess that is really about all I wanted to say. I hope that this has been useful in terms of something that we can take back with us. I think constantly in terms of are we doing something making some policy, are we aculturating things right, are we doing things and after I wrote the paper it's beginning to change the behavior within our organization a bit. I am certainly concerned about it, I think there is a lot we can change, much within our own organization. There is a guy who just wrote a book, , called Japan # 1: Lessons for America and he read this paper and he said that this was a short version of some of the things he said but mine is mainly aimed at the observations or what does it mean in terms of our development research industrial segment that we are all a part. Now questions.

Q: Would you like to comment on the role the University plays in that system?

A: The educated Japanese as far as I can tell. I don't know. Universities are my favorite places. One of the reasons why

I wanted to publish this was that I wanted people to be aware of what is happening. I saw some good university industrial relationships in Japan. They effectively used the universities for bringing in _____ and using that, early in the 70's and used that for a framework for getting the Japanese industry into shape. I think from our standpoint we've really got to improve the _____ industry

To me, that's a key part of being innovative of really focusing I think that in fact this stuff is really a two way flow and if you look at basic research, applied research and advanced development and so on, that getting that flow backward, if you try to put money in there and there without putting money in there nothing seems to _____ and you end up with too big an intellectual gap between those places.

I think universities are our key to basic applied research and we don't have a very good way of managing that. For the amount of money we fund overall everywhere in development and advanced development through basic research I don't think much flows at all.

Q: It has been fascinating intellectually to listen to all you have observed and I wonder if you would sort for us which you think are symptoms and which you think are fundamental causes? What are two or three really dominant drivers which led to the Japanese success even though much of the patterns are different, we don't necessarily have to do everything the same way ...

A: ~~There kept coming back~~ an overriding element of time and patience ^{is key to long term success. These Japanese} in here, they are willing to wait on a whole bunch of things ^{but} they really work at ^{obtaining up to date} information flow, looking for ^{new} ideas. ^{They were impatient with trivial nuances, inventing and using} I just felt they really knew how and really worked ^{automatic taxi door openers, and were patient in achieving quality} the flow of ideas very, very effectively. ^{performance.}

There was certainly an attitude about ^{to} development which was pretty important too. Sometimes I observe in our organization that inhibit ^{but I guess} everybody's notion of what their function in life is in terms of ^{results that in the process really struck} home. ^{In such a way} They didn't do something if there wasn't a place to have it go somewhere, they really didn't waste any effort.

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to p. 14

Q: I had an advantage, I had my wife with me so she did the shopper's view. Fundamentally there ^{between} the human value and economic values and that's the base line. The story you tell about the loyalty to the company is restricted to ~~large-productive~~ companies in large productive areas not at all the case of our tour guide operator for example, by enlargement the government is not involved in social programs.

A: The government is not that involved overall, the government is small compared with our government. There are some key management interfaces and that whole thing the segment called government There aren't that many people in government.

Q:

conglomeration of large companies and financial institutions that does a lot of what the government tries to do here.

A: The nice thing about it is that there are several of them and to me I don't know how we run this large organizational structure, I think the government thinks the computer is going to help them somehow, that's ~~how~~ why we are having problems with the Soviets because they have so much faith that computers can manage this whole 300 million person organization or in fact, society.

Q: We would be lucky if Dr. _____ plug in meaningless data.

A: Yes, that's right.

Q: One of the advantages besides being a planning society, a well organized society, is as you say the industry-industrial sector which takes over many of the social obligations and handles a lot of the welfare situations through redundancy of labor. Japan is facing some very serious social problems, some discontinuities of their own. From a _____ standpoint their population is getting older. The old established 55 year retirement which was put into effect when the life expectancy was 61, now the life expectancy is like 77, is out of date, archaic. Another thing is that the older person is becoming a burden on society and another thing is that the corporation is breaking down very seriously. You find people shifting from one corporation to another. Many of these

factors were brought out in an economic conference I attended last year. Incidentally, our planning guide is going to be in this country and he is a very brilliant planner, good to listen to in terms of what he sees as the future problems of discontinuity of Japan and they are very serious.

A: Oh, I believe that.

Q: Did you mean to leave the impression that you were suggesting

I would like to not think that the whole problem exists because solely one is aculturated and in good shape because they are pretty soon going to be pulled back down.

A: I was speaking a lot within the way they are operating in computing and in fact I'll bet if you look at any one of those industries they went they same way and in fact the reason they got into some of them to get a share was in fact to get a base, a significant export base. The cameras in fact the people were shunning off as the Germans certainly had the dominant position there and the Japanese took over. I don't know what their gain planning was at that particular time, maybe they said we were only going to go into something where there was only one country dominant, we are not going to take on both Germany and the U.S. in cameras, for example. I don't know what the situation on . If you look at everyone independently I'll bet the whole notion of

trying to focus some resources in a certain area and being able to dominate a segment to me that is totally foreign to the way we operate.

Q: It seems to me that that is exactly the way we think we operate, maybe they do a better job

A: Who is doing that? There is no global kind of thing. I can't even say that I operate that way in terms of tens of millions of dollars in R&D. I had trouble really operating that way.

Q: Coke

A: Coke operates that way.

Q: Countries like Japan, the Netherlands with similar types of problems have tended to orient

A: The way you go is back through that process. Generally you start with the basic chain of manufacturing - you start with _____ on an aculturated basis and gradually go back and build up the structure. I bet if you look at they probably initially made very simple structures trying to get an economic base through manufacturing and maybe even buying into the market so they could get that and gradually into radios. All the accusations stem from operating that way, get in, get started and get some money flowing and the answer is _____ market so you know what you have to do in advance in the research phase. To me, the operation goes this way (blackboard).

Q: Your talk has been concentrating on an analysis of ourselves and the Japanese and some important points and I think that from what you said that you would believe the model of how to do it would be inappropriate to the United States. Do you agree that it is and if you do what idea turning now to synthesis would you put forward for constructive things for us to do?

A: My simple way of solving all these problems was essentially what amounted to decentralized bilateral trade which I said everybody that imports then they have to export. Don't make the federal government deal with that problem, don't make Jordan deal with that, let the individual organizations deal with that on the level of the honor system

I had to get started and that was the only example I could think of that was so absolutely trivial to start so it didn't imply bureaucracy, was effective as hell, and is certainly not a trade barrier. It doesn't require any laws. I can tell computers to go sell corn or go sell software, it does not matter, let's get the thing back on a balanced

Q: I think there is a clear indication that should be pointed into out, that imported consumables ~~from~~ Japan are awfully expensive compared to ... it's the aspect of perfectionism with respect to imported consumables not imported from

A: I am worried actually about a phenomena that if you look at the ultimate of all this we've got two situations now - I call it the 3 in 1 problem. What happens is we got energy here, consumption here and manufacturing here and this is information flow here (blackboard)

I don't see any stability to this system other than that these folks have to acquire and they can fight over what part they want. There is no stability, if you have any kind of paper flow or money here there isn't any stability where energy is coming this way and manufactured goods, maybe some iron ore junk is going that way and a few little things. But with flow like that there isn't any stability in this system, there isn't any stability until these guys acquire back and has to become a 2 problem. A 3 problem means stable. I think things have got to get a hell of a lot worse before we understand this and just going to continue to buy. The reason the dollar isn't worth anything in Japan is there is nothing you can buy ...

We sell wheat.

Q: We sell real estate too.

A: Yes, real estate too, and factories. Now, admittedly from some of the times the way we have managed mass production it is probably a reasonable thing

I think they would do a hell of a lot better job of managing.

Q: You have a negative view of industrial research labs.

A: I think it is a realistic view - I think this whole problem is a big problem in these organizations.

Q: Let me give you an example of why productivity is quite low particularly in the computer industry - it takes quite a while from an idea until you actually start making money on something. The way we ordinarily work the system is, say

I am manager of the system and I will be by the amount of money that will be made while I am head of the system and say I will be there for 5 years and I as a worker go the manager and say I have this great idea if we actually work on it in 6 years our company will make a lot of money. The manager would stifle this and as a result many of our industrial lab long range ideas which will make a lot of money for the company more than 5 years down the pike pretty much

A: I go along with your 6 year idea - there are some. I think one has a balance and what we attempt to do we measure people in those environments on what ...

Q: That's only the amount of money made, what's to be made later on?

A: We are saying what's flowing and what's likely to be a successful whim and we try to evaluate whether that thing is going to have any value. We have some conscious ideas, areas that are essentially appealing to our consciousness the thing may be important. Everybody, the research community is hot on that and we ought to spend some money there, we do that but no one can think of any use other than ..

and we try to make a decision. Actually the way I work along the budget is, how is the budget allocated (blackboard)

Every industry is different in terms of what you do. (blackboard)
If we feel we have too many ideas we will say well, let's turn that off a little bit and maybe put more in here, let's use

this up quickly and get some products out quickly to stimulate the demand.

Q: Zenith has found a way of tuning a TV set

There is a material called zinc oxide which would make the best tuner and a material called

which is easier to handle and could get the product out in 3 years and even though we would take say 5 or 6 years to get the better product out in Zenith...

Of course 5 years down the pike the Japanese came out with the zinc oxide and now Zenith who was so opposed to any dumping is buying their zinc oxide tuner from the Japanese. So, it does hurt.

A: Oh, yes, and I guess one really has to be conscious of just when to review the program. We say, gee, it may be really important, it is over 5 years but then we also put into place under the same general management area a program which happened to be in that space because acceptable the probability that they would know and give or tell anybody were so small that we said ...

Q: It seems quite frequently that it goes over 5 years in many instances.

A: No, we try to know what we are doing and say during the next 2 years we are going to concentrate on this area.

Q: I think that will vary depending upon the company. Some years ago at IBM they were giving us a feel of what they were working on. There were a few very specialized areas and these were obviously much more than 5 year impacts and the question

came up who people involved. How do you so narrowly over such a long term period.

They had a very simple answer. If we work on it it is going to be important.

A: In these kinds of things there is what I called the .. fact which is hey, Bell Labs happened to be working on a thing and TI and if there are 3 groups working on it there is a good chance it will make it.

Q: But neither Bell Labs nor TI system. TI

A: TI will argue about that on everything. But the point is when they were committing to do it was very fundamental they could pretty much say that was an important area because

Q: I am not saying they were brilliant in the selection. Before they ever built an electronic data processor there equipment was being used in accounting machine offices for competitive type calculators and that whole they grouped from, a market connection and a service connection had a hell of a lot more to do with it than their technical innovation.

Q: From the discussion that we just had now, it is pretty clear that the individual companies sponsoring R&D has to make decisions regarding their own capability to exploit and if the R&D establishment is very, very good they immediately

outrun the company's ability to exploit what comes up. This means that within our industry to the extent we are good at R&D a lot of ideas are there for which there is no mechanism to be moved up, That in contrast with the Japanese where they are able and don't hesitate to sell to one another and it is easy to do because they don't have this anti-trust problem, so it appears that one of the things that we could do would be to find ways to promote the ability for R&D organizations within a corporation to market their ideas outside the company and to have that whole concept acceptable to their managements and the government. I notice that CBC has promoted their concept of this which is supposed to achieve this computer based marketing system which has been interrogating ...

Do you believe from what you know of the industrial scene that this is an idea whose time has come and will make a difference for us.

A: Has R&D on the open market

Q: Yes, let's assume for the moment that you can exclude the Japanese from this.

A: There is CBC and there is another one, a computer network one some sort. I don't know that an international .. patent them.

A lot of the things can flow or do flow already because of some of their suppliers. For example, TI, we have a lot of parts from TI and TI also sells a lot of parts internal and essentially we compete with them at the computer level. We

do talk with them as a buyer of semi-conductors but we don't talk to them as a computer supplier.

Q: I was thinking of enhancing the position of the R&D operations, their ability ...

A: It might have an interesting effect if some of these organizations who in fact do research for the sake of research if they had to ever sell to anybody other than one obscure lab in the Defense Department who doesn't know what they are buying, if they had to sell their output maybe ...

We use the phony buck method. We say look, development you can buy any research you want, here is this paper money and that turns out to be probably one of the most useful methods, we use the phony buck method.

Myron:

Q: Do you want to set up a sort of international type licensing system or is this intra U.S.

A: At the moment I am interested in U.S. situation although I put it up as a question not so much as a proposition that I would push at the moment because I want to understand the consequences of the idea but we have really no good market place for R&D in the sense like you go to the stock market to make an investment you want to find out who is doing what and to buy in technology all the labs have such an air of secrecy about them about what they are working on because they all expect to sell to the company that supports them and if we could break that down within this country then there would be

a market for that. For the moment I don't know how to keep the Japanese out of it, I would like to and then could that develop into something provided connections he is talking about.

A: It is conceivable that one could operate that way. I think we do it now.

Q: I don't want to name a product but if Xerox we have a particular competence in a laboratory. An American manufacturer comes around and we get involved in licensing and so forth. But the corporate view of the relationship of the laboratory was if these guys are doing that we just wonder what their relationship is to our company and I believe that is true of a large number of corporations that don't think that's the best thing to do. so, this other company that wanted to buy this technology finally after long negotiations they gave up and went somewhere else and then that technology vanished because in the end it didn't pay off. I think that happens many, many times.

Q: It increases with increasing regulations, I can't get something through the FDA but I've invented it and I have to license it. It used to bother me but it doesn't anymore. This year I had 2 million in royalties from ...

Q:

A: Absolutely, I have a paper on this. They are great computer users. I don't want them out of our lives.

The census bureau was insulation. Aberdeen was a significant computer user. Los Alamos, , both significant users, innovators by the way buying those things. Within computing the government is very significant about development and the past, present and future development are computing by the way they act . They have never said, how do you build those things. For the first time they said, we want you to build and all things should couple like this. We have innovated very rapidly according to very loose market by this demand, ^{namely} how many operations per second per buck can you provide, how much storage can you do and what are the problems you solve. By the way, we want you to solve it this way too, solve all those things plus use this interface. We say, that is going too far because we are about to change, it won't cost to get more cycles, that particular interface is a bad cycle.

Q: One of your problems is the ...

A: I know that but we are talking about computing.

Q: He knows something about the cost.

A: No, he doesn't. You can make absolutely strong arguments the other way.

Q: Didn't you make the point that the hardware and facilities that you are using is really a small cost, a small portion of the cost of the computer process, some of the motivation and some of the factors of recognition - hardware is cheap, it is trivial, becoming trivial and the other costs is what is

driving it and therefore the hardware should be designed in such a manner and perhaps even bear some of the penalties, so as to offset the total system costs.

A: I agree with all that. What did that have to do with that interface?

Q: I would suspect that that is one of the motivation factors behind some of these standards that ...

A: That particular standard is one of the ones that inhibits a particular kind of structural organization to form.

January 30, 1980

Elmer B. Staats
U.S. Comptroller General
441 G Street
North West, Washington 20548

Dear Mr. Staats:

I read your report 10-79-53 of September 21, 1979 and would like to commend you for recognizing the problem of United States - Japan Trade. The report definitely shows some understanding, more so than by any other individual in government.

It stimulated me to make the following comments, which I hope will add even more insight for you:

1. The fact that we spend twice as much on R and D is very, very misleading (and even wrong!) because:
 - a. The Wrong Direction - most of our funding goes into military and health. These are fundamentally irrelevant to the trade problem. Rarely does a relevant idea get developed in these areas, and the chance is even smaller of it getting into the private sector for trade which your report addresses.
 - b. Efficiency - we aren't terribly efficient, i.e. there's lots of overhead that the funding doesn't show. These include the funding agents (buyers), and checkers such as auditors, plus administrators on both sides that don't do R and D. Measure people doing work, not funds and I'll bet the picture changes! Also note R and D per capita~~l~~ and per GNP is higher in Japan.
 - c. R and D is World-oriented - much of our R and D goes directly to Japan - how many scientists have you ever met that aren't basically open, world citizens, and feel knowledge should be broadcast without restrictions? Hence, much of our R and D funding is "world public". So take much of the R and D and mark it for the world. Japan has an open, but closed society due to language barriers.

- d. Poor Process Management - Japan does a really top job of managing the R and D flow of results from basic research, to product. We lose our results due to having a non-existent management process for this flow. Scientists, engineers, and product designers are all different and don't communicate very well.
- e. We don't understand effect of public vs. private R and D funding on trade! A recent announcement by Frank Press to the members of the National Academy of Engineering noted an increase in government spending here of 3% (real growth). This basically should disturb us because we are constrained by people to spend it.

Money will not make researchers materialize. I trust that you never believe that money and people aren't instantaneously interchangeable like our culture, particularly sophomore economics, teaches. Therefore, an increased R and D budget will only raise salaries, which in 10 years might increase the supply.

In the short term, I believe it is safe to predict that increased federal R and D means: increased salaries; more attention to the irrelevant areas already over funded described above; less development to address trade; and finally decreased coupling between industry and academia. For example, the recent ARPA VLSI funding is likely to make it unnecessary for the current researchers to seek any industry funding when they can get completely on the government dole. Hence, they'll have one shop funding versus the two now--government AND industry!

2. The computer section requires beefing up to:
- include semiconductors, the key primary industry for computers.
 - show that the future is bleak as projected, from any market survey.
3. Similarly, the auto section didn't address steel. Note the Japanese have the most efficient, and the most computer control in steel making. Again, this is not just capital, but lack of trained manpower and little investment in R and D in this industry! The steel industry isn't making it and I don't think it will without a major revolution in thinking, supported by trained engineers in process control. Maybe you can help.

4. Things are getting worse fast, especially in computers, because:

- a. The Bureau of Standards is getting into the act to specify how to build products. Do you recall hearing about the forced use of the IBM I/O Channel within the Government? Isn't your organization behind this move: to limit our innovation, our ability to compute, to force some of the marginal mainframers out of the market? Note, this is a key standard for Japan to help them become a major supplier to the U.S. and the world. I find this report and your action on the I/O Standard mutually exclusive and contradictory!
- b. We have become a stifling/control society versus an innovative/building society! For example, net output of lawyers versus electrical and computer engineers has recently changed.

Graduates/year

	<u>Lawyers</u>	<u>Engineer's</u>
1971	17.4K	17.4K
1979	34K	16.9K

Observe the high cost, both direct and in terms of using up our finite fuel supply, of a bunch of lawyers in Congress designing automobile catalytic converters. The Japanese have 15K lawyers versus our 450K, or 15 times the number per capital! Can we get our lawyers to sue the Japanese?

- c. The situation of MBA's is about the same. These people are potentially more harmful than the lawyers in some sense because they mainly turn-on by return on investment and marketing. Manufacturing is a dirty word, a hard business, requires long term plans, people and real work, in short, money and a personal intellectual investment. Buying manufactured goods from Japan is appealing: look at some of this year's top roi performers: Subaru (U.S.), Tandy, and Amdahl.

Both of the disciplines further decrease output by controlling, finding (or tricky accounting) additional ways to spend when they enter politics, and merely promoting versus producing.

These professions (basically real or semantic accountants) detract from workers who could enter R and D and engineering and when could address our trade deficit at a fundamental level. As our Comptroller, I urge you to audit our pool of technical talent. This is the crux of the matter, I believe.

Enclosed is a paper by me on the Japanese situation which has other points you omit - especially the management of R and D to aid the flow of ideas (lacking in DOD, Commerce Department, NSF, etc. thinking). Hopefully, there are some actions to take, but if the past is any predictor. I'm sceptical.

I look forward to a helpful prescription. When?

Sincerely yours,

Gordon Bell
Vice President, Engineering
Professor, Computer Science and Electrical Engineering
Carnegie-Mellon University, on leave
Member of National Academy of Engineering
Fellow of the IEEE

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Enclosure

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HOW THE JAPANESE HAVE CONVERTED U.S. INDUSTRY INTO DISTRIBUTORS

-- Working Draft -- Please Do Not Copy -- December 8, 1978

Copy # 5

Name: Ted Johnson

Gordon Bell
Vice President of Engineering,
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The island of Japan, with few natural resources and over 100 million people, virtually dominates world production of manufactured goods, including the components and processes to make these goods. The United States still holds a dominant position in the production of computers and semiconductors, but the Japanese plan to dominate these industries. Unwittingly, U.S. industry, government and society continue to aid the Japanese. Forty odd reasons are given to support this conjecture, each one providing a lesson.

The Japanese have progressed from domination of low-technology simple commodities to complex manufactured goods. The progression has been from textiles, steel, radios, sewing machines, typewriters, quality cameras/optics, watches, small cars, television sets, tape recorders, video tape recorders, calculators and on to state-of-the-art semiconductors and computers. Their current position in semiconductors and semiconductor-making equipment indicates they are well on their plan to dominate this manufacturing as a base for the continued and future market domination of electronics and computers. High-technology industry is increasingly being concentrated in Japan while the Japanese-owned low skill textile and

television factories are being located in the U.S.

Dataquest describes how the Japanese go about systematically to dominate a market. Appendix 1 describes the four, detailed phases: initial development of a domestic industry, establishment of an export base, significant market penetration in foreign markets and final market exploitation.

BASIC STRATEGY, AND TACTICS FOR DOMINATION

Japanese industry and government operate as a team reinforcing strategy and tactics with appropriate levels of competition. Unlike many companies and countries that have tried and failed, they successfully planned and built a mainframe computer industry.

The Ministry of International Trade and Industry (MITI), with autocratic power, helps to amalgamate strategies within industry groups creating an organization commonly referred to as "Japan Inc." Because there is no direct control, I prefer not to use the term "Japan Inc." but to name the phenomena "The Japan Club" since there's competitiveness at the market level. For example, MITI identified and encouraged early importing of minicomputers, including those from Digital Equipment Corporation, as a competitive "straw horse" to build their own industry. One of DEC's interactive data base systems, MUMPS, was bought in Japanese for six end-user applications. On seeing six lost sales, MITI funded the development of MUMPS on a Japanese minicomputer. In mid 1978, a Japanese researcher asked me, through an academic channel, for the internal architecture of MUMPS in order to study its structure from a so-called computer science viewpoint. We expect to catch MUMPS from Japan soon.

The U.S. has no equivalent of MITI to protect major corporations as national resources. In contrast, U.S. corporations are looked on as adversaries to the national interest. IBM, already under attack from Japanese competition, is also under the gun from U.S. government agencies. Together they seem intent on destroying IBM, leaving it and others as distributors for Japanese products.

The strategy of MITI and the Japanese companies to win dominance of the computer industry is clearly evidenced, but it is not understood by U.S. government and industry. In keeping with the priority, MITI is both very strong and attracts competent people. The Japanese companies, while maintaining competition in limited domains, both plan and talk with one another. For example, Fujitsu and Hitachi have developed IBM plug-compatible machines, but Hitachi is concentrating on the internal Japanese market against IBM Japan while Fujitsu is concentrating on exports. Coupling individual, competing companies for technological acculturation in this fashion is an important management technique to assimilate technology quickly.

The U.S. Department of Commerce and the U.S. Labor Department, in contrast to MITI, have neither a plan nor the personnel to help maintain U.S. dominance in high-technology fields important to the future of the country's economy and security. Furthermore, these two adversary departments are adversary to U.S. business. A recent trade trip to Japan by Secretary Kreps only emphasizes our lack of understanding of the Japanese capability to use trade to introduce technology into their society. Our trade deficits cannot be turned around by hand-shaking missions, but demand a strategic and tactical plan based on understanding. Our political system is devoid of planning and accountability of government departments; even if the Secretary of Commerce could plan, her short tenure is inadequate to solve this problem. Once a new administration appears, all plans and commitments are reset to zero!

Japanese tactics focus on the centrality of work and loyalty to a company. A company screens each new employee carefully because when it hires an individual it takes on a lifetime commitment. (The security promotes risk-taking, a phenomena generally unknown in large U.S. corporations.) The team spirit is engendered as the various members learn how to get along with each other.

Quality control is in the hands of the workers. Although data is kept centrally, the analysis, corrective action and responsibility for manufacturing and quality rests with the employees concerned. Quality

control is generally centralized and the organization of work often does not lead to self-esteem in the U.S. organization. Such participative management provides a key to the devotion to the workplace and sense of value achieved through work. The incompetent workers become the wards of the organization rather than wards of the state. Pride, family tradition, and because everyone is working, nonwork is socially unacceptable, embedding the importance of work into the fabric of society. A similar effect is observed in the U.S. during periods of high unemployment. At this time non-work is approved since others are unemployed.

In the U.S., the freedom of the individual has superseded work as a goal.

The employee mobility is high and as a result companies screen very little as the short tenure is assumed. One recent semiconductor company ad claimed that no interviews were required at all. Turn-over and unemployment here are high with levels of consumption also rising so that some Japanese observers have concluded that the Japanese live to work and the Americans need to work to live. The measurable results are simply that the per capita productivity in manufacturing of Japan is now twice that of the U.S!

Don't believe this is true!

The Japanese government has been able to nurture both large and small companies while the U.S. government agencies seem to alienate the large and aren't effective at supporting the small ones. Much work in Japan is done in small subassembly operations. Competitive small shops keep the cost down by removing it from the large, hard to manage hierarchical organizations.

USING ACCULTURATED DESIGN AS THE BASIS TO DOMINATE

For centuries Japan has acculturated customs, but mostly it adopts and adapts technology. In the 16th century, for example they began manufacturing gunpowder a scant 18 months after the Portuguese brought it to Japan. Any idea or product has always been fair game for adoption and improvement. Product and process evolution are merged in a long term view of achieving market domination. They orient the processes

competitively considering quality, volume for growth, and flexibility to allow for the fast turn-around needed to maintain full-production capacity in a shifting market.

All the Japanese computer manufacturers have acquired their technology within the past ten years by dealing with U.S. manufacturers either as a joint venture or under license, including: Fujitsu (Amdahl/Siemens) and Hitachi (RCA); NEC (Honeywell, GE, Varian) and Toshiba (Honeywell, GE, Interdata); Mitsubishi (Xerox) and Oki (with Univac joint venture); Yokogawa (HP); and Nippon Minicomputer (DG). In all cases, the Japanese have improved the technology in terms of perceived quality, performance and manufacturability.

The agreement between Fujitsu and Amdahl Corporation, though still at an early stage, provides a good example of the classic Japanese computer acculturation process. In the late 1960's, Gene Amdahl, then head of IBM's San Jose Advanced System Development Laboratory, explored the basic technology for high-performance IBM computers. When he failed to interest IBM in building high performance machines, he formed Amdahl Corporation to develop the technology. When he needed more capital Fujitsu bought an interest and acquired the manufacturing rights to, and became the manufacturer for the Amdahl line. Fujitsu was also able to use the same technology to design and manufacture computers for the Japanese market. In only one computer generation, at the beginning of 1978, both Amdahl and Fujitsu announced their latest computers based on the Fujitsu-Amdahl circuits and packaging. Now, Fujitsu appears to have a machine with higher performance and reliability (the M200) than either Amdahl or IBM have so far announced. Fujitsu has produced a machine based on multiprocessing which provides users with new capabilities; furthermore they can buy more processors rather than trade-in when increased computation is needed.

In addition, Japanese computer manufacturers have a complete line of peripherals and test and manufacturing equipment that is based on counter-parts invented in the U.S. The designs range from "reverse engineered", to look-alike copies, to radically improved products based on Japanese inventions. With "reverse engineering" a product is dissected

with micrometers, special gauges, etc. and made compatible in nearly every respect. The Japanese make only products for export to the U.S. market that do not violate patents. Tektronix look-alike scopes and reverse engineered IBM disks are common. In 15 months, Nippon Peripherals Limited produced a disk that was mechanically identical to the IBM 3340. From comparing the two drives, one might conclude that they were made from the same drawings.

PRODUCT DESIGN BASED ON NEED, QUALITY AND THE LONG-TERM

Traditional top-down marketing is characterized by expensive, thick market surveys that extrapolate history in a self-perpetuating fashion. Here, the goal is to fill various revenue gaps that develop. Using a market survey approach the U.S. continues to build heavy, gas-consuming cars, because the marketing managers can only think in terms of what has sold in the past. Freed from this approach, the Japanese have been able to look at the real needs, and they have appropriately adapted existing ideas. High-level corporate marketing does not design the products; engineers design according to needs using a bottom-up approach and based on technology.

Japanese companies, with long-term goals and commitments, similarly are not forced to depend on a short-term marketing approach. (NEC, Fujitsu and Hitachi, unlike Xerox, GE, Westinghouse, and RCA, have all persisted with computer manufacturing and after years of investment have established successful products. Their long-range thinking from the outset allowed them to invest in long lasting quality.

Japanese companies focus on highly sophisticated quality products rather than ultra-high quantity, low-quality throw-away merchandise. The differences are characterized by comparing Seiko versus Timex watches and comparing Minolta or Nikon versus Kodak or Polaroid cameras. Japanese styling is often technical and gadget oriented, typified by multi-knob hi-fi sets and complex watches. It may be impossible for them to design a product like the Polaroid One-Step Camera because of the differences in picture quality. The emphasis is on an educated consumer who will value his purchase.

Concern for quality and long-term values leads the Japanese to build products that have a long lifecycle. Even their auto industry constrained by Detroit's yearly new model concept is now getting very high ratings for durability and serviceability. Accounting models lead to emphasizing production of long lived versus throw-away goods. ✓

PRODUCTS RESULT FROM UNDERSTANDING AND MANAGING A COMPLETE PROCESS

The successful production of competitive performance products in high technology industries depends on understanding a complete process that includes basic research, going through applied research and advanced development, to product development. In addition, a parallel and equally complex process is required to design and build the process that manufactures such products. After a new product is introduced, it may then be necessary to modify and enhance it to adapt it to the real or changing market, and finally to eliminate it when it is no longer effective. 4

The Japanese need invest little in basic and applied research because they are effectively coupling the U.S. laboratories into their advanced development. In contrast, aside from the direct hiring of students and researchers, there is very little flow of ideas from our public laboratories into our own industry. As Carver Mead of Cal Tech points out, "I like the Japanese. They listen. Also unlike American industry, they're willing to build from our ideas." The university laboratories at Stanford, MIT, Carnegie-Mellon, the University of Illinois, receiving significant (\$20-30M/year) Advanced Research Projects Agency (ARPA) funding for Computer Science, have post-doctoral Japanese visitors. The university and industrial laboratories of Japan are headed and staffed by researchers who've spent their research years in key American laboratories (e.g., MIT Multics).

Most recently, Japan has offered to spend one billion dollars in the U.S. for research, predominately for energy conversion. By accepting these funds, the Japanese can be even more effectively coupled to U.S. research and can "learn" to research, just as they've learned manufacturing, design and advanced development. The scientific community is anxious for more

funds, independent of where they come from or what the consequences are. Of the large companies with research laboratories, the Japanese emphasis is on advanced development where the output is a testable prototype, often of a potential product. In contrast, U.S. corporate laboratories hide behind the veil of science where the output is vague and untestable. The quality of these laboratories is high versus many comparable large U.S. companies where research is to ease the corporate conscience instead of providing new development. Although such corporate research laboratories (e.g., GE, Motorola, RCA, Westinghouse and Zenith) were significant in the early development of television, the U.S. television industry has declined with few recent local advances.

MITI funds and manages other laboratories and corporations to carry out research that is oriented toward getting experience that will eventually produce products. Funding specific, as opposed to having a captive laboratory, not only provides a system of checks and balances, but also provides an incentive. Many of our government laboratories were initially set up for specific missions, and although the missions were completed, the laboratories continue to exist. Since they no longer have a real goal, or mission, negligible new work is done. The dust is blown off the equipment for visitors and the same demonstration is run year after year. A buyer-seller relationship, in which an independent organization, such as a university, manages the lab and takes responsibility for results can minimize this "dusty lab" syndrome. Moreover, funding for specific projects can bring together diverse groups and promote technical interchange.

The Japanese orientation is toward engineering for trade rather than being strongly science-based. Since the rest of the world provides research, why should they bother? This comes about because of their need to manufacture products and their total dependence on the export of manufactured goods. Since our basic federal research funding for computing comes through the NSF, ARPA, and the armed services, the emphasis is on science and research. Their funding comes through MITI and from various corporations, and hence the orientation is on international trade.

The trade drive causes a strong emphasis on manufacturing, not just product design. In addition to the product engineering process there is a comparable and equally important process responsible for the development and operation of manufacturing. This discipline has been nearly eliminated from U.S. universities as it has moved from the engineering to the management school. There is a decided emphasis on manufacturing processes in Japan as people are rotated among the various processes and disciplines, making it equally desirable to be in all functions.

Everyone associated with science, engineering and manufacturing understands basic learning and demand curves and they are quantity (and growth) oriented, subject to the quality-first constraint. Knowledge of the learning curves (i.e., increases in the combined number of units produced cause a reduction in manufacturing cost) is everywhere. Fred Bucy comments on Japanese competition in TI's 1978 Annual Report: "...the big difference is that TI is the first major non-Japanese company they have run into that understands and uses the learning curve". The Japanese are willing to sell outside Japan at a lower price (dump) and lose money for the short term (see also Appendix 1) in order to buy market share. This practice is illegal for a U.S. company. Although the Japanese pretend that their products are not competitive because the yen is so strong, they are consciously ignoring our dependency as a distributor now in many industries.

*dumping
not
defined
1. less
profit?
2. below
cost?*

As a corollary to learning curves and market domination, it's necessary and they are willing to give up profit for growth. For example, RCA is now a rug maker (or distributor), car rentor, publisher, television component distributor; it hardly resembles the electronics company that pioneered television. RCA's role is that of a banker and such a conglomerate is no match for a serious manufacturer. Whereas there is extreme pressure on our business for profit and return on investment, these factors are less important to the Japanese companies. Sony is only moderately profitable, Fujitsu does relatively poorly financially and NEC or Hitachi computer divisions may even lose money. None of these companies would compete for capital in the U.S. stock market where return-on-investment is the key criterion. Japanese companies are buying market share, and this is clearly

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more acceptable to the U.S. investors than for GE, Xerox and RCA who left the computer business. They can buy the business through "dumping" and why not if there is long term reward?

JAPANESE DOMINATION IS PREDICATED ON OUR GREED AND VALUES

As we watched the first few industries of textiles and steel become dominated by the Japanese, we unsympathetically stated that these industries were tired, the workforce was lazy, and the management was incompetent, unimaginative and unaggressive about getting capital. Certainly, there is no fondness for the automotive and petroleum industries and it seems fitting to import our cars as a lesson to our own U.S. manufacturers. Now, however, the domination of all manufacturing is becoming so clear that we must look deeper at the causes.

The domination can only happen with consenting buyers in the U.S. It is these buyers, called distributors, including tired, old, former manufacturers that are to blame, not the Japanese. Our values appear to be too short term and too basic. We really must understand that the following, simple, long-term consequence is complete economic domination.

The (Unstable) Three Island System - Or How and Why We Will Be Dominated

Since it's not clear what the long term, stable situation has to be, let's look at the end point. A system of three inhabited islands, all of which have adequate food, water, shelter and land, points out the dilemma:

- #1. supplies energy; consumes negligible manufactured goods;
- #2. supplies manufactured goods (is supplied raw materials from several small islands it owns, and from discarded goods of island 3); and consumes energy;
- #3. consumes energy and manufactured goods; supplies information.

Given that information is generally treated as a waste commodity of zero

value, there is no stable state for the system until islands 1 and 2 absorb island 3. Or conversely using any monetary system, island 3's paper or tokens will always be worthless. That is, islands 1 and 2 currency values will be out of balance with island 3, until 1 and 2 "own" island 3.

Through greed and short-term values, the Japanese and their counterpart American buyers have systematically transformed American business from inventor-manufacturer-distributor to simply distributorships. This transformation is in complete keeping with the goals of American business as reported in business magazines and the teachings of modern business schools. The goal and reward of American industry are clear: return on investment and profit. Secondary measures, such as market share, are occasionally used. Only a few corporations consider no lay-offs and full-employment to be important; as such, a clear separation has formed between management and labor. Following only the profit-based goals, subject to no other constraints, leads U.S. industry directly to distributorships for Japanese products. This strategy requires no investment, no planning, and no risk. All a company has to do to be successful is to buy the right product from Japan and then resell it.

?
- like our
OEM
business?
Are you
consistent?

This merely confirms the classic definition of a capitalist as someone who'll make and sell the rope to hang himself. However, in this case the capitalist is reselling someone else's rope because he is too lazy to design and make his own rope.

The essence of distributorships is completely counter to the principles that made American industry initially great. The new principle is simply that with no work and no capital, anyone (everyone) can do nothing and succeed. All that's important is to find a supplier who'll put up the capital, design, and manufacture products that we can distribute. In computing, the trend has also started: ITEL is buying Japanese-manufactured IBM 370-compatible computers. Thus we expect ITEL to have good financial metrics and be a good investment. It will also cause a high net flow of dollars from the U.S. as it becomes more successful.

There's no way a manufacturer can re-enter a lost business once he has

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history
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become a distributor. The spirit, and capability to catch-up and manufacture are gone. Society and the investment structure are all aimed at continuing a status quo. Radio, television, hi-fi, and video recorder products are all built using key U.S. developed ideas and patents, yet are no longer built by U.S. manufacturers. Again, we can blame the Japanese, but someone in the distributors had to choose to buy the products rather than design and build competitive products. In the case of Motorola, the television division was purchased by Matsushita in 1974 and included both manufacturing and distribution. By 1976, the U.S. plant was reduced by 2/3, but the distribution network was left intact.

We (U.S.) have a higher regard for business training versus engineering and technical training. In the U.S. many engineers regard the MBA degree as necessary for a career in industry. The Japanese do not yet have many business schools; therefore, instead of MBAs, engineering master's degrees are sought. This makes the Japanese better engineers for the same educational investment. Also, the management of manufacturing organizations are the better equipped to understand technology and products.

By having more people just concerned with distribution, we are becoming a nation of shopkeepers. The emphasis is simply to keep stores open longer and to find new ways to distribute Japanese manufactured goods. Not only does this further stimulate consumption, but it takes people from the primary production work force and makes us merely an island of consumers with no material means of support.

THE JAPANESE HAVE PRIORITIES AND SUPPORT FOR TRADE

At a government/society level the Japanese appear to have their act together. The Japanese seem to have a clear, crisp ranking of goals and priorities. For starters, the Japanese know their goals and priorities, whereas nearly all our goals that begin simple become entangled as special interest groups enter the fray. Some issues that compete for priority include: human rights versus equal rights; full employment versus inflation and balance of payments; environment versus region versus

country; capital versus labor; and consumer protection versus business protection.

Because of the need to manufacture and export, the Japanese educational system supports engineering and technology, while we support lawyers and other semantic accountants. There are fewer lawyers per person by a factor of (two) than in the U.S. The Japanese emphasis (priority) is on physical output. The increasingly large number of U.S. lawyers: consumes productive and creative output of workers; creates a self-perpetuating, non-productive body; detracts from persons who would otherwise enter productive occupations; and tends to build an even larger governing body. With an increased emphasis on legal training, our output is measured by intergroup contracts, policies, laws, rules, regulations and other forms of bickering among semantic accountants.

As a simple explanation, more money is available in Japan for investment to enable them to manufacture (for their island) because of lower taxes. This clearly affects their ability to invest in industry.

Their government spending for military is nearly nonexistent. Although there is some prototypic and R and D output from our military spending, it seems small and is clearly a by-product. In the case of research for semiconductors and computers the benefit though impressive might have been as great, given a different goal (e.g., energy self-sufficiency).

The Japanese don't have the federal research over-expenditures, epitomized by NASA and NIH. In the event of results, the Japanese will capitalize on our research for their manufacture and export. The NASA goals, for example, appear to be vague now that they've stopped providing the world with exciting space shots and television pictures from the moon, and the immediate needs for this research is unclear to most of us.

National health research seems equally vague. This research appears to increase health care costs, through a number of secondary effects. By contrast the Japanese spend one-half of what we do per capita for health care and medical research. They can capitalize on our research, but since

they have a longer lifespan, it is not clear what we gain with the extra expenditures. In effect, Japan's lack of spending in medicine goes to investments which result in full, lifetime employment which is probably the best solution to personal health.

The Japanese believe computers are fundamental for the long term and they are prepared to invest in them and wait for return. Non only are machines used in all products they build for export, but they save labor too. Labor is both precious and expensive in Japan: there are only about one hundred million people and two percent unemployment. They're ~~considering raising retirement from 60 to 65 to get the extra productivity.~~ They must have computers to raise productivity; computers are vital to their continued domination of manufacturing. As a separate research area, robots are an important component of manufacturing domination. While much of the pioneering work was done in the U.S., the continued work to make robotics practical takes place in Japan. By contrast, in Australia where there is increasing unemployment, there's a belief that computers must be eliminated. Australia buys nearly all Japanese products, produces less and less, and the small Australian automotive industry of GM- and Ford-based large cars is rapidly declining under the stress of small, mass-produced Japanese cars.

THE JAPANESE SOLUTION TO OUR BALANCE OF PAYMENTS PROBLEM: SELL (IN JAPAN)

Can we solve our balance of payments problem by selling to Japan? Selling to Japan is the answer our government and industry want and willingly, but foolishly, look to. However, the Japanese rhetoric is only for our gullible government and academic communities and the naive business people. Furthermore the trade missions are only stocked with powerless, non-responsible, short-lived politicians whose main purposes include visiting Japan and being able to say something to the folks back home. For example, when trade envoys from Massachusetts and New Hampshire visit Japan with the expectation of selling high technology goods, they succeed in selling only a few prototypes. The real sales will come in 5-10 years when these products are resold in volume to the U.S!

There has not been, nor will there be any serious trading of American products with Japan. The distributor/trading network entirely thwarts such an effort! The results are clear and we must face them.

Japan is a closed society and market. As the most powerful, homogeneous culture in the world it has a long history of being closed. There is no counter-evidence that an open market exists. The language is a code to further segment. Although business people do learn the language in crash courses, the language is relatively useless without the societal understanding. We only teach Japanese minimally on the West Coast of the U.S. On the other hand the technically trained Japanese have several years of English.

Even though there are major cultural differences among Japan and other far eastern countries (e.g., China, Taiwan, Korea) there is closer proximity among them than with western countries. This closeness is especially advantageous in finding additional sources of especially low cost labor.

The tariffs support the establishment of any industries they target. At present the computer import duty has been reduced to be on a parity with the U.S., but this matters little since their industry is strong enough to withstand imports. Still prices of U.S. produced machines are cheaper. As evidenced in other industries, this is a come-on to further strengthen the Japanese manufacturers for export competition by having them compete in a token way with the few imports and thereby gain ideas to sharpen their exports.

For example, in the early seventies the Japanese encouraged U.S. minicomputer imports, although there were high tariffs. These occurred and now there is a significant Japanese minicomputer industry. For example, the basic structure of Fujitsu's minicomputer is quite similar to the DEC PDP-11.

Because of the closed nature of society and the emphasis on personal relationships, it is difficult, perhaps impossible to have significant Japanese sales. There are no significant examples to the contrary. "Doing

business" together appears to be done over a long time period and is almost ritualistic. This means that it's essentially impossible to have an effective international company as we know it. A foreign manager is clearly tabu and sales are limited to one-shot deals with trading companies. There is no trading except as joint ventures. A foreign-owned company with controlling equity is illegal in Japan.

JAPANESE HIGH LABOR COST, LIMITED POPULATION, FULL EMPLOYMENT AND FEW NATURAL RESOURCES, CREATES IMPORTANT BY-PRODUCTS TO FURTHER HELP TRADE

Japanese transportation and meetings run on time and at full capacity. Roughly twice as much as in the U.S. can be accomplished per day in Japan, especially those requiring meetings. The cordial, formal protocols help meetings proceed rapidly.

There's measurement of and pressure for efficiency. That is, the work-out/work-in ratio is high. For example, taxis have a driver-operated back door opener so that passengers can load/unload faster. The notion of efficiency seems to be taught to all and factories measure, graph and display key results. Concepts like fuel efficiency versus speed, weight and pollution are difficult concepts for Americans to understand, yet the Japanese "feel" them.

Given a notion of efficiency, there's real concern for saving physical resources too. At the computation center, printing isn't automatic; it's queued and must be requested separately. Lights, always florescent for high efficiency, are off when not in use. Of course small cars, taxis, a good train/subway are other indicators. The cars have mandatory bells that ring when the car is going over 100 Km/h! None of these artifacts for efficiency exist in the U.S.

Contrary to our "feelings", they are working the environment issue by less consumption, for example. This will indirectly make more money and resources available for production at lower costs. For example, cars don't pollute. U.S. environmental people at conferences in Japan are politely ignored while taking their basically boondoggle-oriented conference

registration fees paid for by the U.S. government research establishment.

There is a range of basically human and personal concerns which encourage and support productivity. The result is a longer life span in the face of stress on productivity. While the subways and high density trains jostle people pretty badly, and there's no segmented smoker areas (and many smoke), there's great concern for the feelings, privacy and treatment of individuals. On arrival and departure at every organization, one is given moist cloths and refreshments. Taxis and buildings are air-conditioned. The hotels, though very expensive, provide privacy, ambiance and excellent food and service. For example, one expects a cloth cover over the telephone to enable it to fit the room decor. There are Japanese baths, and these are great too!

They are compulsively clean. In an indirect way, this really helps the manufacturing of small, precise goods including cameras, semiconductors, high-speed computers and disk memories.

There's orderly queueing at each server. The Japanese appear to be the world's best self-queuers. Queued systems of this type have higher through-put and make the best use of resources. One might suspect there is lower general hostility arising from competing for a finite resource when queueing.

Inventions are to labor-saving devices. There are countless gadgets to save scarce labor. Computation center line printers have paper cutters and conveyors in order to bring printing back to a single station. There are no computer operators and people to serve the users! This direct use of facilities not only costs less, but provides better service and through-put.

Conclusions

We must be impressed with the intense drive coupled with the technical, manufacturing and marketing acumen of the Japanese. This drive and ability, coupled with many factors of our society, has enabled the Japanese

to systematically plan and dominate every U.S. market that they've attempted. Although there's been a "feeling" that the market domination is limited to low technology, there is evidence that nothing is immune.

However, despite a desire to blame the Japanese for dominating our manufacturing, it comes about because there are U.S. buyers and distributors for their goods. Distributors come about because of the intense emphasis we have on profit and return-on-investment. By only distributing and not designing and manufacturing the investment is negligible, giving a high return-on-investment.

The intent of the paper is to describe variously "how" this market/product domination is carried out. Like any good Japanese product, the ideas within the paper have been taken liberally from many sources -- mostly without credit. It should be self evident that, we (the U.S.) have a problem. Each of us, whether we be part of industry, government, or academia, can now address the issues we're responsible for. There's no real need for another fact-finding trip to Japan to further define the problem. Japan is clearly not a place to search for the solution.

Many solutions are required. Freezing the current level of government size spending and non-productive people (e.g., lawyers) would be fine first starts. Living within our collective energy budget is also needed. Rather than engaging in a trade war the following mechanism could simply address the trade deficit:

No company can import and distribute a foreign product without arranging an equal export credit. That is, a company; such as ITEL who buys and resells Japanese computers can get agricultural products to sell or it could export its own services in an equal amount. The trade balance has to be the distributor's problem --not that of the President, or the Secretary of Commerce or Congress.

Appendix 1. A Chronology of Systematic Domination*

* Courtesy of Dataquest.

I. "Development of a domestic Japanese industry. The Japanese industry is developed and grows rapidly. The major aspects that mark this development include:

- (a) Market control. Imports limited essentially to zero. Only a few major manufacturers are permitted. Prices remain significantly higher in Japan than in other competitive markets.
- (b) Borrowed technology. The Japanese borrow heavily from foreign technology, including a large number of purchased licenses and patent rights, and wholesale reverse engineering.
- (c) Vertical integration of most manufacturing.
- (d) Major investments. Major investments are made in modern plant, equipment and technology, both for the final product and throughout the vertical chain of manufacturing. Continued research, development and plant investment expenses are made.

II. Establishing an export market base.

- (a) The establishment of world-wide sales organizations.
- (b) Researching and understanding of the foreign markets.
- (c) Establishment of a reputation for quality and reasonable prices.
- (d) A limited focus, especially in those markets less attractive to domestic manufacturers.

III. Major market penetration. Major market penetration occurs usually during an economic downturn in Japan. Previous efforts by the industry have set the stage for them to be successful in this endeavor. It is marked by the following considerations:

- (a) Cooperation among the Japanese companies with respect to models,

prices, and markets.

- (b) Focus at the mainstream of the foreign market.
- (c) High inventories because of poor markets in Japan, i.e., an export push at any cost is necessary and expedient.
- (d) Extremely low prices to the mass market to gain market share rapidly, i.e., a knock-out punch to the domestic manufacturers. Modern plants, reasonable costs, an established export organization, and good reputation set the stage for success.

At this time, marketing muscle is established. Not only was the export market share large, but the domestic market remained closed. It should be pointed out that this major market penetration had been made by a combination of factors, as outlined. The greater marketing muscle allows the Japanese manufacturers to profit from their long investment.

- IV. Market exploitation. This period is marked by higher prices -- often higher than domestic manufactured models. However, the higher prices are often more than offset by perceived higher quality, both real and imagined. There is also continued cooperation on prices and markets, as well as continued limitations on imports to the Japanese market."

Gordon

COMPANY CONFIDENTIAL

ID#0238

d i g i t a l

interoffice memorandum

Subject: Some First Impressions of Japan

To: OOD, OC, Dave Ballantine, Jim Bell, Max Burnet, Don Frost, Bill Green, Carl Janzen, Ron Smart, Dick Yen

Date: 24 AUG 78
From: Gordon Bell
Dept: OOD
Loc.: ML12-1 Ext.: 2236

Here are a few brief first impressions of Japan (having visited Sony, NEC, Fujitsu, five Universities and a Government Lab). As you see below, I'm impressed with their intense drive, technical ability and will to win. Also, I position my understanding of factors which support what I believe is a basic goal to dominate the computer market...just like they do other (especially consumer electronic) markets.

This is a one-sided view as to their ability to win in our market...I didn't see things to get in their way.

I was prepared to dislike the Japanese because they had been so closed and absorbing of our technology and work. I could not help but like them; they were generally open. Now, I fear them more than I was prepared to. Here's why:

- 1. As a group, they're (industry-government) the most competitive. It's really built into their culture and reinforced by training. The only reason they aren't competing in minis is they're still enamoured with competing with IBM and building mainframes e.g., Fujitsu's new M200 technically dominates the new IBM3033 and Amdahl V7 machines. (We must worry because of what they've done in quality cameras/optics, textiles, small cars, radio, TV, tape recorders, watches, calculators, their position in semiconductors and semiconductor-making equipment, typewriters, sewing machines, etc.) This also drives them to fast response and hard work.
2. They're excellent engineers and tend to be less NIH-oriented than us. This is derived from having less egos, although there is a strong group ego! Japan has acculturated customs, technology, etc. from everywhere for centuries. In the 16th century they apparently set up manufacturing of guns/gunpowder in 18 months once the Portuguese brought them in. Any good idea is fair game (subject only to strict patent technicalities). Having adopted an idea they want to understand it and improve it. (This can be seen looking at progress in all the above plus the research they do.)

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3. The current computer manufacturers have a complete line of peripherals, and set of test and manufacturing equipment, taken from copying and improving counter-part U.S. products. [Just as we all learn something from touring another facility, so do they. Should we avoid having them visit our plants? We have to be careful about our discussion of technology!] Here, I'm somewhat ambivalent, because I think we should trade - buy/sell - with them. We (DEC - especially the 11, DG, HP) clearly influenced their minis.
 4. All of the manufacturers have acquired their technology over a 10+ year history of dealing with U.S. manufacturers either as a joint venture or under license: Fujitsu (Amdahl/Siemens); Hitachi (RCA); NEC (Honeywell, GE, Varian); Toshiba (Honeywell, GE, Interdata); Mitsubishi (Xerox), Oki (Univac - actually joint venture); Yokogawa (HP); Nippon Minicon (DG). In all cases, the technology has been improved in terms of quality and manufacturability. For example, in the case of the Amdahl technology (that was at least started at IBM), I suspect Fujitsu is one of the few companies capable of manufacturing the miniature/hi-density PC Boards, backplanes and small cables.
 5. They seem to be less oriented to technology for its own sake versus what it can do for them in the long run. For example, they moved more rapidly into gate arrays for their computers earlier. (Maybe Amdahl's influence). They clearly think both product and process together in what is a longer term view. (Here, let me reiterate: We must clean up our processes or they'll win by default. We can't make one shot products on a rigged up, ad hoc process). Again, here they're competitive and they orient the processes to 1. Quality first, 2. Volume second (for growth) and 3. Flexibility and turn-around in order to support the volume. This gets into:
 6. The Japanese orientation is a strongly engineering versus strongly science-based culture! (We - the U.S. - do their research, so why should they bother?) This comes about because of the competition through manufacturing novel products and their total dependence on export/manufacturing. For example, much of our federal training, funding, comes through the NSF, ARPA, and armed services for research. Their funding comes through MITI (Ministry of International Trade and Industry). There's rotation among design and manufacturing engineers. They do have good central research staff and their flow appears to exist to the development groups. They both think they're on the same team. -- In contrast, research in many of the large U.S. corporations is a vast waste, e.g., GE, Westinghouse, RCA and Univac; the work is usually behind the average development and totally decoupled. It's clear how TV, Radio and recording was lost, but the engineers had help because:

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7. We (U.S.) have a higher regard to business training versus engineering training. They're in good shape because they don't yet have all the business schools. Therefore, instead of getting MBA's, their students get engineering masters. This not only makes them better engineers, but doesn't reinforce the notion that engineering is the route through to the management ladder, or that an MBA is automatically needed if one is to supervise people. The MBA, oriented at every dual-career person being president, and epitomized by the content-free case study methodology, focusses on the quick buck. This is in contrast to the Japanese concern for the long term (an overall theme).
 8. They've read the Boston Consulting Group monograph and are volume (and growth) oriented, subject to the quality-first constraint. Knowledge of the learning curves is everywhere, even the government research labs and universities. Their needs and goals are manufacturing/trade/industry oriented. This also means, like TI that they're will to dump and lose money for the short term in order to gain the market. Although they put on a good act that their products won't be competitive when the yen is so strong, having gone from 300/\$1 to 100/\$1, it's a big ruse because:
 9. Roughly speaking, they have systematically transformed American business from inventor-manufacturer-distributor to simply distributorships. This is in complete keeping with the goals of American business and the modern business school, Horatio Alger, such as RCA, GE, Chrysler, etc. No investment, no planning, no risk, these simply distribute products for the Japanese and roi, profits look fine. All a person has to do to be successful is buy the right product for resale. RCA/GE don't have to worry where the money comes from to pay the Japanese (or Arabs). On the other hand a group who can only run a distributor is probably fairly top heavy and can easily be replaced say, be a hard-working Japanese group. [A solution here is to make someone at the Commerce Department responsible for each area. This should include the joint planning with industry and the prohibition of current manufacturers from being importer/distributors. I.E., RCA would not be allowed to remain in the business and import. The responsibility for an industry has to be delegated!!]
 10. There's no way we can re-enter various lost businesses now that we're just a distributor. The spirit, understanding to develop and manufacture are gone. It's too easy just to distribute. There are now no decent American TV, radio, Hi-Fi, or video recorder products/manufacturers for what are basically indigenous U.S. products and which the first invention or key patents apply! Somehow, these industries and companies have been grossly mismanaged. (I also blame the Department of Commerce - a faceless, leaderless nobody!) How? Why? It can easily happen to us!
 11. They're more long versus short term oriented. Their history encourages this. They're capable of waiting us out in an area because we're so big bang (product) oriented and because they want long term business domination. NEC, Fujitsu and Hitachi, unlike Xerox, GE, Westinghouse, RCA, have all persisted with computers and now appear to be winning! This timeliness certainly affects their thinking on quality, and lastingness both in markets and products.

12. They believe computers are fundamental for the long term and they're prepared to wait. Machines are used in all products they build for export and they save labor - and labor is precious expensive in Japan as there are only 110 M people and 2% unemployment. They're considering raising retirement from 60 to 65 to get the extra productivity. They need computers to raise productivity! This is vital to their domination of manufacturing. (This is the opposite of the Australian attitude where there is high unemployment and a need/belief that computers must be eliminated. Australia is now almost totally dominated by Japanese products).
13. They are willing to give up profit for growth. For example, RCA is on a rug maker (or distributor), car rentor, book publication, TV Distributor etc., instead of an electronics company that really pioneered the T.V. Whereas there is extreme pressure on business for profit and return on investment, these factors are less in the Japanese companies. Sony is quite profitable, Fujitsu does relatively poor financially and I'd bet NEC or Hitachi computer divisions might even lose money. For now, they may still be buying in - clearly more acceptable than GE, Xerox and RCA. (This makes them doubly hard to beat...since they can lose money on every one and make it up in volume. They'll buy this business - DUMPING! and why not?)
14. Products are quality/detail oriented versus being the ultra-high volume, low-quality throw-away types. These are characterized by say, Sieko (versus Timex) and anyone of their cameras say, Minolta (versus Kodak or Polaroid which assume an idiot user with no concern for quality picture, but must have it now...again the time attitude). For example, while they make no instant cameras, perhaps due to patents, when they do they'll be quality.

There are zero defect signs everywhere! In the Sony VTR plant there was no burn-in of the recorder. All subassemblies had been inspected and tested. When it was put together it worked.
15. They are compulsively clean. In an indirect way, this really helps the manufacturing of small, precise goods (e.g., cameras, LSI, high-speed computers, some disks).
16. Even though they have a concern for long term, they work the short term very hard. This may follow from the competitiveness/growth. They engineer for quick turn around, they have good processes and the engineers at these large companies work very hard. The official work week is 40 hours, but a more accepted pattern is 50-60 hours...particularly to maintain schedule or to win against IBM, Amdahl or Hitachi (if you're at Fujitsu).

-
17. As the head of our Osaka sales office put it: the Japanese live to work versus the American need to work to live. He claims this is instilled at birth and trained. Work is a central theme, and the companies go through extensive screening to hire for life - e.g., some companies only get graduates from certain universities. Housing is provided for the workers and they have what amounts to a lifetime contract. This is bad if a person's incompetent, it also means that it's hard to breathe different life into an organization. On the other hand, turn-over is low to non-existent and a team spirit clearly develops as the various members learn to work with one another.

Their physical condition certainly reflects this work ethic too! On one hand there is a great deal of smoking, although a campaign is in progress to reduce it. However, nearly all Japanese are trim versus being basically overweight. Their diet (including excellent raw fish and vegetables) is conducive to trimness and better health, I'd guess. Although alcoholism is supposedly on the rise, the consumption in business I saw was certainly less than in the U.S.

18. The long term, quality products makes them build products that are hard to beat on a life-cycle basis. While it isn't clear they really consider all life-cycle costs, their cars now get good ratings - even though they may be designed to decay rapidly after say x years/y miles. In the case of computers, they always build multiprocessors because their customers invariably buy and want upgrades. Since IBM rents, the multiprocessor approach hasn't been developed. The multiprocessors they sell are also built for better Reliability, Availability and Maintainability. They seem to do a better job considering life-cycle costs than we do!

19. At a government/society level they appear to have their act together much more than we do. In both newspaper stories and in their products they seem to have clear, crisp ranking of goals and priorities. For starters, they know them, whereas nearly all our issues that start out simple become entangled as everyone (a new set of referees) enters the fray (e.g., human rights vs equal rights; full employment vs inflation, balance of payments; environment vs region vs country; capital vs labor; consumer protection vs business protection), but worse than a muddy set of design criteria is a muddy set of decision makers and an unclear decision process.

Because of the need to export, there's very good support for engineering and many go into it. There are comparatively few lawyers, (factor of 2 per person), so the emphasis is on physical output rather than paper, and intergroup contracts, and bickering among semantic accountants.

20. INVESTMENT

As a simple explanation, more money is available for investment because of lower taxes. This clearly affects their ability to invest in industry. They're supposed to be willing to pollute for profit...I didn't observe this. (Maybe they only kill whales outside of Japan and pollute other environments). Their environment is fine - though high density. On the other hand, taxes can be low because:

-
21. Their Government spending for military is far less. (Nearly non-existent). Although there is some fall out of our military spending for computers and related research, it's small compared to what it could be if there were more directed goals such as the Japanese export goals. It's not clear what these goals should be.
22. The Japanese don't have the waste, federal research expenditures, such as NASA and the Energy Department. (Here again, they can rely on us if there's any output.) These are big expenses and contribute little. The Energy Research seems to still be the old Atomic Energy Commission, but dressed in new clothes. The labs do about the same work, with essentially no output. (At least at the AEC, their goals were clearer, and we had a consistent flow of big computer bangs...plus a constant market that's motivated to provide computers.) Here, the Japanese do some nice work in regard to funding and managing research flow. Their labs buy versus develop in a vacuum with no way to get the flow.
23. MITI and other labs fund other laboratories and corporations to carry out research that's oriented to getting experience that will assist products. This not only provides a system of checks and balances, but provides an incentive. This minimizes what I call the "dusty-lab syndrome". Many of our government and federally funded labs were initially set up for a mission, and once the mission has been completed, the lab continues to exist. Since there's no real need, or mission, or review, negligible new work is output. (Recall visiting labs in which the dust is blown off the equipment for visitors and the same demo is run year after year. The same equations are on the board, with the same usually vague, unattainable, immeasurable goal for the research.) A buyer-seller relationship can help check this to some extent. Also this brings the groups together and technology transfer is more likely to take place.

For example, NBS is setting up a lab to do standards research and industry is free to contribute interns to them - this is ridiculous! A more fruitful way to bring about the standards is to subcontract several approaches and have industry develop and report on them with NBS. In this way the staff is minimized at NBS (which will be obsolete and impossible to acquire) but they will get more quality through their buyer role. Foremost, there's a reason to interact.

There's a good understanding about the research flow mechanism. They use all sorts of techniques -- organization, people-rotation, having many visitors to the U.S. Labs, buyer-seller, space, etc. -- but they do have the concern because of the limited number of people. We seem to have too many doing too little with no concern for output.

24. Overall, MITI appears to be very strong and competent! The goal of MITI/industry is a strong industry! This is in contrast to our Department of Commerce which appears to have the standard 9-5 bureaucrats, who are in it for either security or power - but with no real way to make anything happen. Nor is there any measure. I don't know what's missing that they have (just quality people - as Reischauer suggests, the right longevity, power, process, maybe they segment responsibility and measure results with reward based on performance (e.g., winning in a trade area)). In a few samples, I believe it's simple people quality, and the right process enabling them to accomplish something. Being responsible may be the key variable. Here, this suggests we could probably eliminate the Department of Commerce and have no real change except more output.
25. While there doesn't appear to be Japan Inc., there is clear collusion (planning etc.) among the government, and companies. They actually plan to win! This includes basic strategy setting among the players to segment and go after various markets (e.g., Fujitsu/Hitachi are 370 plug compatible). The companies can talk to one another and do, but certainly compete intensively with one another.
- Japan is quite a closed society and market. As the most powerful, homogeneous culture there is a long history of this. A quick trip, a pass through Reischauer's book, The Japanese, and an explanation of just a part of the tea ceremony make this vivid! Two years is a frequently quoted number to begin to understand this.
26. The language is a code to further segment. It's not clear how difficult it is to learn, but it's probably relatively useless without the societal understanding. We don't teach Japanese widely. On the other hand the technically trained Japanese have maybe six years of English in order to read the literature. (This is probably a good reason why we should use OEM's to enter the end-user commercial market versus translating the many manuals.) On the other hand, the lab, industrial, educational and engineering market may be open without extensive mail translation.
27. The tariffs support the establishment of any industries they target. Now the computer import duty has been reduced, but I doubt if this matters much since their industry is strong enough to withstand imports!
28. By the society and the emphasis on personal relationships (not clear they're any more than French) it's hard for foreigners to break into or sell, especially on a one shot basis. (It remains to be seen whether an American manager say, could set up and effectively manage a Japanese office.) "Doing business" together appears to be done over a long time period and is almost ritualistic.

29. There is an amalgamation of the Japanese within an industry which creates something that's often referred to as Japan Inc. (I think the Japan Club is a better name, because there's at least a show of competitiveness at the market level.) Not only is MITI supportive, they also appear to dictate. What's worse is they interact with industry in what appears to be a helping way as described above. For example, DEC products were in the Computer Engineering/Science Departments when the 11 first came out, but with a Japanese mini industry we really don't sell there. I'm sure it's because of their recognition of this market (also they discount heavily in the universities and consider it a prestige sale)...there may even be some special tax incentive. There is incredible pressure to buy Japanese products!

The high cost of labor, limited population and full employment coupled with few natural resources, creates some interesting by-products.

30. The pressure to work is fed back, creating more work and output, since everyone is working.
31. Inventions are to labor-saving devices. I saw countless gadgets of this form. All the printers at computation centers had paper cutters on them with conveyors to bring output back to a single station. There are NO computer operators, tape mounters, etc. running around!
32. There's real concern for saving of physical resources too. At the computation centre, printout isn't automatic; it's queued and must be requested by badge reader, (also, lights - always fluorescent due to efficiency - are off in the computer room - the console is external with only one or two operators!) Of course small cars, taxis, a good train/subway are other indicators. The cars have bells that ring when the car is going over 100kmh!
33. There's measurement of and pressure for efficiency (i.e., work out/work in is high). In a taxi, there's an automatic back door opener so that the driver can load/unload faster. Of course, the factories graph everything. It feels like the notion of efficiency is taught to all.
34. Everything runs on time and at full capacity (trains, planes, a supply of taxis, buses and especially meetings, tours, etc.). This is in contrast to the habits we've gotten into on scheduling and performing at meetings! Also, Yu Hata did an excellent job of scheduling customers, manufacturers and sightseeing. I accomplished roughly twice as much per day as in another western country.
35. There's orderly queueing at each server. The Japanese appear to be the world's best self-queuers. There's probably some protocol for resolving races when two persons arrive to the queue at the same time.

-
36. There is a range of basically human/personal concern. While the subways and trains jostle people pretty badly (at high density), and there's no segmented smoker areas (and many smoke), there's great concern for the feeling/privacy/treatment of individuals. Perhaps I had special treatment, but on arrival/departure at every organization, we were given hot cloths for refreshing (it was hot and humid - but taxis and all buildings had A/C), and either tea (occasionally coffee - to be really considerate of a westerner) or cold juice. The hotels though incredibly expensive were the best I'd ever stayed at in terms of quietness, service and general treatment. This included a large, but very well run chain hotel in Tokyo. In Kyoto I stayed at a tiny (fifteen room) old style, old Inn, and only once did I ever see any other guests (at the front door). The goal is to make certain that guests are totally alone, with incredible attention to simplicity, design and detail (e.g., there was a cloth over the telephone because it didn't fit the room decor).

Of course, the food is the ultimate in personal concern. Food served in seven, nine, or eleven courses varied from raw fish to pickled vegetables (e.g. potatoes) and flowers (lotus blossoms) with lots of seaweed and fish and fish eggs. There is western-oriented food like tempura (deep fried), hibachi grilled meat and fish and teryaki. At the first of the week we had western/continental/universal-style food because our hosts were concerned, and then we asked to have only Japanese food. We ate nearly everything (there's one kind of seaweed I found unpalatable). Of the sandwiches we had, the bread crusts were removed. There was much concern that the colors of the food matched - the physical looks were important.

There are Japanese baths, and these are great too!

37. Products are designed for people with attention to detail. The styling happens to be also attractive to others, but their technical, gadget-orientation really biases them to designing technical looking, knob-intensive products (hi-fi, complex watches, cameras, etc.). It's probably impossible to have them design a product like the polaroid one-step camera. (Emotionally, I doubt if the designers can do it based on the picture quality.) Color monitors were used to control the larger machines.
38. Contrary to expectations they are working the environment issue. There were U.S. environmental people there at a conference, and the Japanese were politely ignoring them...and taking their conference registration fees. Nearly all cabs are LP gas! Although they're physical comfort oriented, they do work the resources too.
39. They seem to do "bottom-up" product design versus "top-down" market planning as typified by the expensive heavy, multi-volume market surveys. These usually report history and extrapolate it in a self-perpetuating fashion. Using this approach, we continue to build heavy, gas-consuming cars because the market has historically bought them (given few alternatives). They look at the needs, and take existing ideas (designs) and improve them.

EPILOGUE

On arriving at Sydney, I was struck with contrast to dense, intense, humid and hurried Tokyo. I was ecstatic to get back (after twenty years) to a life style, people and place I really like:

Sydney's beaches are the world's finest; the weather's great; people spend lots of time out of doors with sports, strolling and simple gardening (versus the subtle and very complex Japanese gardens); work starts late, runs slower and ends promptly; and the food (universal/continental/western), beer and wine are drastically improved having moved away from the early English influence. I look forward to a last weekend stroll. I'll enquire about the best reef for SCUBA diving (on another trip).

GB:ljp

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April 4, 1979

Mr. Gordon Bill
Vice President of Engineering
ML 12-1/A51
Digital Equipment Corporation
146 Main Street
Maynard, Massachusetts 01754

Comments

Dear Gordon:

I enjoyed your presentation at the Faculty Club the other night and, as promised, am sending along my comments on the draft. I hope you press on and get it into shape for publication. The key message is original and interesting, to my thinking.

Page 1

Actually the Japanese don't "dominate world production of manufactured goods." West Germany exports more manufactured goods, and the U.S. and Japan are nearly even at current exchange rates. The Japanese do very well in a number of areas--consumer electronics, steel, autos, motorcycles, etc.--and are coming on strong in many others like microelectronics, but the Japanese do poorly in many others--chemicals, agricultural equipment, machine tools, aircraft, etc.

Page 2

MITI has very strong power in a number of industries but has played a small role in some others. I am enclosing a piece Jim Abegglen and I did in Foreign Affairs recently which categories Japanese sectors, in part by the role government plays. See pages 155-159. In computers, however, government has left no stone unturned. I am enclosing also a memorandum I did last year on this subject.

Page 3

I like your points about MITI and its charter to regard corporations as national resources, and about the absence of risk taking in U.S. companies.

Page 6

You might elaborate the "reverse engineering" point. It is very interesting, particularly for the non-technical reader, because it explains something previously mysterious.

Pages 7-8

Once again, your strong points are about quality product engineering, flow of ideas from public to industry laboratories, and quality of market analysis.

Page 8

Elaborate paragraph starting "MITI funds and manages other laboratories and corporations . . ." This paragraph is not clearly written, and sub-points need development.

Page 12

Japan's national government budget was formerly balanced but since 1974 has been in serious deficit.

Page 12

Your points about U.S. corporate decision-making and ROI leading to less manufacturing value-added could be elaborated. Many readers who don't work inside companies won't appreciate the point fully unless the behavior is described further. It is a fascinating syndrome.

Page 13

The ratio of lawyers number, I believe, you know is understated.

Page 14

Japanese effective corporate tax rates are somewhat lower than in U.S. While the nominal rates are similar (48% to 51%), Japan's tax free reserves and more accelerated depreciation schedules made its average effective tax rate 20% on reported profits before tax while the effective rate in the U.S. was 20%. Since 1972, the Ministry of Finance has suspended a number of the tax shields, and thus effective rate has moved closer to ours.

Page 15

Your statement "Japan is a closed market" is too strong. See the Foreign Affairs article. It depends on the sector.

Page 16

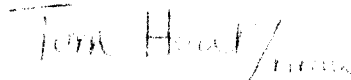
The most recent GATT studies show average Japanese manufacturing tariffs about equal to ours. In certain new industries, they are higher. But, in general, tariffs are not meaningful barriers in non-commodity markets.

Page 18

Your "best self-queuers" point is superb.

I don't know if these will help, but I enjoyed reading the paper. Your thesis is dead right. Give me a call if you would like to discuss it further.

Regards,



Thomas M. Hout
Vice President

TMH: nmw

Enclosures

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+-----+
| d | i | g | i | t | a | l |
+-----+

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i n t e r o f f i c e
m e m o r a n d u m

SUBJ: ENCLOSED NOTES OF VISIT TO VARIOUS JAPANESE COMPANIES AND RESEARCH ORGANIZATIONS

TO: OPERATIONS COMMITTEE
PEG:
Dick Clayton
Jim Cudmore

Date: 7/21/82 Wed
From: Gordon Bell
Dept: Eng. Staff
MS: ML12-1/A51 Ext: 223-2236
EMS: @CORE

JUNE 21

- . Japan Engineering Center Meeting
- . Visit Mr. Yanase, TEAC President re our lack of buying drives
- . Dinner with Drs. Kanai and Sasaki (head of Semis), NEC

JUNE 22

- . Presentation and Demonstration on Kanji at CSS Hakusan by JTC and CSS personnel
- . Ethernet lecture at KEIO University (Hiyoshi Campus)
- . Dinner with Dr. Aiso and Prof. Tokoro

JUNE 23

- . Visit Hitachi Central Research
They want a VAX. Looked at color CRT design.
- . Visit Hitachi Musashi Semiconductor plant (see attached) and dinner (Dr. Makimoto)

JUNE 24

- . Visit Asahi-shinbun Newspaper on IBM Kanji system
- . Press Conference at Hilton Hotel
- . Dinner with Sharp Dr. Sasaki (R&D, VP--now President) at American Club

JUNE 25

- . Visit Fujitsu Kawasaki (Dr. Yasufuku, Semiconductor group head--General Manager Semis)--See M382, fiber optics, semis--see attached.
- . Visit Mr. Yamamoto, President, at Fujitsu Headquarters re becoming a member of Fifth Generation Research Group.
- . Dinner with Yasufuku, Hiraguri

JUNE 26

- . Visit Machida (fiber optics) Industry - "one man" company

JUNE 27

- . Rikei

JUNE 28

- . Visit Electrotechnical Laboratories (ETL) in Tsukuba - Dr. Tojo (see attached)

JUNE 29

- . Visit NEC O.A. Show Room
- . Visit NEC Central Research
Dedicated to be Number 1 in C&C (Computers and Communications)
 - . Engineers do marketing
 - . Sales and marketing are in 1 group
 - . There are quarterly, 1 week meetings on Product Planning with 50-100 people. Design engineers must attend (in Tokyo).

Chairman Kobayashi says:

1. All engineers must learn/know English
2. All employees must use Personal Computers

JUNE 30

- . Lecture at Tokyo University (Moto-oka and Hiroya Fijisaki. Saw Dataflow Computers (8-control, 16-processor) FOR:1
Have built:
 1. Old mP=4P
 2. Prolog MC = 16 processor computers, 8 control computers, Z80 message passing, each P communicates 4 control computers.
The companies build these gratis.
- . Visit NTT Headquarters (sales)
- . ICOT (5G) Research Lab, Dr. Fuchi
- . Dinner with Mitsui, Zosen staff (sales) Prof. H. Goto (LISP machine)

JULY 1

- . Visit SONY Headquarters (See MAVICA, audio disk)
- . Visit SONY Atsugi, Mr. Morizono, VP
(see attached)

JULY 2

- . Visit NTT Tsu-shin Kenkyu-sho
Electro Communications Lab
 - . Building T^L LISP machine
 - . Building 2 Dataflow machines
 - . Building "Array" (1 bit machine)
- . Address to sales and MC, dinner with MC

JULY 3

- . Arrive Taipei - rest, write, swim, dinner with Yen

JULY 4-7

- . Visit DEC Taiwan, 3 universities, China Computer Corporation
(our rep.)

JAPAN IMPRESSIONS (Part I)

Reaffirmed to be #1 in Sales and Technology (see slide on IBM hi-end)

Now claim to be #1 in supercomputers

Technologies that are dominated:

- . Base materials and production (esp. Quality)
- . CRT, LCD, EL
- . Printing, fax, thermal, xerography
- . Magnetic recording and video disk
- . Video, video b/w compression and image processing
- . Voice i/o
- . Communications (installing systems)
- . Fiber optics (installed LANs)
- . Packaging and PWB's
- . Semis and Semi CAD
- . ECL, Bipolar, MOS, CMOS
- . Research in J^2 , (GaAs and HEMT in factory?)
- . Robotics?

The Japanese Computer Industry

- . (MITI and Fujitsu, Hitachi, NEC, Mitsubishi, Toshiba, Matsushita, Oki)
- . have and are implementing a vision of 5G computing based on AI and high performance processing.

Program includes:

- . Supercomputer technology, 1981 + 8 years (VLSI, J^2 , GaSa, HEMT)
 - new architecture and technology
- . Dist. Proc. and LAN's (\$40M over 3 years)
- . ICOT (the main push)
- . Next generation (farther out)
- . NTT Si Compiler - a real compiler that's so far produced a 13k t chip in 2 months without using a CRT. Totally language driven with separate backends for CMOs, HMOs, bipolar or ECL. 2,000 people are working on VLSI and this will be used for smaller companies. Also, several new architectures, including 2 data flow.

ICOT - INSTITUTE OF NEXT GENERATION COMPUTERS

- . Headed by Dr. Fuchi
- . Coupled into universities - 5 people + 5 x 7 company research
- . Use a 2060 for Prolog and LISP
- . Two machines are to be built by companies (in 2 years)
 - RDMS
 - Prolog processor
(Data flow for Resolution desired)
- . Prof. H. Goto, TU, believes Prolog is wrong and has Mitsui building a 10 mips LISP machine for him.
- . Government funded, Company's fund space,...
- . They are driven.
- . Three Groups: Architecture, Application, Human Interface

POWER SUPPLY	P	P	P	P	P	P	S	P	P	P	P	P	P	P	P	P	P	P	P	M	P	P	P
ASSEMB. CUP	S	S	S	S	S	-	S	-	-	-	-	-	-	-	-	-	-	-	-	S	S	M	-
HYS. INT. CUN	P	P	P	S	P	-	S	-	-	-	-	-	-	-	-	-	-	-	-	S	-	M	-

SEMI																							
VLSI	S	S	S	S	S	S	S	S	P	-	P	-	P	-	-	-	-						
CMOS GA	S	S	P	P	S	S	P	P	P	-	-	-	-	-	-	-	-						
EIP GA	S	S	S	P	P	P	P	P	P														
ECL/G-L GA	S	P	P	P	P	-	-		R														
H/S (JJ, GeAs)	R	R	R	R	R		R	R	R														

DISPLAY																							
ELD, LCD, PLASMA CRT	S	S			S			S			S												
TV	-	S	S	S	S		S	S	S	S					S								

PRINTER																							
KEYBOARD	S	P	P	P	P		S	P	P	-	P	-	-	-			S					S	
DOT MATRIX FAX	S	P	-	-	-	S	-	P	-	-	S	-	P	-			D	S	S	S		S	
DAISY COPIER	S	S	S	S	S	S	S	S									M	S	S				S
THERMAL	-	-	-	-	-	S	-	-	-	-	S	-	P	-			S	S	S	S		S	S

ROBOTICS	S	S	S	S	S		P	P	P														
IMAGE PROC																							
VOICE IO	R	R	S	S	S	R	R	S	R		S	S											
AUDIO	S	S	S	S	S		S	S	S	S					S	S							

MEMORY																							
FLOPPY		S	S	S	S		S						S				S	S	S		S		
MINI WINI	S	S	S	S	S													S					
LG WINI	S	S	S	S	S																		
TAPE	S	S	S															S					
VIR	S	S	S	S		S	S		S	S					S	S							
VIDEO DISK	R	S			S		S	S	S	S					S	S							
LG MASS STOR	S	S	S																				

L/S																							
FIBER OPTICS	S	S	S		S			P	R														
RADIO LINK	S	S	S		S	S																	
PAEK	S	S	S		S	S																	
LAN'S	S	S	S																				

CALC, PC, C/S																							
< 250					S		S	S			S	S	S				S						
250 - 1K					S		S	S			S	S	S				S						
1K - 4K	S	S	S	S	S	S	S	S	S	S	S	S	S	S			S	S			S		S
4K - 16K	S	S	S	S	S	S	S	S	S	S	S	S	S	S			S	S					S
16K - 64K	S	S	S	S	S	S	S																
64K - 256K	S	S	S	S	S																		
256K - 1M	S	S	S	S																			
> 1M	S	S	S	S																			

FU - FUJITSU HI - HITACHI NE - NEC MI - MITSUBISHI TO - TOSHIBA OK - OKI MA - MATSUSHITA
 SH - SHARP SO - SONY SA - SANYO SE - SEIKO CA - CASIO CN - CANON SD - SORD
 JV - JVC PI - PIONEER CI - C. ITC BR - BROTHER TE - TEC JU - JUKI TC - TEAC
 YE - YE DATA TD - TDK AL - ALPS KY - KYOCERA FX - FUJI XEROX RK - RICOH
 S = SELL (USE AND MAKE) R = RESEARCH M = MAKE + SELL P = PROPRIETARY (MAKE + USE)
 D = DISTRIBUTOR FOR SOMEONE ELSE - = BUY & USES BLANK = DON'T KNOW OR UNINVOLVED GE:3.S6.4

ELECTROTECHNICAL LABORATORY

1-1-4, UMEZONO, SAKURA-MURA, NIHARI-GUN
IBARAKI, JAPAN

} Tsukuba Science City

Schedule for Prof. Bell's Visit (6/28)

Visitor: Dr. Gordon Bell
Professor
Carnegie-Mellon University

Vice-President
Digital Equipment Corporation

Date: 2:00 p.m. to 4:30 p.m., Monday, June 28, 1982

Received by: Dr. Akio Tojo, Chief
Computer Science Division

also helping on 5G
Program ... have
transferred people/projects.

Subjects: 1. Outline of Electrotechnical Laboratory

Dr. Akio Tojo

ELP-70-80

2. Picture Processing

2 machines
- ACC (77)

Dr. Akio Tojo, Chief
Information Systems Section
Computer Science Division

- ELN-1 (LISP)

Part of Super Computer (SC)

3. Speech Analysis & Recognition

IBM mainframe

Research

Dr. Takayuki Nakajima, Chief
Speech Processing Section
Information Sciences Division

EMLISP system
started in 80

(1) Data base SC

(2) LISP Data-driven SC

4. Computer Vision

single assignment =
LISP

Dr. Yoshiaki Shirai, Chief
Computer Vision Section
Information Sciences Division

5. LISP Machine

Mr. Toshitsugu Yuba, Chief
Computer Systems Section
Electronic Computer Division

6. Tasker Shimada - Building Dataflex Machine!

(Spent 1 year with Dennis
on Dataflex)



CENTRAL RESEARCH LABORATORY
HITACHI, LTD.
P.O.BOX 2, KOKUBUNJI TOKYO 185

WELCOME to CENTRAL RESEARCH LABORATORY

Guests: Mr. Gordon Bell, Vice President, DEC

Dr. T. Kobayashi, Manager, DEC Japan

Date: June 23, 1982 (Wednesday)

Schedule:

#####

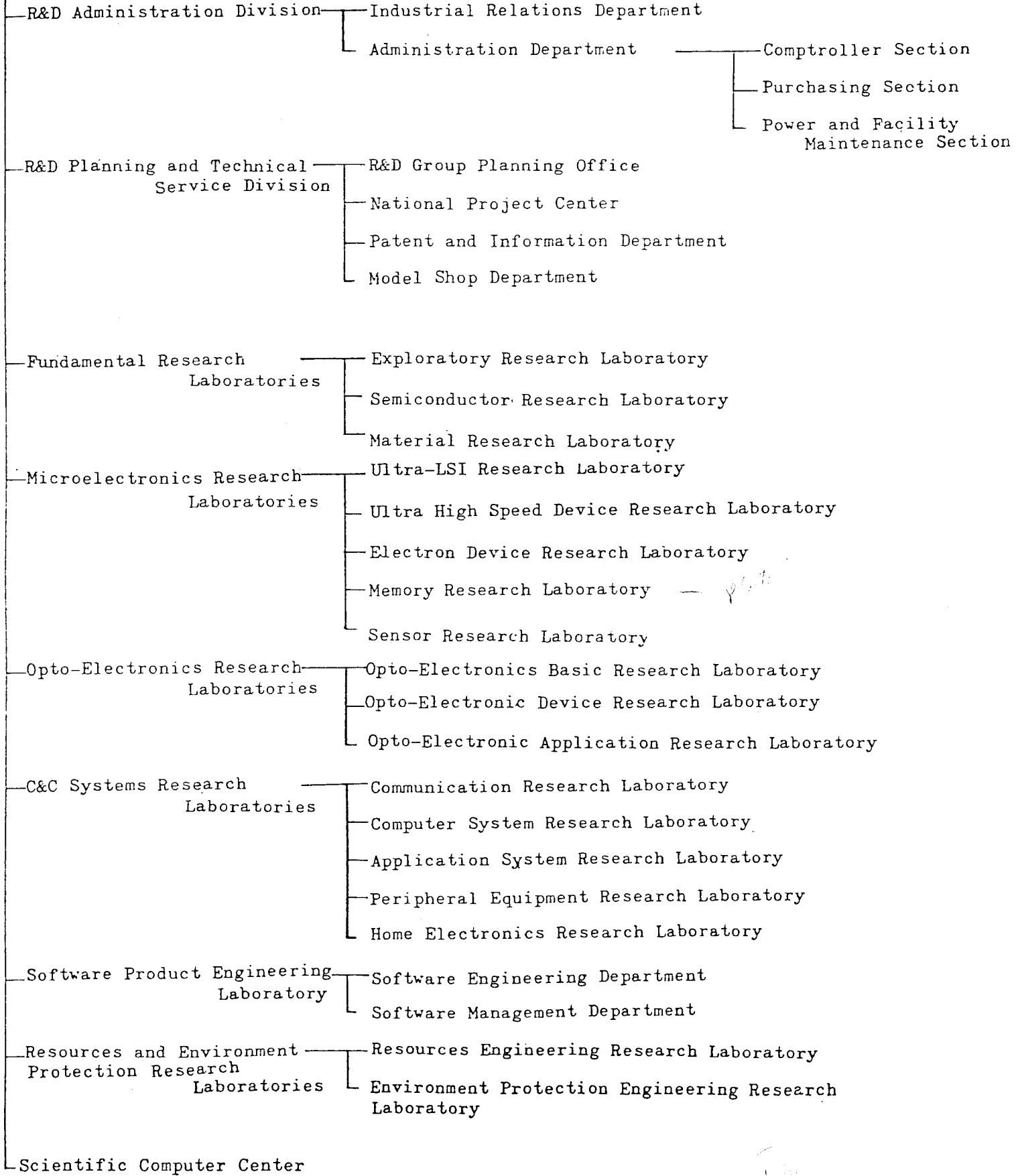
10:00	Arrival at CRL	
	Introduction	T. Chiba K. Kayama
	*Small Scale Computer	T. Kamiuchi
	*Computer Hardware Technology	A. Masaki
11:00	Laboratory Tour	
	*High Speed Computer Network (HINET)	Y. Kuwahara
	*VLSI Center	H. Sunami
	*EB Lithography	S. Okazaki
11:40	Exhibition Room	K. Kayama
12:15	Departure for Jyosui-club	

#####

(Room: D)

10.8 P

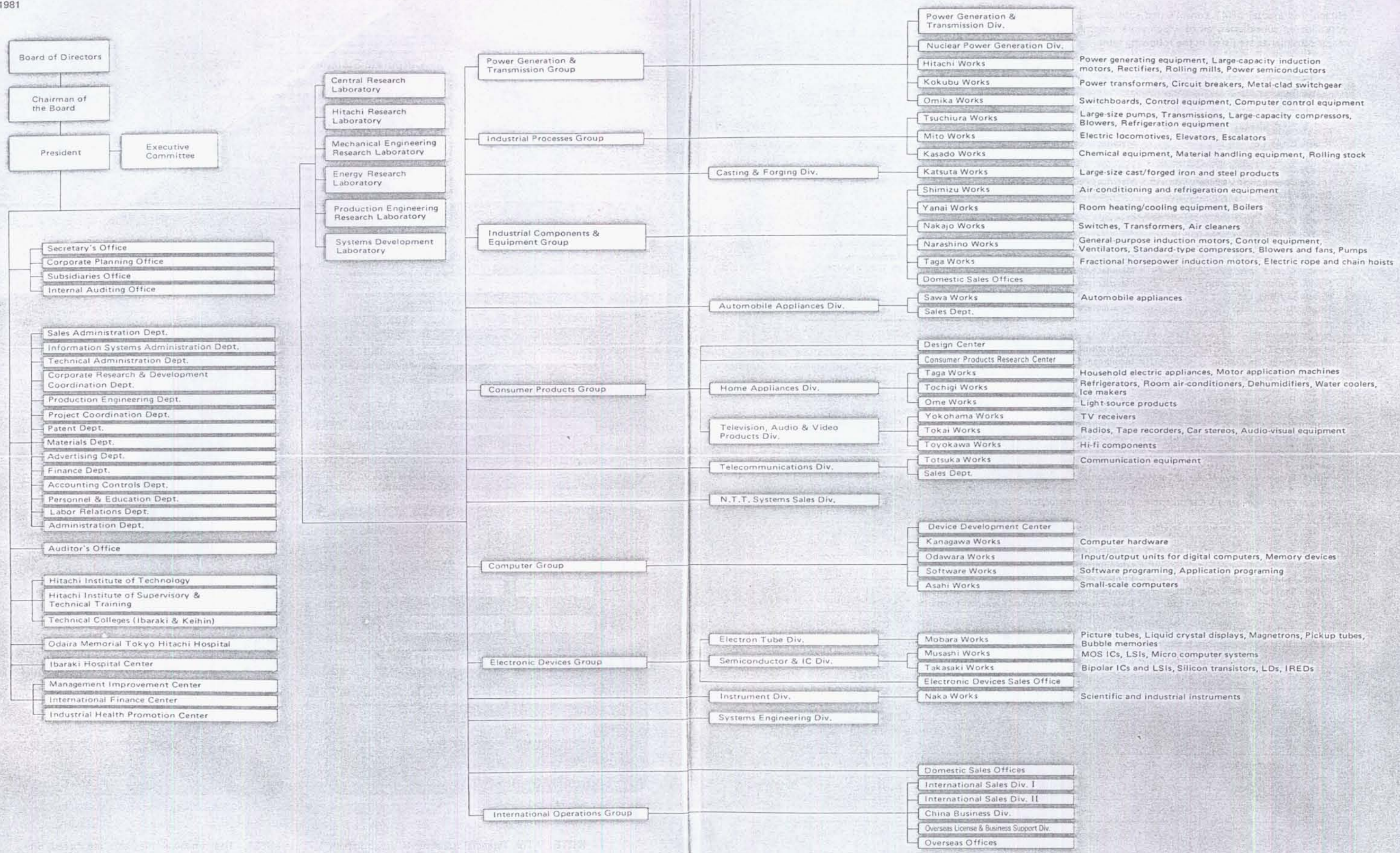
Research and Development Group



10.8 P

Organization Chart Hitachi, Ltd.

As of Aug., 1981



3000 units 3000 units
 cost a spec (Hitachi says good)
 13 people supplied
 2 - Calma (4 stations)
 10 - hit DMAC - 68K t
 3 - 4 design games, 2 yrs
 5 - hit CMOS, up, 6301 + ROM, RAM, etc 74 Series
 63K t

I. Spiny Hierarchical
 II. Automatic!

| also I brought back
 a 64K, static CMOS
 RAM

PRODUCTS AND TECHNOLOGIES

1982

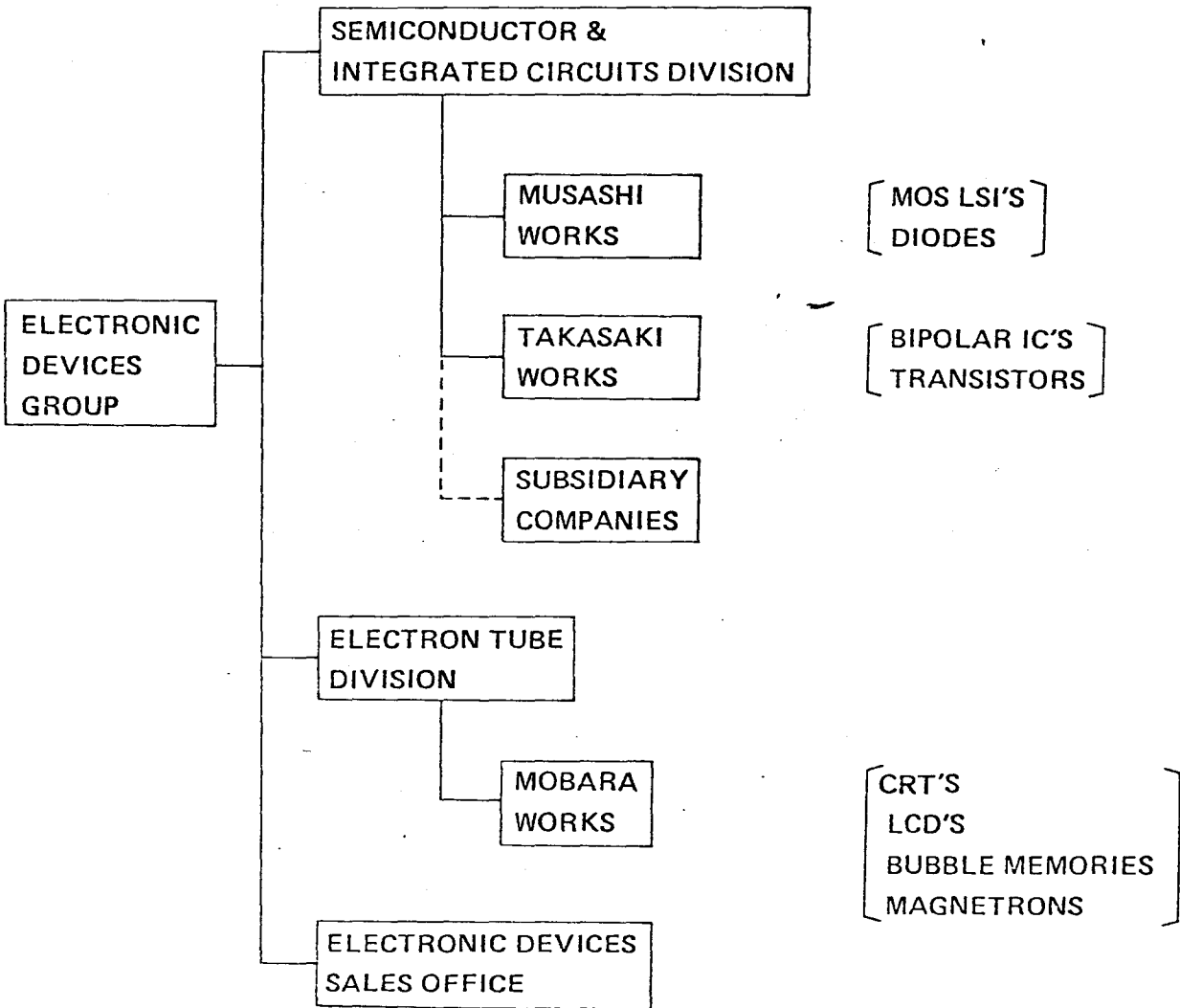
HD25L - 400 g 2.5 ns 72 pin
 TTL 1600 g 1.5/8 ns 118

ECL = ——— Won't sell .. it's in there open!

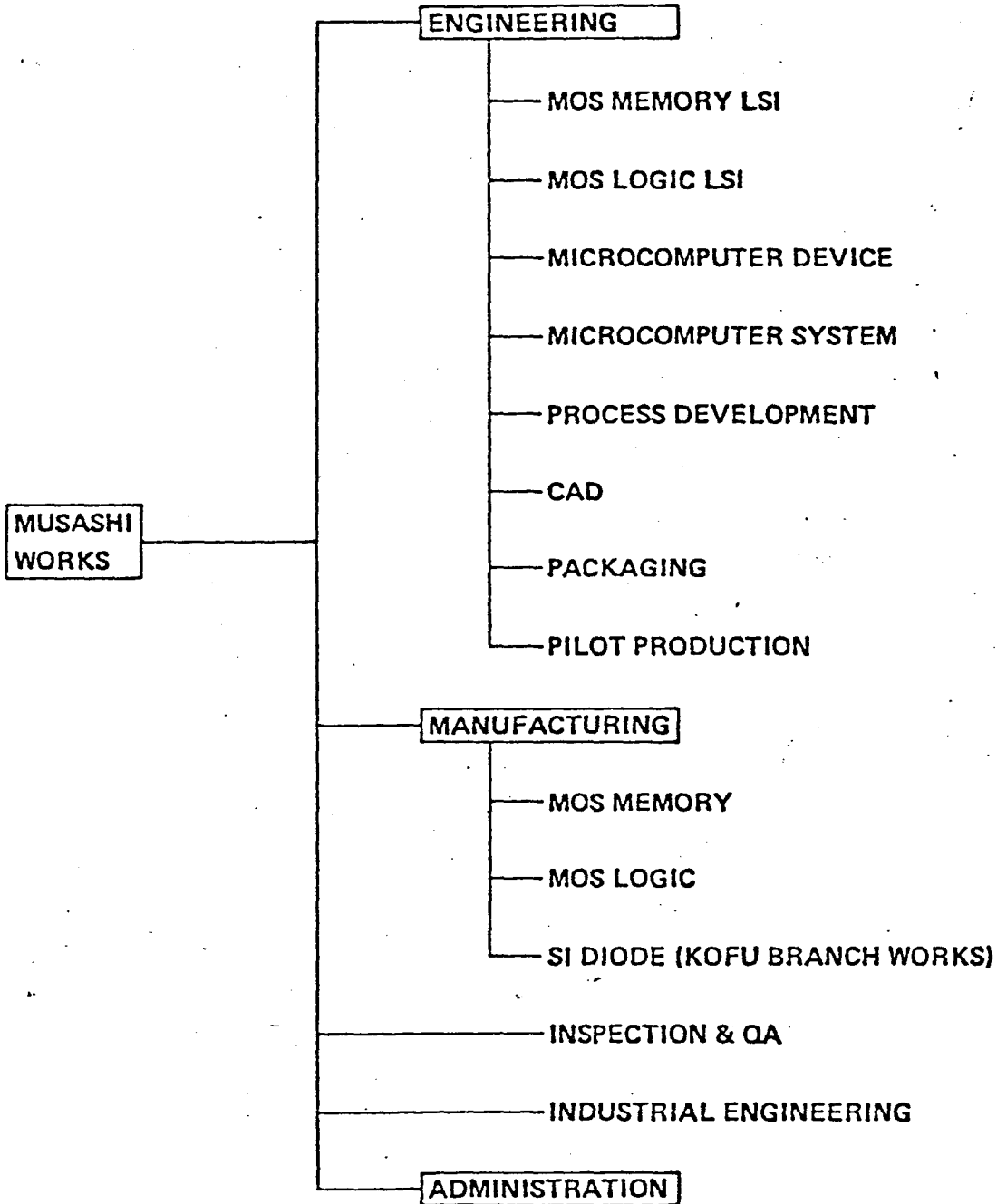
550 7/35 108 pins
 1500 .5

MUSASHI WORKS
SEMICONDUCTOR & INTEGRATED
CIRCUITS DIVISION
HITACHI LTD.

ORGANIZATION



ORGANIZATION



PRODUCT OUTLINES

MOS MEMORY LSI

DYNAMIC:

STATIC:

ROM:

LARGEST SUPPLIER OF 64K D-RAM

LARGEST SUPPLIER OF 16K S-RAM

EP-ROM (16K, 32K, 64K), E² PROM (16K)

AND MASK ROM (64K, 128K, 256K)

MOS LOGIC LSI

STANDARD :

SEMI-CUSTOM :

CUSTOM :

TELECOMMUNICATION AND PERIPHERAL CIRCUIT

C-MOS GATE ARRAYS (500,1000,1600 SERIES)

ESTABLISHED CUSTOM DESIGN PROCEDURES

MICROCOMPUTER DEVICE

4 BIT:

8 BIT:

16 BIT:

C-MOS and P-MOS

N-MOS (6800 SERIES) AND C-MOS (6300 SERIES)

FULL COMPATIBILITY TO 68000

MICROCOMPUTER SYSTEM

SUPPORT SYSTEM:

SINGLE BOARD COMPUTERS:

TRAINING MODULE:

RESIDENT SYSTEMS AND CROSS SOFTWARE

FOR 4 BIT, 8 BIT AND 16 BIT MICROCOMPUTERS.

8 BIT AND 16 BIT MICROCOMPUTERS

8 BIT AND 16 BIT MICROCOMPUTERS

MOS DEVICE TECHNOLOGY

	PAST	PRESENT		FUTURE
Basic Dimension Channel Type	8 μm	5 μm	3 μm	2 μm
P-MOS	Calculators	Calculators 4 bit MPU's	 	
N-MOS	Memories (4K Dynamic)	Memories (16K Dynamic) (4K Static) 8 bit MPU's	Memories (64K Dynamic) 16 bit MPU's	Memories (256K Dynamic)
C-MOS	Watches	Calculators Watches Memories (4K Static) 4 bit MPU's	Memories (16K Static) 8 bit MPU's Gate-Arrays	Memories (64K Static)

ADVANCED TECHNOLOGIES

DENSER MEMORY TECHNOLOGY

- ADVANCED DOUBLE POLY PROCESS:
NMOS, CMOS, AND EPROM
- HIGH SPEED WITH POLYCID
- HIGH YIELD AND RELIABILITY

HI-CMOS TECHNOLOGY

- * LOW POWER, HIGH SPEED, HIGH DENSITY
AND ALPHA-PARTICLE IMMUNITY
- * APPLYING FOR STATIC RAM S MASK ROM'S AND MPU'S
- DOUBLE LAYER METALIZATION

MNOS TECHNOLOGY

- * HIGH DENSITY WITH NMOS POLY-SI
GATE PROCESS
- * LESS PIN HOLES AND LONGER ENDURANCE

HIGH RELIABILITY PLASTIC PACKAGING

- * DEFECT FREE PASSIVATION FILM
- LOW STRESS PLASTIC MATERIAL

LARGE CHIP SIZE IN PRODUCTION

- * MOS IMAGE DEVICE: 200K ELEMENTS ~ 85 mm²
- * WAFER STEPPER
- INTRINSIC GETTERING FOR DEFECT CONTROL

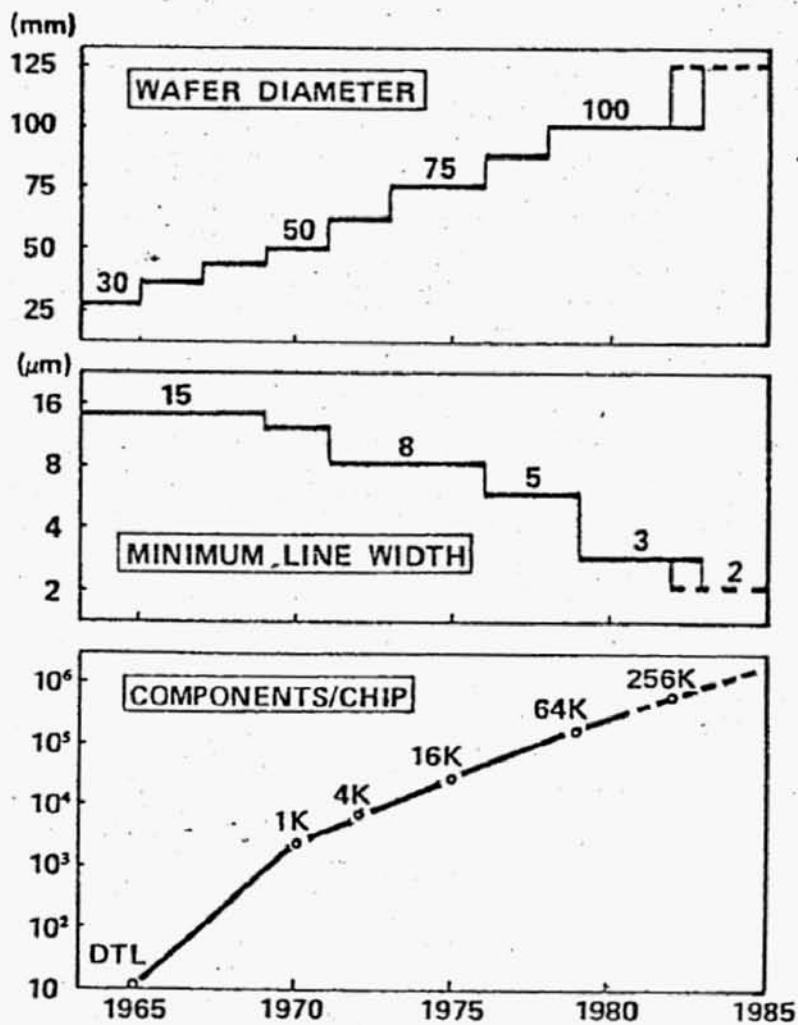
COMPUTER AIDED DESIGN SYSTEM

- * LOGIC SIMULATION
- CIRCUIT SIMULATION
- LAYOUT & ARTWORK

PRODUCTION AUTOMATION

- WAFER PROCESSING
- ASSEMBLING
- TESTING

TREND OF SEMICONDUCTOR TECHNOLOGY

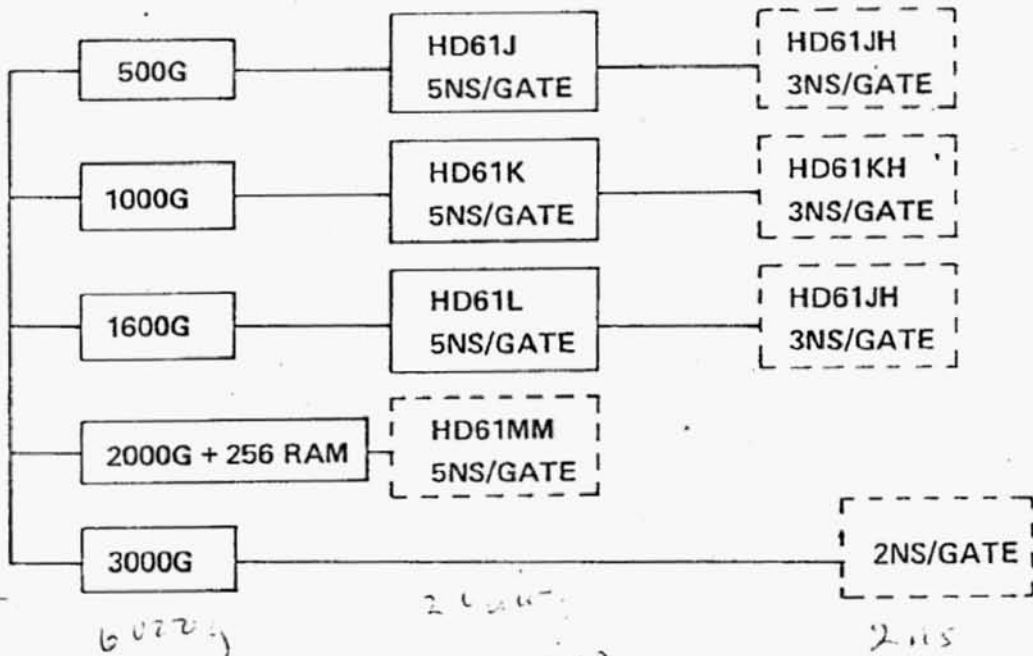


SUPPORT FROM RESEARCH LABORATORIES

LABORATORIES	MAIN SUBJECTS
CENTRAL RESEARCH LAB.	<ul style="list-style-type: none"> • BASIC RESEARCH ON MATERIALS, PROCESSES, AND DEVICES. • MEMORIES • MICRO COMPUTERS. • TELECOMM. CIRCUITS. • VOICE SYNTHESIS & RECOGNITION. • CAD FOR LSI'S.
HITACHI RESEARCH LAB.	<ul style="list-style-type: none"> • MICROCOMPUTERS (CPU'S AND PERIPHERALS) • HIGH RELIABILITY PLASTIC MATERIAL. • GATE ARRAYS AND CAD SYSTEM.
PRODUCTION ENGINEERING RESEARCH LAB.	<ul style="list-style-type: none"> • WAFER PROCESSING EQUIPMENTS. • PLASTIC MOLDING TECHNOLOGY. • LASER BEAM APPLICATION.
SYSTEMS DEVELOPMENT LAB.	<ul style="list-style-type: none"> • SOFTWARE DEVELOPMENT FOR MICRO COMPUTERS. • YIELD ENHANCEMENT SUPPORT SYSTEM.
MECHANICAL ENGINEERING RESEARCH LAB.	<ul style="list-style-type: none"> • PACKAGING TECHNOLOGY.
ENERGY RESERCH LAB.	<ul style="list-style-type: none"> • ALPHA PARTICLE MEASUREMENT.

CMOS GATE ARRAY

LINE UP



FEATURES

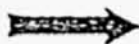
- HIGH SPEED 5NS/GATE → 3NS/GATE (1982/4Q)
- LOW POWER 20 ~ 30 μW/GATE AT 10 MHZ
- QUICK TURN-AROUND TIME LOGIC DIAGRAM TO PROTO-TYPE 10 WEEKS
- MACRO CELL AVAILABLE
- CAD SUPORT

HD 256

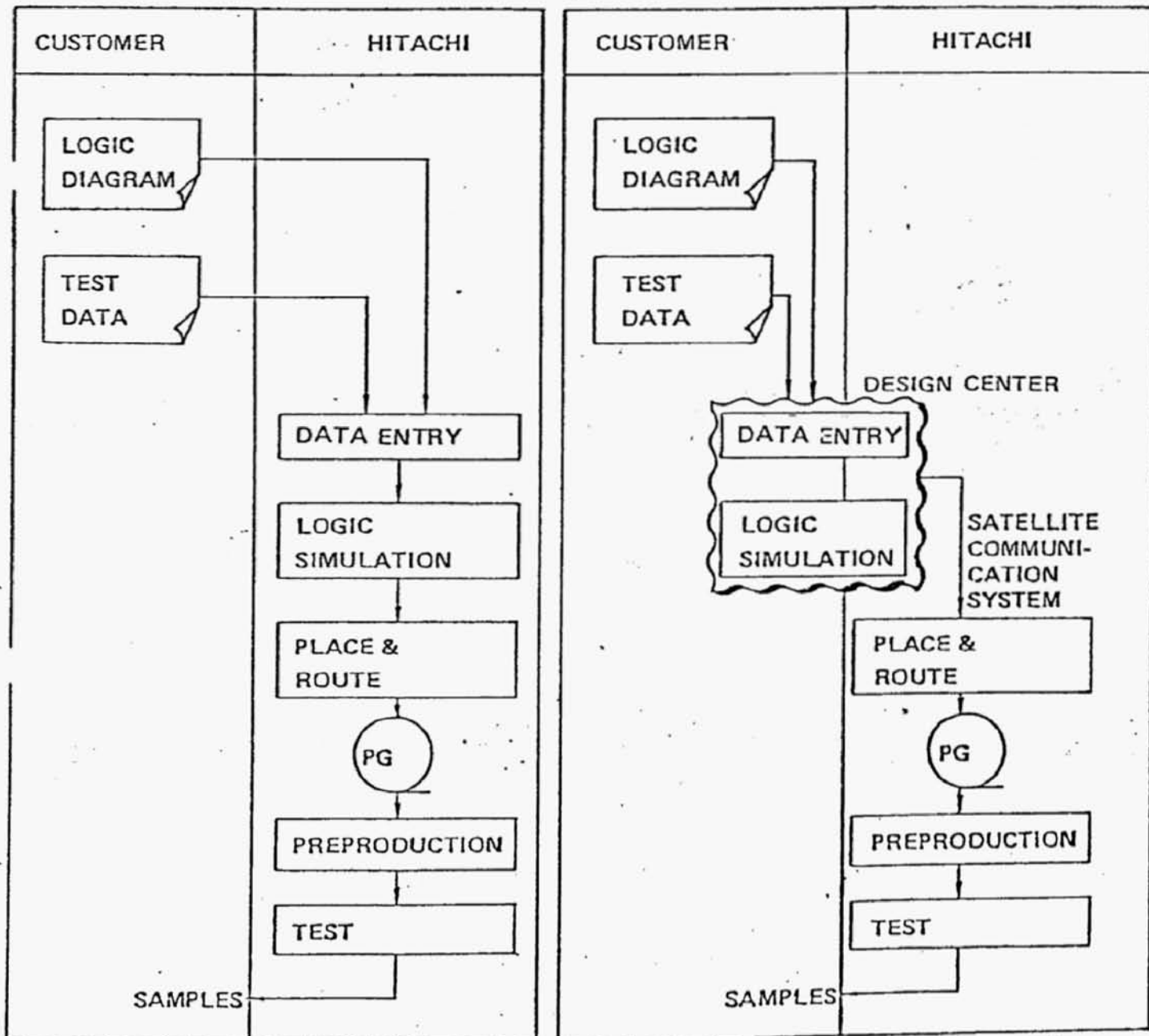
*4k 3 input wires 20 pins
2 fan out 2-4ns (limit cost)*

CMOS GATE ARRAY CUSTOMER INTERFACE

NOW



FUTURE





CURRENT STATUS OF HITACHI SMALL SCALE COMPUTERS

Classification	Processor	Architecture	Application	Technology	Manufacturing Works	Future Trend
Mainframe	HITAC L330/L340	IBM 370 compatible	Entry machine Small Business Computer Office use	TTL/ECL	Kanagawa Works	3 → 3 CMOS VLSI Processor
Mini Computer	HIDIC V90/50	HIDIC Series	32bit Process Control Computer Industrial use	S-TTL	Ohmika Works	1 → 4 ECL(master slice) Super Mini.
	HITAC E800	IBM 370 compatible	32bit Mini Computer	TTL (master slice)	Asahi Works	ECL(master slice) Super Mini.
Microcomputer	HD 6301/68000	Motorola 6801/ 68000 compatible	8/16bit Microcomputer	CMOS/NMOS	Musashi Works	17 → 4-6 CMOS 32bit Processor



High Speed Color Graphics Display System GD-30

Items		Specification
CRT	Size	20-inch diagonal
	Scan	Raster scan (Interlaced 30Hz)
	Resolution	1024 × 1024 points
	Color	256 colors from 4096 possible colors
Segment Buffer	Addressable points	$(2^{23} - 1) \times (2^{23} - 1)$ points
	Storage	80,000 lines (1M Bytes)
Local Transformation		Zooming Panning Scrolling
Primitives and Display Speed	Graphics	Line 30,000 lines/sec. Circle 700 circles/sec. Area Filling . . . 3,000 areas/sec.
	Character	Alphanumeric . . . 2,400 chars/sec. Kanji 1,200 chars/sec.
	Image	Monochromatic . . . 4.3 μ sec./pixel Color 12.0 μ sec./pixel
Market		Computer aided design

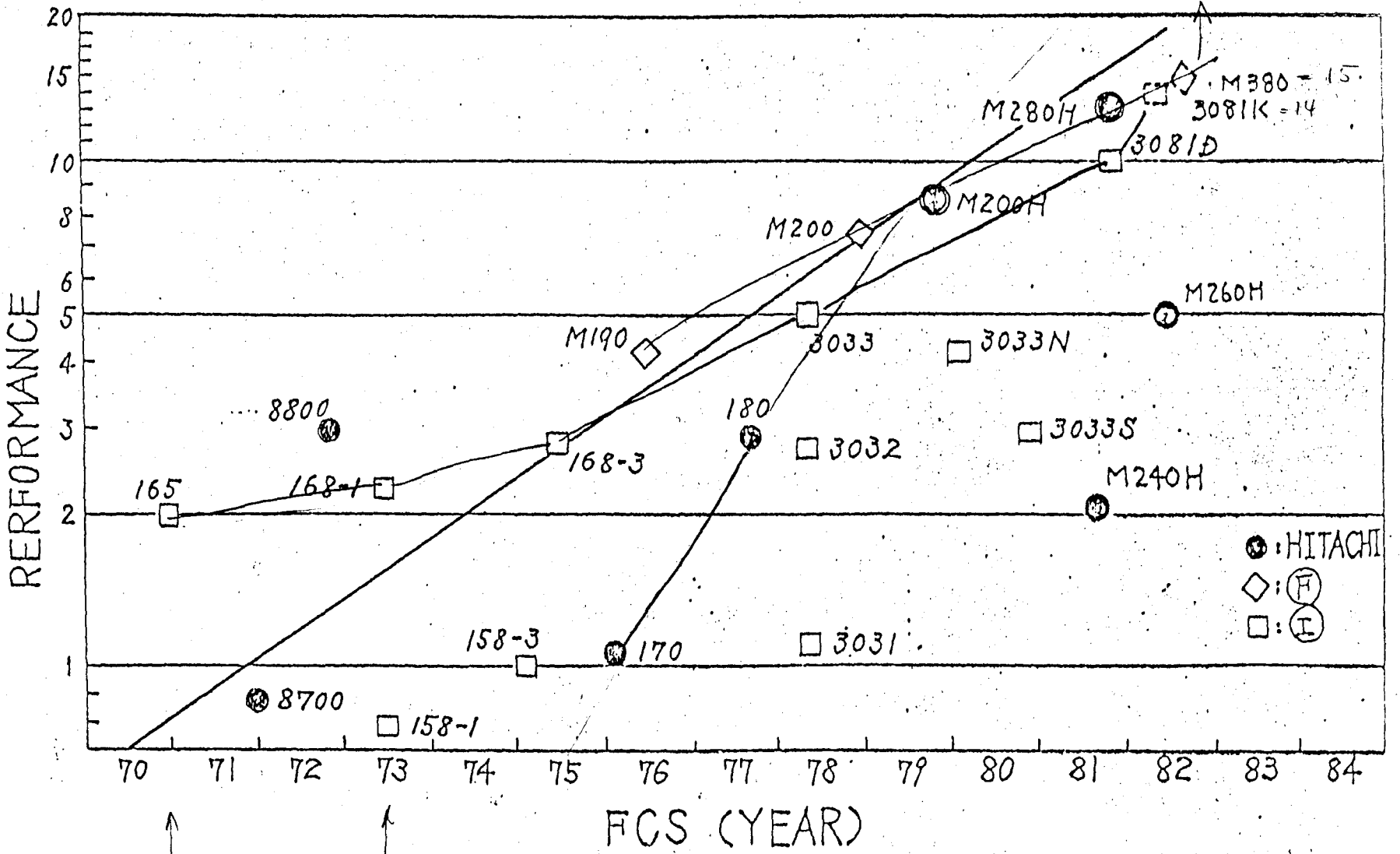
→ Operations Committee, -PEG

godun

ret

next 382 will
23m
382 = 27m
(2pc)

TRENDS OF LARGE CPU (plotted by Hitachi)



↑
365

↑
370

95

A5

P5



FUJITSU LIMITED

1015 Kamikodanaka, Nakahara-ku, Kawasaki 211, Japan.
Cable "FUJITSULIMITED KAWASAKI" Telephone (Kawasaki) 044-777-1111 Telex (Kawasaki) (3842)122

Japan

*Japan
Director*

AGENDA FOR VISITING TO FUJITSU LTD

Head: Be #1

GUESTS
Mr. Gordon Bell Vice President, DEC
Mr. T. Kobayashi Manager, JAPAN Technical CTR for DEC

DATE June 25, 1982

PLACE Fujitsu Kawasaki Guest Room B (a.m.)
Fujitsu Head quarters (p.m.)

*• Mainframes,
• Supers
• Gate Arrays!*

SCHEDULE:

<u>TIME</u>	<u>DISCUSSION ITEMS</u>
9:30 - 10:00	Greetings
10:00 - 11:00	Introduction of LSI and OPTICAL DEVICES
11:00 - 11:30	Visiting tour of OPTICAL TRANSMISSION SYSTEMS <i>(transmission)</i>
11:30 - 12:00	Visiting tour of COMPUTERS <i>> 300K</i>
12:00 - 13:00	Lunch
13:00 - 14:00	Moving to Head quarters
14:00 - 14:45	Meeting with President YAMAMOTO <i>380-15</i>
14:45 - 17 30	New computer technology <i>new with 25Mps</i>

Gen. Director G.A. Business

ATTENDANTS

Dr. M. Yasufuku	Executive Director
Mr. H. Ino	General Manager IC Group
Mr. H. Masunaga	General Manager Bipolar IC Div.
Mr. T. Hiraguri	General Manager Computer Main Frame Div.
Mr. I. Nakajima	Manager Computer Engineering Dept. Main Frame Div.
Mr. A. Miyata	Manager of Optical Transmission Engineering Dept.
Dr. Y. Fukukawa	Assistant to General Manager Semiconductor Group
Dr. M. Shinoda	Deputy Manager Semiconductor Advanced Planning Div.

*121 LSI 11K
13 Bipolar
14 Logic
GA 400 cells
1600nm 1300
350ps
4hr run*

*100-300
Design Centers
in Bos, DAL
Santa Clara
ICL using
2K gates 1.5ns,
3 input
8K gates, 2 input, 2.5ns
CMOS*

(Have transferred G.A.s to Production!)

Can handle 200 gates per chip
Design centers in Boston, Vellore, Santa Clara

ICL also using

Trends

- BIPOLAR TECHNOLOGY TREND
- ECL gate arrays
- CMOS " "
- MOS memory

Pushing
Pin Grid Array
Package.

MAY 20TH , 1982

FUJITSU

— FUJITSU LIMITED —
Proprietary & Confidential

(GATES)

1×10^4

5 x

2 x

1×10^3

5 x

2 x

1×10^2

GATE DENSITY OF GATE ARRAY

- : ECL GATE ARRAY
- : ECL GATE ARRAY
(EXPERIMENTAL)
- △ : TTL GATE ARRAY

1965

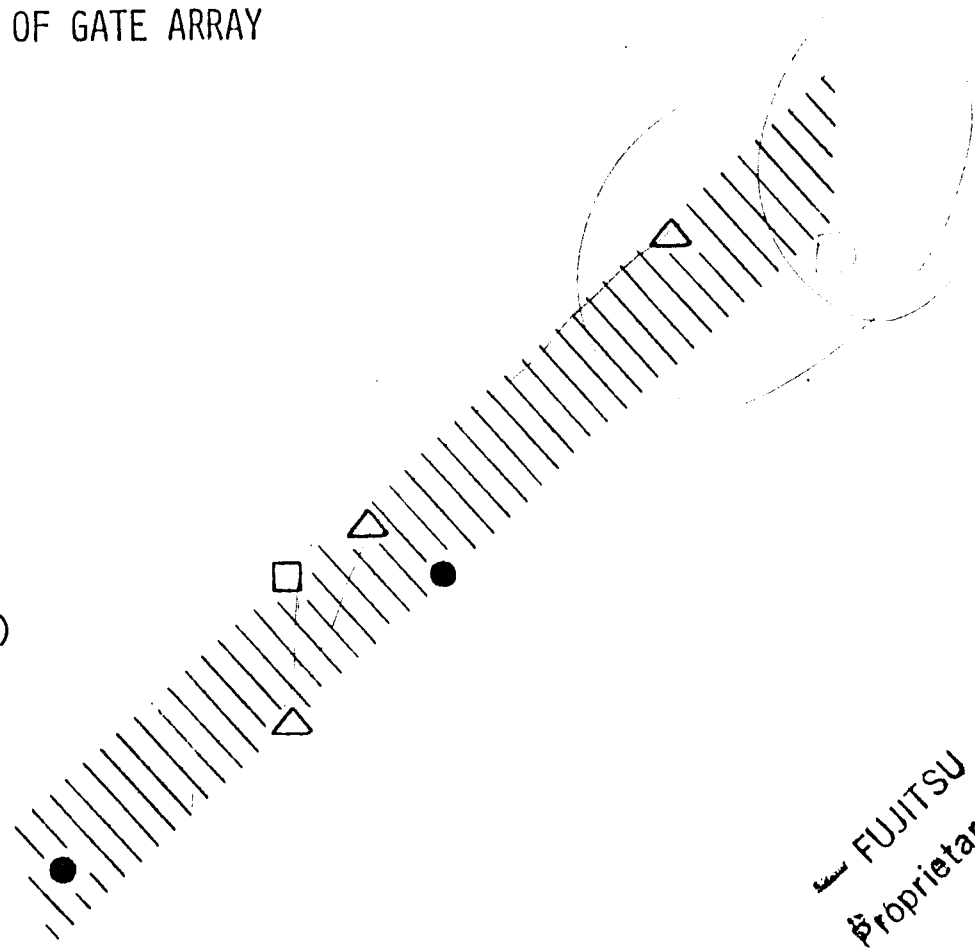
1970

1975

1980

1985

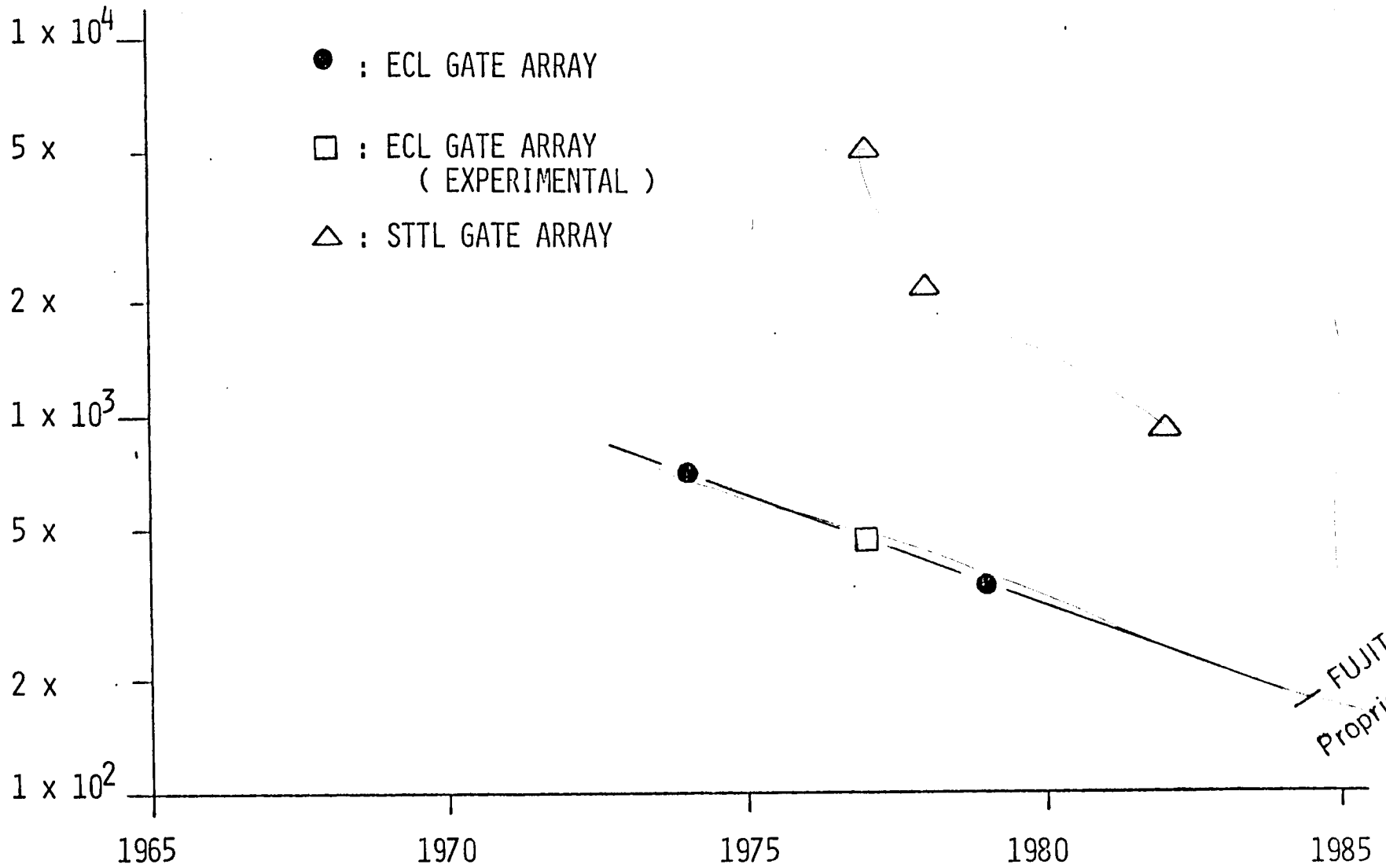
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- : ECL GATE ARRAY
- : ECL GATE ARRAY
(EXPERIMENTAL)
- △ : TTL GATE ARRAY

(PICO SEC)

GATE SPEED



FUJITSU LIMITED
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1985-86

Very sure about this target

	CURRENT		FUTURE		UNIT
	ECL	TTL	ECL	TTL	
GATE DENSITY	400	2000	2000 - 5000	5000 - 10000	GATES
STRUCTURE	BASIC : PRIMITIVE GATE MACRO FOR LOGIC DESIGN		BASIC : PRIMITIVE GATE MACRO FOR LOGIC DESIGN + RAM ?		
CHARACTERISTICS OF INTERNAL GATE					
T _{PD}	350	1000	200	500 - 800	P SEC
POWER	5	0.65	1.5	0.1 - 0.2	MILLI W
P.D	1.8	0.65	0.3	0.1	P JOUL
POWER SUPPLY					
INTERNAL GATE	- 3.6	+ 2.3	- 3.6 & - 2	≠ + 2	V
EXTERNAL GATE	- 3.6	+ 5	- 3.6	+ 5	V
OFF CHIP CHARACTERISTICS	ECL 10K COMPATIBLE R _T = 100Ω	LS TTL COMPATIBLE	ECL 10K COMPATIBLE R _T = 100Ω	LS TTL COMPATIBLE	

3w + 100x
= 5 watt

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350.

auth
1.5 m/s

FJ ECL GATE ARRAY

4.5 m/s
2.5 m/s

CIRCUIT

CS-EF TYPE ECL CIRCUIT

ORGANIZATION

400 GATES / LSI

84 PINS / LSI

SIGNAL PIN 76 PINS

GND & VEE 8 PINS

CHARACTERISTICS

I/O LEVEL \approx ECL 10K LEVEL

T_{PD} 0.35 NS/GATE (TYP)

POWER 2.7 W/CHIP (TYP)

PACKAGE

84 LEADS FLAT PACKAGE

1 Big fan
also SW

FUJITSU GATE ARRAYS

FUJITSU

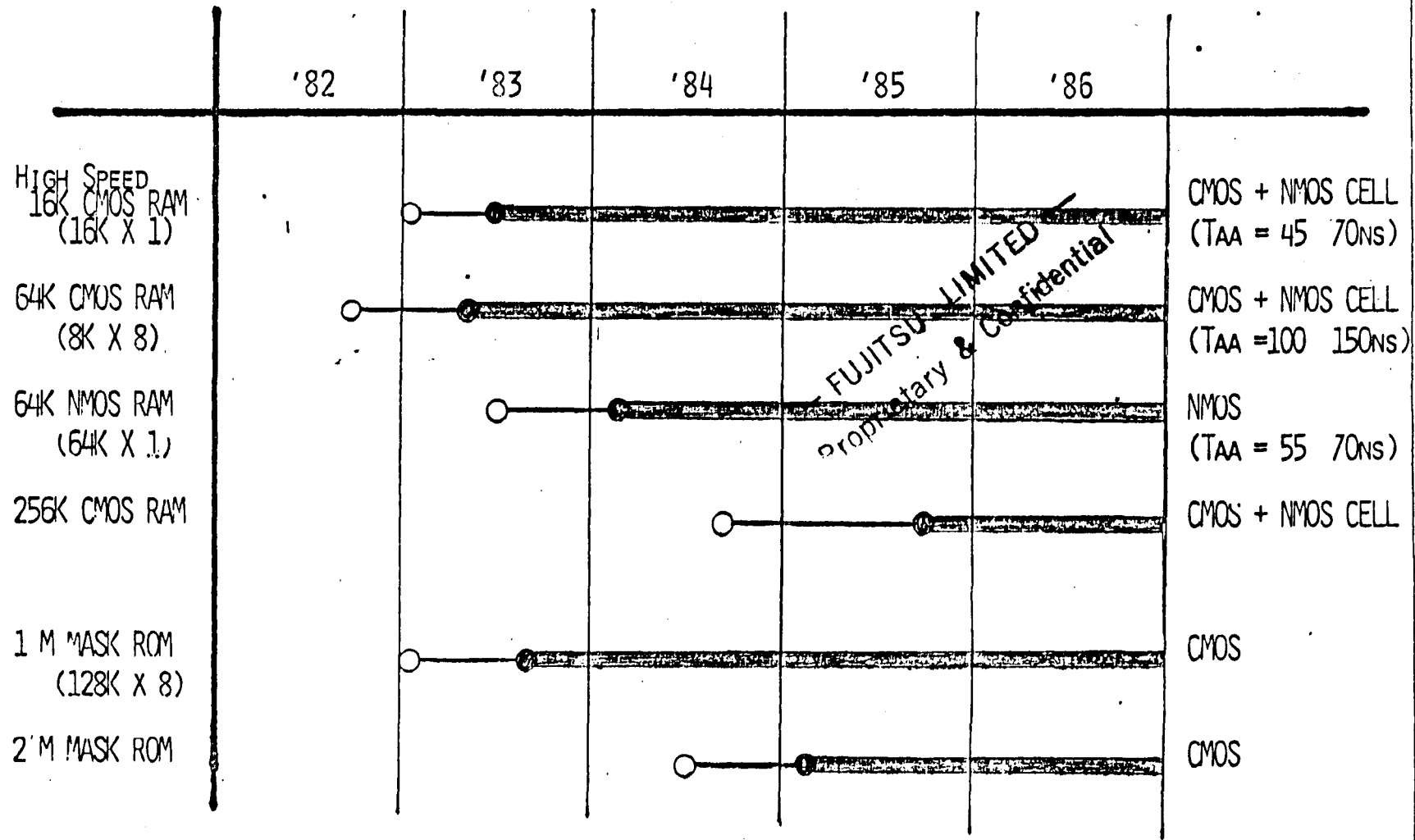
TECHNOLOGY	DEVICE NAME (DEVICE NO.)	INTERNAL CELLS	DELAY TIME(Typ) (INTERNAL CELL)	POWER DISSIPATION
LSTTL GATE ARRAY	B-200 (MB14000)	208 (3-input)	6.5ns	1.8mW/cell
	B-500 (MB15000)	512 (3-input)	2.2ns	2.3mW/cell
	B-2000 (MB17000)	2108 (3-input)	1.5ns	0.65mW/cell
Si-Gate CMOS GATE ARRAY	C-770 (MB62000)	770 (2-input)	7.0ns	50mW/PKG at 10MHz
	C-1275 (MB63000)	1275 (2-input)	7.0ns	50mW/PKG at 10MHz
	C-2000 (MB60000)	2000 (2-input)	7.0ns	50mW/PKG at 10MHz
	C-3900 (MB61000)	3900 (2-input)	7.0ns	100mW/PKG at 10MHz
	C-2000H (MB60H000)	2000 (2-input)	4.0ns	50mW/PKG at 10MHz
	C-3900H (MB61H000)	3900 (2-input)	4.0ns	100mW/PKG at 10MHz
	C-8000VH (MB66VH000)	8000 (2-input)	2.5ns	100mW/PKG at 10MHz

GATE ARRAY



STATIC RAM / MASK ROM FUTURE PLAN

JUNE '82



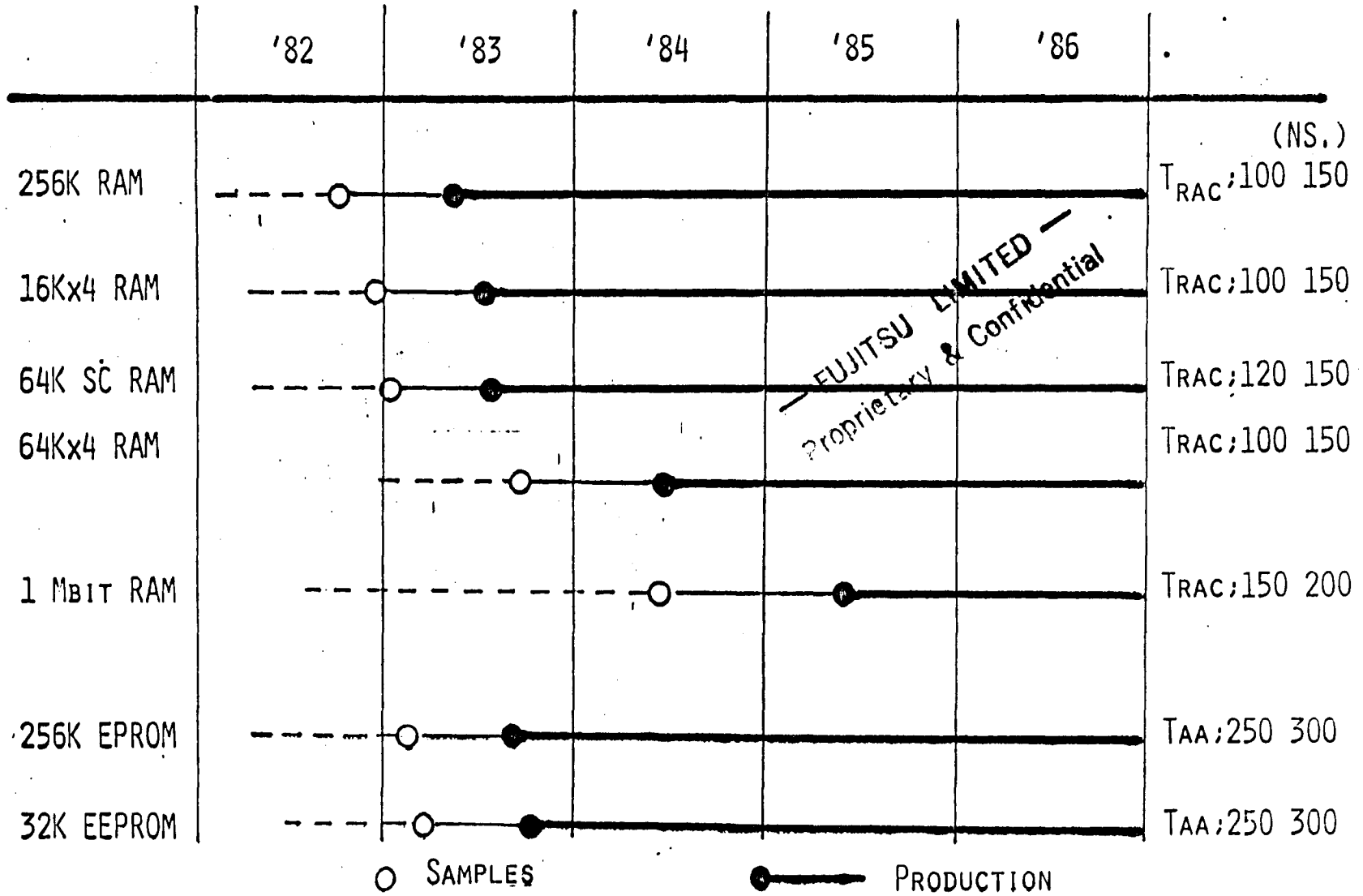
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○ ES
● PRODUCTION
MOS MEMORY



FUTURE PRODUCTS PLAN

JUNE '82



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MOS MEMORY

Mr. Gordon Bell's Visit to Sony

July 1, 1982

Mr. Gordon Bell (Vice President, Engineering,
Digital Equipment Corporation)
Dr. Tsutomu Kobayashi (Director, DEC Japan Engineering Center)

Schedule

10:00 - 12:00

Discussion and Demonstration at Headquarters

Subjects: Application of MAVICA
Application of Digital Audio Disc
Others

Attendants from Sony:

Dr. Nobutoshi Kihara (Senior Managing Director)
General Manager
Development Center

Dr. Masahiro Mizushima, Manager
R&D Planning and Coordination

12:00 - 13:30 Lunch (with Dr. Mizushima)

14:30 - 17:00

Discussion and Demonstration at Atsugi Plant

Subjects: Micro Floppy Disc
Personal Computer
Video Disc

Attendants from Sony:

Mr. Masahiko Morizono (Senior Managing Director)
Director
Communication Products Group

Mr. Yoshiro Kato, General Manager
Information Products Div.

Mr. Shinji Tomita, General Manager
Application Project Dept.,
I. P. Div.

Mr. Kenji Hori, General Manager
Microcomputers Applications Dept.,
Video Products Div.

SUBJECT: ~~SOME FIRST IMPRESSIONS OF JAPAN~~

MEMO TO: ~~OOD; OC; J. Bell, Don Frost,
Ron Smart, Carl Janzen, Dick Yen,
Bill Green, Steve Coleman,
Dave Ballantine (Melbourne),
Max Burnet (Sydney)~~

Here are a few brief first impressions of Japan (having visited /ok Sony, NEC, Fujitsu, 5 Universities and a Gov't Lab). As you see below, I'm impressed with their intense drive, technical ability and will to win. Also, I position my understanding of factors which support what I believe is a basic goal to dominate the computer market...just like they do other (especially consumer electronic) markets.

This is a one-sided view as to their ability to win in our market...I didn't see things to get in their way.

I was prepared to dislike the Japanese because they had been so closed and absorbing of our technology and work. I could not help but like them; they were generally open. Now, I fear them more than I was prepared to. Here's why:

1. As a group, they're (industry-government) are the most competitive. It's really built into their culture and reinforced by training. The only reason they aren't competing in minis is they're still enamoured with competing with IBM and building mainframes e.g. Fujitsu's new M200 technically dominates the new IBM3033 and Amdahl V7 machines. (we must worry because of what they've done in quality cameras/optics, textiles, small cars, radio, TV, tape recorders, watches, calculators, their position in semiconductors and semiconductor making equipment, typewriters, sewing machines, etc.) This also drives them to fast response and hard work.
2. They're excellent engineers and tend to be less NIH-oriented than us. This is derived from having less egos, although there is a strong group ego! Japan has aculturated customs technology, etc. from everywhere for centuries. In the 16th century they apparently set up manufacturing of guns/gunpowder in 18 months once the Portugese brought them in. Any good idea is fair game (subject only to strict patent technicalities). Having adopted an idea they want to understand it and improve it. (This can be seen looking at progress in all the above plus the research they do).

3. The current computer manufacturers have a complete line of peripherals, and set of test and manufacturing equipment, taken from copying and improving counter-part U.S. products. [Just as we all learn something from touring another facility, so do they. Should we avoid having them visit our plants? We have to be careful about our discussion of technology!]. Here, I'm somewhat ambivalent because I think we should trade - buy/sell - with them. We (DEC - especially the 11, DG, HP) clearly influenced their minis.

4. All of the manufacturers have acquired their technology over a 10+ year history of dealing with U.S. manufacturers either as a joint venture or under license: Fujitsu (Amdahl/Siemens); Hitachi (RCA); NEC (Honeywell, GE, Varian); Toshiba (Honeywell, GE, Interdata); Mitsubishi (Xerox), Oki (Univac - actually joint venture); Yokogawa (HP); Nippon Minicon (DG). In all cases, the technology has been improved in terms of quality and manufacturability. For example, in the case of the Amdahl technology (that was at least started at IBM), I suspect Fujitsu is one of the few companies capable of manufacturing the miniature/hi-density PC Boards, backplanes and small cables.

5. They seem to be less oriented to technology for its own sake versus what it can do for them in the longer run. For example, they moved more rapidly into gate arrays for their computers earlier. (Maybe Amdahl's influence). They clearly think both product and process together in what is a longer term view. (Here, let me reiterate: We must clean up our processes or they'll win by default. We can't make one shot products on a rigged up, ad hoc process). Again, here they're competitive and they orient the processes to 1. Quality first, 2. Volume second (for growth) and 3. Flexibility and turn-around in order to support the volume. This gets into:

6. The Japanese orientation is a strongly engineering versus strongly science based culture! (We - the U.S. - do their research, so why should they bother?). This comes about because of the competition through manufacturing and novel products and their total dependence on export/manufacturing. For example, much of our federal training, funding comes through the NSF, ARPA and armed services for research. Their funding comes through MITI (Ministry of International Trade and Industry). There's rotation among design and manufacturing engineers. They do have good central research staff and their flow appears to exist to the development groups. They both think they're on the same team. - In contrast, research in many of the large U.S. corporations is a vast waste, e.g. GE, Westinghouse, RCA and Univac the work is usually behind the average development and totally decoupled. It's clear how TV, Radio and recording was lost, but the engineers had help because:

7. We (U.S.) have a higher regard to business training versus engineering training. They're in good shape because they don't yet have all the business schools. Therefore instead of getting MBA's their students get engineering masters. This not only makes them better engineers, but doesn't reinforce the notion that engineering is the route through to the management ladder or that an MBA is automatically needed if one is to supervise people. The MBA, oriented at every dual career person being president, and epitomised by the content-free case study methodology, focusses on the quick buck. This is in contrast to the Japanese concern for the long term (an overall theme).
8. They've read the Boston Consulting Group monograph and are volume (and growth) oriented, subject to the quality-first constraint. Knowledge of the learning curves is everywhere even the government research labs and universities. Their needs and goals are manufacturing/trade/industry oriented. This also means, like TI that they're willing to dump and lose money for the short term in order to gain the market. Although they put on a good act that their products won't be competitive when the yen is so strong having gone from 300/1\$ to 100/1\$ it's a big ruse because:
9. Roughly speaking, they have systematically transformed American business from inventor-manufacturer-distributor to simply distributorships. This is in complete keeping with the goals of American business and the modern business school Horatio Alger such as RCA, GE, Chrysler, etc. No investment, no planning, no risk, these simply distribute products for the Japanese and roi, profits look fine. All a person has to do to be successful is buy the right product for resale. RCA/GE don't have to worry where the money comes from to pay the Japanese (or Arabs). On the other hand a group who can only run a distributor is probably fairly top heavy and can easily be replaced say, be a hard-working Japanese group.[A solution here is to make someone at the Commerce Dept. responsible for each area. This should include the joint planning with industry and the prohibition of current manufacturers from being importer/distributors. I.E. RCA would not be allowed to remain in the business and import. The responsibility for an industry has to be delegated!!]
10. There's no way we can re-enter various lost businesses now that we're just a distributor. The spirit, understanding to develop and manufacture are gone. It's too easy just to distribute. there are now no decent American TV, Radio, Hi-Fi, or video recorder products/manufacturers for what are basically indigenous U.S. products and which the first invention or key patents apply!

Somehow, these industries and companies have been grossly mismanaged. (I also blame the Dept. of Commerce - a faceless, leaderless nobody!). How? Why? It can easily happen to us!

11. They're more long versus short term oriented. Their history encourages this. They're capable of waiting us out in an area because we're so big bang (product) oriented and because they want long term business domination. NEC, Fujitsu and Hitachi unlike Xerox, GE, Westinghouse, RCA have all persisted with computers and now appear to be winning! this timeliness certainly affects their thinking on quality, and lastingness both in markets and products.
12. They believe computers are fundamental for the long term and they're prepared to wait. Machines are used in all products they build for export and they save labor - and labor is precious expensive in Japan as there are only 110 M people and 2% unemployment. They're considering raising retirement from 60 to 65 to get the extra productivity. They need computers to raise productivity! This is vital to their domination of manufacturing. (This is the opposite of the Australian attitude where there is high unemployment and a need/belief that computers must be eliminated. Australia is now almost totally dominated by Japanese products).
13. They are willing to give up profit for growth. For example, RCA is on a rug maker (or distributor), car rentor, book publication, TV. Distributor etc., instead of an electronics company that really pioneered the T>V> Whereas there is extreme pressure on business for profit and return on investment, these factors are less in the Japanese companies. Sony is quite profitable, Fujitsu does relatively poor financially and I'd bet NEC or Hitachi computer divisions might even lose money. For now, they may still be buying in - clearly more acceptable than GE, Xerox and RCA. (This makes them doubly hard to beat...since they can lose money on every one and make it up in volume. They'll buy this business - DUMPING! and why not?).
14. Products are quality/detail oriented versus being the ultra-high volume, low-quality throw-away types. These are characterized by say Sieko (versus Timex) and anyone of their cameras say Minolta (versus Kodak or Polaroid which assume an idiot user with no concern for quality picture, but must have it now...again the time attitude). For example, while they make no instant cameras, perhaps due to patents, when they do they'll be quality.

There are zero defect signs everywhere! In the Sony VTR plant there was no burn-in of the recorder. All subassemblies had been inspected and tested. When it was put together it worked.

15. They are compulsively clean. In an indirect way, this really helps the manufacturing of small, precise goods (e.g. cameras, LSI, high-speed computers, some disks).

16. Even though they have a concern for long term, they work the short term very hard. This may follow from the competitiveness/growth. They engineer for quick turn around, they have good processes and the engineers at these large companies work very hard. The official work week is 40 hours, but a more accepted pattern is 50-60 hours....particularly to maintain schedule or to win against IBM, Amdahl or Hitachi (if you're at Fujitsu).

17. As the head of our Osaka sales office put it: the Japanese live to work versus the American need to work to live. He claims this is instilled at birth and trained. Work is a central theme, and the companies go through extensive screening to hire for life - e.g. some companies only get graduates from certain universities. Housing is provided for the workers and they have what amounts to a lifetime contract. This is bad if a person's incompetent, it also means that it's hard to breathe different life into an organization. On the other hand turn-over is low to non-existent and a team spirit clearly develops as the various members learn to work with one another.

Their physical condition certainly reflects this work ethic too! On one hand there is a great deal of smoking, although a campaign is in progress to reduce it. However, nearly all Japanese are trim versus being basically overweight. Their diet (including excellent raw fish and vegetables) are conducive to trimness and better health, I'd guess. Although alcoholism is supposedly on the rise, the consumption in business I saw was certainly less than in the U.S.

18. The long term, quality products makes them build products that are hard to beat on a life cycle basis. While it isn't clear they really consider all life cycle costs, their cars now get good ratings - even though they may be designed to decay rapidly after say x years/y miles. In the case of computers they always build multiprocessors because their customers invariably buy and want upgrades. Since IBM rents, the multiprocessor approach hasn't been developed. The multiprocessors they sell are also for better Reliability, Availability and Maintainability. They seem to do a better job considering life cycle costs than we do!

At a government/society level they appear to have their act together much more than we do. In both newspaper stories and in their products they seem to have clear, crisp ranking of goals and priorities. For starters, they know them, whereas nearly all our issues that start out simple become entangled as everyone (a new set of referees) enter the fray (e.g. human rights vs equal rights, full employment vs inflation, balance of payments, environment vs region vs country, capital vs labor, consumer protection vs business protection), but worse than a muddy set of design criteria is a muddy set of decision makers and an unclear decision process.

Because of the need to export, there's very good support for engineering and many go into it. There are comparatively few lawyers, (factor of 2 per person), so the emphasis is on physical output rather than paper and intergroup contracts and bickering among semantic accountants.

20. INVESTMENT

As a simple explanation, more money is available for investment because of lower taxes. This clearly affects their ability to invest in industry. They're supposed to be willing to pollute for profit....I didn't observe this. (Maybe they only kill whales outside of Japan and pollute other environments). Their environment is fin - though high density. On the other hand, taxes can be low because:

21. Their Government spending for military is far less. (Nearly non-existent). Although there is some fall out of our military spending for computers and related research, it's small compared to what it could be if there were more directed goals such as the Japanese export goals. It's not clear what these goals should be.
22. The Japanese don't have the waste federal research expenditures such as NASA and the Energy Department. (Here again, they can rely on us if there's any output). These are big expenses and contribute little. The Energy Research seems to still be the old Atomic Energy Commission, but dressed in new clothes. The labs do about the same work, with essentially no output. (At least at the AEC, their goals were clearer and we had a consistent flow of big computer bangs....plus a constant market that's motivated to provide computers). Here, the Japanese do some nice work in regard to funding and managing research flow. Their labs buy versus develop in a vacuum with no way to get the flow.

3. MITI and other labs fund other laboratories and corporations to carry out research that's oriented to getting experience that will assist products. This not only provides a system of checks and balances, but provides an incentive. This minimizes what I call the "dusty-lab syndrome". Many of our government and federally funded labs were initially set up for a mission, and once the mission has been completed, the lab continues to exist. Since there's no real need or mission or review, negligible new work is output. (Recall visiting labs in which the dust is blown off the equipment for visitors and the same demo is run year after year, the same equations are on the board, with the same usually vague, unattainable, immeasurable goal for the research). A buyer-seller relationship can help check this to some extent. Also this brings the groups together and technology transfer is more likely to take place.

For example, NBS is setting up a lab to do standards research and industry is free to contribute interns to them - this is ridiculous! A more fruitful way to bring about the standards is to subcontract several approaches and have industry develop and report on them with NBS. In this way the staff is minimized at NBS which will be obsolete and impossible to acquire) but they will get more quality through their buyer role. Foremost, there's a reason to interact.

There's a good understanding about the research flow mechanism. They use all sorts of techniques. Organisation, people-rotation, having many visitors to the U.S. Labs, buyer-seller, space, etc. but they do have the concern because of the limited number of people. We seem to have too many doing too little with no concern for output.

24. Overall, MITI appears to be very strong and competent! The goal of MITI/industry is a strong industry! this is in contrast to our Department of Commerce which appears to have the standard 9-5 bureaucrat who are in it for either security or power - but with no real way to make anything happen. Nor is there any measure. I don't know what's missing that they have (just quality people - as Reishauer suggests, the right longevity, power, process, maybe they segment responsibility and measure results with reward based on performance (e.g. winning in a trade area)). In a few samples, I believe it's simple people quality, and the right process enabling them to accomplish something. Being responsible may be the key variable. Here, this suggests we could probably eliminate the Dept. of Commerce and have no real change except more output.

25. While there doesn't appear to be Japan Inc, there is clear collusion (planning etc.) among the government, and companies. They actually plan to win! This includes basic strategy setting among the players to segment and go after various markets (e.g. Fujitsu/Hitachi are 370 plug compatible). The companies can talk to one another and do, but certainly compete intensively with one another.

Japan is quite a closed society and market. As the most powerful, homogenous culture there is a long history of this. A quick trip, a pass through Reischauer's book, the Japanese and an explanation of just a part of the tea ceremony make this vivid! Two years is a frequently quoted number to begin to understand this.

26. The language is a code to further segment. It's not clear how difficult it is to learn, but it's probably relatively useless without the societal understanding. We don't teach Japanese widely. On the other hand the technically trained Japanese have maybe 6 years of English in order to read the literature. (this is probably a good reason why we should use OEM's to enter the end user commercial market versus translating the many manuals. On the other hand, the lab, industrial, educational and engineering market may be open without extensive mail translation.

27. The tariffs support the establishment of any industries they target. Now the computer import duty has been reduced, but I doubt if this matters much since their industry is strong enough to withstand imports!

28. By the society and the emphasis on personal relationships (not clear they're any more than French) it's hard for foreigners to break into or sell, especially on a one shot basis. (It remains to be seen whether an American manager say, could set up and effectively manage a Japanese office.) "Doing business" together appears to be done over a long time period and is almost ritualistic.

29. There is an amalgamation of the Japanese within an industry which creates something that's often referred to as Japan Inc. (I think the Japan Club is a better name, because there's at least a show of competitiveness at the market level). Not only is MITI supportative, they also appear to dictate. What's worse is they interact with industry in what appears to be a helping way as described above. For example, DEC products were in the Computer Engineering/Science Depts. when the 11 first came out, but with a Japanese mini industry we really don't sell there. I'm sure it's because of their recognition of this market (also they discount heavily in the universities and consider it a prestige sale)...there may even be some special tax incentive. There is incredible pressure to buy Japanese products!

The high cost of labor, limited population and full employment coupled with few natural resources, creates some interesting by-products.

30. The pressure to work is fed back, creating more work and output, since everyone is working.

31. Inventions is to labor saving devices. I saw countless gadgets of this form. All the printers at computation centers had paper cutters on them with conveyors to bring output back to a single station. There are NO computer operators, tape mounters, etc. running around!

32. There's real concern for saving of physical resources too. At the computation centre, printout isn't automatic; it's queued and must be requested by badge reader, (also, lights - always flourescent due to efficiency - are off in the computer room - the console is external with only one or two operators!). Of course small cars, taxis, a good train/subway are other indicators. The cars have bells that ring when the car is going over 100kmh!

C's
Printers
Tapes

33. There's measurement of and pressure for efficiency (i.e. work out/work in is high). In a taxi, there's an automatic back door opener so that the driver can load/unload faster. Of course, the factories graph everything. It feels like the notion of efficiency is taught to all.

34. Everything runs on time and at full capacity. (Trains, planes, a supply of taxis, buses and especially meetings, tours, etc.). This is in contrast to the habits we've gotten into on scheduling and performing at meetings!. Also, Yu Hata did an excellent job of scheduling customers, manufacturers and sightseeing. I accomplished roughly twice as much per day as in another western country.

35. There's orderly queueing at each server. The Japanese appear to be the world's best self-queuers. There's probably some protocol for resolving races when two persons arrive to the queue at the same time.

*NTT info
with W.C.*

36. There is a range of basically human/personal concern. While the subways and trains jostle people pretty badly (at high density), and there's not segmented smoker areas (and many smoke), there's great concern for the feeling/privacy/treatment of individuals. Perhaps I had special treatment, but on arrival/departure at every organization, we were given hot cloths for refreshing (it was hot and humid - but taxis and all buildings had A/C), and either tea (occasionally coffee - to be really considerate of a westerner) or cold juice. The hotels though incredibly expensive were the best I'd ever stayed at in terms of quietness, service and general treatment. This included a large, but very well run chain hotel in Tokyo. In Kyoto I stayed at a tiny (15 room) old style, old Inn and only once did I ever see any other guests (at the front door). The goal is to make certain that guests are totally alone, with incredible attention to simplicity, design and detail (e.g. there was a cloth cover over the telephone because it didn't fit the room decor).

Of course, the food is the ultimate in personal concern. Food served in 7, 9 or 11 courses varied from raw fish to pickled vegetables (e.g. potatoes) and flowers (lotus blossoms) with lots of seaweed and fish and fish eggs. There are western-oriented food like tempura (deep fried), hibachi grilled meat and fish and teryaki. at the first of the week we had western/continental/universal-style food because our hosts were concerned and then we asked to have only Japanese food. We ate nearly everything (there's one kind of seaweed I found unpalatable). Of the sandwiches we had, the bread crusts were removed. There was much concern that the colors of the food matched - the physical looks were important.

There are Japanese baths, and these are great too!

37. Products are designed for people with attention to detail. The styling happens to be also attractive to others, but their technical, gadget-orientation really biasses them to designing technical looking, knob-intensive products (hi-fi, complex watches, cameras, etc.). It's probably impossible to have them design a product like the polaroid one-step camera. (Emotionally, I doubt if the designers can do it based on the picture quality.) Color monitors were used to control the larger machines.

38. Contrary to expectations they are working the environment issue. There were U.S. environmental people there at a conference and the Japanese were politely ignoring them...and taking their conference registration fees. Nearly all cabs are LP gas! Although they're physical comfort oriented, they do work the resources too.

39. They seem to do "bottom-up" product design versus "top-down" market planning as typified by the expensive, heavy, multi-volume market surveys. These usually report history and extrapolate it in a self-perpetuating fashion. Using this approach, we continue to build heavy, gas-consuming cars because the market has historically bought them (given few alternatives). They look at the needs, and take existing ideas (designs) and improve them.

EPILOGUE

get metrics on products

On arriving at Sydney, I was struck with the contrast to dense, intense, humid and hurried Tokyo. I was ecstatic to get back (after 20 years) to a life style, people and place I really like:

Sydney's beaches are the world's finest; the weather's great; people spend lots of time out of doors with sports, strolling and simple gardening (versus the subtle and very complex Japanese gardens); work starts late, runs slower and ends promptly; and the food (universal/continental/western), beer and wine are drastically improved having moved away from the early English influence. I look forward to a last weekend stroll. I'll enquire about the best reef for SCUBA diving (on another trip).

Thinking about all those Japanese competing with the Arabs to buy American and Australian mines, property and factories is certainly most remote in my mind and smacks of work.

Besides, does it matter who owns us? Will they interfere with our way of life? Maybe we'll change them and make them lawyers rather than manufacturers. If enough of them come to live abroad very long we'll be back exporting.

to: Patti Anklam
for editing.

U.S.?

HOW THE JAPANESE HAVE CONVERTED WORLD INDUSTRY INTO DISTRIBUTOR

Gordon Bell

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l.c. The ~~Island~~ of Japan, with few natural resources and ^{over} ~~about~~ 100 million people, virtually dominates the production of all manufactured consumer goods, including the components and processes to make these goods. The ^{United States} ~~U.S.~~ still holds a dominant position in ^{the production of} computers and semiconductors, But the Japanese are ^{now} setting out to dominate these industries. Unwittingly, U.S. industry and government continues to aid in this process. [Forty odd reasons are given to support this conjecture, each one providing a lesson that can be applied in the U.S.]

The Japanese have progressed from domination of ^{commodities} ~~low-technology/simple~~ ~~commodities~~ to complex manufactured goods, ^{beginning with} ~~i.e., from~~ textiles, steel, radios, sewing machines, typewriters, ~~quality~~ cameras/optics, small cars, ^{television} ~~tv~~, tape recorders, ^{and} watches, ^{they have progressed to} calculators to semiconductors. Their current position in semiconductors and semiconductor-making equipment indicates they are well on target in their plan to dominate this manufacturing as a base for electronics and computers. High-technology

the future domination of the market in

①

②

industry is ~~on its way to~~ ^{increasingly} being concentrated in Japan ^{while} and the less desirable, Japanese-owned low-technology textile and automobile factories are being located in the U.S. (3)

STRATEGY, TACTICS, AND COMPETITION

Japanese industry and government operate as a team, reinforcing strategy and tactics ^{while allowing} with appropriate levels of competition. [Unlike many companies and countries that have tried and failed, they ~~have carried out a plan to~~ successfully ^{planned and} build a mainframe computer industry. The recently announced Fujitsu M200 computer appears to be the highest performance, most reliable, plug-compatible 360/370 yet announced. The technology, originally from the Amdahl Corporation, was improved and put into manufacturing within six years.] (4)

The Ministry of International Trade and Industry (MITI), with autocratic power, helps to amalgamate strategies within industry groups creating something that is commonly referred to as "Japan Inc." For example, MITI identified ^{the need to (?)} and encouraged early import of Digital Equipment Corporation computers in order to build their own industry. One of DEC's important interactive data base systems, MUMPS, was bought for six applications. Then MITI funded the development of MUMPS on a Japanese Mini. In mid-1978, a Japanese researcher asked me, through an academic channel, for the internal architecture of MUMPS in order to study its structure from a so-called computer science viewpoint. Because there is no direct ^{government} control, ^{and because} (5)

I prefer not to use the term "Japan Inc." but to name the phenomena The Japan Club, since ^{is} there's a show of competitiveness at the market level, (6)

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The U.S. has no equivalent of MITI ^{to} protecting major corporations as national resources. In contrast, in the U.S., corporations are looked on as adversaries to the national interest. IBM, already under attack from Japanese competition, is also under the gun from U.S. government agencies. Together they are likely to destroy this resource, leaving it as a distributorship for Japanese products. ? destroy IBM

The strategy of MITI and the Japanese companies to win dominance of the computer industry is clearly evidenced, but it is ^{not understood} ~~incomprehensible to the~~ ~~thinking~~ by U.S. government and industry. The Japanese companies ~~both~~ plan and talk with one another while maintaining competition in limited domains, (?)
For examples
~~While~~ both Fujitsu and Hitachi have developed IBM plug-compatible machines, ⁱⁿ
but Hitachi is concentrating on the internal Japanese market against IBM Japan ^{while}
and Fujitsu is concentrating on exports.

Coupling individual companies for technology ^{ical} acculturation is a well-known management technique to make technology gains quickly. In keeping with the ^{what priority} priority, MITI is ~~both~~ very strong and has attracted highly competitive people. (6)

The U.S. Department of Commerce, in contrast, has neither a plan nor the personnel to help maintain U.S. dominance in high-technology fields important to the future of the country's economy. The trade trip to Japan by Juanita Kreps only emphasizes the lack of understanding of ^{how} the Japanese ~~capability to use trade to introduce technology to their society.~~ Our
~~Trade~~ deficits cannot be turned around by hand-shaking missions, ^{the U.S. must} but demand an ~~extraordinary~~ ^{the reasons for these deficits and develop} understanding ~~coupled with a strategy and tactics to~~ ^{overcome them} implement it. (7)

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Japanese tactics focus on the centrality of work and loyalty to a company. A company screens ^{each} its new employees ^{carefully} and ~~then~~ ^{because when it hires an individual} takes on a lifetime commitment. The team spirit is engendered as the various members learn how to get along with each other. The security ^{among employees} promotes risk-taking, a phenomena generally unknown in large U.S. corporations. Quality control is in the hands of the workers. Although data is kept centrally, the analysis, corrective action and responsibility ^{rests} with the employees concerned. Such participative management ~~is not generally linked to Japan, but to descriptions of such places as the Volvo factory in Sweden, yet in Japan it~~ provides a key to the devotion to the workplace and sense of value achieved through work. ~~With low unemployment,~~ the incompetent workers ^{u.c.} become the care of the organization rather than wards of the state. Because everyone is working, nonwork is socially unacceptable, embedding the importance of work into the fabric of society.

In the U.S., the freedom of the individual has superseded work as a goal. The employee is free to come and go, and as a result companies screen very little as the tenure is not assumed to last long. A recent Intel ad claimed that no interviews were required at all. Quality control is often centralized and the organization of work often does not lead to self-esteem. [Turn-over and unemployment are high with levels of consumption also rising so that some Japanese observers have concluded that the Japanese live to work and the Americans need to work to live.]

The Japanese government has been able to nurture both large and small companies while the U.S. government agencies alienate the large and ^{can not} support the small. Half the work in Japan is done in small subassembly

8

individual it

for what?

J. employees can't quit

hard to believe!

[delete] ?

9

10

can not

operations. Competitive small shops keep the cost down .

** Tables needed comparing U.S. and Japanese distribution of companies by numbers of workers and manufacturing output in the two countries (can't make the statement, "I believe their manufacturing output is at least equal to the U.S." These tables then would provide the data for the wrap up paragraphs in this section.**

** suggest that A Chronology of Systematic Domination is placed here with appropriate comments. *yes!*

ACCULTURATED DESIGN

For centuries Japan has acculturated customs and technology. In the 16th century, *they began* ~~were~~ *for example* manufacturing gunpowder a ~~scarce~~ *scant* 18 months after the Portuguese introduced it. Any idea or product is fair game for adoption and improvement. In evaluation product and process are merged in a long term view of achieving market domination. They orient the processes competitively, considering quality, and volume for growth, and flexibility to allow for fast turn-around needed to maintain volume in a shifting market.

the All the Japanese computer manufacturers have acquired their technology within the past ten years *by* ~~of~~ dealing with U.S. manufacturers (either as a joint venture or under license): Fujitsu (Amdahl/Siemens) and Hitachi (RCA); NEC (Honeywell, GE, Varian) and Toshiba (Honeywell, GE, Interdata); Mitsubishi (Xerox) and Oki (with Univac joint venture); Yokogawa (HP); and

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Nippon Minicomputer (DG). In all cases, the technology has been improved in terms of quality, performance and manufacturability.

The agreement between Fujitsu and Amdahl Corporation, though still at an early stage, provides a good example of the classic Japanese computer acculturation process. In the late 1960's, Gene Amdahl explored the basic technology for high-performance IBM computers, as head of IBM's San Jose advanced development laboratory. ~~As an IBM employee he tried, unsuccessfully, to get IBM interested in building high-performance machines.~~ He formed Amdahl Corporation and proceeded to develop the technology. For various reasons, more capital was needed and Fujitsu bought in as an owner, acquiring the manufacturing rights to, and becoming the manufacturer for, the Amdahl line. Fujitsu was also able to use the same technology to design and manufacture computers for their Japanese market. At the beginning of 1978, both Amdahl and Fujitsu announced their latest computers. Fujitsu has a higher performance, reliability machine than either Amdahl or IBM have so far announced. Not hampered by the IBM thinking process and appealing to a buyer versus rental market, Fujitsu has produced an unorthodox IBM-type machine with multiprocessing providing users new capabilities that they probably need.

In addition, Japanese computer manufacturers have a complete line of peripherals, test and manufacturing equipment, based on counter-part products invented in the U.S. These range from reverse-engineering look-alike copies to radical improvements based on key inventions in Japan. In general, the Japanese make only products that can be legally exported to the U.S. market. Tektronix look-alike scopes and reverse-engineered IBM

but
6 years
old (1972)

in this
a propos
[delete]

13

given the right (?)

with a ✓

that is

products

products

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disks are common. In 15 months, Nippon Peripherals Limited produced a disk drive that was mechanically identical to the IBM 3340. From comparing the two drives, one might conclude that they were made from the same drawings.

LONG-TERM QUALITY AND VALUE

A traditional,
~~The lack of top-down marketing~~ *with expensive, heavy,* multi-volume market surveys *that e* extrapolating history in a self-perpetuating fashion ~~has freed~~ Japanese industry ~~to respond to real needs~~. Using *a this* marketing approach, the U.S. continues to build heavy, gas-consuming cars, because the marketing managers can show that *those cars* they have sold *well* in the past. The Japanese *freed from this approach,* have *been able to* looked *real* at ~~the~~ needs, and *they have* appropriately adapted existing ideas. High-level corporate marketing does not design the products; engineers design according to needs from a bottom-up approach.

Japanese Companies, with long-term goals and commitments, similarly are not forced to depend on ~~the~~ short-term marketing approach. ~~Nevertheless they work the short-term very hard, engineering for quick turn arounds.~~ *[delete]* NEC, Fujitsu and Hitachi, unlike Xerox, GE, Westinghouse, and RCA, have all persisted with computer manufacturing and after years of investment have established successful products. Their long-range thinking from the outset allowed them to invest in long lasting quality.

Japanese companies focus on highly sophisticated, quality products rather than ultra-high volume, low-quality throw-away merchandise. The differences are characterized by *comparing* Seiko ~~versus~~ *and* Timex watches and *comparing* Minolta ~~versus~~ Kodak or Polaroid cameras. *and* Their styling is often technical and *Japanese*

gadget oriented, typified by hi-fi sets and complex watches. (It may be impossible for them to design a product like the Polaroid One-Step Camera.) The emphasis is on an educated consumer who will value his purchase.

Concern for quality and long-term values leads the Japanese to build products that have a long life-cycle. Even their auto industry [starting out with Detroit's yearly new model concept] is now getting very high ratings for durability. Accounting models on company wide bases lead to emphasizing production of goods with long life so that the worker, who is also a consumer, will receive good value for his purchases.

PRODUCTS RESULT FROM UNDERSTANDING AND MANAGING A COMPLETE PROCESS

successful production
The ~~basis~~ of competitive performance products in high technology industries depend ~~on~~ understanding a complete process *that includes* starting with basic research, going through applied research and advanced development, to product development. In addition, a parallel *and* equally complex process *is* required ~~in order~~ to design and build the process that manufactures such products. *After* ~~As~~ a new product is introduced, it may *then* be necessary to ~~evolve~~ *modify* and enhance it, to adapt it to the real or changing market, and finally to eliminate it when it is no longer effective.

no underscores please!
The Japanese need invest little in basic and applied research because they are effectively coupling the U.S. laboratories into their advanced development. In contrast, ~~aside from hiring~~, there is very little flow of ideas from our public laboratories into ~~U.S.~~ *our own* industry. The university laboratories which have or are receiving significant *Advanced Research* (150,000 per year)

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Projects Agency (ARPA) funding for Computer Science (~~i.e., 20-30M/year~~),
 have post^gdoctoral Japanese visitors. These laboratories include Stanford,
 MIT, Carnegie-Mellon, ^{and} the University of Illinois, ^{and} etc. The university and
 industrial laboratories of Japan are headed and staffed by researchers
 who ~~ve~~ spent their ~~research~~ years in the mainstream American ^{research} laboratories.
 For example, the head of a major research effort at one company was trained
 at the MIT Multics Laboratory. ^{Japanese} ← which?

what's
a
mainstream
lab?

Of the large ^{companies} with research laboratories, the Japanese emphasis is
 on advanced development ^{in which} ~~where~~ the ^{goal} ~~output~~ is a breadboard of a potential
 product. The quality of these laboratories seemed substantially ahead of
 comparable U.S. companies, ^{laboratories owned by} ~~where~~ the title "research" ^{but the laboratories} ~~only~~ eases the corporate
 conscience and provides ^{in which} little new development. Although corporate
 research laboratories were significant in the development of television
 today, and labs ^{laboratories} at GE, Motorola, RCA, Westinghouse and Zenith grew in size
 and number, the U.S. TV industry has disappeared.

14

MITI funds and manages other laboratories and corporations to carry out
 research that ^{is} ~~is~~ oriented ^{toward} to getting experience that will eventually produce
 products. Funding, ^{specific projects} as opposed to having a captive laboratory, not only
 provides a system of checks and balances, but ^{also} provides an incentive. ~~This~~
~~minimizes the "dusty-lab syndrome".~~ Many of our government ^{laboratories} labs were
 initially set up for ^{specific} a mission, and ^{although} ~~once~~ the mission ^{s were} has been completed,
 the ^{laboratories} lab continues to exist. Since ~~there's~~ no ^{they} real ^{longer have a} need, or mission, or
~~review,~~ negligible new work is ^{done} ~~output~~. The dust is blown off the equipment
 for visitors and the same ^{demonstration} ~~demo~~ is run year after year. A buyer-seller
 relationship, ~~can help check this to a great extent where~~ ^{in which} by an independent

organization (such as a university) manages the lab and takes responsibility for results. Diverse groups are brought together and technology transfer is likely to take place.

laboratory
can minimize this "dusty lab" syndrome
Moreover, funding for specific projects can bring together diverse groups and promote technological interchange.

The Japanese orientation is a strongly engineering for trade *rather than*

being strongly science-based culture. Since the rest of the world does their research, why should they bother? This comes about because of their need to for manufacturing novel products and their total dependence on the export of manufactured goods. Since our basic federal research funding for computing comes through the NSF, ARPA, and *the* armed services, the emphasis is on science and research. Their funding comes through MITI and from various corporations, and hence the orientation is on international trade.

The culture supports a strong emphasis on manufacturing, not just product design.

In addition to the product engineering process there is a comparable and equally important process responsible for the development and operation of manufacturing. This discipline has been eliminated from U.S. universities. While it isn't clear *to you?* that the emphasis *on what?* in Japan universities is stronger, there is more emphasis in the companies on manufacturing processes. { People are rotated among the various processes and disciplines, making it equally desirable to be in all functions and phases. *example?*

The whole culture appears to understand basic learning and demand curves and they are volume (and growth) oriented, subject to the quality-first constraint. Knowledge of the learning curves is everywhere even the government research labs and universities. Their needs and goals are

OUTTE

what's a "novel" product?

industry?

15

[delete]

industry

explain the result the curve

Japan? meaning?

manufacturing/trade/industry oriented. This ~~also~~ means that, like Texas Instruments*, they're willing to dump and lose money for the short term in order to gain the market. This practice, when carried to certain extremes, was ruled to be illegal for a U.S. company. Although the Japanese ~~put on a~~ *pretend* good act that their products ~~won't be~~ *are not* competitive ~~when the yen is so~~ *because* strong, ~~having gone from 300/1\$ to 100/1\$, it's a big ruse because of our~~ *they are consciously ignoring* dependency as a distributor now in many industries. [This dependency will be elaborated on the following section.]

*which U.S. company?
or any? not clear.
did T.I. do this?
what happened?*

? which section?

As a corollary to learning curves and market domination, it's necessary and they are willing to give up profit for growth. [For example, RCA is now a rug maker (or distributor), car renter, publisher, TV distributor ~~etc.~~, *it does not resemble the* instead of an electronics company that pioneered television. *RCA's* Their role is essentially no more than *that of* a banker; ~~and~~ such a conglomerate is no match for a serious manufacturer.] Whereas there is extreme pressure on our business for profit and return on investment, these factors are less *important to* in the Japanese companies. Sony is only moderately profitable, Fujitsu does relatively poor financially and I'd bet NEC or Hitachi computer divisions might even lose money. For now, they may still be *learning* ~~buying~~ in which is clearly more acceptable than GE, Xerox and RCA could accept. This makes the Japanese doubly hard to beat, since they can lose money on every one and make it up in volume. They can buy the business dumping and why not if there is long term reward?

*accept what?
oh - p. 7
relate these
3 discussions
and bring
them
together*

some # figures would help here

*?
meaning*

every one what?

* Fred Bucy comment about Japanese competition in TI's 1978 Annual Report "...the big difference is that TI is the first major non-Japanese company they have run into that understands and uses the learning curve".

 INDU.S.TRY DOMINATION BY THE JAPANESE IS SIMPLY PREDICATED ON U.S.

NAIVETY, GREED AND VALUES

When
~~Whereas~~ as we watched the first few industries of textiles and steel become dominated by the Japanese, we unsympathetically stated that these industries were tired, the workforce was lazy, and the management was incompetent and unaggressive about getting capital. Certainly, there ^{was} ~~is~~ no special ~~societal~~ fondness for the automotive and petroleum industries and ~~now~~ ^{it seemed} it's fitting to import our cars ^{as a lesson to (?)} ~~to straighten out~~ the U.S. manufacturers. Now, ^{however} the domination of all manufacturing is ^{becoming} ~~so clear and~~ ~~pervasive~~ that we must look deeper ^{at the causes.} ~~because all society is to blame and is beginning to pay the price.~~ (?)

The domination can only happen with consenting buyers in the U.S. It is these buyers, ^{called} ~~(see)~~ distributors, including tired old former manufacturers, that are to blame, not the Japanese. ~~Alternatively~~ our values are too short term and too basic ~~as~~ to see and understand the real, long-term effect.
 (of ... ?)

(16)
The (Unstable) Three Island System

Since it's not clear to everyone what the long-term, stable situation has to be, let's look at the end point. A system of three inhabited islands, all of which have adequate food, water shelter and land, points out the dilemma:

#1. supplies energy; consumes negligible manufactured goods;

#2. supplies manufactured goods (is supplied raw materials from several small islands it owns, and from discarded goods of island 3); and consumes energy;

#3. consumes energy and manufactured goods; supplies information.

Given that information is generally treated as a waste commodity of zero value there is no stable state for the system until islands 1 and 2 absorb island 3. Or conversely using any monetary system, island 3's paper or tokens will always be worthless. That is, islands 1 and 2 currency values will be out of balance with island 3, until 1 and 2 "own" island 3.

To a first approximation, the Japanese and their counterpart American buyers have systematically transformed American business from inventor-manufacturer-distributor to simply distributorships. This is in complete keeping with the goals of American business as reported and ~~exonerated~~ ^{sanctioned} in business magazines and the teachings of modern business schools. The goal and reward of American industry ~~is~~ ^{are} clear: return on investment and profit. Secondary measures, ^{such as} like market share are occasionally used. Following only the ~~ROI~~ ^{of return on investment} goal, subject to no other constraints, leads U.S. industry directly to ~~being a~~ distributorship^s for Japanese products. ~~With~~ ^{requires} this strategy, no investment, no planning, and no risk ~~are required~~. All a company or its ~~potentially enshrined leader~~ has to do to be successful is to buy the right product for resale. Our electronics industry doesn't have to worry where the money comes from to pay the Japanese and Arabs. On the other hand a group who can only run a distributor is probably fairly top heavy and can easily be replaced say, by

right word?

manufacturers

transformation

are such as

of return on investment

requires

unnecessary & irrelevant, unless you want to elaborate on total J. takeover

a hard-working Japanese group.

This merely confirms the classic definition of a capitalist as someone who'll make and sell the rope to hang himself. *However, the capitalist is because he is* In this case it's merely reselling someone else's rope *as we become* too lazy to design and make *his own* rope.

The essence of distributorships is completely counter to the principles that made American industry initially great. *The new principle is* Now it's simply with no work, *and* no capital, anyone (everyone) can do nothing and succeed. All that's important *for us now* is to find *a* the right supplier who'll put up the capital, design, and manufacture products *which* we can distribute. *that*

In computing, the trend has already started: *with* Intel *is* buying Japanese-manufactured *IBM?* 370-compatible computers. Thus, we expect Intel to have *a* high ROI, and a net flow of dollars from the U.S. The solution is obvious: *return on its investment* *we expect*

(17) No company must be allowed to *import?* buy and distribute a foreign product without *arranging an* an offsetting equal export credit, *which they* must arrange! That is, Intel can get agricultural products to sell or it could export its services. This has to be Intel's problem -- not Carter's, Krep's, or Congress's problem as we now define them.

There's no way a manufacturer can re-enter various lost businesses once he becomes a distributor. The spirit, and capability to catch-up and manufacture are gone. Society and the investment structure are all aimed

at continuing a status quo. In the case of TV, radio, hi-fi, and video recorder products, all of which were U.S. products and, which the first invention or key patents apply, the cause is hopeless.

whose patents?

still?

low 31

Again, we can blame the Japanese, but someone in the distributorships acquired by the Japanese had to buy the sets in the first place and had to choose not to design and build competitive products, or to insist on bi-lateral flow of goods. In the case of Motorola, the division was purchased by Matsushita and included both manufacturing and distribution. By 1976, the U.S. plant was reduced by 2/3, but the distribution network was left intact.

We (U.S.) have a higher regard to business training versus engineering and technical training.

Here the Japanese are in even better shape because they don't yet have many business schools; Therefore, instead of getting MBA's, their engineering students get engineering master's degrees. In the U.S.

contrast, many engineers, quite erroneously, regard the MBA as necessary or useful to enter industry.

This not only makes the Japanese better engineers for the same educational output, but doesn't reinforce the notion that engineering is the route through to the management ladder, or that an MBA is automatically needed if one is to supervise people.

The MBA, oriented at every dual-career person being president, and epitomized by the content-free case study methodology, focusses on the quick buck. This is in contrast to the Japanese concern for deep understanding and the long term.

when? (year)

which division?

18

baised! yes

investment (?) it also

U.S. VALUES ARE CLEARLY DIFFERENT AND AS SUCH WE MAY BE HELPLESS AND SHOULD'N'T BOTHER TO MANUFACTURE ANYTHING

At a government/society level they ^{Japanese} appear to have their act together much more than we do. In societal issues and in their products they seem to have ^a clear, crisp ranking of goals and priorities. For starters, they ^{Japanese} know ^{their goals and priorities} them, whereas nearly all our ^{goals} issues that ^{begin} start out simple become entangled as everyone ^{Special interest groups} (a new set of referees) enter the fray. These ^{issues that compete for rank in priority} include: human rights ^{versus} vs equal rights; full employment ^{versus} vs inflation and balance of payments; environment ^{versus} vs region vs country; capital ^{versus} vs labor; and consumer protection ^{versus} vs business protection. [But worse than a muddy set of design criteria is a muddy set of decision makers and an unclear decision process. The Japanese processes though more complex appear to be clearer. There is less government but it appears to be responsible and accountable!]

Because of the need to ^{manufacture and} export, ^{the Japanese provide} for example there's educational support for engineering and technology, ^{while we support} versus lawyers and other semantic accountants. There ^{are} is a factor of 2 ^{fewer} less lawyers per person ^{by a} than in the U.S. [while lawyers wouldn't be bad if they only talked to each other.] A productive lawyer can consume much productive and creative output of much of society. The Japanese emphasis (priority) is on physical output because ^{Japan is} they are a manufacturing island with no other visible means of support. With ^{an} increased emphasis ^{on} in legal training, our priorities seem to be on the manufacturing of paper, intergroup contracts, governing and bickering among semantic accountants.

As a simple explanation, more money is available for investment to enable

them to manufacture (for their island) because of lower taxes. This clearly affects their ability to invest in industry. [They're supposed to be willing to pollute for profit. I didn't observe this. For example, LPG taxis are used instead of gas or diesel. Perhaps they only kill whales outside of Japan and pollute other environments. Their environment is just fine, though high density. On the other hand,] taxes can be low because their priorities are clearer, more people work and they spend less on government and defense.

Their government spending for military is far less and nearly non-existent. [Although there is some fall out of our military spending for a better society, it seems to be small and clearly a by-product. In the case of semiconductors, computers and related research, the benefit is small compared to what it could be compared to more directed goals such as the Japanese have with export domination.

In a similar way the Japanese spend significantly less per capita for health care and medical research. They can capitalize on our research here, but since they have a longer lifespan, it's not clear what the extra expenditures we make buy. In effect, the lack of spending in medicine goes to investments which result in full, lifetime employment which is probably the best solution to personal health.]

The Japanese don't have the massive federal research over-expenditures, epitomized by NASA and NIH. [Here again, in the rare event there are results, the Japanese will capitalize on our research for manufacture and export.] These areas seem to have big expenses and contribute little

but they

HOW THE JAPANESE HAVE CONVERTED WORLD INDUSTRY INTO DISTRIBUTORSHIPS

Page 18

because much of the work has no goal. NASA goals ^{for example} appear to be vague and ~~tenuous~~ now that ^{it has} they've stopped providing the world with exciting space shots and television pictures from the moon [?] and ~~the immediate needs for this research escapes most of us~~. National health research is also equally vague. This work only increases health care costs, by a whole series of secondary effects. ~~Here~~ the Japanese have a greater life expectancy with ^{less than one half} ~~under 1/2~~ the per capita costs.

^{Japanese that} They ~~believe~~ computers are ^[important] fundamental for the long term and they're ^{are} prepared to invest ^{in them} and wait for return. Machines ^{are} used in all products they build for export, ^{but} and they save labor, too. Labor is both precious and expensive in Japan; ~~as~~ there are only 110M ^{million} people and 2% unemployment. They're considering raising retirement from 60 to 65 to get the extra productivity. They must have computers to raise productivity! ^{they are} This is vital to their continued domination of manufacturing. As a separate research area, robots are an important component of manufacturing domination. While much of the pioneering work ^{was done in the} is U.S., the continued work to make robotics practical takes place in Japan! [?] This is the opposite of say the Australian attitude where there is increasing unemployment and a belief that computers must be eliminated. Australia is now almost totally dominated by Japanese products and the small Australian automotive industry of GM- and Ford-based large cars ~~and~~ is rapidly declining under the stress of small, ~~high-volume~~, quality, Japanese cars. ^{that are produced in high volume}

THE JAPANESE SOLUTION TO OUR BALANCE OF PAYMENTS PROBLEM: SELL (IN JAPAN)

OWTE
Can we solve our balance of payments problem by selling to Japan?
This is the answer our industry wants and will willingly, but foolishly, look to. However, the Japanese rhetoric is only for our gullible government and academic communities and the naive business people. For example, *when* trade envoys from Massachusetts and New Hampshire visit Japan with the expectation of selling high technology goods, *They will succeed in selling only a few prototypes.* The real sales will come in *five to ten* 5-10 years when these products are resold in volume to the U.S!

There has not *been*, nor will there be, any serious trading of American products *with* of Japan. The distributor/trading network entirely thwarts such an effort! *them (?)*
The results are clear and we must face *this.*

Japan is a closed society and market. As the most powerful, homogeneous culture in the world, *it has* ~~there is~~ a long history of being closed. [This can be verified by: reading any of the books or articles on Japan; trying to understand the complexity, yet subtly of a formal tea ceremony; looking at any industry manufacturing case; or just visiting and observing.]

The language is a code to further segment. [It's not clear how difficult the language is to learn, but it's probably relatively useless without the societal understanding. We only teach Japanese minimally on the West Coast of the U.S. On the other hand the technically trained Japanese have several years of English in order to read the literature.]

Even though there are major cultural differences among Japan and other far

eastern countries (e.g., China, Taiwan, Korea) there is closer proximity among them than with western countries. This closeness is especially advantageous in finding additional sources of especially low cost labor.

The tariffs support the establishment of any industries they target. *At present,* Now the computer import duty has been reduced to be on a parity with the U.S., but this matters little since their industry is strong enough to withstand imports! *so prices are on par?* As we've seen in other industries, this is a come-on *that* to further strengthen the Japanese manufacturers for export competition; ~~by having them~~ *they* compete in a token way with the few imports and thereby gain ideas to sharpen their exports. *but you didn't provide many examples!*

For example, in the early seventies the Japanese encouraged U.S. minicomputer imports. These occurred and now there is a significant Japanese minicomputer industry. *SI* For example, the basic structure of Fujitsu's minicomputer is identical to the PDP-11 *DEC introduced manuals and brochure about the PDP-11 before the patent application, making the PDP-11 is non-patentable in Japan.* *on and*

Because of the closed nature of By the society and the emphasis on personal relationships, it's hard for foreigners to break into or sell, *it is difficult* especially on a one shot basis. "Doing business" together appears to be done over a long time period and is almost ritualistic. This means that it's essentially impossible to have an effective international company as we know them. A foreign manager is clearly ~~taboo;~~ *taboo;* and sales are limited to one-shot deals with trading companies. There is no trading except as joint ventures! A foreign-owned company with *?* of the equity is illegal in Japan. *#?*

HOW THE JAPANESE HAVE CONVERTED WORLD INDUSTRY INTO DISTRIBUTORSHIPS

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LABOR COST, LIMITED POPULATION, FULL EMPLOYMENT AND FEW NATURAL RESOURCES,
CREATES IMPORTANT BY-PRODUCTS

Transportation and meetings run on time and at full capacity. This is in contrast to U.S. facilities, especially the meetings scheduling and performance. I accomplished roughly twice as much per day as in another western country in terms of customer and plant visits. The cordial, formal protocols help meetings proceed rapidly. By operating in a highly scheduled fashion more work gets done and there is less anxiety as to performance.

There's measurement of and pressure for efficiency. That is, the work-out/work-in ratio is high. In a taxi, there's an automatic back door opener so that the driver can load/unload faster. Of course, the factories graph everything. It feels like the notion of efficiency is taught to all. Concepts like fuel efficiency versus speed, weight and pollution are impossible concepts for Americans to understand. Worse yet, having only briefly lived in a constrained environment during wartime, most of us have no understanding of living with finite resources.

Given a notion of efficiency, there's real concern for saving of physical resources too. At the computation center, printout isn't automatic; it's queued and must be requested by badge reader. Lights, always florescent due to efficiency, are off when not in use. Of course small cars, taxis, a good train/subway are other indicators. The cars have bells that ring when the car is going over 100 Km/h! None of these exist in the U.S.

Do these things really contribute to the scheme? I think you sort of course here a little.

There are indeed several attributes that contribute to the success the Japanese have had.

Maybe work this into earlier discussion of industry/culture

Also, most of the info on these next three pages is highly subjective - given that it consists of your personal impressions and direct conclusions, it may not belong here at all.

Contrary to a previous "feeling" they are working the environment issue.
There were U.S. environmental people at a conference at the same time I visited; the Japanese were politely ignoring them while taking their basically boondoggle-oriented conference registration fees paid by the U.S. government research establishment.

There is a range of basically human and personal concerns. The result is a longer life span. While the subways and high density trains jostle people pretty badly, and there's no segmented smoker areas (and many smoke), there's great concern for the feelings, privacy and treatment of individuals. Although I had special treatment on the visit, on arrival and departure at every organization, I was given hot cloths and refreshments of tea, juice or coffee to be really considerate to westerners. It was hot and humid in July, but taxis and all buildings had air-conditioning. The hotels, though the most expensive, were also the best in terms of privacy, food and service. This included a large hotel in Tokyo and a 15 room old style, inn in Kyoto. The goal is privacy, and ambiance, with incredible attention to simplicity, design and detail. For example, there was a cloth cover over the telephone because it didn't fit the room decor.

Of course, the food is the ultimate in personal concern. Food served in many courses varied from raw fish to pickled vegetables (e.g., potatoes) and flowers (lotus blossoms) with lots of seaweed, fish and fish eggs. Tempura, teryaki, and hibachi grilled meat and fish are more easily digested by the westerners. The bread crusts were removed when sandwiches were served to westerners. There was much concern that the colors of the food matched; the physical looks were important.

There are Japanese baths, and these are great too!

They are compulsively clean. In an indirect way, this really helps the manufacturing of small, precise goods (including cameras, semiconductors, high-speed computers and disk memories.

There's orderly queueing at each server. The Japanese appear to be the world's best self-queuers. There's probably some protocol for resolving conflict when two persons arrive to the queue at the same time. In general, a system of this type has higher through-put. I also suspect there is lower general hostility arising from competing for a finite resource.

Inventions are to labor-saving devices. I saw countless gadgets of this form. The printers at computation centers had paper cutters on them with conveyors to bring output back to a single station. There are no computer operators and people to serve the users! This direct use of facilities not only costs less, but provides significantly higher through-put.

EPILOGUE

[On arriving at Sydney, I was struck with the contrast to dense, intense, humid and hurried Tokyo. I was ecstatic to get back, after 20 years, to a life style, people and place I feel more comfortable with.

Sydney's beaches are the world's finest; the weather's great; people spend lots of time out-of-doors with sports, strolling and simple gardening versus the subtle and very complex Japanese gardens; work starts late, runs slower and ends promptly with twice as many secretaries to do half the work -- but they do make their bosses feel good; and the continental and western food, beer and wine drastically improved having moved away from the early English influence.]

(52) Thinking about the Japanese competing with the Arabs to buy American and Australian mines, property and factories is frightening, but remote in my mind. Besides, does it matter who owns us? Will they interfere with our way of life? Maybe we'll change them and make them lawyers rather than manufacturers. If enough of them come to live or vacation with us very long, we'll be back manufacturing and exporting to them if anybody can learn the language. If things don't go our way, we can make it illegal, set up an agency, and then sue them with our incredible bureacracy and legal technology.

Thank you's

Yukitaka - for Frost.

Yen^D, Cheng^D
Burnett^D

Shimamura.

gen
Ken Narui, Head Osaka Office
Miss Tomioaka

Summer 78
people.

Address MITA, Minatoku, Tokyo

(Iso not there)

(Inst. of Info. Sci)

M. U. of Keio - Prof. Noz^D Doi^D; ~~OOE~~, Director

Tu. Ishii / Kitamura - NEC (sent letter already to Ishii)

NEC gave me a calculator (send a books).

Ask for museum pieces!

Wed. Kurosaki - head ← Fujitsu → good museum.

Sato - English

Th. → { Ishida^D } U. of Tokyo.
 { Hiroshi Inose } Sw. Clt. at BTL.

Th. { Mori^D } ETL
 { Nishino^D Nishino }

Fri → IWAMA^D Sony.

Sat/Sun Kyoto / Nara { Ken Narui, Miss Tomioaka, Osaka Office }

Mon: U. of Kyoto: Shu^D Yajima (Museum pieces from Prof.)
 U. of Osaka: N. Tokura.

Kyoto Sangyo University
Dr. Yugo Araki
Dept. of Info.

Tues: NEC, Iwano; Kumamoto

over

July 13 - Thursday

9:45A Leave Boston United 95
 12:45N Arrive San Francisco
 1:30P Leave San Francisco United 35
 3:35P Arrive Honolulu

July 15 - Saturday

1:00PM Leave Honolulu Pan American 1
 3:55PM+1day Arrive Tokyo, Nareda Airport - July 16, Sunday

DUE TO HEAVY GUARD AT AIRPORT PLEASE TAKE A LIMOUSINE BUS SERVICE FROM THE NARITA AIRPORT TO THE DOWNTOWN TERMINAL--TOKYO CITY AIR TERMINAL, HAKOZAKI, WHERE YU HATA WILL PICK YOU UP.

Hotel: OKURA, 7/16 through 7/25
 Contact: Yu Hata, District Manager Tokyo Telex: 781-26428

(Gift for Mary Clark, DEC Nurse)

(Patrick Buffet contact: Yasuo Tarui, director for Cooperative Laboratories, VLSI, Technology Research Associates, 4-1-1 Chomi Street, Mizazaki Takatsu-Ku. Phone: 044 (Japan)-855-7222, or 044-854-1354.

(Lou Abel: Musashino Electrical Communication Laboratory, Nippon Telephone and Telegraph Corp., Musashino-shi, Tokyo, Dr. Akihiro Hashimoto, *best bet; Dr. Yoichi Muraoka; Dr. Masao Kato, Kenji Naemura, may not be at Musashino. If interested in Mitsubishi computers: Chiyozi Tanaka, Mitsubishi Electric, Kamakura (S. of Tokyo, location of great Buddha statue.)

July 17 - Monday

AM Seminar in DEC-J
 PM KEIO University (CMU affiliated) *

July 18 - Tuesday

AM NEC factory visit (Consumers products and computers)

July 19 - Wednesday

AM Fujitsu
 (M200, Kawasaki and Numazu Factory)

July 20 - Thursday

AM Speech in Electro Technical Lab - Dr. Mori *
 (Nischno, name from Al Newell)
 3:00PM Seminar in U. of Tokyo Computer Center *

July 21 - Friday

AM SONY Hq. Meet with Mr. Morita, Chairman of Board.
 Mr. Iwama, President
 Mr. Goda, Director of Engineering
 (+Mr. Kihara, Saburo Kikuchi (Manager, Special Projects, N.Y.)
 & Mike Schulof, SONY Pres.USA--you met 6/20)

PM Visit VTR factory in Nagoya by helicopter, then go to Kyoto, also by helicopter provided by SONY

Tawaraya Hotel (FUYACHO, OLKE Tel: 211-5566)

D2303604 J.
 J2068834 B

Ticket:

8831-692-2979
 8325-295-287B

Quantas

5-242101

5-229131

Managing Div.
 Dev(tape) *

July 22 & 23 - Sat. & Sun.

Sightseeing Kyoto and Nara
Visit Imperial Estates - need permission--takes at least 24
hours to get--A. SUGA KUIN, B. KATSURA IMPERIAL VILLA.
Visit rock gardens: RYOANJI TEMPLE

Quantas

July 24 - Monday

AM Seminar in Kyoto Sangyo U. (System 20 user) *
PM Seminar and discussion in U. of Kyoto *

5-242101

July 25 - Tuesday

AM Return to Tokyo

3:05PM Leave Tokyo, Haneda Airport China Airlines 015
5:15PM Arrive Taipei

Mr. Yuen
Koolen

Hotel: President (Jack Smith contacting Yen to change to Grand
Hotel)

~~FUNG LUM Restaurants, 72 Lin San road, N. Taipei~~

3-039-07

Contact: Taiwan - Dick Yen, General Manager Telex: 34161 DETL

033-88-3101

July 27 - Thursday

9:30AM Leave Taipei China Airlines 9
11:00AM Arrive Hong Kong

contact: K.L. Cheung, Plant Manager Telex: 780 75400 DEHKL HX

Hyatt.

~~FUNG LUM RESTAURANTS, 501-505 Shatin, or 22 Leighton Road,
Hong Kong. YUCCA DE LAC Garden, Ma Liu Shui, N.T., Hong Kong.~~

July 28 - Friday

8:30PM Leave Hong Kong Quantas 28
MUST RECONFIRM WITHIN 72 HOURS OR AUTOMATICALLY CANCELLED!!
8:45AM+1 Arrive Sydney, July 29

HK 5-404845
HK 5-484281

Met by Max Burnet

Contact: Max Burnett, General Manager, Australia/New Zealand District

Telex: 790-20740 (DEC phone #: 61-2-439-2566

Home phone 846 7712

North Sydney Travelodge

Dave Ballantine, Melbourne
Paul Williams, Sydney
John Foster, Auckland

July 30 - Sunday

Lunch: Burnets - Summit or Captain Cook Cruise
Supper: Boundary Road

9x14x22

July 31 - Monday

9:30AM Meet and address Sydney Sales/Mktg/SWS at Chandos Street
2:00PM U. of NSW, Murray Allan - private visit
4:00PM Prof. Vowells/Dinner - private visit

August 1 - Tuesday

12:00N Lunch - Sydney Hilton - Computer Science attendees
6:15PM Leave for Canberra - met by J. J.
Park Royal Hotel

August 2 - Wednesday

Canberra customer and prospect talk
Visit Criso, Mt. Stromlo

5:30PM To Melbourne met by Dave B.

Stay at St.Kilda Road Travelodge

-1 hour
-231
KKV
12 hrs diff

August 3 - Thursday

9:30AM Meet and address Melbourne sales/SWS
PM Visit Monash, Bellamy, etc.
St. Kilda Road Travelodge

August 4 - Friday

12:00N Lunch Melbourne Hilton
Computer Science Attendees *
Back to Sydney
North Sydney Travelodge

August 5 - Saturday

OPEN
North Sydney Travelodge

August 6 - Sunday

5:25PM Leave Sydney UT 588

August 6 - Sunday

6:05AM Arrive Papeete (yes, leave and arrive same day)

August 26 - Saturday

8:00P Leave Papeete, PA 818
6:45A Arrive Los Angeles, Aug. 27
9:35A Leave Los Angeles American 12
5:49P Arrive Boston

4:22

1:35

← flight
from
Melbourne

~~11/9~~

Tokyo

1. National Museum and, in same park, gallery of Horyu-ji treasures. Go via subway and inspect wonderful food stores around Oeno Station.
2. Hatakeyama Museum. Take subway to Shibuya Station and visit the fabulous food stalls in the passageway en route to train to museum - the best food stalls we saw anywhere in Japan. Train and then bus to Museum, tiny but exquisite museum, can have tea there. The museum is opposite a famous old, country restaurant where it would be wonderful to have lunch or dinner before returning to town.
3. Folk Art Museum - also slightly out of town, but the first and most important of its kind in Japan.
4. Daimaru Department Store - especially the top floor for crafts, floor for conignment antiques, and food in basement.
5. Walk around Ginza at night. Ten-Ichi for tempura. Zacura for shabu-shabu.
6. Day trip to Kamakura. Either arrange a trip so that you can see everything, or go on your own and content yourself with seeing what you can. At the least: town of Kamakura, Great Buddha, Museum.

If you travel by train to Kyoto and you leave after 10:00 be sure to give yourself time to buy eki-ben (box luncheon) in the basement of Daimaru which is in the train station. Try not to buy eki-ben on the train and be sure not to eat in the dining car. Eki-ben is the best part of a train trip.

Kyoto

1. National Museum and Sanjusangendo (opposite one another). Lunch at Warajiya, next street down (oldest restaurant in Kyoto, prix fixe meal of eel - fantastic, \$15 @). From there walk to Kawai Kanjiro's House - one of the most important 20th Century painter and a collector of fold art, an amazing house.
---I should have begun with instructions to go straight to the Tourist Information Center to find out if any special events will be on while you are in Kyoto, arrange a day trip to Nara and to Ise (unless you want to go on your own), arrange for tickets to theatre, get maps etc. Information center is opposite Railroad Station which is easily reached by bus or tram from Tawaraya, and from there you can take another tram to Museum.
2. Have hotel arrange permits to see ^{XXX}Kat-ura Imperial Villa for one morning and ^XShugakuin Imperial Villa for another. Also permit to Moss Garden. Do this immediately on arrival so that you will have enough time for them to make arrangements.
- 3/ Walk from ^XTawaraya down Pontochō Street, cross river to Gion and antique area around Shinmonzen Street. In this area there are many restaurants, great noodle and chūhi shops on Shijo-dori, and two superb tempura places, O-awa and Yotaro. Also the best fish restaurant in city, Hama-aku.

4. Take taxi to Kiyomizu Temple, visit temple and then walk to Yasaka Shrine and Maruyama Shrine on the walking tour mapped out by Tourist Information - get a map at the office. You will end up near Shinmonzen again. Have lunch at Mrs. Matsume's Eel Kitchen one day.
5. Take bus from Sanjo-Keihan Station (walking distance from Tawaraya) to Daigoji. It's a long bus trip (40min or so) but was the most beautiful and impressive temple and garden we saw and is absolutely undisturbed - no herd of tourists. Return bus will deposit you at Sanjo-Keihan which is near Shinmonzen again.
6. Other temples you should see: Kinkakuji and Daitokuji (same end of town) see Ginkaku-ji and then walk (or rent a bike preferably) along the canal (fantastic residential area) to Fikan-do and on to Nanzen-ji. Nanzen-ji was the least impressive to us, but the second half of the walk is the best. From Nanzen-ji (especially if you skip it) take a taxi to Shoren-in, which is nearby, if you can still stand up. Nijo Castle is also something not to miss. We did not like the Heian Shrine and be sure to avoid, at all cost, Kyoto Handicraft Center.
7. Set aside at least one day to see Nara (There is a great old hotel if you want to stay over). It's only 45 min. by suburban train. Be sure to see Todaiji, Kasuga Shrine, Museum, and Treasure House, and if you have time Horyuji, which is a 30 min. bus trip further on.

Shops in Kyoto

J. Izumi (tel 531-4033) Shinmonzen Street - this is where we bought our signed basket. Next door is a Korean shop specializing in chests.

Mituru Akai, Shinmonzen - another small shop, has stencil-

T. Nakani-hi, Nawate-Furumonzen - toys

Guy Ni-himura, Nawate-Furumonzen - textiles, antique kimono

Y. Tsuruki and Kaji on Shinmonzen are the most prestigious shops

Takeda Higashiyama Villa - is a restaurant in the hills which also has an antique shop specializing in chests of excellent quality. The store is open at night. Owned by Mrs. Emiko Takeda and I wrote to buy something and said you might be coming.

Other Restaurants

Mi-himatai for Oil-yaki - an old butcher shop near Tawaraya in arcade - beautiful atmosphere and good beef.

The covered arcade around the Tawaraya, Teramachi, Sanjo etc. have wonderful sushi and noodle restaurants and shops making sweets of all kinds.

Daichi - a famous turtle restaurant we never got to.

at Hamaku be sure to order egg plant, and fried karei (flat fish)

~~XX~~ Mrs. Matsume's kitchen be sure to order eel omlet.

Eat at Tawaraya

Don't forget →

Hilton

What

GORDON BELL'S ITINERARY IN JAPAN

7/12/78

DATE	MORNING	AFTERNOON	STAY AT
MON JULY 17	10:00 SEMINAR IN DEC-J	14:30 <i>20 min</i> KEIO UNIVERSITY <i>Hata + Shimamura.</i>	OKURA HOTEL
TUE JULY 18	9:30 NEC FACTORY VISIT. (CONSUMERS PRODUCTS AND COMPUTERS)		"
WED JULY 19	10:00 FUJITSU KAWASAKI FACTORY	15:00 FUJITSU NUMAZU FACTORY	"
THU JULY 20	10:00 <i>20 min</i> SPEECH IN ELECTRO TECHNICAL LAB., DR. MORI	15:00 SEMINAR IN U. OF TOKYO COMPUTER CENTER <i>20 min.</i>	"
FRI JULY 21	9:30 SONY Atsugi VTR FACTORY	12:00 SONY HQ 15:36 Leaving for Kyoto by SHINKANSEN Hikari 115	TAWARAYA
SAT JULY 22	Sightseeing Kyoto: Imperial Household Agency, Shugakuin Detached Palace, Arashiyama and Nijo-jo Castle		"
SUN JULY 23	Sightseeing Nara: Todaiji Temple, Kasuga Taisha Shrine, Toshodaiji Temple and Yakushiji Temple		"
MON JULY 24	10:00 Seminar in University of Kyoto	15:00 Seminar and discussion in University of Osaka	"
TUE JULY 25	Visit <u>NEC KUMAMOTO LSI</u> Factory	Leaving for Taipei at 16:50 via EG281 (Osaka Airport)	

Wednesday, July 19, 1978

OBJECTIVES: FUJITSU KAWASAKI AND NUMAZU FACTORY VISIT

8:00	
9:00	
10:00	FUJITSU KAWASAKI FACTORY Mr. Sato, Manager, Circuitry Technology No. 1 Dept.
11:00	
12:00	
13:00	
14:00	
15:00	FUJITSU NUMAZU FACTORY
16:00	
17:00	
18:00	
19:00	
	Accompanied by Hata & Shimamura

OBJECTIVES: To give a lecture and exchange information on the computer architecture research.

8:00	
9:00	
9:45	Arrive at Nishino's office
10:00	Outline of the ETL and the PIPS project by Dr. Nishino
10:15	} Give a lecture on the mini-computer architecture
11:00	
11:30	} coffee break
11:45	} Technical tour in the ETL and discussion on computer organization
12:00	
12:30	1) Computer System Section
	2) Logical System Section
13:00	} Lunch
14:00	14:00 Leave the ETL
15:00	} Lecture on "Mini-computer Architecture" by Bell at University of Tokyo
16:00	
16:30	} Discussion & technical tour in computer center
17:00	
17:30	
18:00	
19:00	
	Accompanied by Hata and Shimamura.

OBJECTIVES: Visit SONY Atsugi VTR Factory and SONY HQ
Meet with Dr. Morita, Mr. Iwama and Mr. Goda

8:00	8:00 8:20	Pick you up at Okura Hotel by SONY's car
9:00		
10:00	9:30 10:30	} SONY Atsugi VTR plant visit
11:00		
12:00	12:00	Arrive at SONY HQ Lunch
13:00		
14:00		Leave SONY HQ
15:00		
16:00	15:36	Leave for Kyoto by SHINKANSEN "HIKARI No. 115"
17:00		
18:00		
19:00	18:29	Arrive at Kyoto
		Accompanied by Hata.

OBJECTIVES: Sightseeing around Kyoto

8:00		
9:00	9:00	Pick you up at "Tawaraya" by Narui and Tomioka
	9:20	Visit the Imperial Household Agency
10:00	10:00	} Visit the Shugakuin Detached Palace
	11:30	
11:00		
12:00	12:30	} Go boating on a Hozu river Take a ship at Kameoka
13:00		
14:00	14:00	Get out of a ship at Arashiyama
	14:05	Lunch at "Arashi-tei" (a Japanese-style restaurant)
15:00		
	15:30	} Visit Nijo-jo Castle
16:00		
17:00	17:00	
18:00		
19:00	19:00	Dinner
		Ms.
		Accompanied by Hata, Narui and Tomioka.

OBJECTIVES: Sightseeing around Nara

8:00	
9:00	Pick you up at Tawaraya by Narui
10:00	Arrive at Nara Station by Kintetsu Express
10:10	Visit Todaiji Temple
11:00	Visit Kasuga Taisha Shrine
12:00	
12:30	Lunch at TONOCHAYA
13:00	
14:00	Visit Toshodaiji Temple
15:00	Visit Yakushiji Temple
16:00	
17:00	
18:00	
19:00	
	Accompanied by Hata, Narui and Tomioka.

OBJECTIVES: Seminar in University of Kyoto
Seminar and discussion in University of Osaka

8:00	
9:00	
10:00	Seminar in University of Kyoto
11:00	
12:00	
13:00	
14:00	
15:00	Seminar and discussion in University of Osaka
16:00	
17:00	
18:00	
19:00	
	Accompanied by Hata and Narui.

Tuesday, July 25, 1978

OBJECTIVES: VISIT NEC KUMAMOTO LSI FACTORY

8:00	07:00	Depart Osaka for Kumamoto via ANN521
	08:05	Arrive Kumamoto
9:00		Factory visit Kyushu NEC, LSI manufacturing
10:00		
11:00		
12:00		
13:00		
	13:25	Depart Kumamoto for Osaka via ANN524
14:00		
	14:30	Arrive Osaka
15:00		
	15:45	Depart Kumamoto for Tokyo via ANN646 (Yu Hata) Arrives at Haneda at 17:25
16:00		
	16:50	Depart Osaka for Taipei via EG 231
17:00		
18:00		
	18:25	Arrive Taipei
19:00		
		Accompanied by Hata.

Tentative Schedule for Mr. G. Bell

Visitor : Mr. Gordon Bell
Vice president,
Digital Equipment Corporation

Date: July 20, 1978 (Thursday)

Objectives: To give a lecture and exchange information
on the Computer architecture research.

Detailed Time Schedule:

9:45	Arrive at Nishino's office Outline of the ETL and the PIPS project by Dr. Nishino
10:15-11:30	Give a lecture on the small computer architecture.
11:30	coffee break
11:45-12:30	Technical tour in the ETL and discussion on computer organization. (1) Computer System Section (2) Logical System Section Visits to other sections may be arranged.
12:30-14:00	Lunch
14:00	Leave the ETL.

prepared by H. Iizuka

1978.7.3

GORDON BELL LUNCHEON - SYDNEY

Reals 12.15 - 12.45
12.45 - --

GORDON BELL
MAX BURNET
PAUL WILLIAMS
RICHARD WARE
ANNE ELITH

GEORGE CONTE
PETER GRAY
JOE MOSS
ALAN ROBERTS
THEA LEWIS

PROF. J. BENNETT
MR. K. ROSOLEN
PROF. M. ALLEN
DR. P. BUTLER
PROF. J. CAMPBELL
MR. JOHN LAMBERT *Director*
PROF. J. REINFELDS
MR. T. SKEIVYS *Director*
MR. H. WOOLDRIDGE
DR. R. FREYER
MR. S. LOGIE
MR. M. RAMSAY
DR. K. NAPIER
DR. I. JACKSON
MR. P. RAYNER (*Apple-Paris, CS*)
MR. B. DeFERRANTI
MR. J. COSTELLO
SUSAN COLEMAN
MR. G. ELITH *CSIR Computer Research*
DR. P. BOWEN
DR. D. RICHARDSON
FRANK LINTON-SIMPKINS

UNIVERSITY OF SYDNEY
UNIVERSITY OF SYDNEY
UNIVERSITY OF N.S.W.
UNIVERSITY OF NEWCASTLE
UNIVERSITY OF NEWCASTLE
UNIVERSITY OF NEWCASTLE
UNIVERSITY OF WOLLONGONG
MACQUARIE UNIVERSITY
DEPT. OF T.A.F.E.
R.P.A.
WESTMEAD HOSPITAL
BHP NEWCASTLE
I.C.I. AUST
UNIVERSITY OF SYDNEY
C.S.I.R.O.
BARRY FERRANTI & ASSOC
COMPUTERWORLD
COMPUTERWORLD
CSR
CSR
AUST. ATOMIC ENERGY COMMISSION
THE AUSTRALIAN

This copy should be surrendered to the immigration authorities upon arrival in Japan

VISA APPLICATION FORM TO ENTER



Name in full Bell (Surname)

Chester Gordon (Given and middle name)

Different name used, if any --

Sex male Marital status married x single

Nationality or citizenship USA

Former nationality, if any --

Date and place of birth 19 August 1934 : Kirksville, Adair, Missouri USA

Criminal record, if any --

Home address Page Farm Road Lincoln, Mass. Tel. 617-259-9144

Profession or occupation Engineer

Name and address of firm or organization to which applicant belongs Digital Equipment Corporation 146 Main Street, Maynard, Mass. Tel. 617-493-2236

Post or rank held at present Vice President

Principal former positions Professor

Passport (Refugee or stateless should note the title of Travel Document)

No. J2303604 Diplomatic, Official, Ordinary Issued at Mass. on Sept. 12, 1973

Issuing authority Mass. Valid until Sept. 11, 1978

Purpose ourney to Japan Business meetings

Length of stay in Japan intended 13 days

Route of present journey : Name of ship or airline Boston/Honolulu/Tokyo Pan Am. 1

Port of entry into Japan Tokyo Probable date of entry July 16, 1978

Address of hotels or names and addresses of persons with whom applicant intends to stay

Hotel: OKURA

Visit: Yu Hata, Digital Equipment Corp. - see below

Dates and duration of previous stays in Japan --

Guarantor or reference in Japan : Name Yu Hata Digital Equipment - Japan

Address 8-7, Sanban-cho, Chiyoda-Ku, Tokyo Tel. 81-3-264-7101

Relationship to applicant business associate

Persons accompanying applicant and included in his passport Name Relationship Birthdate Bell, Brigham Roy son April 6, 1960

I hereby declare that the statement given above is true and correct. Also, I understand that immigration status and period of stay to be granted are decided by the Japanese immigration authorities upon my arrival.

Date of application 6/11/78 Signature of applicant Chester Gordon Bell



19 JUNE 1978

Consulate General of Japan
280 Park Avenue
New York, New York

Dear Sir:

This is to identify Mr. Chester G. Bell as an employee of Digital Equipment Corporation. Mr. Bell is presently functioning in the capacity of Vice President in our facility.

Mr. Bell will be traveling to Japan on July 16, 1978 for Business Meetings. His approximate length of stay will be thirteen (13) days. Digital Equipment Corporation will guarantee the support of Mr. Bell while in Japan and his return transportation.

Mr. Bell's contact while in Japan will be Digital Equipment Corporation-Japan, Kowa Building 25, 2-7, Sanban-cho, Chiyoda-ku, Tokyo 102, Japan.

Thank you for your assistance in this matter.

Sincerely,

A handwritten signature in cursive script that reads "Margaret Downing". The signature is written in dark ink and is positioned above the typed name.

Margaret Downing
Visa Coordinator

MD:edc