d i g i t a l

INTEROFFICE MEMORANDUM

TO: EMC
Rick Corben -- ML012-1/T39
Bill Strecker -- TWO/B05

DATE: 20 September 1982
FROM: Mahendra R. Patel
DEPT: SAC Technical Office
LOC: ZKO1-3/J10
EXT: 264-8232
NODE: HARDY::SIVA::PATEL

SUBJECT: Attached REVISED "Product Strategy" document

Attached is the FOURTH draft PRODUCT STRATEGY document. Please note that I've indicated the addition/change where it occurs in the left margin, and boldfaced the addition/change itself in the text.

PRODUCT STRATEGY

LARGE SYSTEMS

MEDIUM SYSTEMS

SMALL SYSTEMS

DISTRIBUTED SYSTEMS

TERMINALS AND WORKSTATIONS

BASE SYSTEMS SOFTWARE

GENERIC SOFTWARE

Added:

STORAGE SYSTEMS

SEMICONDUCTORS

PACKAGING

LARGE SYSTEMS

1. There is a need for a replacement for the 780, today at the same price, but at 3-4 times the performance of a 780. We have no project that can provide such a machine today. VENUS is the only machine available in the near future (perhaps 2 years) that can help fill the role at 4-5 times the 780 performance. Therefore, we must go ahead with the VENUS project as fast as we can.

2. There is a need for another machine in the same price range, that has an improved cost/performance over that of VENUS, trailing it by a couple of years at most. NAUTILUS is the only machine available in that timeframe that can help fill the role at 3-4 times the 780 performance. Therefore, we must go ahead with

Added: NAUTILUS now, so that it is available to market in good time. **A cost effective packaged dual processor version of NAUTILUS is required to fill the performance gap between NAUTILUS and a 3-4X VENUS machine.**

3. There will exist a recognized need for a machine with a performance of 3-4 times the performance of VENUS in a couple of years' time. We have no plan at present to build such a machine. We must prepare for the necessary technology for such a machine now.

   Now that we are using the MCA ECL technology on both the VENUS and NAUTILUS machines, we must seek an improvement of this ECL gate array technology for the next high performance machine in the VAX family; i.e., build on the experience rather than abandoning it for another.

4. In order to produce these large machines in a reasonable timeframe, it is imperative that adequate tools be available for their design and verification. Sufficient management attention and resources must be assigned to this task in order to make the products available.

5. In order to minimize the number of machines that we must build to cover (e.g., 0.25 to 15 Mips) performance range, we must adopt an

Change: architecture(s) that permits the use of multiple computers to generate performance requirements in between those of the models that we do build. Thus, instead of building processors with performance ratios between 1.5 and 2 (730/750/780), we should target at a performance ratio of 4 between the processors.

Change: **The asymmetric dual processor support by VMS, and the multi-computer cluster architecture (SCA) based on CI (70 Mbits/sec.) satisfies this requirement. We should now build on its strengths and a multi-computer cluster capability based on NI (10 Mbits/sec) should be planned for.**

6. In order to meet the commitments made to our customers, we should complete the JUPITER program as the last machine development in the DEC 10/20 range. The team should then promptly move on to the design of 3-4X VENUS VAX machine.

   A homogenous multi-computer cluster JUPITER architecture should also be based on CI and SCA. There is no need for an NI based multi-computer approach on DEC 10/20 range, since there will not be any more lower performance machines in the range.

7. We need to ease the transition of the DEC 10/20 customer base to the VAX machines. One means of so doing is a shared HSC (not volume sharing) on CI between JUPITER and VENUS machines, executing TOPS 20 and VMS, respectively.

MEDIUM SYSTEMS

1. The current VAX 750 and 730 will last for a few years, but will need replacement with more cost effective products. The SCORPIO

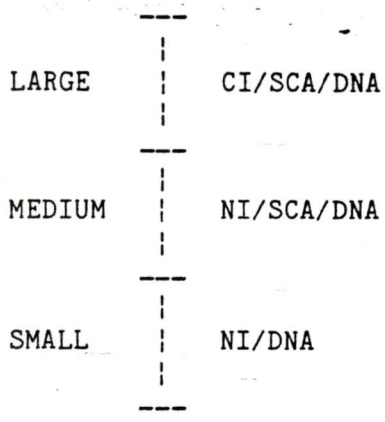
Change: project should be able to fill this need, **particularly in a multi-computer version of it packaged cost-effectively.** It is highly unlikely that a CI based multi-computer configuration can be cost effective in this price range. It may be just about possible to build a multi-computer configuration based on NI with perhaps an acceptable level of cost/performance temporarily based on NEBULA's. A more likely approach to succeed is one in which multiple processors are plugged into a common bus (e.g., BI), sharing some but not necessarily all the memory, for communication between processors.

Added: 2. **VMS will be able to support asymmetric dual processor systems, based on the software developed for the 782. It would also be possible for the SCA to** be implemented in VMS using the bus/memory combination as the communication medium between the processors (SCORPIO based). This joint implementation between hardware and software needs to be planned. NAUTILUS may also be able to exploit the bus/memory combination as the communication medium for SCA support.

3. Although the SCORPIO uses TTL gate arrays from TI, it is very likely that in the longer term the CMOS gate array technology will predominate in this space. Consequently, the use of the TTL gate arrays should be minimized wherever possible within Engineering in order to minimize the number of technologies that need to be supported.

4. SCORPIO based systems should be the top end of systems supported by Seaboard and the bottom end of systems supported by VMS, thus providing the necessary overlap at one point in the range.

5. VMS will need to support a co-existence of SCA and DNA over NI and CI to make the above possible.



SMALL SYSTEMS

1. These systems should be based on the microVAX chip set, with II interconnect for the peripheral chips.

2. A personal computer with the same packaging as the PC350 or its derivatives should be used to house a microVAX-based board.

3. The 32 bit personal computer should use the same power supply, disk drives, NI connection, synchronous communication link, video subsystem and memory support as the PC350.

4. We need to embark on the design of the microVAX at full speed, and subcontract the design of II based peripheral chips to other semiconductor manufacturer(s).

5. We need to commit to the production of a pruned VMS, suitable for microVAX based products; i.e., microVMS with less options than VMS and, therefore, lesser memory needs, but with emphasis on carrying forward the largest set of existing layered products.

6. There needs to be a microVAX based workstation with high resolution graphics display, in black and white and in color.

7. Although the peak in the sale of the 16 bit based systems is yet to come, over the next 3-4 years its percentage contribution to DEC revenue will continue to decrease.

8. Lower cost NEBULA based systems and workstations must provide a gap filler until SCORPIO arrives on the scene.

DISTRIBUTED SYSTEMS

1. We are committed to a local area network interconnect based on Ethernet. We will need to cost reduce the attachment to the cable over a period of time.

2. We need a cost-effective remote terminals (e.g., CT, VT200) attachment to our computers through a multi-drop line protocol (HDLC).

3. We need co-existence with IBM computers through a SNA Gateway.

4. We need a means of interconnecting remote Ethernets through a telephone line and the X-25 protocol -- a Router.

5. We need to provide a network design, installation, and maintenance service, for distributed processing networks.

6. We will need fiber optics based local area networks in the future for the factory and the office environment support.

7. The PBX will need to be a part of the local area network to integrate the voice and the data traffics.

8. There is a need for additional security on the local area networks through encryption where appropriate.

9. DNA needs to co-exist with SCA over NI and CI.

10. Provision of Broadband media into Ethernet protocols permits us to remain active in this area without too much investment.

TERMINALS AND WORKSTATIONS

1. There is a need for a lower cost VT100, named VT220.

2. There is a need for a lower cost VT125, named VT240.

3. There is a need for a terminal based on the PC325, supporting a synchronous link protocol (HDLC) -- VT210, with CTAB forming the base for distributed processing.

4. There is a need for a black and white workstation based on the lowest cost VAX available at present -- NEBULA.

5. There is a need for a color workstation based on the lowest cost VAX available -- a lower cost NEBULA would be a good fit here.

6. The strategy concentrates on dumb terminals and personal computers and avoids partially intelligent terminals requiring a lot of additional software development.

7. The PC350 needs NI attachment capability and a synchronous link (HDLC) capability for connection to other DEC products.

8. There is a need for video subsystems supporting 12, 15 and 19-inch CRT's that could be used in a number of different products.

9. There is a need for a laser printer mechanism that can be used in a print server on NI.

10. There is a need for an integrated product that can act as a printer, copier, scanner of documents for facsimile, OCR for encoding scanned documents wherever possible, for the office environment.

11. There is a need for additional input devices such as mouse, tablet, and speech input/output on terminals.

12. The development work on the 12 bit products needs to be brought to an orderly termination.

BASE SYSTEMS SOFTWARE

1. VMS needs to support homogenous multi-computer cluster configurations based on CI, NI and bus/memory interconnect using the SCA architecture.

2. VMS needs to be converted into a microVMS by cutting out options in order to support a 32 bit Personal Computer, based on microVAX.

3. We need to continue with the Seaboard development to cater more effectively to the microVAX chip market.

4. We need to develop a set of terminal access methods (similar to record access methods) for integrated text, forms, graphics, image and voice in order to make the applications programs independent of the terminal implementations.

5. There is a need for software tools to assist migration of DEC 10/20 customer base to VAX/VMS.

6. VMS needs to support a heterogenous local area network based on NI, including nodes based on CT, and servers such as the Router, SNA Gateway, Terminal Concentrator, Laser Print Server.

7. VMS should provide the File Server and Name Server for the heterogenous local area networks, using most of the existing VAX/VMS standards.

GENERIC SOFTWARE

1. We need office environment products based on VAX and CT, with emphasis on Local Area Networks.

2. We need data base management products to support easy to use applications, particularly between the CT and VAX/VMS.

3. There will be a need to integrate PBX into the office product set, in collaboration with a PBX manufacturer.

4. Store and forward of voice messages in the office environment is a requirement.

5. Voice annotation to text documents is a requirement to make the terminals easier to use by executives.

6. Text to speech conversion and recording thereof on a cassette will be a unique Digital application for the easy to use CT based system for the executives.

7. Integration of text, forms, graphics, image and voice based documents should be a prime focus for the generic software applications.

8. Selected end-user applications will be addressed for developing a core of applications experience for Digital products.

9. The ability of the office products to interface to other DEC software (VIA, RTL, Terminal Access Methods, etc.) and be able to use a common file structure in a loosely coupled architecture is essential.

10. There is a need for a set of end user based tools such as those that provide decision support applications, fourth generation languages for the non-programmer community of users.

Added: STORAGE SYSTEMS

1. **Develop the technology and the products based on vertical recording for the magnetic disks to derive an increased recording density.**

2. **Develop the products based on the optical disk storage technology, particularly for the office market.**

3. **Develop the HSC disk controller to interface to NI, to support the homogeneous VAX clusters.**

4. **Exploit LSI to reduce the cost of disk controllers using the MSCP protocol.**

SEMICONDUCTORS

1. Development and support of CMOS technology should be a goal for VLSI.

2. Development and support of ECL technology should be a goal for high performance machines.

3. Development and production of a microVAX microprocessor chip by 1984 should be a goal.

4. Development and production (subcontracted if necessary) of a set of support chips for the microVAX based on the II bus should be a goal.

5. Concentration on CMOS and ECL technologies will permit a focus on the necessary tools development.

6. Cost reduction in volume products (e.g., terminals) should be obtained through the use of dense MOS gate arrays and custom MOS chips.

/pms

COMPANY CONFIDENTIAL

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TO: EMC

CC: RICK CORBEN

DATE: 14 SEPTEMBER 1982
FROM: JOE REILLY
DEPT: CE FINANCE
EXT: 223-6883
LOC/MAIL STOP: ML012-2/A16

SUBJECT: PRODUCT STRATEGY/BUDGET ISSUES DATA BASE

Attached FYI is an updated data base sectioned by major group to be used as background material for our Woods Meeting September 20 and 21.

Included is all the data I have received to date.

- TMC Recommendations
- Alternatives Charts as supplied
- Original Budget Scenarios
- Product Line Engineering
- Other Questions/Answers

I have collected data from all line groups with the exception of Electro Mechanical Design (EMD). My assumption is that we have capped this organization at a previous EMC meeting.

JR5.66

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* DIGITAL *
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INTEROFFICE MEMORANDUM

TO: Joe Reilly
CC: TMC

DATE: 8 September 1982
FROM: Nancy Neale
DEPT: Corporate Research and Architecture
EXT.: 225-5867
LOC/MAIL STOP: HL02-3/N04

SUBJECT: TMC Investment Strategy/Budget Review for EMC

The purpose of the 9/2/82 TMC meeting was to participate in the review of Engineering's FY83 product investment strategy and related budget issues.

Given our time constraint, and the fact that Bill Johnson's and Grant Saviers' staffs were meeting the same day for the same reason, TMC concentrated its review on other areas, providing a brief review of Software and Storage.

The following areas were covered:

Terminals/Workstations
Distributed Systems
16 Bit Systems
32 Bit Systems
36 Bit Systems
Process Design and Support
Storage
Software
Semiconductors

The following areas were not covered:

Cross Group Issues (except Venus/Nautilus)
Product Group Engineering

You will note that we have included project expenses as listed in the 6/14/82 (Corben) Engineering Investment Summary. These numbers are provided to show the relative scope of the proposed cut/merger/buyout. It is important to realize that total costs can not be recouped, even with cuts.

Also, please note that the TMC member presenting his area was NOT necessarily part of the committee consensus resulting in a TMC recommendation.

16-BIT

16 BIT SYSTEMS

TMC recommendations

			Project Cost $K FY83	FY84
MERGE:	1) MICROS, TVG, 16 BIT WORK		?	?
	2) PLUTO and PLUTO JR (see Distributed Systems Pluto & Terminal Server projects)			
REDUCE:	1) LCP-5		$2672	$251
CUTS:	1) LCP-8, go directly to ORION	(Orion)	3478	4528
		(LCP-8)	998	667
	2) OTHER expense category (cut by 1/2) includes:	personnel	75	87
		finance	289	335
		program office	360	460
		admin	625	806
		contingency	114	182
		Other subtotal	1463	1870

COMMENTS:

- Such work as Gipper in 16 Bit Advanced Development makes the A/D effort worthwhile
  (N.B. Gaubatz doesn't cost too much, ref: A/D $$)
- Cutting the LCP-8 project means full effort on ORION
- MSCP at all levels is available now; being done, this will save a lot of $$
- Note statement in question #5 is an error, and should be deleted (see attached slide)

TMC review slides attached
Gaubatz slides attached

16-BIT SYSTEMS

INCLUDE GIPPER

1. Why grow advanced development in 16-bit systems? Need to justify with realistic time-to-market considerations, otherwise, eliminate entirely.

2. Is there too much overlap between Orion-Q and LCP-8? Could we do just Orion and skip LCP-8?

3. Save money on software development by having only one protocol for interfacing to AZTEC (presumption was that we should stick with MSCP.) DONE

4. Can we use a low cost PDP11 rather than Pluto?

5. (PLUTO) Are we doing this the right way? Today we are using 11/24 with protocol accelerator. ~~But protocol accelerator will not be in first SW release~~. ERROR Faster, cheaper and better migration path might be LCP + QNA for gateway/routers, and statistical MUX for terminal concentration. Natural upgrade will be J11 board replacing F-11 board in LCP.

6. With all the work going on in this space in Micros, TVG and the 16-BIT group, is there too much redundancy and is there an opportunity to consolidate?

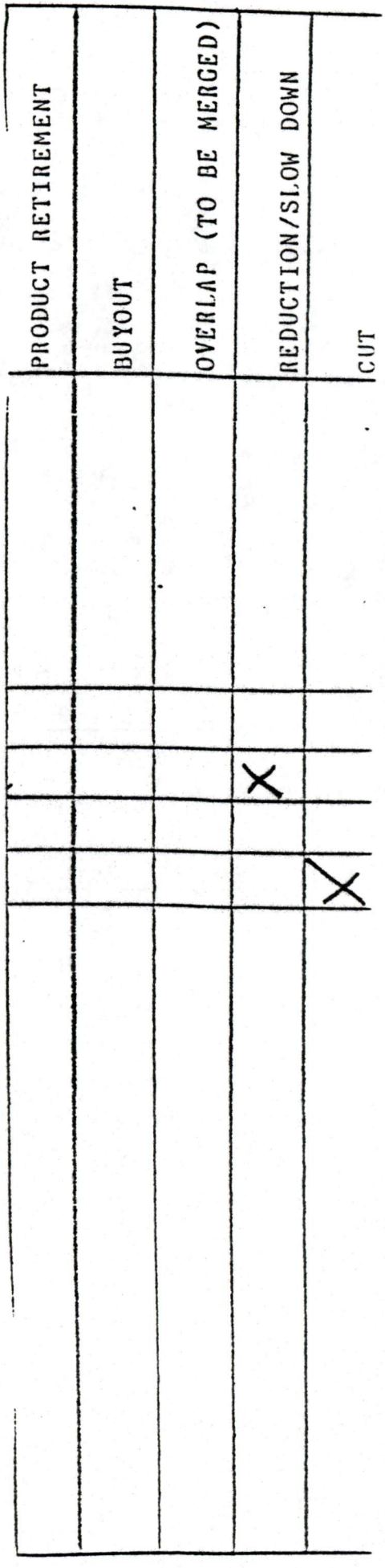
PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT
				X
MERGE PLUTO + PLUTO JR (DIST. SYS.)				
		X		

16 BIT SYSTEMS

PRODUCT DEVELOPMENT

	FY82	FY83	FY84
11/23 B	806	0	0
ORION	1618	3478	4528
LCP - 5	1349	2672	251
QNA*	0	458	0
LCP - 8	113	998	667

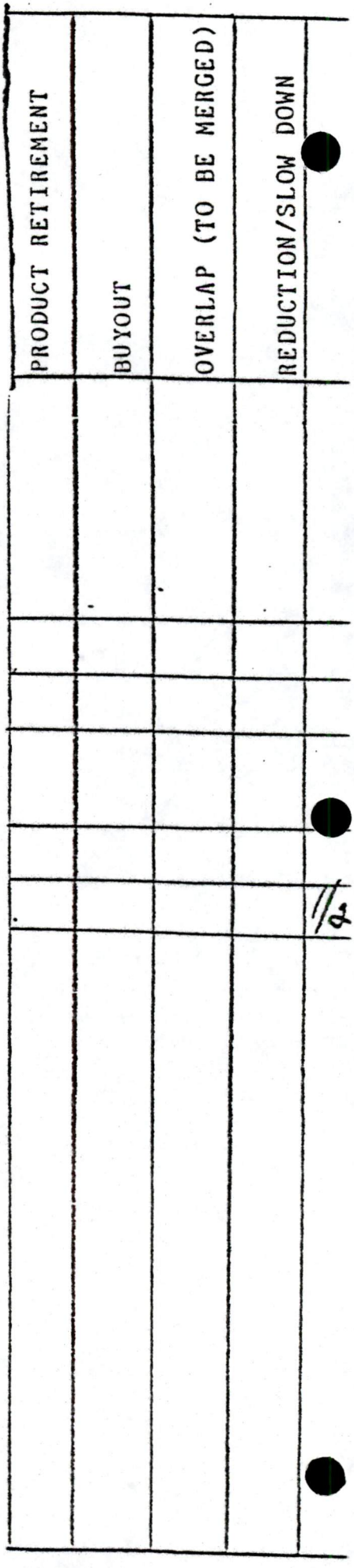
* QNA = FY82 IN A/D



16 BIT

PRODUCT SUPPORT

	FY82	FY83	FY84
SUPPORT	1327	2164	2205
ENHANCEMENTS	913	1271	1295
FCC	742	469	0
ADVANCED DEVELOPMENT			
QNA	400	0	0
OTHER	299	350	400
OTHER ENG EXPENSE	1122	1463	1870



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* D I G I T A L *
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INTEROFFICE MEMORANDUM

RECEIVED
SEP 07 1982
CE CONTROLLER

TO: EMC
Rick Corben
CC: PSD Staff
Jack Smith
Gordon Bell

DATE: 31 Aug. 82
FROM: MIKE GUTMAN
DEPT: PSD
EXT: 223-5285
LOC/MAIL STOP: ML12-2/E71

SUBJECT: PSD HARDWARE FY83 BUDGET

On the following pages you will find:

A. Summary FY83 budgets containing four scenarios:

1. No cut in PSD hardware budget - FPA funded by corporation (no revenue loss).

2. 10% cut in PSD hardware budget - FPA funded by corporation ($550M revenue loss).

3. 20% cut in PSD hardware budget - FPA funded by corporation ($1.5B revenue loss).

4. No cut in PSD hardware budget - FPA funded by PSD (effective 7% cut in budget). ($550M revenue loss).

We strongly recommend alternative #1 above, as it is the only one with no significant revenue loss associated with it. (The order of our recommendation is #1, #4, #2, #3). PSD has already taken 9.8% cut since March. (See addendum for details).

B. Lifetime revenue and units associated with each program (includes service revenue and product enhancements - new memories and disks).

C. Rationale for Budget Scenarios.

D. Brief description of each program/positioning.

E. FY83-85 budget for each scenario.

F. Advanced Development budget.

G. Addendum:
- o ORION performance with and without FPA
- o Response to questions
- o PSD FY83 budget evolution
- o Product Plan Summaries
  - o PSD FY83 budget evolution
  - o ORION U
  - o ORION Q
  - o ORION office
  - o LCP-5
  - o LCP-8

A. PSD BUDGET FY83 (HW ONLY)

#1 #2

	7/15/82		8/25/82 Update Of 7/15		#1 = No Cut Corp. Funds FPA	#2 = 10% Cut Corp. Funds FPA	#3 = 20% Cut Corp. Funds FPA	#4 = 7% Eff. Cut PSD Funds FPA
o Product Dev								
o Orion U/Q	3301	Q484/Q185	3301	Q185/Q484	3301	3301	3301	3301
o LCP-5	2705	Q3/4 FY83	2705		2705	2705	Don't Get	2705
o CNA	879	Q4 FY83	790		548 (Q1 FY84)	169 (Q3 FY84)	790	587 (Q1 FY84)
o LCP-8	1094	1H FY84	674	Q1 FY84	674	Don't Get	Don't Get	Don't Get
o Admin.	342		342		342	342	250	342
o HW Support/Enhance.	3832		3372		3372	3372	3372	3372
o Adv. Dev.	268		268		268	268	268	268
o Prog. Off, Fin, Pers., Admin, uTrack	1679		1570		1570	1570	1558	1570
o Unfunded								
o Orion Accel U/Q	918	Q284/Q384	918		FY84 Issue	FY84 Issue	FY84 Issue	FY84 Issue
o FPA	887		885		Corp Funded	Corp Funded	Corp Funded	885
o RD/RX Package	600		350		TVG Funded	TVG Funded	TVG Funded	TVG Funded
o UBus RD/RX Cont.	496		496		250 (MSCP, Mid FY84)	Start FY84	Not Needed	Start FY84
o LCP-5/RL02 Hybrid	800		800		Don't Get	Don't Get	Don't Get	Don't Get
o Total	17801		16471		13030	11727	9539	13030
o Budget	13323		13030	(Q4 Cap)	13030	11727	10424	13030
o Budget Shortfall Or Revenue Impact	4478	(Shortfall)	3441	(Shortfall)	-	$550M Lost Revenue	$1.5B Lost Revenue	$550M Lost Revenue

B. LIFETIME PRODUCT REVENUE AND UNITS (Includes Service and Enhancements)

		FY83	FY84	FY85	FY86	FY87	FY88	TOTAL
ORION	(Includes Options)							
	Units	-	250	8500	19200	25000	25000	77950
	NOR ($M)	-	6.	208.	479	648	668	$2 Billion
LCP-5	(Excludes Options)							
	Units	1900	15000	22400	22200	20300	18200	100000
	NOR ($M)	11.	125.	197.	201.	195.	187.	$.92 Billion
LCP-8	(Excludes Options)							
	Units	-	400	6400	10000	12000	12000	40800
	NOR ($M)	-	5.	82.	138.	165.	165.	$.55 Billion
ONA								
	Units	250	2060	6590	12670	12750	11800	46120
	Nor ($M)	.2	1.8	5.7	10.9	11.0	10.2	$40M

C. RATIONALE FOR BUDGET SCENARIOS

1. Quality is more important than quantity. (Do a few things very well)

2. Time to market is extremely important. (Slipping deliverables to attain budget fit is a poor trade off).

3. Scenarios generated for minimum revenue loss.

4. FPA is a critical part of ORION and must be funded (see attached performance chart). It is the critical part which separates us from the chip competitors.

5. All non-product related areas were cut to the bone immediately (Support, Admin, Program Office, Personnel, Finance).

6. QNA is really a sub-contract from Distributed Systems and should not be cut below $468K provided to PSD. It may also have a life beyond PSD if the Qbus is selected for MICROVAX.

D. PROGRAM DESCRIPTION/POSITIONING

1. ORION

Utilizes the J-11 chip set in 11/70+ performance Unibus and QBus systems. Boards, boxes and systems will be provided. Transfer costs will be in the $6500 to $7500 range, providing 11/70+ performance in the $20K to $30K price band. Critical program to a significant number of OEM 11/70 and 11/44 customers. FPA is a critical part of this program. Approximately $2B in lifetime revenues associated with this program. Design center will be Aztec, stretch system will use UDA based disks. FRS mid-late FY84. Commercial packaging dependent on LCP-8 packaging.

2. MICRO/PDP-11 (LCP-5)

Utilizes the F-11 chip set in a new packaging concept which permits a single product to be used in rack, floor and horizontal mount. Our major system product to go head to head with microcomputer vendors. Uses 5 1/4" Winchesters, floppies and streaming tape. Cost will be under $3000, providing systems in the $6K to $10K price band. Major OEM product, just under $1B lifetime revenue. Upside potential is significant. FRS March/April 1983.

3. LCP-8

Packaging varient of LCP-5, utilizing Aztec disk. This is the major COEM and small business package, providing office asthetics. Also provides Aztec add-on to LCP-5 and Aztec add-on to LCP-8. Lifetime revenue $550M. FRS July/Sept. 1983. Upgrade of LCP-8 with ORION boards will provide the performance enhanced commercial/small business product in mid-late FY84.

4. QNA

Single board QBus to NI communications adapter. Single quad (now looking at single dual!). Key element in the corporate Ethernet strategy. Estimated lifetime revenue $40M. FRS June 1983.

5. MSCP Disk Controller

Must recover from first abortive attempt at driving the MSCP protocol down into the low end. Proto now running in PSD Adv. Development. Plan would be to phase Q/U versions into MICRO/PDP-11 (LCP-5) with 25+ MB upgrade (mid-FY84). Project must be transferred from Adv. Dev. to product development early in FY83. Critical for UBus development system support for MICRO/PDP-11.

6. RD/RX Package

Add-on package for LCP-5 which houses an RD51 and/or an RX50. Includes power but no control. Built around a modified CT multi-box for rack, horizontal surface and floor mount.

E. FY83-85 BUDGET SCENARIOS

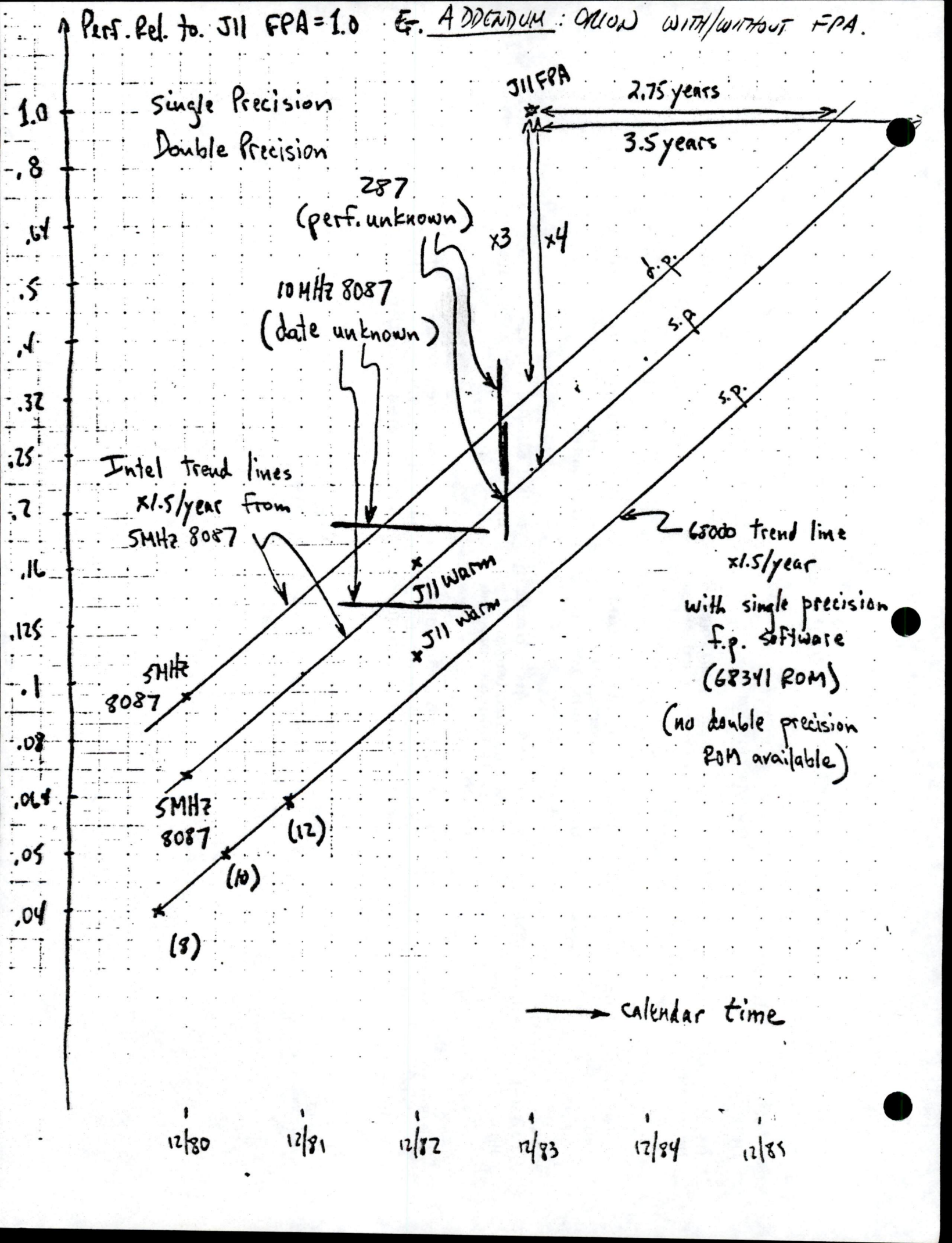
#1 #2

	Scenario #1 = No Cut			Scenario #2 = 10% Cut			Scenario #3 = 20% Cut			Scenario #4 = 7% Eff C		
	FY83	FY84	FY85	FY83	FY84	FY85	FY83	FY84	FY85	FY83	FY84	FY8
o Product Dev												
o Orion U/Q	3301	3894	315	3301	3894	315	3301	3894	315	3301	3894	31
o LCP-5	2705	226	–	2705	226	–	Don't Get	–	–	2705	226	–
o CNA	548	242	–	169	621	–	790	–	–	587	203	–
o LCP-8	674	167*	–	Don't Get	–	–	Don't Get	–	–	Don't Get	–	–
o Admin.	342	460*	498*	342	460*	498*	250	283*	320*	342	460*	49
o VLCP (J-11 SBC)	–	1300*	2800*	–	1300*	2800*	–	–	–	–	1300*	280
o HW Support/Enhance	3372	3500	3800	3372	3500	3800	3372	3300	3000	3372	3500	380
o Adv Dev	268	400	450	268	400	450	268	400	450	268	400	45
o Prog. Off, Fin, Pers, Admin, uTrack	1570	1774*	2000*	1570	1774*	2000*	1558	1200	1000	1570	1774*	200
o Other												
o ORION Accel	–	918	–	–	918	–	–	918	–	–	918	–
o FPA	Corp.	Corp.	Corp.	Corp.	Corp.	Corp.	Corp.	Corp.	Corp.	885	950	27
o RD/RX Package	TVG	–	–	TVG	–	–	Not Needed	–	–	TVG	–	–
o UBus RD/RX Cont.	250	550	–	–	800	–	Not Needed	–	–	–	800	–
o LCP-5/RL02 Hybrid	Don't Get	–	–	Don't Get	–	–	Don't Get	–	–	Don't Get	–	–
o Total	13030	13431*	9863*	11727	13893*	9863*	9539	9995	5085	13030	14425*	1013
o Budget	13030	13431*	13700*	11727	13893*	15700*	10424	9995	5085	13030	14425*	1630
o Revenue Loss	Lifetime = 0			Lifetime = $550M			Lifetime = $1.5B			Lifetime = $550M		

* Place-Holder Funding - To Be Determined If Follow-on's Required

F. PSD ADVANCED DEVELOPMENT

PROJECT	PROJECT LEADER	DATE OF ENTRY	GOALS/DESCRIPTION	CONSTRAINTS/DEPENDENCIES	PHASE	BUDGET
PDP-11 Arch. Management	Morse	4/1/82	Maintain integrity and consistence of PDP-11 processor and system architectures		N/A	14.8
ORION Multiprocessing	Warchol	9/1/81	Prove feasibility of J-11/PMI ORION performance range multiprocessing by Q2'83, demo BB by Q2'84.	Ability to implement low cost multiprocessing hooks on Orion PMI.	Pre Phase 0	56.6
VAX/PDP-11 Hybrid Processor	Schanin	6/1/81	Reduce cost/size/power/complexity of VAX "interface hardware" by using J-11 I/O processor, demo BB by Q2' 83.	Maximal software compatibility with VMS, RSX	Pre Phase 0	107.1
Integrated Peripheral Controllers	Souza	9/1/81	Demo BB of integrated 5" disk (H&S) controller by Q2'83, integrated terminal controller by Q3'83.	Maximal software compatibility with module (non-integrated) controllers	Pre Phase 0	81.7
Integrated Circuit Interconnect (II)	Schanin	2/1/81	Publish monograph on integrated circuit interconnect (II) standards and design philosophy by Q2'83.	Adoption of proposed standards by design community	N/A	18.8


Perf. Rel. to. J11 FPA = 1.0
E. ADDENDUM: ORION WITH/WITHOUT FPA.
1.0
.8
.64
.5
.4
.32
.25
.2
.16
.125
.1
.08
.064
.05
.04
Single Precision
Double Precision
J11 FPA
2.75 years
3.5 years
287
(perf. unknown)
x3
x4
10 MHz 8087
(date unknown)
s.p.
s.p.
s.p.
Intel trend lines
x1.5/year from
5MHz 8087
J11 warm
J11 warm
68000 trend line
x1.5/year
with single precision
f.p. software
(68341 ROM)
(no double precision
ROM available)
5MHz
8087
5MHz
8087
(12)
(10)
(8)
calendar time
12/80
12/81
12/82
12/83
12/84
12/85

Response To Questions

1. Advanced Development is not 16 Bit Advanced Development. It is ISP independent and covers the system price band from $10K-$40K. No work (to our knowledge) is going on elsewhere in the company in this price band - therefore, this work is required and no overlap exists.

2. There is only one protocol for interfacing to Aztec, and it is MSCP. The change we made was for RD/RX, not Aztec. No action required.

3. We have examined the packaging overlap between ORION, LCP-5 and LCP-8. We have now combined Orion Q and LCP-5 into one package and have changed the LCP-8 packaging concept to a less expensive approach. (Orion Commercial was always planned to be put into the LCP-8 package). The result has been a $242K savings which we've applied to other problem areas.

4. There may be some redundancy between the PSD and TVG engineering programs. TVG's major thrust is in the board business (Micros portion) while PSD's main thrust is at the system business. TVG maintains that these two markets require very different products (functionality, form factor). We may be able to work this issue more fruitfully in the near future when a proposal to combine these two engineering groups is brought forward and implemented.

5. Reduction in spending for 16 Bit software is being examined. A separate submission by Dom Lacava will address 10% and 20% cuts. Over 2/3 of the 16 bit software spending is in support of existing releases. It will take some time to work through this issue - but since PSD has now picked up SW responsibility - we are committed to a thorough examination of the issue and bringing forward recommendations for significantly reduced spending. This will take about 2 months.

PSD FY83 BUDGET EVOLUTION

	3/19/82	Transfer & Cuts* Through 5/19/82		6/15/82	6/17/82 Q4 Cap
o Product Dev					
o ORION U/Q	4075		-288	3787	
o LCP-5	2615		-98	2517	
o QNA	500		-32	468	
o LCP-8	466		-36	430	
o Admin.	355		-13	342	
o HW Support/Enhance	3783	+469 For FCC	-420	3832	
o Adv Dev	278		-10	268	
o Prog. Off, Finance, Person, Admin, uTrack	1871		-192	1679	
o Other					
CTNA	500	-467 To CT	-33	-	
o Total Cut/ Transfer		+2	-1122	-	-293
o Total Budget	14443	14445	13323	13323	13030

* Productivity + Jack Smith + O.C.

PRODUCT PLAN SUMMARY

PRODUCT: Orion-UBus Systems — REVISION DATE: 7/14/82

PRODUCT MGR.: David Poole — PROGRAM OFFICE: PSD

PROJECT MGR.: Ken McDaniel (DRI) — DISCRETE PROJ. # 020-05302/ 020-05299

DEVELOPMENT MANAGERS: Dave Quimby (Sys.Int.)/Gerry Goodrich (Modules & Arch)

DESCRIPTION AND CHIEF CHARACTERISTICS:

Develop new CPU using J-11 Chip Set, release two modules (CPU/UBA), and provide a Unibus system (AZTEC design center) to replace 11/24, 34, 44, and 70 systems in FY84-88 timeframe. Unibus system to achieve 11/70 performance at 11/24 cost. Development tasks include:

- CPU development
- UBA development with LESI port
- Backplane with 4 dedicated slots (1 CPU, 2 MEM, 1 UBA)
- Unibus system consisting of components packaged in H9642 box.
- Unibus non-expandable FCC box.
- Systems level testing DMT and FCC
- RSX and RSTS/E support

Assumes:

- J-11 Chip Set by SEG Q1/FY83
- AZTEC Q&UBus storage systems Q4/FY83
- DZ32, RA80, 81, TU81, Terminals - other devices availability software supported by others
- New 64K chip ECC memory on quad by memory systems - also 256K chip on same quad

KEY PRODUCT LIMITS:

N[redacted]

TRANSFER COST:

TOTAL SYSTEM INCL. VOLUME INTEGRATION - $7400 (FY85 dollars)

For system consisting of:

CPU	UBA	512 KB ECC Memory
Aztec	DZ11	Cabinet

INTERDEPENDENCIES:

Major development dependencies on:

J11 chips	MSV11
RC25 (Aztec)	FPA chips

Achievement of business plan also depends on:

UNA/NI	UDA50	MICRO/PDP-11	RA81
DMF32	RD50	LCP8	RA60
DMZ32	RX50	TU81	

Other projects which depend upon this project:

- Orion QBus System
- Orion office
- Pluto
- Micro/PDP-11 & LCP8 (business plan achievement)

RISKS:

W[redacted] are the key risks involved with this project?

S[redacted]edule risks on MSV11, J-11 Chips, FPA, TAT020

SCHEDULE:

PHASE 0	PHASE 1	PHASE 2	PHASE 3	FRS
Sept., 81	Sept., 82	Q1, FY84 / Q2 FY84	Q3, FY84 / Q1 FY84	Q4, FY84 / Q1 FY84

PRODUCT PLAN SUMMARY

PRODUCT: Orion QBus Systems

REVISION DATE: 7/14/82

PRODUCT MGR.: Daryl Long

PROGRAM OFFICE: PSD

PROJECT MGR.: Ken McDaniel (DRI)

DISCRETE PROJ. # 020-05794

DEVELOPMENT MANAGERS: Dave Quimby (Sys. Int.)/Gerry Goodrich (Modules & Arch)

DESCRIPTION AND CHIEF CHARACTERISTICS:
Build 11/70 equivalent system at 11/23+ cost to replace 11/23 and 11/23+ systems and extend the top end of the QBus system marketplace in the FY84-88 timeframe. Using the same CPU and memory from the UBus system project #020-05299 and based on RSX and RSTS operation systems. Target single or dual AZTEC design center with downward extension such as RX, RD50 support.

KEY PRODUCT LIMITS:
None

TRANSFER COST:

TOTAL SYSTEM INCL. VOLUME INTEGRATION - $6600 (FY85 dollars)
For system consisting of:
CPU, Cabinet, 512 KB ECC Memory, 8-line multiplexer, Aztec

INTERDEPENDENCIES:
Major development dependencies on:
RC25 (Aztec)
Orion Unibus systems & Board Set
Achievement of business plan also depends on:

DHV11	MICRO/PDP11	RD50
QNA/NI	LCP8	RX50

Other projects which depend upon this project:
Orion Office
Micro/PDP-11 & LCP8 (business plan achievement)

RISKS:
What are the key risks involved with this project?
Schedule risks on J-11 chips, memory and FPA

SCHEDULE:

PHASE 0	PHASE 1	PHASE 2	PHASE 3	FRS
Sept., 81	Sept., 82	~~Q1, FY84~~ Q3 FY84	~~Q4, FY84~~ Q4 FY84	~~Q1, FY85~~ Q4 FY84

Projects in Phase 0 and 1 use Target dates. Projects entering Phase 2 are considered Commit dates, use Actuals where applicable.

PRODUCT PLAN SUMMARY

PRODUCT: Orion-Office REVISION DATE: 7/14/82

PRODUCT MGR.: Daryl Long PROGRAM OFFICE: PSD

PROJECT MGR.: Ken McDaniel (DRI) DISCRETE PROJ. # 020-05813

DEVELOPMENT MANAGER: Dave Quimby (Sys. Int.)/Gerry Goodrich (Modules & Arch)

DESCRIPTION AND CHIEF CHARACTERISTICS:
Develop a small business system based on AZTEC and the logic modules developed for the Orion program (J-11). Office environment packaging developed for the LCP8 program is to be used to house these elements. Tasks include integrating the CPU and memory modules into the LCP8 package in place of the F-11 CPU and parity memory and performing necessary testing for system release. Documentation upgrades to cover the Orion modules is also included.

KEY PRODUCT LIMITS:
J11; 9 slot backplane; Aztec based system

TRANSFER COST:

TOTAL SYSTEM INCL. VOLUME INTEGRATION - $6000 (FY85 dollars)
For system consisting of:
CPU, 512 KB ECC Memory, LCP8 Cabinet, Aztec, 8 line multiplexer

INTERDEPENDENCIES:
Major development dependencies on:
LCP8, Orion Unibus System, Orion QBus System
11 chips, RC25 (Aztec), MSV11
Other projects which depend on this project:
LCP8 (business plan achievement)
Orion QBus System (business plan achievement)

RISKS:
What are the key risks involved with this project?
Schedule risks only - memory, J-11 and LCP8

SCHEDULE:

PHASE 0	PHASE 1	PHASE 2	PHASE 3	FRS
Sept., 81	Sept., 82	~~Q2, FY84~~ Q3 FY84	~~Q1, FY85~~ Q4 FY84	~~Q1, FY85~~ Q1 FY85 OK

Projects in Phase 0 and 1 use Target dates. Projects entering Phase 2 are considered Commit dates, use Actuals where applicable.

PRODUCT PLAN SUMMARY

P.)UCT: LCP-5

REVISION DATE: JUNE 1982

PRODUCT MGR: NEIL RICH

PROGRAM OFFICE: PSD

PROJECT MGR: RICH HULTMAN

DISCRETE PROJ. #: E020--05793

DEVELOPMENT MGR: PAUL GARDNER (DRI)

DESCRIPTION:

LOW COST PDP-11, GENERAL PURPOSE, MULTI-USER, MULTI TASKING COMPUTER SYSTEM (2 - 4 USERS) ON THE Q-22 BUS. F-11 (KDF11B) BASED SYSTEM WITH 5.25 INCH WINCHESTER AND FLOPPY DISK COMBINATION MASS STORAGE SUBSYSTEM. NEW PACKAGING FOR A RACK MOUNT VERSION FOR TECHNICAL OEM'S AND A TABLE TOP/FLOOR MOUNT VERSION FOR THE OFFICE ENVIRONMENT. THIS PRODUCT WILL BE CUSTOMER INSTALLED.

WILL SUPPORT A SPECIFIED NUMBER OF OPTIONS AT FRS AND BE COMPATIBLE WITH THE FULL RANGE OF Q-BUS OPTIONS.

CHIEF CHARACTERISTICS:

10 MEGABYTE FIXED WINCHESTER DISK (RD51)
400 KBYTE DUAL FLOPPY (RX50)
256K MAIN MEMORY (MSV11-PK)
D .1 COMM (4 USER) FOR COMMERCIAL KERNEL

KEY PRODUCT LIMITS:

LIMITED EXPANSION/6 SLOT BACKPLANE; NO SUPPORT FOR BUS EXPANSION OUTSIDE THE BOX. EXPANSION FOR MASS STORAGE.

TRANSFER COST: GOAL IS $2850 IN FY 84 (VOLUME)

INTERDEPENDENCIES:

Projects this product is depending on: RT-11, RSX, RSTS, RD51, RX50 AND RD/RX CONTROLLER DEVELOPMENT

Projects depending on this product: LCP-8

RISKS: TIME TO MARKET; TRANSFER COST; RD/RX CONTROLLER DEVELOPMENT; RD51 AVAILABILITY; RX50 ALLOCATION

SCHEDULE:

Phase 0	Phase 1	Phase 2	Phase 3	FRS
1?/81	7/82	Q383	Q483	Q483 PLAN Q383 GOAL

PRODUCT PLAN SUMMARY

UCT: LCP-8

REVISION DATE: JUNE 1982

PRODUCT MGR: NEIL RICH

PROGRAM OFFICE: PSD

PROJECT MGR: RICH HULTMAN

DISCRETE PROJ. #:020-05809

DEVELOPMENT MGR: PAUL GARDNER (DRI)

DESCRIPTION:

LOW COST PDP-11, GENERAL PURPOSE, MULTI-USER (4-8), MULTI TASKING COMPUTER SYSTEM ON THE Q-22 BUS USING THE AZTEC MASS STORAGE AS DESIGN CENTER

CHIEF CHARACTERISTICS:

SAME AS LCP-5 EXCEPT DIFFERENT PACKAGING AND 40 MB AZTEC MASS STORAGE (FIXED AND REMOVABLE)

KEY PRODUCT LIMITS:

LIMITED EXPANSION/ 9 SLOT BACKPLANE
NON RACK MOUNT

T SFER COST: TBD

INTERDEPENDENCIES:

Projects this product is depending on: AZTEC; KLESI INTERFACE; DHV-11; LCP-5

Projects depending on this product: NONE

RISKS: AZTEC COST AND SCHEDULE

SCHEDULE:

Phase 0	Phase 1	Phase 2	Phase 3	FRS
12/81	TBD	TBD	TBD	Q1 84

16-Bit Systems

****
DIGITAL
****

DC# 7.4

INTEROFFICE MEMORANDUM

TO: [redacted]

CC: MIKE GUTMAN
PSD STAFF
JOE REILLY

DATE: 10-JUN-82
FROM: MARY ANN SERRA
DEPT: PSD ENG FINANCE
EXT: 223-8969
LOC/MAIL STOP: ML12-2/E71

SUBJECT: PSD ENGINEERING INVESTMENT ANALYSIS

ATTACHED IS THE ENGINEERING INVESTMENT ANALYSIS FOR PSD.

PLEASE NOTE THE FOLLOWING:

1. FY82 ENGINEERING EXPENSE IS PER BUDGET.
2. FY83 ENGINEERING EXPENSE IS PER CURRENT BUDGET INCLUDING MOST RECENT CUTS.
3. FY84 ENGINEERING EXPENSE IS PER SCENARIO A.
4. IRR FIGURES ARE NOT PROVIDED. WE HAVE DONE BURP ANALYSES ON PRODUCTS IN DEVELOPMENT, BUT THE USE OF DIFFERENT HURDLE RATES MAKES A COMPARISON MEANINGLESS.

MAS:M

CHART I

PSD

PRODUCT DEVELOPMENT

Product Name & Summary Description & Summary Prioritized	Current Phase	FRS	IRR %	NOR Lifetime $B	ENG EXP Lifetime $M	NPSU $M	SERV. Summary $M	ENG. '82	DEV. '83 $K	EXP. '84
11/23B	4	JAN 82		0.6b	3.0m	3.3m	NA	806	-	-
ORION	1	Q4/84		1.5b	10.0m	4.6m	?	1618	3478	4528
LCP-5	1	Q4/83		0.9b	4.4m	2.1m	0.5m	1349	2672	251
QNA*	0	?		?	?	?	?	-	458	-
LCP-8	1	HI/84		0.3b	1.8m	?	?	113	998	667
								3886	7606	5446

*The QNA project is currently in Advanced Development. It will move to product development in FY83.

6-9-82

PSD

CHART II

PRODUCT SUPPORT

PROJECT NAME AND SUMMARY DESCRIPTION PRIORITIZED

ENGINEERING BUDGET $K

	BUDGET '82	PRELIM BUDGET '83	SCENARIO A '84
SUPPORT	1327	2164	2205
ENHANCEMENTS	913	1271	1295
FCC	742	469	-
TOTAL PRODUCT SUPPORT	2982	3904	3500

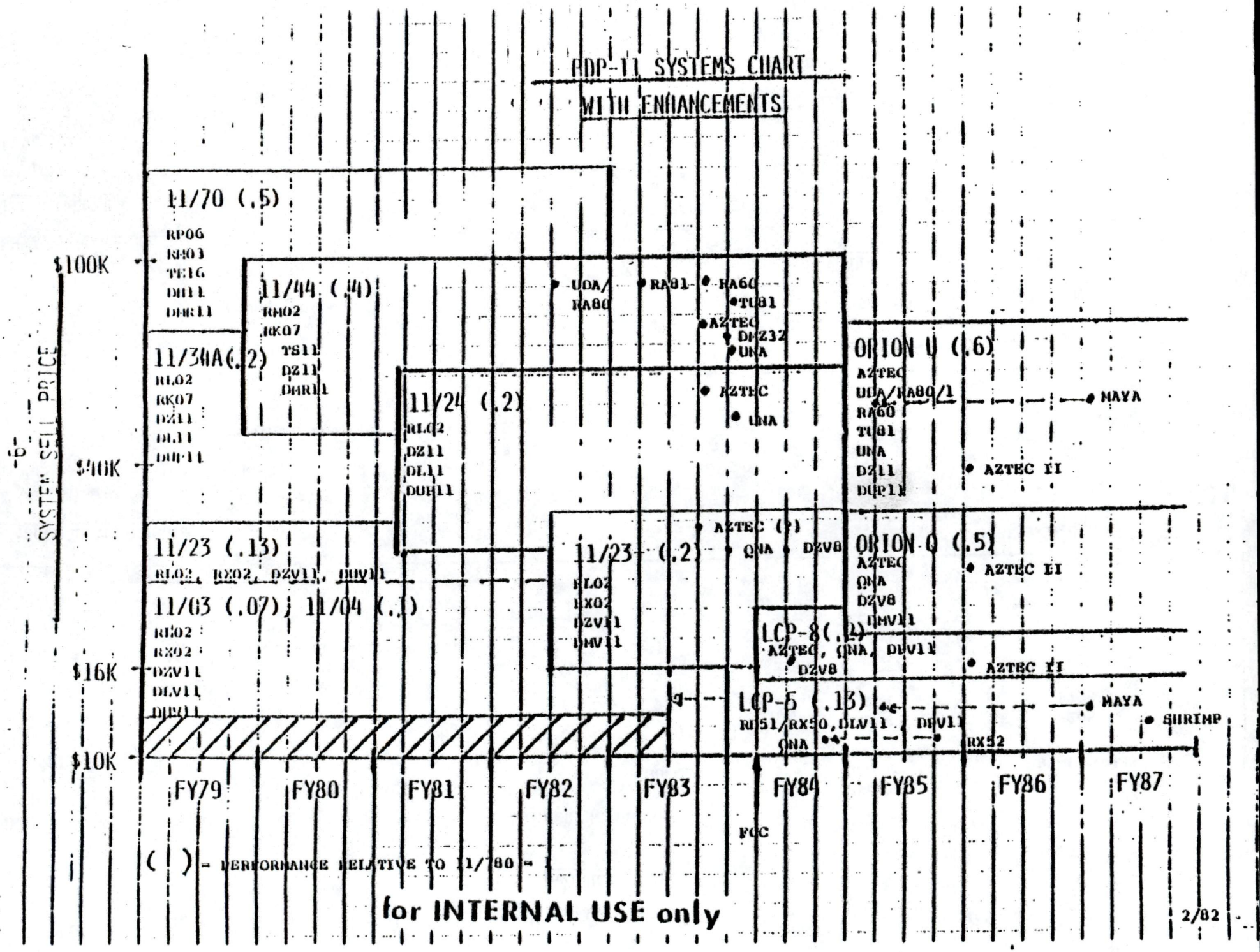
ADVANCED DEVELOPMENT		'82	'83	'84
	QNA	400	-	-
	OTHER	299	350	400
	TOTAL ADVANCED DEVELOPMENT	699	350	400

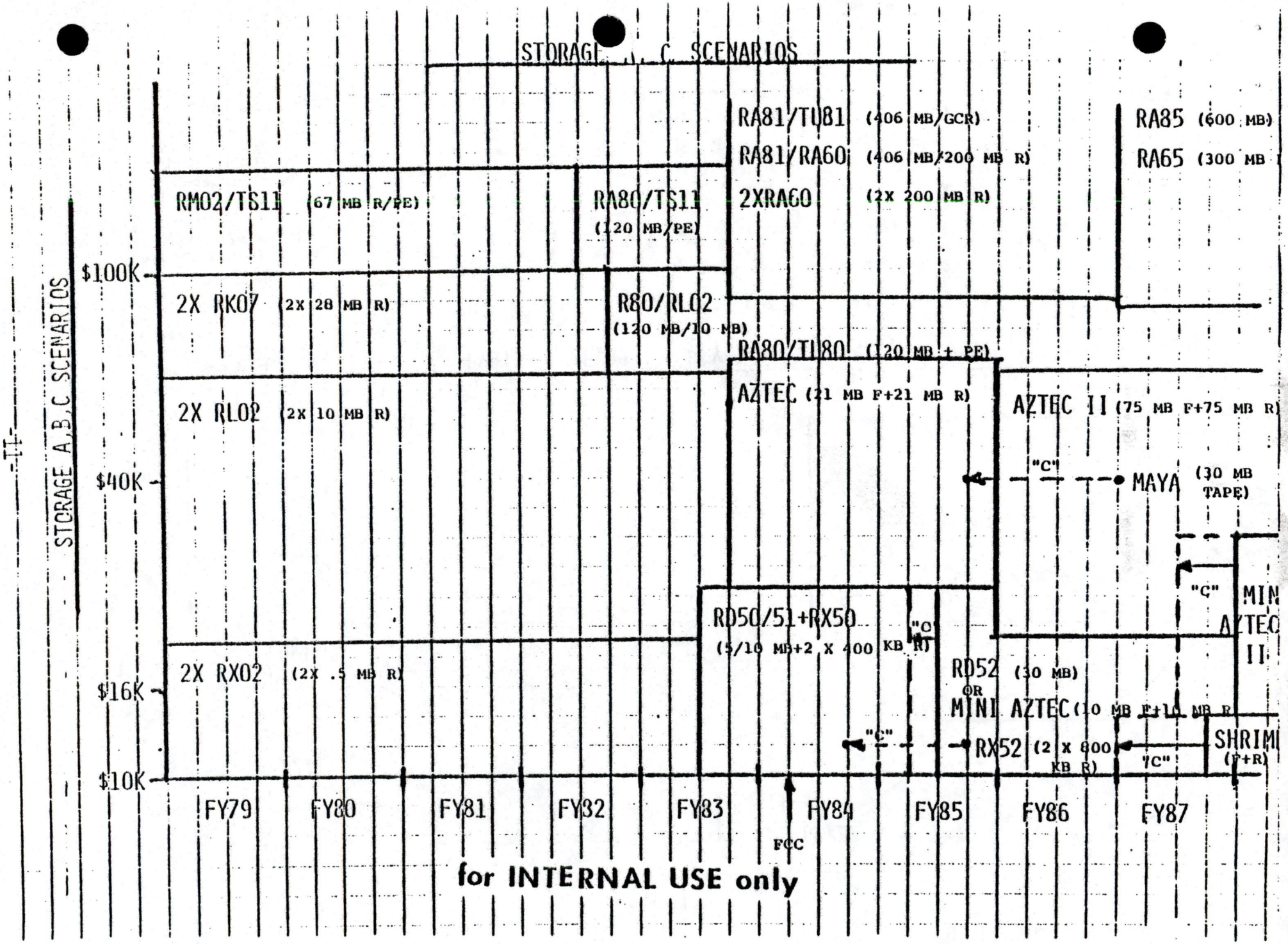
OTHER ENG EXPENSE				
	PERSONNEL	84	75	87
	FINANCE	270	289	335
	PROGRAM OFFICE	268	360	460
	ADMIN	500	625	806
	CONTINGENCY		114	182
	TOTAL OTHER	1122	1463	1870

TOTAL EXPENSE				
	PSD	8689	13,323	11,216

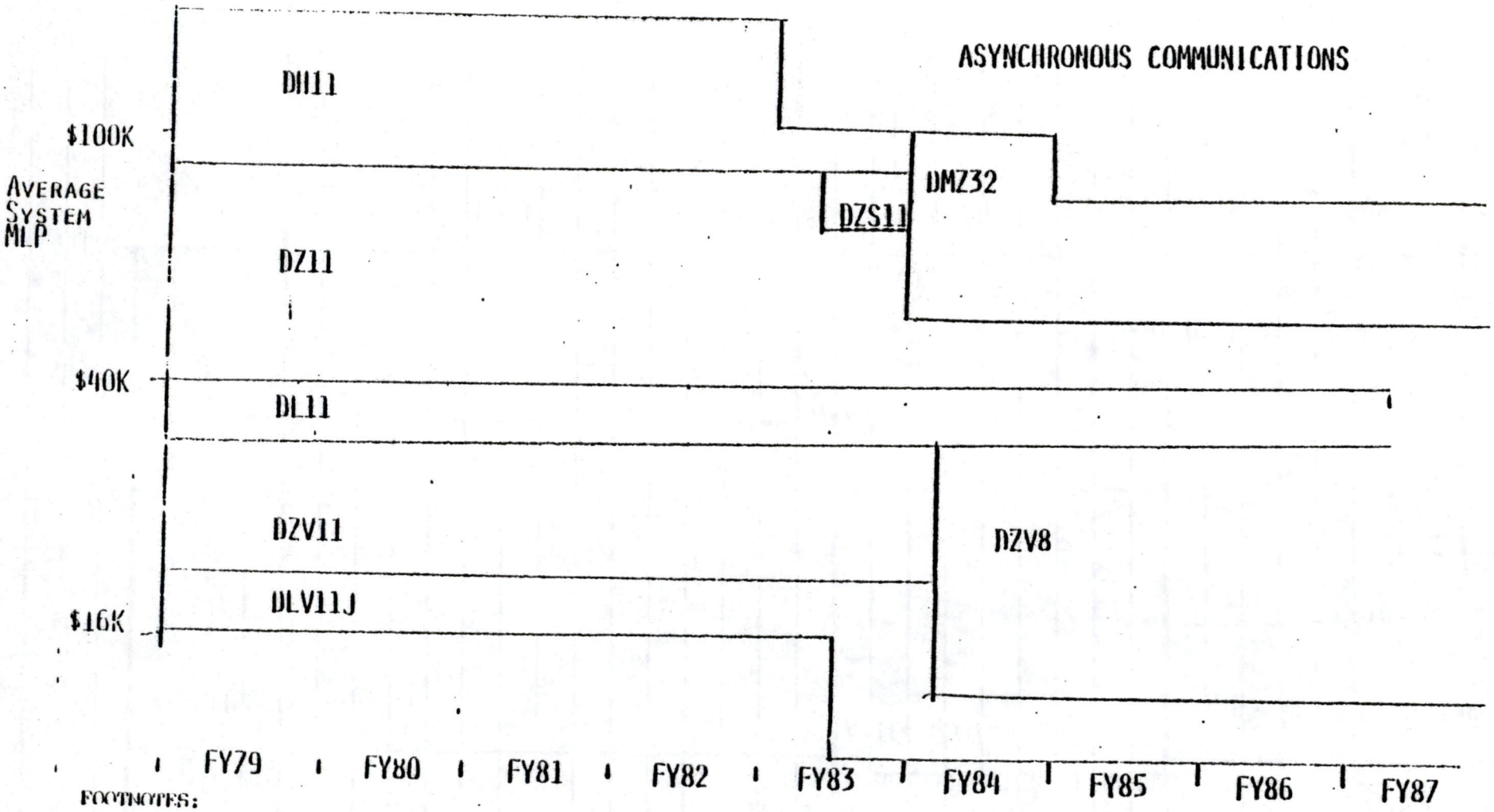
JR4.52

6-9-82


RDP-11 SYSTEMS CHART
WITH ENHANCEMENTS
SYSTEM SELL PRICE
$100K
$40K
$16K
$10K
11/70 (.5)
RP06
RH03
TE16
DH11
DHR11
11/44 (.4)
RH02
RK07
TS11
DZ11
DHR11
11/34A(.2)
RL02
RK07
DZ11
DL11
DUP11
11/24 (.2)
RL02
DZ11
DL11
DUP11
11/23 (.13)
RL02, RX02, DZV11, DMV11
11/03 (.07), 11/04 (.)
RL02
RX02
DZV11
DLV11
DUP11
11/23+ (.2)
RL02
RX02
DZV11
DMV11
UDA/RA80
RA81
RA60
TU81
AZTEC
DHZ32
UNA
AZTEC
UNA
AZTEC (?)
QNA
DZV8
LCP-8(.4)
AZTEC, QNA, DMV11
DZV8
LCP-5 (.13)
RL51/RX50, DLV11
QNA
DHV11
RX52
ORION U (.6)
AZTEC
UDA/RA80/1
RA60
TU81
UNA
DZ11
DUP11
MAYA
AZTEC II
ORION Q (.5)
AZTEC
QNA
DZV8
DMV11
AZTEC II
AZTEC II
MAYA
SHRIMP
FY79
FY80
FY81
FY82
FY83
FY84
FY85
FY86
FY87
FCC
( ) - PERFORMANCE RELATIVE TO 11/780 = 1
for INTERNAL USE only
2/82


STORAGE A, B, C SCENARIOS
STORAGE A,B,C SCENARIOS
RA81/TU81 (406 MB/GCR)
RA81/RA60 (406 MB/200 MB R)
2XRA60 (2X 200 MB R)
RA85 (600 MB)
RA65 (300 MB
RM02/TS11 (67 MB R/PE)
RA80/TS11 (120 MB/PE)
$100K
2X RK07 (2X 28 MB R)
R80/RL02 (120 MB/10 MB)
RA80/TU80 (120 MB + PE)
AZTEC (21 MB F+21 MB R)
2X RL02 (2X 10 MB R)
AZTEC II (75 MB F+75 MB R)
"C"
MAYA (30 MB TAPE)
$40K
"C"
MIN
AZTEC
II
RD50/51+RX50 (5/10 MB+2 X 400 KB R)
"C
2X RX02 (2X .5 MB R)
RD52 (30 MB)
OR
MINI AZTEC (10 MB F+10 MB R
$16K
"C"
RX52 (2 X 800 KB R)
"C"
SHRIM
(F+R)
$10K
FY79
FY80
FY81
FY82
FY83
FY84
FY85
FY86
FY87
FCC
for INTERNAL USE only

ASYNCHRONOUS COMMUNICATIONS



FOOTNOTES:

	DH11	DL11	DLV11J	DMZ32	DZ11	DZS11	DZV11	DZVP
RS232/RS423/20MA.	232/20	232	423	423	232/20	232	232	423
MAX # OF LINES:	16	1	4	8	8	8	4	8
MAX SPEED: (K BAUD)	9.6	9.6	19.2	19.2	9.6	9.6	9.6	19.2
DMA OUTPUT	X			X				X
SILO INPUT	X			X	X	X	X	X
FULL MODEM CTL & SPLIT SPEED	X			X				X

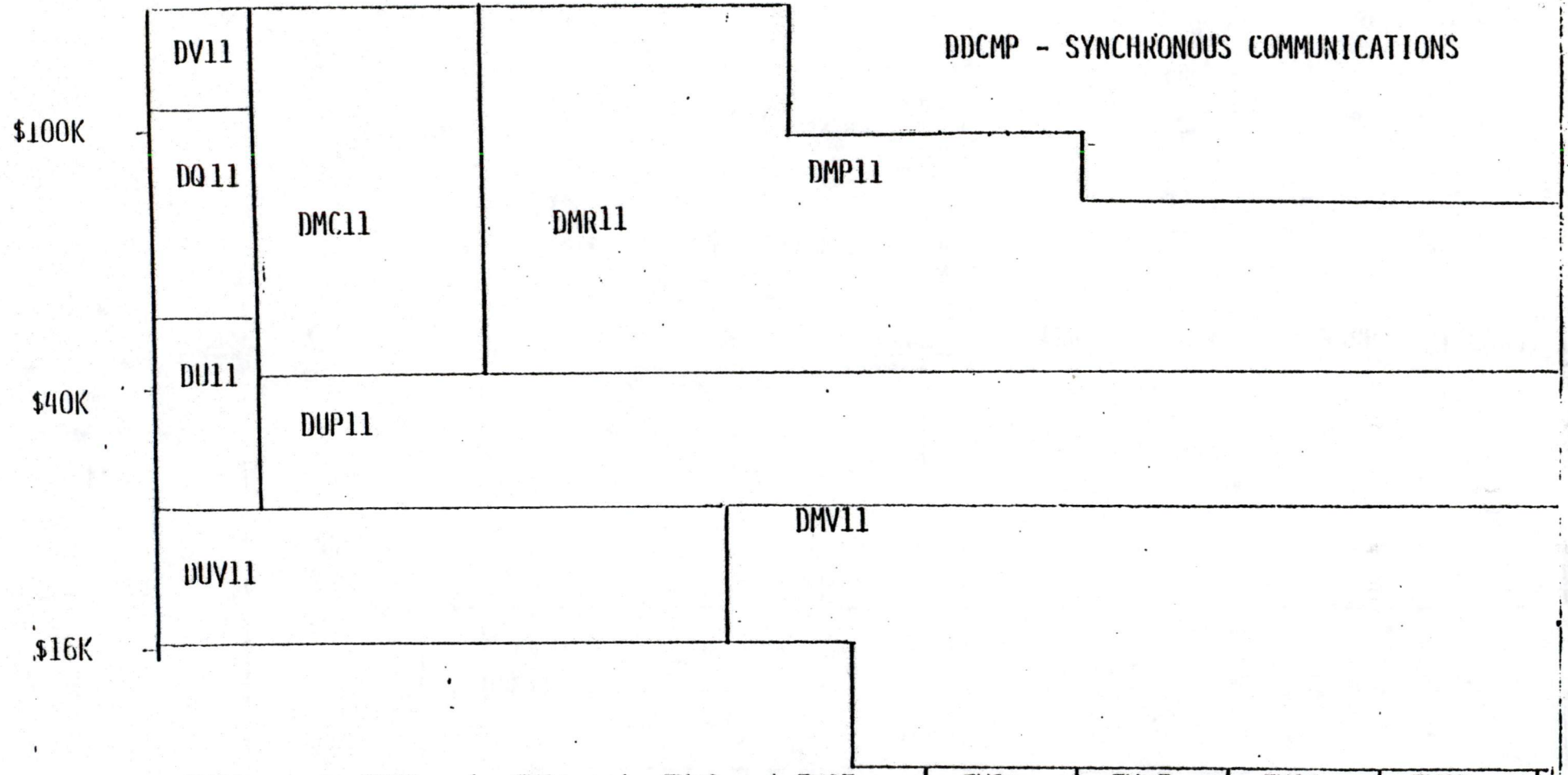
- Efficient DEC Virt Terminals needed for multi-system installations
- Assumption: DL11/DZ11 adequate through '87 for technical interfaces

PFC/TDR
1-8-82

PDP-11 SYSTEMS

for INTERNAL U[illegible]only

DDCMP - SYNCHRONOUS COMMUNICATIONS

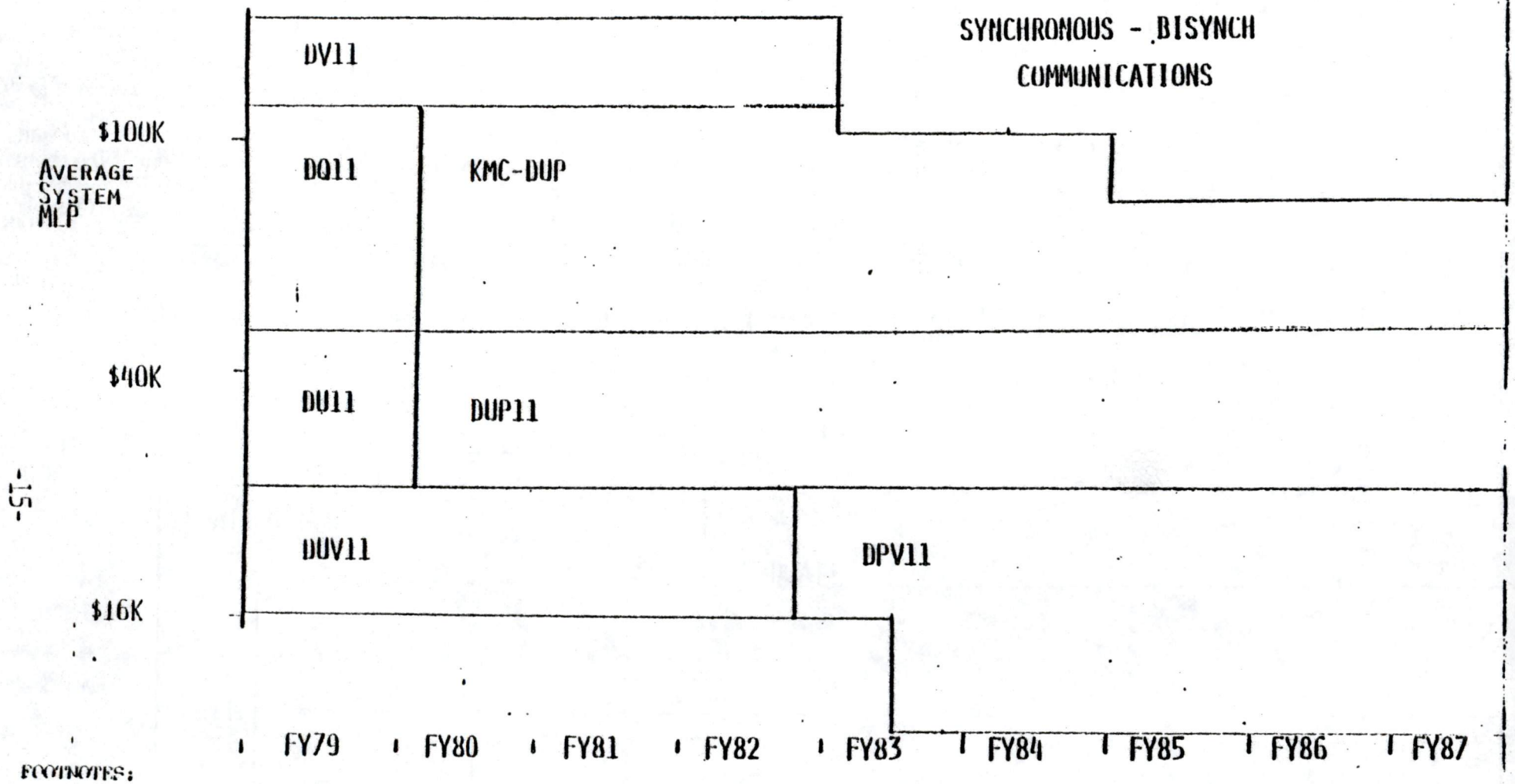


FOOTNOTES:

	DMC11	DMP11	DMR11	DMV11	DQ11	DU11	DUP11	DUV11	DV11
MAX # OF LINES	1	1	1	1	1	1	1	1	16
MULTI-DROP		X		X					
MAX SPEED (K BAUD)	1000	1000	1000	56	1000	9.6	9.6	9.6	38.4
SW SUPPORT	X	X	X	X	IAS	RSX,RT	RSX,RT	RSX,RT	RSX
DMA	X	X	X	X	X	X			
PROTOCOL PROC.		POLLING		POLLING					CRC
	RETRANS	RETRANS	RETRANS	RETRANS					

PFC/TDR
1-8-82

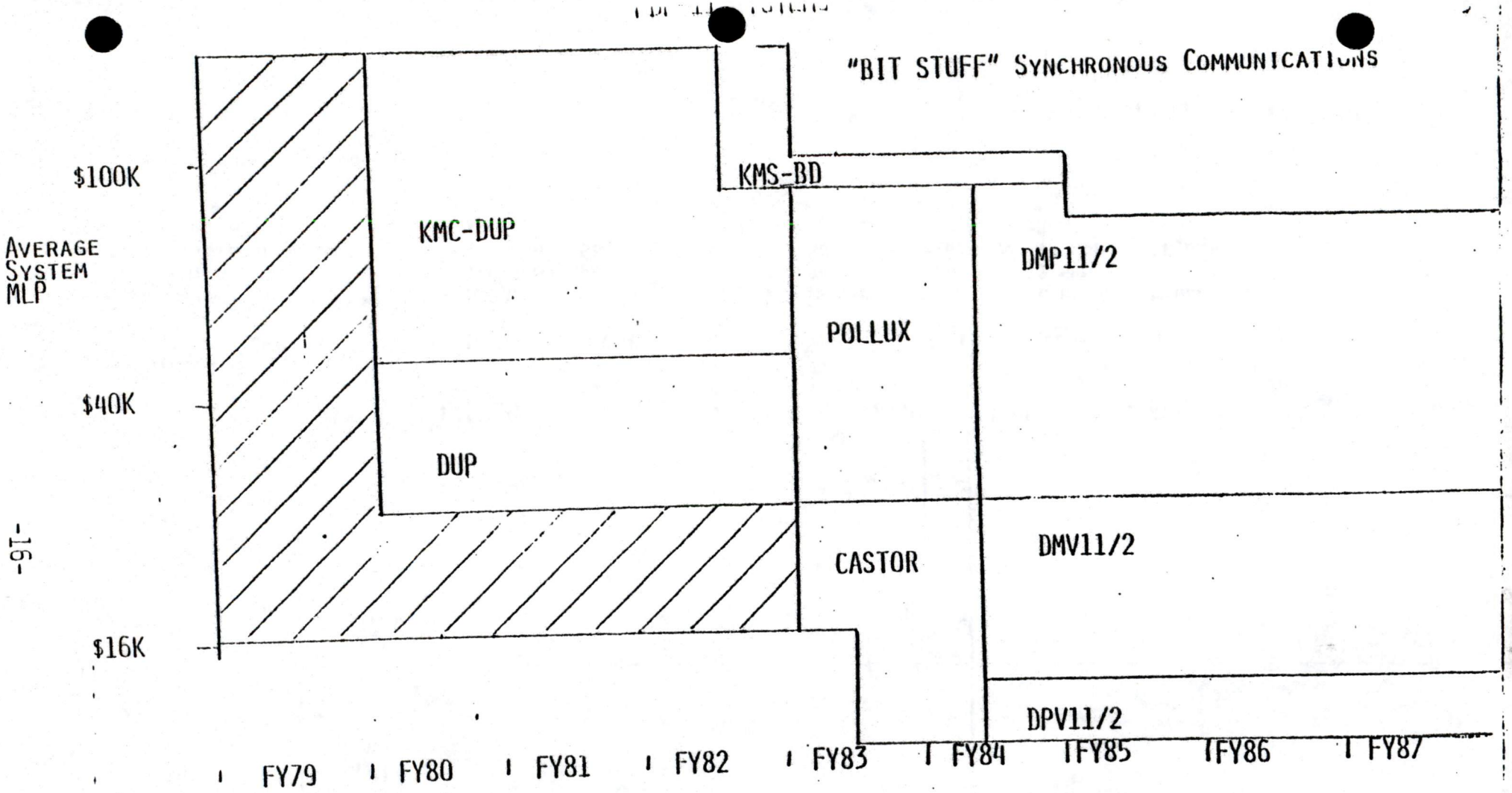
PDP-11 SYSTEMS



FOOTNOTES:

	DPV11	DQ11	DU11	DUP11	KMC-DUP11	DUV11	DV11
MAX # OF LINES	1	1	1	1	1	1	16
MAX SPEED (K BAUD)	56	1000	9.6	9.6	19.2	9.6	38.4
2780/3780				X	RSTS		
3271 P.E.	RSX,RT			RSX,RT	RSTS		RSX
DMA					X		X
PROTOCOL PROCESSING					X		CRC

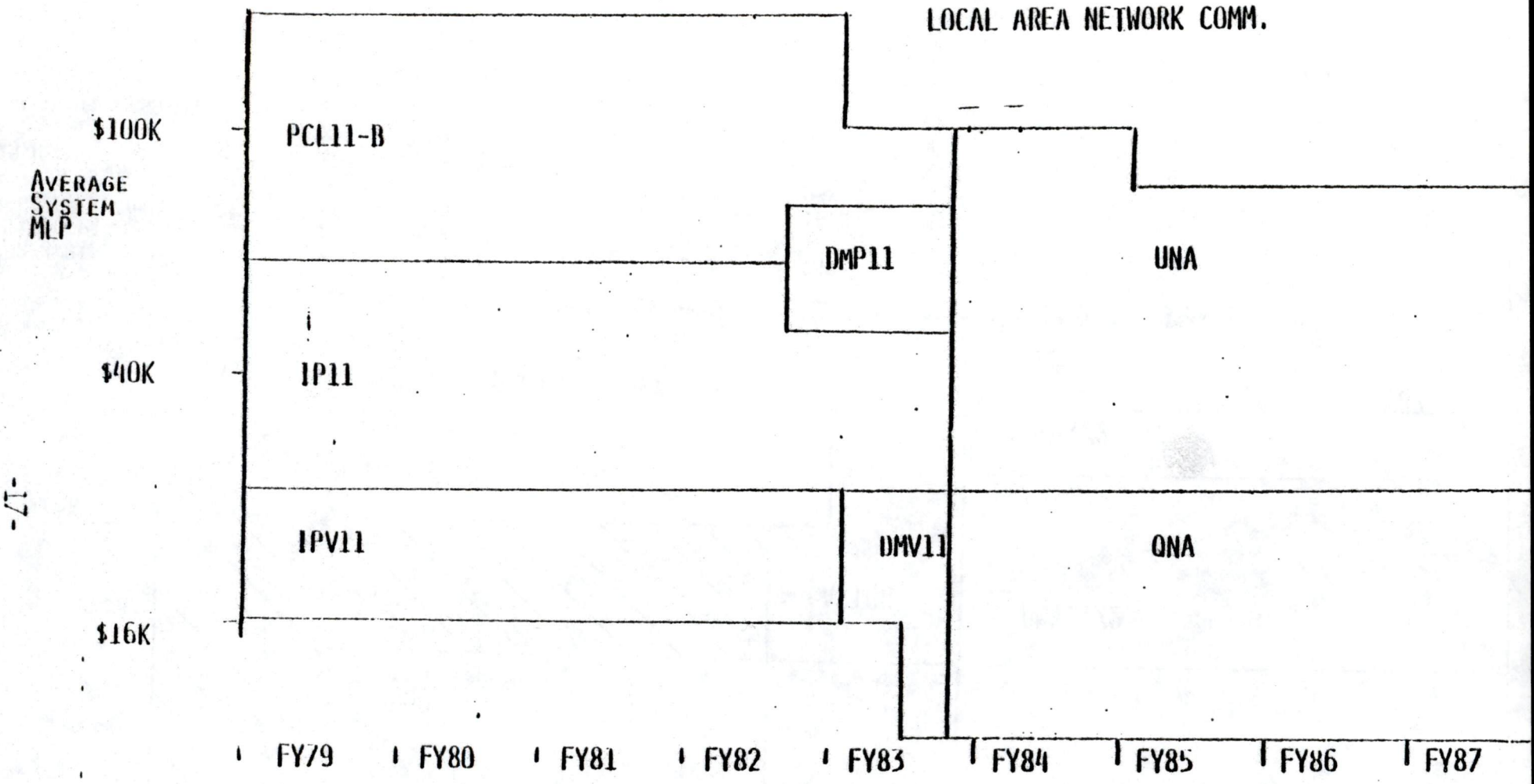
PFC/ TDR
1-A-82



FOOTNOTES:

	DMP11/2	DMV11/2	DPV11/2	DUP11	KMC-DUP	KMS-BD	CASTOR	POLLUX
RS232/X.21	X.21	X.21	X.21	232	232	232	X.21	X.21
MULTI-DROP	X	X	X					
MAX SPEED (K BAUD)	56	56	56	9.6	19.2	56	64	56
SNA				RSX	RSX	X		
X.25,HDLC	X	X	X			X	X	X
DMA	X	X			X	X		X
PROTOCOL PROCESSING	X	X				CRC		

PFC/TDR
1-8-82

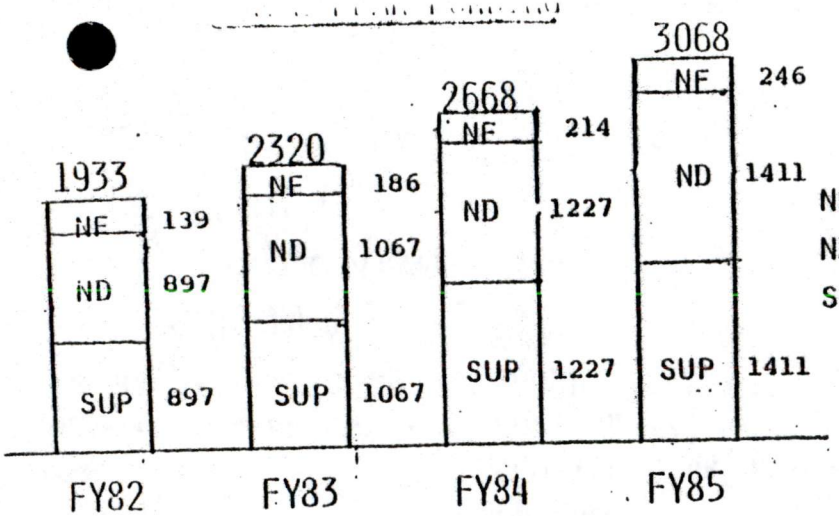


FOOTNOTES:

	DMP11	DMV11	IP11	IPV11	PCL11	QNA	UNA
INTERFACE	RS232	RS232	DATAWAY	DATAWAY	PCL	ETHERNET	ETHERNET
LENGTH	2KM/4KM	4KM	8KM	8KM	80M	2-5KM	2-5KM
MAX SPEED (K BAUD)	1000/56	56	56	56	4,000	10,000	10,000
SW SUPPORT	X	X	RSX/RT	RSX/RT	RSX	RSX	RSX

PFC/TDR
1-8-82

for INTERNAL USE only

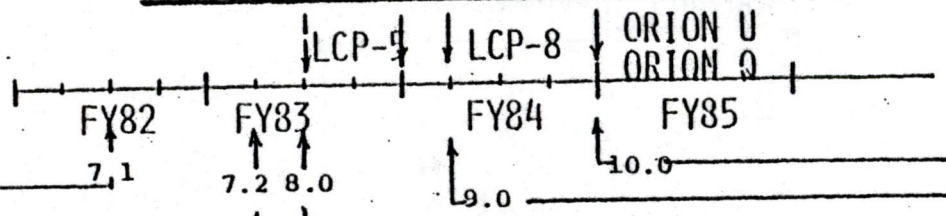


NF = NEW FUNCTIONALITY
ND = NEW DEVICE SUPPORT
SUP = SUPPORT

- o TU81 UNSCHEDULED
- o DHV-11 1 Q LATE
- o ORION Q 4Q (+) LATE
- o QBUS 2780/3780
- o DMZ-32 1 Q LATE
- o TU80, UNSCHEDULED
- o INCREMENTAL BRU 3 Q LATE

DELIVERABLE - BASE PLAN

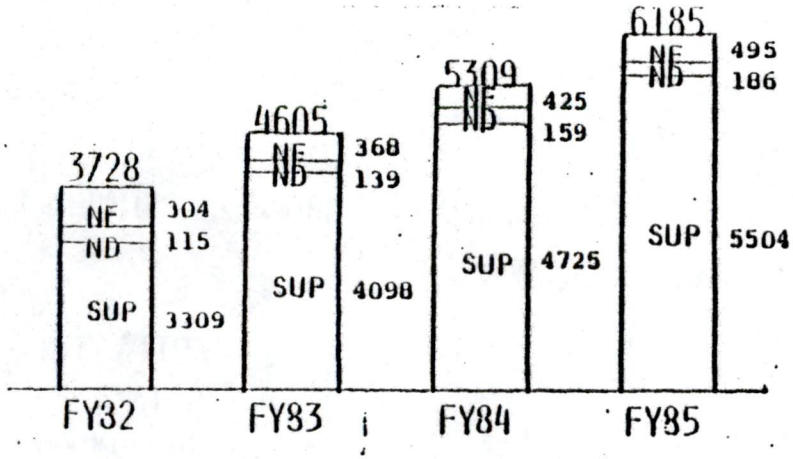
SCENARIO A



11/23 PLUS (256K)	FULL 11/23 PLUS	RSTS/E SUBSET	RSTS/E	AZTEC	ORION U
MORE SIMUL. USERS	UDA/RA30	(RSTS/A)	MS11-P	DHV-11,	
DECNET PHASE III	CLUSTER LIB	APPL. ONLY	RA81	DMZ-32	
RM80	COBOL 81 V1.1	1-4 USERS	RA60	SMALL	
DECWORD/DP V1.1	VT125, LA100	NO COMPILERS	SMALL SPOOLER	BATCH,	
FMS-11 V1.5		LCP-5	BASIC +2 V2	CUSPS,	
VT101/VT102		RD51/RX50		LCP-8	
LP26/07		RMS-11 V2		INCREMENTAL BRU	

SCENARIO B - QBUS 2780/3780 FY83 = ?

3/22/82



NF = NEW FUNCTIONALITY
ND = NEW DEVICE SUPPORT
SUP = SUPPORT

- o TU81 UNSCHEDULED
- o TU80 UNSCHEDULED
- o C COMPILER UNFUNDED

DELIVERABLES - BASE PLAN

SCENARIO A

LCP-5 | LCP-8 | ORION U / ORION Q

FY82 | FY83 | FY84 | FY85

M,S M+ V4.0 | V2.0 | M+ V2.1 | M+ V5.1 | M;S V4.1

11/23 PLUS
UDA/RA80
DCL
RM05
CLUSTER LIBRARIES
FORTRAN-77

11/24
11/23 PLUS
UDA/RA80
CLUSTER LIBRARIES
FORTRAN-77
COBOL-81 V1.1

BACK-UP ENHANCE*
LCP-5
RD51/RX50

* AUTOPATCH

MERGE M AND M+
LCP-8
AZTEC
RMS-V2.0
OFIS
RA60
DHV-11
RA-81
DMZ32
KDJ11A

ORION U
ORION Q
CUSTOMER INSTALI
PERFORMANCE
11S FUNCTIONALI
IN M+
DECNET INTEGRAT

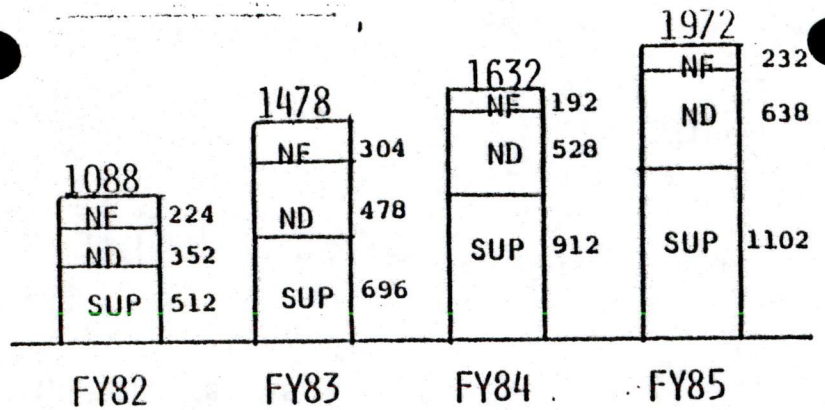
SCENARIO B

FILER SERVER - LOW END H2 FY85 FY83 $380K

SCENARIO C

FY84 = $545K FY85 = $610K

ODS II, INTERNATIONALIZATION

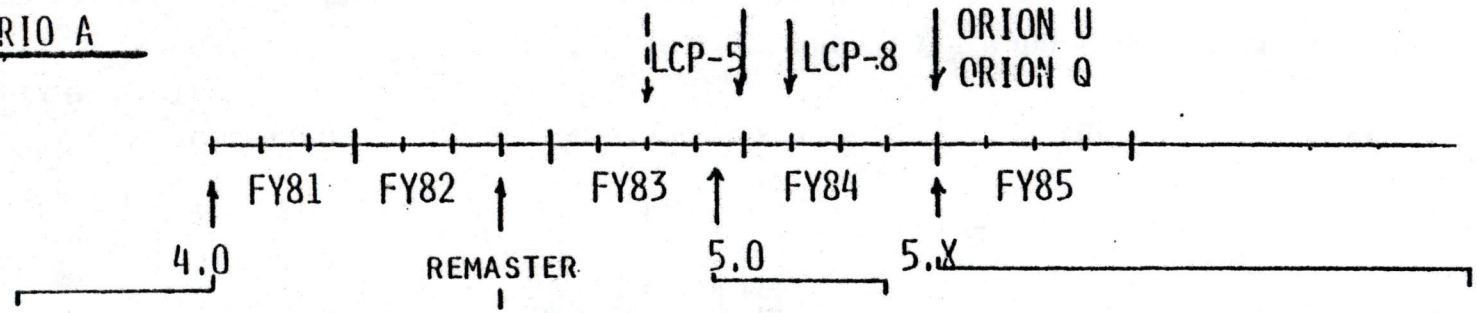


NF = NEW FUNCTIONALITY
ND = NEW DEVICE SUPPORT
SUP = SUPPORT

- o NEED NEW LANGUAGE
- o KDJ11A UNPLANNED
- o DHV-11 3 Q LATE

DELIVERABLES - BASE PLAN

SCENARIO A



AUTOPATCH
ERROR LOGGER
11/44
11/24
KED
RL02
FMS V1.1
PDT

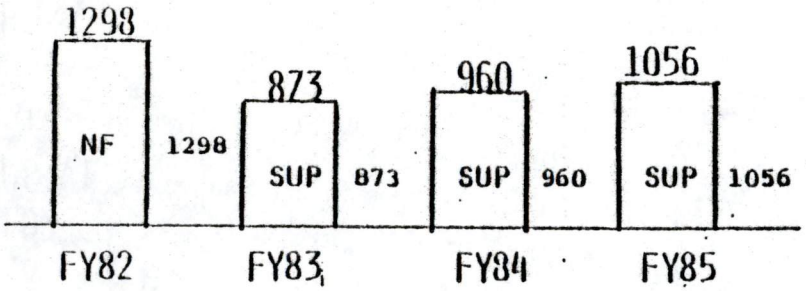
MICRO-POWER DEV. SYSTEM
DECNET PHASE III V2.0
CTS 300 V7.0
11/23 PLUS
DECTYPE
REGAL
QUILL

IMPROVED EXTENDED MEMORY MONITOR
LCP-5
LCP-8
AZTEC
NEW BACK-UP UTILITY
RD51/RX50
CUSTOMER INSTALLED

ORION Q
ORION U
DHV-11
PASCAL-11

SCENARIO B MAKE RT SMALLER - CONTINUING PROCESS - DELIVERABLES AT EACH REMASTER
FY83 $200K

BASE PLAN FUNDING



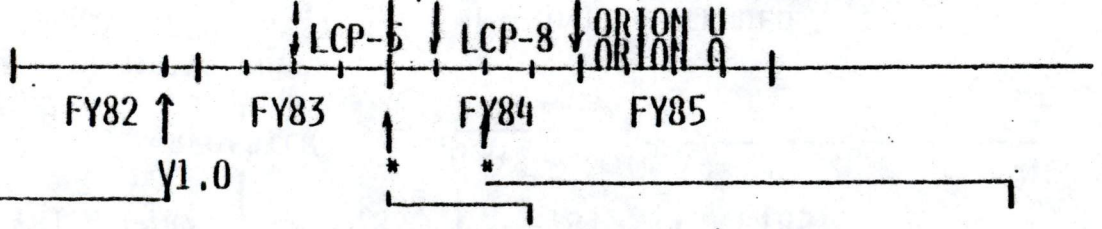
NF = NEW FUNCTIONALITY
SUP = SUPPORT

PROBLEMS

- o LCP-5 UNFUNDED
- o P/L FUNDING UNSCHEDUL
- o UPDATE CYCLE (PERIOD)
- o RD51/RX50 UNFUNDED
- o KDJ11A UNFUNDED
- o MULTI-CPU 2Q LATE
- o M+, VMS HOST 6Q LATE
- o SILICON OS 5Q LATE
- o COMM STRATEGY
- o PL 20 FUNDING SUPPORT AND UPDATE KITS ONLY

DELIVERABLES - BASE PLAN

SCENARIO A



REAL TIME APPLICATION
RUN-TIME SYSTEM
COMPILES ON HOST
RUNS APPLICATION ON TARGET
PASCAL
MACRO-11
TARGET SYSTEMS
11/23 11/23 PLUS
LSI-11/2 SBC-11/21
RT-11 HOST SYSTEM

VMS AND RSX-11M+ HOST +

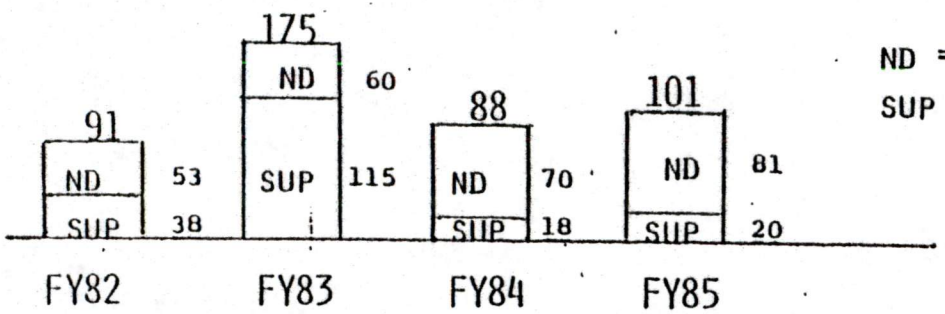
* QUARTERLY UPDATES - MODULE REPLACEMENT
NEW DEVICE SUPPORT
NEW FUNCTIONALITY

MULTI-CPU TARGET +

+ MICROPRODUCT GROUP FUNDING

SCENARIO B - VMS HOST EARLIER - FY83 $218K SILICON OS - FY84 $403K ROM DIST. - FY85 $648K

P/L FUNDING

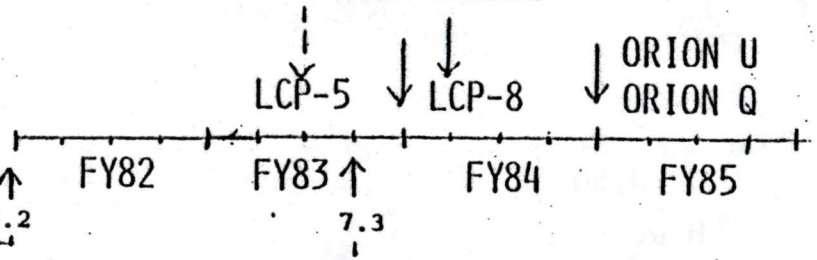


ND = NEW DEVICE SUPPORT
SUP = SUPPORT

PROBLEMS

- o IMPACT OF BELL RELEASE III
- o LICENSING ISSUES
- o METHOD OF COMMUNICATIN BETWEEN UNIX AND RSX-11M+ SYSTEMS

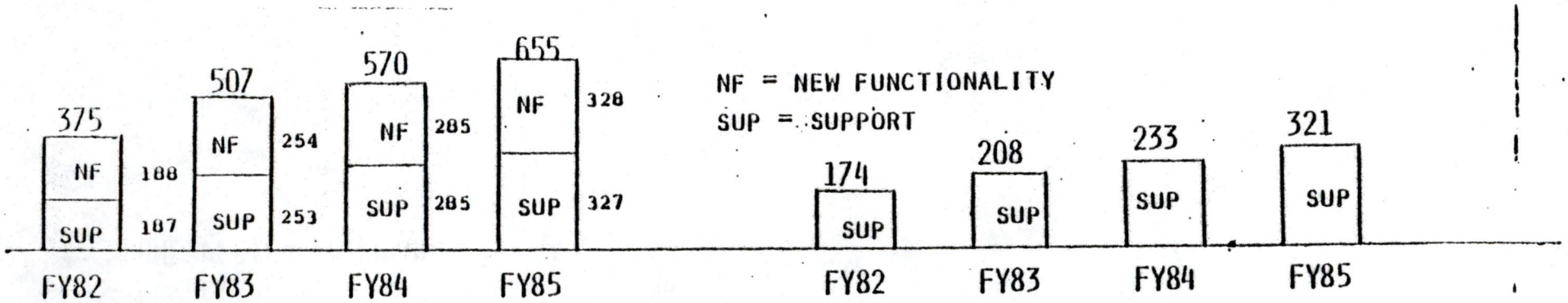
DELIVERABLES



ML-11
TS-11
BUG FIXES
ECC FOR RP's
AND RK's
MEMORY PARITY
UNEXPECTED INTERRUPTS

11/23 PLUS
UDA/RA80
ERROR LOGGING
COMPETITIVE
PERF. INFO.
BUG FIXES

WILL SUPPORT:
LCP-5
LCP-8
ORION U
ORION Q
AT FCS

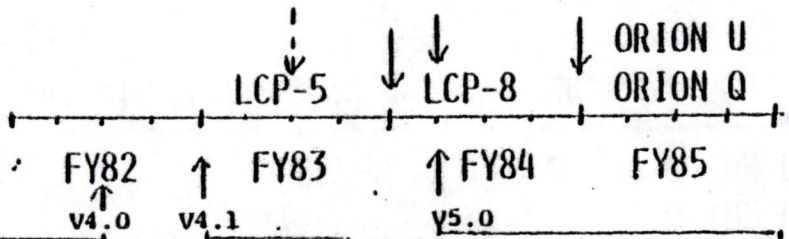


FORTRAN-77

FORTRAN-IV - SUPPORT ONLY

DELIVERABLES - BASE PLAN

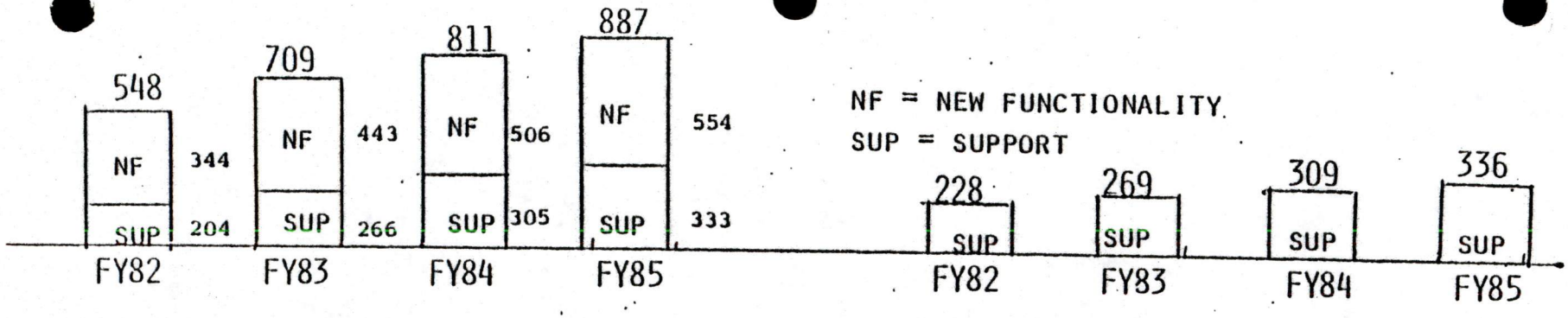
SCENARIO A



FIRST RELEASE
SUBSET ANSI-77
STANDARD
RSX, RSTS

ANSI FLAGGER
BUG FIXES
RSX, RSTS

FULL ANSI-77
STANDARD
RSX, RSTS

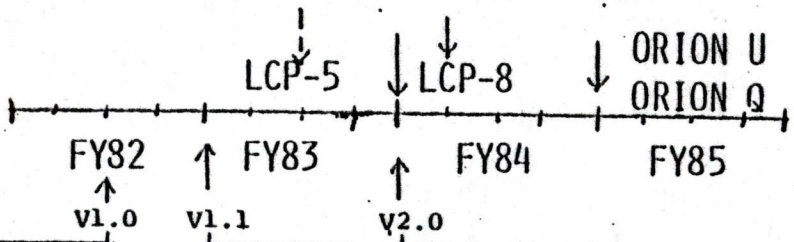


COBOL-81

DELIVERABLES - BASE PLAN

PDP-11 COBOL - SUPPORT ONLY

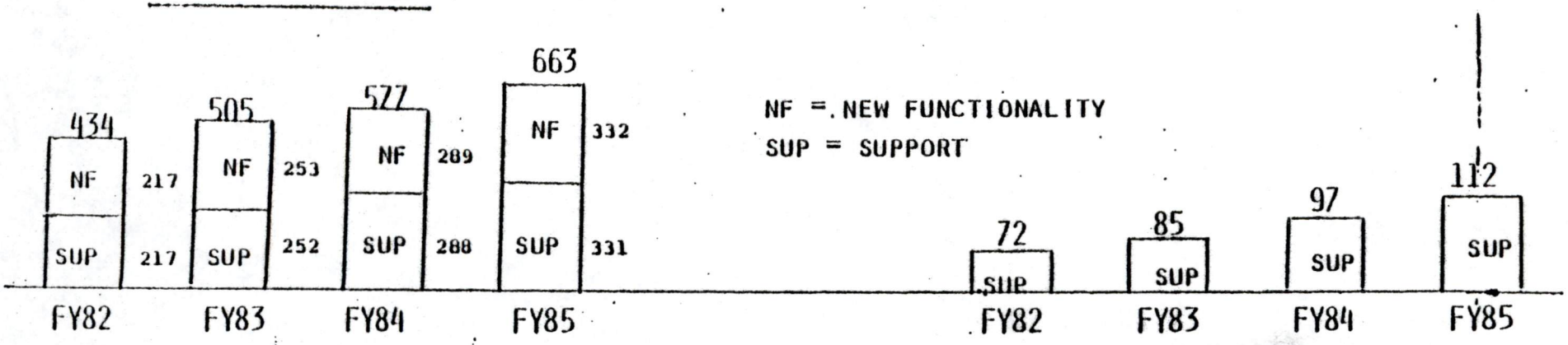
SCENARIO A



SUBSET OF PDP-11 COBOL
SUPPORT CIS AND NON-CIS
SYMBOLIC DEBUGGER
RSTS ONLY

RSX SUPPORT
BUG FIXES

FUNCTIONAL REPLACEMENT OF
PDP-11 COBOL
RUN TIME FOR CT
IMPROVE PERFORMANCE
NO SIZE INCREASE
RSTS, RSX

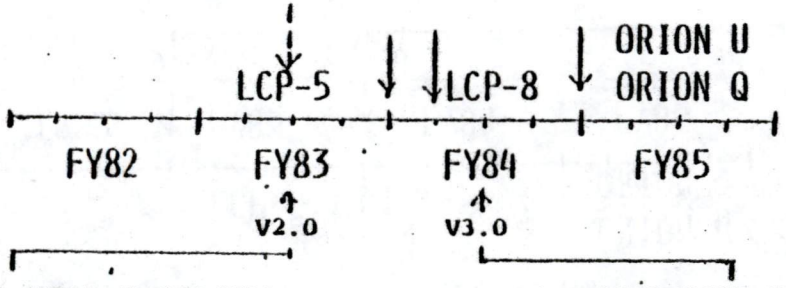


BASIC +2

BASIC PLUS - RSTS ONLY

SCENARIO A

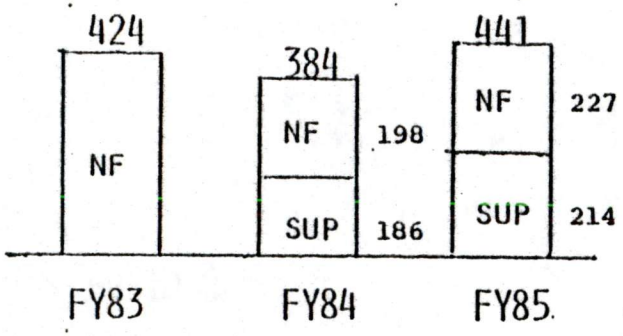
DELIVERABLES - BASE PLAN



IMPROVED HELP FACILITY
NEW DATA TYPES
SUPPORT FOR CLUSTER LIBRARIES
IMPROVED USER INTERFACE
RUN/LOAD COMMANDS
RSX, RSTS

IMPROVED PERFORMANCE
TRACK ANSI STANDARD
BASIC-PLUS UPGRADE
RSX, RSTS

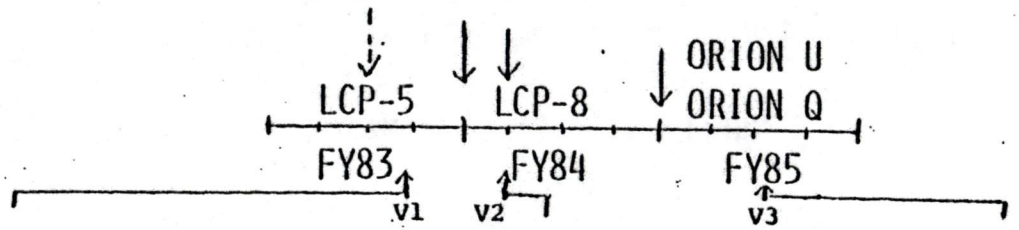
PL 85 FUNDING



NF = NEW FUNCTIONALITY
SUP = SUPPORT

DELIVERABLES

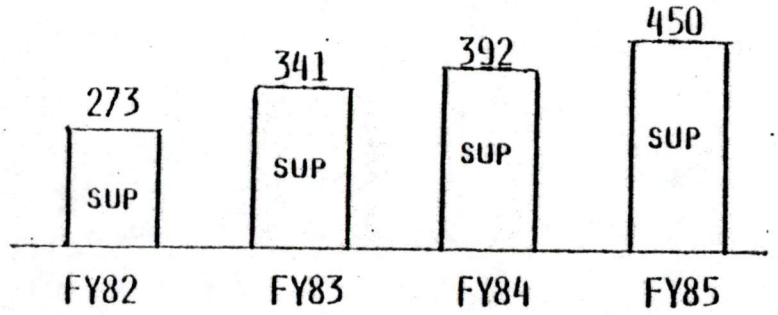
SCENARIO A



ISO CONFORMANT
VAX-11 PASCAL
V2 SUBSET
RSX ONLY

RT-11
BUG FIXES

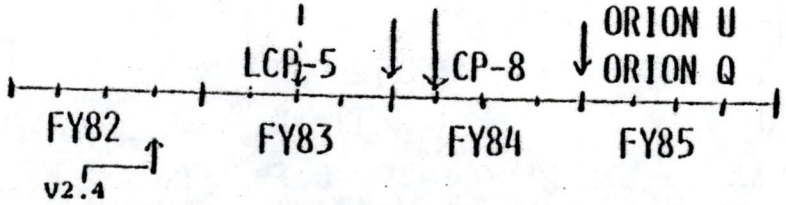
DEBUGGER
DIRECT ACCESS
RMS
MORE VAX-11 PASCAL
FEATURES
RSX, RT



SUP = SUPPORT

DELIVERABLES - BASE PLAN

SCENARIO A



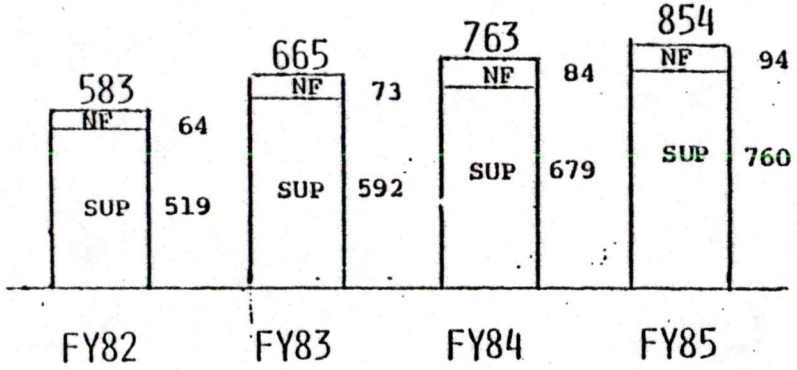
REVISED INSTALLATION PROCEDURE
BUG FIXES
DATATRIEVE-11/DBMS-11 INTERFACE INCLUDED
RSX, RSTS

SCENARIO B

FULLY DISTRIBUTED DATA ACCESS, PDP-11, VAX, CT

FY83 - $282K FY84 - $396K FY85 - $450K
SHIP - 112 FY84

BASE PLAN FUNDING*

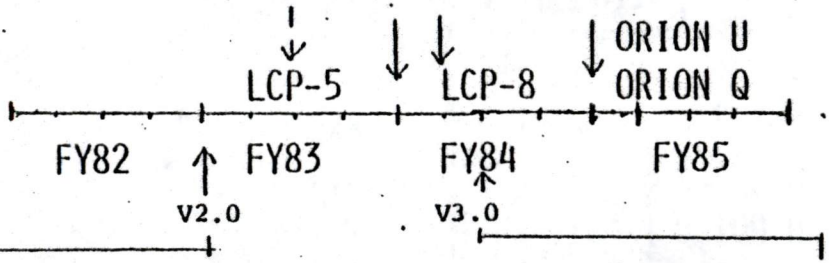


NF = NEW FUNCTIONALITY
SUP = SUPPORT

* FUNDING INCLUDED IN RSX CHART

DELIVERABLES - BASE PLAN

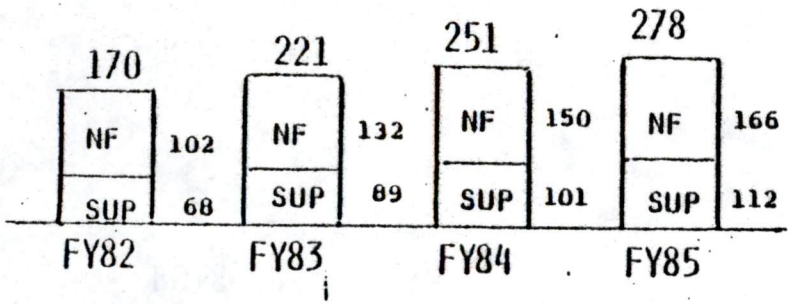
SCENARIO A



CLUSTER LIBRARIES
DAP SUPPORT
NEW IFL
FILE DESIGN UTILITY
RSTS, RSX

DISK SPACE RECLAMATION
REMOVE RMS FROM USER ADDR SPACE
VERIFY - RECOVER UTILITY
RSTS, RSX

BASE PLAN FUNDING



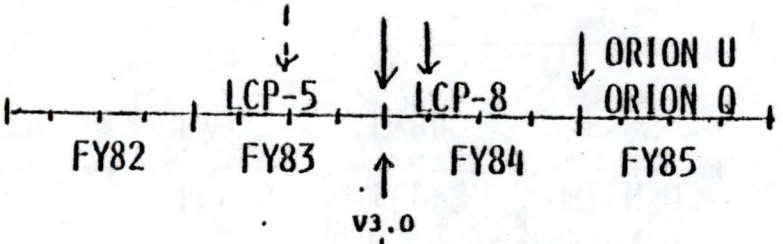
NF = NEW FUNCTIONALITY
SUP = SUPPORT

PROBLEMS

o PLANS BEYOND FY83

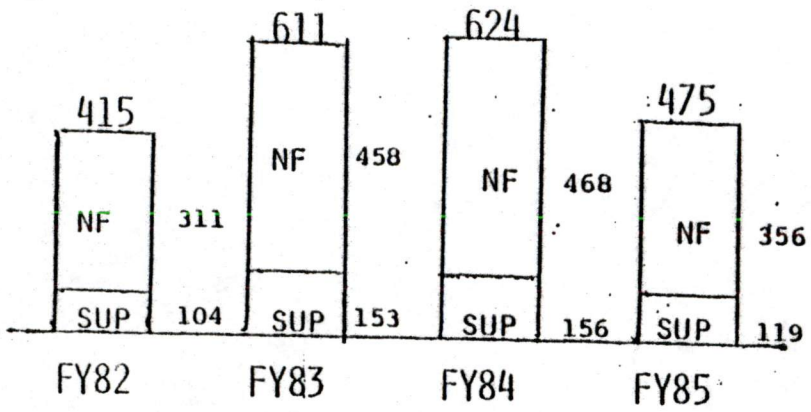
DELIVERABLES - BASE PLAN

SCENARIO A



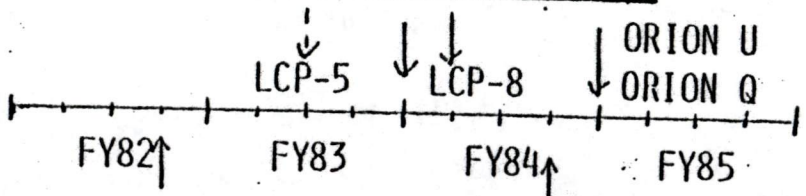
TOTAL REWRITE IN BLISS
COBOL AND DIBOL DATA TYPES
USER SPECIFIED COLLATING SEQUENCE
MERGE
RSTS, RSX

BASE PLAN FUNDING



NF = NEW FUNCTIONALITY
SUP = SUPPORT

DELIVERABLES - BASE PLAN



SCENARIO A

V1.5

SCREEN FORMATTER
RSTS SUPPORT ONLY
HARDWARE TRANSPARENT
TERMINAL SUPPORT

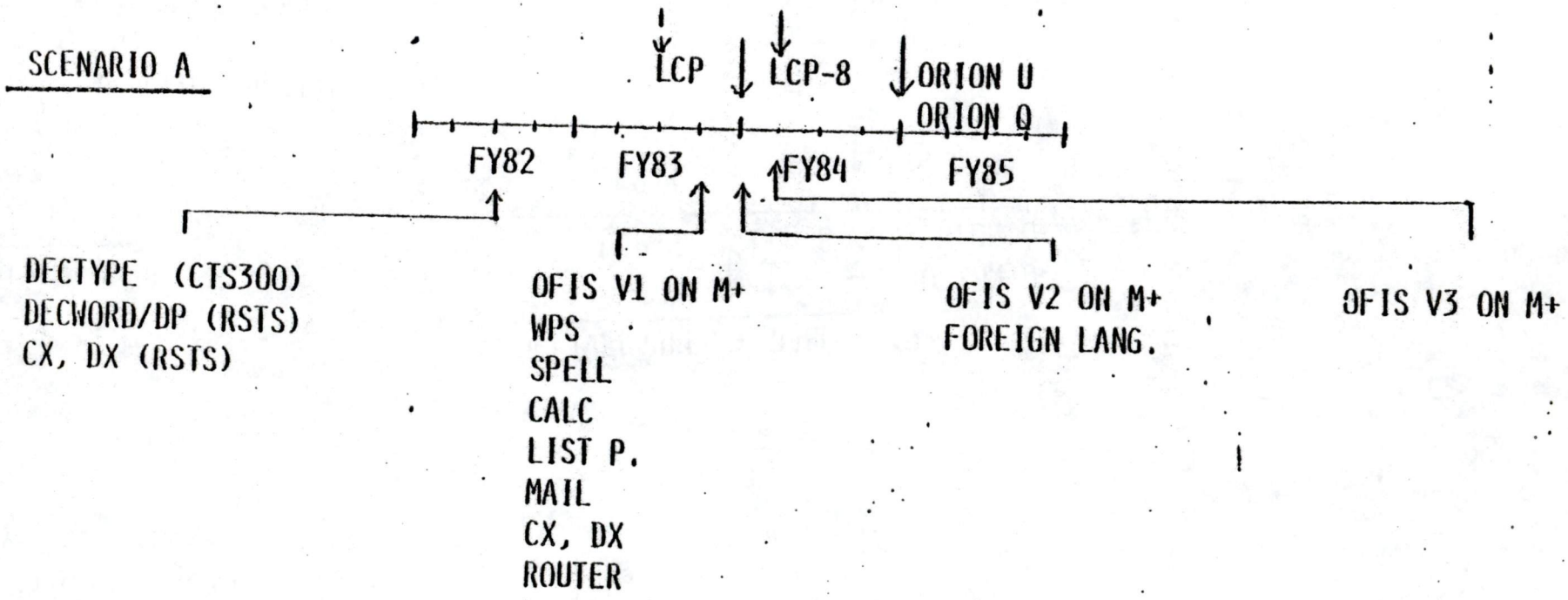
V2.0

INCREASE PERFORMANCE
NETWORKING
COMPLETE PRODUCT REWRITE
RSX
RSTS

NOTE: V1.0 RUNS ON
RSX AND RT-11

OFIS

DELIVERABLES



Term. & Work.

VIDEO PRODUCT ALTERNATIVES

TERMINAL PRODUCTS	BEST ALTERNATIVE	CONSEQUENCE OF ALTERNATIVE	CASH FLOW	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOW DOWN	BEST PRODUCT AVAILABLE TODAY
VT220	COST REDUCE VT102	- LOSE DEC'S NEW FAMILY LOOK - HIGHER TRANSFER COST - LOSE MARKET SHARE	T.B.D.	-VT100 FAMILY WOULD NOT SUPPORT MARKET VERY LONG CAUSING A DECREASE IN DEC'S VIDEO TERM. BUSINESS	-LOSE MARKET SHARE -LOSS OF REVENUE -COMPETITION WOULD BECOME LEADER	CITOH-CIT 101 ANNOUNCED TELE-VIDEO TV970
VT240	-BUYOUT -COST REDUCE VT125	-LOSE LOW END GRAPHICS CAPABILITY -VOLUMES WOULD STAY LOW BECAUSE TRANSFER COST	T.B.D.	-GRAPHICS TERMINAL BUSINESS WOULD BE LOST TO COMPETITION	- FOLLOW COMPETITION - LOSS OF REVENUE -TO LATE TOO ESTABLISH DEC AS A LOW END GRAPHICS SUPPLIER	H P TEKTRONICS CITOH
VIDEO SUBASSEMBLIES						
15VSS	-NONE	-LOSE MARKET SHARE	T.B.D.	-EUROPEAN MARKET WOULD BE LOST IN PC -WINDOWING FUNCTION INADEQUATE	- LOSE MARKET SHARE AND PROFIT	
RAINBOW GRAPHICS	-3rd PARTY DESIGN	-LOSE MARKET SHARE -1 YR DELAY	T.B.D.	- LOSS OF MARKET SHARE	-CMMITMENT WOULD NOT BE MET-IMAGE LOSS FOR DEC	
DATA COMMUNICATIONS						
TMS	BUYOUT	6MTHS-1 YR.LATE LOSE INHOUSE CAP.	T.B.D.	LOSS OF REVENUE ANNOUNCED PRODUCT DEC CREDABILITY	LOSS OF REVENUE	
MODEMS INTEGRAL)	EXTERNAL MODEMS	-COST TO END USER -LOSS OF REVENUE FEATURE	T.B.D.	LOSS OF REVENUE	LOSS OF REVENUE	VADIC 3400 BELL 212A
CTNA	BUYOUT DESIGN	- 1 YEAR DELAY - HIGHER COST	T.B.D.	MAJOR STRATEGY IMPACT	LOSS OF REVENUE	

LSI /IDEO)	EXTERNAL LSI VENDOR	DEC WOULD BE A FOLLOWER NOT A LEADER IN VIDEO -6MTHS-1YR LATER -LOWER FUNCTIONALITY	T.B.D.	- LIMITED FUNCTIONALITY IN FUTURE PRODUCTS -MORE DIFFICULT TO IMPLEMENT NEW PROTOCALS(e.g. PLP) -HIGH PREFORMANCE REQ'D	-IMPACT ON STAYING COMPETITIVE	NEC

Non-Product Alternatives

A. Video Support:

Alternatives	None/do as planned
Consequences	Any alternative would impact terminals and personal computers
If cancelled	No shipments
Slow down	Fewer shipments/less cost reduction effort/product development would be affected and enhancement efforts

B. Video Advance Development:

Alternatives	Do without or slow down
Consequences	Dependent on industry technology developments for product ideas
	Makes DEC's Video and Data Communications less competitive for personal computers and terminals
	Loss of new markets
	More buy-out dependent
If cancelled	Same as "consequences"

C. Video Other:

Alternatives	None
Consequences	N/A
If cancelled	N/A
Slow down	Less product management/ marketing leadership
	Product requirements development would decrease

Less product introduction activity

Less technical support from Central Engineeering to sales

Business plans may not be as detailed

	FUND. REQ. FY83	FY83	FY84	DESCRIPTION OF PROJECT WORK
Professional	$(000)	$(000)	$(000)	
$ NOR Goals		312000	119300	
Incremental Funding Projects				
Wedge Monitor	427			
VSS - 15" Monitor	340			o Firmware effort for the 15" Video Monitor
TMS	561			o Telephone Management System
CTNA	374			
256K RAM	110			o An additional memory board for PC
CT200 (J11)	650			o Next generation of PC; originally development planned for FY84
PLP	180			o Multi screen for PC; provides ability to read separate data on bottom of screen
Prod. Assur/Docum	350			o Add'l PA for these incremental projects
CT100 - PS/PKG/DIA	375			o Overspend due to FCC compliance requiring design change
Mfg Test Eq.	250			o Test equipment used by Mfg.
DECNET	320			o O^2D funding for SND/CTNA/DECNET passed to Demmer to Gutman to Avery; by the time it got to Avery nothing was left for DECNET
	3937			
DECmate				
$ NOR Goals		66000	238000	
Rainbow				
$ NOR Goals		72000	165000	
Video				
$ NOR Goals		308000	373000	
Incremental Funding Projects				
Onyx Cost Reduction	790			o 32 Bit workstation; engineering to cost reduce it
Mouse (Prel. Est.)	100			
	890			
	===			
Hardcopy				
$NOR Goals		295000	461000	
Orprey	600			o Low cost impact printer
Vesta	500			o Low cost thermal hardcopy production
Apollo	400			o Color thermal hardcopy production
Hermes	300			o High end laser hardcopy production
	1800			
ECO Support	2010	———	———	o Requested at time of run rate budget determination; no approval obtained
TOTAL	$8637	$ 1053000	$ 2430000	
	=====	=========	=========	

TERMINALS AND WORKSTATIONS

TMC recommendations

			Project Cost $K FY83	FY84
BUYOUTS:	1) LA 200		1600	1100
	2) Mechancial Hardware for Lazer/Xerography Printing	(LN03)	1200	2100
	3) All Printers (including thermal ribbon from Japan)			
	Hardcopy			
	Prod. Dev.		4200	4100
	Prod. Support		600	600
	A/D		800	1300
	Other		1700	3700
		subtotal	$7300	$9700
MERGE:	1) CT and Workstation Clusters	(CT Cluster)	1700	2200
		(Workstation Cluster)	3400	4000
	2) VT250 with Workstation	(VT250)	800	2300
CUTS:	1) PDP-8 (DECMATE)		9800	-
	2) OTHER (cut by 1/2) includes:			
		HC	1700	3700
		Video	4000	1700
		CT	2400	2800
		Firmware/Diag.	1300	1500
		Tech Services	1100	1300
		M/E	300	200
		Admin	600	700
		Other subtotal	11400	11800

COMMENTS

- Fundamental question: this is a $350M printer business - where's it going?
  N.B. General TMC bias: printers are not strategically critical to DEC

- As long as DECMATE exists, 11's won't do word processing - leaving vulnerable market gap.

- Problem: there are three different personal computers not compatible by application.

- Terminals/Workstations need to develop business models (eg, showing cost/profit) for Monitors/Terminals.

- In the VT, CT, and VS Programs, ther's no overlap in the physical hardware, but a tremendous overlap in architecture and clusters.

TMC Review Slides attached
Tetschner slides attached

TERMINALS AND WORKSTATIONS

	PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGE	REDUCTION/SLOW DOWN	
1. Are we spending too much on hardcopy A/D? TOOK IS OK					
2. Is the LN03 a buyout of obsolete technology? N/A					
3. Has the LN02 gone away? (Presumption that it should.) YES					
4. Is there a thermal ribbon printer project? If so, why copy obsolete Japanese technology? YES 2 IN JAPAN					
5. Support is 25% of development in terminals. Sounds wrong. NEED UPDATED FINANCIAL DATA					
6. Low-end RO project needs review. Why not a Japanese buyout? LA50 IS A JAPANESE BUY					
7. Reduce overlap in the VT, CT, and VS programs. NO OVERLAP IN PHYSICA HL SEE #12 BELOW					●
8. Why build so many video ~~displays~~? subsystems? CLARIFY					
9. Should we be gearing down our spending for the 12-BIT area?					X
Do we really want/need to invest another $9.8M in the 8's in FY83? This is 2/3 of what we're investing in CT ($14.7M), and more than 2X Rainbow investment ($3.8M). Do revenues in DECMATE really support this magnitude of investment?					
Why continue spending on PDP-8 (DECmate)?					
10. Lazer/Xerography Printing - What can we contribute? What would it take to acquire a competitive technology base to Ricoh, Xerox or Canon?		(MECHANICAL HARDWARE) X			
11. Consider buyout all printers (incl. thermal ribbon from a Japanese supplier).		X			
12. CT and Workstation Clusters			X		●

TERMINALS AND WORKSTATIONS

PRODUCT SUPPORT

	FY82	FY83	FY84
PRODUCT SUPPORT			
HC	700	600	600
VIDEO	700	300	400
CT	0	900	1200
ADVANCED DEVELOPMENT			
HC	1100	800	1300
VIDEO	500	800	1300
CT	700	500	1100
TECHNOLOGY	400	600	700
OTHER	7400	11400	11800
PRODUCT LINE FUNDED			
DECMATE	9200	9800	0
LA12	2600	500	0
RAINBOW	2200	3800	2800

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	
				n/a
				X

TERMINALS AND WORKSTATIONS

PRODUCT DEVELOPMENT

	FY82	FY83	FY84	PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN
HARCOPY							
LK201	700	300	0				
LN01	300	300	100				
LA50	100	400	0				
LA100/RO	1900	400	0				
LA200	1400	1600	1100		X		
~~LN03~~ SEE QUESTION #2	~~100~~	~~1200~~	~~2100~~				
LA12	400	0	0				
LA300	0	0	0				
VIDEO							
VT125	100	0	0				
VT201 - 240	600	1200	0				
VT192 - 220	100	0	0				
12/15 VSS	1700	0	700				
19" VSS	1800	1100	2000				
VT250	0	800	2300			X with workstat	
CT							
CT100HW	4400	1100	200				

TERMINALS AND WORKSTATIONS

PRODUCT DEVELOPMENT

	FY82	FY83	FY84
CT25	1100	600	100
CT200	0	0	0
TMS	700	600	0
APPLICATIONS	500	600	300
TOOL KIT	900	1200	1100
INT'L DEVEL	200	700	1100
CTAB REL. 1	2200	3500	2000
CTAB REL. 2	0	800	2400
CLUSTERS	100	1700	2200
RAINBOW			
ENGR. DEVEL	1300	0	0

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN
		X	

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TO: TMC

DATE: 26 August 1982
FROM: Walt Tetschner
DEPT: Terminals and Workstations
Technology Advanced Development
EXT: 6788
LOC: ML03-3/U8

SUBJECT: ENGINEERING PRODUCT STRATEGY - TERMINALS AND WORKSTATIONS RESPONSE

The programs within Terminals and Workstations that are being questioned are:

1. DECMATE II
2. CT Clusters
3. Video Displays
4. Printers

DECMATE II

The questions here center around the use of the PDP8 in this product. The investment in this product area appears quite sound. Some figures forecasted in the DECMATE II business plan (dated 15 July 1982) are:

- Worldwide ships - 184400
- NOR - $1268M
- IRR - 58.3%

The $9.8M that is being spent in Engineering in FY83 on the DECMATE program is small.

In actuality, the investment in DECMATE II is closer to $6.0M since the $9.8M includes the LQP program and DECMATE I, WS200, COS310, ... support.

The goal of the DECMATE II program is to have an entry level small business system for approximately $1000 transfer cost in FY83. Utilization of the DECMATE I hardware and software technology are the tactics which yield the highest probability for achieving this goal. The possibility of using A Professional derivative to meet this goal has been thoroughly

addressed in the past and has not proven to be a practical approach.

In any event, the issues here are time to market, appropriate design center, levering previous investment and minimizing risk. Whether the processor is an 8 or an 11 is an insignificant issue when contrasted with the real issue.

CT CLUSTERS

The question was: "Is there total redundancy in the Clusters program? VAX vs Workstations vs CT."

The clusters program at DEC is just now becoming stable to the point where serious product development is beginning on cluster architectures.

The cluster programs seem, at this stage, to tend to compliment each other and it is not obvious that any significant redundancy exists. Given the critical importance of the Cluster program to the Professional (CT) product, I feel a bit uncomfortable that we do not have more redundancy!

The basic CT cluster program uses the LNI (Star) configuration for a cluster of eight CT's (with no mass storage) and a single CT with 10M - 20M storage which functions as the server/gateway. This configuration is particularly effective in environments that are physically close (distances of 50-100 meters).

The VAX cluster approach uses the NI and DECNET and is an effective solution when a tight physical configuration cannot be maintained. CT's are being designed to function as either DECNET end node devices attached directly to the NI as devices attached to the NI via an LNI cluster.

The Workstation Cluster program is presently an advanced development program which is addressing functional extensions to the cluster architectures being developed. A Name Service capability is a major area being addressed. The groups working on these programs seem to be quite well coupled at this time and the risk of any major redundancy appears low at this time.

It should be emphasized that, although the general direction of the three efforts seems complementary and consistent, the programs are presently at an early stage and a high potential for architectural divergence is possible as full scale product development occurs.

VIDEO DISPLAYS

The question was: "Why build so many video displays?"

Presently, the monitors that are being developed are:

12"	24 Line
15"	37 Line
19"	66 Line

13" Color

Going to more characters on a display necessitates that we go to larger displays to meet the ergonomic requirements. Standardizing on the 19" display is not a solution since it gives the smaller configurations a severe cost and size penalty.

Our total development expenditure in FY83 for monitor development is < $700K and we are fielding a minimum set necessary to satisfy a broad product requirement. The only video terminals being developed are the VT220 and the VT240. The VT220 is a low-end, text only terminal with a transfer vcost target of $400. The VT240 is the follow-on replacement to the VT125.

OVERLAP IN VT, CT, AND VS PROGRAMS

The comment was: "Reduce overlap in VT, CT, and VS programs."

We have achieved an operational situation where monitors, keyboards, video subsystems and packaging are being addressed with a centralized and consistent orientation. This has only come into being during the last six months by organizing all video subsystems activities within the Video Engineering Group. We are working to achieve this same orientation via the Terminal Architecture program and will then have a minimum level of redundancy in data communications, spatial I/O, system compatibility,...

It is not apparent that any direct reduction in the Terminals and Workstations engineering budget, would occur in FY83 due to this effort. The real development cost saving should show up in the activities of the Software and Interconnect groups which will have a more consistent interface to contend with and in FY84 and beyond.

PRINTERS

The printer business at DEC accounts for a FY83 NOR of $330M. Our O2D engineering investment during FY83 is anticipated to be $7.4M, which is 2.2% of NOR. The bulk of the NOR comes from the KSR Teleprinter market where it is estimated that we hold a leadership position with a 17% marketshare. Our strategy is to go from impact matrix technology to non-impact technologies (electrophotographic and thermal plain paper). The information above was provided since the questions and comments suggest a lack of understanding of the printer business and are clearly aimed at getting out of the printer business.

"Laser printing - What can we contribute? What would it take to acquire a competitive technology base to Ricoh, Xerox, or Canon?"

Our unique contributions will be focused in the controller and the laser scanner. We have developed a proprietary scheme for linearizing an electronic galvonometer which appears to be patentable and would allow us to achieve a much lower cost scanner than a rotating polygon. The ability to control the image generation will permit us to do an excellent job of meshing our display and hardcopy products.

Although the copier technology base of Ricoh, Xerox, or Canon is significant, in many ways they are carrying past investment baggage which has become an albatross. For example, non-solid state lasers are committed to because of the large investment in photo-conducters that do not respond well to solid-state laser wavelengths. We have the advantage of being able to select the best elements of each technology area, as it exists today, and use it.

"Consider buyout all printers (including thermal ribbon from a Japanese supplier)"

The printer group has two engineers in the Japan Technology center who are exploring the possibilities of obtaining Japanese printing technology. Plain-paper Terminal printing is an area that will be explored. This technology has the potential to be the dominant low-end printing technology. Our investment in this area is rather small and if it fulfills its potential, we will have missed an opportunity to grow and prosper. A buyout strategy is only appropriate if we recognize that we are going out of the printer business.

"Are we spending too much on hardcopy A/D?"

Our hardcopy A/D spending was high in proportion to our product development spending which is significantly underfunded. We have recently changed this situation by putting a major portion of the A/D resources on the LN03 (JUNO) project.

"Is the LN03 a buyout of obsolete technology?"

The LN03 project is not a buyout of obsolete technology. On the contrary, it is a exploitation of state of the industry technology.

"Has the LN02 gone away? (presumption that it should)."

The LN02 (HERMES) project is not funded in FY83, although the need for a high performance (40-60 PPM, two-sided printing, rotate, scale,...) printer does exist.

"Is there a thermal ribbon printer project? If so, why copy obsolete Japanese technology?"

Our activity in this area is A/D, being done by the engineers in the Japan Technology center. We have no intention of copying obsolete technology and our main thrust is in plain paper printing.

"Low end RO project needs review. Why not a Japanese buyout?

The low end RO project is a Japanese buyout. The product is the LA50.

JUN 10 1982

Terminals and Workstations

+-+-+-+-+-+-+-+
|D|I|G|I|T|A|L| INTEROFFICE MEMORANDUM
+-+-+-+-+-+-+-+

TO: Rick Corben

DATE: 9 June 1982
FROM: Rozanna Patane
DEPT: T&WS F&A
EXT: 223-6922
LOC/MAIL STOP: ML1-2/t29

SUBJ: OC ENGINEERING INVESTMENT ANALYSIS

Please find enclosed the analysis requested in Joe Reilly's memo of May 25, per the format of the forms enclosed in that memo. If you have any questions, please don't hesitate to call.

TERMINALS + WORKSTATIONS

CHART I
JUNE 9, 1982

T&WS ENGINEERING
PROJECT PRIORITIES FOR EMC REVIEW

PRODUCT DEVELOPMENT

Product Name & Summary Description & Summary Prioritized**	Current Phase	FRS	IRR %	NOR Lifetime $B	ENG EXP Lifetime $M (Unloaded)	NPSU $M	Serv. Startup $M	Engr $(M) '82	'83	'84
H/C										
LN01	II	Q3FY83	62%	.1	3.0	-	5.0	.3	.3	.1
LA50	II	Q2FY83	36%	.5	1.0	-	-	.1	.3	-
LA100/RO	III	Q1FY83	39%	.4	8.0	1.7	-	1.9	.4	-
LA200	0	Q4FY83	NA	.5	3.0	-	-	1.4	1.6	-
LN03	0	FY84	NA	.1	3.4	-	-	.1	1.2	2.1
VIDEO										
VT125	III	Q2FY82	55%	.2	3.0	.2	3.3	.07	-	-
VT201	0	Q3FY83	NA	.5	1.8	-	-	.6	1.2	-
VT192	0	Q4FY83	NA	.5	.1	-	-	.1	-	-
*12/15 VSS	0	Q1FY84	NA	-	2.4	-	-	1.7	-	.7
*19" VSS	0	FY84	NA	-	4.9	-	-	1.8	1.1	2.0
VT250	-	(NA)1984	NA	.5	3.1	-	-	-	.8	2.3
**PROF. FAM.	II	Q1FY83	NA	2.5	51.6	NA	NA	15.5	14.7	18.3
P/L FUNDED:										
LA12	III	Q1FY83	35%	.3	12.0	2.2	-	2.9	.5	-
***RAINBOW FAM	I	Q2FY83	33%	1.1	18.1	1.6	.2	3.5	3.8	2.8
**DECMATE II	I	Q1FY83	25%	.3	19.0	1.5	NA	9.2	9.8	-

PRIORITIES WITHIN PRODUCT CATEGORIES ONLY.

* NOT A STANDALONE PRODUCT; NOR INCLUDED IN PRODUCT PLANS FOR CT, VT200

** PROF. INCLUDES HW, OPERATING SYSTEM, AND SW NOR OVER 5-YR LIFE. LIFE TIME EXPENSE INCLUDES FY81 $3.1M. PHASE 1 BUSINESS PLAN IRR NOT APPROPRIATE BECAUSE THE VOLUMES AND CHANNELS OF DISTRIBUTION HAV CHANGED DRAMATICALLY. CURRENTLY A PRICE/EARNINGS RATIO OF 18 HAS BEEN SELECTED AS THE APPROPRIATE MULTIPLIER FOR EVALUATING THESE PROGRAM. PHASE 2 BUSINESS PLAN WILL HAVE AN IRR.

*** RAINBOW INCLUDES $1.3M OOD FUNDING IN FY82. TOT NOR INCLUDES HW, HW OPTIONS ($.3B) AND SW ($.5B) OVER 5 YR LIFE. TOT ENGR. SPENDING IS FOR 5 YEAR IN BUSINESS PLAN.

ENGINEERING BUDGET

PRODUCT DEVELOPMENT

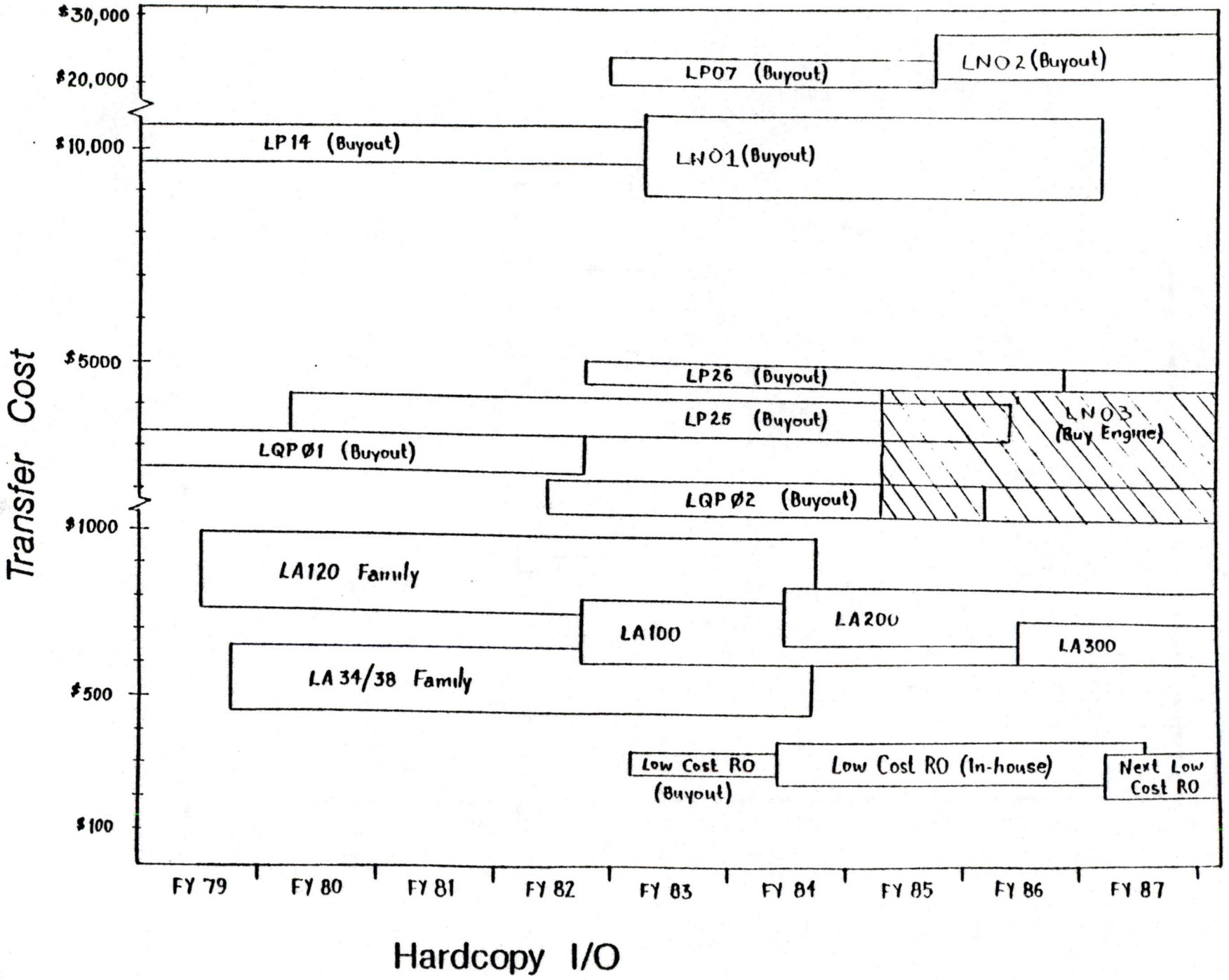
PROJECT (Priority order within category)	FY82	FY83	FY84
Hardcopy			
LK201	.7	.3	-
LN01	.3	.3	.1
LA50	.1	.4	-
LA100/RO	1.9	.4	-
LA200	1.4	1.6	1.1
LN03	.1	1.2	2.1
LA12	.4	-	-
LA300	-	-	-
Subtotal	4.9	4.2	4.1
Video			
VT125	.1	-	-
VT201	.6	1.2	-
VT192	.1	-	-
12/15 VSS	1.7	-	.7
19" VSS	1.8	1.1	2.0
VT250	-	.8	2.3
Subtotal	4.3	3.1	5.0
CT			
CT100HW	4.4	1.1	.2
CT25	1.1	.6	.1
CT200	-	-	4.1
TMS	.7	.6	-
Applications	.5	.6	.3
Tool Kit	.9	1.2	1.0
Int'l Devel	.2	.7	1.0
CTAB Rel. 1	2.2	3.5	2.0
CTAB Rel. 2	-	.8	2.4
Clusters	.1	1.7	2.2
Subtotal	10.1	10.8	13.3
RAINBOW			
Engr. Devel	1.3	-	-
TOTAL PROD. DEVEL.	20.6	18.1	22.4

CHART II

ENGINEERING BUDGET &M

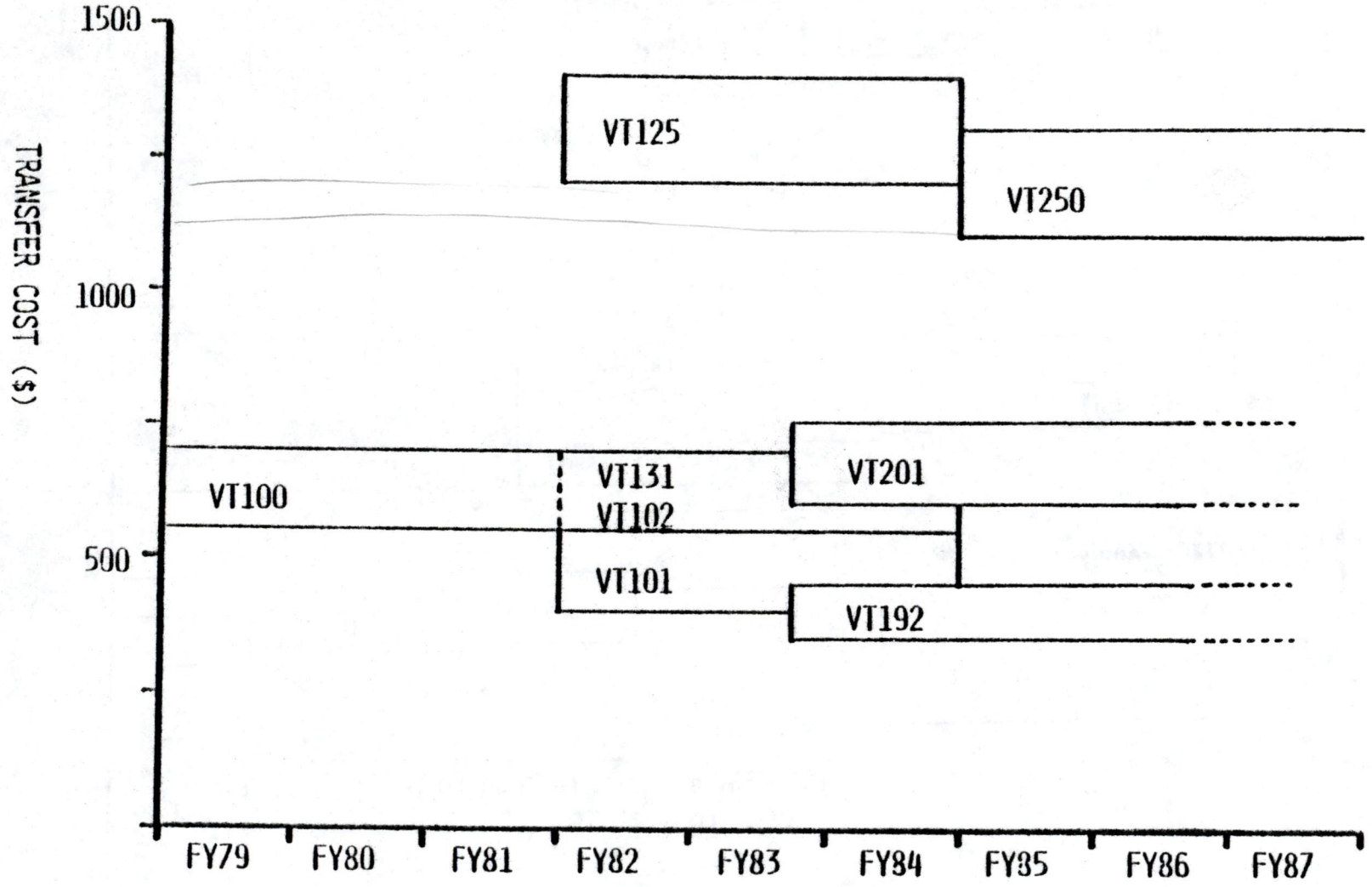
PROJECTS	FY82	FY83	FY84
PRODUCT SUPPORT			
HC	.7	.6	.6
VIDEO	.7	.3	.4
CT	-	.9	1.2
Subtotal	1.4	1.8	2.2
ADVANCED DEVELOPMENT			
HC	1.1	.8	1.3
Video	.5	.8	1.3
CT	.7	.5	1.0
Technology	.4	.6	.7
Subtotal	2.7	2.7	4.3
OTHER			
HC	.3	1.7	3.7
Video	.6	4.0	1.7
CT	4.7	2.4	2.8
Firmware/Diag.	.5	1.3	1.5
Tech Services	.8	1.1	1.3
M/E	.3	.3	.2
Admin.	.2	.6	.7
Subtotal	7.4	11.4	11.8
TOTAL C.E.	32.1	34.0	40.8
PRODUCT LINE FUNDED			
DECmate	9.2	9.8	-
LA12	2.6	.5	-
Rainbow	2.2	3.8	2.8
Subtotal P/L	14.0	14.1	2.8
TOTAL DEC ENG.	46.1	48.1	43.6

TERMINALS AND WORKSTATIONS -- HARDCOPY I/O
PROPOSED PRODUCT STRATEGIES AND BUDGETS THROUGH FY '86

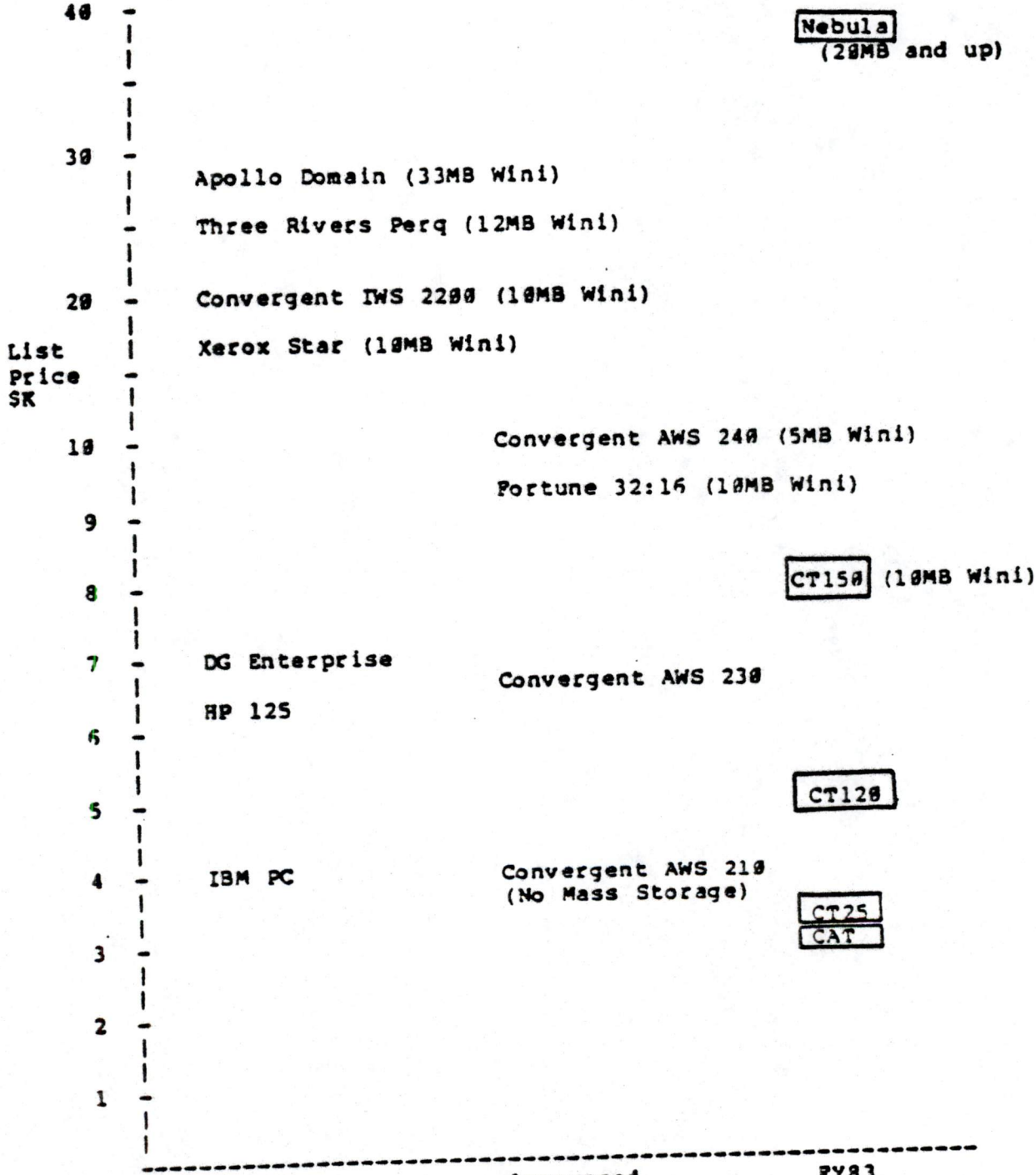


PRODUCT SCENARIO VERSUS [illegible] AND TRANSFER COST

VIDEO TERMINALS PRODUCT SUMMARY



PROFESSIONAL COMPUTER WORKSTATIONS



Configurations exclude printers and application software, are dual floppy-based or Winchester/floppy-based (Wini capacity is stated), with memory necessary to run target applications. COMPANY CONFIDENTIAL

32-BIT

digital

INTEROFFICE MEMORANDUM

TO: Bill Johnson

DATE: 17 September 82
FROM: Bill Demmer
DEPT: 32 Bit Systems
EXT: 247-2111
LOC/MAIL STOP: TW0/D19

SUBJECT: FY83 BUDGET OPPORTUNITIES

The following are some of the areas of risk in our present plans or opportunities to extend the plans into areas not now covered because of funding limitations:

o Scorpio TAT20 Support - Required with the Nautilus decision to switch technologies.	$400K
o Scorpio BI Options - Fundig for accelerating options for the low end that TVG not willing to fund.	$600K
o Scorpio Multiprocessing - With Nautilus moving up in both cost and performance this becomes necessary in the FCS timeframe.	$500K
o Nautilus Risk Reduction - Technology, CAD, & programming people to support technology change along with $1M worth of additional capital equipment.	$500K
o Nautilus Follow on - Small Advanced Development level aimed at a minimum change to Nautilus to upgrade to MCA II.	$200K
o Low Cost Nebula - Lower priced system for office environment with Aztec and/or integrated Onyx design and the NI as options. Can be used as a computing terminal to off load 11/780s.	$2000K
o CI Chips & BCA - Starts development of cost reduced CI as well as a BI-CI Adapter.	$800K
o 780 Mid-Life Kicker - MP Upgrade plus modifications to Cache and other modules.	$1000K to $2000K
o VAX Base Product Marketing - To pick up full sales support, tactical marketing, and performance analysis activities.	$1000K
Total	$7-8M

BA/kj

VENUS/NAUTILUS

TMC recommendation

Fund both programs until running prototypes

	Project Cost $K	
	FY83	FY84
Nautilus	6300	10500
Venus	16400	16800

COMMENT:

Cost goals argue Nautilus; time goals argue Venus; Nautilus is dependent on Venus for technology. TMC's recommendation is based on DEC's need for a high end machine, (In FY83, DEC plans to spend close to $40M in three ECL high end machines: Venus, Nautilus and Jupiter) and the high technical risks associated with each of these projects.

Venus Technical Risks

-Design Verification
-Timing
-Layout Density
-MFG Ramp

Nautilus Technical Risks

-Design with new Design Rules
-CAD Tools
-Phase 0 "Limited Foresight"

Also, resolve marketing issues

- Venus - End Users
- Nautilus - OEMS

RAMP

The committee's recommendation includes the caveat that top management review both projects on a 1-2 month basis; if it's possible for convergence of these projects, that should happen. The associated high costs of service development were noted, as was the market risk due to a factor of four (performance) between Nautilus and Venus.

32 BIT SYSTEMS

TMC recommendations

		Project Cost $K FY83	FY84
MERGE: 1) LOW END 32-BIT SYSTEMS (CT, Workstations, Seaboard)			
	CT		
	Prod. Dev.	$10800	$13300
	Prod. Support	900	1200
	A/D	500	1000
	Other	2400	2800
	CT Subtotal	$14600	$18300
	Workstations	3400	4000
	Seaboard (V1, SW)	1500	2300
REDUCE: 1) SCORPIO		7000	7900
CUT: 1) OPAL		800	-
2) WORKSTATIONS ?		3400	4000
3) MICROVAX ?		2000	3700
4) OTHER category (cut by 1/4)			
includes:	FCC Modifications	2200	200
	FCC Program Mgt/Chamber	800	200
	Finance, Program Office, Personnel, Purchasing,	2300	2700
	Site Planning, Emg, Process, VLS testing, System Quality,	3100	9900
	Other subtotal	8400	13000

COMMENTS:

- OPAL $$ should be cut, and not absorbed by AGATE or WORKSTATIONS projects
- Possible $$ reduction in the SCORPIO Program Office
- Are the $$ numbers correct for WORKSTATIONS project? If so, cut.
- Dollars shown for MICROVAX project do not come from Seminconductors - what's being spent here?
- A low cost CI could cover BI needs
- Are there possible savings in co-locating VENUS and NAUTILUS?

TMC review slides attached
Jessel slides attached

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT
		X		

32-BIT SYSTEMS

1. Is the DR750 yesterday's product tomorrow? Could we license a third-party to build it?

2. Has the 730/750/780 budget been cut too much?

3. Do not do both OPAL and AGATE? Do only one.

4. Are we spending too much on Scorpio? Are too many people on board for this stage in the project?

5. (VENUS/NAUTILUS) If Venus is closer to 3.5 X 780 and Nautilus is closer to 2.9 X 780, do we really need both? Should we establish a minimum spread between the two - and if not met, one should be stopped?

   Do VENUS and NAUTILUS overlap too much? Do a review. January was suggested as a possible time-frame.

6. We have too many low-end busses--Q22, CTI, Multibus (Rainbow?). VT/LA interconnect?, BI. Does BI contribute enough to justify doing it? RETAIN

7. Do we have too much uncoordinated effort in low-end 32-bit systems -- CT, Workstations, Seaboard? YES

→ LOW COST CI COULD COVER BI NEEDS

32 BIT SYSTEMS

PRODUCT DEVELOPMENT

	FY82	FY83	FY84
CURRENT VAX			
11/780 Options	2000		
11/750 Options	3000	2800	2700
11/730 Options	3300		
HI AVAILABILITY OPTIONS	2400	3800	1700
SCORPIO	5100	7000	7900
WORKSTATIONS	2800	3400	4000
NAUTILUS	2000	6300	10,500
MICROVAX	0	2000	3700
AGATE	100	2100	2000
OPAL (BUYOUT)	300	800	—
Venus		16,400	

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT
			PROGRAM OFFICE	
			X	
			?	
		DOLLARS RIGHT		
				?
				X

NAUTILUS & VENUS COLOCATE?

32 BIT SYSTEMS

PRODUCT SUPPORT

	FY82	FY83	FY84
780 CPU PLUS OPTIONS	SHOWN	400	700
750 CPU PLUS OPTIONS	IN	500	800
730 CPU PLUS OPTIONS	DEV.	1100	1900
ADVANCED DEVELOPMENT			
FIBER OPTICS	0	500	600
PEEWEE	0	300	300
VLSI	0	200	300
NEW ARCHITECTURE/TECHNOLOGY	0	100	400
V-COMPILER	0	300	300
OTHER	5100	8400	13000

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT
				1/4

JUN 10 1982

32-Bit Systems

interoffice memorandum

DIGITAL

TO: Rick Corben
ML12-1/T39

DATE: 8 June 82
FROM: Bill Demmer
DEPT: 32 Bit Systems
EXT: 247-2111
LOC: TW/D19

SUBJ: Engineering Investment Analysis For O.C.

Attached is the information you requested.

32-Bit

32 Bit Systems

PRODUCT DEVELOPMENT

Product Name & Summary Description & Summary Prioritized	Current Phase	FRS	IRR %	NOR Lifetime $B	ENG EXP Lifetime[C] $M	NPSU $M	SERV Summary[D] $M	FY82	FY83	FY84
Current VAX										
11/780 Options/Pkg Systems[A] 64K Memory, Pkg Systems	3	Q1-Q4FY83	53%	5.8B	27M	6.3M	1M	2.0		
11/750 Options/Pkg Systems[A] 64K Memory, DR750, DW750, Pkg Systems	3	Q1-Q4FY83	45%	5.6B	24M	8.0M	.1M	3.0	2.8	2.7
11/730 Options/Pkg Systems[A] BBU, Combo, Pkg Systems	3	Q1-Q4FY83	61%	4.3B	20M	3.1M	.6M	3.3		
Hi Availability Options/Systems[B] CI780, CI750, Cluster System Test	2/3	Q4FY83	45%	.3B	4.4M	.8M	.3M	2.4	3.8	1.7
Scorpio										
Scorpio office system, OEM box and BI based board products	0	Q3FY85	41%	5.1B	53.5M	5.6M	1.1M	5.1	7.0[E]	7.9
Workstations										
ONYX Low end workstation - monochrome internally developed		Feb 83	51%	.5B	10.2M	1.0M	.2M	2.8	3.4	4.0
Workstation S/W										
Nautilus $100-300K price range VAX. 2.5-2.9 times 780 performance at 1.5 times 750 CPU cost. Dual CPU option; 30-40 mb/sec. I/O; Integral hot FP.	1A	Q2FY85	71%	10B	38.2M	9.1M	1.1M	2.0	6.3	10.5
Microvax Systems A very low priced VAX System ($5-15K) that is competitive in the 1984/85 timeframe with both personal and shared logic (2/4 users) systems.	0	early FY85 (goal)	To be determined					-	2.0	3.7
AGATE* Medium range workstation (16 color) Extension of ONYX.	0	Dec 83	To be determined					.1	2.1	2.0

32 Bit Systems

PRODUCT DEVELOPMENT

Product Name & Summary Description & Summary Prioritized	Current Phase	FRS	IRR %	NOR Lifetime $B	ENG EXP Lifetime[C] $M	NPSU $M	SERV Summary[D] $M	FY82	FY83	FY84
OPAL High end workstation (256 colors) buyout	0	March 83	45%	.2B	1.1M	.5M	.2M	.3	.8	-
Sub-Total								21.0	28.2	32.5
Less P/L funding								(3.0)		
								18.0	28.2	32.5

Notes:

[A] 11/780, 11/750, 11/730 investment metrics (IRR, NOR, Lifetime Eng, NPSU, Service) are system level financial metrics.

[B] Hi Availability investment metrics represent CI780 financials and do not include CI750.

[C] Lifetime engineering expense is unloaded hardware development expense.

[D] Service summary represents service spending prior to FRS.

[E] An additional .3M will be funded by manufacturing.

*Not budgeted.

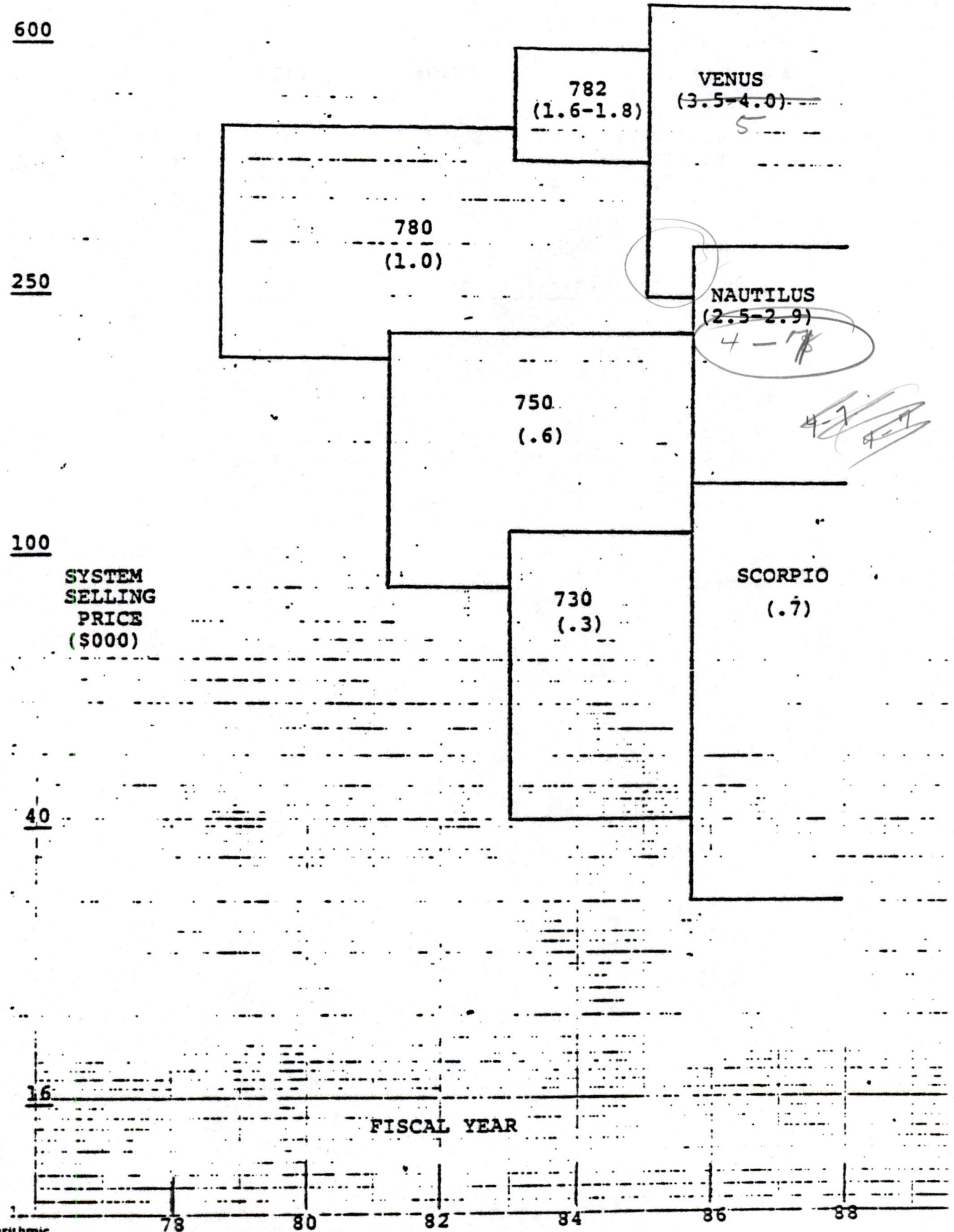
32 Bit Systems

PRODUCT SUPPORT

ENGINEERING BUDGET $M

Project Name and Summary Description Prioritized	FY82	FY83	FY84
780 CPU plus options	shown	.4	.7
750 CPU plus options	in	.5	.8
730 CPU plus options	Dev.	1.1	1.9
		2.0	3.4
Advanced Development			
Fiber Optics		.5	.6
Peewee		.3	.3
VLSI		.2	.3
New Architecture/Technology		.1	.4
V-Compiler		.3	.3
Advanced Development Sub-Total	1.0	1.4	1.9
Other Engineering Expense			
FCC Modifications	shown in Dev.	2.2	.2
FCC Program Mgt/Chamber	.8	.8	.2
(1) Architecture	1.1	1.3	1.5
(2) Configuration Program	2.0	2.7	2.8
Finance, Program Office, Personnel, Purchasing	2.0	2.3	2.7
Site Planning & Mgt, Eng. Process, VLS Testing, System Qual, Other	2.5	3.1	9.9
Sub-Total Expense	8.4	12.4	17.3
Less Outside Funding for Arch. & XCON	(3.3)	(4.0)	(4.3)
	5.1	8.4	13.0
Total 32 Bit	24.1	40.0	50.8

(1) Not currently in 32 Bit Base Plan. Being rolled up under Sam Fuller.
(2) Completely funded outside of Engineering.



Semi-Logarithmic
2 Cycle x 10 to the in

PRELIMINARY COMPANY CONFIDENTIAL

Large Systems
JUN 10 1982

digital

INTEROFFICE MEMORANDUM

TO: Rick Corben/Joe Reilly
cc: Steve Behrens
Ulf Fagerquist

DATE: 09 June 1982
FROM: Dave Sawin
DEPT: LS Finance
EXT: 231-5965
LOC/MAIL STOP: MR1-2/G3
REFERENCE #: 1.67

SUBJECT: ENGINEERING INVESTMENT ANALYSIS FOR OC

To give you a quick response macro view, the attached is submitted.

We are still working on it. If there are additional breakouts, Ulf will have them for the SAC review meeting, Monday, June 14th.

/vt

Attachments

CHART I

PRODUCT DEVELOPMENT

Product Name & Summary Description & Summary Prioritized	Current Phase	FRS	IRR %	NOR Lifetime $B	ENG EXP Lifetime $M	NPSU $M	SERV. NOR $M	'82	'83	'84
VAX SYSTEMS										
1. VENUS (a)	1	6/84	40%	7.8	212	---	1590	12.3	16.4	16.8
DEC-10/20 SYSTEMS										
1. JUPITER PROGRAM	1	9/83	29%	1.5	45.4	6.5	112	9.4	13.2	7.7
2. KL PROGRAM (b)								5.1	3.2	3.0

FOOTNOTES: (a) Follow-on to VAX-11/780 @ 4 X 11/780 system throughout (CPU @ 4 - 5X) at comparable cost for system above $250K MLP.

(b) Cross-reference Chart IV. This program is a family of Hardware and Software related projects with no singular FRS oe financial metric.

CHART II

PRODUCT SUPPORT

PROJECT NAME AND SUMMARY DESCRIPTION PRIORITIZED	ENGINEERING BUDGET $M '82	'83	'84
	N/A	N/A	N/A
ADVANCED DEVELOPMENT	'82	'83	'84
	0.9	2.1	5.5
OTHER ENG EXPENSE	'82	'83	'84
	0.3	1.3	1.7
TOTAL EXPENSE	28.0	36.2	34.7

JR4.52

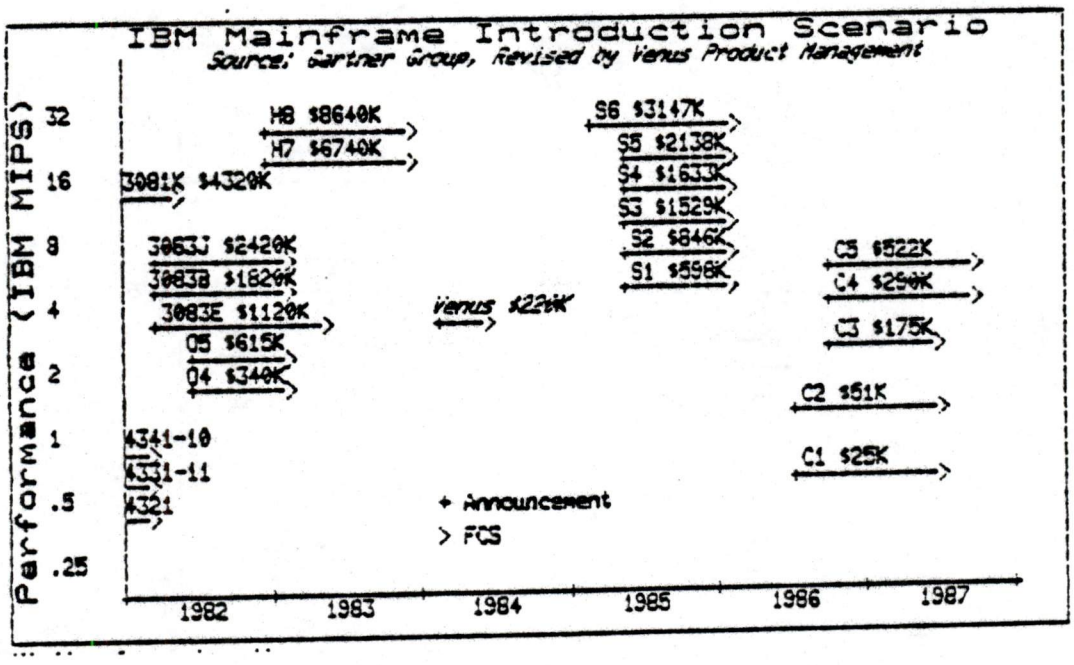
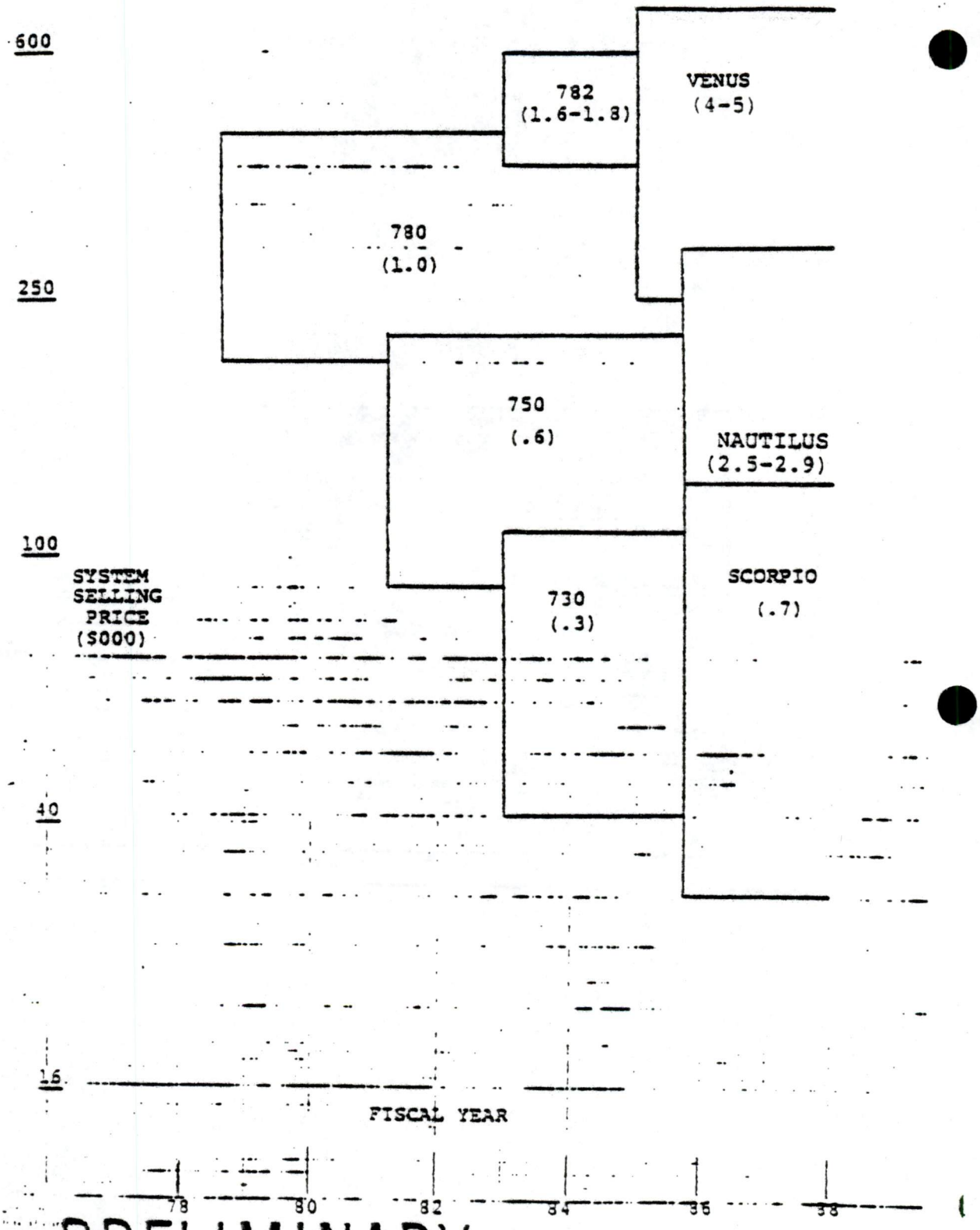


Fig. 1-1

CHART III



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DISTRIBUTED SYSTEMS

TMC recommendations

		Project Cost $K FY83	FY84
MERGE:	1) Pluto and Terminal Server Projects (Pluto)	1100	200
	(Terminal Server)	900	900
CUTS:	1) Startup activity in UK	?	?
	2) HDLC support (on DMP & DMV for CT)	400	500
	3) DHV - 11	500	300
	4) CT - BISYNC	200	300
	5) Chip based Ethernet (Too High?)	2000	5500
	6) OTHER expense category (cut by 1/2)		
	includes: FCC	900	-
	Hardware Product Mgt	600	800
	Software Product Mgt	600	700
	Planning, Marketing, Admin	1000	1100
	Other subtotal	3100	2600

COMMENTS:

- The Chip based Ethernet FY83 ($2000K) and FY84 ($5500K) numbers seem too high - can these be reduced?
- Considerable overlap in the Pluto and Terminal Servers projects

TMC Review slides attached
Kirby slides attached

DISTRIBUTED SYSTEMS

1. Could we save by delaying or cancelling the startup activity in the UK.

2. Lowest priority project is HDLC support on DMP and DMV for CT. Any chance of cancelling or delaying this? (Not much enthusiasm for this idea at the EMC meeting).

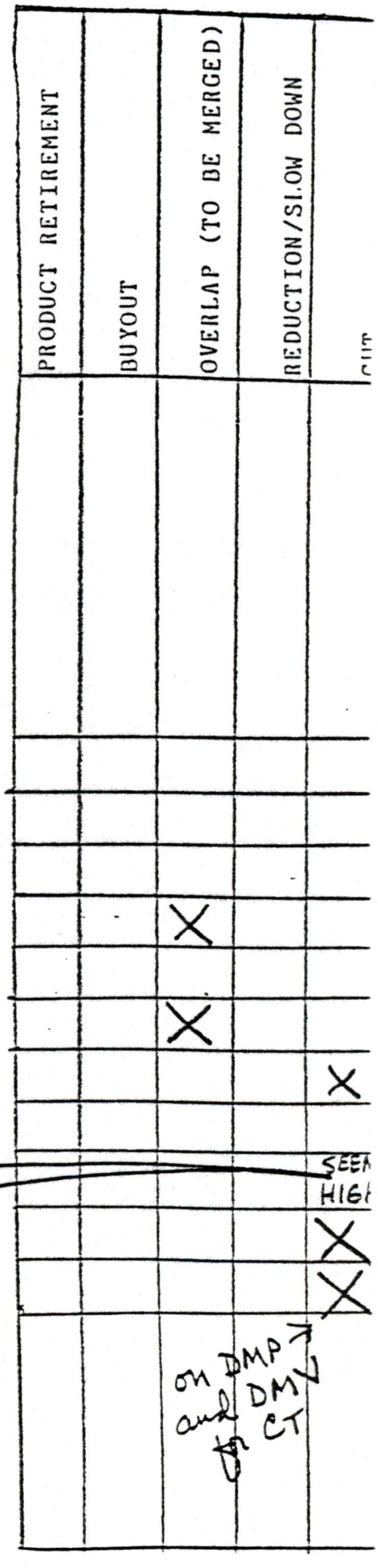
3. (BROADBAND) we spending money (1/2 million) solely as a reaction to Wang hype?

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT
				X
				X

DISTRIBUTED SYSTEMS

PRODUCT DEVELOPMENT

	FY82	FY83	FY84
RSX/VMS PS1	600	200	100
ETHERNET HW	2100	2000	200
DECNET PHASE IV	500	1700	2200
SNA GATEWAY	900	1600	1300
PLUTO	1400	1100	200
ROUTER/X.25 G.W.	300	1500	1700
TERMINAL SERVER	400	900	900
CT BISYNC	0	200	300
BROADBAND NETWORK	0	500	1500
CHIP BASED ETHERNET	300	2000	5500
DHV-11	0	500	300
HDLC SUPPORT	0	400	500



DISTRIBUTED SYSTEMS

PRODUCT SUPPORT

	FY82	FY83	FY84
HARDWARE SUPPORT	700	800	1900
SOFTWARE SUPPORT	800	1300	1700
CERTIFICATION AND PERFORMANCE ANALYSIS	1100	1900	2100
ADVANCED DEVELOPMENT			
ARCHITECTURE	700	600	700
ADVANCE DEVELOPMENT	400	800	900
OTHER	2200	3100	2600

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT
				●
				1/2
				●

Distributed Systems

CHART I

PRODUCT DEVELOPMENT

PRODUCT NAME & SUMMARY DESCRIPTION & SUMMARY PRIORITIZED	CURRENT PHASE	FRS	IRR %	NOR LIFETIME $B THUR FY86	ENG EXP LIFETIME $M THRU FY86	NPSU $M	SERV. SUMMARY $M	'82	'83	'84
RSX & VMS PSI INTEGRATED X.25 FOR VMS & RSX	2	6/82-2/83	TBD	.015	.9	N/A	N/A	.6	.2	.1
ETHERNET HARDWARE TRANSCEIVER, UNIBUS ADAPTER, REPEATER, TESTER, LNI	2	1/83-12/83	33% *	.34	5.1	2.1	.4	2.1	2.0	.2
DECNET PHASE IV ETHERNET AND LARGE NETWORK SUPPORT FOR VMS, RSX, & CT	1	5/83-12/84	TBD	.060	6.0	N/A	N/A	.5	1.7	2.2
SNA GATEWAY GATEWAY TO SNA NETWORKS FOR VMS, RSX & CT	2	2/83-6/84	TBD	.066	5.5	N/A	N/A	.9	1.6	1.3
PLUTO GENERAL PURPOSE COMM. SERVER FOR ETHERNET	2	9/83	TBD	.460	2.9	1.7	.2	1.4	1.1	.2
ROUTER/X.25 G.W. DECNET ROUTING SOFTWARE THAT RUNS ON PLUTO. X.25 SOFTWARE THAT RUNS ON PLUTO FOR VMS, RSX, & CT.	0	9/83-6/84	TBD	.034	5.0	N/A	N/A	.3	1.5	1.7
TERMINAL SERVER TERMINAL CONCENTRATION SOFTWARE THAT RUNS ON PLUTO FOR VMS, RSX, & TOPS	1	9/83	TBD	.036	3.0	N/A	N/A	.4	.9	.9

* UNIBUS ADAPTOR ONLY

CHART I

PRODUCT DEVELOPMENT

PRODUCT NAME & SUMMARY DESCRIPTION & SUMMARY PRIORITIZED	CURRENT PHASE	FRS	IRR %	NOR LIFETIME $B THRU FY86	ENG EXP LIFETIME $M THRU FY86	NPSU $M	SERV. SUMMARY $M	'82	'83	'84
CT BISYNC 2780/3780 & 3270 EMULATION FOR CT	0	TBD	TBD	TBD	1.0	N/A	N/A	0	.2	.3
BROADBAND NETWORK ETHERNET COMPATIBLE BROADBAND MODEM, HEAD END & TRAP	0	12/84	TBD	TBD	4.0	TBD	TBD	0	.5	1.5
CHIP BASED ETHERNET HARDWARE LSI, UNA, LSI, QNA, LSI, BNA, NI CHIP, PLUTO JR.	0	FY86	TBD	TBD	10.0	TBD	TBD	.3	2.0	5.5
DHV-11 8 LINE ASYNC MUX FOR Q-BUS	1	12/83	TBD	.089	1.2	.2	TBD	0	.5	.3
HDLC SUPPORT FOR DMP, DMV, HDLC MICROCODE TO SUPPORT CT SYSTEMS	0	12/83	TBD	TBD	1.5	TBD	TBD	0	.4	.5

PROD	BEST ALTERNATIVE	CONSEQUENCE OF ALTERNATIVE: TECHNOLOGY	CONSEQUENCE OF ALTERNATIVE: SYSTEM	CASH FLOW (DELTA)	CONSEQUENCE OF NO PRODUCT	CONSEQEUNCE OF SLOW DOWN	BEST PROD. TODAY
NSX VMS PSI	EXISTING PRODUCT		NO INTEGRATEION OF X.25 AND DECENT-LOWER LEVEL OF USER TRANSPARENCY		LIMP ALONG WITH TODAY'S PRODUCT	WON'T SAVE MANY $ FRS IS 2/83	EXISTING PRODUCT
NI* H/W	BUY OUT FOR UNA, TRANSCEIVER NO EQUIV. FOR LNI, TESTER, REPEATER	DEVICES AVAIL. ON MARKET. DO NOT IMPLEMENT MANY MAINT. FEATURES (E.G. HEARTBEAT, LOOPBACK ETC.)	MAINTENANCE OF LAN WOULD BE MORE COMPLEX AND COSTLY		NO ETHERNET LAN FROM DEC	ALREADY LATE	NO DEC PRODUCT
DECNET P.4	NONE				NO ETHERNET LAN FROM DEC	ALREADY LATE	NO DEC PRODUCT
SNA GATE WAY	NONE		NO SNA CONNECTIVITY FOR DEC SYSTEMS		SEVERE IMPACT ON ABILITY TO CONNECT DEC TO CENTRAL IBM MACHINE IN F1000 COMPANIES	ALREADY IN CATCH UP MODE	NO DEC PRODUCT
PLUTO H/W	LCP 5 OTHER ALT IS U-B BOX- MASSIVE SOFTWARE INVESTMENT REQUIRED	LOWER NUMBER OF LINES FOR TERM. NEED TO DEVELOP SYNC QBUS CARDS	CHANGE CONCENTRATOR + GATEWAY BASE FOR LAN'S - SCHEDULE AND FUNCTIONALITY SLIP. JUPITER IMPACT		NO COM. SERVERS FOR ETHERNET LAN'S FROM DEC	ALREADY IN CATCH	NO DEC PRODUCT

* NI HARDWARE = UNA, TRANSCEIVER, LNI, NI TESTER, REPEATER.

PROD	BEST ALTERNATIVE	CONSEQUENCE OF ALTERNATIVE TECHNOLOGY	SYSTEM	CASH FLOW (DELTA)	CONSEQUENCE OF NO PRODUCT	CONSEQEUNCE OF SLOW DOWN	BEST PROD. TODAY
ROUTER X.25 GATE WAY S/W	NONE	S/W NEEDS TO BE WRITTEN FOR PDP-11 AND/OR VAX	IMPLEMENT ROUTING AND X.25 IN ALL SYSTEMS		NO NI COM SERVER S/W JUPITER IMPACT	ALREADY IN CATCH UP MODE	NO DEC PRODUCT
TERM SERVER S/W	U-B BOX WITH LAT	LOWER NETWORK INTEGRITY - MORE SUPPORT NEEDED	GIVE COMPETITOR LAT PROTOCOL		NO DEC/ DECNET TERM. MUX FOR LAN. JUPITER IMPACT	JUPITER SCHEDULE	NONE
CT 2780 3270	BUY OUT (COMMIS-SION OUT-SIDE S/W HOUSE)	RISK OF INTEGRATION WITH POS	COULD DELAY IBM CAPABILITY ON CT		COMPETITIVE PRESSURE FROM IBM P.C. GREATER	SAME AS NO PRODUCT	NONE
BROAD BAND MODEM	NONE	PRODUCT IS BUY OUT FROM DCC	NO NI BROADBAND		NO DEC NI BROADBAND	WANG COMPETITIVE PRESSURE	NONE
LSI NI**	BUY OUT FROM OUTSIDE SOURCE	MSI IMPLEMEN-TATION WON'T BE COMPETITIVE 2-3 YRS FROM NOW	LOWER POWER AND SPACE REQUIREMENTS LOWER COSTS		COMPETITIVE-NESS WILL ERODE - REPLAY OF THE NO COM. INVESTMENT STRATEGY OF THE MID/LATE 1970'S	ENCOURAGE PMC	MSI IMPLEMEN-TATION

** LSI NI = ETHERNET CHIP (AMD/MOSTEK), NEXT GENERATION OF NI CONTROLLERS

PROD	BEST ALTERNATIVE	CONSEQUENCE OF ALTERNATIVE: TECHNOLOGY	CONSEQUENCE OF ALTERNATIVE: SYSTEM	CASH FLOW (DELTA)	CONSEQUENCE OF NO PRODUCT	CONSEQEUNCE OF SLOW DOWN	BEST PROD. TODAY
DHV11	ABLE DEVICE (BUYOUT)	POTENTIAL PROBLEM WITH Q22 ADDRESSING	LITTLE IMPACT IF NO Q22 PROBLEM		MORE TRADITIONAL COM. TO PMC. RISK OF LOSING SERVICE BUSINESS	SAME AS NO PRODUCT	PCM: ABLE DEC: DLV11 (4 LINES)
HDLC FOR DMP CT VT200	USE S/W DDCMP IN CT, VT200	REQUIRES MORE MEMORY ON CT, VT200 INSTEAD OF HDLC CHIP	COST PENALTY FOR CT, VT200 PERFORMANCE IMPACT		CANNOT CONNECT VT200/CT AS SYNCH. TERMINAL TO VAX	SAME AS NO PRODUCT	NONE
DMZ32	ALREADY PARTIAL BUYOUT - CONVINCE LINKABIT TO DO THEMSELVES	GIVE BUSINESS TO LINKABIT IF WE CAN ENTICE THEM TO DO THE COMPLETE JOB	LITTLE DIRECT IMPACT		CONTINUE TO HAVE LESS THAN OPTIMUM TERMINAL SUPPORT FOR VAX	SAME AS NO PRODUCT	DZ11 DMF32
DHU11	BUYOUT FROM ABLE	GIVE MORE 16 BIT UNIBUS AND LOW END VAX ASYNCH MUX TO PCM	LITTLE DIRECT IMPACT		CONTINUE TO HAVE LESS THAN OPTIMUM TERMINAL SUPPORT FOR VAX	SAME AS NO PRODUCT	DZ11

DHV11 = 8 LINES ASYNCH MUX FOR QBUS
DMZ32 = UNIBUS TO T1 CARRIER CARD USED IN CONJUNCTION WITH 24 LINES LINKABIT DISTRIBUTION PANEL. ORIGINALLY FUNDED BY TIG. FUNDING STATUS UNCLEAR.
DHU11 = 16 LINE VERSION OF DHV11 FOR UNIBUS. FUNDING STATUS UNCLEAR BASED ON EUROPEAN P.L. SITUATION.

Distributed Systems

CHART I

PRODUCT DEVELOPMENT

Product Name & Summary Description & Summary Prioritized	Current Phase	FRS	IRR %	NOR Lifetime $B Thur FY86	ENG EXP Lifetime $M Thur Thru FY86	NPSU $M	SERV. Summary $M	'82	'83	'84
RSX & VMS PSI Integrated X.25 for VMS & RSX	2	6/82-2/83	TBD	.015	.9	N/A	N/A	.6	.2	.1
ETHERNET HARDWARE Transceiver, Unibus Adapter, Repeater, tester, LNI	2	1/83-12/83	33% *	.34	5.1	2.1	.4	2.1	2.0	.2
DECNET PHASE IV Ethernet and large Network support for VMS, RSX, & CT	1	5/83-12/84	TBD	.060	6.0	N/A	N/A	.5	1.7	2.2
SNA GATEWAY Gateway to SNA networks for VMS, RSX & CT	2	2/83-6/84	TBD	.066	5.5	N/A	N/A	.9	1.6	1.3
PLUTO General Purpose Comm. Server for Ethernet	2	9/83	TBD	.460	2.9	1.7	.2	1.4	1.1	.2
ROUTER/X.25 G.W. DECnet routing software that runs on Pluto. X.25 software that runs on Pluto for VMS, RSX, & CT.	0	9/83-6/84	TBD	.034	5.0	N/A	N/A	.3	1.5	1.7
TERMINAL SERVER Terminal con-centration soft-ware that runs on Pluto for VMS, RSX, & TOPS	1	9/83	TBD	.036	3.0	N/A	N/A	.4	.9	.9

* UNIBUS ADAPTOR ONLY

CHART I

PRODUCT DEVELOPMENT

Product Name & Summary Description & Summary Prioritized	Current Phase	FRS	IRR $	NOR Lifetime $B Thru FY86	ENG EXP Lifetime $M Thru FY86	NPSU $M	SERV. Summary $M	'82	'83	'84
CT BISYNC 2780/3780 & 3270 emulation for CT	0	TBD	TBD	TBD	1.0	N/A	N/A	0	.2	.3
BROADBAND NETWORK Ethernet compatible broadband modem, head end & trap	0	12/84	TBD	TBD	4.0	TBD	TBD	0	.5	1.5
CHIP BASED ETHERNET HARDWARE LSI, UNA, LSI, QNA, LSI, BNA, NI Chip, Pluto Jr.	0	FY86	TBD	TBD	10.0	TBD	TBD	.3	2.0	5.5
DMV-11 8 line async mux for Q-bus	1	12/83	TBD	.089	1.2	.2	TBD	0	.5	.3
HDLC SUPPORT FOR DMP, DMV, HDLC microcode to support CT systems	0	12/83	TBD	TBD	1.5	TBD	TBD	0	.4	.5

CHART II

PRODUCT SUPPORT

PROJECT NAME AND SUMMARY DESCRIPTION PRIORITIZED	ENGINEERING BUDGET $M '82	'83	'84
HARDWARE SUPPORT	.7	.8	1.9
SOFTWARE SUPPORT	.8	1.3	1.7
CERTIFICATION & PERFORMANCE ANALYSIS	1.1	1.9	2.1
ADVANCED DEVELOPMENT	**'82**	**'83**	**'84**
ARCHITECTURE	.7	.6	.7
ADVANCE DEVELOPMENT	.4	.8	.9
OTHER ENG EXPENSE	**'82**	**'83**	**'84**
FCC	.5	.9	Ø
HARDWARE PRODUCT MANAGEMENT	.4	.6	.8
SOFTWARE PRODUCT MANAGEMENT	.5	.6	.7
PLANNING, MARKETING & ADMIN.	.8	1.Ø	1.1
TOTAL EXPENSE	12.6	21.7	25.Ø

*NOTE: FY82 spending was 16.5M. Projects that completed in FY82 account for the discrepancy

DISTRIBUTED SYSTEMS PRODUCT DESCRIPTIONS - SOFTWARE

RSX & VMS PSI	Software that permits RSX & VMS systems to communicate over the X.25 based public data networks of France, U.S., Canada, U.K., Holland and Germany. This communication can be at the virtual circuit level (primarily used for DEC to Non-DEC communication), or at the DECnet level (primarily used for DEC to DEC communication. This capability was publicly announced as part of the X.25 program announcement in Sept. 1980.
DECnet Phase IV	A DECnet release that supports larger networks (up to 1000 nodes), and direct attachment to Ethernet for VMS, RSX and professional systems. These products were publicly announced as part of the Ethernet program is May of 1983.
SNA Gateway & Access Routines for VMS, RSX, & CT	A stand alone gateway to SNA networks that runs in a floppy based 11/24. The gateway may be accessed from VMS, RSX and CT based systems providing they are running the appropriate access routines. The functions of RJE, terminal emulation and task to task are supported from DEC systems to SNA hosts. The gateway appears as an SNA PU type 2 and runs the 8100 RJE and terminal emulation protocols. This capability was publicly announced as part of the Ethernet Program in May 1983.
Router/X.25 Gateway	DECnet routing software and X.25 packetnet software that runs in Pluto. This software permits systems attached to an Ethernet to access remote Ethernets or remote systems, via DECnet or the X.25 virtual circuit interface. This capability was publicly announced as part of the Ethernet Program in May 1983.
Terminal Server	Terminal concentration software that runs in Pluto. This software permits the attachment of dumb terminals and unit record devices to an Ethernet network via Pluto. This capability was publicly announced as part of the Ethernet Program in May 1983.
CT BISYNC	Support of 2780/3780 and 3270 protocol emulation in the professional 3XX series of personal computers.

DISTRIBUTED SYSTEMS PRODUCT DESCRIPTIONS - HARDWARE

Ethernet Hardware	Basic hardware required to build an Ethernet and connect Unibus systems to it. These products were publicly announced as part of the Ethernet Program in May 1983.
Pluto	A general purpose Ethernet communications server designed to support DECnet routing, SNA and X.25 gateway access, and terminal concentration. This product is a key component of the Jupiter program, and its capability was publicly announced as part of the Ethernet Program announcement in May 1983.
Broadband Network	Basic hardware required to build an Ethernet compatible broadband network. Hardware includes modem, head end plus trap, cable and connector specifications.
Chip Based Ethernet Hardware	Follow on Ethernet hardware using the Ethernet chip. Hardware includes LSI adapters for BI, Unibus and Q bus plus a low cost terminal concentrator, Pluto Jr. the BI adapter and Pluto Jr. are key components in the Nautilus and Scorpio programs.
DHV-11	An 8 line async mux for Q22 based systems. This product doubles the number of async lines on a quad module and is important to the success of LCP5 and Orion Q.
HDLC Support for DMP, DMV	Multipoint support for the international data link protocol HDLC. This project is important to the CT program since it permits them to use industry standard HDLC chips rather than DDCMP.

Soft. Eng.

SOFTWARE

TMC recommendations

			Project Cost $K FY83	FY84
RETIRE:	1) DBMS-11/TRAX		385	240
MERGE:	1) TAP and DIBS	TAP	?	?
		DIBS	COEM Funded	
	2) INDENT and CATS	INDENT	COEM Funded	
		CATS	?	?
	3) DECGRAPH and DECPLOT	DECGRAPH	COEM Funded	
		DECPLOT	Commercial Marketing Funded ($340K)	
	4) QUILL and DATATRIEVE	QUILL	COEM Funded	
		VAX-11 DTR	777	888
		DTR-11	350	400
	5) DIBOL move to LANGUAGES	DIBOL	COEM Funded	
CUT:	1) 16 BIT Software spending		?	?
	2) DECSET	DECSET/OFIS	400	?
		DECSET/PBI	Product Line Funded ($1M)	
	3) OFIS/M+		750	3780
	4) RSTS/E, V8?		2660	3040
	5) VMS, V4?		10500	12500

COMMENTS:

- TRAX and DBMS-11 are currently being retired
- OFIS/M+ is not part of current plan
- BASIC - PLUS is a one person effort essential to the RSTS space. Recommendation is to look at the whole BASIC effort (6 people)
- DATATRIEVE - 11 is making losts of $$
- Human Factors groups in Central Engineering have technology transfer problem needing resolution plan
- Releases of 32-Bit languages are already slow!
- We need to get a better focus in Languages
- Do we take 11 software and move to CT? This will cost $$, and won't happen, since it's not in the plan
- In RSTS space, are bulk of $$ going to man machine interface?

TMC Review slides attached
Revised OFIS Budget attached

SOFTWARE

	PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT
1. Could 16-bit software spending be reduced further? YES					X
2. Possible to reduce TRAX spending more? – RETIRED THIS QUARTER	X				
3. Could we retire BASIC-PLUS sooner? ONE PERSON EFFORT \ WORTH LOOKING AT BASIC GROUP					
4. Same question for DTR/DBMS-11? < BEING RETIRED MAINTAIN →	X				
5. Could we cancel DECSET? YES < TYPESET / PHOTO OFFICE					X
6. Could we drop the "Human Interface" project? (ZIMMER) → LOOK AT OTHER GROUPS! GET BETTER TECHNOLOGY TRANSFER					
7. How about savings from slowing down the releases of 32-bit languages? – ALREADY SLOW!					
8. OFIS/XT AND ~~OFIS/M~~. – NOT PART OF PLAN The investment here is very high. (4400 in FY83, 7190 in FY84). Can't we merge the two (same operating system) and significantly reduce the cost?					OFIS/M+ X
9. VAX-11 TSS, V1. Why can't we resolve the overlap with FMS NOW, and save a half million? NO					
10. COEM Software - How does it mesh with Commercial Software? Are there opportunities in this space? YES			X		
11. Spend 50% less on PDP-11 Software 16-BIT.					

12. GET BETTER FOCUS IN LANGUAGES.

#10. OVERLAP OPPORTUNITIES:
TAP + DIBS
INDENT + CATS
DECGRAPH + DECPLOT
QUILL + DATATRIEVE
DIBOL → MOVE TO LANGUAGES

SOFTWARE

PRODUCT DEVELOPMENT

	FY82	FY83	FY84	PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT
OFIS/VMS, V1	3120	2430	2290					
OFIS/XT, V1	1500	3650	3410					
OFIS/RSX-11M+	0	750	3780					
DECMAIL, V2	1410	750	240					
RDMS, V1	357	966	1100					
VAX-11, TSS, V1	1190	1155	1320					
VAX-11, TPSS, V1	1445	1769	2008					
VAX-11 DTR, V2	682	777	888					
VAX-11, CDD, V3	310	647	740					
VAX-11, TMS, V1	540	630	720					
VAX-11, DBMS, V2	1341	1246	1424					
RSTS/E, V8	1909	2660	3040					
DBMS-11/TRAX-11	245	385	240					
VAX-11 ADA, V1	276	697	823					
VAX-11 APL V1	307	373	439					
VAX-11 BASIC, V2	728	798	1048					
VAX-11 BLISS-16/32, V2	338	485	549					
VAX-11 COBOL, V3	594	704	1122					

SOFTWARE

PRODUCT DEVELOPMENT

	FY82	FY83	FY84
VAX-11 FORTRAN, V5	370	426	505
VAX-11 PASCAL, V2	0	510	625
VAX-11, PL/I, V2	373	484	730
VAX-11 DEC/CMS, V2	402	485	653
VAX-11 RTL	695	878	994
VAX-11 DEBUGGER, V1	383	1557	663
EDT/VAX/RSX/RSTS	279	258	297
VAX-11 SORT/MERGE, V3	141	137	149
VAX-11 ADA PSE, V1	0	284	384
DEC/TCS, V1	235	230	313
VAX-11 RPG, V1	0	81	100
PDP-11 BASIC PLUS 2, V2	563	665	751
PDP-11 COBOL/COBOL-74	168	175	314
COBOL-81, V2	431	690	811
PDP-11 FORTRAN-77, V5	292	408	584
PDP-11 FORTRAN IV	124	169	250
PDP-11 SORT/MERGE V3	185	284	248
RSX FAMILY	3989	4600	5300
VMS, V4	7079	10500	12500

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT
				?

SOFTWARE

PRODUCT DEVELOPMENT

	FY82	FY83	FY84
SEABOARD, V1	952	1500	2300
MICROPOWER, V2	728	848	819
FMS, V2	795	1372	1331
RT-11, V5	1128	1528	1482
GRAPHICS	428	960	932
VAX WORKSTATION, V1	117	750	1087
DISTRIBUTED COMPUTING	573	1319	1913
CMU	200	2000	4000
LOLA-32	0	557	0
CCEG S38 SYSTEM	0	200	200

LOLA-

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT

SOFTWARE

PRODUCT SUPPORT

A/D	FY82	FY83	FY84
OFIS A/D	370	1000	1300
A/D: IRDS, ETC	780	1440	1840
TECH LANG A/D	0	233	465
COMM LANG A/D	228	729	750
METHODS/TOOLS A/D	247	367	311
A/D: ARCHITECTURE, ETC	734	800	1200
A/D: HUMAN FACTORS	208	513	498
A/D: APPLICATIONS	125	200	300
A/D: OFFICE/UK	300	461	376
PRODUCT SUPPORT	325	461	417
SW TOOLS	3317		
OTHER	4975	4524	5192

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT

****
*   *
* DIGITAL * INTEROFFICE MEMORANDUM
*   *
****

TO: [redacted]

CC: Rick Corben
Bob Dockser
Dick Davies
Bill Johnson
David Stroll

DATE: 26 August 1982
FROM: Dennis Hopkins/Mike Herman
DEPT: OSP Product Management
EXT: 264-4737/264-7154
MAIL STOP: MKO1-2/D03
ENET: MERLIN::HOPKINS,HERMAN

SUBJECT: OSP ALTERNATIVE ASSESSMENT CHART

The attached material represents the completion of the "Alternative Assessment Chart" for all software products within the Office Systems Program that are funded by the Central Engineering Baseplan. The cash flow analysis will be based upon internal-OSP assumptions relative to our proposed product strategy and the best alternatives if components of the OSP strategy are eliminated. Please contact us in regard to any questions or issues relative to the data provided in the attached chart.

ATTACHMENT

PRODUCT ALTERNATIVES

PRODUCT	BEST ALTERNATIVE	CONSEQUENCE OF ALTERNATIVE		CASH FLOW (DELTA $) UNDISCOUNT/DISCOUNT (IN MILLIONS)	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOWDOWN	BEST PRODUCT TODAY
		TECHNOLOGY	SYSTEM				
OFIS/VMS V1	EXTEND THE LIFE OF "ALL IN ONE" AND DECMAIL V2	NO ARCHITECTURAL BASE FOR MULTI MEDIA OFFICE DATA (TEXT,DATA,VOICE, IMAGE) LACK OF OFFICE APPLICATION INTEGRATION LACK OF COMMON USER INTERFACE BETWEEN VMS AND CT	NO EXTENSIBILITY TO CT	110.1/ -1.19	LACK OF COMPETITIVE OA/DP SOFTWARE ON VAX/VMS IN FY83-FY86 TIMEFRAME	LESS DEPTH TO OFFICE APPLICATIONS WITH EACH RELEASE VERSION RELEASES WOULD INCREASE FROM 12 TO 18 MONTH CYCLES	IBM PROFS MAIL, CALENDAR, TICKLER $1016/MONTH WITHOUT OPERATING SYSTEM
OFIS/XT V1	3RD PARTY WP SOFTWARE BUYOUT OR EXTEND THE LIFE OF DECMATE II, WS200, AND DECWORD.	NO ARCHITECTURAL BASE FOR MULTI MEDIA OFFICE DATA (TEXT, DATA,VOICE, IMAGE) NO LEVERAGE OF CT HARDWARE FEATURES (TMS, BIT-MAPPED GRAPHICS) FOR OA/DP FUNCTIONS LACK OF COMMON USER INTERFACE BETWEEN VMS AND CT	NO SINGLE USER OA/DP WORKSTATION THAT IS COMPATIBLE WITH VMS OFIS SYSTEM	21.39/ -3.41	LACK OF COMPETITIVE OA/DP CT WORKSTATION IN FY83-FY86 TIMEFRAME	CLUSTERED CT CAPABILITY WOULD BE DELAYED SOFTWARE WOULD NOT BE TAILORED TO LEVERAGE CT TMS AND GRAPHICS RELEASE CYCLES DELAYED TO 16 MONTHS	XEROX 3TAR WORKSTATION WP,GRAPHICS, MAIL, MATH $6800
OFIS/ RSX-11M+ V1 UNFUNDED	CONTINUE SALES OF RSTS-BASED DECWORD AS ONLY PDP-11 WP PRODUCT	NO ARCHITECTURAL BASE FOR MULTI MEDIA OFFICE DATA (TEXT, DATA,VOICE, IMAGE) NO LEVERAGE OF CT DEVELOPMENT EFFORT WHICH IS BASED UPON RSX DERIVATIVE	NO DIGITAL OA/DP SOFTWARE TO LEVERAGE SMALL BUSINESS AND DEPARTMENT SALES OF 11/23,11/23, 11/44, LCP-5, LCP-8, AND ORION CPUS	68.12/ 1.96	LACK OF COMPETITIVE OA/DP SMALL BUSINESS AND DEPARTMENT OFFERINGS WHICH POSITION BETWEEN VMS AND CT OFIS SYSTEMS	NO EFFECT AS RSX VERSION IS UNFUNDED	WANG ALLIANCE IMAGE, CP/M, BASIC, WP,MAIL, CALENDAR, TICKLER, AND VOICE STORAGE. $15000

PRODUCT ALTERNATIVES

PRODUCT	BEST ALTERNATIVE	CONSEQUENCE OF ALTERNATIVE		CASH FLOW (DELTA $) UNDISCOUNT/DISCOUNT (IN MILLIONS)	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOWDOWN	BEST PRODUCT TODAY
		TECHNOLOGY	SYSTEM				
DECMAIL V2	CONTINUE SALES OF SINGLE NODE DECMAIL V1. CONTINUE SALES OF CP/OSS AS AN UNINTEGRATED OA SOFTWARE PRODUCT	SINGLE NODE MAIL SYSTEM ONLY WOULD BE FORCED TO COMPETE WITH LOWER PRICED WP OPTIONS FROM IBM AND WANG LACK OF OA/DP FUNCTIONALITY IN "ALL-IN-ONE"	REDUCED SALES OF VAX-VAX COMM HARDWARE AND DECNET PHASE IV	3.59/ .09	NO MULTI-NODE "OFFICE PLUS" PRODUCT IN FY83-FY84 TIMEFRAME TO COMPETE WITH WANG'S ALLIANCE AND IBM'S PROFS OA SOFTWARE	CONTINUE INTEGRATION WITH CP/OSS BUT REDUCE PLANNED EDITOR FUNCTIONALITY POTENTIALLY SLIP SCHEDULE WHICH WOULD LOWER CUSTOMER BELIEF IN DIGITAL OA STRENGTHS	IBM PROFS (SEE OFIS/VMS)
OFIS ADVANCED DEVELOP-MENT	DECREASE THE COMPETIVENESS OF FUTURE OFIS RELEASES OR BUYOUT TECHNOLOGY FROM 3RD PARTIES	LACK OF ABILITY TO DIRECT OFFICE A/D WHICH IS SPECIALIZED TO DIGITAL SYSTEMS, LONGER LEAD TIME TO INTEGRATE THIRD PARTY TECHNLOGIES INTO OFIS/VMS AND OFIS/CT	DECLINING ABILITY TO MEET MARKET WINDOW WITH STATE OF THE ART DIGITAL OA/DP SYSTEMS	128.13/ -2.29	NO USE OF AVAILABLE IMAGE, VOICE, GRAPHICS, DATA RETRIEVAL, AND AI TECHNOLOGIES IN FUTURE DIGITAL OA/DP SYSTEMS	SPECIFIC PROTOTYPE OFFICE TECHNOLOGIES WOULD NOT BE BUILT WITH A SIGNIFICANT EFFECT ON DIGITAL OFFICE SYSTEMS	FUTURE IBM, XEROX, WANG, AT & T, AND JAPANESE OFFICE SYSTEMS IN THE FY84-FY90 TIMEFRAME.

Heffner Group

PRODUCT ALTERNATIVES ASSESSMENT -- SYSTEMS SOFTWARE

PRODUCT	BEST ALTERNATIVE	CONSEQUENCE OF ALTERNATIVE		FY83-FY87 CASH FLOW ($M) UNDISC/DISC	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOWDOWN	BEST PRODUCT TODAY
		TECHNOLOGY	SYSTEM				
VMIX/PRODUCTIVITY SOFTWARE							
CMS	Retirement and third party referral	N/A	Hurts our Unix strategy and productivity message; credibility with major national accounts suffers	14.7/7.2	Potential loss of system sales to competitors with heavy productivity message (e.g., IBM)	Some loss of system sales	SCCS (Unix) System 38
MMS	Third party referral	N/A	"	16.5/5.2	"	"	MAKE (Unix) System 38
TCS	Third party referral	N/A	"	TBD	"	"	TBD
SHELL	Buy out by TIG	N/A	"	TBD	Unix strategy severely impacted	Bell commitment to Unix may become irreversible	Bourne shell
TACTICAL 16-BIT SOFTWARE							
PASCAL-11	Third party referral	N/A	Customer base given message; abandonment of systemness of PDP-11 family and reversion to iron + OS approach	27.3/11.5	Considerable loss of system revenue; precludes end game plan for 16-bit software; loss of customer confidence and might upgrade to competitor's 32-bit systems	Some loss of system revenue	Pascal-2 (DMSI)
FMS-11	Retirement and third party referral	N/A	"	22.8/8.7	"	"	VISTA
F77/DEBUG	Third party referral	N/A	"	4.3/1.6	"	"	XBUG77
EDT-11	Retirement and third party referral	N/A	"	(bundled)	"	"	TBD
SORT-11	Retirement and third party referral	N/A	"	(bundled)	"	"	SYNCSORT
COBOL-11	Cobol-81	N/A	N/A	N/A	N/A	N/A	Cobol-81
BASIC/US	N/A	N/A	May force [redacted]	N/A	N/A	N/A	N/A

PRODUCT ALTERNATIVES ASSESSMENT -- SYSTEMS SOFTWARE

PRODUCT	BEST ALTERNATIVE	CONSEQUENCE OF ALTERNATIVE		FY83-FY87 CASH FLOW ($M) UNDISC/DISC	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOWDOWN	BEST PRODUCT TODAY
		TECHNOLOGY	SYSTEM				
USER INTERFACE							
OLA (OnLine Assistance)	Don't Implement Product At All	No expertise in ergonomics developed in house	Mainstream 32-bit systems suffer with antiquated human interface	TBD	User friendly image of VMS erodes; Unix may become system of choice (Unix runs on competitive equipment)	Unix continues to gain in popularity	Unix System 38
HUMAN FACTORS	"	"	"	N/A	"	"	Unix System 38
ADA PSE	Third party referral	"	"	TBD	Loss of system sales to vendors with complete Ada language system	N/A	Softech ALS (when available)
SCOPE	"	"	"	TBD	Unix may become OS of choice (Unix runs on competitive equipment)	N/A	Unix PWB
TACTICAL 32-BIT SOFTWARE							
LNPI	Third party referral	N/A	N/A	TBD	Loss of revenue to DEC	Some loss of revenue	TBD
DECVUE	Third party referral	N/A	Digital not seriously in graphics systems	TBD	Impact on sales of graphics systems	Some loss of revenue	TBD
MODEL	Don't Implement Product At All	N/A	"	TBD	"	"	TBD
NON-PRODUCT DELIVERABLES							
TOOLS REVIEW BOARD	N/A	Software Engineering techniques stagnate	N/A	N/A	N/A	N/A	N/A
WORKSHOPS	N/A	"	N/A	N/A	N/A	N/A	N/A
DOCUMENTATION TOOLS	N/A	No productivity im-	N/A	N/A	N/A	N/A	N/A

SAC TECH 'AL OFFICE
TECHNICAL

CONSEQUENCES OF ALTERNATIVE

Product/ Function	Best Alternative	Technology System		Consequences of No Product	Consequence of Slow Down	Best Alternative Product Today	Cash Flow (Delta)
Project Review & Recommen-dations	Limp Along	Less Synergy	Less Synergy	Less Confidence in Management	Cover Fewer Areas of Contention	SARA/TMC/RAD	May not be able to Save as much as Possible in Development Budget
SARA Management	Limp Along	Less Synergy	Less Synergy	Less Confidence in Management	Less Communica-tion Among Architects	TIA/TMC/RAD	Negligible Impact
Software Tools	Rely on Each Development Unit to Develop Their Own	Less Synergy	Less Synergy	Less Sharing of Tools Between Development Units	Slower Growth in Productivity of Programmers	Software Tools Development Group	Could Save about $400K
Software Product Summary Publica-tions	Word of Mouth Carrier	None	None	Reduced Awareness of Digital Products	Reduced Awareness of Digital Products	Software Engineering News	Could Employ the Capability on other Publications with No Impact on Cash Flow

FY86

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CCEG PRODUCT ALTERNATIVES CHART
20% REDUCTION IN BASE PLAN

PROD.	BEST ALTERNATIVE	CONSEQUENCES OF ALTERNATIVE		CASH FLOW UNDIS/DISC.	CONSEQUENCE OF NO PRODUCT OFFERING	CONSEQUENCE OF SLOW DOWN	BEST PRODUCT TODAY
		TECHNOLOGY	SYSTEM				
SYSTEM 38 ANALYSIS + TEST	LOOK TO P/L'S TO DO, READ REPORTS, TALK TO CUSTOMERS (SWAT TEAMS)	POTENTIALLY BAD OR INCOMPLETE DATA WILL EFFECT PRODUCT DEV, POSITIONING AND MARKETING	SAME AS TECH.	NO DIRECT CASH FLOW	HIGH RISK OF INCORRECT PRODUCT REQUIREMENTS + LESS EFFECTIVE PROD, POSITIONING/MKTG.	WILL MISS TIME TO EFFECT DEC PRODUCTS ALSO WILL LOSE A LOT OF BUSINESS TO THE S-38	S/38 SQL
IMG ADVANCED DEV.	TRY TO DO DIST. DBMS/TP AS "BEST EFFORT" PART OF PROD. DEV. IN NEXT VERSION	HIGH RISK THAT WE WILL NOT SOLVE THESE PROBLEMS AND FAIL COMPETITIVELY	DIST. INFO MGMT. IS BACKBONE TO OUR "FUTURE ARCH" OF HIGH AVAIL, SERVERS LAN'S, CI'S ETC. FAILURE IN DIST. TECH WILL KILL IT		DIST. INFO MGMT. IS BACKBONE TO OUR "FUTURE ARCH" OF HIGH AVAIL, SERVERS LAN'S, CI'S ETC. FAILURE IN DIST. TECH WILL KILL IT	RISK THAT S/W WILL NOT SUPPORT NETWORK AND VMS CAPABILITIES ON TIME	LEADERSHIP ACTIVITY TANDEM CULLINANE IDMS
	GET OFFICE TO DO NON-CODED DATA STORAGE	POTENTIALLY LESS INTEGRATED SOLUTION IN TERMS OF VIA ARE PROPER SKILLS AVAIL IN OFFICE AREA	LESS COMPETITIVE OFFICE OFFERING		UNCOMPETITIVE OFFICE OFFERING, LESS COMPETITIVE VIA OFFERING	LOSS OF COMPETITIVE POSITION	WANG/IBM
	LET CX DO DB MACHINE BASED ON INGRES	HIGH INTERFACE COSTS FOR OTHER S/W LANG'S, TP, ETC.	POTENTIAL FOR A POINT PRODUCT W/O PROPER/SUFFICIENT INTEGRATION TO DEC INFO. MGMT. ARCH.		STRATEGIC/COMPETITIVE ADVANTAGE WILL GO TO HP/IBM WHO ARE WORKING ON DB MACHINES	STRATEGIC/COMPETITIVE ADVANTAGE WILL GO TO HP/IBM WHO ARE WORKING ON DB MACHINES	BRITTON-LEE IDM-500
PRESENTATION/ GRAPHICS S/W AND VIDEOTEX A/D	HOPE THAT INTERESTED P/L'S FUND OR DO A/D NECESSARY TO POSITION DEC IN THIS MKT.	- TECHNOLOGY/ KNOWLEDGE CENTER FOR THIS ACTIVITY IN CCEG. POTENTIAL LOSS OF "LEADERSHIP" MKT OPPORTUNITY - LESS COMPETITIVE OFFERINGS IN DECplot SPACE	VIDEOTEX MARKET ENTRY DELAYED	ESTIMATED (TIG) MARKET SIZE $2.5B IN 1990 WE CAN GET 30% OF IT	VIDEOTEX IS A HUGE/ EMERGING MARKET IN ITSELF. THE TECHNOLOGY IT NEEDS IS APPLICABLE TO OTHER AREAS. LACK OF A/D HERE IS IGNORING A MAJOR MKTG OPPORTUNITY	WE WILL LOSE OUR RECOGNITION AS A PRIME VENDOR (H/W) AS OTHER VENDORS OFFER S/W-DIRECTION	PRESTEL AT+T IBM + WANG IN FUTURE
VAX-II TDMS/D	REDUCE/LOWER PRODUCT POSITION OF ACMS/TP TO ACCOMODATE FEWER TERMINALS	DIST. FORMS ARCH WILL BE WASTED IF SUITABLE VEHICLE (INTELLIGENT TERMINAL) IS NOT FOUND	ACMS WILL NOT ACHIEVE MARKET POTENTIAL OF TP APPLICATIONS MAJOR ACCOUNT PROBLEM	$59M TMS/RUTO & CTPSS	LESS EFFECTIVE TP OFFERING (APPROX. 40 TERMINAL/780 VERSUS 100 TERMINALS	WE MOVE INTO SELLING FUTURES AT ACMS ANNOUNCEMENT	3270 CLASS TERMINALS + TP SOFTWARE
	MOVE TDMS/D FUNCTION TO PC BASED TERM.	A LOT OF WORK TO MOVE TDMS/D TO CTAB	INTERIM REDUCTION IN ACMS POSITIONING INCREASED COST OF TERMINALS IN OUR TP OFFERING	$44M			

PRODUCT ALTERNATIVES CHART
20% REDUCTION IN DALEY FUNDS (ALL)

PROD.	BEST ALTERNATIVE	CONSEQUENCES OF ALTERNATIVE		CASH FLOW DELTA UNDISC/DISC.	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF PRODUCT SLOW DOWN	BEST PRODUCT TODAY
		TECHNOLOGY	SYSTEM				
DECSET/ PBI	MARKET 3RD PARTY OFFERING (DATALOGICS)	NO SERIOUS CONSEQUENCE	MUST RELY ON 3RD PARTY S/W-LOSS OF "SYSTEM" VENDOR PRESTIGE	$11OM ~~(H/WARE/SOFTWARE)~~	LOSS OF "SYSTEM VENDOR" STATUS	UNCOMPETITIVE POSITION	?
ADE	MOVE USER TO DATA-TRIEVE OR ONE OF SEVERAL SPREAD-SHEET PROD.	NO SERIOUS EFFECT	MIGRATION/CONFUSION ISSUE SINCE WE JUST ANNOUNCED IT.	$13M	LOSS OF SWS REVENUE INCREASE IN P/L REVENUE - ONE LESS PRODUCT TO SUPPORT	-	DIGITCALC
DECSET/ OFFICE	GET OUT OF VIDEO TYPOGRAPHY AREA RELY ON GRAPHICS/ VIDEOTEX TECHNOLOGY TO ACHIEVE BASE REQUIREMENTS	WASTED KNOWLEDGE BASE IN TEXT MGMT. AND DOCUMENT PRESENTATION	LOSS OF COMPETITIVE STANCE IN OFFICE RELATED DOCUMENT PRESENTATION	UNKNOWN	LOSS OF COMPETITIVE ADVANTAGE IN OFFICE AREA	SAME AS NO PRODUCT	XEROX STAR
DECPLOT	RELY ON DTR GRAPHICS AND PROG LEVEL INT. IN KEATING'S AREA	LOSS OF KEY 4GL COMPONENT. LOSS OF GRAPHIC STORAGE TECHNOLOGY AND ICON USER INTERFACE TECH.	LOSS OF KEY PRESENTATION/DECISION SUPPORT TOOL FOR END USERS. LOSS IN OFFICE COMPETITIVENESS	$18M	COMPETITIVE LOSS TO WANG, IBM WHO ARE PURSUING END USER GRAPHICS	ME TOO PRODUCT AT FCS. LOSS ON SIGNIFICANT COMPETITIVE ADVANTAGE	XEROX STAR GRAPHICS
SYSTEM TEST TOOL (ORACLE)	DO NOT ENHANCE ALLOW DEV. TO USE AS IS.	PRODUCTIVITY LOSS FOR DEVELOPMENT AND CSE	-	NONE	LONGER PRODUCT TEST CYCLES + LESS INFORMATION ON PRODUCT POSITIONING	-	-
SYSTEM 38 ANALYSIS + TEST	LOOK TO P/L'S TO DO, READ REPORTS, TALK TO CUSTOMERS (SWAT TEAMS)	POTENTIALLY BAD OR INCOMPLETE DATA WILL EFFECT PRODUCT DEV, POSITIONING AND MARKETING	SAME AS TECH.	NO DIRECT CASH FLOW	HIGH RISK OF INCORRECT PRODUCT REQUIREMENTS + LESS EFFECTIVE PROD, POSITIONING/MKTG.	WILL MISS TIME TO EFFECT DEC PRODUCTS ALSO WILL LOSE A LOT OF BUSINESS TO THE S-38	S/38 SQL
REDUCE IMG A/D	DO NOT PROVIDE DIST INTERCONNECT BETWEEN VIA AND PDP-11'S AND CT'S ONLY PROVIDE DIST. DTR ON VAX'S	VIA WILL REMAIN A MID-RANGE 32 BIT OFFERING - NO LOW END TECHNOLOGY ON 16 BIT INTERFACE	SERIOUS LOSS OF FAMILYNESS AND DISTRIBUTED COMPETITIVE ADVANTAGE	-	WILL NOT ACHIEVE LEADERSHIP IN CONNECTING PC'S TO DEPT SYS, TO CORP SYSTEM. LOSS TO IBM S/38 AND PC	LOSS OF DISTRIBUTED INFO MGMT BATTLE TO IBM/WANG	LEADERSHIP AREA

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SAC CENTRAL QUALITY GROUP

PRODUCT/ FUNCTION	BEST ALTERNATIVE	CONSEQUENCE OF TECHNOLOGY	ALTERNATIVE SYSTEM	CASH FLOW (DELTA)	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOWDOWN	BEST ALTERNATIVE PRODUCT TODAY
CUSTOMER PERCEPTION AUDIT	RELY ON CURRENT KNOWLEDGE	LOWER RELIABILITY OF MEETING CUSTOMERS EXPECTATIONS	NO DIRECT FEEDBACK ON SYSTEMS	300K	IMPACT QUALITY GOALS AND ABILITY TO MEASURE CUSTOMER PERCEPTIONS	LESS PRODUCTS MEASURED	NONE
METRICS (GRAY BOOK)	NO ALTER-NATIVES	LACK OF MEASURE-MENTS	LACK OF MEASURE-MENTS	300K	NO MEASURES ON MAINT. (SPRs) & INSTALLATION	LESS PRODUCTS MEASURED	NONE
PROCESS	RELY ON CURRENT INFORMATION	WON'T BE INCORPORATED IN PROCESS	NO SYSTEM HW/SW PROCESS	300K	NO IMPROVE-MENT OR FOCUS ON SYSTEM DEVELOPMENT PROCESS, NO PRODUCTIVITY INCREASE	MOVE SYSTEM FOCUS OUT SOME OF TIME	NONE
TECHNOLOGY (JAPAN, IBM)	RELY ON CURRENT INFORMATION	STUDY OF OUTSIDE QUALITY TECHNOLOGY NOT DONE	LOSS OF POSSIBLE IMPROVEMENTS TO SYSTEMS	180K	NO OUTSIDE FOCUS ON QUALITY	LESS OUTSIDE FOCUS ON QUALITY	NONE
PROJECT REVIEW & RECOMMEND.	RELY ON OTHER INPUT	LESS QUALITY FOCUS	LESS QUALITY FOCUS	200K	NO PRIMARY FOCUS ON QUALITY	LESS PRIMARY FOCUS ON QUALITY, LOSS OF MANAGEMENT CREDITABILITY	NONE
PRODUCT ASSURANCE	NO CURRENT ALTERNATIVE		ONLY POINT WHERE OS & LAYERED PRODUCTS CHECKED AS A SYSTEM	1.2M	DANGER OF LAYERED PRODUCT NOT BEING INSTALLABLE RISK CUSTOMER QUALITY EXPECTATIONS & CUSTOMER BASE LOSS	LESS CHECK ON INSTALLABILITY OF ALL PRODUCTS, SOME PRODUCTS NOT CHECKED	NONE

SOFTWARE GLOSSARY	RELY ON INDIVIDUAL PRODUCT	LESS SYNERGY	LESS SYNERGY	100K	CONTINUED MISUSE OF TERMS ACROSS PRODUCTS CAUSING CUSTOMER CONFUSION HURT TRANSLATION OF DOCUMENTS	LONGER TO GET PROBLEM ADDRESSED	SHIFT RESPONSIBILITY TO DEVELOPMENT GROUPS
QUALITY WORKSHOPS	NO ALTERNATIVE	LESS SYNERGY	LESS SYNERGY	300K	IMPACT QUALITY GOALS AND ABILITY TO BRING QUALITY TECHNOLOGIES TO INDIVIDUALS	LOSS OF CREDITABILITY ON MGMTS. CONCERN FOR QUALITY	NONE
SPR SYSTEM	NO CENTRAL SYSTEM EXISTS	LOSS OF FEEDBACK	LOSS OF FEEDBACK	160K	CONTINUE CURRENT MANUAL SYS. HEAVY FIELD EXPOSURE IN SLOW FIX TURN-AROUND NO IMPROVED PRODUCTIVITY	LONGER TO GET PROBLEM ADDRESSED	CURRENTLY MANUAL SYSTEM EXISTS
DOCUMENTATION	SYSTEM 3/4 FINISHED, BUT WORKABLE	NO IMMEDIATE IMPROVEMENT IN DOCU.	INDIRECT IMPACT ON PUBLICATION COST	100K	NO IMMEDIATE PRODUCTIVITY INCREASE	LONGER TO GET PRODUCTIVITY INCREASE	NONE INSIDE POSSIBLE OUTSIDE PURCHASE

SOFTWARE DATA

3.0 BASE PLAN

3.1 BASEPLAN INDEX

ORG: OFFICE SYSTEMS PROGRAM Date 7/2/82 Prepared by: BOB DOCKSER Page 1 of Pages 2

PRODUCT NAME/VERSION & DESCRIPTION	PPS REF PG	Curr Phs. FRS	Est. Spend FY82	BUDGET FY83 Q1	Q2	Q3	Q4	FY83	BUDGET ($K) FY84	FY85	FY86	Estimate Total Dev Cost	Resp. Prog. Off.
WPS-8/DECMATE I V3.0	17	0 Q4/FY83 (T)	260	-	-	107	194	301	440	-	-	1001	SBS
WPS-8/DECMATE II V1.0	18	1 12/27/82 (T)	227	283	135	17	-	435	-	-	-	662	SBS
WPS-8/DECMATE II V2.0	19	0 Q4/FY83 (T)	0	-	109	320	320	749	35	-	-	784	SBS
DX - EXTENDED (WPS INTERCONNECT)	20	1	280	118	118	97	-	333	-	-	-	613	SBS
OS/78 MAINTENANCE	21	NA	10	21	21	21	21	84	-	-	-	94	SBS
WPS-8/WS200 MAINTENANCE	22	NA	0	129	129	50	-	308	-	-	-	308	SBS
WPS TESTING TOOLS	23	NA	0	25	25	25	25	100	-	-	-	100	SBS
WPS-8/78,80, DECmate MAINTENANCE	24	NA	158	109	109	109	109	436	-	-	-	594	SBS
DECWORD & DECWORD/DP V1.2	25	3 7/82 (C)	680	55	55	55	55	220	-	-	-	902	COEM
TOTAL OOD INDIRECT FUNDING			1615	740	701	801	724	2966	475	-	-	5056	

NOTE: 1. INDICATE BUDGET SOURCE: OOD DIRECT, OOD INDIRECT, AND OTHER
2. *INDICATE IF FRS IS TARGET (T) OR COMMITTED (C)

3.0 BASE PLAN

3.1 BASEPLAN INDEX

ORG: OFFICE SYSTEMS PROGRAM Date 7/2/82 Prepared by: BOB DOCKSER Page 2 of Pages 2

PRODUCT NAME/VERSION & DESCRIPTION	PPS REF PG	Curr Phs. FRS	Est. Spend FY82	BUDGET FY83 Q1	Q2	Q3	Q4	FY83	BUDGET ($K) FY84	FY85	FY86	Estimate Total Dev Cost	Resp. Prog. Off.
DECMAIL V1.0 MAINTENANCE	26	NA 2/82(C)	824	63	66	68	70	267	--	--	--	1091	OFIS
DECMAIL V2.0 (MESSAGE ROUTER)	27	2 10/82(C)	812	192	209	197	199	797	287	--	--	1896	OFIS
OFFICE/VMS V1.0	28	2 1/83 (C)	4427	598	141	--	--	739	--	--	--	5166	OFIS
OFFICE/VMS V2.0	29	0 12/83(T)	--	450	582	530	493	2055	575	--	--	2630	OFIS
OFFICE/VMS V3.0	30	0 12/84(T)	--	--	--	--	--	--	4204	1130	--	5334	OFIS
OFFICE/VMS V4.0	31	0 12/85(T)	--	--	--	--	--	--	--	8266	1561	9827	OFIS
OFFICE/VMS V5.0	32	0 12/86(T)	--	--	--	--	--	--	--	--	11417	13098	OFIS
OFFICE/CT V1.0	33	1 6/83(T)	2587	526	913	993	418	2850	--	--	--	5437	OFIS
OFFICE/CT V2.0	34	0 6/84(T)	--	--	--	166	804	970	3415	--	--	4385	OFIS
OFFICE/CT V3.0	35	0 6/85(T)	--	--	--	--	--	--	1364	6715	--	8079	OFIS
OFFICE/CT V4.0	36	0 6/86(T)	--	--	--	--	--	--	--	2681	9275	11956	OFIS
OFFICE/CT V5.0	37	0 6/87(T)	--	--	--	--	--	--	--	--	3702	13691	OFIS
A/D FUNDING (SEE SECTION 4.0)			650	215	225	230	232	902	1155	2208	3045	7960	
OOD BASEPLAN FUNDING(PL20)			9300	2044	2136	2184	2216	8580	11000	21000	29000	90550	

NOTE: 1. INDICATE BUDGET SOURCE: OOD DIRECT, OOD INDIRECT, AND OTHER
2. *INDICATE IF FRS IS TARGET (T) OR COMMITTED (C)

digital

INTEROFFICE MEMORANDUM

TO: Rick Corben

cc: SWE Staff
CSE PMM's

DATE: 8 June 1982
FROM: George Thissell
DEPT: CSE Operational Planning
TEL: 223-7698
LOC/MAIL STOP: ML12-3/A62

SUBJECT: ENGINEERING INVESTMENT ANALYSIS - CSE

The attached material presents a summary of the major planned software products along with their projected NOR and Software Engineering Expense. To provide a relative measure of financial return, we've provided a "Software Markup" entry which is (1) NOR over SWE Expense for FY82-3-4; or (2) in the case of products not shipping in FY82, the NOR for the first 3 years over the SWE Expense to that point.

Let me know of any problems.

Regards.

PROJECT NAME AND SUMMARY DESCRIPTION	CURRENT PHASE	FRS	NOR (M) [2]	ENG EXP (000) 82	83	84	85	SW MARKUP [1] NOR/EXP
o OFIS/VMS, V1: Office Automation Applications Architecture and products for VAX/VMS including single node mail with multi node option, calculator, spreadsheet, word processing, administrative functions, list processing, etc. Successor to VAX DECMAIL product; Migration aids will be supplied.	2	11/82	791.5	3120	2430	2270		52.0
o OFIS/XT, V1: Same functionality as OFIS/VMS, V1; Successor to WPS-8 and DECMATE products; migration aids will be provided.	0	Q4,83	257.0	1500	3650	3410		16.7
o OFIS/RSX-11M+, V1: Same functionality as OFIS/VMS, V1; Potential OFIS-compatible replacement for DECWORD.	0	Q4,83	255.4	0	750	3780		23.4
o DECMAIL, V2: Multi node superset of V1; more integrated with VMS; combines with CP/OSS to form "ALL IN ONE" product.	3	10/82	21.5	1410	750	240		7.1
o OFIS Advanced Development				370	1000	1300		
o RDMS, V1: A Relational Data Base System for VMS; provides mid range, easy to use DBMS for programmer productivity; positioned below VAX-11 DBMS in performance.	1	Q1,84	89.5	357	966	1100	1100	25.1
o VAX-11 TSS, V1: Terminal Service Subsystem providing record level forms management services to the VIA products. Current overlap with FMS will be resolved in V2 time frame.	2	Q3,83	16.2	1190	1155	1320	1565	3.1
o VAX-11 TPSS, V1: Transaction Processing Subsystem for VAX; extends FORMS processing to non-procedural applications development, structural rollback, memory, etc; serves as IBM coexistence factor; positioned at upper end of FORMS Management products.	2	Q4,83	20.1	1445	1769	2008	2420	3.0
o VAX-11 DTR, V2: Fourth Generation Language aimed at programmer and end user productivity; adding improved FORMS management, improved end user documentation.	1	Q3,83(T)	48.1	682	777	888	999	16.9

PROJECT NAME AND SUMMARY DESCRIPTION	CURRENT PHASE	FRS	NOR (M) [2]	ENG EXP (000) 82	83	84	85	SW MARKUP [1] NOR/EXP
o VAX-11 CDD, V3: General extensions to help performance, ease of use and support new processors (RDMS); common data/meta data repository for VIA; increases productivity through improved control, reduced redundancy, etc.	0	FY84(T)	6.5	310	647	740	879	3.0
o VAX-11 TMS, V1: Terminal Management Services that allow off-loading of FORMS processing to video terminal cluster based on PLUTO; improves the number of terminals supported.	2	9/83	41.4	540	630	720	810	15.3
o VAX-11 DBMS, V2: Provides performance oriented CODASYL DBMS for large, complex data bases; improved performance, increased interface to TPSS.	1	Q2,84	33.5	1341	1246	1424	1690	5.9
o DTR-11, V2.X: High level language, query/Report Writer for PDP-11's; maintenance mode-SPR fixes, general maintenance.	-	--	4.3	274	350	400	475	2.9
o RSTS/E, V8: Adds execute only option (RSTS/A); new hardware support. Generally moving towards smaller configurations for small business system market.	1	Q3,83(T)	18.5	1909	2660	3040	3230	2.4
o DBMS-11 o TRAX-11 Both in retirement mode.			.3	245	385	240	90	.3
o VAX-11 ADA, V1: DOD-mandated language for embedded computer systems; Brand new language, never before implemented.	1	Q3,85	38.1	276	697	823		10.4
o VAX-11 APL, V1: First implementation of APL for VAX; Features compatibility with DEC-20 APLSF.	3	Q3,83	9.8	307	373	439		8.7
o VAX-11 BASIC, V2: Addition of features required for FIPS validation; ANSI graphics support; VAX-11 DBMS support.	3	Q3,83 Q3,84	37.0	728	798	1048		14.4
o VAX-11 BLISS-16/32, V2: Support/ enhancement of DEC standard systems implementation language.	1	Q1,84	6.5	338	485	549		6.5
o VAX-11 COBOL, V3: Correction of errors detected in FIPS validation.	0	Q4,83(T)	33.3	594	704	1122		13.7
o Advanced Development: IRDS; Voice/Image; D.B. machine; common display management.				780	1440	1840		

PROJECT NAME AND SUMMARY DESCRIPTION	CURRENT PHASE	FRS	NOR (M) [2]	ENG EXP (000) 82	83	84	85	SW MARKUP [1] NOR/EXP
o VAX-11 FORTRAN, V5: Performance enhancements; Integration with VIA products.	0	TBD	86.2	370	426	585		66.2
o VAX-11 PASCAL, V2: ISO conformance; Runtime performance enhancements; Systems programming features; Enhanced I/O capabilities.	3	Q2,83	29.5	--	510	625		26.0
o VAX-11 PL/I, V2: Support/enhancement of common code generator; Addition of IBM-compatibility and full-language ANSI features.	0	TBD	16.8	373	484	730		10.6
o VAX-11 DEC/CMS, V2: Performance enhancements; User-controlled security features.	0	TBD	11.8	402	485	653		7.6
o VAX-11 RTL: Support/enhancement of bundled VMS component providing language-independent and language specific run time features.	2	Q4,83	N/A	695	878	994		N/A
o VAX-11 DEBUGGER, V1: Support/ enhancement of bundled VMS component providing symbolic debugging for VAX languages.	1	Q4,83	N/A	383	5557	663		N/A
o EDT/VAX/RSX/RSTS: Support/enhancement of cross-system DEC standard editor; bundled component of respective operating systems.	2	Q4,83	N/A	279	258	297		N/A
o VAX-11 SORT/MERGE, V3: Support/ enhancement of bundled VMS component providing standalone or callable sort/ merge capabilities.	2	Q4,83	N/A	141	137	149		N/A
o VAX-11 ADA PSE, V1: Ada language programming support environment.	0	TBD	TBD	--	284	384		TBD
o DEC/TCS, V1: Test control system developed for internal engineering use; Productized and marketed as productivity aid.	0	TBD	TBD	235	230	313		TBD
o VAX-11 RPG, V1: First release of this product on VAX; Central funds supplement ECS P/L funding.	0	TBD	TBD	--	81	100		TBD
o PDP-11 BASIC-PLUS-2, V2: Addition of features required for FIPS validation; ANSI graphics support.	3	Q1,83	18.9	563	665	751		9.5

PROJECT NAME AND SUMMARY DESCRIPTION	CURRENT PHASE	FRS	NOR (M)[2]	ENG EXP (000) 82	83	84	85	SW MARKUP[1] NOR/EXP
o PDP-11 COBOL/COBOL-74: Maintenance of original FIPS-validated products.	4	Q4,82	6.9	168	175	314		10.5
o COBOL-81, V2: Correction of errors detected in FIPS validation; Replacement product for PDP-11 Cobol.	1	Q4,83	7.7	431	690	811		4.0
o PDP-11 FORTRAN-77, V5: Maintenance/ enhancement of premier 16-bit Fortran; Integration with symbolic debugger; Additional full-language ANSI features.	1	TBD	27.4	292	408	584		21.3
o PDP-11 FORTRAN IV: Maintenance mode.	-	--	12.7	124	169	250		23.4
o PDP-11 SORT/MERGE, V3: Product rewrite to enhance features and performance; bundled with RSTS, optional with RSX.	2	Q2,84	1.2	185	284	248		1.7
o Product Support-Software Tools Support				325	461	417		
o Technical Languages A/D: Firmware support for language constructs; language optimization techniques.				0	233	465		
o Commercial Languages A/D: Fourth generation languages; cross language testing; distributed editor; language sensitive editors.				228	729	750		
o Methods and Tools A/D: Scope Tools Architecture.				247	367	311		
o RSX FAMILY: Processor and Device Support; LAN support; File servers; XT support.	-	--	188.6	3989	4600	5300		12.1
o VMS, V4: Support of clusters, data integrity, small VMS, AME, new hardware.	0	Q4,83	243.1	7079	10500	12500		8.1
o SEABOARD, V1: Real Time, Chips and Board support via PASCAL language.		Q2,84	23.6	952	1500	2300	2500	2.4
o Advanced Development: Architecture; Ethernet, clusters, small VMS, personal computer, PUBS System.				734	800	1200		
o MICROPOWER, V2: Maintenance, support for FTF-11, MXV11-B, RL02 (target); will be complimented with VMS based multi user development system in Q1, FY84 (TVG funded)	-	--	27.3	728	848	819		11.4

PROJECT NAME AND SUMMARY DESCRIPTION	CURRENT PHASE	FRS	NOR (M) [2]	ENG EXP (000) 82	83	84	85	SW MARKUP [1] NOR/EXP
o FMS, V2: Terminal independent FORMS language; supports VT125, VT18X as well as VT100; structured for high performance; improved FORMS editor. FMS is Field oriented while TSS is Record oriented; FORMS language brings FMS closer to INDENT.	2	Q4,83	45.0	795	1372	1331		
o RT-11, V5: New hardware (LCP5, RL25) support; customer installed, maintenance; includes RTEM, BASIC-11 Maintenance.	2	Q4,83	49.8	1128	1528	1482		12.0
o GRAPHICS: LN01 support for RSX, RSTS, VMS; ISO/GKS conforming graphics subroutine library; picture structuring management and manipulating product based on the library. Provides a migration path for current DEC terminal specific software; modeling and LN01 support are unique. (The FRS numbers are for LN01, DECVUE, Modeling, respectively)	0,1	Q1,84 Q3,83 Q3,84	N/A	428	960	932		N/A
o VAX Workstation, V1: High resolution B/W Graphics display; permits several virtual displays on a given terminal with multiple windows; clusters of workstations within LAN's. Priced above Professionals ($20K per work-station)	0	Q3,83	N/A	117	750	1087		
o Distributed Computing (nee 36-32): Data Interchange Library and Utility; Message Transport System; Name Server; Distributed Job Services.	0/1	TBD	N/A	573	1319	1913		
o Advanced Development - Human Factors:	-	--	---	200	513	498		---
o Advanced Development - Applications: Blackboard math; X.25 hub for VAX; Integrated CPI facility for Professional; a menu driven IEEE interface.				125	200	300		
o CMU:				200	2000	4000		
o OTHER: Finance				480	560	600		
Personnel				550	685	756		
Administration				995	1260	1555		
Facilities/Relocation				2750	2019	2281		

1 NOR for 82-83-84, unless (1) the product has not yet been released, in which case it is the NOR for the first 3 years; or (2) in the case of OFIS, both NOR and expense are lifetime projections.

2 Where the 3 year NOR period extends beyond FY84, the Engineering Expense total is also extended.

Software Engineering

digital

INTEROFFICE MEMORANDUM

TO: [redacted]

cc: SWS Staff
CSE PMM's

DATE: 10 June 1982
FROM: George Thissell
DEPT: CSE Planning & Operations
TEL: 223-7698
LOC/MAIL STOP: ML12-3/A62

SUBJECT: ENGINEERING INVESTMENT ANALYSIS - CSE ADDENDA

My apologies for dropping the UK entries:

Product Name and Summary Description	Engineering Expense 82	83	84
o LOLA-32: Natural Language (French, German) development in support of 32-bit products.		557	
o Advanced Development: In support of OFFICE and European products.	300	333	376
and the CCEG S38 System			
o CCEG S38 System:		200	200

Additionally, the Graphics NOR is $14.4M and the SW Markup is 6.2; the VAX-11 DEBUGGER, V1 Engineering Expense for FY83 should be "557".

SOFTWARE ENGINEERING

LSG

36 BIT SYSTEMS

TMC recommendations
(Rezac Proposal)

	Project Cost $K FY83	FY84
CUTS: 1) Elimination of KL operating systems and associated communication software	$2500	
2) $700K from administration budget	700	
N.B KL Program	3200	3000

COMMENT:

- LSG can't change Jupiter; only total cancellation of this project will effectively return dollars to company

TMC review slides attached
Rezac slides attached

36 BIT SYSTEMS

PRODUCT DEVELOPMENT

	FY82	FY83	FY84
VENUS	12,300	16,400	16,800
JUPITER	9,400	13,200	7,700
KL PROGRAM	5,100	3,200	3,000

(Set 20% cut from KL) →

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT
				X

36 BIT

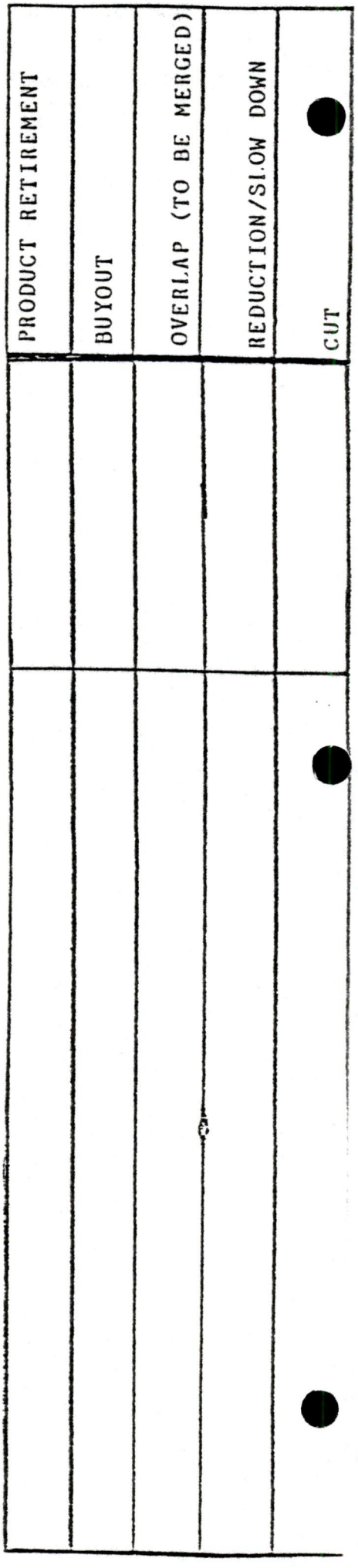
PRODUCT SUPPORT

	FY82	FY83	FY84
ADVANCED DEVELOPMENT	900	2100	5500
OTHER	300	1300	1700

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT
				$700K

36-BIT SYSTEMS

1. Would a replan based on schedule stretch out or feature reduction leave us with a viable product?



36 BIT PROGRAM OFFICE
FY83 BUDGET ALTERNATIVES
($ MIL)

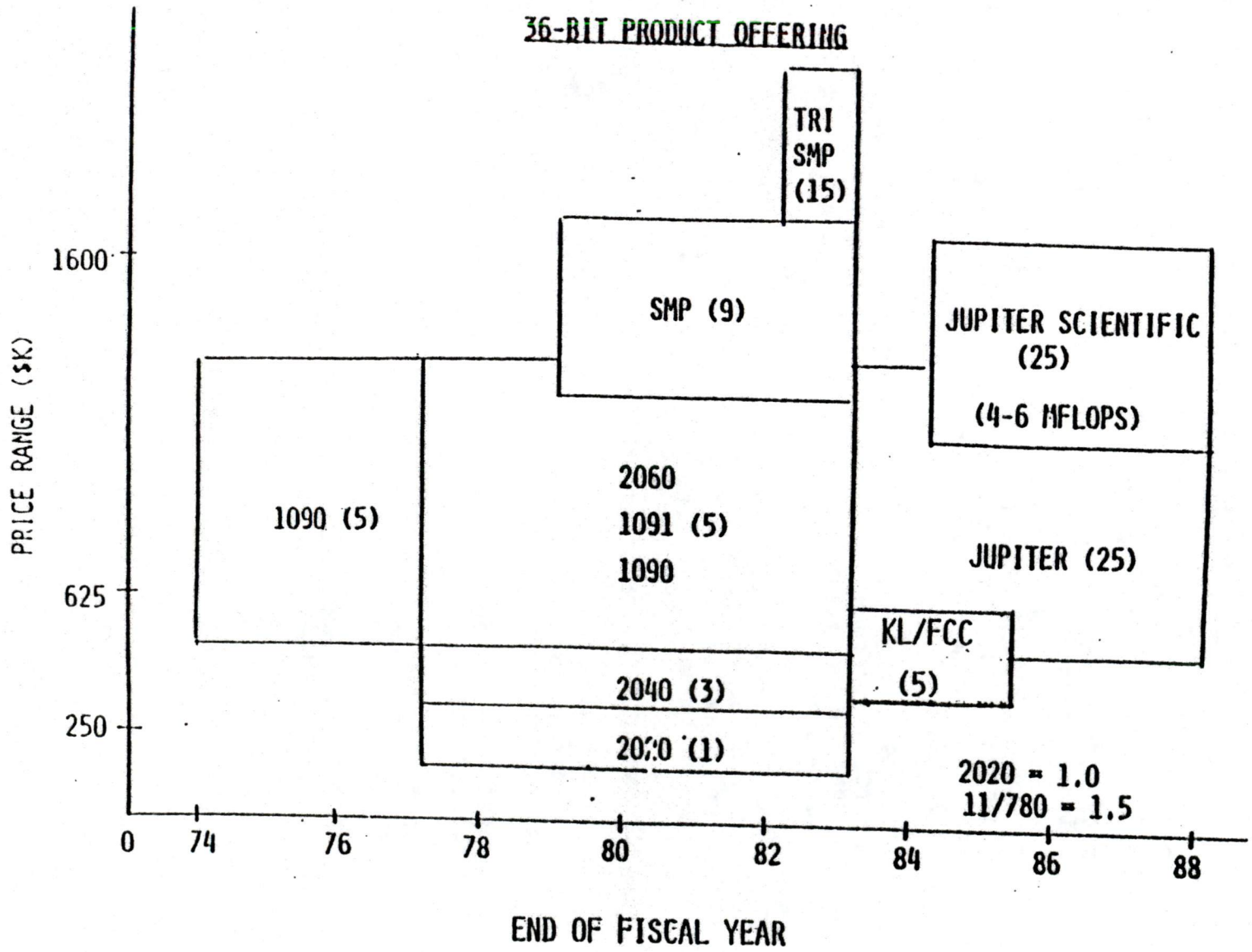
Product	Computer Cost	Labor Cost	Total Cost	-20%	-85%
Jupiter HW	1.0	6.8	8.6	8.6	-
Jupiter SW	.4	1.8	2.2	2.2	-
KL Software	.8	1.7	2.5	0	2.4
FCCKL HW	.1	.1	.1	.2	.2
KL/KS Support	.1	.5	.6	.6	.6
Admin.	-	1.2	1.2		
				1.3	-
Tax	-	.8	.8		
Total	$3.2	$12.9	$16.1	$12.9	$3.

- A 20% budget reduction would be effected by elimination of KL operating systems and associated communication software.

  In addition, $700K would have to be cut from the administrative budget.

- An 85% budget reduction would be effected by cancellation of Jupiter and 100% reduction of administrative expense. We would invest solely in extending the product life of KL

CHART III


36-BIT PRODUCT OFFERING
TRI SMP (15)
SMP (9)
JUPITER SCIENTIFIC (25)
(4-6 MFLOPS)
1090 (5)
2060
1091 (5)
1090
JUPITER (25)
KL/FCC (5)
2040 (3)
2020 (1)
2020 = 1.0
11/780 = 1.5
PRICE RANGE ($K)
1600
625
250
0
74
76
78
80
82
84
86
88
END OF FISCAL YEAR

For the KL Program the following Software projects are essential and included in the Product Development Chart (Chart I).

- TOPS-10 7.02 Operating System release to support DECnet-10 Phase III and TU78 support.

- TOPS-20 5.1. Announced at Spring DECUS for shipment in Q2 FY83. Support for DECnet-20 Phase III.

- X.25/X.29. Support for packet-switching networks with shipment targeted for Q3 FY83.

- GALAXY/IBM COMM. GALAXY 4.1 (TOPS-10) and 4.2 (TOPS-20) and IBM COMM 10/20 should continue in their current course. These products were announced at Spring DECUS for delivery starting in Q2 FY83.

- ARPA TCP/IP Support. We are currently developing support for the TCP/IP protocols. These protocols must replace the current ARPA protocols by January, 1983 to meet ARPA requirements.

- 2020 DECnet-Phase III. Necessary to provide this project to maintain networking support for installed 2020's. 2020's must be at Phase III level so that with release of Phase IV DECnet they can be supported with our networking software.

- FORTRAN, COBOL, LINK, PASCAL, IQL, APLSF, BLISS

The following software projects for the JUPITER program are included in the development information in Chart I.

JUPITER - TOPS 20 - First release of JUPITER Operating System for TOPS-20.

JUPITER - TOPS 10 - First release of JUPITER Operating System for TOPS-10.

JUPITER IBM - COMM/GALAXY - First release to support GALAXY and IBM COMMUNICATIONS on JUPITER.

STORAGE

TMC recommendation

Vote of confidence in Riggle's rationale planning.

COMMENT:

- o TU80 will replace TS11, and is too late to stop
- o RDXX is now a buyout
- o Riggle will change strategy - in which space(s) should we not be in?

TMC Review slides attached
Riggle slides attached

STORAGE

1. We have too many tape programs - TU80, TU81, MAYA, TSV05, UB Version of TSV05, plus existing ~~TS11, TU77, TU78.~~ Let's forego at least one (TU80 is our choice) and accelerate MAYA - desperately needed by end FY83. Otherwise, we'll be forced into buyout.

   TU-80 - Do we need it? Would we be better off focusing on MAYA?

2. RX52 - suggest this be looked at in following light: How much capacity can we get with current mechanism and cost, going double sided, but still able to read RX50 disks? Cleraly not a disk backkup product, but certainly a floppy based product at very low end (PC's).

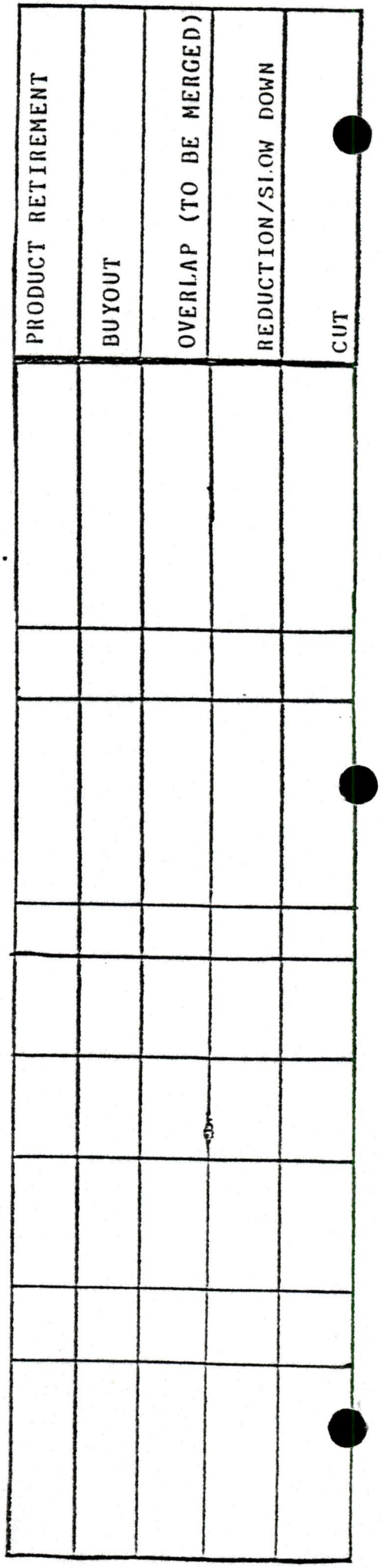
3. Buy out low-end disks.

4. RAXY - How sure are we that the world really needs another larger removable disk?

5. RAXX at 600 MB is not a big enough step from RA81 at 450 MB. Same observation RAXY over RA60.

6. Before we invest in RDXX or Shrimp, need to be sure we understand the cost frontier curve and that these products are on it. Otherwise, keep buying out.

7. We're still in search of a low end strategy!



STORAGE

PRODUCT DEVELOPMENT

	FY82	FY83	FY84	PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT
RA81	2966	1254	0					
RD50	757	175	0					
RD51	152	330	0					
RA60	3382	3536	1069					
RX50	3000	850	0					
UDA50/RA80	2822	0	0					
HSC-50	2940	4519	3326					
UDA-52	208	447	150					
AZTEC	4523	5356	2500					
TA78	727	861	350					
TU81	740	661	200					
RD52	0	620	400					
HSC-50 CACHE	100	500	950					
TU80	310	548	550					
TA81	310	548	550					
TA81	SEE TA78							
RAXX	238	3922	10322					
MAYA	1076	2503	3569					

STORAGE

PRODUCT DEVELOPMENT

	FY82	FY83	FY84
BSA	0	800	3058
AZTEC II	0	1476	3890
RX50	0	200	200
RAXY	SEE RAXX		
RX52	0	755	200
RD5X	0	50	3029
ELECTRONIC STORAGE	1290	1044	1201

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	

TAPE ENGINEERING DELIVERABLES

PRIORITIZED PRODUCTS	BEST ALTERNATIVE	CONSEQUENCE OF ALTERNATIVE		CASH FLOW (DELTA $)		CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF A SLOWDOWN	BEST DEC PRODUCT TODAY
		TECHNOLOGY	SYSTEMS	NET PRESENT VALUE	CASH FLOW			
TU81/TA81	TU78/TA78	Higher price and performance Lower reliability Less attractive packaging - 2x higher cost of ownership	MLP $55K vs. 20K - Limited mid-range and low end systems appeal - BMC $340 vs. $75	(98M)	(360M)	No back-up for >200MB disks	Until FRS DEC will be non-competitive on 730/750/780 system packages	TU78
MAYA	¼" 3M Cartridge Streaming Tape (DEI, Archive)	Lower reliability. 70% higher cost of ownership - Dubious extensibility - Less useful form factor. No 'familiness'	Undesirable size - earlier time to market (Q1,FY84) - higher entry cost. Not useful as console I/O device	(24.2M)	(143M)	No low-cost companion for 5MB-200MB disks. CT150, LCP5, LCP8, Orion and Scorpio have major exposure.	No suitable back-up for 5MB disks in mini-floppy package	RX50
TA78	TU78	No HSC cluster functionality for tapes.	Requires massbus system. Utilities require CPU usage.	No SI tapes until TA81		No high end tape tape for SI subsystems.	No DSA tape support for clustered configurations.	TU78
	TA81	No start/stop GCR - Lower performance.	No high performance - start/stop tape on HSC					
TU80	TS05	Lower reliability - No 'Familiness' with TU81. No common packaging. Higher cost of ownership.	No 25 ips start/stop performance. Delay to FRS. Legal liability w/vendors.	(10.8M)	(20.9M)	TS11 is too expensive and too large. $2000 extra cost. Lost device and system sales.	TU80 in DMT; funding spent or committed. FRS +6 months. Impact on 730/750/44 system sales.	TS11
YANKEE	TA81	Higher cost - lower device capacity - lower reliability - larger (Cabinet) package.	No 16-bit support - too expensive for ORION 2 x cost of ownership	(36.6M)	(245M)	Back-up device for large, fixed disks more expensive than the disks. TA78 is 52K TA81 is 23K	None - no funding committed for FY83.	TS11
	Optical Disk	Not cost-effective for back-up, no interchange. Uncertain media costs. High risk in Technology	Not attractive for low end systems.					
OPTICAL DISK	YANKEE	Less risk. Less effective random access. Optical technology could leap-frog tape technology.	Mostly new markets. May not be required until late 80's.	No presence in this market		We may be unable to meet a market need for large, on-line archives or hierarchical files.	None - no funding committed for FY83. DWB 9/15/82	None

PROD.	BEST ALTERNATIVES	CONSEQUENCE OF ALTERANATIVE TECHNOLOGY	SYSTEM	CASH FLOW (DELTA $) UNDISCOUNT/DISCOUNT (IN MILLIONS)	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOWDOWN	BEST PRODUCT TODAY
RD50, RD50 RD51	No alternatives considered. Products either announced or so close to completion that alternative consideration is not practical.						
AZTEC	Buyout Quantum 40 MB fixed 8" & use RX50 or RL02 as back-up until Maya (H2FY84). Could buy-out Lark II 20.4F + 20.4R) but unproven at this time.	Approx.$4000 cost vs.$3000 6 mo. delay if Quantum is bought & exisiting B/O devise is used. Min. 9 mo. delay.	Operating System S/W driver investment		Continue to sell RL02's & RD50 + RD51 Small System Storage	Use RL02 and and RD51	RL02, RD51
Common Electronics Set	Wait for Nirvana (FY86)	o 33% less board area o $250 to $300 lower cost o Aztec II 12-18 mo. later	Stay with Aztec for 12 - 18 mo.		Use Aztec I and 5 1/4" buyouts till FY86	Go to Nirvana	Aztec I, RD51
RX52	Buyout RXXX	Approx. $100 higher cost 2X to 5X capacity approx. 1 yr. later	Higher prod. cost oNew interchange standard & media oLoose RX50 based SW		Uncompetitive capacity by FY84	Go to RXXX	RX50

Paul Bauer
9/17/82

PROD.	BEST ALTERNATIVE	CONSEQUENCE OF ALTERANATIVE TECHNOLOGY	SYSTEM	CASH FLOW (DELTA $) UNDISCOUNT/DISCOUNT (IN MILLIONS)	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOWDOWN	BEST PRODUCT TODAY
RX50 High Rel.	Don't Do it (Use RX50 as is)	2000 hr MTBF (current RX50) vs. 4000 hr. MTBF, $10 to $20 higher cost			lower system MTBF	Don't Do It	RX50
Aztec II	RD52(80-100MB) + Maya	3-5 minutes backup vs. 20+ minutes for Maya Tape B/U. o10% Higher Cost/MB o375 cu.in.vs. 2132 cu. in. for Aztec o125 w vs. 215W for AzII o80-100 MB vs. 150 MB for AZII. o6 to 12 mo. later	o Possibly poorer performance + poorer B/U performance o Smaller but lower capacity systems.		Use Aztec I and 5 1/4" products.	Don't Do It Go to RD52	Aztec
RDXX	2 RD51's Wait for RD52	oHigher cost ($1200 vs.$900) oLower MTBF (5000 hrs. vs. 10,000 hrs.) oSame cost ($950) but higher capacity (80-100 MB) oRequires controller with Nirvana architecture oH2 FY85 vs. H1FY84	oNo upgrade or LCP-5 oNo space for removable oSell existing drives (RD51). oUncompetitive system for 12-18 mo., then back on the leading edge with RD52 @ 80-100 MB		Give up competitive position in storage + small sys. Give up competitive-ness for 12-18 mos., then regain.	Use RD51's + wait for RD52's	RD51, AZTEC

PROD.	BEST ALTERNATIVE	CONSEQUENCE OF ALTERANATIVE TECHNOLOGY	CONSEQUENCE OF ALTERANATIVE SYSTEM	CASH FLOW (DELTA $) UNDISCOUNT/DISCOUNT (IN MILLIONS)	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOWDOWN	BEST PRODUCT TODAY
MSCP/ LESI	Q-Bus Native Mode	oNo U-bus Controller oNo easy extension of technology	o No U-Bus or VAX o RD/RX. Requires two (2) controllers (Q-Bus, U-Bus) increases sftw.		No LCP-5	Don't Do It	CT Controller
RD/RX	Pkge. Native Controller Depopulate LCP-5	Interconnect Problems o Higher Risk in FCC qualification o Higher Cost	" No Unibus version		No 5 1/4" storage add-ons for Q-Bus and U-Bus Sys.	Don't Do It	PC350
SWORD 5 1/4"	Buyout lower Density (5MB)	o Same cost $400 for half the capacity (5MB) o Higher Risk: start up company. o No Track record. o No prod. avail. today. o Put a removable hard disk vendor in business	Give up compatibility for future high capacity removable		o No RL02 replacement. o Give up 10MB leadership position in removable hard disk business. o Switch to to fixed disk + floppy and/ or tape strategy o Lower system performance	Do Buyout	RD50 or RD51 Plus RX50

PROD.	BEST ALTERNATIVE	CONSEQUENCE OF ALTERANATIVE TECHNOLOGY	CONSEQUENCE OF ALTERANATIVE SYSTEM	CASH FLOW (DELTA $) UNDISCOUNT/DISCOUNT (IN MILLIONS)	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOWDOWN	BEST PRODUCT TODAY
RAINBOW							
Internal option	Use external option	Higher cost by $300 requires external pkg.			No product for announced Winchester option for PC100	Wait for NI File Server	PC350
External option	PC350 plus new communi-cation option	Requires new PC350 option communi-cation to be developed			SAME		

FY83 CX PROJECT ALTERNATIVES/CONSEQUENCES OF BEST ALTERNATIVE

PRODUCT	BEST ALTERNATIVE	Consequences of Best Alternative: TECHNICAL	Consequences of Best Alternative: SYSTEMS	CASH FLOW (DELTA $)	CONSEQUENCES OF "NO PRODUCT"	CONSEQUENCES OF SLOWDOWN	BEST PRODUCT TODAY
RDZX (100 MB, 5¼" wini)	Buyout	"Go out of Engineering business at state-of-art for highend 5¼".	Lose competitive position at highend of 5 ¼" disk business (lowend of 32-bit systems business).		Won't have competitive mid-range disks in 5¼" form factor.	Will delay introduction at least 6 mo no longer be on technology leading edge	None, may be some in FY85
BSA	I. Assume no BI (1) If on VAX, develop new bus, need BSA equivalent for this bus.	Unknown	Possibly use industry STD microbus; Advantage: allows disksubsystem OEM business. Disadvantage: loses unique I/O (plugable).	($25M)	No disk attachment to BI. If no BI then we will have to address the performance issues that surround the UNIBUS controller space.	No disk subsystem for BI Scorpio systems at FRS. Due to early Scorpio board-level announcement, we need to speed up, not slow down, to have controllers when third-party vendors will.	None
	(2) stay w/Unibus (i) LSI-UDA	New development program. Cost reduced & size reduced UDA.	Allows future systems to use Adv. packages. No parity checking. Performance not as good.		Won't have competitive mid-range disk from a performance point.		
	(ii) Stay w/UDA	Possibly have to repackage.	Packaging incompatibility (cooling, size, connector) with future smaller systems. Consequence: constrains packaging on those systems.		Currently have a product gap between UDA50 and HSC50.		
	(3) Use Q-bus-develop QDA	Major development program.	Future VAX stay w/Unibus or add Q-bus.		Qbus not good enough.		
	II. Assume BI (1) limit to low end, but use BI AZTEC.		Cost too high for low end. Less system flexibility. Systems also need Unibus to get other SI devices of use NI - requires BSA development				
DBM	Buyout	May not gain key strategic technology knowledge to compete w/ Japanese 5th generation	Will require SDI interface & MSCP protocol to attach our disks. DEC host interfaces will also have to be accommodated. Costs will be higher. Risk that avail. buyouts will be competitive.	(>$300M)*	If never have a DBM could lose significant competitive position. If delay DBM to later market window & lose sales, including systems.	Project is currently not funded. Need to fund to acheive an FY85 product.	Servio

FY83 CX PROJECT ALTERNATIVES/CONSEQUENCES OF BEST ALTERNATIVE

PRODUCT	BEST ALTERNATIVE	Consequences of Best Alternative: TECHNICAL	Consequences of Best Alternative: SYSTEMS	CASH FLOW (DELTA $)	CONSEQUENCES OF "NO PRODUCT"	CONSEQUENCES OF SLOWDOWN	BEST PRODUCT TODAY
RA60	None, already announced	N/A	N/A		N/A	N/A	RA60
RA81	None, already announced				N/A	N/A	RA81
HSC	No Product (CI dies stay with Massbus & Unibus. Possibly find a buyout for CI to SI attachments.	Massbus not as fast Less Competitive Lose arch. momentum (future cache, DMB, file servers, etc.) Lose people.	Poor maintainability in field. Stay w/MB disks (buyouts) and MB tapes (TM78) or use SI drives w/UDA & TS tapes on Unibus. Performance on highend systems suffers if use MB. Lower performance backup. Requires more software (drive) development.	($173M)*	Current CI cluster development depending on HSC50 device. High Availibility goals of VAX COMPLEX SYSTEMS eliminated. No replacement for the high performance controller. Give up market share.	Miss VMS v-3B support of HSC50. This is the clusters release so clusters would ship without high Performance disk subsystems. Jupiter would have no disks at FRS. It is solely dependent on HSC50 for disk storage. Increased HSC50 program cost.	HSC
HSC CACHE	No Product - put Cache in CPU or main memory.	Lower performance (increase access time). Increase performance requirements for Adv. disks.	Not competitive with IBM, etc.	(>$25M)*	Cache should be a money maker It is targeted at a relative price insensitive market & will be required for clusters & the next generation of VAX & LCG processors.	Delayed Competitiveness. IBM & others already announced cache	HSC Cache
RAXX/RAXY	Buyout	"Go out of Engineering business" at state-of-art for High end disk.	Unknown Probably higher cost (1.6 times mark-up).		Lose competitive position with IBM & Japan at highend and mid-range (heart of DEC systems business).	Will delay introduction at least 6 months no longer be on technology leading edge	None Today RSDII/FSDII & Eagle II are coming FY85

*Note: The above cash flows do not account for the impact that will be felt on Digital's high-end processors or the loss of storage device sales. This leveraged amount should be in excess of ($500M).

FY83 CX PROJECT EXPENDABILITY RANKING

PROJECT	BEST ALTERNATIVE	KILL IF USE BEST ALTERNATIVE	PUSH OUT TO HELP FY83 EXPENSES	KILL WITH NO ALTERNATIVE (No Product)
1. RA81	None			
2. RA60	None			
3. HSC	Continue Massbus/ Unibus			
4. UDA52	2 UDA's			
5. RAXX/ XY	Buyout			
6. BSA	Dependent on system strategy.		(3)	
7. HSC Cache	Add to CPU	(3)		(2)
8. RDZX	Buyout	(2)	(2)	(3)
9. DBM	Buyout	(1)	(1)	(1)

ESD ALTERNATIVES CHART

PRIORITIZED PRODUCTS	BEST ALTERNATIVES	CONSEQUENCE OF ALTERNATIVE TECHNOLOGY	SYSTEMS	* CASH FLOW (DELTA $) UNDISC./DISC. (IN MILLIONS)	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOWDOWN	BEST PRODUCT TODAY
11/780	Add more 16K backplanes	16K RAM is less dense, less reliable, & not cost effective	System much larger physically, lower MTBF, 16MB instead of 32MB	$318m / $132m	Uncompetitive sys. packaging, cost, reliability, & performance limiting 11/780 market and sales	Customers would delay CPU orders to get 64K memory: reduce sales in Q3 FY'83	MS780-C/D
MS11-P	Continue use of MS11-M 256KB/ECC module	16K RAM is less dense & is less reliable on a per bit basis	11/44 will have a limited addressing, 1MB vs 4MB, & it will be less reliable/cost effective	$71m / $38m	Decreased 11/44 systems revenue	FY'83 memory revenue loss of $1.5 million, 11/24-44 systems revenue decrease	MS11-MB 256KB ECC Memory
Venus	MF-20 array with redesigned cont. for Venus	MF20 uses 16K RAM which has lower density & MTBF & higher cost	Redesign system to interface with MF-20	$1263m / $315m	Unacceptably small memory capacity & MTBF. Cost too high; increase in development cost	Venus system slip in FCS, loss of sales $	None
Scorpio	Current 64K RAM std. array & control module	64K RAM is less dense, less reliable & more costly than 256K RAM	System could not be Eurocard F.F, would not interface directly with BI	$658m / $81m	Limited market space without Eurocard F.F. No BI interface capability	Scorpio systems FCS/ FRS slip loss of sales dollar & competitive edge	None
Jupiter	MF-20 array with redesigned cont. for 2080	MF-20 uses 16K RAM which has lower density & MTBF & higher cost	Redesign system to interface w/MF20 array	$250m / $85m	Unacceptably small memory capacity & MTBF. Cost too high; increase in development cost	System FCS slip, loss of sales; older products will not be able to fill gap	None

*Cash Flow (NOR-TC-TAXES) discounted back to FY'83

ESD ALTERNAT[illegible] CHART

PRIORITIZED PRODUCTS	BEST ALTERNATIVES	CONSEQUENCE OF ALTERNATIVE TECHNOLOGY	SYSTEMS	* CASH FLOW (DELTA $) UNDISC./DISC. (IN MILLIONS)	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOWDOWN	BEST PRODUCT TODAY
MSV11-J	Continue use of MSV11-P	Performance/reliability hit due to lack of PMI interface & ECC from the MSV11-P	Lower performance & reliability. No upgrades to 256K RAMS	$265M/$55M	Orion CPU would not meet its performance goals that are needed to make it a marketable product	1st shipments of Orion CPU's would be uncompetitive from a performance & reliability standpoint	MSV11-PL 512KB MOS Parity Memory
MXV11-B	. MSV11-A (32KB RAM/8K ROM) . BDV11 (diagnostic module)	16K RAM 4K x 8 ROM are less dense and less reliable	No 22 bit addressing, minimum two(2) more backplane slots needed, less memory, less flexibility of of serial I/O configurations	$3.7m / $1.3m	No boot capabilities for the new KDJ11-A CPU module, increased cost & decreased reliability of sys. needing multifunctional board support	Forced usage of less competitive & more costly $90/unit existing products	MX11-A, BDV11
MRV11-D	MRV11-C (Maximum 64KB capacity)	Limited to use of 24 pin dip packages which limits memory capacity	No static RAM, decreased memory capacity, increased difficulty in configuring systems as a result of 129 wire wrap pins on the MRV11-C module	$1.5m / $.5m	Increased cost, decreased reliability & memory capacities for LSI-11 board sets. Increased user configuration difficulties as a result of excessive wire wraps on existing modules	Forced usage of less competitive & more costly $60-140/unit depending on capacity existing products	MRV11-C
Nautilus	MS780-E/F (64K RAM) memory array & controller, upgrade to 256K RAM	Would not require TAT20 gate array development just for the memory	MS780-E/F would not directly interface the NMI, more dedicated hardware slots for memory, lower memory bandwidth. Repartition system logic	Product under redefinition	Uncompetitive system packaging, increased cost, decreased performance & reliability, lower Nautilus sales	Nautilus system FCS/FRS slip, loss of Rev. $	None

*Cash Flow (NOR-TC-TAXES) discounted back to FY'83

STORAGE SYSTEMS ADVANCED DEVELOPMENT

PROJECT (SUMMARY)	BEST ALTERNATIVE	CONSEQUENCES OF ALTERNATIVES	CONSEQUENCES OF CANCELLING	CONSEQUENCE OF SLOW DOWN
30Mbits per sq. inch	Buy out Disks in FY'85, '86	Back to non-competitive disks in FY'85, '86	Same	FY'85, '86 Disks get delayed
60Mbits per sq inch	Buy out Disks in FY'87, '88	Back to non-competitive disks in FY'87, '88	Same	FY'87, '88 Disks get delayed
Vertical Recording Floppy	Buy out high density floppy	DEC is probably out of the floppy business	Same	Same - if we aren't in early, we shouldn't do
Low Cost Disk/Floppy Electronics, DSA level	Industry Standard Electronics	DEC has no product edge, i.e. like all competition	Same	Same - if we slow down significantly, we shouldn't do the program
Low Cost Disk Mechanics	Use standard technology mechanics	DEC has no product edge, i.e. like all competition	Same	We get the edge later, if at all
Next Generation Storage Interconnect	Use industry standard interconnects	Opens door to PCM competitors; can't tailor for best DEC system	Same	Delays products which need interconnects (some in FY'85,'86 some in FY'87, '88)
Data Base Systems	Buy out DBS for FY'85 and beyond	Probably less competitve products	Same	Later to catch up with competition
Video/Audio Disk	Stay out of business or get in late	Miss a major business opportunity	Same	Get into market late - believe Japan, Inc., will own it
LSI Support for ETC	Buy out all custom LSI	No DEC uniqueness or product advantage	Same	Either higher cost electronics longer or no product edge longer

CMR/ddo
09/14/82

STORAGE

PRODUCT SUPPORT

	FY82	FY83	FY84
HEAD AND MEDIA	521	498	1010
MED/LARGE/ATTACH	2153	2523	3292
TAPES	971	900	1450
SMALL SYSTEMS	487	1000	2300
LEC. STOR. DEV	285	202	232
ADVANCED DEVELOPMENT	5722	7694	10150
ARCHITECTURE	0	525	700
OTHER	8132	9449	15291

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT

SSD PRODUCT ALTERNATIVES CHARTS

. SMALL DISK ENGINEERING DELIVERABLES/ALTERNATIVES

PRIORITIZED PRODUCTS	BEST ALTERNATIVE	CONSEQUENCE OF ALTERNATIVES: TECHNOLOGY	CONSEQUENCE OF ALTERNATIVES: SYSTEM	CONSEQUENCE OF NO PRODUCT
RX50,RD50 RD51,Aztec	No alternatives considered. Products either announced or so close to completion that alternative consideration is not practical.			
Common Electronic SET	Wait For Nirvana (FY86)	o Smaller Size o Lower Cost o Higher Reliability	o Lose Small Disk Storage Leadership	o Give Up Aztec till FY86. o Give Up higher capacity 5 1/4" till FY86
RX52	Buyout	Higher Cost	Higher entry cost. Volume availabilty Uncompetitive entry system storage by FY84.	Uncompetitive capacity by FY84.
	RXXX	Higher capacity	New interchange standard & media Loose RX50 based SW.	
RX50H	Don't Do It	Lower uncompetive MTBF. Higher cost	Buyout higher MTBF drive at higher cost. Use RX50 as is and therefore have lower MTBF.	Uncompetitive low MTBF.
AZTEC II including	RD52+ MAYA	Poorer back up performance New storage architecture? Higher cost per megabyte. Smaller + less power Lower disk capacity.	Poorer system performance. Smaller + lower capacity.	Abandon midrange system competitiveness.

R	2 RD51's	Higher cost Lower MTBF	Not upgrade for or LCP-5. No space for removable storage. devices.	Give up competitive position in storage and small systems.
	Wait for RD52	Same cost Higher capacity Later No Controller	Sell existing stuff. Uncompetitive system for 6-12 months, then back on the leading edge.	Give up competitiveness for 6-12 mo., then regain
RD/RX Controller	Native Mode	No common storage.	Requires two (2) controllers (Q-Bus, U-Bus)	No LCP-5
RD/RX	Package Native Controller Depopulate LCP-5	Interconnect Problems FCC Quality High Risk Higer Cost	" No Unibus version	No 5 1/4" storage add-ons for for Q-Bus & U-Bus Sys.
SWORD 5 1/4" 1/2 Height 10MB	Buyout lower Density (5MB)	Less capacity Higher cost Higer Risk	Give upward compatibilty for future high capacity removable Put a removable hard disk vendor in business.	No RL02 replacement. Give up leadership position in removable hard disk business. Switch to fixed disk + floppy and/or tape strategy. Lower sys. ?

RAINBOW s er	Use File Server	higher cost Requires only one controller to be		File required a higher price No extensiblity.
add on Server File	PC2350	Requires new PC350 option		No product support announced winchester option.

FY83 CX PROJECT ALTER. .IVES/CONSEQUENCES OF BEST ALTERNATIVE

RODUCT	BEST ALTERNATIVE	Consequences of Best Alternative TECHNICAL	SYSTEMS	CONSEQUENCES OF "NO PRODUCT"
RA60	None, already announced			
RA81	None, already announced			
HSC	No Product(CI dies stay with Massbus & Unibus. Possibly find a buyout for CI to SI attachments.	Massbus not as fast Less Competitive Lose arch. momentum (future cache, DMB, file servers, etc.) Lose people.	Poor maintainability in field. Stay w/MB disks (buyouts) and MB tapes (TM78) or use SI drives w/UDA & TS tapes on Unibus. Performance on high end systems suffers if use MB. Lower performance backup. Requires more software (drive) development.	same
HSC CACHE	No product - put Cache in CPU or main memory.	Lower performance (increase access time). Increase performance requirements for Adv. disks.	Not competitive with IBM, etc.	same
RAXX	Buyout	"Go out of Engineering business" at state-of-art for High end disk.	Unknown Probably higher cost (1.6 times mark-up).	Lose competitive position with IBM and Japan at high end and mid-range (heart of DEC systems business).

FY83 CX PROJECT ALTERNATIVES/CONSEQUENCES OF BEST ALTERNATIVE

Consequences of [illegible] t Alternative

PRODUCT	BEST ALTERNATIVE	TECHNICAL	SYSTEMS	CONSEQUENCES OF "NO PRODUCT"
RXY	(1) Buyout	Unknown what's available (RSD-II is one possible candidate). Takes apprx. 5 RSDII:1 RXX Performance not as high as RXY.	Back-up costs higher (5:1 F/R). Back-up time longer. Need SI.	
	(2) Tape (Yankee)	High risk Yankee won't make it. Back-up slower. Market acceptance	Lose "disk only capability". Poor systems swapping capability. Less disk expansion capability and flexibility. Lower systems availability.	
	(3) RA60	Capacity lower (5:1 F/R). Performance not as high as RXY. Cost higher. No table-top;acoustics,power etc. not as good.	Takes 5 RA60 packs vs. 3 RXY packs to back-up RXX. Not as fast back-up. More floor space, power, storage cost, etc.	
	(4) RA6M+ (RA62)	Cost goes up; size, power, weight acoustics, modularity, etc., not as good. Transfer rate same; seek time longer. Performance not as good.	Floor space and storage space larger. Performance not as good.	No removable product for RXX.
	(5) TA81	Not as cost competitive as Yankee. Much larger.	Slower back-up. Same as Yankee, otherwise, only worse.	
	(6) AZTEC II	Capacity much lower (approx 10:1 F/R ratio). Performance (drive basis) is compatible. Only LESI I/O; cost higher for SI. High risk can do AZTEC II.	Back-up cost higher (10:1 F/R). Back-up time much longer. Need SI I/O. F/R forces spindle stop or don't use fixed.	

Consequences of Best Alternative

PRODUCT	BEST ALTERNATIVE	TECHNICAL	SYSTEMS	CONSEQUENCES OF "NO PRODUCT"
BSA	I. Assume no BI (1) If on VAX, develop new bus, need BSA equivalent for this bus.	Unknown	Possibly use industry STD microbus; Advantage: allows disk subsystem OEM business. Disadvantage: loses unique I/O (pluqable).	No disk attachment to BI.
	(2) stay w/Unibus			
	(i) LSI-UDA	New development program. Cost reduced & size reduced UDA.	Allows future systems to use Adv. packages. No parity checking. Performance not as good.	
	(ii) Stay w/UDA	Possibly have to repackage.	Packaging incompatibility (cooling, size, connector) with future smaller systems. Consequence: constrains packaging on those systems.	
	(3) Use Q-bus - develop QDA	Major development program.	Future VAX stay w/Unibus or add Q-bus.	
	II. Assume BI			
	(1) limit to low end, but use BI AZTEC.		Cost too high for low end. Less system flexibility. Systems also need Unibus to get other SI devices or use NI - requires BSA development.	
UDA 52	2 UDA's	Performance possibly better.	Cost higher; more space and power.	Live with UDA50.
	1 UDA	Performance lower (current). Puts more pressure on pure drive performance.	11/750's not as fast (thruput).	

FY83 CX PROJECT ALTERNATIVES/CONSEQUENCES OF BEST ALTERNATIVE

Consequences of Best Alternative

PRODUCT	BEST ALTERNATIVE	TECHNICAL	SYSTEMS	CONSEQUENCES OF "NO PRODUCT"
DBM	Buyout	May not gain key strategic technology knowledge to compete w/Japanese 5th generation.	Will require SDI interface and MSCP protocol to attach our disks. DEC host interfaces will also have to be accommodated. Costs will be higher. Risk that available buyouts will be competitive.	If never have a DBM, could lose significant competitive position. If delay DBM to later market entry, could miss market window and lose sales, including disks and possibly systems.

FY83 CX PROJECT EXPENDAB[illegible]Y RANKING

PROJECT	BEST ALTERNATIVE	KILL IF USE BEST ALTERNATIVE	PUSH OUT TO HELP FY83 EXPENSES	KILL WITH NO ALTERNATIVE (No Product)
1. RA81	None			
2. RA60	None			
3. HSC	Continue Massbus/ Unibus			
4. UCA52	2 UDA's			
5. RXX	Buyout			
6. BSA	Dependent on system strategy.		(3)	
7. HSC Cache	Add to CPU	(3)		(2)
8. RXY	Buyout	(2)	(2)	(3)
9. DBM	Buyout	(1)	(1)	(1)

PRIORITIZED PRODUCTS	BEST ALTERNATIVE	CONSEQUENCE OF TECHNOLOGY	ALTERNATIVE SYSTEMS	CONSEQUENCE OF NO PRODUCT
1. 11/780 64K Upgrade	Add more 16K backplanes	16K RAM is less dense, less reliable, and not cost effective	System much larger physically, lower MTBF, 16MB instead of 32MB	Uncompetitive system packaging, cost, reliability, and performance limiting 11/780 market and sales
2. MS11-P 1MB U-Bus/ECC uses 64K RAM	Continue use of MS11-M 256KB/ECC module	16K RAM is less dense and is less reliable on a per bit basis	11/44 will have a limited addressing, 1MB vs 4MB, & and it will be less reliable/cost effective	Decreased 11/44 systems revenue
3. Venus 4MB array using 256K RAMS	MF-20 array with redesigned cont. for Venus	MF20 uses 16K RAM which has lower density and MTBF and higher cost	Redesign system to interface with MF-20 array	Unacceptably small memory capacity and MTBF. Cost too high; increase in development cost
4. Scorpio 512KB/2MB ECC Eurocard F.F. using 64K/256K RAMS	Current 64K RAM standard array and control module	64K RAM is less dense, less less reliable, and more costly than 256K RAM	System could not be eurocard F.F, would not interface directly with BI	Limited market space without Eurocard form factor. No BI interface capability
5. Jupiter 1MB/4MB array using 64K/256K RAMS	MF-20 array with redesigned cont. for 2080	MF20 uses 16K RAM which has lower density and MTBF and higher cost	Redesign system to interface with MF-20 array	Unacceptably small memory capacity and MTBF. Cost too high; increase in development cost
6. MSV11-J 512KB/2MB ECC uses 64K/256K RAM	Continue use of MSV11-P	Performance/reliability hit due to lack of PMI interface and ECC from the MSV11-P	Lower performance and reliability No upgrades to 256K RAMS	Orion CPU would not meet its performance goals that are needed to make it a marketable product
7. MXV11-B multifunctional board for LSI-11 contains 128KB DRAM/16K ROM, 2 serial I/O ports line time clock, LED register	. MXV11-A (32KB RAM/8K ROM) . BDV11 (diagnostic module)	16K RAM 4K X 8 ROM are less dense and less reliable	No 22 bit addressing, minimum two (2) more backplane slots needed, less memory, less flexibility of serial I/O configurations	No boot capabilities for the new KDJ11-A CPU module, increased cost and decreased reliability of systems needing multifunctional board support
8. MRV11-D LSI-11 universal socketed PROM module supporting the Q22 bus, boot strap user configurable, contains static RAM/ROM/PROM/EPROM up to a capacity of 512KB	MRV11-C (Maximum 64KB capacity)	Limited to use of 24 pin dip packages which limits memory capacity	No static RAM, decreased memory capacity, increased difficulty in confurging systems as a result of 129 wire wrap pins on the MRV11-C module	Increased cost, decreased reliability and memory capacities for LSI-11 board sets. Increased user configuration difficulties as a result of excessive wire wraps on existing modules
9. Nautilus extended HEX card with capacities from 4MB to 8MB per module, uses TAT20 gate arrays	MS780-E/F(64K RAM) memory array and controller, upgrade to 256K RAM	Would not require TAT20 gate array development just for the memory	MS780-E/F would not directly interface the NMI, More dedicated hardware slots for memory, lower memory bandwidth. Repartition system logic	Uncompetitive system packaging, increased cost, decreased performance and reliability, lower Nautilus sales

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INTEROFFICE MEMORANDUM

T Bob Flynn

DATE: 23 August 1982
FROM: Dan Haley/Joe Austin
DEPT: Product Management
EXT: 3-2525/3-8897
LOC: ML021-2/E64

SUBJECT: ADDITONAL DATA FOR PRODUCT ALTERNATIVE CHART

PRIORITIZED PRODUCTS	CONSEQUENCE OF SLOWDOWN	BEST PRODUCT TODAY
. 11/780 64K Upgrade	Customers would delay CPU orders to get 64K Memory: reduce sales in Q3 FY83.	MS780-C/D
. MS11-PB 1MB Unibus MOS Memory	FY83 memory revenue loss of $1.5 million, 11/24-44 systems revenue decrease.	MS11-MB 256KB ECC Memory
. Venus 4MB Array	Venus system slip in FCS, loss of Sales $.	None
. Scorpio	Scorpio systems FCS/ FRS slip loss of sales $ and competitive edge.	None
. Jupiter 1MB Array	Jupiter system FCS slip, loss of system sales to LCG; older products will have ramped down significantly and will not be able to fill gap.	None
. MSV11-JA/JB	First shipments of Orion CPU's would be uncompetitve from a performance and reliability standpoint.	MSV11-PL 512KB MOS Parity Memory

• MXV11-B	Forced usage of less competive and more costly existing products. → $90/UNIT	MXV11-A BDV11
MRV11-D	Forced usage of less competitive and more costly existing products. → $60-140/UNIT DEPENDING ON CAPACITY	MRV11-C
• Nautilus	Nautilus System FCS/FRS slip, loss of Rev $.	None

TAPE ENGINEERING DELIVERABLES

PRIORITIZED	BEST ALTERNATIVE	CONSEQUENCE OF ALTERNATIVE		CASH FLOW (DELTA $)		CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF A SLOW DOWN	BEST DEC PRODUCT TODAY
		TECHNOLOGY	SYSTEMS	NET PRESENT VALUE	CASH FLOW			
TA81/TA81	TU78/TA78	Higher Price and Performance Lower Reliability Less Attractive Packaging - Higher Cost of Ownership	At MLP $55K, limited mid-range and low end sysems appeal			No Back-up for 200MB Fixed Disks under 52K MLP until YANKEE (FY86)	Until FRS DEC will be non competitive on 730/750/780 system packages	TU78/TA78
MAYA	¼" 3M Cartridge Streaming Tape i.e., DEI, Archive	Lower Reliability Higher Cost of Ownership Dubious Extensibility Less Useful Form Factor No 'Familiness'	Unacceptable Size for CT? Earlier Time to Market (Q1 FY84) Higher Entry Cost - Not Useful as Console I/O device			No Low-Cost Companion for 5MB-200MB Winchester Disks. CT150, LCP5, LCP8, Orion and Scorpio have Major Exposure.	No suitable back-up for > 5MB disks in mini-floppy package	RX50/None
	TU80	Less Favorable Cost, Size, Media Capacity	Too costly, large for CT and LCP					
TA78	TU78	Not Used with HSC-50 Higher Cost of MassBus	Requires MassBus System Utilities require CPU Usage			No High End Tape for SI subsystems	No DSA tape support for clustered configurations	TU78
	TA81	No start/stop GCR Lower Performance	No 16-bit support					
TU80	TS05	Projected Lower Reliability - No 'Familiness' with TU81. No Common Packaging Higher Cost of Ownership	Little Impact Directly			TS11 is too expensive, and too large for low end systems - $2000 extra cost - Poor market acceptance could result in lost device and system sales	TU80 in DMT; funding already spent or committed. FRS < 6 months. Potential impact on 730/750/44 system sales.	TS11
YANKEE	TA81	Higher Cost - Lower Device Capacity - Lower Reliability - Larger (Cabinet) Package	No 16-bit support Too expensive for ORION			Back-up device for large, Fixed Disks More Expensive than the Disks. TA78 is 52K TA81 is 23K	None-No funding committed for FY83	None
	Optical Disk	Not Cost-Effective for back-up, no interchange Uncertain media costs High risk in Technology	Not attractive for Low End Systems					
OPTICAL DISK	YANKEE	Less Risk, but... Less Effective Random Access Less On-Line Capacity Optical Technology could leap-frog tape	Mostly New Markets - May not be required until late 80's			We may be unable to meet a market need for large, on-line archives or hierarchical files. LFT - 8/82	None - no funding committed for FY83	None

JUN 9 1982

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+ D I G I T A L +
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INTEROFFICE MEMORANDUM

TO: Joe Reilly/[redacted]

CC: SSD Staff

DATE: 09 JUNE 82
FROM: B. Flynn/E. Sawyer (for Grant Saviers) EDS
DEPT: Storage Systems
EXT: 223-1850/223-5046
LOC/MAIL STOP: ML3-6/E94

SUBJECT: DATA FOR 6/9 INVESTMENT ANALYSIS

Attached is the data requested. Questions should be addressed to either of us.

There are several important trends to note in this rollup which resulted from this year's productivity focus.

1) FRS dates have accelerated in several cases (RAXY, Maya, RD52) even with a lower FY83 total budget.

2) Both Product Development and Advanced Development are a bigger portion of the total budget in FY83.

CHART I

PRODUCT DEVELOPMENT

Product Name & Summary Description & Summary Prioritized	Current Phase	FRS	IRR %	NOR Lifetime $B	ENG EXP Lifetime $M	NPSU $M	SERV. Summary $M	'82	'83	'84
1) ANNOUNCED PRODUCTS										
RA81	3	Q1'83	47	1.23	6.49	1.97	--	2966	1254	--
RD50	2	Q2'83	67	.76	3.51	.72	--	757	175	--
RD51	0	Q3'83		.69	.48	--	--	152	330	--
RA60	3	Q3'83	43	1.51	12.99	3.63	--	3382	3536	1069
RX50	2	Q2'83	29	.42	5.90	2.75	--	3000	850	--
UDA50/RA80	4	Q3'82	39	.77	9.62	2.87	--	2822	--	--
2) PRODUCTS WITH FY83/84 FRS										
HSC-50	2	Q4'83	39	.80	25.12	1.62	--	2940	4519	3326
UDA-52	0	Q2'83		SEE UDA/50				208	447	150
AZTEC	2	Q4'83	39	2.01	16.67	--	--	4523	5356	2500
TA78	1	Q4'83	45	.54	4.56	.97	--	727	861	350
TU81	1	Q1'84	--	1.58	NO PLAN		--	740	661	200
RD52	0	FY84	--	.79	--	--	--	--	620	400
HSC-50 CACHE	0	Q4'84		SEE HSC-50				100	500	950
TU80	0	Q3'83	39	.25	1.66	.54	--	310	548	550
TA81	1	Q1'84		SEE TA78				--	--	--

CHART I

PRODUCT DEVELOPMENT

Product Name & Summary Description & Summary Prioritized	Current Phase	FRS	IRR %	NOR Lifetime $B	ENG EXP Lifetime $M	NPSU $M	SERV. Summary $M	'82	'83	'84
3) FRS AFTER FY84										
* RAXX	0	Q4'85	--	1.98	--	--	--	238	3922	10322
MAYA	0	Q1'85	--	.97	--	--	--	1076	2503	3569
BSA	0	FY86	--	.31	--	--	--	--	800	3058
** AZTEC II	0	Q4'85	--	3.62	--	--	--	--	1476	3890
RX50 Cost Red.	0	FY85	--	--	--	--	--	--	200	200
RAXY	0	Q3'86	--	2.04	SEE RAXX		--	--	--	--
RX52	0	Q2'85	--	--	--	--	--	--	755	200
RD5X	0	Q2'85	--	--	--	--	--	--	50	3029
4) ELECTRONIC STORAGE			--	--	--	--	--	1290	1044	1201

* INCLUDES HD TESTER DEV FOR RXX, RXY AND AZTEC II

** HD TESTER DEV FOR AZTEC II INCLUDED IN RAXX PLAN

CHART II

PRODUCT SUPPORT

PROJECT NAME AND SUMMARY DESCRIPTION PRIORITIZED	ENGINEERING BUDGET $M '82	'83	'84
HEAD AND MEDIA	521	498	1010
MED/LARGE/ATTACH	2153	2523	3292
TAPES	971	900	1450
SMALL SYSTEMS	487	1000	2300
ELEC. STOR. DEV	285	202	232
SUBTOTAL	4417	5123	8284

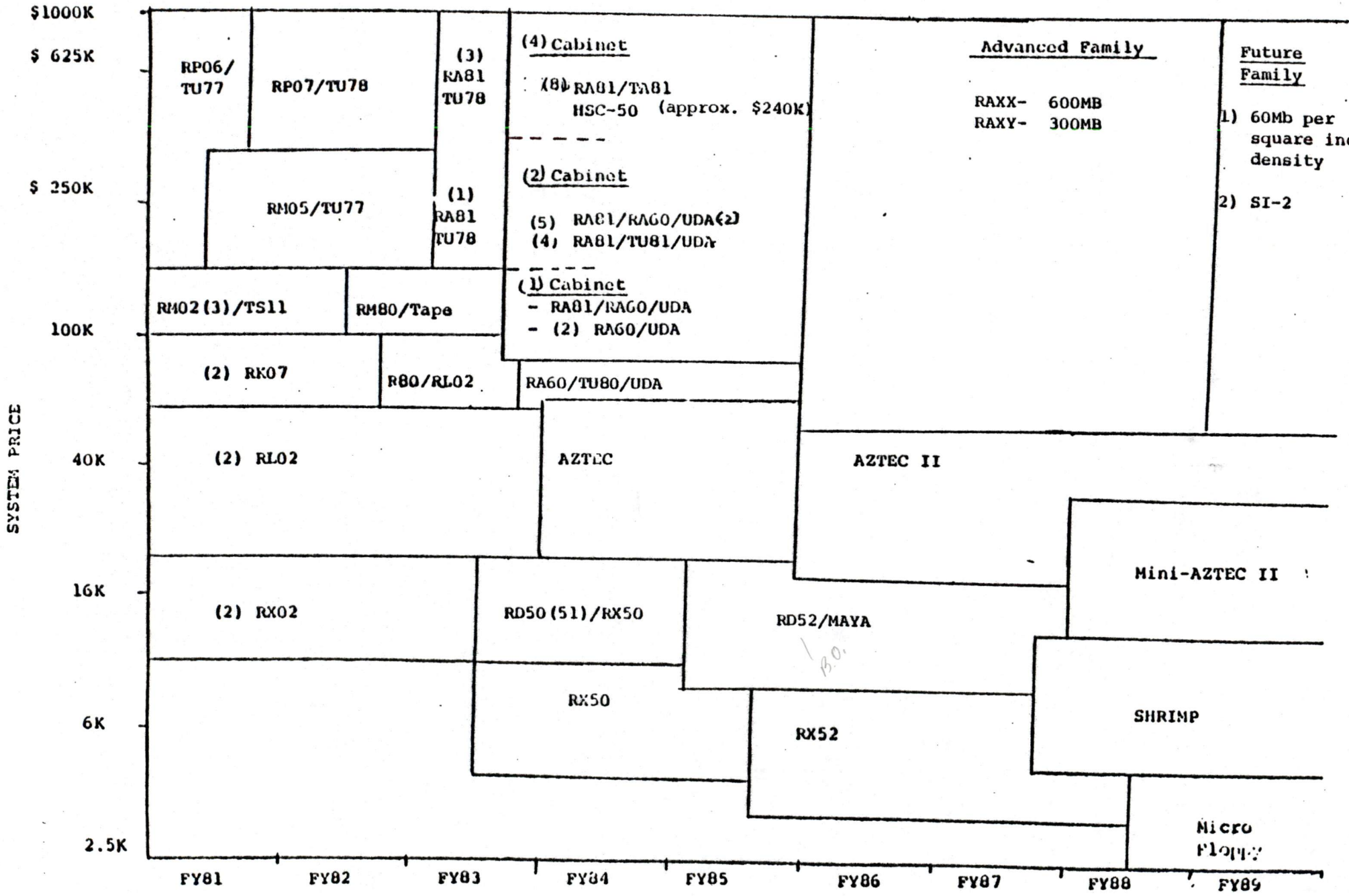
ADVANCED DEVELOPMENT	'82	'83	'84
	5722	7694	10150
ARCHITECTURE	--	525	700

OTHER ENG EXPENSE	'82	'83	'84
JAPAN, PERSONNEL, FINANCE, STO, CENTRAL STAFF, ADMIN	8132	9449	11754
CONTINGENCY	--	--	3539
TOTAL EXPENSE	* 43502	* 53198	* 69391

JR4.52

* PER CENTRAL ENGINEERING BUDGET UPDATE 5/26/82

STORAGE SUBSYSTEM P[illegible] (JUNE 1982)



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* d i g i t a l *
****

TO: DAVID W BROWN

cc: JOE REILLY

DATE: THU 19 AUG 1982 9:56 AM EDT
FROM: GRANT SAVIERS
DEPT: STORAGE SYSTEMS
EXT: 223-9765
LOC/MAIL STOP: ML3-6/E94

MESSAGE ID: 5173047363

SUBJECT: TAPE ISSUES FOR EMC PROCESS

MAYA is a winner -- let's get it quicker.

How much could MAYA be accelerated if TU80 were stopped?

If Maya was maximally accelerated by slowing down TU/TA81,
what would the impact be to TU/TA81.

Are there other areas in tape that would be better sources
of MAYA funds?

19-AUG-82 11:33:17 S 01514 CORE
CORE MESSAGE ID: 5173042333

****
* d i g i t a l *
****

To: GRANT SAVIERS

cc: *JOE REILLY
ED SAWYER

DATE: WED 8 SEP 1982 11:15 AM EDT
FROM: DAVID W BROWN
DEPT: STORAGE SYS. ENG.
EXT: 292-2070
LOC/MAIL STOP: YWO/YWO

MESSAGE ID: 5175060394

SUBJECT: TAPE ISSUES FOR EMC PROCESS

We are short $500K this year for a maximum effort on Maya.

The Engineering effort on TU80 is essentially complete, and most of the FY83 budget funds are committed. Cancelling TU80 would free-up $165K for Maya:

FY83 TU80 Budget	$509K
Committed/Spent	$344K
Unspent/Uncommitted	$165K

The bigger problem with cancelling TU80 is that we have additional exposures of $2M, including TU81 engineering absorption problem with CPI of $500K, committed manufacturing U funds that would have to be written off of $400K, and a potential suit from DILOG that could cost us $1M. We also have accepted $50K from TVG for TU80 that we would have to return.

There also would be serious revenue impacts due to having only the TS11 available for Comet and Nebula systems. TVG would be seriously impacted.

The small TU/TA81 team, since this is a buyout program, does not offer any help to the Maya acceleration problem. The TA78 talent would be useful. Kinzelman and Jackson are currently slated to move over to TA81 as soon as TA78 is shipped in Q4, FY83. Deferring TA78 one year to Q4, FY84 and TA81 one year to Q2, FY85 would give us two man years of help on Maya ($200K).

There are no other Tape funds except product support and product management, both of which are undernourished now.

8-SEP-82 12:41:57 S 02196 CLEM
CLEM MESSAGE ID: 5175081224

SEG

SEP 16 1982

digital

INTEROFFICE MEMORANDUM

TO: EMC

DATE: 16 September 1982
FROM: Jeff Kalb
DEPT: LSI Administration
EXT: 225-4025
LOC: HL2-2/M11

SUBJECT: SEG BUDGET

Please add the attached SEG Budget to the Product Strategy/Budget Issues Book that was distributed to you.

Thanks.

JCK:met
P24

digital

INTEROFFICE MEMORANDUM

TO: EMC

DATE: 16 September 1982
FROM: Jeff Kalb
DEPT: LSI Administration
EXT: 225-4025
LOC: HL2-2/M11

SUBJECT: SEG BUDGET

Attached is the information on the Budget (as revised) for SEG in FY83. The Budget itself is fairly complex because there are specifically 5 major areas of activity (Chip Development, Tools, Processes, Advanced Development & Training, and G&A), with 3 primary funding sources cutting across them (E98, E97, User Funding). Additionally, many of these investments are also linked to Manufacturing spending in the form of Process Development, Test Development, and Product Engineering and Packaging. Funding for this part of the development programs comes from E97, E69 and inventoriable support. Because many of the activities overlap across multiple programs as well as multiple funding, I have attempted to provide a number of ways of looking at the Budget and isolating the relative impacts of programs.

The first page is a summary of the Spending versus Funding issues. The primary point is that the bottoms up spending analysis for the programs involved, including MicroVax which was previously unbudgeted, requires 40.2 million dollars. The commitment which we made in the earlier budget exercises was that we would complete this work for 38 million dollars, which included the 36 million dollars of then allocated funding from all sources, plus an additional 2 million dollars for MicroVax. To the extent that User Funding might not materialize, this number may be further modified, but that is something to which we would adapt internally. However, any discussion of the Budget should start from the 40.2 million dollars rather than from the 38 million dollars. All numbers in the Budget package are based on this, with Management Adjustments having been tacked on to the total.

The next set of pages represents a Chart of the Projects which are funded all or in part by OOD dollars. Information is contained which gives a brief description of the Project, the Budget, and alternatives for reducing the Budget in each area. A summary statement of OOD Funding which contains only the Budget numbers follows. In those cases where it is relatively impossible to show User Funding separate from OOD Funding, the total Project Budget is shown with a charge out line to take account of that funding. On the second page of this summary, there is a charge out line of $1548K which represents the Management Adjustment to OOD Budgets.

The next section indicates "Program by Activity" in a matrix format. All major programs are shown with their funding broken down into the 5 major categories mentioned. CAD Tool Development and Process Development have been allocated by Program based on our best estimates of the support and development costs incurred by each of the Programs from each of the tools involved. It should be noted that there is considerable sharing involved in this and the elimination of a specific Program does not necessarily imply the elimination of all the costs associated with the CAD Tools or process attributed to it. No attempt has been made to allocate overhead across any of the Programs, but rather it has been kept as a separate line item and attributed to "Miscellaneous". Behind the overall activity matrix, is a much more detailed backup matrix which shows all the categories and programs within each one of the blocks based on its components of funding. By relating the specific numbers in each block to the User Funding side of the Chart, each and every Project and its funding source or sources can be determined.

The rest of the information within the packet is a further cut at the User Funding, the E97 Funding, and some of the major non-Project expense items such as Administration, Overhead, and University Payments.

RECOMMENDED APPROACH

I would suggest that we go down each of the Programs involved, and discuss the relative merits, clarify the Program and try to deal with specific cuts as appropriate. If we then wish to talk about any of the overhead items, or the other charges, we can do that in sequence.

BUDGET RECOMMENDATIONS

I would recommend that EMC accept the original LSI Proposal to make an arbitrary cut of $2.2 million from the bottoms up spending numbers presented ($40.2 million). This leaves LSI with the task of finding out how to cut approximately 1.5 million dollars from the bottoms up OOD funding, and approximately 700 thousand dollars from the bottoms up User Funding requirements. These would be in addtion to the 800 thousand dollar Management Adjustments that have already been made to E97 Funding on the Manufacturing side of Process Development.

If that is not an acceptable solution, then all cuts should be related directly to the Programs which we want to kill or delay and then the Management Adjustment revisited at that time.

SPECIAL SUBJECT EDIT GATE ARRAYS

At an earlier meeting of EMC on Budgets, a decision was made that there were no funds available to fund the Gate Array Center. At that time, I decided to try and find ways of funding it from within the Engineering Budgets and Manufacturing Budgets at my disposal. Since that time, considerable enthusiasm has arisen over the work which the people in the Gate Array Center have been doing. They are supporting numerous people and helping them to get their designs done. Included in your packets is a recommendation from TMC to allocate 650 thousand dollars for the Gate Array activites which would then include the Gate Array Center completely funding 4 designs out of those monies in addition to doing the device qual for a CMOS Gate Array. I believe that this effort should be funded by EMC as a corporate effort, but should not be related to the SEG Budget.

JCK:met
8.23

FY '83 SPENDING vs FUNDING

BOTTOMS UP SPENDING

SEG:	38.1M
S/C	2.1M
	40.2M.

FUNDING SOURCE

OOD:	20.8M
E97:	6.8M
* USER:	8.4M
	36.0M
MICROVAX:	2.0M
TOTAL:	38.0M

ASSUMES: FPA = 891K
MICROVAX 2.0M
NON SEG COMP. FUND = 929K
VT200 = 1.1M (REQUIRED = $1.6M)

SPENDING/FUNDING DELTA = 2.2M

SILICON SYSTEMS	1.5M
ADV DEV	.1M
CAD	.6M

*REPRESENTS CURRENT ESTIMATED FUNDING (CONSTANTLY NEGOTIABLE)

JK
REVISED 9/15/82

PROJECT	BUDGET K$ (OOD ONLY)	PRIME SOURCE O2D, E97	INVEST TO DATE	DESCRIPTION OF PROJECT	ALTERNATIVE TO PROJECT FROM A BUDGET REDUCTION STANDPOINT
V-11	6484	OOD	6464	Design and release to mfg. a custom MOS Chip Set, Microde, and CPU module.	Don't do V-11/Scorpio Primary alternative would be to adopt an industry standard architecture for medium range systems
J-11 *Excludes J11 module shown below	2004	OOD	8194	The J-11 Project is a joint effort with Harris Semicond-uctor to develop a CMOS/LSI chip set that implements a high performance PDP-11 processor with integral memory management, EIS, FP11, Floating Point and Commercial Instructions Sets	Drop the J-11 product set. Switch CPU architectures or let the 16 bit business atrophy.
J-11FPA	891	User	----	Same as for J-11	Same as for J-11
J11 MODULE	615	OOD	245	Module implementation of of the J-11 Chip set	Same as for J-11

PROJECT	BUDGET K$ (OOD ONLY)	PRIME SOURCE O²D, E97 USER	INVEST TO DATE	DESCRIPTION OF PROJECT	ALTERNATIVE TO PROJECT FROM A BUDGET REDUCTION STANDPOINT
BI	196 (1231= Total)	USER	1438	The Backplane Interconnect Interface Chip (BIIC) development project comprises the design and implementation of a ZMOS LSI circuit containing all functionality necessary to exercise the synchronous backplane bus in future VAX -based systems	Adopt a different bus which has industry Standard LSI to support it and live with what ever functionality that provides. could consider a gate array implementation but would probably save $200K at most and would take 7 chips
ALGORITHM SCALING	391	OOD	283	Project is intended to create methodology and CAD tools to allow a chip designed in one CMOS process to be scaled to work in a smaller dimensioned CMOS process. This will improve yield & provide a migration path for high volume chips as the fabrication process evolves by reusing existing designs	Might yet find a university program, but would still require installation & or CPU conversion plus inputting our own models Could defer monies from this project and pay higher engineering costs in future years
VERIFICA -TION	224	OOD	283	Project will develop metholdology & tools to assure correctness of logic & circuit designs. This will assure that chip implementations correspond exactly to their designed & simulated models, so as to guarantee that chips will work (assuming no process problems) first time	Since this represents the purchase of tools and adoption to our computers, hierarchical partitioning, etc., it could be dropped as a line item but would show up in increased costs in other area, plus elongated design cycles (cost)
SILICON COMPILER	174	OOD	157	Goal is to cut design time by creating a CAD system which will allow one to describe a chip or sub-circuits in a high level language. Then, CAD programs will compile the high-level (behavioral) description of the chip into a working physical implementation.	Could just defer, as it represents A.D. Represents pulling in university work & trying to make it work for more than one project. No direct cost for deferring-opportunity

PROJECT	BUDGET K$ (OOD ONLY)	PRIME SOURCE O D, E97 USER	INVEST TO DATE	DESCRIPTION OF PROJECT	ALTERNATIVE TO PROJECT FROM A BUDGET REDUCTION STANDPOINT
SILICON DIRECTED ARCHITECT (DATAFLOW)	263	OOD	197	Build DDF prototype attachment to VAX in order to gain experience with hardware implementation of this unconventional architecture. Provide software research vehicle in Languages, Operating Sys., Applications. Distribute copues of the prototype to elicit feedback on potential applications market & architecture revisions	Don't do it, or combine the project with some other Corporate effort for reduced cost and duplication (?)
DVANCED ROCESS TECHNOLOGY	609	E97	1703	Develop, implement & sustain the required processes to support the development of ZMOS & CMOS device fabrication. The specific areas of process development in FY83 include Photolithography, Plasma etching, Metallization, & Dielectrics	Stop all the projects relying on ZMOS, or reduce budget and to manage risk
MICROVAX	2000	OOD	----	MicroVax is a single chip, 32 bit NMOS microprocessor that implements a subset of the full VAX architecture Its purpose is to migrate the VAX architecture into low cost application spaces, such as single board computers, single-user work stations, and low end sys.	Adopt an industry Standard microprocessor
SEMINARS	223	OOD	164	Technical Seminar Series is an HL site based LDI program which offers educational information to the eng. & mfg community. Lecture topics are specific to tech. areas such as CAD, Process Mfg & Architecture, Testing Digital products in LSI & now includes the CRG Seminar Series	Reduces the scope, or eliminate it.

PROJECT	BUDGET K$ (OOD ONLY)	PRIME SOURCE O D, E97 USER	INVEST TO DATE	DESCRIPTION OF PROJECT	ALTERNATIVE TO PROJECT FROM A BUDGET REDUCTION STANDPOINT
TRAINING	106	OOD	553	This Project is respoonsible for the development of semi conductor design engineering course to "grow" & keep current engineering resources inside LSI & to provide training for Eng. outside LSI in design in silicon	Eliminate or reduce - this is in the investment category
RESEARCH RESIDENTS	101	OOD	70	The Research & Residents project is responsible for managing Digital's links to university VLSI research centers, including placement & support of residents, & collation & distribution of research results.	Reduce the number of participants (may not be possible now)
QBUS MP	421 (921= TOTAL)	USER	88	The QMIC is a custom LSI Chip that includes translation of protocols between the II and QBUS space. It enables DEC to build a single board J-11 based computer with QBUS Multiprocessing functionality	Should be based on customer (TVG) decision
VT200	508 (1608= TOTAL)	USER	1645	The VT200 is a family of Terminal Products that provide high quality text/ graphics performance. The VT200 LSI project provides the 2 custom chip designs (DC322 & DC323) required by the video subsystem. The video subsystem provides a faster scanned bitmap display	Kill VT200 project or adopt industry chips - should be decided based on terminal product needs

PROJECT	BUDGET K$ (OOD ONLY)	PRIME SOURCE OOD, E97 USER	INVEST TO DATE	DESCRIPTION OF PROJECT	ALTERNATIVE TO PROJECT FROM A BUDGET REDUCTION STANDPOINT
BFC 2	520.2	OOD		(Brute Force Chip) We will designing the Floating Point for MicroVax as Brute Force Chip. The chip will be done in ZMOS & the plan is to make extensive use of the J-11 FPA architecture & data base. We intend to ship product at about the same as MicroVax. Team now forming; project plan coming shortly	Do MicroVax without an FPA or Delay FPA
MODULE XJ-11 SBC	275.0 (425= TOTAL)	USER		Bidding to design the SBC module for the J-11 (TVG Funding)	Decision should be based on user decision about necessity of product
METHODS	346.8	OOD		Mfg. introduction & testing that will reduce time, people & dollars required for chip design. By the end of FY84, chip projects that will start are 30K to 100K devices; take ,12 mos. from concept to LR; done with 5 or less people. New approach for ZMOS methods, chip design & will drive polycell methods to be used in SEG & exported to other DEC design groups	Reduce funding or eliminate. This is an AD project aimed at quick turn-around designs
BFC 3 & BFC 4	64.8	OOD		"Chip a Month" devices which are presently being proposed and bid (Presently looking at DMA for MicroVax and a chip for the DMF32 Cost Reduction)	Don't start these devices

PROJECT	BUDGET K$ (OOD ONLY)	PRIME SOURCE O^{2}D, E97 USER	INVEST TO DATE	DESCRIPTION OF PROJECT	ALTERNATIVE TO PROJECT FROM A BUDGET REDUCTION STANDPOINT
PRODUCT MGMT	389	OOD	780	Provide Product Management for SEG Products including T-11, J-11, V-11, MicroVax, QMIC, and other new chips. Provide competitive and market analysis	Eliminate (?) - don't do (?)
CHAS	474	OOD	552	Computer Aided Design Sys. being developed for the V11 project. It is an integrated system for handcrafted MOS design, gate array design & semi custom chip design. CHAS runs on a VAX/VMS system	Reduce funding. This would impact project schedules. No alternative program is feasible without major impact to V-11
AUTO LAYOUT	557	OOD	559	A project to provide automated & interactive placement & routing tools in the frame work of an integrated semiconductor design system (CHAS) (Gate Arrays & Polycells)	Reduce funding. This ties in to the methods work for quick turn around & represents A.D., but is key to getting higher levels of VLSIzation in our systems
CAD DOCUMENTATION	458	OOD	101	SEG/CAD writing group writes & maintains documentation that describes the CHAS chip design system. Includes user guides, reference manuals, etc. & railroad charts that cover the various logic, circuit & layout design, design verification, and design support tools	Reduce budget and take what ever impact on productivity or support costs fall out

PROJECT	BUDGET K$ (OOD ONLY)	PRIME SOURCE OOD, E97 USER	INVEST TO DATE	DESCRIPTION OF PROJECT	ALTERNATIVE TO PROJECT FROM A BUDGET REDUCTION STANDPOINT
DECSIM	1221	OOD	2274	A hierarchical logic/fault simulator with ATG capabilities. (SAGE 3 and VOTE simulator merged). It is a continuation of the development efforts resulting in several releases to the Scorpio & BI Projects.	Reduce funding and manage the risks as to projects
LAYOUT VERIFICATION (PHYSICAL VER.)	717	OOD		Two major goals are to install & improve upon VAX based tools to verify & generate masks from IC lay outs within the CHAS design sys. & begin an effort to add synthesis capability within the CHAS design sys. Deliver PLA & ROM programming tools as a first step	Reduce funding and manage the risks to projects
GRAPHICS	532	OOD	623	Development, support & maintenance of a schematic, logic, & layout graphic editor. Final product will allow a circuit designer to do hierarchical design in color & black & white on a VAX host. Will be terminal independent, & will have a complete interface through CHAS to SPICE, DECSIM, etc	Reduce funding and manage the risks to projects
CIRCUIT SIMULATION	420	OOD		An integrated set of software tools being developed which will be used in the following areas of IC design IC simulation, (SPICE & GRAPES), Semiconductor process development simulation (SUPREM & SUPRA), Semi device analysis simulation MINIMOS, GEMINI, SEDAN & MEDUSA), Semiconductor device model development (EQUUS)	Reduce funding and manage the risks to projects

PROJECT	BUDGET K$ (OOD ONLY)	PRIME SOURCE OOD, E97 USER	INVEST TO DATE	DESCRIPTION OF PROJECT	ALTERNATIVE TO PROJECT FROM A BUDGET REDUCTION STANDPOINT
CMOS VAX	419	OOD	0	Advanced Development work for the next generation VAX/MicroVAX using CMOS technology (3-4 Mip). To be started in Q3. Anticipate a 3 year total program	Delay this AD work out of FY83

SEG FY83
PROGRAM BY ACTIVITY MATRIX

	ACTIVITY									
	CHIP DEV	CAD TOOLS	AD	PROCESS	MISC	G&A	TOTAL PROJ SPEND/ FUND	OOD	USER	E97	TOTAL
V-11	6483	2039		1210			9732	6613	2061	1058	9732
J-11	3510	317					3827	2777	1050		3827
MICROVAX	2000	633		363			2996	2660	19	317	2996
BI	1231	216		217			1664	439	1035	190	1664
VT-200	1608	292		315			2215	825	1115*	275	2215
CHIP-A-MONTH	1644			315	389		2348	2073		275	2348
CMOS		286		2747			3033	574	16	2443	3033
AD			2176				2176	1901	275		2176
MISC.	2570	1690		2192	929	4733	12114	6369	3553	2192	12114
UNFUNDED (Mgmt Adj)	(1458)	(638)	(93)				(2189)	(1458)	(731)		(2189)
TOTAL	17588	4835	2083	7359	1318	4733	37916	22773	8393	6750	37916

* VT200 IS UNDERFUNDED BY USER BY $500K

JK/FP
8/31/82

BACKUP NOTES

FOR

PROGRAM BY ACTIVITY MATRIX

V-11	CHIP DEVELOPMENT + CAD ALLOCATION + ZMOS ALLOCATION
J-11	J-11 & J-11 FPA CHIP DEVELOPMENT + CAD ALLOCATION
MVAX	CHIP DEVELOPMENT + CAD ALLOCATION + ZMOS ALLOCATION
BI	CHIP DEVELOPMENT + CADALLOCATION + ZMOS ALLOCATION
VT200	CHIP DEVELOPMENT + CAD ALLOCATION + ZMOS ALLOCATION
CHIP-A-MONTH	DIRECT OOD FUNDING FOR ARCHITECTURE, BFC #2, METHODS CHIPS #3 & 4 AND APPLICATIONS + ZMOS ALLOCATION
CMOS	1/2 THE DIRECT OOD FUNDING FOR PROCESS TECHNOLOGY + CAD ALLOCATION + DIRECT E-97 FUNDING
AD	DIRECT OOD FUNDING FOR VLSI TRAINING, METHODOLOGY, CMOS-VAX AND USER FUNDING OF $275K
MISC.	CHIP DEVELOPMENT FOR OMIC, T-11, MODULE, OBUS + MDE J-11 + EBEAM + MOS J55 CHIP.

BACK-UP MATRIX FOR PROGRAM BY ACTIVITY MATRIX

	CHIP DEV.	CAD TOOLS	AD	PROCESS	MISC.	G&A	TOTAL	OOD	USER	E-97	TOTAL
V-11	(A) 4483 (B) 2000	2039		(C) 1210			9732	4483 (D) 1978 (E) 152	2000 (D) 61	(E) 1058	9732
J-11	(F) 3510	317					3827	2469 (G) 308	891 150 (G) 9		3827
MICROVAX	(H) 2000	633		(I) 363			2996	2000 (J) 614 (K) 46	(J) 19	(K) 317	2996
BI	(L) 1231	216		(M) 217			1664	196 216 (M) 27	1035	(M) 190	1664
VT 200	(N) 1608	292		(P) 315			2215	508 (O) 277 (P) 40	1100 (O) 15	(P) 275	2215
CHIP-A-MONTH	(Q) 1644			(R) 315	(S) 389		2348	1644 (R) 40 (S) 389		(R) 275	2348
CMOS		(T) 286		(U) 1555 (V) 261 (W) 627 (X) 304			3033	(T) 270 304	(T) 16	1555 261 627	3033
AD			(Y) 430 (Z) 1052 (AA) 419 (AB) 275				2176	430 1052 419	275		2176
MISC.	(AC) 500 (AD) 954 (AC) 197 (AF) 121 (AG) 102 (AH) 421 (AI) 275	(AJ) 887 (AK) 165 (AO) 638		(AL) 2062 (AM) 130	(AN) 929	4733	11476	121 102 421 275 (AJ) 557 (AK) 160 4733	(AC) 500 954 197 (AJ) 330 (AK) 5 929 (AO) 638	2062 130	11476
UNFUNDED	<1458>	<638>	<93>				<2189>	<1458>	<93> <638>		<2189>
TOTAL	17588	4835	2083	7359	1318	4733	37916	22773	8393	6750	37916

FOOTNOTES FOR BACK UP MATRIX

V-11

(a) Direct OOD SEG allocation.
(b) User Funding - CE - Tewksbury.
(c) Z MOS allocation.
(d) CAD Tool Allocation.
(e) ZMOS Allocation.

J-11

(f) Direct OOD SEG allocation of 2,469 + User Funding of 891 - CE - Maynard + User Funding of 150 - P/L - TVG.
(g) CAD Tool Allocation.

Microvax

(h) Non-committed funding which is assumed to come from OOD.
(i) ZMOS Allocation.
(j) CAD Allocation.
(k) ZMOS "

BI

(l) 196 Direct OOD SEG allocation + 1,035 user funding - CE - Tewksbury.
(m) ZMOS Allocation.

VT200

(n) 508 Direct OOD SEG allocation + 1100 user funding - CE - Terminals.
(o) CAD Tool Allocation.
(p) ZMOS Allocation.

Chip a Month

(q) Direct OOD SEG allocation which is unfunded by 1458.
(r) ZMOS allocation.
(s) Product Management

CMOS

(t) CAD allocation.

(u) CMOS E-97 Project.
(v) 50% of E-97 Device Lab Project.
(w) 50% of E-97 Process Technology Project.
(x) 50% of OOD " " "

AD

(y) OOD Training Project.
(z) OOD Methodology Project.
(aa) OOD CMOS Vax Project.
(ab) User funding of 130-CE-MMP + user funding of 52 - CE - CRG + 93 of unidentified funding.

Misc.

(ac) User Funding - P/L - TVG for QMIC
(ad) User Funding - P/L - TVG for MDE/J11
(ae) User Funding - P/L - TVG for MDE/T11
(af) Direct OOD Funding for MOS-JSS Project
(ag) Direct OOD Funding for T11 Completion Project
(ah) Direct OOD Funding for Q/BUS MP Project
(ai) Direct OOD Funding for Module Project
(aj) CAD allocation for auto layout
(ak) CAD allocation for QMIC chip
(al) E-97 Funding for E Beam lithography (net $)
(am) E-97 Funding for E Beam technology
(an) Computer resources external funding

CAD

(ao) Unfunded cost center spending for CAD

CAD TOOL USAGE BY PROJECT

PROJECT	CHAS	DECSIM	SPICE	RSIM	VERIFICATON	GRAPHICS	AUTO LAYOUT
V-11	X	X	X		X	X	
J-11 FPA			X	X	X	X	
J-11					X		
MICROVAX	X	X	X	?	X	X	
BI		X		X		X	
VT 200 UPPER	X	X	X	?	X	X	
VT 200 LOWER	?	?	X	?	X	?	
QMIC	X	X	X		X	X	
CMOS			X		X	X	
ZMOS							

MW:8/27/82 FRI

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DIGITAL EQUIPMENT CORPORATION

BASE BUDG YR: 83 BUDG TYPE: R

ENGINEERING DP BUDGET BY ORGANIZATION CODE
(All values in 1000's)

OOD: TEICHER

DISCRETE PROJ. NO.	DESCRIPTION	PROD CODE	ORG CODE	AC CD	Q1	Q2	Q3	Q4	83TOT	Q1	Q2	Q3	Q4	84TOT	85TOT
020-02656	V-11 PRODUCT MGMT	1214	1311	PM	20.0	20.0	20.0	20.0	80.0	0.0	0.0	0.0	0.0	0.0	0.0
020-02665	V11 CHIP TEST & D	1214	1311	PD	50.5	105.1	105.2	105.9	366.7	0.0	0.0	0.0	0.0	0.0	0.0
020-02666	V-11 MICROCODE &	1214	1311	PD	136.8	134.4	134.1	137.2	542.5	0.0	0.0	0.0	0.0	0.0	0.0
020-02667	V11 CPU & MEMORY	1214	1311	PD	174.2	298.0	388.9	441.0	1302.1	0.0	0.0	0.0	0.0	0.0	0.0
020-05516	CIRCUIT TEST CHIP	1214	1311	PD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
020-05667	I/E CHIP DEVELOPM	1214	1311	PD	363.4	379.0	394.1	426.1	1562.6	0.0	0.0	0.0	0.0	0.0	0.0
020-05670	F CHIP DEVELOPMEN	1214	1311	PD	39.1	92.0	110.8	124.2	366.1	0.0	0.0	0.0	0.0	0.0	0.0
020-05711	M CHIP DEVELOPMEN	1214	1311	PD	352.5	348.8	363.9	395.3	1460.5	0.0	0.0	0.0	0.0	0.0	0.0
020-05715	RAM/ROM	1214	1311	PD	198.1	153.1	243.2	208.6	803.0	0.0	0.0	0.0	0.0	0.0	0.0
020-06329	V-11 CHARGE OUT	1214	1311	PD	440.0-	480.0-	520.0-	560.0-	2000.0-	0.0	0.0	0.0	0.0	0.0	0.0
DICKHUT	*SUBTOTAL		1311		894.6	1050.4	1240.2	1298.3	4483.5	0.0	0.0	0.0	0.0	0.0	0.0
020-02605	L70 DIRECT HARRIS	1213	1312	PD	110.0	319.0	264.0	55.0	748.0	0.0	0.0	0.0	0.0	0.0	0.0
020-02616	J-11 CHIP DEVELOP	1213	1312	PD	92.8	107.5	179.1	154.6	534.0	0.0	0.0	0.0	0.0	0.0	0.0
020-02618	J-11 MICROCODE/CA	1213	1312	PD	36.2	36.2	36.8	37.0	146.2	0.0	0.0	0.0	0.0	0.0	0.0
020-02660	J-11 PRODUCTION E	1213	1312	PD	183.3	158.3	117.0	117.0	575.6	0.0	0.0	0.0	0.0	0.0	0.0
020-02673	FLOATING POINT AS	1213	1312	AD	191.2	198.9	245.9	254.5	890.5	0.0	0.0	0.0	0.0	0.0	0.0
020-05665	J-11 CPU MODULE	1213	1312	PD	204.4	177.9	131.8	100.7	614.8	0.0	0.0	0.0	0.0	0.0	0.0
020-06331	KDJ-11 CHARGE-OUT	1213	1312	PD	37.5-	37.5-	37.5-	37.5-	150.0-	0.0	0.0	0.0	0.0	0.0	0.0
020-06332	FFA CHARGE-OUT	1213	1312	PD	191.2-	198.9-	245.9-	254.5-	890.5-	0.0	0.0	0.0	0.0	0.0	0.0
CASALETTO	*SUBTOTAL		1312		589.2	761.4	691.2	426.8	2468.6	0.0	0.0	0.0	0.0	0.0	0.0
020-06184	B.I.	1215	1315	PD	315.0	319.8	333.1	263.4	1231.3	0.0	0.0	0.0	0.0	0.0	0.0
020-06191	MOS JSS CHIP	1210	1315	PD	30.4	30.1	30.2	30.9	121.6	0.0	0.0	0.0	0.0	0.0	0.0
020-06330	BI CHARGE OUT	1215	1315	PD	315.0-	255.0-	267.0-	198.0-	1035.0-	0.0	0.0	0.0	0.0	0.0	0.0
PARKER	*SUBTOTAL		1315		30.4	94.9	96.3	96.3	317.9	0.0	0.0	0.0	0.0	0.0	0.0
DICKHUT	**TOTAL		131		1514.2	1906.7	2027.7	1821.4	7270.0	0.0	0.0	0.0	0.0	0.0	0.0
020-06337	ALGORITHMIC SCALI	1215	1321	AD	87.2	95.8	100.6	107.6	391.2	0.0	0.0	0.0	0.0	0.0	0.0
020-06338	VERIFICATION	1215	1321	AD	57.3	60.0	51.0	55.8	224.1	0.0	0.0	0.0	0.0	0.0	0.0
020-06339	SILICON COMPILIER	1215	1321	AD	32.3	34.8	50.9	56.0	174.0	0.0	0.0	0.0	0.0	0.0	0.0
020-06340	SILICON DIRECT AR	1215	1321	AD	25.0	52.0	88.6	97.1	262.7	0.0	0.0	0.0	0.0	0.0	0.0
HANOVER	*SUBTOTAL		1321		201.8	242.6	291.1	316.5	1052.0	0.0	0.0	0.0	0.0	0.0	0.0

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DIGITAL EQUIPMENT CORPORATION

BASE BUDG YR: 83 BUDG TYPE: R

ENGINEERING DP BUDGET BY ORGANIZATION CODE
(All values in 1000's)

OOD: TEICHER

DISCRETE PROJ. NO.	DESCRIPTION	PROD CODE	ORG CODE	AC CD	Q1	Q2	Q3	Q4	83TOT	Q1	Q2	Q3	Q4	84TOT	85TOT
020-06200	PROCESS TECHNOLOG	1215	1322	AD	152.2	152.2	152.3	152.3	609.0	0.0	0.0	0.0	0.0	0.0	0.0
RAWA	*SUBTOTAL		1322		152.2	152.2	152.3	152.3	609.0	0.0	0.0	0.0	0.0	0.0	0.0
020-06164	MICROVAX CROSS FU	1215	1325	AD	366.7-	484.7-	587.4-	561.2-	2000.0-	0.0	0.0	0.0	0.0	0.0	0.0
020-06198	CMOS VAX	1215	1325	AD	69.7	107.9	110.8	130.6	419.0	0.0	0.0	0.0	0.0	0.0	0.0
020-06199	MICROVAX	1215	1325	AD	366.7	484.7	587.4	561.2	2000.0	0.0	0.0	0.0	0.0	0.0	0.0
SUPNIK	*SUBTOTAL		1325		69.7	107.9	110.8	130.6	419.0	0.0	0.0	0.0	0.0	0.0	0.0
020-05663	SEMINARS SERIES	1215	1327	AD	75.2	47.6	50.1	50.3	223.2	0.0	0.0	0.0	0.0	0.0	0.0
020-06196	TRAINING	1720	1327	AD	18.6	16.6-	54.8	49.2	106.0	0.0	0.0	0.0	0.0	0.0	0.0
020-06197	RESEARCH AND RESI	1720	1327	AD	25.7	23.8	25.5	25.8	100.8	0.0	0.0	0.0	0.0	0.0	0.0
THORNDIKE	*SUBTOTAL		1327		119.5	54.8	130.4	125.3	430.0	0.0	0.0	0.0	0.0	0.0	0.0
[redacted]NIK	**TOTAL		132		543.2	557.5	684.6	724.7	2510.0	0.0	0.0	0.0	0.0	0.0	0.0
020-06192	CHIP ARCHITECTURE	1210	1331	RE	103.9	122.8	123.1	137.4	487.2	0.0	0.0	0.0	0.0	0.0	0.0
MARKS	*SUBTOTAL		1331		103.9	122.8	123.1	137.4	487.2	0.0	0.0	0.0	0.0	0.0	0.0
020-05925	Q-BUS MF	1211	1332	PS	160.8	202.7	284.1	272.9	920.5	0.0	0.0	0.0	0.0	0.0	0.0
020-06185	VT200	1152	1332	PD	210.6	122.8	97.4	76.9	507.7	0.0	0.0	0.0	0.0	0.0	0.0
020-06194	BFC #2	1215	1332	PS	7.3	118.3	154.1	240.5	520.2	0.0	0.0	0.0	0.0	0.0	0.0
020-06195	MODULE	1215	1332	PS	25.5	46.3	99.3	103.9	275.0	0.0	0.0	0.0	0.0	0.0	0.0
020-06326	METHODS	1215	1332	PS	43.1	101.9	112.1	89.7	346.8	0.0	0.0	0.0	0.0	0.0	0.0
020-06327	T-11 COMPLETION	1212	1332	PS	85.7	16.6	0.0	0.0	102.3	0.0	0.0	0.0	0.0	0.0	0.0
020-06328	CHIP 3&4	1210	1332	PS	0.0	0.0	21.8	43.0	64.8	0.0	0.0	0.0	0.0	0.0	0.0
020-06334	QMIC CHARGE OUT	1211	1332	PD	72.0-	93.0-	131.0-	204.0-	500.0-	0.0	0.0	0.0	0.0	0.0	0.0
LEWANDOWS	*SUBTOTAL		1332		461.0	515.6	637.8	622.9	2237.3	0.0	0.0	0.0	0.0	0.0	0.0
020-02661	APPLICATIONS	1211	1334	PS	74.6	46.3	43.4	60.8	225.1	0.0	0.0	0.0	0.0	0.0	0.0
HARBERT	*SUBTOTAL		1334		74.6	46.3	43.4	60.8	225.1	0.0	0.0	0.0	0.0	0.0	0.0
020-06193	PRODUCT MGMT	1215	1335	PM	100.4	110.3	90.9	87.1	388.7	0.0	0.0	0.0	0.0	0.0	0.0
020-06333	CHARGE OUT	1215	1335	PD	367.8-	377.7-	358.3-	354.5-	1458.3-	0.0	0.0	0.0	0.0	0.0	0.0
[redacted]BERT	*SUBTOTAL		1335		267.4-	267.4-	267.4-	267.4-	1069.6-	0.0	0.0	0.0	0.0	0.0	0.0
HARBERT	**TOTAL		133		372.1	417.3	536.9	553.7	1880.0	0.0	0.0	0.0	0.0	0.0	0.0

Mgmt Adj.

ENGINEERING DP BUDGET BY ORGANIZATION CODE
(All values in 1000's)

OOD: TEICHER

DISCRETE PROJ. NO.	DESCRIPTION	PROD CODE	ORG CODE	AC CD	Q1	Q2	Q3	Q4	83TOT	Q1	Q2	Q3	Q4	84TOT	85TOT
020-05668	CHAS	1313	1350	PD	110.7	116.5	121.6	125.5	474.3	0.0	0.0	0.0	0.0	0.0	0.0
SHARP	*SUBTOTAL		1350		110.7	116.5	121.6	125.5	474.3	0.0	0.0	0.0	0.0	0.0	0.0
098-08917	AUTO LAYOUT	1313	1351	TL	85.0	59.6	203.3	208.8	556.7	0.0	0.0	0.0	0.0	0.0	0.0
JANSON	*SUBTOTAL		1351		85.0	59.6	203.3	208.8	556.7	0.0	0.0	0.0	0.0	0.0	0.0
020-06170	CAD DOCUMENTATION	1313	1352	TL	85.2	107.5	130.9	135.2	458.8	0.0	0.0	0.0	0.0	0.0	0.0
GOLDFEIN	*SUBTOTAL		1352		85.2	107.5	130.9	135.2	458.8	0.0	0.0	0.0	0.0	0.0	0.0
098-05215	DECSIM	1313	1355	TL	299.0	312.8	299.9	309.3	1221.0	0.0	0.0	0.0	0.0	0.0	0.0
HUTCHINGS	*SUBTOTAL		1355		299.0	312.8	299.9	309.3	1221.0	0.0	0.0	0.0	0.0	0.0	0.0
[redacted]06172	PHYSICAL VERIFICA	1313	1357	TL	197.7	134.4	240.3	144.8	717.2	0.0	0.0	0.0	0.0	0.0	0.0
MCGRATH	*SUBTOTAL		1357		197.7	134.4	240.3	144.8	717.2	0.0	0.0	0.0	0.0	0.0	0.0
020-06173	GRAPHICS	1313	1358	TL	102.2	125.4	149.6	154.5	531.7	0.0	0.0	0.0	0.0	0.0	0.0
ZAKS	*SUBTOTAL		1358		102.2	125.4	149.6	154.5	531.7	0.0	0.0	0.0	0.0	0.0	0.0
020-06174	CIRCUIT SIMULATIO	1313	1359	TL	44.2	128.4	124.6	123.1	420.3	0.0	0.0	0.0	0.0	0.0	0.0
ANGST	*SUBTOTAL		1359		44.2	128.4	124.6	123.1	420.3	0.0	0.0	0.0	0.0	0.0	0.0
SHARP	**TOTAL		135		924.0	984.6	1270.2	1201.2	4380.0	0.0	0.0	0.0	0.0	0.0	0.0
020-05284	HUDSON ACCT SERVI	1313	1371	AM	47.5	47.5	47.5	47.5	190.0	0.0	0.0	0.0	0.0	0.0	0.0
020-05285	HUDSON OFFICE SER	1N02	1371	AM	113.0	113.0	114.0	115.0	455.0	0.0	0.0	0.0	0.0	0.0	0.0
020-05286	HUDSON PURCHASING	1N03	1371	AM	29.0	29.0	29.0	29.0	116.0	0.0	0.0	0.0	0.0	0.0	0.0
020-05287	HUDSON RECEIVING	1N05	1371	AM	6.0	6.0	6.0	7.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0
020-06158	LSI GROUP ALLOCAT	1313	1371	AM	164.0	164.0	164.0	165.0	657.0	0.0	0.0	0.0	0.0	0.0	0.0
020-06159	CORP MFG ALLOCATI	1313	1371	AM	107.2	107.2	107.3	107.3	429.0	0.0	0.0	0.0	0.0	0.0	0.0
MERCIER	*SUBTOTAL		1371		466.7	466.7	467.8	470.8	1872.0	0.0	0.0	0.0	0.0	0.0	0.0

ENGINEERING DP BUDGET BY ORGANIZATION CODE
(All values in 1000's)

OOD: TEICHER

DISCRETE PROJ. NO.	DESCRIPTION	PROD CODE	ORG CODE	AC CD	Q1	Q2	Q3	Q4	83TOT	Q1	Q2	Q3	Q4	84TOT	85TOT
020-02337	ADMIN COMPUTER CH	1313	1372	AM	10.0	10.0	10.0	10.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0
020-02683	LINE FINANCE	1313	1372	AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
020-05279	HUDSON FINANCE/AD	1313	1372	FN	44.5	46.3	54.5	54.7	200.0	0.0	0.0	0.0	0.0	0.0	0.0
020-05513	UNIVERSITY RELATI	1313	1372	AM	250.0	0.0	0.0	350.0	600.0	0.0	0.0	0.0	0.0	0.0	0.0
MERCIER	*SUBTOTAL		1372		304.5	56.3	64.5	414.7	840.0	0.0	0.0	0.0	0.0	0.0	0.0
020-05293	SEG ENGINEERING M	1313	1373	AM	241.5	250.0	266.3	269.2	1027.0	0.0	0.0	0.0	0.0	0.0	0.0
HARBERT	*SUBTOTAL		1373		241.5	250.0	266.3	269.2	1027.0	0.0	0.0	0.0	0.0	0.0	0.0
020-05290	SEG PERSONNEL	1313	1374	PR	116.1	121.2	123.0	125.7	486.0	0.0	0.0	0.0	0.0	0.0	0.0
020-05291	HUDSON HOST PERSO	1313	1374	PR	76.0	76.0	76.0	76.0	304.0	0.0	0.0	0.0	0.0	0.0	0.0
SMALL	*SUBTOTAL		1374		192.1	197.2	199.0	201.7	790.0	0.0	0.0	0.0	0.0	0.0	0.0
[redacted]5276	HUDSON STOCKROOM	1313	1375	AM	24.0	25.8	25.7	27.5	103.0	0.0	0.0	0.0	0.0	0.0	0.0
CASTANO	*SUBTOTAL		1375		24.0	25.8	25.7	27.5	103.0	0.0	0.0	0.0	0.0	0.0	0.0
020-05280	HUDSON LIBRARY	1313	1376	AM	16.4	16.6	22.3	18.7	74.0	0.0	0.0	0.0	0.0	0.0	0.0
SHEAR	*SUBTOTAL		1376		16.4	16.6	22.3	18.7	74.0	0.0	0.0	0.0	0.0	0.0	0.0
020-06163	ENDEC/SERDES COMP	N	1377		23.5	2.6	0.9	0.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0
WEIDMAN	*SUBTOTAL		1377		23.5	2.6	0.9	0.0	27.0	0.0	0.0	0.0	0.0	0.0	0.0
MERCIER	**TOTAL		137		1268.7	1015.2	1046.5	1402.6	4733.0	0.0	0.0	0.0	0.0	0.0	0.0
TEICHER	**TOTAL		TEICHER		4622.2	4881.3	5565.9	5703.6	20773.0	0.0	0.0	0.0	0.0	0.0	0.0

800K

USER FUNDING
($000)

GROUP	SOURCE	PROGRAM	CE FUNDED	P/L FUNDED	TOTAL
AFL	TEWKSBURY	V-11	2000		
	TEWKSBURY	BI	1035		
	TVG	J-11	891 (A)	(F) 150	
	TEWKSBURY	J-11 FPA			
TOTAL AFL			3926	150	4076
AD	MMP	AD	130		
	CRG	AD	52		
TOTAL AD			182		182
CAD	MDS	CAD	250 (Autolayout)		
	RAD	CAD	185 (60 Autolayout & 125 Circuits)		
	LSG	CAD	20 (Autolayout)		
TOTAL CAD			455		455
SILICON SYSTEMS	TERMINALS	VT200	1100		
	TVG	OMIC		500 (C)	
	TVG	MDE/J-11		954 (D)	(F)
	TVG	MDE/T-11		197 (E)	
TOTAL SILICON SYSTEMS			1100	1651	2751
COMPUTER RESOURCES			514	130	
			285 (B)		
			799	130	929
TOTAL SEG			6462	1931	8393

JK/MW 8/24/82

(A) INCLUDES $320K OF FUNDING FROM TEWKSBURY (16 BIT PROGRAMS) WHICH IS SUBCONTRACTED TO ENGINEERING COST CENTERS EXTERNAL TO SEG.

(B) ASSUMED TO BE 020/098 FUNDING, BUT MAY BE FUNDED FROM NPSU.

(C) INCLUDES $ 64K OF FUNDING FROM TVG WHICH IS SUBCONTRACTED TO ENGINEERING COST CENTERS EXTERNAL TO SEG.

(D) INCLUDES $339K OF FUNDING FROM TVG WHICH IS SUBCONTRACTED TO ENGINEERING COST CENTERS EXTERNAL TO SEG.

(E) INCLUDES $122K OF FUNDING FROM TVG WHICH IS SUBCONTRACTED TO ENGINEERING COST CENTERS EXTERNAL TO SEG.

(F) FUNDING NOT FIRM.

(18)

SEG

FY 83

E-97 PROJECT BUDGETS

DISCRETE #	E-97 PROJECTS	QTR1	QTR2	QTR3	QTR4	FY83
097-05644	CMOS	348.3	374.2	451.4	380.6	1554.5
097-05640	ZMOS	249.9	310.5	347.1	319.8	1227.3
097-05643	DEVICE LAB	127.2	127.6	132.4	134.4	521.6 ✓
097-04001	BEAM TECHNOLOGY	31.8	31.9	33.1	33.6	130.4
097-04002	PROCESS "	243	317.7	346.4	347.1	1254.2 ✓
[illegible]-05645	E-BEAM LITHO-GRAPHY (NET)	557	517.6	511.8	475.6	←2062
	TOTAL	1557.2	1679.5	1822.2	1691.1	6750
						609
						>359

020-06200 Process Tech

7/30/8

LSI Group

FY83
E97 BUDGET
SUMMARY BY PROJECT

K $'s

	-FY82-	FISCAL YEAR 1983				
	TOTAL YEAR	Q1	Q2	Q3	Q4	TOTAL
SEG						
ZMOS Technology	$2479.0	$ 249.9	$ 310.5	$ 347.1	$ 319.8	$1227.3
Device Eng. Lab.	222.0	127.2	127.6	132.4	134.4	521.6
CMOS	927.0	348.3	374.2	451.4	380.6	1554.5
E-Beam Lithography	854.0	557.0	517.6	511.8	475.6	2062.0
Beam Technology	---	31.8	31.9	33.1	33.6	130.4
Process Technology	---	243.0	317.7	346.4	347.1	1254.2
Other	1791.0	---	---	---	---	---
SUB-TOTAL	6273.0	1557.2	1679.5	1822.2	1691.1	6750.0
HL						
ZMOS Process Devel.	---	1162.4	1296.8	1362.0	1207.7	5028.9
Probe at Speed	134.0	20.0	10.0	---	---	30.0
TAB	---	35.0	35.0	35.0	35.0	140.0
High Density Pkg.	---	7.0	13.3	11.3	8.4	40.0
Mosaic Process	---	126.0	187.0	67.0	---	380.0
Other	108.0	---	---	---	---	---
SUB-TOTAL	242.0	1350.4	1542.1	1475.3	1251.1	5618.9
A & T						
New Part Introd.	---	40.0	40.0	35.0	35.0	150.0
PROM Process	---	15.0	10.0	---	---	25.0
Sentry Skeleton	---	12.0	12.0	11.0	10.0	45.0
Reliability	---	20.0	20.0	20.0	10.0	70.0
PAL Process	87.0	35.0	35.0	35.0	35.0	140.0
Auto - AC	---	25.0	25.0	25.0	25.0	100.0
ITA	---	15.0	15.0	15.0	15.0	60.0
Scan Design	---	10.0	10.0	10.0	10.0	40.0
Other	408.0	---	---	---	---	---
SUB-TOTAL	495.0	172.0	167.0	151.0	140.0	630.0
GROUP						
Paperless Fab	---	75.0	75.0	75.0	75.0	300.0
Auto Characterization	---	25.0	25.0	25.0	25.0	100.0
Group Other	---	(146.8)	(50.9)	34.0	171.2	301.1
SUB-TOTAL	0.0	246.8	49.1	134.0	271.2	701.1
TOTAL E97 LSI	$7010.0	$3326.4	$3437.7	$3582.5	$3353.4	$13700.0

(19)

SEG
FY'83 ADMIN SPENDING
($000)

PROJECT	$	SERVICE
HUDSON ACCOUNTING	190.0	G/L ACCTNG INCL A/P & EDP
HUDSON OFFICE SERVICES	455.0	OFF SUP, COPY SER, & MAIL SYS.
HUDSON PURCHASING	116.0	PURCHASING SERVICES
HUDSON RECEIVING	25.0	SHIPPING DOCK & RECEIVING SER.
LSI GROUP ALLOCATIONS	657.0	LSI GRP FINANCIAL & ADMIN. SUPPORT
CORP MFG. ALLOCATION	429.0	CORP. MFG. SUPPORT
SITE PERSONNEL	304.0	LSI GRP PERS. SUPPORT & COL REL PROG.
STOCKROOM 290	103.0	ENGINEERING SUPPLIES
HUDSON LIBRARY	74.0	MAINT. OF RESOURCES MAT. ON SEMICONDUC ENGR.
TOTAL SITE SERVICES	2353.0	
FINANCE	200.0	FINANCIAL SUPPORT
ENGINEERING MGMT	1027.0	GRP MGRS, DIRECT ENGR. RPTS & SEC.
SEG PERSONNEL	486.0	PERSONNEL SUPPORT
UNIVERSITIES ~~RELATIONS~~ Fees	600.0	MIT, STANFORD, & CAL TECH PAYMENTS
COMPUTER CHARGES	40.0	HUDSON & MAYNARD EDP SUPPORT
ENDEC/SERDES COMPLETION	27.0	COMPLETION OF ENDEC & SERDES PROJ. BY PLANT
TOTAL G&A SPENDING	4733.0	

MW:8/26/82

SEG G&A
FY'82 vs FY'83
($000)

SERVICE	Actual FY'82 $	Budget FY'83 $	$	%
HUDSON ACCOUNTING	120.0	190.0	70.0	58
HUDSON OFFICE SER	312.0	455.0	143.0	46
HUDSON PURCHASING	71.0	116.0	45.0	63
HUDSON RECEIVING	15.0	25.0	10.0	67
HUDSON FACILITIES	19.0	.0	<19.0>	--
HOST PERSONNEL	305.0	304.0	<1.0>	0
STOCKROOM 290	69.0	103.0	34.0	49
HUDSON LIBRARY	125.0	74.0	<51.0>	<41>
TOTAL SITE SERVICES	1036.0	1267.0	231.0	22
FINANCE	179.0	200.0	21.0	12
ENGINEERING MGMT	1154.0	1027.0	<127.0>	<11>
PERSONNEL	471.0	486.0	15.0	3
UNIVERSITY RELATIONS	459.0	600.0	141.0	31
COMPUTER CHARGES	27.0	40.0	13.0	48
SUB-TOTAL COMPARATIVE CHARGES	3326.0	3620.0	294.0	9
MISCELLANEOUS PROJ:				
PRODUCT MGMT	183.0	0	<183.0>	--
FTA ENG OFF	127.0	0	<127.0>	--
TEST ENGINEERING	40.0	0	<40.0>	--
CAM ENGINEERING	150.0	0	<150.0>	--
HL II MOVE	435.0	0	<435.0>	--
CONTINGENCY	<281.0>	0	281.0	--
LSI ALLOCATION	0	657.0	657.0	--
MFG. ALLOCATION	0	429.0	429.0	--
ENDEC/SERDES	0	27.0	27.0	--
TOTAL SEG ADMIN	3980.0	4733.0	753.0	19

MW: 8/27/82

SEG
FY'83 UNIVERSITY PAYMENTS
($000)

SCHOOL	SECHEDULED COST QUARTER	CENTER	PROJECT	$
MIT	Q1	3H2	UNIV. RELATIONS	250.0
STANFORD	Q4	3H2	UNIV. RELATIONS	250.0
CAL TECH	Q4	3H2	UNIV. RELATIONS	100.0
				600.0

MW:8/26/82

SEG

FY'83 COST CENTER BUDGET (Bottoms Up)

($000)

ACCOUNT	$	%
DIRECT LABOR	10124	26.5
INDIRECT LABOR	2874	7.5
OTHER LABOR	2755	7.2
RELOCATION	996	2.6
GENERAL OH	103	.4
SUPPLIES	127	.4
OCCUPANCY	4574	12.0
MATERIALS	607	1.5
DEPRECIATION	4628	12.1
FIELD SERVICE	1458	3.8
TRAINING	549	1.4
TRAVEL	634	1.7
CONSULTING	158	.5
NEW HIRES	132	.4
TELECOMM	563	1.5
DIRECT TO PROJ	8440	22.1
TRANS IN	2426	6.3
TRANS OUT	<3010>	<7.9>
	38138	100

MW
8/24/82

SEG FY'83
CONSOLIDATED COST CENTER SPENDING

CONSOLIDATED ACCOUNT	AFL	SIL SYS	CAD	AD	ADMIN	COMP RESOURCES	TOTAL
DIRECT LABOR	2485	1768	1966	2254	696	955	10124
INDIRECT LABOR	452	470	430	665	280	577	2874
OTHER LABOR	601	479	480	613	210	372	2755
RELOCATION	241	122	241	298	6	88	996
GENERAL OH	10	5	30	34	9	15	103
SUPPLIES	14	14	40	27	11	21	127
OCCUPANCY	452	446	462	2111	138	965	4574
MATERIALS	4	85	59	83	10	366	607
DEPRECIATION	467	338	383	2063	52	1325	4628
FIELD SERVICE	195	50	179	407	32	595	1458
TRAINING	68	72	104	155	60	90	549
TRAVEL	109	110	118	177	77	43	634
CONSULTING	0	0	0	0	63	95	158
NEW HIRES	24	48	25	35	0	0	132
TELECOMM	131	75	107	132	63	55	563
DIRECT TO PROJECT	2397	717	700	1813	2813	0	8440
TRANSFERS IN	487	334	299	386	186	734	2426
TRANSFERS OUT	0	0	0	<570>	0	<2440>	<3010>
TOTAL	8137	5133	5623	10683	4706	3856	38138

MW:8/26/82

(24)

SEMICONDUCTORS

TMC recommendation

Prakash Bhalerao is the only authorized representative from Semiconductors and is presently circulating his Gate Array Business Proposal

Proposal Summary

- The total cost of bringing in a gate array is composed of BASE ARRAY COSTS and OPTION SPECIFIC COSTS. The N.R.E. costs are included in option specific costs. Total cost incurred = $665K
- These costs are associated with bringing in a CMOS family of arrays.
- The BASE ARRAY that is preferred is a CMOS Array currently offered as the LSI Logic 5000 series. This is offered in 3u technology. It has the added advantage of being offered as a family of 800, 1400, 2200, 3200, 4200, 6000 gates, which makes it extremely attractive.
- It is assumed that the first 4 options coming in FY83 will then incur NO OPTION SPECIFIC COSTS

TMC review slides attached
Bhalerao 9/2/82 memo attached

PRODUCT RETIREMENT	BUYOUT	OVERLAP (TO BE MERGED)	REDUCTION/SLOW DOWN	CUT

SEMICONDUCTOR

1. Too many groups are working on gate arrays. Jeff needs to develop a proposal and take it to Grant, et.al.

SEE PRAKESH BALERO PROPOSAL

(SENT W/ 8/19/82 TMC MINUTES)

| d | i | g | i | t | a | l |

INTEROFFICE MEMORANDUM

TO: SAM FULLER

CC: Distribution

DATE: 2 SEP 82
FROM: PRAKASH BHALERAO/SUNIL MURGAI
DEPT: A&T CUSTOM ENGINEERING
DTN: 279-5380/5400
LOCATION: LMO2

This memo is to follow up on the discussion we had with the TMC on August 19.

The following discussion outlines the cost incurred in bringing in a BASE ARRAY to DEC as well as OPTION SPECIFIC costs. The N.R.E. costs are included as part of the option specific costs.

It is assumed that the 1st 4 options coming in FY'83 will then incur NO OPTION SPECIFIC costs.

The BASE ARRAY that is preferred is a CMOS Array currently offered as the LSI Logic 5000 series. This is offered in 3u technology. It has the added advantage of being offered as a family of 800, 1400, 2200, 3200, 4200, 6000 gates, which makes it extremely attractive.

The following tables outline the total costs incurred in BASE ARRAY and OPTION SPECIFIC COSTS for FY'83 only.

CMOS BASE ARRAY COST		OPTION SPECIFIC COST	
ITEM	COST $	ITEM	COST $
• Design Process Definition (CAD)	10K	• NRE (Vendor) (4 Options)	4 X 50 = 200K
• CATT Tool Selection	40K	• Option Specific Costs (A&T)	4 X 30 = 120K
• Package Definition/ Development	20K		
• T/Chip Characterization	40K		
• Application Studies	30K		
• AC Predictability	30K		
• Generic Array Qual	110K		
• Specification	20K		
• Program Management	45K		
TOTAL	345K	TOTAL	320K

The total cost = BASE ARRAY + OPTION SPECIFIC

= $345K + 320K
= $\underline{665K}$

Attached in Table 1 is the Phases of Gate Array development which includes feasibility, design, design verification, characterization/qualification and manufacturing.

In addition, we have outlined and explained in ADDENDUM 1 the various terms used for BASE ARRAY DEVELOPMENT & OPTION SPECIFIC. This will better explain all the costs associated with bringing in a gate array.

SUMMARY

- The total cost of bringing in a gate array is composed of BASE ARRAY COSTS and OPTION SPECIFIC COSTS i.e. TOTAL COST INCURRED = $665K.
- These costs are associated with bringing in a CMOS family of arrays.
- In addition, the 1st 4 options in FY'83 will then incur NO OPTION SPECIFIC costs.

Distribution:

Bob Brownell
Greg Carter
Chan-You Chow
Dan Hamel
Jeff Kalb
Steve Ulevich
Len Winmill

PHASES OF GATE ARRAY DEVELOPMENT PROJECT

FEASABILITY	DESIGN	DESIGN VERIFICATION	CHARACTERIZATION/ QUALIFICATION	EARLY PRODUCTION
- TECHNOLOGY SELECTION	- TESTABILITY ASSESSMENT	- PROTOTYPE EVAL.	- EXTENSIVE CHARACTER.	- MODULE CORR.
- VENDOR SURVEY	- TEST PLAN	- SYSTEM EVAL.	- BASE ARRAY - PROCESS - CUSTOM LAYERS - TEST CHIP	- ONGOING REL. ASSESSMENT
- R.F.Q.	- CHARACTER. PLAN	- TEST DEBUG		
- COST/YIELD ESTIMATES	- QUAL. PLAN	- REL. ASSESSMENT	- FULL REL. ASSESSMENT - PACKAGING - SYSTEM BRING UP RETURNS	- INCOMING YIELD ENHANCEMENT
- CAD/CAT TOOL SELECTION	- TECH.REVIEW ASSESSMENT	- SPEC. REVIEW - EARLY TEST CHIP CHARACTERIZATION		- BEGIN COST RED. EFFORTS
- LOGIC DESIGN BEGINS	- COMPLETE LOGIC DESIGN	- DEBUG CAD/CAT TOOLS	- FULL SYSTEM EVAL.	- PMT/DMT SUPPORT
- INITIAL SYSTEM REQS. DEFINED - ELECT. - RELIABILITY - PACKAGING	- (CIRCUIT DESIGN) - (LAYOUT DESIGN) - DESIGN REVIEW - SOFTWARE MODELING - PACKAGING - TEST CHIP BUILD			- RELEASE SPECS. - FIELD TRACKING

TABLE I

ADDENDUM 1

NEW ARRAY INTRODUCTION TO DEC

- Base Array Development
- Option Specific Development

- BASE ARRAY DEVELOPMENT
  - Design Process Definition (CAD)
  - CATT Tool Selection
  - Package Definition/Development
  - T/Chip Char
  - Application Studies
  - AC Predictability
  - Generic Array Qualification
  - Specs
  - Program Management

- OPTION SPECIFIC DEVELOPMENT
  - Feasibility Study Support
  - Design Support
  - Program Management
  - Test Program Development
  - Prototype Debug & Char
  - Vendor/Customer Correlation
  - Option Specific Qual
  - Packaging Implementation

- BASE ARRAY DEVELOPMENT

  - DESIGN PROCESS DEFINITION

    - To Define Available Design Flow
    - From DEC Designer Into Vendor Tools
    - CAD Tool Selection & Optimization
    - Development of Bridge Tools Where Necessary

  - CATT TOOL SELECTION

    - CATT Tools Imply Test Vector Generation
    - Interface Existing CATT Process With Defined Design Process
    - Modification/Improvement Of Existing Tools For Base Array Specific Needs (Auto AC, Auto DC, Testability, Analysis)
    - Test Process Defined Completely

  - PACKAGE DEFINITION/DEVELOPMENT

    - Identification/Evaluation of New Packaging Technology
    - Coordination of Vendor/Customer Implementation
    - Drive Vendor Towards Char Comprehensive Packaging Studies/Tradeoffs

  - T/CHIP CHARACTERIZATION

    - Extensive Eval of Process/Design & Design Rules
    - Reliability Studies to Understand Technology Constraints
    - Drive Vendor to Develop & Char T/Chips
    - Recommend T/Chip Modification to Improve Data Base

  - APPLICATION STUDIES

    - ESD Evaluation
    - ICT/Back Drive Study
    - Latch-up Constraints

  - AC PREDICTABILITY

    - Drive Vendor Towards Simulation/Modelling (Spice/SLIC)
    - 4 Corner Lot Characterization
    - Statistical Analysis of Path Data vs. Limits
    - Min/Max AC Evals

- GENERIC ARRAY QUAL/RELIABILITY

  - Selection of Worse Case Options For Qual
  - Process/Package Life Time Studies
  - Drive Vendors to Correct Problems of Technology Process
  - Result - Fully Qualified Family of Arrays

- PROGRAM MANAGEMENT

  - Coordination of Vendor/Customer Needs
  - Single Point Contact for Technical Issues
  - User Support Through All Phase of Development

- SPECIFICATIONS

  - Development of General Purchase Specs
  - Negotiate/Close Specs With Vendor

- OPTION SPECIFIC DEVELOPMENT

  - FEASIBILITY STUDY SUPPORT

    - Provide Detailed Technical Information to the User
    - Help the User With Vendor Selection
    - Assist During Logic Design Phase
    - Provide Cost Tradeoffs/Estimates

  - DESIGN SUPPORT

    - Assist the Designer in the Use of CAD Tools at Vendor and in DEC
    - Provide Modelling Libraries for Simulation
    - Result - Smooth Design Process For Less Experienced G/A Designer

  - PROGRAM MANAGEMENT

    - As per Base Array

  - TEST PROGRAM DEVELOPMENT

    - Generation of Incoming Test/Characterization Program
    - Utilize Automated Test Generation Process

  - PROTOTYPE DEBUG & CHARACTERIZATION

    - Parallel Debug of Chip/Board Prototypes with User
    - Comprehensive Data Collection & Comparison to Specs

  - VENDOR/CUSTOMER CORRELATION

    - Resolution of Application/Test Problems
    - Comprehensive Eval of Board/System Test & Reliability Data

  - OPTION SPECIFIC QUAL

    - Eval of Any Variation From Previously Qualified Base Array
    - Accelerated Lifetest for Reliability
    - Understanding/Resolution of Failure Mechanism

  - PACKAGE IMPLEMENTATION

    - Resolution/Support of Packaging application Problems
    - Evaluation of Changes to Package/sockets/Heat Sinks

PROCESS DESIGN AND SUPPORT

TMC recommendation

Do NOT do special in house hardware; namely CAD/Design Station. It's not cost effective today, and will lead to internal special purpose software development requirements tomorrow.

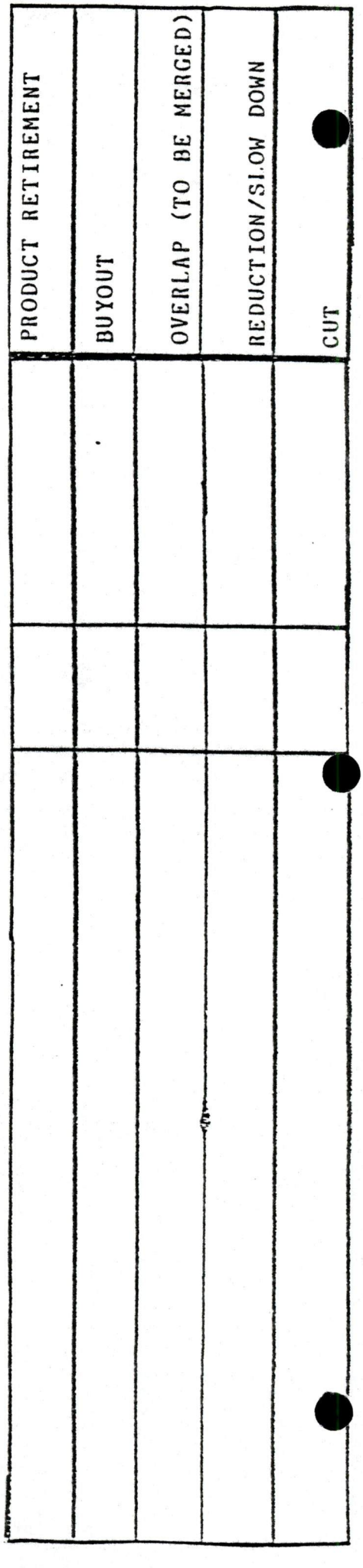
	Project Cost $K
	FY83
Unigraphics	
Unigraphics Support	400
Unigraphics Walk In	100
Analysis Support	200
Design Automation Tool's	900
	1600
N.B. Anderson Total	$1700

TMC Review slides attached
Anderson slides attached

PROCESS DESIGN AND SUPPORT

1. Do we really need to spend $1M on internal marketing of Unigraphics?

2. Central UNIGRAPHICS support should be disbanded ($1M?). Support should be supplied by the vendor. The internal groups adds essentially no value.



GOALS

DECENTRALIZE LARGE UNIGRAPHCIS USERS

RETAIN CENTRAL UNIGRAPHICS SUPPORT FOR MEDIUM TO SMALL USERS

RETAIN CENTRAL CAD/CAM AND ANALYSIS DEVELOPMENT TO ENABLE AN INTEGRATED MECHANICAL PROCESS

MECAD
ORGANIZATION

25 JUNE 82 REORGANIZATION

DON METZGER - PROCESS DESIGN AND SUPPORT

- PROCESS TECHNOLOGY DEVELOPMENT
- COMPONANT ENGINEERING
- TOPS

WALT HANSTEIN - ELECTRO-MECHANICAL DESIGN

- ELECTRO-MECHANICAL DESIGN ENGINEERING
- INDUSTRIAL DESIGN
- INDUSTRIAL PACKAGING ENGINEERING
- LOW END POWER SUPPLY
- MECHANICAL TECHNOLOGY
- MECHANICAL CAD/CAM

MECAD SERVICES
MECHANICAL CAD/CAM/ANALYSIS

PROVIDE:

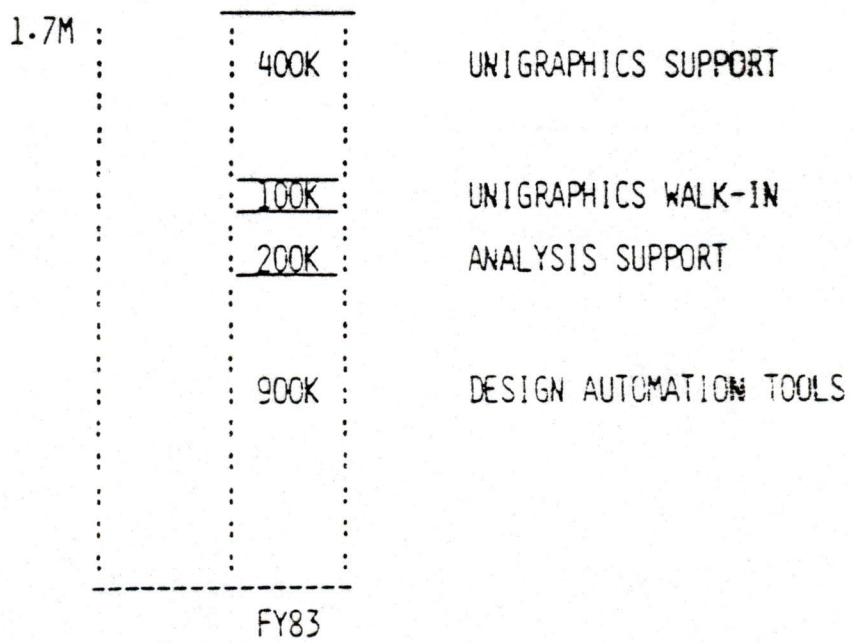
CUSTOMER SUPPORT

- INSTALL AND MAINTAIN UNIGRAPHICS CAD/CAM
- MAINTAIN ANALYSIS AND CAD/CAM WALK-IN SERVICE

DESIGN AUTOMATION TOOLS

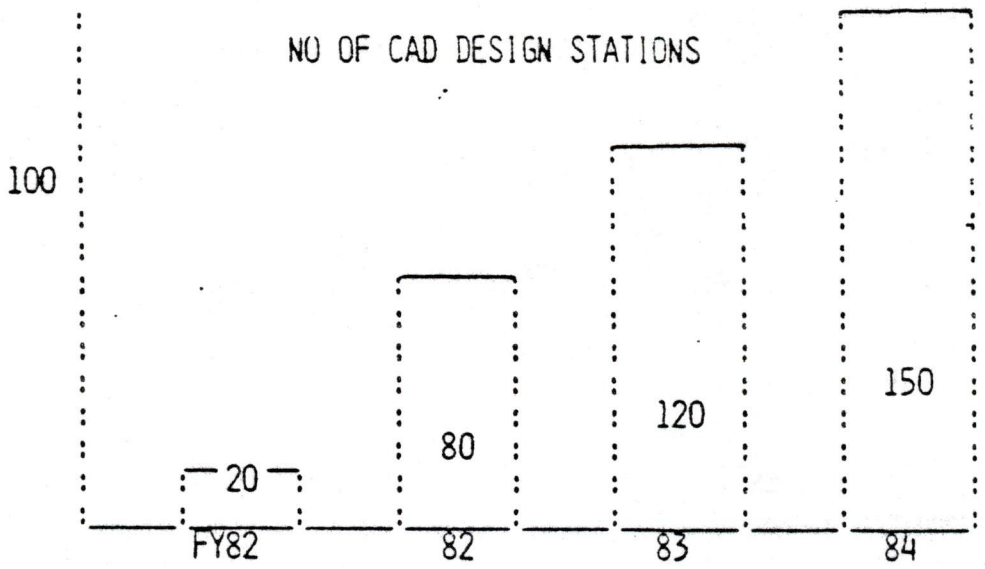
- UNIGRAPHICS ENHANCEMENTS
- NEW CAD SYSTEMS
- ANALYSIS TOOLS
- DESIGN SYSTEM INTEGRATION

FUNDING:



CUSTOMER SUPPORT - UNIGRAPHICS

STATUS



100 TODAY

50% SATURATION

SERVICES

INSTALL SOFTWARE AND DESIGN STATIONS
RECONFIGURE HARDWARE
VENDOR LIASON-PROBLEMS, REVISIONS

RESOURCES

$300 TO 500K

FOUR PEOPLE

CUSTOMER SUPPORT - ANAYLSIS

STATUS

NEW FINITE ELEMENT SYSTEM
25 USERS TRAINED.
DEDICATED VAX 780
GENERAL ANALYSIS TOOLS
2ND FINITE ELEMENT SYSTEM INSTALLED COLORADO SPRINGS

SERVICES

MAINTAIN WALK-IN OPERATION
ANALYSIS SOFTWARE SUPPORT AND VENDOR LIASON
GENERAL ANALYSIS PROGRAMMING

FUNDING/RESOURCES

200K TWO PEOPLE

DESIGN AUTOMATION TOOLS

PROGRAM	DEVLIVERABLES	BENEFITS
SOLIDS MODELING	- EVALUATION - BUY-OUT PACKAGE	- EASE OF USE/REVIEW - COMPLETE DATA MODEL ENABLES AUTOMATED CHECKS (COLLISION, INTERFERENCE)
MECHANICAL ANALYSIS	- GRAPHICS PREPREOCESSOR - SPECIFY CAD INTERFACE	- REDUCE MODEL PREPARATION TIME - BEGIN LINKAGE TO CAD
CAD DESIGN STATION	- FUNCTION BOX AND MESSAGE MONITOR - VS11 - EVALUATE VT100 AND VS100	- LOW COST DESIGN STATION - RANGE OF TERMINALS
DATABASE/ NETWORK	- NETWORK DESIGN - DESIGN LIBRARY - NEW FILE MGR - SPECIFY DCF/EPLS INTERFACE	- DESIGN DATA SHARING - QTA/DESIGN - MFG
UNIGRAPHICS ENHANCEMENTS	- DIE DESIGN - UNBENDING	- MFG AUTOMATION

P&DS BUDGET EVOLUTION

ORIGINAL FY83 ASSUMPTIONS

	PEOPLE	$
PTD	725	56.8
TOPS	491	24.8
C/E	129	8.4
TOTAL	1345*	90.0

REALIGNMENT OF FUNCTIONS < - P&DS>

HANSTEIN	145	8.9
TOPS	83	4.4
ME/CAD	18	1.8
P/P	44	2.7
TWKS	43	2.1
P/P MARSHALL	14	.7
P/P STAFFIERE	29	1.4
MFG GROUPS - C/E	45	2.3
TOTAL TRANSFER OUT	-233	-13.3
NET P&DS FY83 BUDGET	=1112	=76.7
DELETE AP MFG	-152	-10.4
SUBSEQUENT BUDGET REDUCTIONS		-4.4
MOST REALISTIC COMPARISON PLAN	960	61.9

* HEADCOUNT ADJUSTED TO REFLECT 55 CONTRACT WORKERS ON BOARD OR IN THE PROPOSED BUDGETS.

ACTUAL HEADCOUNT UPDATE

	MAY	JULY	CHANGE
ACTUAL COUNT	860	900	40
RATIONALE			
FACILITIES	13	29	16
OFFICE SERVICES	4	6	2
PURCHASING	9	13	4
PERSONNEL	17	19	2
SUMMER *	0	5	5
COLLEGE *	14	19	5
MISC. ADDS **	--	6	6
	57	97	40

* PREVIOUS COMMITS

** MUCH ACTIVITY IN ALL CC'S
NET ADD OF 6 - SOME PREVIOUS COMMITS
ALL ENGINEERS (DL)

P&DS

SOURCES AND USES OF FUNDS

($M)

SOURCES	$	%
E98 ENG	14.4	24
E97	11.0	18
E69	2.5	4
NPLSU	8.8	15
MAT ACQ	2.6	4
G&A	.5	1
MERKSAMER COMP SVCS(ENG)	2.9	5
VACANT SPACE RENT	1.2	2
INDIRECT		
ENG. MFG,P/L (ERNY)	.7	1
ENG. (ROSE)	7.0	12
ENG. (THORPE)	.5	1
MFG P/L, OTHER (ROSE)	7.5	12
	59.6	100%

USES	$	%
ROSE-TECHNICAL	20.4	33
THORPE-PROCESS	12.1	20
STRAKA-DESIGN	9.0	14
ERNY-OPERATIONS	20.4	33
	$61.9	100%

SOURCES: (RECAP)	$	%
ENG	24.8	42
MFG	28.4	48
OTHER	6.4	10
	59.6	100

TOTAL USES	$61.9
TOTAL SOURCES	59.6
UNFAVORABLE VARIANCE	$2.3

RUN RATE

1.	RUN RATE PER PERSON (BASED ON MAY ACTUALS)	$66.9K/PERSON *
2.	FY83 PROJECTED SPENDING USING MAY HEAD-COUNT (860)	$57.5M
3.	FY83 PROJECTED SPENDING USING JULY HEAD-COUNT (900)	$60.2M
4.	FY83 EBS BUDGET	$61.9M

* MAY FY82 DATA ADJUSTED FOR DEPRECIATION, FACILITIES, AND INFLATION FOR FY83.

OPPORTUNITIES

SUPPORT GROUP CONSOLIDATIONS

MIS - CAPITAL

PERSONNEL

DEPR. EXPENSE (CAPITAL)

UNIT CHARGE ON QTA

COST CENTER SPENDING PROBABLY CONSERVATIVE

EXPOSURES

UNLIQUIDATED SPENDING ($2.3M)

INDIRECT FUNDING

HIGHLY RECOMMENDED LIST

MIX OF SOURCES (ARE WE REPORTING PROPERLY?)

- D. METZGER
8/24/82

****
Digital
****

TO: *JOE REILLY

CC: PETE STRAKA

DATE: THU 26 AUG 1982 5:17 PM EDT
FROM: DON METZGER
DEPT: PROCESS & DESIGN SUP.
EXT: 223-9740
LOC/MAIL STOP: ML1-5/B98

MESSAGE ID: 5173752663

SUBJECT: ENGINEERING ALTERNATIVE RECOMMENDATIONS

It comes as no surprise to you that I have blown the 8/25 date for inputs on the subject. Pete Straka and I are working on a CAD recommendation along the following lines:

1. Do Nautilus MCA I design in MR with MR tools.
2. Develop next generation common tools around DECSIM/CHAS from Hudson.
3. Use Pete's group as an export and standard-setting agent.

The savings will be great in the long run, but difficult to quantify. We will be recommending a small team of folks to go off to flesh out this strategy and the impacts on resources. Hope to be ready early next week.

P/L Eng.

PROJECT NAME AND SUMMARY DESCRIPTION	CUR PHS	FRS	IRR%	LIFETIME NOR INCL SVC $B	ENG EXP LIFETIME $M	NPSU $M	SERVICE EXPENSE $M	FY82	ENGINEERING EXPENSE $ FY83	FY84	FY83 $M AT SPENT IN C/E
ASG -											
o DF04 Modem	0	Q2 84	277	.0157	.5			.1	.5	0	
o MISC Engineering (12 projects+ .4M reserve) DIST SYSTEMS $1.1M, Power Supplies $.25M, Other Mechancial Design $.28M, Reserve $.4M								0	1.9	2.6	
AS&G TOTAL, UNIDENTIFIED = 0								.93	2.1	2.6	2.1
SOFTWARE SERVICES (no breakout submitted)								2.4	2.5	3.8	
EDUCATIONAL SERVICES (no breakout submitted)								1.8	0.6	2.5	
PRODUCT GROUP TOTAL ENGINEERING EXPENSE LINE SHOWN PAGES 1-9 ABOVE									73.8		28.5
ON-LINE BUDGETING SYSTEM AS OF 26 AUGUST (SOFTWARE SERVICES SHOWS C/E SPENDING OF $3.1M IN CURRENT O.-L.B.S. PASS)									71.0		32.5
CSSE Jon F. Schoomaker - 223-9593											
NOTE: These appear on the Service expense line under the general heading of Maintainability Engineering (not included are the cost of Control Distribution Kit - FY82 - $16.4M, FY83 - $21.0M, FY84 - $27.3M).											
16B								1.6	1.0	1.5	
32B								2.1	2.1	2.6	
36B								1.3	1.4	1.8	
Terminals & Workstations								1.1	1.7	2.1	
Mass Storage								2.4	3.5	4.4	
Software								3.9	6.4	8.1	
Distributed Systems								2.4	2.9	3.7	
Product Line								4.1	3.3	4.2	
RAMP								1.3	1.8	2.3	
o RD, Remote diagnostics hw/sw investments								2.9	3.7	3.7	
o IVIS, interactive video instruction for technical training			120					.6	1.1	1.2	
o A/D PERICLES, joint with MIT; artificial intelligence for system diagnostics								0.5	0.7	0.9	
o Administration								1.2	1.1	1.4	
CSSE TOTAL, (Service expense line only - no ENG EXP shown)								25.4	30.7	37.9	

PROJECT NAME AND SUMMARY DESCRIPTION	CUR PHS	CUR FRS	IRR%	LIFETIME NOR INCL SVC $B	ENG EXP LIFETIME $M	NPSU $M	SERVICE EXPENSE $M	ENGINEERING EXPENSE $ M FY82	FY83	FY84	FY83 $M SPENT IN C/E
CSS - William A. Schwickrath - 264-6352											
o NETWORKS:											
KASTOR - QBUS com processor								.2	.1		
POLLUX - UBUS com processor								.1	.1		
DT07 - UBUS switch								.2	-		
DZS1 - Stat MUX								.3	.1		
DZSII - Stat MUX								-	.4		
KMS - Com Processor								.2	.1		
KMS/SDLC - Com processor protocol								-	.1		
KMS/DECnet - Com processor protocol								-	.1		
PCL/VAX - PCL on VAX								.1	-		
TITAN - SYN Processor								.1	.3		
X.25 SW - X.25 software								-	.2		
PBX - PBX Interface								-	.1		
FEP VAX - VAX Frontend processor								-	.2		
o GRAPHICS:											
VTV31K - Graphics interface								.2			
VT36 - Graphics workstation								.2	.1		
VS11 ENHANCE - VS11 Graphics workstations enhancements								.1	.2		
GIANT - Graphics workstation								.1	.4		
GRAPHICS MON - Graphics monitor								-	.1		
VIGL - Graphics software								.1	.1		
KANJI/PHII - Character sets								.1	.1		
VT125 TEC - Graphics software								-	.1		
VT31 - Graphics display									.1		
GRAPHICS I/O - graphics I/O								-	.1		
o PERIPHERALS:											
TSV05 - streamer tape								.4	-		
TS05 S/W - TSV Software									.1		
LXY32 - printer/plotter									.3		
MINIWINI - Micro Winchester								.1	.4		
LP27 - 1200 LPM printer								.2	.1		
LXY/BC - printer/plotter option								.1	-		
o INDUSTRIAL/SCIENTIFIC:											
IEX - IEEE448 interface								.2	-		
CMR - I/O subsystem								.1	-		
CMR/T11 - I/O subsystem/T11								.1	.1		
CMR SGLE BD - I/O subsystem									.2		
MICRO TEMPL - T11 template									.1		
PMCS - Process monitor & control								.2	.1		
FDCM - Factory Data Collection								.1			
RT 100/137 - Ruggedized terminals								.1			
DRX11/CATB									.1		
CMR/1P11 ENH - I/O Subsystems									.1		
VS11/APMCS									.1		
SMRTBOX									.4		
DNC11									.1		
o Engineering Development Programs								.6	.7		
o Area Discretionary Funds and Miscellaneous Projects								1.4			
CSS TOTAL, FY83 UNIDENTIFIED = <2.1> (BOD SHOWS 3.936)								6.0	6.0		

PROJECT NAME AND SUMMARY DESCRIPTION	CUR PHS	FRS	IRR%	LIFETIME NOR INCL SVC $B	ENG EXP LIFETIME $M	NPSU $M	SERVICE EXPENSE $M	FY82	ENGINEERIN EXPENSE $ FY83	FY84	FY83 $M MT SPENT IN C/E
PBI COMMERCIAL GROUP - Rick Hill 264-5290 / PBI: Brian Mullan - 264-6036 / Peter Martin - 264-6102											
o DECset: V2 PBI only, integrate DECset V1 with "data logic's" "pager" (joint venture), maint for DECset								1.6	1.4	2.3	
o DECset/OFIS joint with C/E to provide DECset features to OFIS users											
o MEDIA:											
CABLE: On-line desktop addressable VAX converter	0			.001	.2			0	.2	.3	
Library V5.3 forerunner to integrated newspaper system								.7	.2	0	
CMS VAX Common Phone RM for circulation & Class AD	0			.040	1.0			0	.4	.6	
Editorial Pagination for newspaper production	0			.101	.6			0	.2	.4	
Office Editorial System migration of 11/70 to VAX/PC								0	0	.3	
o Project Engineering								.8	.7	.6	
o Documentation								.3	.2	.2	
o Cable Tech Consultation								0	.1	0	
o ADV DEV								.4	0	0	
o OTHER: PG HW Engineering Function								.4	.3	.3	
PBI TOTAL, FY83 UNIDENTIFIED = 0 (memo 23 July On-Line Budgeting System shows PG total of $3.4M in FY83 and spending in CE = $2.516M)								4.2	3.7	5.0	3.4
TIG COMMERCIAL GROUP - Rick Hill - 264-5290 / TIG: Bill Howerton - 264-5043											
o VNX: "C", MMS UNIX Productivity tools on VMS				.015	3.5			.9	1.0	1.2	
o BX.25 BELL System X.25 Protocol Enhancements					.5			–	.2	.2	
o PBXT1 Interface				.1	2.3			–	.3	2.0	
o DMZ-32 Buyout				.275	.6			.1	.5	–	
o TIG APPLICATIONS:											
DNSS Industry applications tools				.080	.2			–	.1	.1	
UMS Industry applications tools				.080	1.0			.1	.4	.5	
COSMOS				.020	.3			.3			
o DR750/CI				.255	.5			.2			
o GEMINI					.5			.2			
o ML-11 RAM pseudo disk					.5			.5			
o TIG COST CENTERS (SUPPORT)											
ACS				.250				.6	.7	.9	
UNIX				.200				1.0	1.1	1.3	
TECH SUPPORT								1.3	1.7	2.0	
VAX COMM.								.7	.2		
o ADV DEV:											
4540 Blockmode - VMS								–	.3	.3	
VAX/UNIX LAN (UCLA)								–	.1	.1	
VIDEOTEXT				.100				.2			
TIG TOTAL, FY83 UNIDENTIFIED = <188>								6.4	6.6	8.6	2.73
OFIS COMMERCIAL GROUP: OFIS PRODUCT GROUP											
o Acceleration of Office Technologies to insure competitiveness			150	.557	1.2				1.2		
o Projects under 500K									0.8		
o Applications technical support - Central Engineering Funded								1.0	0	0	
OFIS TOTAL								1.0	2.0	0	2.0

PROJECT NAME AND SUMMARY DESCRIPTION	CUR PHS	FRS	IRR%	LIFETIME ENG EXP NOR INCL SVC $B	LIFETIME NPSU $M	SERVICE EXPENSE $M	ENGINEERING EXPENSE $ FY82	FY83	FY84	FY83 $M PIT SPENT IN C/E
MDC COMMERCIAL GROUP - Rick Hill - 264-5290 / MDC: Bill Lowman - 264-4346 / Steve Gutz 223-2239										
o VMCS - manufacturing control system; shop floor MRP purchasing software package (VAX manufacturing control system)	2	Q1 83	24	.0326	1.0		.5	.5	?	
o DY32 - Dataway interface to VAX	2	Q2 83	36	.365	1.9		.6	.7	?	
o DYX02 - Fiber optical link to Dataway	4A	Q1 83	-	.0022	.3		.1	0	0	
o DYS50 - remote computer system for Dataway	2	Q3 83	22	.0143	.3		.2	.1	?	
o INDUSTRIAL SCREW TERMINAL	0	Q1 84	?	?	.1		0	.1	?	
o A/C I/O Module							0	.2	?	
o HW SW SPT - service expense line for MDC equipment under warranty, etc. (SPRS, ECO's, module repair, etc.)							.705	.552	.607	
o FCC COMPLIANCE							-	.068	.075	
o CZK MP - diagnostic for DY32							.119			
o DPM16 V4.2, V1.2							.260	.054	.059	
o ISV11 ECO - support for Q22 Bus: including all ecos to options							-	.526	.579	
NOTE: All above items represent specific commitments to customers on equipment either to be sold or already delivered.										
o ADV DEV MISC							.112	-	-	
o Robotics Workstation - hw and sw construction of higher level languages input to control automation equipment (joint with Vendors and DEC MFG)							.146	.276	.304	
o Industrial Micro Processor - getting DEC into the program logic controller (industrial Micro Controller Chip HW and SW business)**							.124	.100	.110	
o Factory Interconnect - Cabling etc., for Industrial Local Area Network							-	.075	.082	
o Network Enhancements - Evaluation of proposals (i.e., to be competitive with IBM token ring) of Industrial Interconnect Products and Standards							-	.100	.110	
o General Overhead								.074	.483	
o Evaluation/Consulting								.175	.083	
MDC TOTAL, FY83 UNIDENTIFIED = <.377>							2.9	3.6	4.3	
** NOTE: MDC has a proposal to expand the Industrial Microprocessor project for major spending thru FY90. The first three years, starting with FY83, would be $2.0M, $8.0M, and $13.6M. Revenue thru 1990 would be $3.8B.										
CSI COMMERCIAL GROUP - Rick Hills - 264-5290 / CSI:										
o SGB - Tech support for special package				.040			.333	.337	.050	
o ADVANTAGE - F.S. Tech support for All-in-1							-	.154	.180	
o Personal Computer - SW producers program for 3rd party PC compatible SW							-	.100	.100	
o ADV DEV, E/U SW House Program							.064	-	-	
o OTHER ENGINEERING EXPENDITURES										
All-in-1 Development							.240			
CSSE - Tech support							.020	.020	.020	
Central Group Engineering allocation							.294	.151		
CSI TOTAL, FY83 UNIDENTIFIED = <.059>							.951	.802	.350	

PROJECT NAME AND SUMMARY DESCRIPTION	CU PHS	CU FRS	IRR%	LIFETIME NOR INCL SVC $B	ENG EXP LIFETIME $M	NPSU $M	SERVICE EXPENSE $M	FY82	ENGINEERI EXPENSE FY83	ENGINEERI EXPENSE FY84	FY83 $M AMT SPENT IN C/E
TVG - Peter Graham - 225-5358 / Roy Moffa - 225-4760											
o PROGRAM I. Maintain base and support general purpose systems				1.0							
BA11-Q (comp box), MRV-11D (Q22 ROM boot), MXV-11B (ROM-test-boot), KDJ-11A (J-11 dual CPU)									.366		
MACDBG V2 support on VMS, extend for memory management (MACRO debugger)									.200		
SABER I, II C/E project FCC packaging 3 1/2" rack mount box product									.320		
o PROGRAM II. Maintain base for dedicated (built-in) applications				.01							
PROMBIAST SW VMS/RSX/RT11 program to support new HW products									.110		
U POWER RHS - MICROPOWER SW to support new HW products									.500		
o PROGRAM III. Dedicated microcomputer - single board multiprocessing computers				.03							
- F-11 FIC: Logic interface for F-11 on single board computers									.267		
- MICRO POWER SILICON - ROM version of MICROPOWER SW - project cancelled											
- ISBC/Multiprocessor (KXF/DAM)									1.205		
- M POWER Mulitprocessor hookd for F-11 multiprocessing CPU (KXF11)									.925		
- RMX-11A: RD50 mini disk interface for single board group									.104		
- KXJ: Multiprocessing HW with J-11 and parallel I/O									.366		
- J-11 JIC: Interface logic to J-11 for single board computer									.389		
- QMIC: Single chip multiprocessing interface support for QBUS									.664		
o PROGRAM IV. Expand General Purpose Single Board Computer market share				0.1							
MSV-11: Memory module for use with KXT? (incorporating 256KB chips?)										.320	
KXT/IOP: T-11 based I/O processor for single board computer									.426		
RXX-11A, DNX-11A, DPX-11A: Smart HW and SW interfaces on single board computer for Disk and communicating									.445		
Runtime, IOP/SW									.250		
o PROGRAM V. MICROPROCESSOR Program - multiprocessor programming tools: MICROPOWER PASCAL, Engineering support of 16b Chip development system Development of documentation beyond MICROPOWER PASCAL									1.680		1.680
o ADV Design, P&AS, Administration									2.150		
SUMMARY TVG, FY83 UNIDENTIFIED = 0				1.5					10.68		6.6 (7.0)

NOTE: Revenue assumptions include C/E spending on FPA Scorpio, BSA ACCEL, J-11 FPA, etc. Unidentified is difference between reported and BOD.

PROJECT NAME AND SUMMARY DESCRIPTION	CUR PHS	FRS	IRR%	LIFETIME NOR INCL SVC $B	ENG EXP LIFETIME $M	NPSU $M	SERVICE EXPENSE $M	FY82	ENGINEERI EXPENSE $ FY83	FY84	FY83 $M MT SPENT IN C/E
COEM - John S. Niggl - 264-7512											
o DIBOL-82 VI, first major enhancement since 1975	0	FEB 83	31	.136	1.8	0	0	0	.798	.798	
o DIBS-11 VI, put CTS300 & RSTS/E on VAX	5	NOV 81	20	.596	1.1	0	0	.250	.240	0	
o VAX DIBOL VI, DIBOL-82, CDD, FMS, improve 11/730 DIBOL put DIBOL-11 on VMS	5	FEB 82	32	.011	.85	0	0	.322	.285	.240	
o OTHER Engineering Expenditures (20+ projects included in breakout below)								3.9	2.5	3.3	
This breakout includes items noted above but represent the current FY83 budget:											
- DECtype: WPS applications for CTS300 (DIBOL system) .236											
- Quill: user inquiry language .118											
- Indent II: forms management .118											
- Indent VAX: forms for VAX .276											
- Graphics: business graphics .276											
- DIBS: general ledger for DIBOL .394											
- RPG: maintenance ? .0392											
- CTS300 .187											
- DIBOL/RSTS .2855											
- DIBOL/VAX .236											
- DIBOL/XT .236											
- DIBOL/81.5 .394											
- COS310 278, support joint with Small Systems .0788											
- R&D .118											
- TAP: applications generator .400											
- Milton: cabinetry, pkgs and power for the commercial market .300											
- DECword, EAS, CI, RSTS/E and Other Projects .195											
COEM TOTAL, FY83 UNIDENTIFIED = 0								3.830	3.841	4.301	3.840

PROJECT NAME AND SUMMARY DESCRIPTION	CL PHS	FRS	IRR%	LIFETIME ENG EXP NOR INCL SVC $B	LIFETIME NPSU $M	SERVICE EXPENSE $M	FY82	ENGINEER EXPENSE FY83	FY84	FY83 $M AMT SPENT IN C/E
LCG - Bill Gervais - 231-6866										
o LCG COMMUNICATIONS SUMMARY DECnet 10 V.30, DECnet 20 X29, TOPS20 AN			100				.4	.160	.090	
o LANGUAGES SUMMARY PASCAL20, COBOL81, DATATRIEVE20, FORTRAN V7, PASCAL10 V1.0, PASCAL10/20 V.2			100				.3444	.890	.810	
o LAYERED SOFTWARE SUMMARY MS10-20 DEV, RUNOFF upgrade, CMS, CT XT, MICROTOOLS			100				.0511	.688	.450	
o OPERATING SYSTEMS SUMMARY TOPS10 V7.02, GALAXY V 4.1, T20			92				.422	.187	.090	
o FCC KL's								.400		
o EXTERNAL RESEARCH								.175		
LCG TOTAL, (As per July 23 On-Line Budget System and verbal input from Bill Gervais)								2.500		1.8
TPG - Mike McGrath - 278-4011 / Bill Burke - 278-4348 / Ames Coney - 278-4387								1.8		
o PROGRAMMABLE PRODUCTS										
Rainbow 100 CP/M 86-80 based	1	Q2 83	33	1.1	18.1	1.6	.2	2.2	3.8	2.8
ROBIN (VT18X) CP/M upgrade to VT100	3	Q3 82	29	.1	2.6	1.1	.3	2.2	.2	0
TIGER, RAINBOW follow-on		Q2 84							.9	1.7
ROBIN Graphics (VT185)	0	Q1 83		<.1>		.5	.1	.2	.3	-
o NON-PROGRAMMABLE PRODUCTS										
LA12 Portable Printer	3	Q1 83	33	.3	12	2.2	.2	2.6	.2	-
BF05 Buffer	0	Q2 83	38	<.1>	.6	.2	-	.3	.2	
o PRODUCT SUPPORT										
Hardcopy/Video								.3	.5	.1
Product Assurance								.1	.2	.2
MKTG SPT includes special projects								.1	1.3	1.6
o ADV DEV										
CHIPMUNK - Portable PC								-	.5	.2
WORKHORSE - PC Workstation								-	.2	3.0
PBT - PC Business Computer								.4		
o OTHER										
Product Enhancements/Special Projects Hardcopy/Video								.1	.7	.5
ECO Provisions								.6	1.8	1.5
Other								.7	2.5	2
TPG TOTAL, FY83 UNIDENTIFIED = 0								9.1	10.8	11.6 1.4
DECmate - Dick Loveland (per 27 August memo from J. Lawless)										
o Terminals & Workstations - HW $2.8M, APPL SW $2.0M, PRINTER $.75M, Product Management Support $1.23M, Software QA (B. Fitzgerald) $.22M, OFIS $2.8M								9.8		9.8
SMALL SYSTEMS (pers 27 August memo from J. Lawless)										
o IA100 Support $.532M, IA12 $.485M, Lightweight Printer $.1M; Direct to Phoenix $.2M; FONT development $.1M, Video $.3M, Hardcopy Terminals Project to be identified $.1M (Credit of approximately $.4M due Small Systems from C/E not included								1.8		1.8

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LDP - Steve McGown - 231-7497											
o CINNABAR (announced) real time hw & sw for Professional (IEEE488, SLU,DR)	1	Q4 83	579	.23	1.01	-	-	.1	.91	-	
o QUICKSILVER real time I/O server on LAN's or as satellite front end	0	Q1 85	64	.25	4.8	-	-	.5	1.74	2.56	
o CROCUS Information management for resch & svc Labs (e.g. Chemical and pharmaceutical)	0	Q1 84	499	.052	.69	-	-	-	.63	.06	
o MISC PROJECTS:											
SAS BRIDGE: Software bridge between DEC CDD 7 SAS CDD (Common Data Dictionary									.02		
FASTBUS - investigate bus architecture and standards									.015		
Remote MINC, pkg with DMV, SW, I/O									.09		
Graphics, scientific plot with corp. graph. prod (i.e., DECview, PC)									.150	.3	.150
o CORPORATE FUNDED PROJECTS:											
"C", UNIX Languages								.125	.200	-	.200
OFIS scientific characters for WPS								-	.150	-	.150
DR32/FASTBUS with CSS Japan								-	.030	-	
DR32 for Nautilus								-	.050	-	.050
o Product Support/Maintenance for some 12+ products: MINC SYS. & I/O, MINC BASIC, FEP-11, IBS-11, LPA-11 & I/O, VT11/VR17, RGL/VMS, RGL-11, CINNABAR, CROCUS, RGL-11, MINC BASIC V3.0								-	.926	-	
o ANSI Basic for MINC including maintenance release								.113	.40		
o REGAL Basic maintenance release								.131	.008		
LDP TOTAL, FY83 UNIDENTIFIED = <.210>{BOD PL ENG shows 5.109 (on 1JUL82)}									5.319		1.742
ESG - Jeff Stoddard - 231-5153											
o DECOR, VAX library of graphics device-independent subroutines		Q3 83	499	.009581	1.683	-	-	.334	.490	.544	.145
o WORKSTATION 68000 based 19" RAster with Software								.562	.356	.450	
o MDGS SW for secure communications and archiving of engineering data								.050	.170	.415	
o Human engineered applications switch for easy changing (i.e., All-in-1 for engineering applications)								-	-	.250	
o FASTEK - increase disp speed, cut CPU overhead, increase dist between graph and host								.136	.278	-	
o ADV DEV - TECH EVAL								.042	.292	.439	
o EXT. APPLICATION SOFTWARE Library								.038	.075	.115	
o XT PERS COMP									.025	.050	
o MISC PROJECT MGT, forecasting & CSS VS70 phaseout								.154	.093	.176	
ESG TOTAL, FY83 UNIDENTIFIED = 0								1.316	1.779	2.438	.145

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MSG - Joe LeBlanc 225-4222											
o DECrad: develop, launch and support a new radiology $60K software pkg	1	12/82	43	.0424	2.2	-	.1	.6	.6	.3	
o DECheath: develop, launch and support occupational health $100K sw pkg	1	3/83	49	.0438	2.1	-	.1	.3	.4	.5	
o GAMMA-11	4	Ship'd	29	.0192	1.8	0.1	-	0.7	.5	.2	
o OTHER NEW PRODUCTS: Include imaging, pharm, admissions	-								.2	1.1	
o DIGITAL Standard MUMPS enchancements and support	4	Ship'd						0.2	0.2	0.2	
MSG TOTAL FY83 UNIDENTIFIED = 0*								1.8	1.9	2.3	0
GSG - Elaine Reid - 264-4545											
o H9660 RFI Cab (0 RFI like Tempest)	2	Q3 83	45	.016	.6	.1	0	.420	.250	0	
o RFI Product support								.030	.027	.050	
o ADV DEV Appl Engineering								.330	.230	.370	
RFI/EMI								.490	.823	.936	
ILS								0	.180	.370	
COMMUNICATIONS								.088	.120	.370	
CERT & STDS								.430	.300	.098	
SECURITY								.156	.240	.246	
OFFICE AUTOMATION								.259	0	0	
o OTHER Engineering Expenses								.030	.030	.024	
GSG TOTAL, FY83 UNIDENTIFIED = 0*								2.233	2.2	2.464	.570
TPL - Pauline Therrien - 264-6746											
o MKTG MFG and ENG support								.361			
o PDP-8 Hotline								.098			
o VT278 HW and SW support								.216			
o MKTG ENG support								0	.255	.283	
TPL TOTAL, FY83 UNIDENTIFIED = 0								.675	.255	.283	0
ECS - John Andrews - 231-6391											
o GIGI Enhancements: PLOT, MISC							.5	.540	.140	0	
o THIRD PARTY JOINT PROJ: Admin SW, West'house, Waterloo, U Delaware								.310	.450	.650	*
o DIMENSION: CAI Tool new venture project using new terminal products								.380	.140	.140	
o DOCUMENTATION: ECS Writer & SW Documentation								.210	.240	.240	.025
o RPG: originally a joint, now only an ECS project, typical educational spec									.175	.200	.175
o OTHER (UNDEFINED): Maintenance of equipment, administration								.263	.422	.296	
ECS TOTAL, FY83 UNIDENTIFIED = 0*								1.703	1.567	1.526	.200

NOTE:

1 "FY83 UNIDENTIFIED" appears on the TOTAL line for each Product Group. It indicates the difference between the Product Group's Engineering budget for FY83 as shown in the On-Line Budget System and the sum of the projects shown herein.
2 Detailed projects in the Product Group sections were submitted during June. Some of these have changed and may contribute to totals not adding up.

EG:kr(prod[illegible]7

INDEX

Other General
Questions/Ans.

****
* d i g i t a l *
****

To: see "TO" DISTRIBUTION

cc: PSD STAFF:

DATE: WED 28 JUL 1982 12:21 PM EDT
FROM: MIKE GUTMAN
DEPT: PSD
EXT: 223-5285
LOC/MAIL STOP: ML012-2/E71

MESSAGE ID: 5170833009

SUBJECT: REQUESTED COMMENTS ON ENGRG BUDGET

**** THIS EMS IS FROM BOTH MIKE GUTMAN AND JESSE LIPCON ****

9.86

We have examined the Engrg budgets and have the following comments/ observations/questions.

1. VENUS/NAUTILUS. If Venus is closer to 3.5 X 780 and Nautilus is closer to 2.9 X 780, do we really need both? Should we establish a minimum spread between the two - and if not met, one should be stopped?

2. OFIS/XT AND OFIS/M+. The investment here is very high. (4400 in FY83, 7190 in FY84). Can't we merge the two (same operating system) and significantly reduce the cost?

3. VAX-11 TSS, V1. Why can't we resolve the overlap with FMS NOW, and save a half million?

4. STORAGE

   a. We have too many tape programs - TU80, TU81, MAYA, TSV05, UB Version of TSV05, plus existing TS11, TU77, TU78. Let's forego at least one (TU80 is our choice) and accelerate MAYA - desperately needed by end FY83. Otherwise, we'll be forced into buyout.

   b. RX52 - suggest this be looked at in following light: How much capacity can we get with current mechanism and cost, going double sided, but still able to read RX50 disks? Clearly not a disk backup product, but certainly a floppy based product at very low end (PC's).

   c. RAXY - How sure are we that the world really needs another larger removable disk?

   d. RAXX at 600 MB is not a big enough step from RA81 at 450 MB. Same observation RAXY over RA60.

   e. Before we invest in RDXX or Shrimp, need to be sure we understand the cost frontier curve and that these products are on it. Otherwise, keep buying out.

f. We're still in search of a low end strategy!

5. PLUTO

Are we doing this the right way? Today we are using 11/24 with protocol accelerator. But protocol accelerator will not be in first SW release. Faster, cheaper and better migration path might be LCP + QNA for gateway/routers, and statistical MUX for terminal concentration. Natural upgrade will be J11 board replacing F-11 board in LCP.

6. BROADBAND

Are we spending money (1/2 million) solely as a reaction to Wang hype?

7. TVG

a. FIC and JIC may be unnecessary if we go to state machines. Is F-11 old enough now that we should stop new developments around it? ($700K)

b. Do we really want to introduce yet another new (KX) bus? ($440K)

8. GSG

$823K invested in RFI/EMI seems unusually high. What's it for?

9. DECMATE II

Do we really want/need to invest another $9.8M in the 8's in FY83? This is 2/3 of what we're investing in CT ($14.7M), and more than 2X Rainbow investment ($3.8M). Do revenues in DECMATE really support this magnitude of investment?

28-JUL-82 13:41:21 S 02998 CORE
CORE MESSAGE ID: 5170809203

"TO" DISTRIBUTION:

EMC:
ROY MOFFA

LEES:
PEG:

WARD MACKENZIE
HARVEY WEISS

****
* d i g i t a l *
****

TO. *BOB FLYNN
GRANT SAVIERS
cc. SSD STAFF.

DATE: FRI 20 AUG 1982 2.13 PM EDT
FROM DAVID W BROWN
DEPT: STORAGE SYS. ENG.
EXT: 292-2070
LOC/MAIL STOP: YWO/YWO

MESSAGE ID: 5173145208

SUBJECT. RESPONSE TO GUTMAN S COMMENTS ON ENGINEERING BUDGET

A. TAPES

We believe that we are developing the right tape subsystems which will give us competitive 9-track offerings and leadership in high technology products. Programs currently underway, in particular, the TS11 and TU77 are planned for phase-out.

MAYA - We hope to announce a FRS acceleration for into H2, FY84 within the next 30 to 60 days. Acceleration into end FY83 is probably not realistic, even for a buyout, were a satisfactory one available today. We hear your message and will do everything possible to comply with its urgency.

TU80 - We believe this product is important to the Company because of its long term cost, reliability, and packaging benefits, among others. This program is not competing with MAYA or any other program for resources at this time. The TU80 program is in DMT now, with announcement planned for fall DECUS and FRS by February '83. Killing TU80 would not accelerate MAYA.

TSV05 - No other industry - compatible tape is offered by DEC for Q-bus systems. CSS has chosen to do this product on their own, based on their analysis of the business potential. CSS has indicated to us that they have no plan to put TSV05 on UNIBUS.

20-AUG-82 14:28:58 S 02257 CLEM
CLEM MESSAGE ID: 5173158853

****
* digital *
****

TO: GRANT SAVIERS

c: SSD STAFF:

DATE: TUE 10 AUG 1982 2:41 PM EDT
FROM: PAUL BAUER
DEPT: SMALL STORGE SYSTEMS
EXT: 223-6581
LOC/MAIL STOP: ML1-3/T62

MESSAGE ID: 5172128522

SUBJECT: RESPONSE TO MIKE GUTMAN'S COMMENTS

****
* DIGITAL *
****

INTEROFFICE MEMORANDUM

TO: Grant Saviers

cc: SSD Staff
SSSD

DATE: 9 August 1982
FROM: Paul Bauer
DEPT: SMALL STORAGE SYSTEMS
EXT: 223-6581
LOC: ML1-3/T62

SUBJ: RESPONSE TO MIKE GUTMAN'S COMMENTS ON ENGINEERING BUDGET

Grant, my response to Mike's comments are as follows:

RX52 - We are considering alternative next generation floppy design because of changes in the market place and feedback from the low end systems groups. 2 alternative designs are being considered and will be presented to the Storage Strategy Review committee in August.

The first is the product that Mike describes, that is, the maximum capacity floppy that is read compatible with RX50 diskettes. The second is an absolute maximum capacity mini floppy available as soon as possible.

RCXX, Shrimp - RDXX is already a buyout product. When we invest in the design and manufacture of any low end disk product we will position it on the cost leadership curve, and Shrimp and RD52 will be measured by that constraint. Since these are products that will be available in FY85 and FY86, we see them as providing cost leadership at capacity able to support VAX systems (40 + MB on one or2 spindles).

PB:mpc

10-AUG-82 21:58:25 S 05854 MLEM

****
* digital *
****

TO: *BOB FLYNN
SSD STAFF:

DATE: WED 11 AUG 1982 11·12 AM EDT
FROM: TOM BURNIECE
DEPT: STORAGE SYSTEMS
EXT: 522-2100
LOC/MAIL STOP: CX/Q21

MESSAGE ID: 5172229089

SUBJECT: RESPONSE TO GUTMAN'S COMMENTS

****
* *
* digital *
* *
****

INTEROFFICE MEMO

TO BOB FLYNN

DATE: 10 AUGUST 1982
FROM: TOM BURNIECE
DEPT: STORAGE SYSTEMS ENGINEERING
EXT: 2100
LOC/MAIL STOP: CX-Q/21-1

SUBJ: RESPONSE TO GUTMAN'S COMMENTS ON ENGINEERING BUDGET, RE: STORAGE

c. RAXY:

We don't know whether the world needs another removable disk, but conversely, if it is done right, you can be sure plenty of people will want it. Our current RAXY plan is to leverage off the existing CDC RSD 3-disk (9") cartridge and the CX RAXX (30MBit/sq in.) development to create a matched companion removable (RAXY) to the new high-end Winchester (RAXX). This is a minimal incremental investment and results in flexible mix and match 1/2 rack fixed and removable disks that can span the high end of the CT world all the way to Jupiter. We've asked for feedback on this proposal for over 6 months and had very little response.

d. RAXX:

The current RAXX plan is 1013MB (7 disks). We need good feedback on the optimal capacity/actuator, however. Since 2 RAXX's will fit in the same hole as 1 RA81, even 600MB/RAXX is almost 3:1 capacity improvement over RA81 on a volume basis. The same argument holds true for RAXY (about 300MB) versus RA60. You also can't discount the significant performance and cost differences.

e. RDXX

We believe the way to lick the buyout cost advantages on the RDXX is to leverage our significant technology lead over Tandon and Seagate, et al, by delivering an 80-120MB 5" fixed drive in 1984, before they

can.

f. Low-end Strategy

proposed strategy of putting 3 Winchesters and 2 removables in 3 box sizes is a total hard disk strategy spanning the DEC line and should fulfill all storage requirements when combined with a high capacity floppy, plus a cartridge and high end streamer tape.

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* d i g i t a l *
****

: GRANT SAVIERS
SSD STAFF:

DATE: MON 2 AUG 1982 5:16 PM EDT
FROM: MIKE RIGGLE
DEPT: STORAGE SYSTEMS
EXT: 522-2300
LOC/MAIL STOP: CX1-1/Q29

MESSAGE ID: 5171316166

SUBJECT: GUTMAN, LIPCON COMMENTS ON STORAGE

I agree with most of their inputs.

Exceptions are:

1. I believe that the compatibility anchor on RX52 is wrong, i.e. we would win bigger by making RX52 higher capacity than by making it RX50 compatible.

2. RAXY undoubtedly has a market. Only issue, is it big enough to support the investment. My gut says it is, but we should do what we can to size it.

****
* d i g i t a l *
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TO: *JOE REILLY

cc: BILL JOHNSON

DATE: WED 25 AUG 1982 4:27 PM EDT
FROM: BILL HEFFNER
DEPT: BSSG
EXT: 264-8348
LOC/MAIL STOP: ZK1-3/J35

MESSAGE ID: 5173651694

SUBJECT: ANSWERS TO THE PRODUCT INVESTMENT QUESTIONS YOU POSED

Question 5 your memo of 17Aug
Clusters: Yes, there is alot of redundancy in the Cluster area. VMS is building clusters as part of the next release. Many people should be layering on this, but inreality are starting from scratch.
Software questions 3,6,7 your and Coben's memo of 15Jun

Retirment of Basic Plus: We are retiring this in accordance with the policies.
Human factors: No it can not be dropped. It's critical to all our businesses, especially the low end.
Can we slow down our language releases: We've done that. It was part of the last budget reduction. They can not be slowed down further, we are at the point of diminishing return.

If you need more, please let me know.
Bill Heffner

20-AUG-82 17:03:48 S 03459 CORE
CORE MESSAGE ID: 5173651570

d then type <CR>
****
* d i g i t a l *
****

TO: *JOE REILLY

DATE: TUE 24 AUG 1982 12:28 PM EDT
FROM: FRED ENGEL
DEPT: LSG S/W ENG.
EXT: 231-6871
LOC/MAIL STOP: MR1-2/L10

MESSAGE ID: 5173550314

SUBJECT: COMMENTS ON QUESTION 5

Comments on Question 5

[(5) Is there total redundancy in Clusters Program? VAX vs. Workstations vs. CT]

While total redundancy does not exist, there is a great deal of overlap that is potentially wasteful and dangerous to DEC's network goals.

The area of clusters and Local Area Networks's (LAN's) is still new enough that we need to do experimentation before we can truly say what is needed in any particular environment. Each of the product areas (e.g. CT's, Workstations, Office, VMS, etc.) will need to experiment so that they can understand what the real requirements are for their particular products. SCA, for example, was developed by four groups, three of which (i.e. VMS, HSC and TOPS-20) had done some experimentation to understand what the individual requirements were.

While multiple Advanced Development efforts are necessary, having every group that might use the network duplicate all of the experimentation for all of the components (e.g. print servers, file servers, name servers, data transmission, mail) is probably stretching our A/D dollars too thin. A key piece of technology we software people have to learn is to rely on other groups to build the pieces we need (the hardware people do this better than the software people).

My concern is that we can't make any rational decision on the duplication until we have decided on what it is we wish to do in this space. The CT folks, for example, believe that their primary goal is to talk to other CT's. Talking to other DEC equipment is, at best, a secondary goal. Do we wish to have all of DEC's network/cluster/LAN products interact in a meaningful manner? Are we willing to make this as high a goal as being compatible with ones own product? If not, how important a goal is it?

To be concrete: Is it important, for example, for CT, IAS, RSX, RT, RSTS and TOPS-20 to all use the same print

server? It would make the salesmen's life much simpler to have only a single print server family that talked to all of our products. It would be a real mess if each product needed a different print server because the software was different. Try explaining to the customer that the print server he bought for his VMS machine can not be used for his DT. The same case can be made for the other pieces of technology (e.g. security, transport, mail, file servers, name servers, accounting).

The danger, as I see it, is the development of duplicate incompatible products that will not talk to each other. It will make us have to duplicate many products that could have been consolidated. We could leverage our dollars better by having many product groups rely on one version of a component. The flip side of this coin is that we can tie the company in knots by making too many things depend on one key piece.

The usual counter argument is that we should "Let a thousand flowers bloom". As I stated above, this has certain advantages. It has pitfalls as well. We should strive to let the flowers bloom in A/D and not in too many products. Having too many products causes confusion and waste.

Why am I not more specific about what needs to be changed? The data I have is not reliable enough for me to propose too many specific things. What is needed is a thorough audit of the intentions of each group with relation to the network/cluster/LAN products (perhaps a STRATON N+1 meeting could serve this purpose).

24-AUG-82 12:58:01 S 01804 MLCG
MLCG MESSAGE ID: 5173595270

****
* d i g i t a l *
****

: BILL JOHNSON
*JOE REILLY
: DAVE RODGERS

DATE: WED 25 AUG 1982 11:07 AM EDT
FROM: BERNIE LACROUTE
DEPT: DISTRIBUTED SYSTEMS
EXT: 247-2113
LOC/MAIL STOP: TW/A08

MESSAGE ID: 5173651294

SUBJECT: CAN WE USE LCP INSTEAD OF PLUTO?

The LCP5 is clearly an attractive package which we should investigate further for the next generation of servers perhaps with the Seahorse engine as an alternative to J-11.

I believe we should not switch to LCP5 for the current set of PLUTO products for the following reasons:

a) 16 lines terminal multiplexer

It is very unlikely that we could have a 16 lines distribution pause, a power line cord and an Ethernet cable fit in the current LCP5 package; there is not enough space for the cables and the panel. One can fit 8 lines, an Ethernet cable and a power cord comfortably; we might be able to go to 12 lines. The transfer cost comparisons are as follows:

LCP5 w/o disk	$1,450	
Additional 256Kb	420	
QNA + Cable	600	
2 x DHV11/Q	1,000	(this assumes 16 lines which I do not believe is feasible)
	$3,470	

PLUTO 16 lines T.C. $4,200 - $4,500. The transfer to Puerto Rico has a potential cost reduction of about $500.

b) 32 Lines Multiplexer (design center for Jupiter).

Need 2 x LCP5 with a T.C. of $6,940 (assuming again that a 16 line packaging could be achieved). PLUTO 32 lines has a T.C. target of $6,000.

c) PLUTO/CATS

The diagnostics ROM's would need to be added to LCP5 and the software effort refocused again since we switched from the 11/23 about 6 months ago. This would entail a slip of several months and not much gain in T.C.

d) X.25 Gateway

There is not a good X.25 synchronous option for the Qbus

today. This is something we should clearly build but is not in the plan today. We also have a sever cable management problem with LCP5 and multiple X.25/X.21 cables (they are about 3/4 inch in diameter with big connectors).

e) SNA Gateway

The DPV11 could be used as the interface card, also it has a lower performance than the PLUTO SDLC option. New drivers would have to be written.

f) Router

We do not have a synchronous DDCMP option for the Qbus today; without DDCMP implemented in microcode as is done in PLUTO and the DMR we cannot achieve the appropriate level of performance.

In summary, the LCP5 package is very nice, it can win for 8 lines terminal multiplexers but falls short (without non trivial mechanical repackaging, HDLC and DDCMP cards and new drivers, software) for 16, 32 lines terminal MUX, the gateways and routers. Switching the hardware base at this point would also have a significant impact on the schedules which I have not evaluated. The LCP package and appropriate modifications to it should be evaluated in the context of J-11 and Seahorse.

25-AUG-82 13:25:04 S 02055 CORE
CORE MESSAGE ID: 5173650678

QUESTIONS, COMMENTS AND ISSUES BY PROGRAM

16-BIT SYSTEMS

1. Why grow advanced development in 16-bit systems? Need to justify with realistic time-to-market considerations, otherwise, eliminate entirely.

2. Is there too much overlap between Orion-Q and LCP-8? Could we do just Orion and skip LCP-8?

3. Save money on software development by having only one protocol for interfacing to AZTEC (Presumption was that we should stick with MSCP.)

TERMINALS AND WORKSTATIONS

1. Are we spending too much on hardcopy A/D?

2. Is the LNO3 a buyout of obsolete technology?

3. Has the LNO2 gone away? (Presumption that it should.)

4. Is there a thermal ribbon printer project? If so, why copy obsolete Japanese technology?

5. Support is 25% of development in terminals. Sounds wrong.

6. Low-end RO project needs review. Why not a Japanese buyout?

7. Reduce overlap in the VT, CT, and VS programs.

8. Why build so many video displays?

9. Why continue spending on PDP-8 (DECmate)?

PROCESS DESIGN AND SUPPORT

1. Do we really need to spend $1M on internal marketing of Unigraphics?

SEMICONDUCTOR

1. Too many groups are working on gate arrays. Jeff needs to develop a proposal and take it to Grant, et.al.

32-BIT SYSTEMS

1. Is the DR750 yesterday's product tomorrow? Could we license a third-party to build it?

2. Has the 730/750/780 budget been cut too much?

3. Do not do both OPAL and AGATE? Do only one.

4. Are we spending too much on Scorpio? Are too many people on board for this stage in the project?

5. Do VENUS and NAUTILUS overlap too much? Do a review. January was suggested as a possible time-frame.

6. We have too many low-end busses--Q22, CTI, Multibus (Rainbow?), VT/LA interconnect?, BI. Does BI contribute enough to justify doing it?

7. Do we have too much uncoordinated effort in low-end 32-bit systems -- CT, Workstations, Seaboard?

36-BIT SYSTEMS

1. Would a replan based on schedule stretch out or feature reduction leave us with a viable product?

SOFTWARE

1. Could 16-bit software spending be reduced further?

2. Possible to reduce TRAX spending more?

3. Could we retire BASIC-PLUS sooner?

4. Same question for DTR/DBMS-11?

5. Could we cancel DECSET?

6. Could we drop the "Human Interface" project?

7. How about savings from slowing down the releases of 32-bit languages?

DISTRIBUTED SYSTEMS

1. Could we save by delaying or cancelling the startup activity in the UK.

2. Lowest priority project is HDLC support on DMP and DMV for CT. Any chance of cancelling or delaying this? (Not much enthusiasm for this idea at the EMC meeting.)

STORAGE

1. Buy out low-end disks.

CROSS-GROUP ISSUES

1. Too many file server projects. Would things be better if we just stopped the task force?

2. Too many overlapping CAD projects. Make some choices: CHAS, CHROMA, DAISY, VALID, et.al.

3. With the current financial situation, is this the right time to start up three new sites--CMU, Japan, and West Coast? Perhaps, we should slow down the sites by holding each of them to 6 people in FY83?

PRODUCT GROUP ENGINEERING

1. Make CSSE just a Customer Services planning function.

2. Eliminate overlap in Dave Schroeder's area. Move DIBOL to Bill Keating and CTS to the RT group. Let FMS V2 replace INDENT. Move the Report Writer project to the RSTS group.

3. Both CSS and SWS develop overlapping and counter-strategic products. How do we avoid this inefficiency?

4. MDC should stop development activities and do third party reference selling.

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* d i g i t a l *
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TO: see "TO" DISTRIBUTION

cc: RICK CORBEN

DATE: TUE 17 AUG 1982 2:55 PM EDT
FROM: JOE REILLY
DEPT: CE FINANCE
EXT: 223-6883
LOC/MAIL STOP: ML12-2/A16

MESSAGE ID: 5172845804

SUBJECT: ADDITIONAL QUESTIONS/COMMENTS/OBSERVATIONS

The following are additional questions/comments/observations which should be answered by each operating group along with the questions and issues previously distributed.

August 25 is the due date for your response to these questions/comments/observations.

(1) 16-BIT - With all the work going on in this space in Micros, TVG and the 16-BIT group, is there too much redundancy and is there an opportunity to consolidate?

(2) COEM Software - How does it mesh with Commercial Software? Are there opportunities in this space?

(3) TU-80 - Do we need it? Would we be better off focusing on MAYA?

(4) Can we use a low cost PDP11 rather than Pluto?

(5) Is there total redundancy in the Clusters Program? VAX vs. Workstations vs. CT.

(6) Lazer Printing - What can we contribute? What would it take to acquire a competitive technology base to Ricoh, Xerox or Canon?

(7) Central UNIGRAPHICS support should be disbanded ($1M?). Support should be supplied by the vendor. The internal groups adds essentially no value.

(8) Central space & construction "helper" should go away. Joe Reilly should be keeper of the space number.

(9) Central process administration should be one para-professional to keep the library & publish the schedules.

(10) Consider buyout all printers (incl. thermal ribbon from a Japanese supplier).

(11) Should we be gearing down our spending for the 12-BIT area?

(2) Spend 50% less on PDP 11 sfl 16 bit

- 63:1.6

1. Project Name--One-for-one with Chart II in the Engineering Investment Summary, perhaps as revised.

2. Best Alternative--There can be no standard approach to this question. Based on your understanding of the need and the nature of the work, what is the most creative approach to saving money, being more productive, etc.? If the entry is for an area such as FCC or finance and administration and if you already have pared out any fat and if you can think of no ways to combine functions or "do without", then the right answer for this column is "None". (Obviously, the challenge of this exercise is recognizing our severe budget problems and finding creative alternatives rather than giving up quickly.)

3. Consequences of Alternative--What is the impact on DEC from taking the alternative rather than your regular plan? Try to quantify the impact in terms of revenue or some other metric (e.g., MB/$ for mid-range disk products in 1988, risk level of losing X% of terminal business because of X year lag vs competition in voice capability, dollars of "hidden costs" saved elsewhere in DEC as a result of this project, etc.).

4. Consequence of Cancelling Project--What are the impacts if we throw caution to the wind and just cancel the project altogether. (Don't be hesitant to give the obvious answer. If we cancel an FCC project, then "don't comply with FCC regulations" is the answer.)

5. Consequence of Slowing Down Project--What is the impact of reducing funding/headcount? Choose the level of slowdown which makes the most sense for this project but assume at least a 20% reduction in resources.

The charts are due in Joe Reilly's office by August 25th.

If I can be of help in clarifying the intent of the exercise, please feel free to contact me for assistance.

PROD	BEST ALTERNATIVE	CONSEQUENCE OF ALTERNATIVE: TECHNOLOGY	CONSEQUENCE OF ALTERNATIVE: SYSTEM	CASH FLOW (DELTA $) UNDISCOUNT/DISCOUNT (IN MILLIONS)	CONSEQUENCE OF NO PRODUCT	CONSEQUENCE OF SLOWDOWN	BEST PRODUCT TODAY
MAYA	1/4" 3M Cartridge Steaming Tape i.e. DEI, Archive	Lower Reliability Higher Cost of Ownership Dubious Extensibility Less Useful Form Factor No 'Familiness'	Unacceptable size for CT? Earlier Time to Market (Q1 FY84) Higher Entry Cost-Not Useful as Console I/O device	$143.0/$24.5	No Low-Cost Companion for 5MB-20CMB Winchester Disks. CT150, LCP5, LCP8, Orion & Scorpio have Major Exposure	Not Supplied In Original Storage System Format	Not Supplied In Original Storage System Format
	TU80	Less Favorable Cost, Size, Media Capacity	Too costly, large for CT and LCP				
YANKEE	TA81	Higher Cost - Lower Device Capacity - Lower Reliability - Larger Pkg	No 16-Bit Support Too Expensive for ORION	$245.0/$36.6	Back-up Device for large, fixed Disks More Expensive than the Disks TA78 is ~ $55K! TA81 is ~ $22K!	Not Supplied In Original Storage System Format	Not Supplied In Original Storage System Format
	OPTICAL DISK	Not Cost-Effective for Back-Up, No interchange Uncertain media costs High risk in Technology	Not Attractive for Low End Systems				
OPTICAL DISK	YANKEE	Less Risk, but... Less Effective Random Access Less On-Line Capacity Optical Technology Could Leap-frog tape Technology	Mostly New Markets - May not be required until late 80's	NO PRESENCE IN THIS MARKET SPACE	We may be unable to meet a market need for large, on-line archives or hierarchial files.	Not Supplied In Original Storage System Format	Not Supplied In Orginal Storage System Format
TU80	TS05	Projected Lower Reliability - No "Familiness" with TU81. No common Packaging Higher Cost of Ownership	Little impact directly	$20.9/$10.8	TS11 is too expensive and too large for low end systems - $2000 extra cost. Poor Market acceptance could result in lost device and system sales	Not Supplied In Original Storage System Format	Not Supplied In Original Storage System Format
TU81 TA81	TU78/ TA78	Higher Price & Performan Lower Reliability Less Attract. Packaging Higher cost of Ownership	At MLP $55K, limited mid-range and low end systems appeal	$360.0/$98.0	No Back-up for >200MB Fixed Disks for under $55K MLP until YANKEE	Not Supplied in Original Storage System Format	Not Supplied in Original Storage System Format
TA78	TU78	Not Used with HSC-50 Higher Cost of MassBus	Requires MassBus System Utilities require CPU Usage	NO SI TAPES UNTIL TA81	No High End Tape for SI Subsystems	Not Supplied in Original Storage System Format	Not Supplied in Original Storage System Format
	TA81	No start/stop GCR Lower Performance	No 16-Bit Support				

d i g i t a l

INTEROFFICE MEMORANDUM

RECEIVED
AUG 0 1982
CE CONTROLLER

TO: PEG

cc: EMC
ENGPPC:

Date: 3 AUGUST 1982
From: Rick Corben
Dept: Corp. Product Management
Ext: 223-3123
Loc: ML12-1/T39

SUBJECT: ALTERNATIVE ASSESSMENT CHART

EMC has requested 'alternative assessment' charts to assist in reviewing Engineering strategy and budget so they can make critical priority decisions for presentation to the Operations Committee. [redacted] The intent is to look at alternatives to our current plan; project by project. The charts are based on a format used successfully in Storage Systems. A sample is attached.

Two charts are requested from each Engineering group doing product development--one for the product part of the budget, one for the non-product part.

PRODUCT ALTERNATIVES

The products entered on the first chart should correspond one-for-one with the products listed in Chart I of your group's Engineering Investment Summary published to the OC on June 14, 1982. (Update that chart and re-submit if there are any significant changes.) The following definitions apply to the columns of the 'alternative assessment' chart:

1. Product Name--One-for-one with Chart I in Engineering Investment Summary.

2. Best Alternative--Indicate best alternative product approach for DEC. If you propose building the product in your regular plan, then the alternative probably is a buyout. If you are already buying out, then the alternative probably is "living with what we've got today". Other alternatives might be merging the development with another related project, encouraging CSS or third party vendors to 'fill the hole', joint marketing agreement with a third party, etc. (For software, product retirement may be the best alternative.)

3. Consequence of Alternative

a. Technology- The relative competitiveness of the alternative product versus your regular plan. Also, the impact of doing the alternative on DEC technology strengths as it affects future product possibilities.

b. Systems--Impact of the alternative on systems level competitiveness for DEC.

4. Cash Flow Delta $--The difference between the proposed project and the best alternative. Use consistent and realistic market and competitive assumptions.

a. Undiscounted cash flow delta--Compute the lifecycle net cash flow of the two alternatives (proposed versus best alternative) and then subtract. (This is intended to scale the overall business size and leverage for DEC.)

b. Discounted delta--Compute the net present value (NPV) of the two alternatives at a 40% rate and then subtract. (This is intended to be a measure of the difference in "quality of investment".)

5. Consequence of No Product--What are the impacts to DEC from 'living without ?

6. Consequence of a Slowdown--What is the impact of slowing down the project by reducing funding/headcount (e.g., later delivery date, higher price, less functionality, etc.)? Choose the level of slowdown which makes the most sense for the project but assume, at least, a 20% resource reduction.

7. Best Product Today--What is the best competitive product actually shipping today? Give price and the relevant specs. (This is intended as a sanity check on "yesterday's products tomorrow".)

NON-PRODUCT ALTERNATIVES

The format of this chart is nearly identical to the product chart. Only two columns are deleted. But the content of the chart is more subtle (less quantifiable) and may require more effort to demonstrate that real thought and insight went into generation and assessment of alternatives. There should be an entry in the chart corresponding to each of the entries in Chart II of your group's Engineering Investment Summary published to the OC on June 14, 1982. (If there have been significant changes or if you think that intelligent analysis of alternatives requires dividing up the non-product part of your budget into more detailed [e.g., project level] components, then re-submit Chart II.)

The definitions for the columns in the alternatives chart are: