XEROX PRODUCT BUSINESS PLAN

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XEROX PRODUCT BUSINESS PLAN

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SECTION I

MANAGEMENT SUMMARY

1.1 PURPOSE & SCOPE OF PLAN

The purpose of this plan is to update the business status and outlook of the HIS products and programs for maintaining, growing and migrating the acquired Xerox computer base. The Xerox business will be viewed as three interrelated components:

- Xerox Equipment - the Xerox parc and the activities to support it.
- Class 12 - HIS peripherals for Xerox central systems.
- Control Program - 6 (CP-6) - the Level 66 hardware/software environment for migration of the Xerox user.

This Product Business Plan was developed to establish an updated planning baseline for the Xerox business with the majority of the emphasis on CP-6, for which a business plan was last prepared in April 1976. The PBP reflects financial and other assumptions of the 1978 LRP as of July 31, 1978, and the May 1978 announcement of the initial CP-6 offerings on Level 66.

Revision 1 was prepared as an update to Revision 0, which understated portions of the Xerox (non-CP6) business from the LRP. This business plan is now synchronized with the 1978 LRP.

1.2 MARKET SUMMARY

The marketplace for the products and services of this plan is the Xerox parc.

- HIS provides maintenance and other services to approximately 700 Xerox computer systems.
- The key strategic segment of the parc are the CP-V installations.

- CP-V is the multi-dimensional operating system environment for the Large (32 bit) Xerox computers.

- The functionality and capabilities of CP-V have made it very successful and the CP-V parc has actually grown since the withdrawal of Xerox from the computer business Currently CP-V represents approximately half of the Xerox parc ($174M ISV).

The basic marketing directions for the Xerox program are:

(a) continue to support the existing Xerox parc (CP-V and other for the maintenance and add-on businesses (i.e. extend the revenue Life of the Xerox base)

(b) provide the capabilities for migrating the CP-V user to CP-6 on Level 66. It should be noted these directives remain the same as the original (1976) Xerox business plan.

1.3 PRODUCT SUMMARY

The products of the Xerox program are:

- Refurbished and, as required, new build Xerox computer systems, subsystems and parts.

- Class 12 products - peripherals and other HIS subsystems for Xerox Sigma and 500 series central systems.

- CP-6 system for Level 66

1.3.1 Class 12 Products

Class 12 products offer the user the capabilities to:
- Add capacity
- Add functionality
- Assist in migration to CP-6

The objectives of Class 12 are to:

- Provide an additional market (i.e. the Xerox base) for HIS peripherals and technology.

- Provide user growth and accordingly parc protection by added capacity and function
- Assist in user migration to CP-6 by:

  - Introducing HIS equipment to the user site
  - Offering Class 12 equipment, for the most part, only on CP-V
  - Permitting the use of the Class 12 equipment on the CP-6 installation, after migration from CP-V.

The products are characterized by (a) Honeywell technology combined with special interfaces for connection to the Sigma/500 central system, and (b) software support within the CP-V and/or other Xerox operating systems. The specified products are:

- Mos memory for Sigma 6 and 9
- Sigma 5 memory map option
- Sigma 6 dual processing option
- Disk system using HIS MPC
- Tape system using HIS MPC
- Level 6/Sigma communications coupler
- Double density memory for Xerox 560

1.3.2 CP-6

CP-6 is the vehicle for migrating the CP-V parc to Level 66. The basis of CP-6 is its software system which provides to the user the functionality and characteristics of the five processing dimensions of CP-V, i.e., batch, time sharing, remote batch, transaction processing and real-time processing. A key objective of CP-6 is that it be a competitive offering in the 1979-82 time frame. Some of the enhancements to CP-V are in extended and updated language capabilities, data and file management, and comprehensive communications capabilities. In effect, CP-6 is the next generation upgrade for the CP-V user.

An important objective of the hardware environment for CP-6 was that it employ standard HIS equipment to the greasest extent possible to minimize costs. Fundamentally, this objective has been met by the use of the Level 66 central processor (with full B capability), the Level 6/43 front-end processor, and standard HIS peripherals. Some special interface and technology are required (i.e. L6/L66 coupler and Sigma memory cabinet), but basically CP-6 differs from L66/GCOS systems because of (a) its software, (b) the packaging of its hardware components, and (c) the need for very large main memory.

A range of price/performance offerings is needed to migrate the CP-V user to CP-6. CP-V installations vary from Small Xerox 560 sites to multiple Sigma 9 configurations. Due to the well-defined nature of the CP-V parc it is possible to characterize the CP-6 target systems into four basic types as outlined below:

	SMALL(S)	MEDIUM(M)	LARGE(L)	EXTRA LARGE(XL)
CP (approx power)	66/20	66/40	66/80	Dual 66/80
MEMORY	2MW	3MW	4MW	6MW
NUMBER OF COMM. LINES	40	80	120	200
DISK (200 MB UNITS)	2	4	8	16
TAPE UNITS	1	2	3	4

It should be noted that the bulk of the CP-V migration candidates are in the Large and Extra Large categories.

A formal announcement, including pricing, of CP-6 was made to the Xerox user community in May 1978. The hardware package is called Level 66/DPS/C and is the central system (CPS) that contains:

- Central Processor (L66/80 B with 2K cache)
- ICU
- IOM
- Memory cabinet
- SCU
- Memory
- Data Communications Subsystem including L6/43 FEP and L66/L6 coupler
- Keyboard Printer
- MG Set

Two performance levels were announced for availability in 4Q79.

	C3	C5
MEMORY	4MW	6MW
FEP	1 L6/43	2 L6/43
LINES	120	200
ISV	$1.093M	$1.409M

Additional performance is provided through incremental user connectability options (memory and communications) A second CP is available by RPQ.

The announcement was targeted at the large scale CP-V users who are critical to the success of the CP-6 program. The C3 package

is the Large System previously mentioned. Until further announcements, Extra Large capability is derived from C5 plus the second CP RPQ. The Small and Medium systems are due to be announced by January 1979.

Software for L66/DPS/C is seperately priced. Release 1 of the CP-6 operating system includes the Timesharing, Batch and Remote Batch modes, plus the L6 front-end software, Language and other Processors for Release 1 are FORTRAN, APL, BASIC, COBOL, IDS/II, IDP (an interactive query language), RPG-II, SORT/MERGE, TEXT and GMAP. Release 2 of CP-6 scheduled for one year after Release 1 adds the Transaction Processing and Real Time modes of operations plus additional language and interface enhancements. Release 3 to be available one year after Release 2 is targeted with meeting the overall performance goals and complete functionality requirements of CP-6.

1.4 KEY MILESTONES

Major milestones - both historical and planned - for the Xerox program are:

GENERAL

• Xerox Data Systems Termination	July 1975
• HIS-Xerox Agreement-Marketing & Maintenance	Feb 1976
• Xerox "Liberator" Business Plan for CP-6	Apr 1976
• LADC Formed	July 1976
• Xerox User's Meeting - CP-6, Class 12 Announced	Feb 1977
• Phoenix Refurbishment/Manufacturing Center Established	Feb 1977
• First Shipments of Class 12 Products	Sept 1977
• Formal L66/CP-6 Announcement	May 1978
• Announcement of Smaller CP-6 Systems	Jan 1979
• FCS of CP-6	June 1979
• CP-6 General Release 1	Dec 1979

CP-6

• PFS Released	Aug 1977
• Step 1 IPR	Sept 1977
• Step 2 IPR	May 1978
• Product Announcement (PLN's)	May 1978

• Initial System Performance Measurement	Dec 1978
• First User Benchmark	Mar 1979
• First Test Site Shipment	June 1979
• Fully Tested Controlled Release	Sept 1979
• Step 4 IPR	Nov 1979
• CP-6 General Release 1	Dec 1979

CLASS 12 (First Customer Shipment)

• Disk System(MPC-MPI 200 MB Disk)	Sept 1977
• Sigma 5 Map	Sept 1977
• 560 Large Capacity Memory	Sept 1977
• Sigma 9 MOS Memory	Dec 1977
• Sigma 6/7 MOS Memory	Apr 1978
• CP-V Level 6 Communications Coupler	Apr 1978
• Tape System	Sept 1978

1.5 KEY RISKS AND ISSUES

TACTICAL

- Scheduled Availability of CP-6
  - Dependencies upon Phoenix in support of Los Angeles, primarily IDS-II, COBOL 74, and system maintainability T&D (COLTS).
  - L66 hardware design changes to accomodate Sigma functionality. They are identified and are being planned as standard L66 functionality.
  - In short, a viable CP-6 product in 1979 is mandatory to meet both user expectations and Honeywell financial objectives.
- CP-6 Pricing impact on L66 Parc. The CP-6 CPS package price (which includes large memories) may be attractive to segments of the L66 parc.
- Third party vendors and attacks on the Xerox parc.
- CP-6/L66 system performance and growth to higher performance machines beyond L66.

- CP-V to CP-6 conversion difficulty.

- Lack of specific Xerox expertise.

  - FED attrition for both Xerox hardware and software.
  - LADC staffing.
  - Field support skills for 1979 conversions, benchmarks, and installations.

STRATEGIC

- Product line strategy beyond CP-6 Release 3. A CP-6 to GCOS-66 convergence plan has been proposed and will be budgeted. The approach is generally supported in Marketing, PMO and Engineering, but specific resource commitments have not been obtained. The plan includes the CP-6/L6 front-end system and its convergence.

- Use of CP-6/L66 as a new name attack product beyond the original scope as a CP-V migration product.

- Current R&D plan excludes all extensions to program including convergence, additional functionality, and DPS-E and ADP support.

1.6 FINANCIAL OVERVIEW AND ASSESSMENT

The Xerox program financial summary is shown in Exhibit 1.6.1. This factors the Xerox business into CP-6 and Xerox-other (Class 12 and Xerox Equipment). The following points should be noted about the financial summary.

- CP-6 accounts for 35% of program revenue, but only 7.3% of PBIT over the plan period. This is due to the fact that CP-6 does not provide significent shipments until 1980 and bears almost the entire R&D expense for the program as well as other start-up costs.

- By 1983 CP-6 is very profitable (PBIT/Revenue ratio is 28.1%) and CP-6 sites are 50% of the ISV of the total Xerox parc.

XEROX PRODUCT BUSINESS PLAN
MANAGEMENT SUMMARY
FINANCIAL OVERVIEW AND ASSESSMENT

- Without the presence of CP-6, the Xerox parc would decline rapidly since the CP-V users (55% approximately of the current parc ISV) would not continue to provide revenue to HIS for long.

- Total Xerox business PBIT as a percent of revenue declines by 8.4 percentage points from 1978 to 1979 (23.1% to 14.7%) primarily as a result of increased "front-end" costs for CP-6, with little revenue in 1979. In 1980, however, with volume shipments of CP-6, the PBIT for the CP-6 segment turns positive and total Xerox PBIT improves by 9.3 percentage points from 1979 to 1980 (14.7% to 24.0%).

- From 1980 to 1983 Xerox-other PBIT declines rapidly, this is offset by accelerating CP-6 PBIT for a PBIT/Revenue ratio of 22.6% for the total program over the LRP period.

Table 1.6-1. XEROX PRODUCT BUSINESS PLAN HIS BASIS XEROX BUSINESS SUMMARY

($ IN MILLIONS)	(MEMO) Actual 76-77	1978	1979	1980	1981	1982	1983
CP6							
GROSS BOOKINGS		9.3	17.9	32.5	32.7	28.5	21.5
NET BOOKINGS		9.3	17.9	32.5	32.7	28.5	21.5
GROSS SHIPMENTS		--	9.3	32.1	37.4	31.9	27.2
NET SHIPMENTS		--	9.3	32.1	37.4	31.9	27.2
# CP'S IN SHIPMENTS		0	8	27	35	28	19
REVENUE		--	2.3	26.4	32.2	31.1	31.3
GROSS PROFIT AFTER R&D		(6.5)	(6.5)	8.0	12.6	12.7	15.2
PBIT		(7.2)	(8.4)	1.2	5.2	6.2	8.8
% PBIT/REVENUE		--	--	4.5	16.1	19.9	28.1
XEROX-OTHER							
GROSS BOOKINGS		21.5	17.9	17.7	18.7	15.5	8.1
NET BOOKINGS		7.4	1.7	(7.0)	(3.5)	.3	(1.4)
GROSS SHIPMENTS		24.6	19.4	18.3	19.2	16.0	11.9
NET SHIPMENTS		10.0	3.5	(5.5)	(2.4)	.9	1.7
REVENUE		52.3	46.6	42.0	36.9	29.5	22.0
GROSS PROFIT AFTER R&D		26.9	22.3	21.0	17.7	12.1	7.4
PBIT		19.3	15.6	15.2	12.1	7.8	4.0
% PBIT/REVENUE		36.9	33.5	36.2	32.8	26.4	18.2
TOTAL XEROX BUSINESS							
GROSS BOOKINGS	56.1	30.8	35.8	50.2	51.4	44.0	29.6
NET BOOKINGS	33.8	16.7	19.6	25.5	29.2	28.8	20.1
GROSS SHIPMENTS	68.2	24.6	28.7	50.4	56.6	47.9	39.1
NET SHIPMENTS	45.3	10.0	12.8	26.6	35.0	32.8	28.9
REVENUE	84.5	52.3	48.9	68.4	69.1	60.6	53.3
GROSS PROFIT AFTER R&D	37.5	20.4	15.8	29.0	30.3	24.8	22.6
PBIT	26.4	12.1	7.2	16.4	17.3	14.0	12.8
% PBIT/REVENUE	31.2	23.1	14.7	24.0	25.0	23.1	24.0

Revenue for Xerox is outlined in greater detail in Exhibit 1.6.2. Some points of interest are:

- By the end of the plan period, CP-6 is close to 60% of the program revenue.
- The major sold revenue contribution to the program is the central system package (CPS) of CP-6. The USISG revenue distribution by type is:

	$(M)	%
Rent	100.6	32
Maintenance	114.8	37
Total Recurring	215.5	69
Sold	91.3	30
Conversion	3.6	1
Total Non-Recurring	94.9	31
Total	310.3	100

Table 1.6-2. XEROX REVENUE

($ in Millions)

	1978	1979	1980	1981	1982	1983	Total
USISG							
CP-6	-	1.1	24.1	29.7	28.6	29.6	113.1
Class 12	2.1	8.7	8.3	7.8	6.6	5.8	39.3
Xerox	40.0	30.8	27.9	24.8	19.9	14.5	157.9
Total	42.1	40.6	60.3	62.3	55.1	49.9	310.3
HIS-LTD	3.5	2.3	1.8	1.5	1.1	.7	10.9
HIS-P/C/M	5.0	4.9	5.5	4.7	4.0	2.4	26.5
HIS-ITALIA	.1	.1	.1	.1	.1	.1	.6
CII-HB	1.6	1.0	.7	.5	.3	.2	4.3
TOTAL HIS/CII-HB	52.3	48.9	68.4	69.1	60.6	53.3	352.6

- USISG Revenue is 88% of total
- USISG Revenue by product type (%)

	1978	1979	1980	1981	1982	1983	Total
CP-6	0	3	40	48	52	59	36
Class 12	5	21	14	12	12	12	13
Xerox	95	76	46	40	36	29	51

- Of the total USISG Xerox revenue, 65% ($102.5M) is generated from maintenance of sold systems.

Exhibit 1.6.3 shows the three components of the Xerox parc over the LRP period for USISG. The following observations can be made about the parc dynamics:

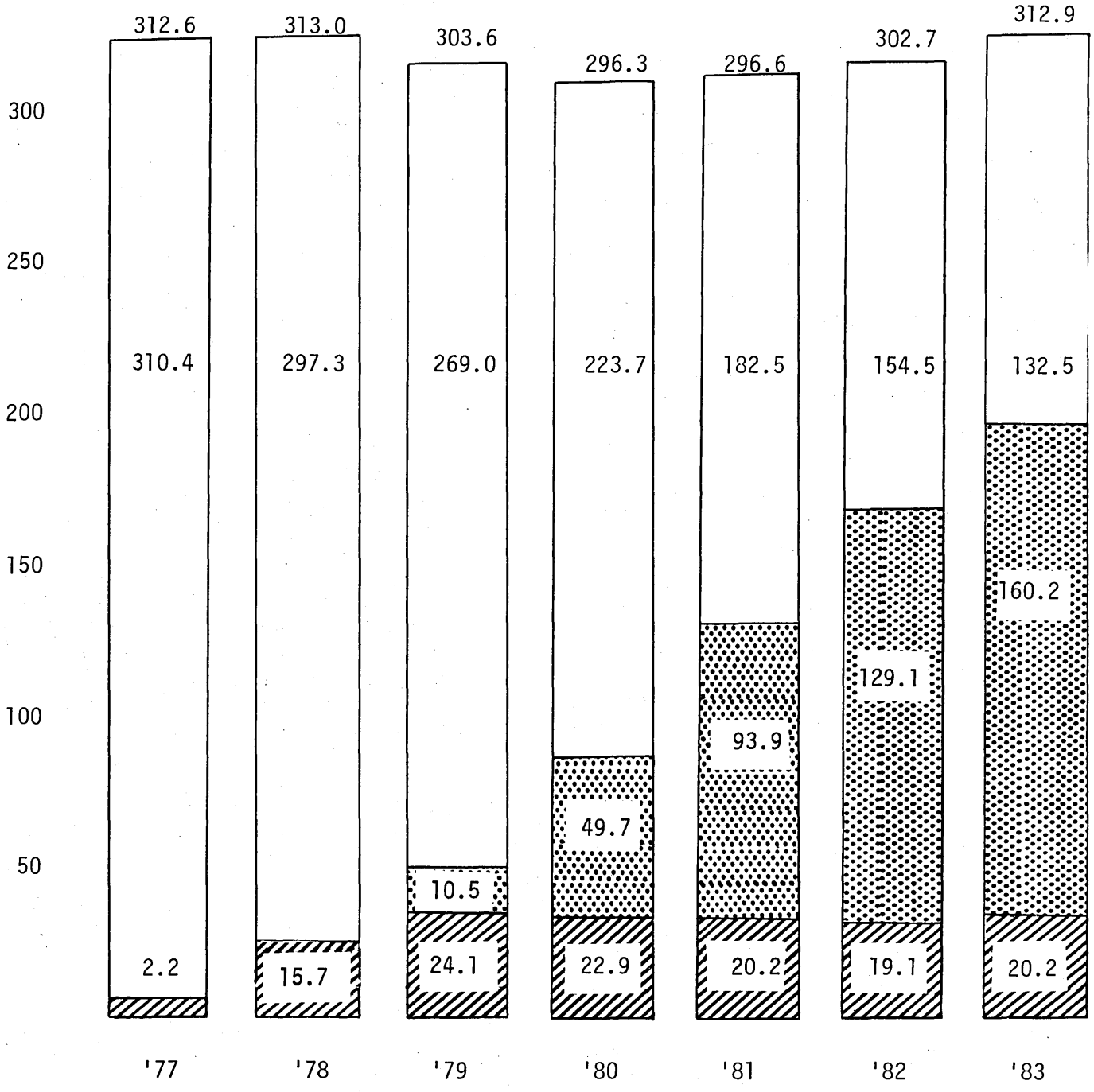
- Total Xerox parc ISV remains relatively constant over the period. The distribution, however, shifts from almost entirely Xerox equipment to where 50% of the parc is CP-6.

- The CP-6 components includes the Class 12 equipment that "shifts" from CP-V installations to be usable on the CP-6 sites. The bulk of this is MPC-Disk and MPC-Tape equipment.

- Class 12 parc stays about $20M (ISV) even with the shift to CP-6 since many CP-V sites will migrate late or will not migrate during the period.

USISG - XEROX PARC DYNAMICS

YEAR-END



YEAR-END PARC (EXCL. SNOR/SNOM)

In summary, the Xerox program outlook is good and (as detailed in Section 1.7) the financial data compares favorably with the previous plan. PBIT in the current plan is 124% greater than that of the 1976 plan for the comparable 1976 to 1981 period. The key downside risk is slippage in the CP-6 schedule since this would accelerate the attrition of the CP-V parc segment and the decline of Xerox parc revenue would not be offset by the rising CP-6 contribution. An upside potential exists by providing additional functionality as outlined in the PFS for the a more functional CP-6 product. The impact of this is a 14% increase ($4.6M) in R&D to acquire an estimated 17 additional CP-6 systems with an ISV of approximately $29M.

1.7 COMPARISON WITH PREVIOUS BUSINESS PLAN

1.7.1 Financial

Comparison of the current plan with the 1976 plan is outlined in Exhibit 1.7.1 and detailed in Exhibit 1.7.2. It should be noted that even though CP-6 availability is later and its system shipments are 25 systems lower than that of the 1976 plan, the overall financial comparison is favorable for the current PBP. The improved financial performance is primarily the result of the following:

- Increased recurring revenues resulting from greater Xerox maintenance revenue than anticipated. Xerox computer system have remained on revenue due to HIS support and the systems' unique capabilities. As noted earlier, the CP-V parc has grown since 1976.

- Improved product cost rates and lower FED cost projections in the current plan than originally estimated.

- Overall, the Xerox systems still remain viable for many of their users and we have benefited by it. Fast attrition of the Xerox base has not taken place.

The only unfavorable comparison with the previous plan is in R&D expense. Part of this is due to the learning curve in providing CP-6 on Level 66. Other technical changes are discussed in the next section.

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MANAGEMENT SUMMARY
COMPARISON WITH PREVIOUS BUSINESS PLAN

Table 1.7-1. COMPARISON WITH 1976 PLAN '76-'81 TOTAL

($ in Millions)

	1978 PBP	1976 PBP	Favorable/ (Unfavorable) Variance
Revenue	323.2	278.8	44.4
Cost of Revenue	157.2	N/AV	-
R&D	33.0	N/AV	-
Gross Profit after R&D	133.0	N/AV	-
PBIT	79.4	35.4	44.0
%PBIT/Revenue	24.6%	12.7%	11.9%

Key Plan Parameters

- CP-6 Availability
  76 Plan: 4Q78/1Q79
  78 Olan: 4Q79 (General Release)

- CP-6 System Forecast
  76 Plan: 104 (includes Canada)
  78 PlaN: 79 (includes Canada)

This is 117 CP's including dual CP systems and growth.

XEROX PRODUCT BUSINESS PLAN
MANAGEMENT SUMMARY
COMPARISON WITH PREVIOUS BUSINESS PLAN

Table 1.7-2. APRIL 1976 HIS BASE CASE PBP VS. 1978 PBP

($ in millions)

	1976	1977	1978	1979	1980	1981	TOTAL
REVENUE							
BASE CASE	32.3	34.9	41.0	45.4	53.5	71.7	278.8
1978 XEROX PBP	38.4-A	46.1-A	52.3	48.9	68.4	69.1	323.2
VARIANCE	6.1	11.2	11.3	3.5	14.9	(2.6)	44.4
COST OF REVENUE							
BASE CASE	N/AV	N/AV	21.9	25.4	31.2	42.9	-
1978 XEROX PBP	19.9-A	21.9-A	24.8	25.6	32.3	32.7	157.2
VARIANCE	-	-	(2.9)	(.2)	(1.1)	10.2	-
R&D							
BASE CASE	N/AV	N/AV	6.0	6.1	5.6	5.0	-
1978 XEROX PBP	0.5	4.7-A	7.1	7.5	7.1	6.1	33.0
VARIANCE	-	-	(1.1)	(1.4)	(1.5)	(1.1)	-
CROSS PROFIT AFTER R&D							
BASE CASE	N/AV	N/AV	13.1	13.9	16.7	23.8	-
1978 XEROX PBP	18.0-A	19.5-A	20.4	15.8	29.0	30.3	133.0
VARIANCE	-	-	7.3	1.9	12.3	6.5	-
PBIT							
BASE CASE	4.0	3.7	7.0	5.5	5.9	9.3	35.4
1978 XEROX PBP	12.1-A	14.3-A	12.1	7.2	16.4	17.3	79.4
VARIANCE	8.1	10.6	5.1	1.7	10.5	8.0	44.0
PBIT/REVENUE RATIO							
BASE CASE	12.4	10.6	17.5	12.1	11.0	13.0	12.7%
1978 XEROX PBP	31.5-A	31.0-A	23.1	14.7	24.0	25.0	24.6%

A= ACTUALS PER HIS FINANCE

1.7.2 Non-Financial

The "Xerox Liberator" Plan of April 1976 was an outgrowth of Honeywell/Xerox interaction and strategization on migrating the Xerox CP-V base to HIS products. The plan is the product proposal for CP-6 and as such established the initial baseline for the program. This section compares the current planning situation with the 1976 plan.

PRODUCT STRATEGY

- Product Availability - The 1976 plan called for CP-6 available on Level 66 and Med 6 by 1Q79 with demonstration capability by 2Q78. Current plans call for the general release of CP-6 for 4Q79 for L66 and 3Q82 for ADP.

- Product Objectives - The 1976 plan assumes product functionality at least as good as CP-V with performance up to 2X Sigma 9 (achievable by use of the Med 6). CP-V functionality goals have remained essentially consistent since the original. The high performance requirements cannot be met by L66, and must now be addressed by the ADP program and/or DPS-E.

- Hardware Approach - The original hardware environment specified was Level 66 NSA architecture with the utilization of Level 6 processors for interfacing both a high performance swapping device and a communications subsystem. The major shift in the approach is that the swap processor during a head-per-track disk (such as the Xerox RAD) or equivalent high-speed memory has been replaced by use of large amounts of main memory. Level 6 has remained as the front-end concept, in fact, CP-6 represents the first use of L6 as a standard communications processor for L66. Since the 1976 plan, much has been learned in detail about achieving CP-V functionality on L66; this has led to required extensions to L66 such as hexadecimal floating point, power sequencing and memory power backup.

- Software Approach - Software environment for CP-6 was to "combine the highest quality elements of the Xerox and HIS software sets to provide language processors and file access methods common to the converted CP-V and the proposed GCOS-66 operating systems". It was viewed that the user would be provided an evolutionary path from CP-6 to the more comprehensive GCOS66 operating environment. The key HIS processors to be added to CP-V were to be, COBOL-74, IDS-II, a query facility for IDS-II, SORT/MERGE, PL/1, and GMAP. Since the 76 plan, PL/1 has been dropped as a user language and the assembler and

query facility concepts have changed. Convergence to GCOS-66 remains a major strategic objective.

- Migration Products (Class 12) - Integral to the 76 plan was support of the MPC and HIS peripherals on the Sigma line. Given this capability, migration would require only the replacement of the mainframe for transition to HIS equipment. Since the original plan, the MPC products have become a reality, and the migration products for growing the CP-V user have become more comprehensive.

MARKET STRATEGY

- Marketplace - The original plan called for one basic thrust - migration of the CP-V base. This remains marketplace for CP-6 in current plans.

  It should be noted that the 76 plan does include new accounts as an upside potential which is qualified in detail. For new accounts, CP-6 was viewed as a vehicle for the Fortune 1000 and Education market areas by co-residence with IBM, capitalizing on CP-6's on-line orientation and strengths, and by packaging of dedicated limited function systems.

- Pricing - Pricing and merchandizing concepts were not fully developed in the original plan. However, the basic directions as represented in the recent CP-6 announcement have remained fairly consistent since 1976. In particular (a) the intent to remain within 10-15% of Sigma/500 price-performance relationships, and (b) merchandising a facility with a broad range of performance with modular capacity and feature add-ons.

SECTION II

MAJOR STRATEGIES

2.1 PRODUCT STRATEGY

2.1.1 CP-6

2.1.1.1 CP-6 DESCRIPTION

CP-6 is a product targeted to appeal to the current XEROX CP-V customer. CP-6 will utilize the NSA capability, and thus executes on the L66-B processor. Communications processing will be handled by a Level 6 system connected to the Level 66 host. Real time processing will also utilize one or more Level 6's for critical tasks.

In order to facilitate the implementation and future maintenance of CP-6, the decision was made to use a higher-level system implementation language. For this purpose, the language PL-6 was developed at LADC. The majority of CP-6 operating system and processors will be implemented in PL-6.

The goal is to develop a product that is closely compatible and equal in function to CP-V release F00, that also includes a sufficient set of enhancements to ensure a competitive offering during 1979 and beyond. This provides an excellent opportunity for Honeywell to capture 100+ new name accounts.

Full CP-6 functionality is expected to be achieved using a three release, phased approach. Additional releases may be needed to satisfy migration requirements.

CP-6 Release 1

- OBJECTIVES

  - Provide a L66 system product for the Xerox CP-V user.
  - Ensure that CP-V to CP-6 conversion is significantly less difficult than that required to go to other vendors.
  - CP-6 basic system including batch, time sharing and remote batch.
  - RMA (Reliability, Maintainability, Availability) including on-line diagnostics and remote access.

- USER VISIBLE FUNCTIONALITY

  - BASIC
  - ANS FORTRAN
  - TEXT
  - RPG II
  - ANS COBOL 74
  - ON-LINE DEBUGGER
  - I-D-S II
  - IDP (FOR I-D-S II)
  - SORT/MERGE
  - ASSEMBLER
  - APL (WITHOUT I-D-S II INTERFACE, GRAPHICS FUNCTIONS)
  - CP-V CONVERSION AIDS
  - PL-6 SYSTEM IMPLEMENTATION LANGUAGE (AVAILABLE, UNSUPPORTED)
  - RMA
  - TERMINALS (EXCEPT 2741) AS CURRENTLY SUPPORTED ON CP-V VIA L6 FNP

CP-6 Release 2

- OBJECTIVES

  - Add transaction processing and real-time modes of operation.
  - Support new tape and disk subsystems.
  - Improve performance and size.

- USER VISIBLE FUNCTIONALITY

  - TRANSACTION PROCESSING (compatible with GCOS-66 ITP and Series 60 standards)
  - REAL-TIME CAPABILITY
  - APL WITH I-D-S II INTERFACE
  - PL/6 SUPPORTED
  - I-D-S (WITH MANAGE-LIKE FACILITY)
  - REMOTE FRONT-END COMMUNICATIONS PROCESSORS (HDLC)
  - 6250 BPI TAPE AND 600 MB DISK
  - PERFORMANCE/SIZE IMPROVEMENTS

CP-6 Release 3

- OBJECTIVES

  - Meet overall CP-6 performance goals
  - Meet overall CP-6 functionality requirements

- USER VISIBLE FUNCTIONALITY (TENTATIVE)

  - PERFORMANCE/SIZE IMPROVEMENTS
  - FUNCTIONALITY ENHANCEMENTS TO MEET COMMITMENTS TO XEROX PARC
  - REAL-TIME PHASE II
  - TRANSACTION PROCESSING-PHASE II

2.1.1.2 CP-6 PRODUCT CAPABILITIES

PERFORMANCE

The performance criteria for the initial release of CP-6 is equivalency with CP-V on the Sigma 9. However, the criteria for the third release are more demanding and represent key CP-6 objectives.

	Release 1	Release 3
Throughput	As good as Sigma 9 on L66/80 (DPS/C3)	30 to 50% greater then Sigma 9 on L66/80
Time Sharing Response	90% terminal response less than 2 seconds	90% terminal response less than 1 second

CONFIGURABILITY AND AVAILABILITY

CP-6 will be configurable to meet the performance and growth requirements of a wide range of users from small Xerox 560 systems to those employing multiple Sigma 9s.

System availability is to be greater than 99%. The mean time between a software induced interruption is to be greater than 150 hours. The maximum duration for such an interruption will be five minutes. System recovery facilities are to be as comprehensive and as rapid as experienced with CP-V. The design goal is to minimize (1) the number of users that have to be reinitialized and (2) the occurrence of losing a user's file.

COMPATIBILITY/INCOMPATIBILITIES

The following are significant compatibilities and incompatibilities between CP-6 and GCOS-66 that have been identified based on current plans. A Baseline Plan has been developed by a team of Product Planning, Marketing, PMO, and Engineering to resolve the incompatibilities.

Compatibilities

- Application languages: Common compilers are planned for FORTRAN, BASIC, COBOL-74, RPG II, APL and GMAP.
- Data base management (I-D-S/II)
- Sort/Merge
- File access: Sequential, relative, indexed and integrated (I-D-S/II)
- T&D aids: TOLTS, HEALS
- Common data types and alignments from compilers eliminate need for file content translation.
- CP-6 will support GCOS-66 file organizations (sequential, relative, indexed, and integrated), thus supporting program transferability.
- CP-6 release 2 transaction processing will be compatible with the Series 60 UTDS kernal standards.
- Level 6 FEP uses common hardware but has CP-6 unique software.

Incompatibilities

The following areas, based on CP-V design (to attract CP-V users), have the most significant incompatibilities (in terms of potential cost to bridge) with GCOS-66:

- Communications and terminal "personality"
  - CP-V terminal "personality" features: full duplex type ahead, echoplex.
  - IBM network protocols
  - CP-V terminals

- Keyed file organization (used extensively for CP-6 system as well as user files) are not currently planned for GCOS-66.
- Catalogs and naming conventions are different.
- Unified file formats (UFF) are not used in CP-6.
- Terminology and documentation
- End user languages: IDP (CP-V) vs. QRP/PLP (GCOS-66: MDQS successor)
- Control languages: CP-6 IBEX vs. GCOS-66 ECL. Control languages are highly visible, but it is less costly to provide translation. IBEX resembles ECL.
- Systems implementation language: CP-6 PL-6 vs. GCOS-66 PL/I
- Interactive symbolic debuggers: CP-V users regard this area as key.
- Utility and service processors: PCL, EDIT

2.1.1.3 BASE LINE PLAN FOR CP-6 MIGRATION

The baseline plan for CP-6 Migration is summarized as follows:

- CP-6 release 1, 2 and 3 will proceed as currently scheduled
- The transaction processor schedule for CP-6 release 2 will be compatible with the Series 60 UTDS kernel Standard.
- Basic requirements (listed in the succeeding section) to create an acceptable migration target for CP-6 users will be added to GCOS-66 release 6V.
- CP-6 communications will be supported by the LADC developed FEP software on Level 6 hardware
- The CP-6 FEP will initially be supported by a gateway in GCOS-66.
- Communications convergence will be to the UNCP and XNP with CP-6 features added.

BASIC REQUIREMENTS

The basic requirements to be available with GCOS-66 SR 6V or associated ADF releases are as follows:

1. IBEX control language will be supported

2. CP-V/6 terminal personality will be supported.

3. CP-6 communications will be supported in GCOS-66 host.

4. The debugging facilities planned for GCOS-66 will be modified to be compatible with CP-V/6.

5. CP-V/6 user services (IDP, PCL, EDIT) will be supported.

6. Hexidecimal floating point will be supported in GCOS-66 compliers and run-time libraries.

   The implementation of the preceding items is dependent on PL-6 availability with GCOS-66.

7. File exchange facilities will be required.

8. Migration aids to managing and automating application transfer will be required.

.1.2 Class 12 Products

The Class 12 products provide additional growth capability for the Xerox user (primarily CP-V) and aid in migration of the CP-V user to Honeywell technology and CP-6. In summary the Class 12 products are:

- Sigma 9 MOS Memory (XPF9850) - Plug capability add-on to Sigma 9 of Honeywell MOS memory. Available only for CP-V. Planned to be field-modified to operate on Level 66. Battery backup option.

- Sigma 6/7 Extended MOS Memory (XPF6850) - Expands Sigma 6/7 to twice their previous memory capability (up to 256 K words) with Honeywell MOS memory. Available only for CP-V and planned field-upgradable to Level 66. Battery backup option.

- Dual Processing Option (XPF 6851) - Adds a Sigma 6 CP as a resource to a Sigma 6/7 using the extended memory (above). The dual processors operate in master/slave mode with a single copy of CP-V controlling both CPs.

- Sigma 5 Virtual Memory Subsystem (Map) (XPF5850) - A hardware memory map and Sigma memory for the RBM and BTM user for virtual memory operations. The intent is provide a path for these and other non CP-V sites to move to BTM (and then hopefully to CP-6).

- Disk Subsystem (XSP9210/XSU9211) - Mass Storage Processor (modified HIS MPC) and removable disk storage for Sigma and 500 Series computers. For CP-V only and planned adaptability to operate on Level 66.

- Magnetic Tape Subsystem (XTP9310/XTN9312,12,14) - Magnetic Tape Processor (modified HIS MPC) and new tape units for Sigma and 500 series computers. For CP-V only, with planned field upgrade to Level 66.

- Communications coupler and Communications Software (XCC9510 and XCS9910) - Coupler permits interfacing a Honeywell Level 6 (6/36 or 6/43) with a CP-V host system. Software permits the L6 to emulate one or more Xerox aychronous communications controllers and adds enhanced functions.

2.1.3 Technical Approach

2.1.3.1 HARDWARE AND SYSTEMS

In order to provide comparable capabilities to CP-V with HIS technology, the following key technical decisions and approaches were made.

- Use of Real Memory instead of Swapping Devices

  CP-V on Sigma/Xerox 500 systems employed a high speed head-per-track disk for swapping. For CP-6, however, it was decided to eliminate the swapping device and utilize main (real) memory for user program storage. The implication of this decision is that CP-6 configurations require very large memories and according memory technology and costs are a major determinant in CP-6 pricing and packaging.

- Level 66 Enhancements/Extensions

  The Level 66 central system capabilities for GCOS did not include a number of critical features provided to the CP-V user by Xerox computers. These included:
  - hexadecimal floating point hardware

- power sequencing and failsafe
- battery back-up of memory
- use of a terminal as the system console

In addition, support of up to 16MW of memory is needed (see above). These items are now being planned and integrated as standard L66 functions, with power sequencing accommodated by the DPS-E system.

- Level 6 Front-End

  CP-V systems did not employ a front-end communications processor, however; for CP-6 it was decided to use front-end technology. The newer Level 6 was selected instead of Datanet because of the more modern architecture of the Level 6 and to support convergence to Level 6 for all HIS minicomputer applications. Since existing Level 6 software plans did not meet CP-6 functionality or schedule requirements. CP-6 has required (a) unique front-end software developed by LADC and (b) a L6/L66 hardware coupler development since CP-6 represents the first use of an L6 front-end by a L66 configuration

- Memory

  As noted above, large main memories are an integral part of CP-6 configurations. The CP-6 memory packaging will be physically different from the current and planned L66/GCOS memory. For CP-6, it is assumed that the 16K MOS chip in the M128 board configuration in the Sigma (MED 6) cabinet will be used. The implications of two types of 16K MOS memory (M128-CP-6 & M264-GCOS) is currently under review.

2.1.3.2 SOFTWARE

Key technical choices and design approaches with regard to CP-6 software include the following.

- Implementation in Higher Level Language

  Some 80 to 85% of CP-6 is coded in PL-6 a higher level system implementation developed at LADC. This was considered risky and time consumming at first, but has proven to be very effective.

- LADC & Phoenix Development

  Most language processor and other software development and overall system test and integration is the responsibility of

LADC. However, there are key dependencies on Phoenix to provide COBOL, SORT/MERGE, GMAP, PL/1 (as an implementation tool) and T&D software to the CP-6 software complement. It should also be noted that four language processors of CP-6 are planned to be integrated into GCOS66; these are APL, BASIC, FORTRAN and RPG II

- Software for New Hardware

  New hardware for the CP-6 configuration has required complementary software changes. This particularly significant in the Test and Diagnostic area due to the use of the L6 front-end and the planned use of a terminal connected to that front-end as the system console.

2.1.4 R & D and Schedules

2.1.4.1 BASE CASE

The following are the Xerox hardware and software R&D expenses based upon the 1978 LRP.

The plan does include, under the L66 R&D expenses, four hardware requirements identified as CP-6 PFS Unresolved Items. They are 16 million word memory, battery backup for MOS memory, power sequencing on and off, and hexidecimal floating point.

Table 2.1-1. Xerox R&D EXPENSES (1978 LRP)

$IN MILLIONS	1978	1979	1980	1981	1982	1983
NON CP-6						
HARDWARE	.3	.2	-	-	-	-
SOFTWARE	.6	.5	.4	.2	.1	.1
SUBTOTAL	.9	.7	.4	.2	.1	.1
CP-6						
SOFTWARE	6.2	6.8	6.7	5.9	4.7	2.1
TOTAL	7.1	7.5	7.1	6.1	4.8	2.2

.1.4.2 FULL-FUNCTION CASE

The above R&D expenses do not include unresolved items included in Appendix A of the PFS for CP-6. Engineering estimates have been developed for the majority of these items. The current R&D planning estimates for "Full-Function" CP-6 (i.e. including the Appendix A items) incremental above the LRP expression, assuming a 1978 start, is:

$ in Millions	1978	1979	1980	1981	1982	1983	Total
R&D DELTA ($M)	.9	1.0	1.4	1.0	.2	.1	4.6

The additional functionality is primarily in the areas of:

- Real-time processing
- Additional networking and IBM SNA support
- File management enhancements
- Level 6 cross compliers
- Unit record equipment modification

The estimated impact of these features is 17 additional CP-6 systems (in USISG) with an approximate ISV of $28.9M.

.1.4.3 SCHEDULES

The key scheduled CP-6 events through the end of 1979 are as follows:

- Initial performance Measurement — Dec 1978
- First User Benchmark — March 1979
- First Field Test Site Shipment (Initial or controlled release of CP-6 — June 1979
- Step 4 IPR — Nov 1979
- General Release of CP-6 — Dec 1979

All Class 12 equipment has already been shipped with the exception of the Magnetic Tape system which is scheduled for September 1978.

2.1.5 Dependencies and Risks

2.1.5.1 DEPENDENCIES

These are a number of resource and schedule dependencies with regard to CP-6 development and the functionality and delivery of the initial CP-6 product, in particular:

- Hardware productization of CP-6 features

  Level 66 hardware changes to accomodate Sigma functionality have been identified. Hexadecimal floating point, 16MW memory support, and battery backup are planned for Release 1. Power sequencing its planned for Release 2 (June 1980) and for the DPS-E processor. A retrofit capability for the Release 1 CP-6 L66 processors is required In addition, the L66/L6 coupler needs to be productized prior to Release 1.

- Availability of on-line T&D's

  Communications T&D's (COLTS and POL) will not be available for initial CP-6 shipments. Without these capabilities testing of a L6 FEP will require removing the Level 6 (and its communications traffic) from the operational system, thus a single FEP CP-6 system would be totally removed from service.

- Availability of IDS-II

  IDS-II will not be available for initial shipment (June 1979) and availability for general Release 1 (Dec 1979) is questionable.

- LADC Staffing

  LADC manpower has been impacted by attrition and the competitiveness of the software personnel market in the Los Angeles area. Current staffing is under plan by approximately 15%. This situation could clearly delay CP-6 program progress.

2.1.5.2 RISKS

- CP-6/L66 System Performance

  Many uncertainties exist with regard to the actual performance of CP-6 on Level 66. Detailed measurements/benchmarks cannot be established until integration of the total hardware/software system (1Q79). Preliminary tests and

simulations indicate performance comparable or better than Sigma 9 for Release 1 is achievable, but definitive testing is required. The implications of this are that:

- the announced CP-6 systems may have to be modified (internally by processor adjustments) to meet required performance levels

- the small and medimum CP-6 systems and their pricing (to be announced by January 1979) will be supported by performance measurements but considerable uncertainity will exist about their performance at the time of the announcement.

In addition, high performance (e.g., 2X Sigma 9) which is a key program objective is not possible with a single processor on Level 66. Accordingly, timely availability of CP-6 capabilities on ADP is required for the Very Large Xerox user.

- CP-V to CP-6 Conversion

Conversion is a critical item for CP-6; a key objective is that conversion from CP-V be significantly less difficult and less costly than migration to a competitive system. Successful conversions for the initial CP-6 sites will be clearly important as a positive indicator to the CP-V parc. FORTRAN conversion is currently viewed as a difficult task for the initial sites and additional conversion aids are required. Further, personnel (in LADC and other) with Xerox specific expertise is not in abundance and conversion demands must be balanced with other program objectives.

- Strategic Direction of CP-6

Convergence of CP-6 into the GCOS-66 mainstream has been a global objective of the program since its inception. A Baseline Plan for convergence beyond CP-6 Release 3 was described earlier. It is clear, however, that the timing of a CP-6 to GCOS-66 move cannot be to rapid since the bulk of the migration to CP-6 will be in the 1980 to 1982 timeframe. Convergence of CP-6 into the mainstream will also include its Level 6 commmunications capability supporting Honeywell networking products and HDNA requirements as indicated earlier.

2.2 MANUFACTURING STRATEGY

2.2.1 Description

2.2.1.1 XEROX AND CLASS 12 EQUIPMENT

2.2.1.1.1 Xerox

The Metrocenter Facility provides the following manufacturing and related support functions for the Xerox parc.

FED SUPPORT

- Repair of Field Engineering spares
- Central FED logistics depot operation
- Support of major unit replacement emergencies
- Continuation engineering and field change kit distribution
- Central technical documentation files
- Support to FED spare parts sales and repair business.

MARKETING AND SALES SUPPORT

- Refurbishment/reconfiguration for add-on shipments
- Control of field returns (Xerox assets)
- Repair/refurbishment of customer-owned equipment
- Central purchasing functions
- Outside vendor peripheral refurbishment and new purchase
- Limited new build for critical end items

2.2.1.1.2 Class 12

Manufacturing is characterized by:

- Utilization of Xerox-owned FRE units for certain products (Sigma 6/7 Dual Processor and Sigma 5 Map)
- Integration of OEM products (Xerox 560 Dual Density Memory and Level 6 communications software for CP-V)
- Software support (primarily CP-V) and other product support by LADC

2.2.1.2 CP-6

PRODUCTION ASSEMBLY

The manufacturing concept for CP-6 systems is based on current L66 technologies, processes, and identical hardware with a few exceptions in the system configuration. CP-6 uses more real memory, the L6/43 as the FECP rather than Datanet, and can operate without the L66 system console. No unique material components are planned.

The memory is supported with battery backup similar to the battery support now in production with the HIS sigma MOS memory.

PRODUCTION TESTING

L66/CP-6 hardware is tested at subassembly and unit level identical to current production. PAE, working with LADC and manufacturing, will develop the production systems test plan. LADC will provide test specifications and a CP-6 shipments (1979 shipment forecast is six systems). In 1980, when volume shipments begin, CP-6 systems testing will be structured equal to the L66/GCOS procedures and normal MFG., PAE, and FED responsibilities.

PRODUCT QUALIFICATION

The initial systems qualification will be led by LADC with PAE quality standards and audit. By CP-6-Release 2 (June 1980) full system qualification (quality, reliability, maintainability) will be conducted to include all L66 enhancements implemented to that date.

2.2.1.3 TYPICAL CONFIGURATIONS AND PRODUCT COSTS

Typical configurations and product costs for CP-6 are described in Appendix B.

2.2.2 Volume Forecasts

The CP-6 gross shipment forecast factored by system size for USISG is:

CP-6 SYSTEM	1979	1980	1981	1982	1983	TOTAL
SMALL	-	2	5	6	2	15
MEDIUM	1	4	5	3	2	15
LARGE	2	11	6	2	2	23
XLARGE	2	4	6	4	2	18
TOTAL	5	21	22	15	8	71

This forecast does not include (1) Canadian requirements (8 systems) and (2) additional 20 CP's due to CP-6 site growth. When these are taken into account, the CP forecast is as follows (note that the XLarge System has 2 CPs)

	1979	1980	1981	1982	1983	TOTAL
CP's	8	27	35	28	19	117

Detailed forecasts for the Class 12 products through 1983 are not available, the forecast of major units through 1979 are:

	1978	1979
SIGMA 6 MOS MEMORY	16	3
SIGMA 6/7 DUAL PROCESSOR	4	3
SIGMA 9 MOS MEMORY	18	6
SIGMA 5 MAP	12	3
DISK SUBSYSTEM	21	22
TAPE SUBSYSTEM	12	14

2.2.3 Assumptions and Risks

Key assumptions and risks impacting the Xerox manufacturing strategies and approaches are:

- Memory Packaging - The M128 MOS Memory technology and Sigma MOS cabinet with battery back-up are assumed for this plan.
- DPS-E Implications - It is planned that CP-6 will utilize the L66/DPS-E processor with Release 2 (June 1980). This will accomodate the CP-6 power sequencing capability. Retrofit for the initial CP-6 systems is required.

- Productization of L66 Extensions - It is assumed that the L66 extensions for CP-6 and the L66/L6 coupler will be productized (with the exception of power sequencing) for the first release of CP-6.

- Additional CP-6 Features - The potential exists for additional CP-6 functionality to accomodate Appendix A items of the CP-6 PFS to be integrated at a later time. In addition, there may be a requirement for a PROM to prevent the GCOS user from operating on the CP-6 L66 system. The PROM capability is currently planned for DPS-E but if needed for CP-6 presents difficulties for the initial CP-6 systems.

2.3 MARKETING AND PRICING STRATEGY

2.3.1 Marketplace Definition

The principal purpose of Control Program 6 is to provide a vehicle for the orderly customer transition from Xerox hardware and Control Program V to the Series 60 Level 66 DPS product line. Since the CP-V PARC is a known entity, the CP-6 market is necessarily well defined.

2.3.2 Characteristics and Size

As illustrated, the principal thrust for CP-V marketing by Xerox Corporation was within the United States and Canada (158), with less than a dozen additional CP-V systems installed outside of North America, primarily through the activities of Rank Xerox Data Systems.

Table 2.3-1. CP-V PARC Characteristics

A.	Installations	USISG	CANADA	TOTAL
	No. of Customers	106	14	120
	No. of Mainframes	139	19	158
B.	Classification			
	Education	58		
	Fortune 1000 Accts	47		
	Government/R&D	22		
	Service Bureau	31		
		158		
C.	Contractual Status (% of PARC)			
	Purchas	44%		
	Time Sale	19%		
	Lease	37%		

3.3 Competition

Competition within the CP-V PARC historically has been a function of two companies: IBM and DEC. IBM impact resulted primarily within the lease oriented Fortune 1000 segment where typically a CP-V system was coresident with the incumbent IBM system. In this environment, the basic selling strategy was to supplement large IBM systems (i.e., 370/168) with a fast response, efficient interactive system to support the development of applications which could ultimately be put into production on the IBM equipment. In many instances, a CP-V system could be installed for less than the cost of an upgrade to the resident IBM system. A major customer consideration relative to IBM coresidence centered on the language compatibility between CP-V and IBM systems as well as the ease of transferring information and files via tape and high speed communication links.

DEC was the predominant competitor primarily within the purchase/installment purchase oriented education sector. DEC systems (i.e., KL/KI 10 series) and more recently smaller systems approached CP-V from the perspective of functionality and price/performance and was particularly aggressive in marketing into new name educational accounts. The primary strength of CP-V in this environment was its ability to provide balanced services to both administrative and academic users. DEC's primary strength was in the academic application area, while CP-V

provided superior database, transaction processing and time sharing capabilities.

From the perspective of CP-6 competition, CP-V represents the incumbent system. The extent to which IBM, DEC or other manufacturers are viable for CP-V system replacement will be largely based on whether CP-6 meets its primary product objectives.

Specifically:

a. The functionality provided by CP-6 must be greater than CP-V.
b. CP-6 must preserve the CP-V user interface.
c. CP-6 system throughput must span a range from the Xerox 560/CP-V system to performance greater than the Sigma 9. Interactive responsiveness must be at least the equal of CP-V.
d. Customer conversion from a CP-V to CP-6 system must be significantly less costly than conversion to an alternative vendor system.

On the assumption that CP-6 release 1,2, and 3 continue to track closely to their present schedules, and that the above critical product goals are met, there will be no major impact to the CP-6 program due to CP-V system replacement by a competitive vendor. Deterioration of the continuing hardware and software support provided by Honeywell to the CP-V PARC would, however, permit a competitive vendor impact.

A more likely competitive vendor strategy, particularly applicable to DEC, would be to intercept the growth requirements within a CP-V installation through the introduction of new interactive applications on a foot-in-the-door smaller system such as the DEC System 20. Such an intercept strategy would potentially terminate growth on the CP-V system, thereby negating justification for CP-6 upgrade. There are several factors which make this strategy difficult (vis a vis DEC) at the present time.

First, a critical customer consideration is the cost of the smaller system versus the cost of expansion corresponding to the CP-V system.... including hardware, training, and personnel. CP-V hardware systems cost for system expansion is relatively small due to the modularity of the hardware and flexibility of the CP-V software.

Secondly, the foot-in-the-door vendor can be successful only if that vendor can offer a systems approach which addresses expansion to CP-6 level functionality and performance; i.e., competition directly with CP-6.

A competitive area that requires comment is the plug compatible vendor. One such example, Telefile Computer Products, has been marketing a line of Sigma compatible products which include disks, tapes, and memory subsystems. A more recent Telefile announcement described two Sigma 9 instruction compatible mainframes to be available as CP-V compatible alternatives to Honeywell CP-6 systems. The basic Telefile strategy is one of a "hardware technology update".... more modern cost-effective peripheral systems and ultimately faster more cost-effective mainframes which will utilize Xerox software.

With total sales in FY77 of approximately 11.5 million dollars, Telefile sold about $5M. to the Xerox PARC. Sales over the first half of FY1978 were slightly below the 1977 rate. Telefile presently represents the principle Sigma compatible mainframe vendor. The first Sigma 9 level (performance) Telefile central system is scheduled for CP-V system level demonstration in 4Q78. Availability of a faster central system (3 to 4 times Sigma 9) is advertised in late 1979.

To date Telefile has had limited success with the Sigma plug compatible memory and peripherals and no orders for the Sigma 9 compatible mainframe. There are several factors which severely hinder the Telefile approach vis a vis CP-6. First, the Telefile software (CP-V version D01) represents a substantial subset of CP-6. CP-6 release 2/3 functionality represents approximately a 50% improvement over the Telefile version of CP-V. Major CP-6 advantages result from the removal of a number of CP-V restrictions (file system, user interface, user/system security) and from the benefits of using several new language processors, (i.e., "Modernization"). Telefile has neither the technical or financial resources available to carry forward a significant enhancement of CP-V. In addition to CP-V enhancement, Telefile's limited resources preclude the establishment of an on-going CP-V field software support structure. The most likely Telefile strategy is to address the non-CP-V segment of the Xerox PARC with the compatible products aimed at Xerox users of real-time or custom software.

2.3.4 Pricing

2.3.4.1 HARDWARE

The keys to the hardware pricing approach for CP-6 are:

- Packaging of the central system (CPS) of CP-6 to include the large main memory and communications front-end system (See Exhibit 2.3.1 and 2.3.2)

- Permitting only purchase of the CPS package to direct it only to the Xerox parc and not as a threat to L66/GCOS parc.
- Pricing the CPS along the price - performance curve of L66/DPS in competition to IBM 303X. This is illustrated in the following table.

Table 2.3-2. Equivalent CPS Pricing Comparisons

PERFORMANCE LEVEL	66/DPS	CP-6 (66/DPS/C)	IBM 303X
.83			1,000,000
.89	1,011,128		
1.0		1,046,000	
1.39	1,369,903		
1.9			1,916,000

CP-6 TYPICAL CONFIGURATION

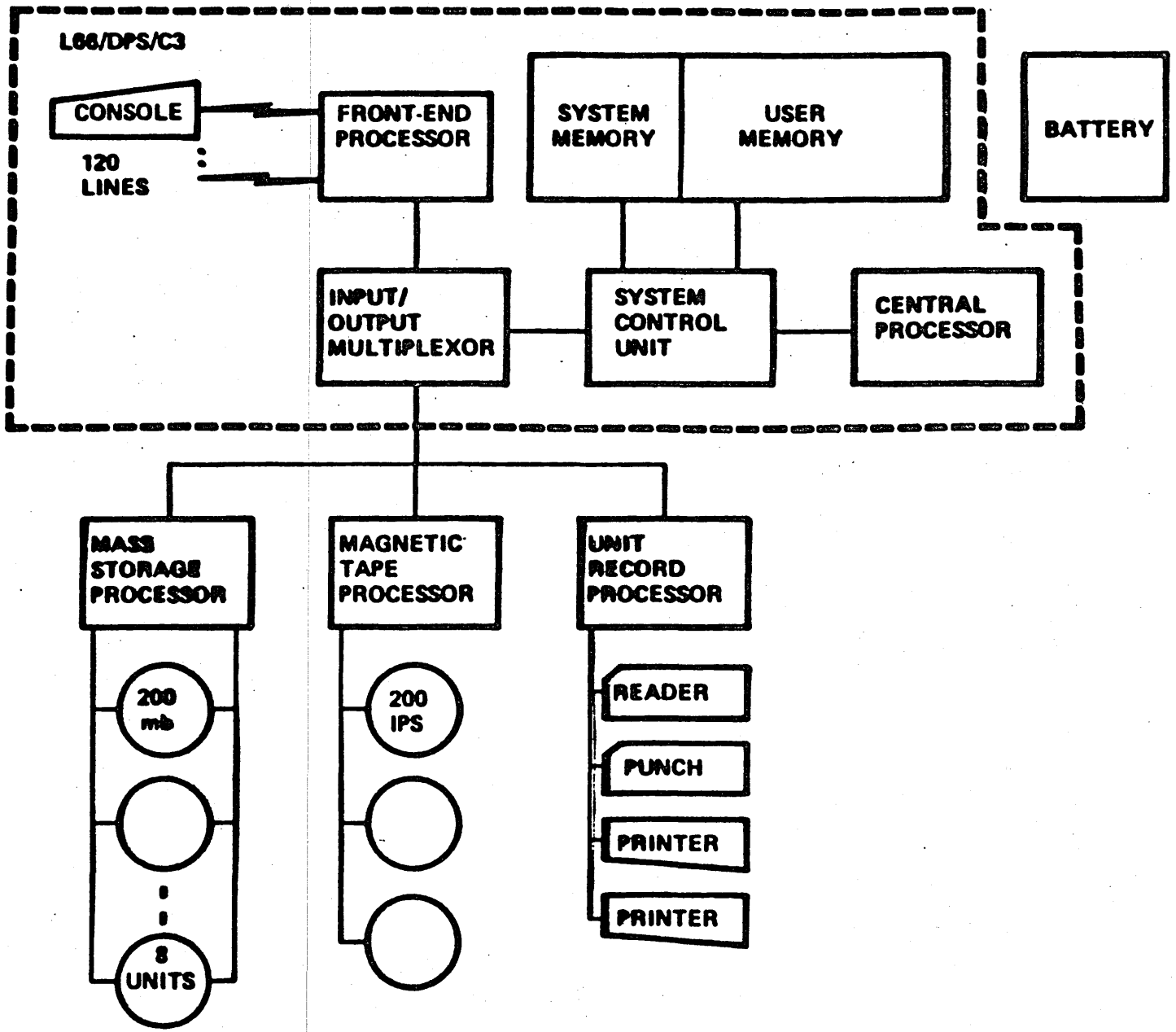

Exhibit 2.3.1

CP-6 TYPICAL LARGE CONFIGURATION

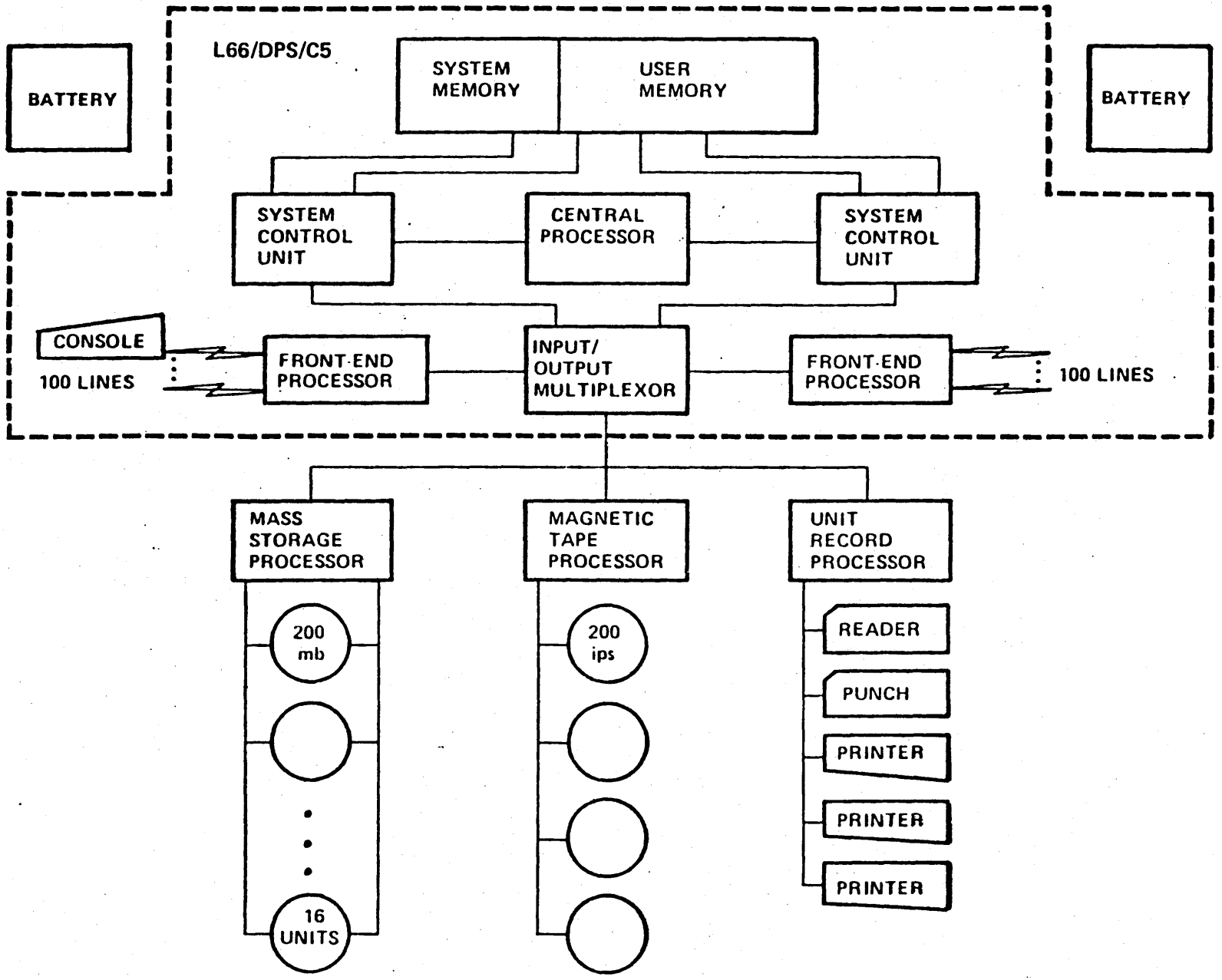

Exhibit 2.3.2

3.4.2 SOFTWARE

Software pricing goals are (a) produce recurring revenue, (b) remain competitive in all CP-V parc segments, and (c) stage the CP-6 user for subsequent GCOS migration. Key elements are:

- Prices/Policies competitive with:
  - IBM
  - DEC
- Charges are no less than for GCOS/MULTICS software with equal functionality
- Charges are higher than for GCOS/MULTICS software when justified by increased functionality, or when no charges exist in GCOS for historical reasons
- Uniform pricing structure for all CP-6 market segments

CP-6 software pricing compared to GCOS, MULTICS and IBM is as follows:

XEROX PRODUCT BUSINESS PLAN
MAJOR STRATEGIES
MARKETING AND PRICING STRATEGY

	CP-6	GCOS	MULTICS	IBM
ANS FORTRAN Less optimization of object code available compared to IBM equivalent	300	250	200	300
APL CP-6 version does not have all shared variable features implemented	325	---	250	400
BASIC No support for internal sub-routines	300	180	280	385
COBOL-74 Same functionality as GCOS	212	200	150	201
IDS-II Same functionality as GCOS	850	850	1250	1302
IDP Limited capability query processor. no file update capability.	360	360	1250	1190
RPG II Equivalent to IBM version	100	---	---	100
SORT/MERGE Same package as GCOS	100	100	100	181
TEXT Less functionality than GCOS TEX but will support more concurrent users	290	290	850	850
ASSEMBLER Subset of GCOS assembler modified to support NSA instructions Very poor procedure capability. Necessary for systems software maintenance.	50	250	250	247

.3.4.3 ASSUMPTIONS AND RISKS

- Product pricing Critical - Both from point of view of customer need and Honeywell credibility.
- CP-6 software product availability - Timing critical
- Large machine availability, i.e., single machine with instruction speeds significantly greater than 66/80 (MIPS).
- Customer attitude: Honeywell bad press has strongly impacted potential migrators. General attitude is one of "Show Me".
- Competitive moves - Specifically IBM "E" series and/or extended DEC 3000 announcements.
- Large memory package array has potential GCOS/MULTICS impact.
- FED initial release support
- Third parties causing personnel attrition

2.4 MAINTENANCE STRATEGY

2.4.1 CP-6

2.4.1.1 OVERALL STRATEGY

- On-call response for all systems
- On-line diagnostics to determine failing unit
- Off-line diagnostics to the ORU
- On-site replacement/repair of failing ORU
- Remote diagnosis/assistance when possible (H/W & S/W)

2.4.1.2 DEFINITION OF OPTIMUM REPLACEABLE UNIT

- Chip for WWB repair and MOS storage
- PWBs for peripheral logic units
- Mechanical sub-assemblies that:

  (1) conform to HIS portability standards.
  (2) provide removal/replacement safety by one person using standard hand tools not affecting adjustment of other ORUs

- Logic board for L6s
- Power supplies

2.4.1.3 TEST & DIAGNOSTIC STRATEGY

- Maximize system availability by using:

  (1) TOLTS to test and diagnose failures
  (2) ELAN for logging and analysis of transient errors

- Encourage customer participation in the isolation stage of the problem cycle
- Utilize remote assist features of CP-6

2.4.1.4 REPAIR STRATEGY

- On-site repair using board tester
- On-site adjustment/replacement of ORU

2.4.2 Xerox and Class 12 Equipment

2.4.2.1 OVERALL STRATEGT

Overall maintenance strategy for 900 Series, Sigma and all peripheral equipment is to isolate the failure to an ORU through use of diagnostics, logic diagrams, logic equations, assembly drawing, etc.

The 500 Series equipment was packaged such that T&D's indicate the defective logic PWB (Printed Wiring Board) or a group of PWB's to be replaced. In addition, 550/560 have a built-in remote interface for trouble shooting from a remote location.

2.4.2.2 OPTIMUM REPLACEABLE UNIT (ORU)

The ORU for the Xerox equipment and class 12 products are defined as follows:

- Logic Faults - The PWB or WWB (wiring wrap board).
- Non-Logic Faults - The basic electron mechanical assembly or subassembly
- Power System Faults - The basic power supply assembly

2.4.2.3 TEST 6 DIAGNOSTIC STRATEGY

T&D's for Xerox computer products provide comprehensive functional testing and assistance with hardware fault isolation for service personnel who are trained on the hardware and use of the T&D's.

900 SERIES PRODUCTS

All T&D's were produced on an individual major unit basis. A centrally controlled system (diagnostic monitor) is unavailable. The individual T&D's are available on several media. Each T&D must be operated off-line. The diagnostics for 900 Series are not supported.

SIGMA SERIES PRODUCTS

T&D's for Sigma series products are software off-line diagnostics. Generally operated under control of the Diagnostic Program Monitor (DPM), these tests will provide fault isolation aids for central processors, options, memory, input-output processors and all peripheral controllers and devices.

500 SERIES PRODUCTS

A combination of automatic firmware and software diagnostics is used to aid in fault isolation and provide system hardware operational status to interpret test results.

The firmware T&D's are executed automatically and provide a visual indication results when required.

Software T&D's are executed by manual start-up and intervention at pre-determined points. These tests operate under control of the Diagnostic Programming System Library (DPSL), available on the Magnetic Tape Library (MTL) or disk pack. Individual functional diagnostic programs (FDP's) are available on card decks.

NEW PRODUCTS (CLASS 12)

These products use a combination of firmware (micro-coded built-in) and software T&D's. These T&D's are automatically shipped when new equipment is being delivered to a customer site.

2.4.2.4 REPAIR STRATEGY

The repair of most hardware requires the use of off-line diagnostic routines, oscilloscope testing, and standard/special hand tools. When off-line diagnostics are used, the system is not available to the customer. Most peripherals can however be repaired, to a degree, without bringing the system down.

.4.3 Assumptions and Risks

.4.3.1 ASSUMPTIONS

- MTBV, MTTR, and other support parameters will be on par with existing L66 configurations as extracted from the FEDDB data base.
- Program impact on Logistics will be minimal
- 100% of CP-6 PARC will be covered with software support
- Total field headcount for all systems will remain constant over the LRP period.
- Existing L66 hardware and CP-V software expertise will be exploited.
- CP-6 user profile is:

  1) 1 shift per day, five days a week while in a 6-month conversion mode, the

  2) 2 shifts per day, six days a week when in production mode.

- Training requirements are predicated on marketing's forecast and resultant geographical considerations/
- Role of FED software support analyst will be similar to the role of the current CP-V analyst.

2.4.3.2 RISKS

- LISD cannot deliver COLTS or POL in time for initial CP-6 installations.
- CP-6 to GCOS-66 migration plan is undefined.
- Engineering slips could cause undesirable ship/install schedules.
- Software education's commitment to benchmarks, demos, and conversions could offer the quality of analyst training.
- Sigma 9 recycles and CP-V new name accounts could cause a long term field resource probles.

XEROX PRODUCT BUSINESS PLAN
MAJOR STRATEGIES
MAINTENANCE STRATEGY

- CP-V/CP-6 co-residence policy could cause a near term resource proglem.
- Scope of the power sequencing retrofits for initial CP-6 sites is unknown.
- Ultimate phaseout of CP-V engineering support could place a great burden on LSPS software support group.
- Attrition could deplete the Xerox base of hardware and software expertise.
- Facilities do not currently exist for a CP-6 configuration that can co-reside with education's CP-V machine.

APPENDIX

A. References/Supporting Plans

B. Typical Configurations and Costs

APPENDIX A

References/Supporting Plans

Xerox Liberator Plan (1976)

Product Functional Specification Control Program 6
Version A-1, October 27, 1977

Xerox Abbreviated PBP - December 1977

CP-6 Master Project Plan, July 1978

PLN 78-065 Level 66/DPS/C Hardware

PLN 78-066 Level 66/DPS/C Software

APPENDIX B

Typical Configurations and Costs

Typical configurations for CP-6 are described in the following listings. The Small and Medium systems assumed in the LRP are as shown. The Announced C3 and C5 systems relate to the Large and Extra Large configurations of the LRP as follows - C3 is the Large system, and the Extra Large is C5 plus a second 66/80 CP.

Shop costs for the announced CP-6 central systems are outlined in the table following the configurations. Shown are C3 (CPS6730), C5(CPS6750) and C7(CPS6770).

TYPICAL SMALL CONFIGURATION

Qty.	Model	Description
Base System		
1	CPSXXXX	CPU without Cache ICU/2 Port IOM MG Set NSA for CPU Memory Exerciser CPU/IOM Addressing Mem. Cabinet and SCU 2MW Memory ASCII Console (ROSY 120 CPS) FEP with 40 lines
Disks		
1	MSA1027	Disk Drive Addressing
2	MSF0007	Rotational Position Sensing Feature
1	MSF1035	MSU 451 Device Adapter
1	MSP0602	Integrated Mass Storage Processor
2	MSU0451	200 MB Disk Unit
Magnetic Tapes		
1	MTA1141	Magnetic Tape Addressing
1	MTF0605	125 IPS 1600 BPI Option for MTU0610
1	MTF1147	EBCDIC/ASCII Code Translator
1	MTF1149	Dual Density Option for MTU0610-800/1600 BPI
1	MTP0610	Magnetic Tape Processor for MTU0610
1	MTU0610	ATS Tape Drive

TYPICAL SMALL CONFIGURATION

Qty.	Model	Description
Unit Record Equipment		
1	CRU1050	1050 CPM Card Reader
1	PRU1100	1100 LPM Drum Printer
1	URA0052	Card Reader Addressing
1	URA0053	1100 Printer Addressing
1	URP0601	Integrated Unit Record Processor
Battery Pack		
1	PSS6700	Control Unit Battery Backup

TYPICAL MEDIUM CONFIGURATION

Qty.	Model	Description
Base System		
1	CPSXXXX	CPU with 2K Cache ICU/2 Port IOM MG Set NSA for CPU Memory Exerciser CPU/IOM Addressing Mem. Cabinet and SCU 3MW Memory ASCII Console (ROSY 120 CPS) FEP with 80 Lines
Disks		
1	MSA1027	Disk Drive Addressing
4	MSF0007	Rotational Position Sensing Feature
1	MSF1035	MSU 451 Device Adapter
1	MSP0602	Integrated Mass Storage Processor
4	MSU0451	200 MB Disk Unit
Magnetic Tapes		
1	MTA1141	Magnetic Tape Addressing
2	MTF0605	125 IPS 1600 BPI Option for MTU0610
1	MTF1147	EBCDIC/ASCII Code Translator
2	MTF1149	Dual Density Option for MTU0610-800/1600 BPI
1	MTP0610	Magnetic Tape Processor for MTU0610
2	MTU0610	ATS Tape Drive

TYPICAL MEDIUM CONFIGURATION

Qty.	Model	Description
Unit Record Equipment		
1	CRU1050	1050 CPM Card Reader
1	PRU1100	1100 LPM Drum Printer
1	URA0052	Card Reader Addressing
1	URA0053	1100 Printer Addressing
1	URP0601	Integrated Unit Record Processor
Battery Pack		
1	PSS6700	Control Unit Power Backup

TYPICAL C3 CONFIGURATION

Qty.	Model	Description
Base System		
1	CPS6730	CPU with 2K Cache ICU/2 Port IOM MG Set NSA for CPU Memory Exerciser CPU/IOM Addressing Mem. Cabinet and SCU 4MW Memory ASCII Console (ROSY 120 CPS) FEP with 120 lines
Disks		
2	MSA1027	Disk Drive Addressing
2	MSA1030	Dual I/O Addressing
8	MSF0006	Disk Dual Access Feature
8	MSF0007	Rotational Position Sensing Feature
1	MSF1028	Dual Simultaneous I/O Channel
1	MSF1035	MSU 451 Device Adapter
1	MSP0602	Integrated Mass Storage Processor
8	MSU0451	200 MB Disk Unit
Magnetic Tapes		
1	MTA1141	Magnetic Tape Addressing
3	MTF0607	200 IPS 1600 BPI Option for MTU0610
1	MTF1147	EBCDIC/ASCII Code Translator
3	MTF1149	Dual Density Option for MTU0610-800/1600 BPI
1	MTP0610	Magnetic Tape Processor for MTU0610
3	MTU0610	ATS Tape Drive

TYPICAL C3 CONFIGURATION

Qty.	Model	Description
Unit Record Equipment		
1	CRU1050	1050 CPM Card Reader
1	PCU1021	400 CPM Card Punch
2	PRB0500	Standard Print Belt
1	PRU1200	1200 LPM Printer
1	PRU1600	1600 LPM Line Printer
1	URA0050D	Card Punch Addressing
1	URA0052D	Card Reader Addressing
1	URA0054D	1200 Printer Addressing
1	URA0055D	1600 Printer Addressing
1	URP0601D	Integrated Unit Record Processor
Communication Equipment		
1	DCE6700	Initial Sync-Line Option
Battery Backup		
1	PSS6700	Battery Backup for 4MW

TYPICAL C5 CONFIGURATION

Qty.	Model	Description
Base System		
1	CPS6750	CPU with 2K Cache ICU/2 with Port IOM MG Set NSA for CPU Memory Exerciser CPU/IOM Addressing X 2 Mem. Cabinet and SCU X 2 6MW Memory ASCII Console (ROSY 120 CPS) X 2 2 FEPs with 200 Lines
Disks		
4	MSA1027	Disk Drive Addressing
4	MSA1030	Dual I/O Addressing
16	MSF0006	Disk Dual Access Feature
16	MSF0007	Rotational Position Sensing Feature
1	MSF1028	Dual Simultaneous I/O Channel
1	MSF1035	MSU 451 Device Adapter
1	MSP0602	Integrated Mass Storage Processor
16	MSU0451	200 MB Disk Unit
Magnetic Tapes		
1	MTA1141	Magnetic Tape Addressing
4	MTF0607	200 IPS 1600 BPI Option for MTU0610
1	MTF1147	EBCDIC/ASCII Code Translator
4	MTF1149	Dual Density Option for MTU0610-800/1600 BPI
1	MTP0610	Magnetic Tape Processor for MTU0610
4	MTU0610	ATS Tape Drive

TYPICAL C5 CONFIGURATION

Qty.	Model	Description
Unit Record Equipment		
1	CRU1050	1050 CPM Card Reader
1	PCU1021	400 CPM Card Punch
3	PRB0500	Standard Print Belt
2	PRU1200	1200 LPM Printer
1	PRU1600	1600 LPM Line Printer
1	URA0050	Card Punch Addressing
1	URA0052	Card Reader Addressing
2	URA0054	1200 Printer Addressing
1	URA0055	1600 Printer Addressing
1	URP0601	Integrated Unit Record Processor
Communication Equipment		
2	DCE6700	Initial Sync-Line Option
2	DCM9103	Sync-Line Addition
Battery Backup		
2	PSS6700	Control Unit Battery Backup

CP-6 1980 SHOP COSTS - HARDWARE

BASED ON 1978 LRP COSTING GUIDELINES

BE CONFIGURATION -A)		SHOP COST & EACH	SYSTEM 6730		SYSTEM 6750		SYSTEM 6770	
			QTY	$	QTY	$	QTY	$
PU66BA-001	NSACPU	$48388	1	$ 48388	1	$ 48388	2	$ 96776
LF66BA-001	BASIC LEVEL OPT	1965	1	1965	1	1965	2	3930
BF80BA-001	CPU PORT CONTR. OPT.	491	1	491	1	491	2	982
BF66BA-001	CACHE DATA HUB	3565	1	3565	1	3565	2	7130
JU66BA-001	B' to B UPGRADE KIT	6144	1	6144	1	6144	2	12288
K-FLT-PT	HEXIDECIMAL FLT. PT. -B)	-	1	-	1	-	2	-
PO001A-001	ACTIVE PORT	937	2	1874	3	2811	6	5622
BO66BA-001	POWER SUPPLY OPT.	567	1	567	1	567	2	1134
AE66BA-001	CPU PORT ADD. EXP.	40	1	40	1	40	2	80
CSM601AA3	ICU	18877	1	18877	1	18877	1	18877
BP66BA-001	BACKPANEL OPTION	1834	1	1834	1	1834	1	1834
CU003A-001	SCU - F.S.	3871	1	3871	2	7742	2	7742
CUNSAA-001	NSA - OPT.	473	1	473	2	946	2	946
EMA-MOS CAB	6685 MEM CAB -C)	16770	1	16770	2	33540	2	33540
PO001A-001	MEMORY PORT	319	4	1276	6	1914	8	2552
PO001A-001	EXERCISER PORT	356	1	356	2	712	2	712
EX001A-001	MEMORY EXERCISER	1385	1	1385	1	1385	1	1385
OS256A-001	256K MOS 16K (4 BDS)	4186	16	66976	24	100464	32	133952
XL006B-001	MEMORY BUCKET	2255	4	9020	6	13530	8	18040
PCS601AA2	CONN. OPTION	313	1	313	1	313	2	626
TOTAL CENTRAL SYSTEM				$184185		$245228		$348148

ARD TESTER (FED COST)	$16666
TIONS	
ATTERY PACK -C)	$ 2000
OTOR GENERATOR & CONTR.	$ 9485

- CONFIGURATIONS PER W. E. DONOHUE
- NEGLIGIBLE ADDITIONAL COSTS - PER ENGINEERING
- FINANCE ESTIMATE (PL's NOT COMPLETE)