HONEYWELL INTEROFFICE CORRESPONDENCE

PHOENIX OPERATIONS – HONEYWELL INFORMATION SYSTEMS

LADC-0-77-17

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Subsection Managers

TO L. Wilkinson

FROM S. Klee

COMPONENT LADC

SUBJECT CP-6 Design Review Response

Attached are the LADC responses to the Risk Evaluations prepared by the CP-6 Design Review Team. The CP-6 Design Review was held in Los Angeles in November 1976. The DR Team was chaired by Ken Barbour, CEO-B.

SK/jas

Copies to:

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CP-6 Design Review Response

Risk Eval. Numb.	Risk Level	Critical Area	Response Responsibility
1	U	PREREQUISITE DOCUMENTATION NOT AVAILABLE	C. MARTIN
2	U	SWAP CAPABILITY	R. LITSCHGI
3	H	PRODUCT SCHEDULE	C. MARTIN
4	H	SPLIT DEVELOPMENT AND INTERFACE RESPONSIBILITIES	C. MARTIN
5	H	EASE OF CONVERSION: CP-V TO CP-6	G. KINNEY
6	M/H	FILE FORMATS	R. LITSCHGI
7	H	IMPLEMENTATION LANGUAGES	W. WONG
8	M	MEMORY VOLATILITY	R. LITSCHGI
9	M	CP-6/GCOS66 MIGRATION	R. LITSCHGI
10	M	REAL TIME CAPABILITY	E. BRYAN
11	M	OPTIMIZATION OF COMMON DEVELOPMENT PROJECTS	A. KOPITO/W. WONG
12	L	HIS TERMINAL SUPPORT	E. BRYAN
13	M	PLANNED FUNCTIONALITY VERSUS PBP SUMMARY	R. LITSCHGI/A. KOPITO
14	M	FEP (FRONT END PROCESSOR)	E. BRYAN
15	M	LACK OF INDEPENDENT TEST FUNCTIONS	R. LITSCHGI
16	L	SOFTWARE DEVELOPMENT TOOLS	C. MARTIN
17	L	SEPARATELY PRICED SOFTWARE	C. MARTIN

Critical Area:	Risk Level:				Number
					1
PREREQUISITE DOCUMENTATION NOT AVAILABLE.	L	M	H	U	Responsibility
				X	C. MARTIN

Finding:

No PFS or Project Plan were available to Review Team. No complete Architectural Description, EPS, or Design Specifications available. It should be noted that all are planned (except, with authorization, EPS) and much of the information was available in different forms.

Recommendations:

Hold further review as soon as documentation is available. Insure PFS and Work Plan agreed to before January Users Group Meeting.

Response: Risk Level	L	M	H	U	Explain if different
				X	

PFS: LADC and Marketing have had several iterations on the PFS prepared by Marketing. Substantive agreement has been reached and it is expected that an agreed to PFS will be available prior to, or very soon after, the Users Group Meeting. Note: Users Group Meeting will be held February 1-3, 1977.

WORK PLAN: Work Plans have been received from each of the LADC Development Managers and are being consolidated into a CP-6 Project Plan. First review of Project Plan was made January 13, 1977. First pass completion of Project Plan is scheduled for January 28, 1977, with internal review by LADC on the 28th.

DESIGN REVIEW: Current CP-6 plans indicate that the next review will be a Design Review and has an anticipated schedule of 2Q77.

Date of this Issue:	Closure Date:	Project:	Rev. No.
770120		CP-6 Eng. Des. Rev.	0

Critical Area:	Risk Level:				Number
					2
SWAP CAPABILITY	L	M	H	U	Responsibility
				X	R. LITSCHGI

Finding:

Software design of CP-6 centers around an extremely fast RAD swap capability. No decision has been made regarding type of swap device.

Recommendations:

- Make a decision as soon as possible
- If decision is for RAM, reassess design impact since CP-5 design based on RAD.

Response: Risk Level	L	M	H	U	Explain if different
			X		

1. A decision has been made. The CP-6 swapper requirement has been eliminated. CP-6 will use RAM memory. Sufficient RAM memory will be provided on CP-6 L66 systems to contain all programs (i.e., operating system, system ghost jobs, shared processors and user programs), previously contained in the Program Swap Area.
2. The impact on CP-6 design is being reassessed as design specifications for memory management and the scheduler are prepared. The design change risk is MODEST given the assumption that all programs are contained in memory, that is, there is no swapping.

Overall risk for this critical area is HIGH because there is no fall back position to add a swap capability for CP-6 if RAM pricing is not competitive. No suitable high performance device has been identified to be available in the 1979 time frame to provide the necessary hardware facility for swapping. We are proceeding with this approach assuming that, per our commitment to Xerox users, this additional RAM memory will be priced to provide at the system level price/performance comparable to his present system.

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770120			0

Critical Area:	Risk Level:				Number
					3
	L	M	H	U	Responsibility
PRODUCT SCHEDULE			X		C. MARTIN

Finding:

The present schedule for the first delivery of CP-6 in 1Q79 appears to be in jeopardy due to both a major work load within the CP-6 organization, as well as many uncommitted external requirements for both hardware and software products to be included within the initial release. In addition, the present staffing plans within the CP-6 organization are found to be very optimistic.

Recommendations:

•RAD, FEP - Determine ASAP the best available solution, gain commitment and proceed the work solutions to any resulting problems. •PL-6 - Gain CEO management concurrence with planned usage of PL-6, lay out detail development plan with phasing as required to achieve mid-77 availability of minimal acceptable functionality. •Staffing - Obtain agreement from CEO management to streamline and shorten Billet and offer processing cycles. •Split Developments - See separate risk. •Hardware Availability - Obtain specific agreements for definition, development and delivery of all required hardware; develop detail plans for testing and validating each new hardware piece as available.

Response: Risk Level	L	M	H	U	Explain if different
			X		

RAD/FEP: Covered in DCR responses 2 and 14, respectively.

PL-6: CEO management concurrence has been received for phase 1 of CP-6. This item also covered in response 7. Detail development plan covered in CP-6 Project Plan - see response 1.

STAFFING: LADC has been working with CEO management to accomplish this recommendation. The success to-date has not been notable. Effort to derive a satisfactory and timely offer process cycle will continue. The primary responsibility to make this happen has been assigned to Chuck Williams (LADC) who is working with Del West and his organization to improve the current situation.

SPLIT DEVELOPMENTS: See response 4.

HARDWARE AVAILABILITY: The recommended approach to the solution of this problem has been under way from the inception of the project. Responsibility for this activity is under Gene Kinney (LADC). Detail requirements and plan are being identified in the CP-6 Project Plan. Commitments for close-in hardware requirements, in particular the 66B-NSA processor, have been obtained.

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770120			0

Critical Area:	Risk Level:				Number
SPLIT DEVELOPMENT AND INTERFACE PROBLEMS	L	M	H	U	4
			X		Responsibility: C. MARTIN

Finding:

Development responsibilities are split between CEO-P, CEO-B, and LADC on major portions of this program. Of most significance are key language processors and maintainability functions. Such project management is prone to many obstacles and concerns primarily of the nature of separate priorities, lack of adequate interface personnel, absence of any definite commitment, design coordination and information exchange, checkout problems, etc.

Recommendations:

Institute strong project management procedures at earliest time to minimize and eliminate many of the problems associated with projects of this nature. Secondly, consider using DIBS as the project management procedures for those projects split over these operations. Ensure integration plans factor in requirements of separate operations. LADC representative on site in Phoenix for duration of program for technical liaison.

Response: Risk Level	L	M	H	U	Explain if different
			X		

LADC interface with CEO-P LDS group has begun. A. Kopito (LADC) met with G. Krekler (LDS) for preliminary commitment considerations for COBOL74. W. Wong to meet with CEO-P people on week 3 to begin preliminary commitment discussions on PL/1 and ASM66. CEO-P language processor commitments will be contained in Work Plans developed by CEO-P personnel and consolidated into the CP-6 Project Plan. Major problem to-date is identification of CEO-P managers who have commitment responsibility for language processors to be used in CP-6.

DIBS is under review. Major criticism is that it is not automated. Also, the information and method of use is not unlike what LADC has/uses in its Work Plans and will be contained in the Project Plan. Automated project management systems are being sought and evaluated.

The idea of an LADC representative in Phoenix has been considered and rejected. As above, we have yet to be given the list of responsible CEO-P managers for our particular interfaces. Further, we will require the attendance of CEO-P managers, when identified, to participate in the CP-6 Project Plan reviews and be responsible for reporting on their commitments to the Plan. This process will begin in 1Q77.

We are hopeful that, while the "sub-contracting" will make the management of this project more difficult, the net benefits to USISG as a whole will be greater.

Date of this Issue:	Closure Date:	Project:	Rev. No.
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Critical Area	Risk Level:				Number
EASE OF CONVERSION: CP-5 TO CP-6	L	M	H	U	5
			X		Responsibility E. KINNEY

Findings:

All user written assembly code must be rewritten. COBOL conversion will be non-trivial due to change from COBOL-68 to COBOL-74 (including File Translation from EBCDIC to ASCII). The volume of customer assembly code is unknown.

Recommendations:

Analyze the CP-5 to CP-6 conversion process in more depth. Acquire more facts about customer program and data mixtures. Lay plans for specific transistion aids designed to achieve the stated conversion goals.

Response:

Risk Level	L	M	H	U
			X	

Explain if different

LADC is working actively to staff the conversion area and prepare a detailed plan and set of conversion aids. In parallel we are working with Phoenix to incorporate enhancements to several processors to reduce the number of incompatabilities. Also, in cooperation with the CP-V technical committee of the XEROX User's Group a questionnaire has been designed to collect data from CP-V users of their projected program and data mixtures and their conversion requirements. The data collected from this survey and the specific conversion aids will be reviewed in detail with the User's Group to insure appropriateness to meet the general needs.

Date of this Issue:	Closure Date:	Project:	Rev. No.
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Critical Area:	Risk Level:				Number
					6
FILE FORMATS	L	M	H	U	Responsibility
		X			R. LITSCHGI

Finding:

CP-6 File Formats are currently incompatibile with the H.I.S. Unified File Formats (UFF). This may be inconsistent with the business plan summary.

Recommendations:

Avoid introducing new file formats by continuing technical discussions concentrating on areas (e.g., Keyed Files) where CP-6 requirements are not satisfied.

Response:

Risk Level	L	M	H	U	Explain if different
		X			

CP-6 file format requirements have been reviewed in consideration of compatibility with GCOS 66. A set of action items has been proposed to be taken by CP-6 and GCOS 66 to ensure data format compatibility between the two file systems. These action items are documented in the memo from Klee to Vance (LADC-0-76-75, titled "CP-6/GCOS 66 File Formats", dated November 15, 1976.) The changes identified for CP-6 file formats have been made in CP-6 file management. The resultant file formats will be similar but not identical. Consistent with the CP-6 business plan, we are attempting to provide maximum compatibility with CP-V on the shortest possible schedule.

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Critical Area:	Risk Level:				Number
					7
IMPLEMENTATION LANGUAGES	L	M	H	U	Responsibility
			X		W. WONG

Finding:

Required implementation languages of PL/I and ASM 66 are either not available or not being used due to functional and/or performance requirements. Interim implementation languages of GMAP and PL-6 are being developed and utilized for the early stages of the first delivery.

Recommendations:

Need for immediate agreement by CEO-P and LADC concerning the functionality and performance needs of implementation versions of PL/I and ASM 66. Commitment to a schedule for the production and delivery of these tools. Thorough assessment needed by LADC as to the risk of a mid-development conversion to these tools upon the delivery of CP-6. Evaluation of the proposed PL-6 by CEO-P as a valid implementation derivative of PL/I for use within both CP-6 and GCOS 66.

Response: Risk Level	L	M	H	U	Explain if different
			X		

1. Negotiations are in process to reach agreement on the functionality and performance needs of PL/I and ASM 66. Three memos (dated November 22, December 16, and January 11) stating the CP-6 requirements have been sent to Phoenix. LADC has requested a meeting in Phoenix for the week of January 17, 1977 to obtain commitments and schedules.

2. In preparation for a potential mid-development conversion, all software differences between PL-6 and PL/I are identified and prominently flagged by two vertical bars in the reference manual. Programmers are instructed to flag these in their programs, to facilitate future conversion. A preprocessor to PL-6 has been developed to provide uniformity and transportability of code.

3. PL-6 documents have been provided to CEO-P. It is not known what has been done by CEO-P in evaluating PL-6 as an implementation language for GCOS 66.

4. It is still unclear if any feasible alternatives to PL-6 exists or will exist in a reasonable time frame for meeting the CP-6 delivery schedule.

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Critical Area:	Risk Level:				Number
	L	M	H	U	8
MEMORY VOLATILITY		X			Responsibility: R. LITSCHGI

Finding:

Present CP-V design is based upon the non-volatility of both main memory and swapping device. The volatile MOS memory of L66 as well as the possible use of volatile memory for swapping requires changes in the approach taken to providing power fail-safe support for CP-6 expected by its customers.

Recommendations:

Evaluate the actual cost and acceptability to marketing of providing battery backup for the volatile memories. Investigate the use of the L66 power shutdown fault and alternate designs for system recovery in the case of a power fault.

Response: Risk Level	L	M	H	U	Explain if different
		X			

CP-6 recovery design requires all of program memory to be intact. Thus, battery backup for main memory is required to ensure rapid and correct system recovery. The program memory must remain non-volatile long enough to allow the transmission of its contents to a magnetic device. A plan is in place to cover the necessary hardware development.

Date of this Issue:	Closure Date:	Project:	Rev. No.
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Critical Area:	Risk Level:				Number
					9
CP-6/GCOS 66 MIGRATION	L	M	H	U	Responsibility
		X			R. LITSCHGI

Finding:

There are important differences between CP-6 and GCOS 66 in the areas of File Formats, JCL & Language specifications.

Recommendations:

Maintain pressure on CP-6 and GCOS 66 to adhere to a common set of standards.

Response: Risk Level	L	M	H	U	Explain if different
		X			

Action Taken -

1. File Format Compatibility. Changes have been implemented in the CP-6 file formats to be compatible with GCOS 66 in the size and content of data block control information. (Note: GCOS 66 has not responded to our proposal. However, a CP-6 to GCOS 66 tape file export utility could (should) be provided.)

2. Language Processors. A common set of language processors for CP-6 and GCOS 66 have been planned.

3. JCL. The command processor facilities of CP-6 permit the future implementation of additional command processors. A GCOS66 - like command processor could be implemented as was done for the GE MARK II Time Sharing System under CP-V.

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Critical Area	Risk Level:				Number
					10
REAL TIME CAPABILITY	L	M	H	U	Responsibility
		X			E. BRYAN

Findings:

The Real Time capability required in CP-6 to support CP-V users may not be achievable. Plans to use Level 6 to satisfy Real Time data acquisition and response are not fully developed and could result in performance and functionality less than required.

Recommendations:

Review plans for real time hardware and software following a more complete planning and design phase.

Response: Risk Level

L	M	H	U
	X		

Explain if different

The recommendation is accepted. The Level 6 is an excellent real time data acquisition vehicle. Although all CP-6 plans are normally under such review, those for real time needs will receive special attention. A meeting with the technical committee on real time will be held at the Users Group Meeting in February 77. Their inputs will play a large role in the emerging real time design. Subsequent reviews will be held later in 77 as plan details emerge.

Date of this Issue:	Closure Date:	Project:	Rev. No.
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Critical Area	Risk Level:				Number
OPTIMIZATION OF COMMON DEVELOPMENT PROJECTS	L	M	H	U	11
		X			Responsibility: A. KOPITO/W. WONG

Findings:

GCOS 66 and CP-6 are optimized for their respective operating system environments.

Recommendations:

Identify areas that fall into this category and negotiate resolution. Strive to meet business plan goal of CP-6 and GCOS 66 having compatible language processors.

Response:	Risk Level	L	M	H	U	Explain if different
			X			

Design personnel in both projects continuously exchange information as to the technical implications of functional characteristics of the planned features and staging of components. Iterative phases of definition trade offs are planned to assure constant management visibility of performance and capability properties inherent in language processor commitments for each system.

Date of this Issue:	Closure Date:	Project:	Rev. No.
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Critical Area:	Risk Level:				Number
					12
HIS TERMINAL SUPPORT	L	M	H	U	Responsibility
	X				E. BRYAN

Finding:

No plans by CP-6 to support HIS terminals (e.g., LCSP, VIP 7100/7200/7700/7760/7800, CX, RBT, RNP).

Recommendations:

1. Check percentage of sold vs. rented terminals in CP-V base.
2. Present HIS terminal line and plans to CP-V users.
3. Prepare plan for HIS terminal support based on above.

Response: Risk Level	L	M	H	U	Explain if different
	X				

The recommendations are accepted. Recommended information is anticipated to be available by next Design Review session. It should be noted that LADC work against this area will occur only if higher priority risks are resolved.

Date of this Issue:	Closure Date:	Project:	Rev. No.
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Critical Area:	Risk Level:				Number
PLANNED FUNCTIONALITY VERSUS PBP SUMMARY	L	M	H	U	13
		X			Responsibility: R. LITSCHGI/A. KOPITO

Finding:

In three Areas (Date, MDQS, TDS) CP-6 is less than PBP required. (Apparently, Marketing has accepted this).

Recommendations:

Acceptance should be stated in PFS.

Response: Risk Level	L	M	H	U	Explain if different
		X			

Marketing is tracking these modifications. The substitution of IDP and CP-V TP is intended to avoid over specification of more functional capability than is required to meet project goals. The PFS addresses and is consistent with the current CP-6 plan.

Date of this Issue:	Closure Date:	Project:	Rev. No.
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Critical Area:	Risk Level:				Number
					14
FEP (FRONT END PROCESSOR)	L	M	H	U	Responsibility
		X			E. BRYAN

Finding:

Definition of the Level 6 to Level 66 interface for the CP-6 front end processor is not complete. There appears to be basis for review of the planned use of a DIA connection for the FEP.

Recommendations:

Formal response to the CEO-B FEP proposal should be sent ASAP followed by whatever discussion may be required to resolve any questions or conflicts that may result.

Response: Risk Level	L	M	H	U	Explain if different
			X		

1. Response to CEO-B FEP coupler proposal was made in November 76. CEO-B responded with a preliminary proposal for coupler enhancements in December 76. LADC responded to EPS-1 draft with a design for its use.

2. EPS-1 draft specifies interface via the DIA. LADC Software Design uses this interface and has acceptably low overhead. CEO-B has reviewed and approved this design.

3. New draft EPS-1 from CEO-B due in February 77, will propose two modes of operation: 1). the direct mode of the initial draft for which LADC's software design is made, and 2). a new design aimed at more completely matching LADC's needs, thus either design can be used to meet CP-6 needs.

4. Although design is now firm, risk is high since no engineering is committed to build an interface prototype by our required date of July 77. Budget for the implementation phase in CEO-B has been cut without any consultation with the LADC program and the delivery of a prototype set out to 4-78. This is clearly unacceptable and as of 1-15, CEO-B is attempting to pull this in to 9-77. Schedule impact is under review.

Date of this Issue:	Closure Date:	Project:	Rev. No.
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Critical Area:	Risk Level:				Number
					15
LACK OF INDEPENDENT TEST FUNCTIONS	L	M	H	U	Responsibility
		X			R. LITSCHGI

Finding:

There are no plans for independent software test phases or hardware qualifications of new products such as swap device.

Recommendations:

- An independent testing group should be an integral part of the CP-6 Development plan.
- Plan adequate hardware qualifications of all new hardware including processor prior to first ship.

Response: Risk Level	L	M	H	U	Explain if different
		X			

1. Available resources do not permit an independent testing group. As in CP-V development, extensive unit, subsystem and system test are planned, as well as in-house pre-release production usage. Initial release sites for CP-6 will be carefully selected and extensively supported by LADC.
2. The L6/L66 interface, NSA option and 16K RAM are the "new" L66 system hardware to be used by CP-6, with the elimination of the swapper hardware requirement. All of these items are standard HIS products.

Date of this Issue:	Closure Date:	Project:	Rev. No.
770120		CP-6 Eng. Des. Rev.	0

Critical Area:	Risk Level:				Number
					16
SOFTWARE DEVELOPMENT TOOLS	L	M	H	U	Responsibility
	X				C. MARTIN

Finding:

The Assembler, PL-6 Compiler, Linker and Pluto Processor are not resident on the same software system. GCOS-III, CP-V, and CP-6 software are involved.

Recommendations:

Consider implementing the Linker on CP-V so the volume of object code to be transported between GCOS-III and CP-V is reduced.

Response: Risk Level

L	M	H	U
X			

Explain if different

This recommendation has been considered and accepted. It will be reflected in the Project Plan.

Date of this Issue:	Closure Date:	Project:	Rev. No.
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Critical Area:	Risk Level:				Number
					17
SEPARATELY PRICED SOFTWARE	L	M	H	U	Responsibility
	X				C. MARTIN

Finding:

Separately priced software possibilities have been considered in the design, but some of the generic problems experienced by other components may not have been taken into consideration.

Recommendations:

LADC should review the Honeywell Corporate Policies and Procedures for separately priced software as well as the experiences of the other components.

Response: Risk Level	L	M	H	U	Explain if different
	X				

This recommendation has been considered and accepted. Primary responsibility for pursuing and understanding Corporate Policies and Procedures has been assigned to Gene Kinney (LADC). Consideration is being given during the design phase for separately priced components and options.

Date of this Issue:	Closure Date:	Project:	Rev. No.
770120		CP-6 Eng. Des. Rev.	0

E. Bryan

CP-6: CONCEPT DESIGN REVIEW

REVIEW BOARD:	K. BARBOUR	SYSTEMS PLANNING-B
	R. GILSTAD	SYSTEMS ENG-B
	D. OSBORN	SOFTWARE ENG-B
	V. CLAGETT	SOFTWARE ENG-P
	J. MC DADE	ADV. SOFTWARE ENG-P
	S. GANGI	SOFTWARE ENG-P
	R. PARK	ADV. SOFTWARE ENG-P
	(J. COULEUR	ADV. SYSTEMS ENG)

GROUND RULES

- TREAT AS FORMAL CONCEPT DESIGN REVIEW EVEN THOUGH NO MARKETING/FED INVOLVEMENT.

- ACCEPT THE PRINCIPLE OF CP-6.

- IN VIEW OF PROBABLE H.I.S. COMMITMENT TO CP-V CUSTOMERS IN JANUARY, EXAMINE:
  - SCHEDULE RISKS
  - CEO-P/CEO-B REQUIREMENTS
  - CP-V TO CP-6 TO GCOS 66 MIGRATION

SUMMARY

- CDR WAS HELD TOO EARLY (UNAVAILABILITY OF PREREQUISITES- PFS*, PROJECT PLAN*).

- CP-6 IS HIGH RISK AT PROPOSED LEVEL OF FUNCTIONALITY FOR 1Q79.
  - EXTERNAL DEPENDENCIES
  - RAD SITUATION**
  - STATUS OF IMPLEMENTATION LANGUAGES

- USER MIGRATION PATH IS TOUGH
  - CP-6 USES COBOL 74/IDS-II BUT NOT UFAS/UFF
  - CP-V TO CP-6 IS COMPLEX UPGRADE
  - CP-6 TO GCOS 66 WILL ALSO BE COMPLEX

- POSITIVE POINTS
  - BASED ON CP-V
  - MOTIVATED, TALENTED TEAM (CP-V EXPERIENCE)

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* MOST INFORMATION AVAILABLE IN DIFFERENT FORM

** WITHIN LIMITS OF CDR, REVIEW BOARD NOT ABLE TO MAKE A RECOMMENDATION ON SWAPPER.

CP-6 CONCEPTUAL DESIGN REVIEW

NOVEMBER 15 - 17, 1976

RISK	SUMMARY
U	2
H	5*
M	8*
L	2

* One Shared

RISK EVALUATION

CP-6 Conceptual Design Review
November 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: Prerequisite Documentation Not Available

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☐ HIGH ☐ UNACCEPTABLE ☒

FINDINGS: No PFS or Project Plan were available to Review Team. No complete Architectural Description, EPS, or Design Specs available. It should be noted that all are planned (except, with authorization, EPS) and much of the information was available in different forms.

CONSEQUENCES:

1. Unclear status of Marketing/Engineering Agreement
2. Review Team difficulty in assessing risk levels
3. Inability to evaluate schedule risk with confidence
4. This Review Board cannot assess risk of January '77 commitment by HIS to customers of this program.

SUPPORTING EVIDENCE:

Discussions

CORRECTIVE ACTIONS:

None possible for this review. Documents are planned for future dates.

RECOMMENDATIONS:

Hold further review as soon as documentation is available. Insure PFS and Work Plan agreed to before January Users Group Meeting.

RISK EVALUATION

CP-6 Conceptual Design Review
November 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: Swap Capability

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☐ HIGH ☐ UNACCEPTABLE ☒

FINDINGS: Software design of CP-6 centers around an extremely fast RAD swap capability. No decision has been made regarding type of swap device.

CONSEQUENCES:

If decision is in favor of RAM, impact on design and cost is unclear. If no decision is made for a prolonged period, design may proceed on the wrong assumptions, seriously affecting schedules.

SUPPORTING EVIDENCE:

Presentations by S. Klee, E. Bryan, R. Litschgi and documentation

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CORRECTIVE ACTIONS:

Two options, RAD and RAM, are being compared as to feasibility and cost.

RECOMMENDATIONS:

- Make a decision as soon as possible
- If decision is for RAM, reassess design impact since CP-5 design based on RAD.

RISK EVALUATION

CP-6 Conceptual Design Review
November 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: Product Schedule

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☐ HIGH ☒ UNACCEPTABLE ☐

FINDINGS: The present schedule for the first delivery of CP-6 in 1Q79 appears to be in jeopardy due to both a major workload within the CP-6 organization, as well as many uncommitted external requirements for both hardware and software products to be included within the initial release. In addition, the present staffing plans within the CP-6 organization are found to be very optimistic.

CONSEQUENCES:

The present commitment for first delivery will be missed, thus causing a loss of confidence within those CP-V customers awaiting CP-6 delivery and a possible eroding of the CP-V customer base.

SUPPORTING EVIDENCE:

Internal to CP-6, the entire CP-V system must be recoded using both a new implementation language and new hardware and requiring a substantial staffing and training effort. External to CP-6, a series of uncommitted products, including a swapping device, L6/L66 interface and split development service processors, are required for the first delivery.

CORRECTIVE ACTIONS:

A workplan is in preparation and is to be fully committed in January '77.

RECOMMENDATIONS:

- RAD, FEP - Determine ASAP the best available solution, gain commitment and proceed to work solutions to any resulting problems.
- PL-6 - Gain CEO management concurrence with planned usage of PL-6, lay out detail developmen plan with phasing as required to achieve mid-77 availability of minimal acceptable functionality.
- Staffing - Obtain agreement from CEO management to streamline and shorten Billet and offer processing cycles.
- Split Developments - See separate risk.
- Hardware Availability - Obtain specific agreements for definition, development and delivery of all required hardware; develop detail plans for testing and validating each new hardware piece as availal

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOV. 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: SPLIT DEVELOPMENT AND INTERFACE RESPONSIBILITIES

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☐ HIGH ☒ UNACCEPTABLE ☐

FINDINGS: Development responsibilities are split between CEO-P, CEO-B, and LADC on major portions of this program. Of most significance are key language processors and maintainability functions. Such project management is prone to many obstacles and concerns primarily of the nature of separate priorities, lack of adequate interface personnel, absence of any definite commitment, design coordination and information exchange, checkout problems, etc.

CONSEQUENCES: Product definition, quality, schedules and support will be difficult to manage, control and achieve. Each operation will tend to become isolated and prone to local pressures and problems. Schedules may be missed or compromised where currently they are very tight and demanding.

SUPPORTING EVIDENCE: Presentations by A. Kopito and S. Klee.

CORRECTIVE ACTIONS:

RECOMMENDATIONS: • Institute strong project management procedures at earliest time to minimize and eliminate many of the problems associated with projects of this nature. Secondly, consider using DIBS as the project management procedures for those projects split over these operations. • Ensure integration plans factor in requirements of separate operations. • LADC representative on site in Phoenix for duration of program for technical liaison.

RISK EVALUATION

CP-6 Conceptual Design Review
November 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: Ease of Conversion: CP-5 to CP-6

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☐ HIGH ☒ UNACCEPTABLE ☐

FINDINGS: All user written assembly code must be rewritten. COBOL conversion will be non-trivial due to change from COBOL-68 to COBOL-74 (including File Translation from EBCDIC to ASCII). The volume of customer assembly code is unknown.

CONSEQUENCES:

The stated Marketing goal of making the CP-5 to CP-6 conversion not more than 30% as difficult as the conversion to a non-CP-6 system may not be achieved.

SUPPORTING EVIDENCE:

Presentations and discussions.

CORRECTIVE ACTIONS:

CP-6 developers plan to produce various transition aids, but these plans are not well defined. LADC requests for COBOL 74/IDS-II enhancements.

RECOMMENDATIONS:

Analyze the CP-5 to CP-6 conversion process in more depth. Acquire more facts about customer program and data mixtures. Lay plans for specific transition aids designed to achieve the stated conversion goals.

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOV. 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: FILE FORMATS

RISK LEVEL:	LITTLE OR NONE	CP-6 MODEST	HIS HIGH	UNACCEPTABLE
	☐	☒	☒	☐

FINDINGS: CP-6 FILE FORMATS ARE CURRENTLY INCOMPATIBLE WITH THE H.I.S. UNIFIED FILE FORMATS (UFF). THIS MAY BE INCONSISTENT WITH THE BUSINESS PLAN SUMMARY.

CONSEQUENCES: (1) AN ADDITIONAL, NEW SET OF FILE FORMATS IS INTRODUCED IN LEVEL 66. (2) CP-6 FILE FORMATS BECOME INCOMPATIBLE WITH LEVEL 6, GCOS III AND GCOS 66. (3) INABILITY TO TRANSFER FILES (AT THE BLOCK LEVEL) IN A NETWORK. (4) THE ABILITY FOR CP-6 TO TAKE ADVANTAGE OF GCOS SOFTWARE (IDS-II, UFAS AND UTILITIES) IS COMPLICATED. (5) MIGRATION TO GCOS 66 IS MADE MORE DIFFICULT.

SUPPORTING EVIDENCE: PRESENTATIONS, DISCUSSIONS.

CORRECTIVE ACTIONS: TECHNICAL DISCUSSIONS ARE CURRENTLY UNDERWAY WITH CEO-P.

RECOMMENDATIONS: AVOID INTRODUCING NEW FILE FORMATS BY CONTINUING TECHNICAL DISCUSSIONS CONCENTRATING ON AREAS (E.G., KEYED FILES) WHERE CP-6 REQUIREMENTS ARE NOT SATISFIED.

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOV. 15-17, 1976

PRODUCT: CP-6
DEPARTMENT:
LOCATION: LADC
DATES:

CRITICAL AREA: IMPLEMENTATION LANGUAGES

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☐ HIGH ☒ UNACCEPTABLE ☐

FINDINGS: REQUIRED IMPLEMENTATION LANGUAGES OF PL/I AND ASM 66 ARE EITHER NOT AVAILABLE OR NOT BEING USED DUE TO FUNCTIONAL AND/OR PERFORMANCE REQUIREMENTS. INTERIM IMPLEMENTATION LANGUAGES OF GMAP AND PL-6 ARE BEING DEVELOPED AND UTILIZED FOR THE EARLY STAGES OF THE FIRST DELIVERY.

CONSEQUENCES: EITHER A MID-DEVELOPMENT CONVERSION MUST BE MADE TO THE REQUIRED IMPLEMENTATION LANGUAGES AS THEY BECOME AVAILABLE OR IF NOT AVAILABLE IN TIME, THE INTERIM IMPLEMENTATION LANGUAGES MUST BE PERPETUATED FOR THE MAINTENANCE OF THE INITIAL DELIVERY.

SUPPORTING EVIDENCE: NO SCHEDULES HAVE BEEN COMMITTED BY CEO-P FOR THE DELIVERY O PL/I OR ASM 66 FOR USE AS A CP-6 IMPLEMENTATION LANGUAGE. INTERIM PL/I VERSIONS INCLUDING PLUTO AND PL-6 (PL-H DERIVATIVE) ARE BEING MODIFIED FOR USE ON CP-V AS INTERIM IMPLEMENTATION LANGUAGES. USE OF THE NSA GMAP ON GCOS III IS ANTICIPATED FOR EARLY DEVELOPMENT.

CORRECTIVE ACTIONS: REQUIREMENTS FOR IMPLEMENTATION LANGUAGES FOR CP-6 HAVE BEEN SUBMITTED TO CEO-P FOR EVALUATION. AN INTERIM PLAN INVOLVING PL/I DERIVATIVES HAS BEEN ADOPTED UNTIL PL/I AND ASM 66 ARE AVAILABLE AND DEEMED ACCEPTABLE.

RECOMMENDATIONS: NEED FOR IMMEDIATE AGREEMENT BY CEO-P AND LADC CONCERNING TH FUNCTIONALITY AND PERFORMANCE NEEDS OF IMPLEMENTATION VERSIONS OF PL/I AND ASM 66. COMMITMENT TO A SCHEDULE FOR THE PRODUCTION AND DELIVERY OF THESE TOOLS. THOROUGH ASSESSMENT NEEDED BY LADC AS TO THE RISK OF A MID-DEVELOPMENT CONVERSIOI TO THESE TOOLS UPON THE SCHEDULE FOR DELIVERY OF CP-6. EVALUATION OF THE PROPOSED PL-6 BY CEO-P AS A VALID IMPLEMENTATION DERIVATIVE OF PL/I FOR USE WITHIN BOTH CP-6 AND GCOS 66.

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOVEMBER 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: MEMORY VOLATILITY

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☒ HIGH ☐ UNACCEPTABLE ☐

FINDINGS: Present CP-V design is based upon the non-volatility of both main memory and swapping device. The volatile MOS memory of L66 as well as the possible use of volatile memory for swapping requires changes in the approach taken to providing power fail-safe support for CP-6 expected by its customers.

CONSEQUENCES:

To avoid basic design changes for the CP-6 system, a battery backup capability may be required at additior expense to support the L66 volatile memory to insure the rapid system recovery now experienced by CP-V users.

SUPPORTING EVIDENCE:

No design exists at present for recovery of CP-6 in the case of power failure affecting the L66 MOS memory and/or the RAM alternative for swapping space.

CORRECTIVE ACTIONS:

Preliminary investigation of providing the battery backup has been done. Actions concerning the volatility of a swapping device await a decision concerning the actual choice of a device.

RECOMMENDATIONS:

Evaluate the actual cost and acceptability to marketing of providing battery backup for the volatile memories. Investigate the use of the L66 power shutdown fault and alternate designs for system recovery in the case of a power fault.

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOV. 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: CP-6/GCOS 66 MIGRATION

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☒ HIGH ☐ UNACCEPTABLE ☐

FINDINGS: THERE ARE IMPORTANT DIFFERENCES BETWEEN CP-6 AND GCOS 66 IN THE AREAS OF FILE FORMATS, JCL & LANGUAGE SPECIFICATIONS.

CONSEQUENCES: THE MIGRATION OF USERS FROM CP-6 TO GCOS 66 WILL BE INHIBITED TO THE DEGREE THAT INCOMPATIBILITIES ARE CREATED; THE PORTION OF THE BUSINESS PLAN RELATING TO MIGRATING USERS FROM CP-6 TO GCOS 66 IS THEREBY PUT AT RISK.

SUPPORTING EVIDENCE: BUSINESS PLAN, PRESENTATIONS AND CONVERSATIONS.

CORRECTIVE ACTIONS:

RECOMMENDATIONS: MAINTAIN PRESSURE ON CP-6 AND GCOS 66 TO ADHERE TO A COMMON SET OF STANDARDS.

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOV. 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: REAL TIME CAPABILITY

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☒ HIGH ☐ UNACCEPTABLE ☐

FINDINGS: THE REAL TIME CAPABILITY REQUIRED IN CP-6 TO SUPPORT CP-5 USERS MAY NOT BE ACHIEVABLE. PLANS TO USE LEVEL 6 TO SATISFY REAL TIME DATA ACQUISITION AND RESPONSE ARE NOT FULLY DEVELOPED AND COULD RESULT IN PERFORMANCE AND FUNCTIONALITY LESS THAN THAT REQUIRED.

CONSEQUENCES: CP-5 USERS THAT ARE DEPENDENT ON SIGNIFICANT REAL TIME SUPPORT MAY NOT BE SATISFIED BY CP-6 WITH THE RESULT THAT BOOKING AND SHIPMENT GOALS MAY NOT BE MET.

SUPPORTING EVIDENCE: PRESENTATIONS AND DISCUSSIONS.

CORRECTIVE ACTIONS: MORE EXPLICIT DEFINITION OF CP-6 REAL TIME REQUIREMENTS IS PLANNED.

RECOMMENDATIONS: REVIEW PLANS FOR REAL TIME HARDWARE AND SOFTWARE FOLLOWING A MORE COMPLETE PLANNING AND DESIGN PHASE.

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOVEMBER 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: OPTIMIZATION OF COMMON DEVELOPMENT PROJECTS

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☒ HIGH ☐ UNACCEPTABLE ☐

FINDINGS: GCOS 66 and CP-6 are optimized for their respective operating system environments.

CONSEQUENCES: Those areas designated as common development projects (e.g. COBOL-74, IDS-II, SORT, FORTRAN, BASIC) will have to be modified to be adapted to CP-6 and GCOS 66 beyond what is currently planned.

SUPPORTING EVIDENCE:

PRESENTATIONS, DISCUSSIONS

CORRECTIVE ACTIONS:

NONE

RECOMMENDATIONS:

Identify areas that fall into this category and negotiate resolution. Strive to meet business plan goal of CP-6 and GCOS 66 having compatible language processors.

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOVEMBER 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: HIS TERMINAL SUPPORT

RISK LEVEL: LITTLE OR NONE [X] MODEST [ ] HIGH [ ] UNACCEPTABLE [ ]

FINDINGS:

NO PLANS BY CP-6 TO SUPPORT HIS TERMINALS (E.G., LCSP, VIP 7100/7200/7700/7760/7800, CX, RBT, RNP)

CONSEQUENCES:

FOREIGN TERMINALS WILL BE SUPPORTED BY CP-6 (AS THEY ARE NOW BY CP-5) AND MAY HAVE TO BE SUPPORTED BY GCOS 66.

SUPPORTING EVIDENCE:

PRESENTATION

CORRECTIVE ACTIONS:

NONE PLANNED

RECOMMENDATIONS:

1. CHECK PERCENTAGE OF SOLD VS. RENTED TERMINALS IN CP-5 BASE.
2. PRESENT HIS TERMINAL LINE AND PLANS TO CP-5 USERS.
3. PREPARE PLAN FOR HIS TERMINAL SUPPORT BASED ON ABOVE.

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOVEMBER 15 - 17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: PLANNED FUNCTIONALITY VERSUS PBP SUMMARY

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☒ HIGH ☐ UNACCEPTABLE ☐

FINDINGS: IN THREE AREAS (DATE, MDQS, TDS) CP-6 IS LESS THAN PBP REQUIRED. (APPARENTLY MARKETING HAS ACCEPTED THIS.)

CONSEQUENCES:

LESS MARKETABILITY, LESS REVENUE

SUPPORTING EVIDENCE:

PBP SUMMARY, PRESENTATION

CORRECTIVE ACTIONS:

SUBSTITUTION OF IDP FOR MDQ; CP-V TP FOR TDS AT LATER RELEASE

RECOMMENDATIONS:

ACCEPTANCE SHOULD BE STATED IN PFS

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOVEMBER 15 - 17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: FEP (FRONT END PROCESSOR)

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☒ HIGH ☐ UNACCEPTABLE ☐

FINDINGS: DEFINITION OF THE LEVEL 6 TO LEVEL 66 INTERFACE FOR THE CP-6 FRONT END PROCESSOR IS NOT COMPLETE. THERE APPEARS TO BE BASIS FOR REVIEW OF THE PLANNED USE OF A DIA CONNECTION FOR THE FEP.

CONSEQUENCES: PLANS AND COMMITMENT FOR DESIGN AND DEVELOPMENT OF THE LEVEL 6/LEVEL 66 INTERFACE FOR THE FEP CANNOT BE FINALIZED UNTIL THE INTERFACE DEFINITION IS AGREED TO AND FROZEN.

SUPPORTING EVIDENCE: PRESENTATIONS AS WELL AS MEMOS BETWEEN LADC AND CEO-B- INDICATE THAT THE BASIS FOR THE INTERFACE AS WELL AS SPECIFIC REQUIRED FUNCTIONALITY FOR THE FEP HAS NOT BEEN AGREED TO.

CORRECTIVE ACTIONS: COMMUNICATION BETWEEN LADC AND CEO-B IS TAKING PLACE TOWARD DEFINING THE LEVEL 6/LEVEL 66 INTERFACE.

RECOMMENDATIONS: FORMAL RESPONSE TO THE CEO-B FEP PROPOSAL SHOULD BE SENT ASAP FOLLOWED BY WHATEVER DISCUSSION MAY BE REQUIRED TO RESOLVE ANY QUESTIONS OR CONFLICTS THAT MAY RESULT.

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOVEMBER 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: LACK OF INDEPENDENT TEST FUNCTIONS

RISK LEVEL: LITTLE OR NONE ☐ MODEST ☒ HIGH ☐ UNACCEPTABLE ☐

FINDINGS:

THERE ARE NO PLANS FOR INDEPENDENT SOFTWARE TEST PHASES OR HARDWARE QUALIFICATIONS OF NEW PRODUCTS SUCH AS SWAP DEVICE.

CONSEQUENCES:

TESTING EXPOSURE MAY BE LIMITED AND PRODUCT SHAKEDOWN NOT ACHIEVED. QUALITY OF PRODUCT DELIVERED MAY SUFFER AND STABILITY COMPROMISED AS A RESULT.

SUPPORTING EVIDENCE:

PRESENTATIONS BY S. KLEE AND R. LITSCHGI

CORRECTIVE ACTIONS:

RECOMMENDATIONS:

- AN INDEPENDENT TESTING GROUP SHOULD BE AN INTEGRAL PART OF THE CP-6 DEVELOPMENT PLAN.
- PLAN ADEQUATE HARDWARE QUALIFICATIONS OF ALL NEW HARDWARE INCLUDING PROCESSOR PRIOR TO FIRST SHIP.

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOVEMBER 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: SOFTWARE DEVELOPMENT TOOLS

RISK LEVEL: LITTLE OR NONE ☒ MODEST ☐ HIGH ☐ UNACCEPTABLE ☐

FINDINGS:

THE ASSEMBLER, PL-6 COMPILER, LINKER AND PLUTO PROCESSOR ARE NOT RESIDENT ON THE SAME SOFTWARE SYSTEM. GCOS-III, CP-5, AND CP-6 SOFTWARE ARE INVOLVED.

CONSEQUENCES:

AWKWARDNESS, DELAY, OPERATIONAL ERRORS LEADING TO REDUCED PRODUCTIVITY.

SUPPORTING EVIDENCE:

PRESENTATIONS AND DISCUSSIONS.

CORRECTIVE ACTIONS:

RECOMMENDATIONS:

CONSIDER IMPLEMENTING THE LINKER ON CP-5 SO THE VOLUME OF OBJECT CODE TO BE TRANSPORTED BETWEEN GCOS-III AND CP-5 IS REDUCED.

RISK EVALUATION

CP-6 CONCEPTUAL DESIGN REVIEW
NOV 15-17, 1976

PRODUCT:
DEPARTMENT:
LOCATION:
DATES:

CRITICAL AREA: SEPARATELY PRICED SOFTWARE

RISK LEVEL: LITTLE OR NONE [X] MODEST [ ] HIGH [ ] UNACCEPTABLE [ ]

FINDINGS: SEPARATELY PRICED SOFTWARE POSSIBILITIES HAVE BEEN CONSIDERED IN THE DESIGN, BUT SOME OF THE GENERIC PROBLEMS EXPERIENCED BY OTHER COMPONENTS MAY NOT HAVE BEEN TAKEN INTO CONSIDERATION.

CONSEQUENCES: CP-5 CUSTOMERS WHO ARE USED TO CERTAIN LEVEL OF USE OF INSTALLATION MAINTENANCE, ETC. MAY BECOME AS DISGRUNTLED AS THE CURRENT GCOS III CUSTOMERS.

SUPPORTING EVIDENCE: PRESENTATION BY R. LITSCHGI & DISCUSSIONS.

CORRECTIVE ACTIONS: NONE.

RECOMMENDATIONS: LADC SHOULD REVIEW THE HONEYWELL CORPORATE POLICIES AND PROCEDURES FOR SEPARATELY PRICED SOFTWARE AS WELL AS THE EXPERIENCES OF THE OTHER COMPONENTS.

CP-6

CP-6 Engineering Technical Review

Honeywell

AGENDA

MONDAY, NOVEMBER 15

I.	REVIEW GUIDELINES	K. BARBOUR	9:30
II.	INTRODUCTION	S. KLEE	9:30–10:30
	• PRODUCT GOALS		
	• ORGANIZATION		
III.	TECHNICAL DESCRIPTION	E. BRYAN/D. HEYING	→ 5
	• CP-V PHILOSOPHY		
	• CP-6 ARCHITECTURE		
	• FUNCTIONAL AREAS		
	• PERFORMANCE		

TUESDAY, NOVEMBER 16

III.	TECHNICAL DESCRIPTION CONTINUED	
	• CP-V LANGUAGES	W. WONG
	• HONEYWELL PROCESSORS	A. KOPITO
IV.	DEVELOPMENT PROCESS	
	• DEVELOPMENT ENVIRONMENT	W. WONG
	• IMPLEMENTATION LANGUAGE	W. WONG
	• STANDARDS AND CONVENTIONS	C. MARTIN
	• PRODUCTIVITY	C. MARTIN
	• DOCUMENTATION	C. MARTIN

CP-6 Engineering Technical Review (Continued)

Honeywell

AGENDA

TUESDAY, NOVEMBER 16 CONTINUED

V.	ORGANIZATION, SCHEDULE AND RELEASE PLANNING	
	• ARCHITECTURE PHASE OVERVIEW	C. MARTIN
	• RELEASE STAGING	R. LITSCHGI
	• MAJOR MILEPOSTS	R. LITSCHGI
VI.	CONFIGURATION	
	• HARDWARE	R. LITSCHGI
	• SOFTWARE	R. LITSCHGI
VII.	CONVERSION AIDS	E. KINNEY
VIII.	RISKS AND ISSUES	S. KLEE
IX.	CP-6 WRAP-UP	S. KLEE

WEDNESDAY, NOVEMBER 17

X.	REVIEW TEAM CAUCUS	K. BARBOUR
XI.	PRESENTATION TO MANAGEMENT	REVIEW TEAM

What Is CP-6?

Honeywell

- CP-V DESIGN

  DISTRIBUTED FUNCTIONS < COMMUNICATIONS / REAL TIME

- CP-V LANGUAGES AND APPLICATIONS
  - ANS FORTRAN
  - APL
  - TEXT
  - RPG-II
- GCOS LANGUAGES AND APPLICATIONS
  - COBOL-74
  - IDS-II
  - SORT-MERGE
  - PL/I
  - ASM-66
- PLUS A NEW BASIC

General CP-6 Objectives

Honeywell

- FUNCTIONALITY $\geq$ CP-V
- PERFORMANCE
  - INTERACTIVE RESPONSIVENESS AS GOOD OR BETTER THAN CP-V
  - THROUGHPUT RANGE FROM 560 EQUIVALENCE TO > 2 X Σ 9
- TIMELINESS - 4Q78 – 1Q79 TARGET
- MINIMIZE CONVERSION EFFORT FROM CP-V
- SYSTEM-USER INTERFACE LIKE CP-V
- SYSTEM-FE INTERFACE LIKE GCOS

Xerox Migration Strategy

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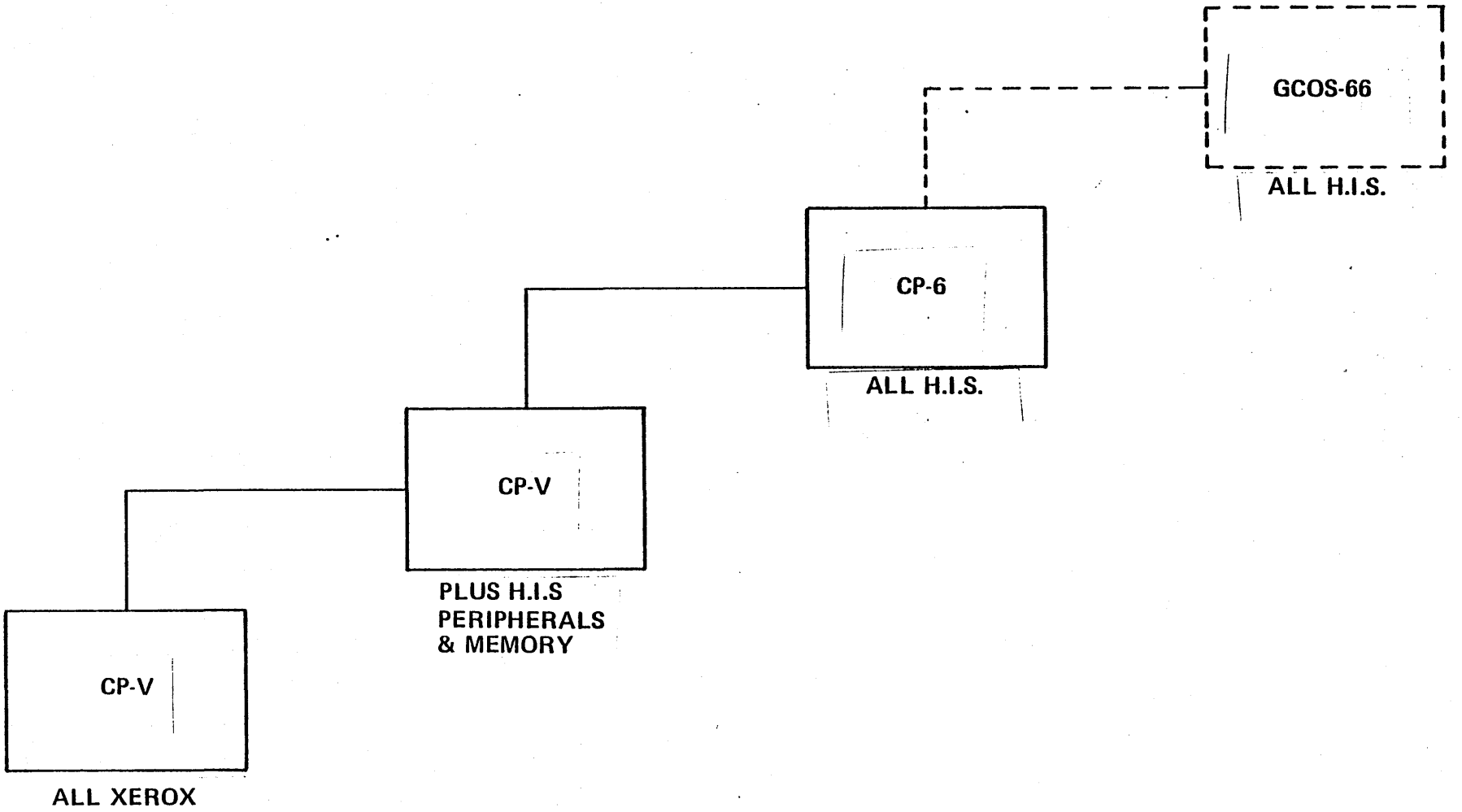

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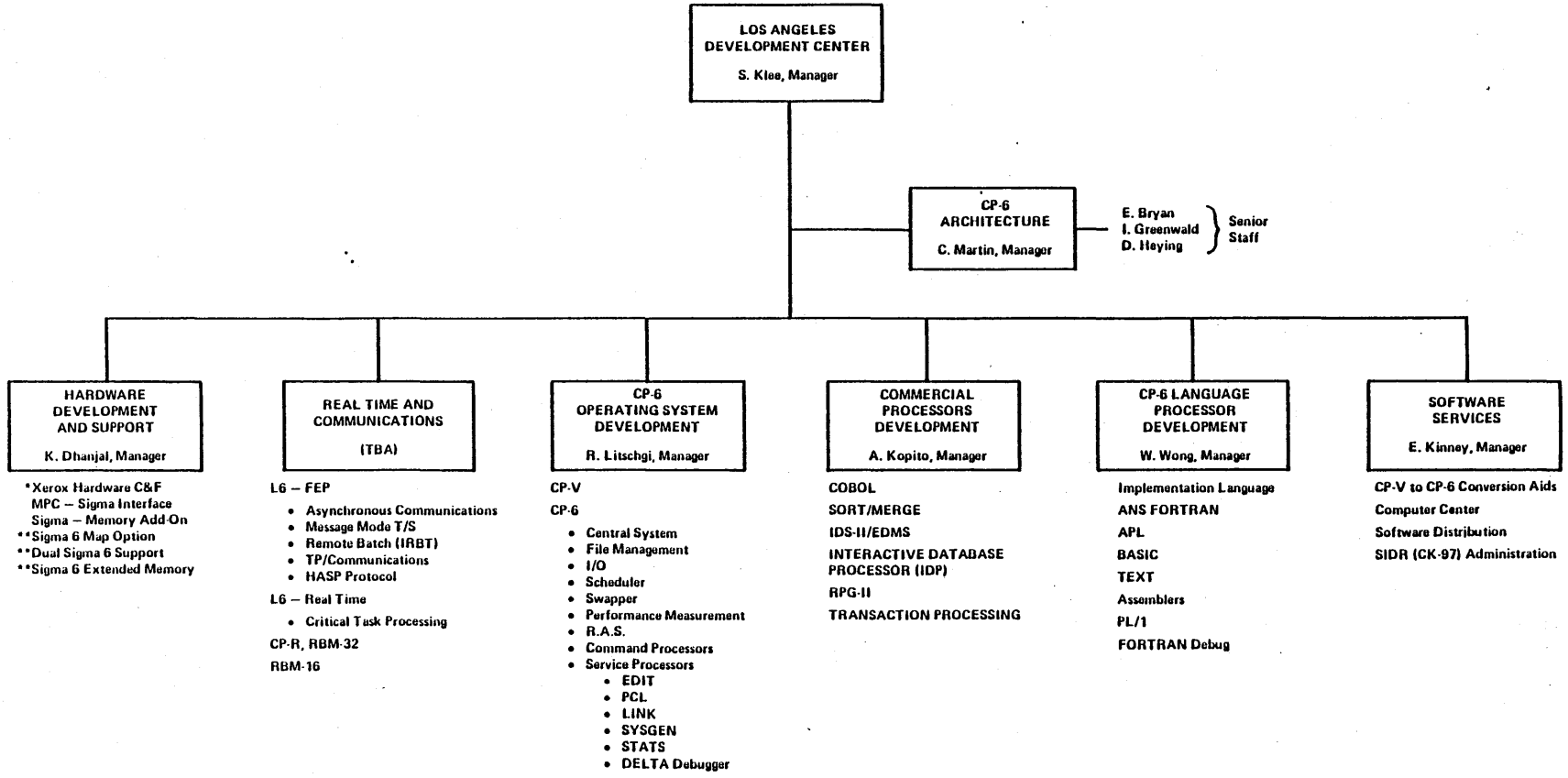
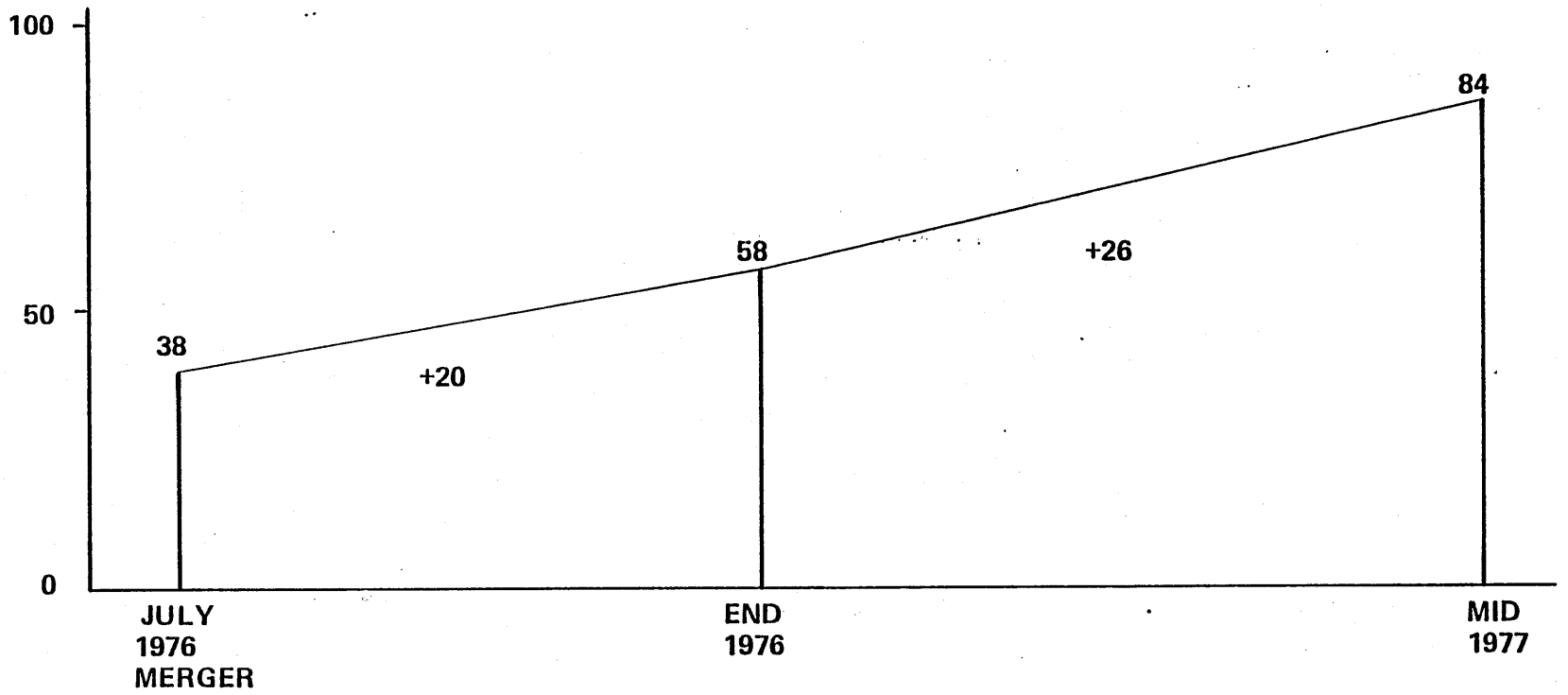


*FED Responsibility currently provided by Development.
**Marketing Desirables.

LADC Software Development Manpower Buildup

Honeywell



CP-V and CP-6

Honeywell

- CP-6 IS CP-VI
- WHAT IS CP-V?
- OUTLINE OF CP-6 AND CP-V
- CP-V DESCRIPTION – EMPHASIS ON CARRY OVERS
- CP-6 DESCRIPTION – EMPHASIS ON NEW
- PERFORMANCE
- SUMMARY

Context of CP-V

Honeywell

- DEVELOPED 1966 TO PRESENT
- SEQUENCE OF SYSTEM – BCM, BPM, BTM, UTS, CP-V
- HARDWARE: SIGMA 5, 6, 7, 9 560
  - 32 BIT, 16 GENERAL REGISTERS, ALLIGNMENT INDEXING
  - VIRTUAL MEMORY MAPPED BY PAGE 128K WORDS
  - FULLY INTERRUPTABLE FOR REAL TIME, 2 CLOCKS (ONE MAPPED)
- CUSTOMERS: 120 NAO SYSTEMS PLUS XEROX
- TYPES:
  - COLLEGES AND UNIVERSITIES
  - XEROX CORPORATION
  - FORTUNE 500 CORPORATIONS
  - COMPUTER SERVICES BUREAUS

CP-V History

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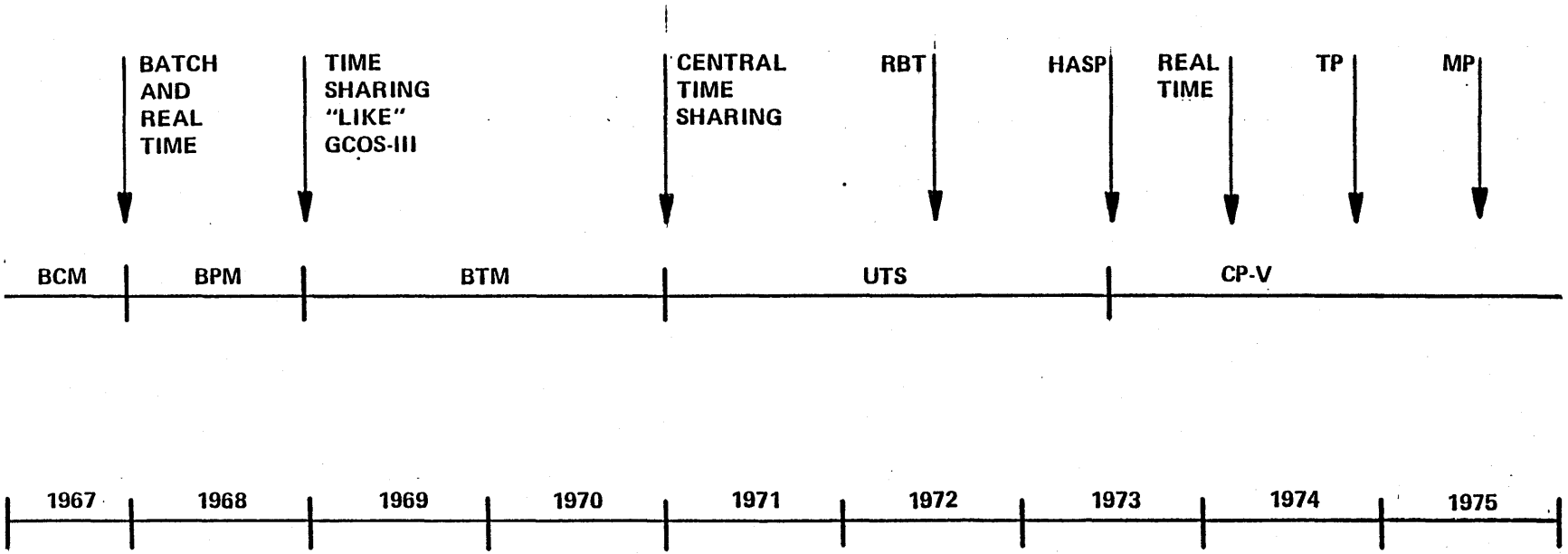

Marketing View of CP-V

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- MULTIPROGRAMMED BATCH PROCESSING
- TIME SHARING
- REMOTE PROCESSING
- REAL TIME
- TRANSACTION PROCESSING

CP-V Should Be CP-1

Honeywell

- ONE KIND OF I/O – LOGICAL I/O
- ONE FILE MANAGEMENT SYSTEM, INTEGRATED
- ONE SCHEDULER/SWAPPER/MEMORY MANAGEMENT
- ONE KIND OF PROGRAM/JOB/TASK

Three Execution Modes of CP-V

Honeywell

- ON-LINE
- BATCH
- GHOST

- LIMITS AND LOGICAL I/O ASSIGNMENTS DIFFER
  - EXIT CONTROL LIMITS
  - RESOURCE LIMITS
  - SERVICE LIMITS
  - FEATURE AUTHORIZATION
  - SYSTEM LIMITS
  - OPERATIONAL LABEL

User-Cited CP-V Features — I

Honeywell

- CENTRALIZATION
  - SINGLE KIND OF PROGRAM REGARDLESS OF MODE
  - SINGLE CENTRAL FILE MANAGEMENT SYSTEM
  - EVENT DRIVEN SCHEDULER INTEGRATED WITH SWAPPING AND MM
  - LOGICAL I/O PERMITTING DEVICE ACCESS
- USEABILITY
  - FAST TIME SHARING RESPONSE
  - EASE AND NATURALNESS OF USE
  - COMPREHENSIVE DEFAULTS
  - TIME SHARING ACCESS TO ALL DEVICES
  - TIME SHARING ACCESS TO ALL PROGRAMS, FILES
  - INTERACTIVE DEBUGGERS
  - TERMINAL PERSONALITY
  - IBM COMPATIBILITY
  - COMMAND PROCESSORS
- FACILITIES
  - MULTIPROCESSING
  - COMPREHENSIVE REMOTE BATCH
  - TERMINALS MAY BE MASTER OR SLAVE TO PROGRAM
  - MODERN DATABASE SYSTEM WITH APL, FORTRAN, COBOL

User-Cited CP-V Features — II

Honeywell

- PERFORMANCE
  - LOW SYSTEM OVERHEAD, FAST SERVICES
  - I/O PERFORMANCE – I/O CACHES, INDEX TREES
  - EFFICIENT USE OF MAIN MEMORY
  - SHARED RE-ENTRANT PROCESSORS
- MAINTENANCE
  - AUTOMATIC RECOVERY
  - ON-LINE DIAGNOSTICS
  - REMOTE DIAGNOSTICS FOR HARDWARE AND SOFTWARE
  - RELOCATABLE SYMBOLIC PATCHING
  - SECURITY OF PROGRAMS AND FILES
  - FAST SYSGEN
- MANAGEMENT
  - COMPREHENSIVE ACCOUNTING SYSTEM
  - INTEGRATED PERFORMANCE MONITOR
  - EASY-TO-MODIFY MODULAR STRUCTURE
  - SMALL SUPPORT STAFF REQUIRED

CP-V/CP-6 Terminology

Honeywell

- JOB – SEQUENCE OF EXECUTION STEPS
- USER = EXECUTING PROGRAM, DISPATCH UNIT
- JIT – THE JOB INFORMATION TABLE
- PROCESSOR – A PROGRAM: SHARED, LANGUAGE, SERVICE, COMMAND
- SCHEDULER – JOB (THE RBBAT) AND EXECUTION/SWAP (DISPATCHER)
- SYMBIONT/COOPERATIVE – UNIT RECORD SPOOLING
- ACCOUNT – A GROUP OF FILES
- GHOST JOB – A JOB WITH NO COMMAND STREAM, OFTEN A SYSTEM TASK
- DCB – DATA CONTROL BLOCK CONTAINING LOGICAL I/O COORDINATION
- FPT – TABLE OF DATA SUPPLIED WITH A LOGICAL I/O OPERATION
- WORKSTATION – A REMOTE BATCH LOGON AND STATION DEFINITION
- PARTITION – A LOGICAL ENVELOPE IN WHICH A BATCH JOB RUNS
- LIBRARY – A COLLECTION OF RUN-TIME ROUTINES
- HASP – A MESSAGE BLOCKING PROTOCOL
- MAP – A PAGE TABLE IN HARDWARE

Some Characteristics of Systems

Honeywell

- CP-V
  - OPTIMIZED FOR RESPONSE
  - DESIGNED FOR SMALL SYSTEMS
  - CONSISTENT INTERNALLY
  - STRONG INTER SYSTEM INTERFACE
  - TAILORED FOR EASY ON-LINE USE
  - LOTS DONE FOR YOU
- MULTICS
  - OPTIMIZED FOR EXTENSIBILITY
  - DESIGNED FOR LARGE SYSTEMS
  - CONSISTENT INTERNALLY
  - AN ISLAND, NO FILE I/O
  - EASY TO TAILOR TO YOUR USE
  - A DEVELOPMENT TOOL KIT
- GCOS III
  - OPTIMIZED FOR THRUPUT
  - DESIGNED FOR A BROAD SPECTRUM OF SYSTEMS
  - INCONSISTENT INTERNALLY
  - STRONG BATCH PROCESSING

- SOME ELEMENTS
  - CENTRAL SYSTEM
  - USER SERVICES
  - JOB MANAGEMENT
  - INITIALIZATION, SYSGEN, RECOVERY
- MORE ELEMENTS
  - SERVICE PROCESSORS
  - INSTALLATION MANAGEMENT PROCESSORS
  - TEST AND DIAGNOSTICS
  - TRANSACTION PROCESSING
  - COMMUNICATIONS
  - REAL TIME

Some Elements of CP-6

Honeywell

- CENTRAL SYSTEM
  - CPU AND SWAP SCHEDULER
  - MEMORY MANAGEMENT AND SWAPPER
- USER SERVICES
  - MONITOR INTERFACE
  - LOGICAL I/O – FILES, DEVICES, STREAMS
  - FILE MANAGEMENT
  - FILE ARCHIVING
  - SYMBIONTS AND COOPERATIVES
  - IOQ AND HANDLERS
- JOB MANAGEMENT
  - JOB SCHEDULING
  - COMMON COMMAND LANGUAGE
  - DEBUGGING
- INITIALIZATION, SYSGEN, AND RECOVERY

More Elements of CP-6

Honeywell

- SERVICE PROCESSORS
  - EDIT – LINE AND CONTEXT EDITOR
  - PCL – MEDIA TRANSPORT AND CONVERSION
  - I/R – INTER CP-6 FILE TRANSPORT
  - LYNX – OBJECT UNIT TO RUN UNIT LOADER
  - LEMUR – USER LIBRARY MAINTENANCE PROGRAM
- INSTALLATION MANAGEMENT PROCESSORS
  - USER AUTHORIZATION AND ACCOUNTING
  - SYSTEM PERFORMANCE MONITORING AND CONTROL
  - OPERATOR COMMUNICATIONS
- TEST AND DIAGNOSTICS
- TRANSACTION PROCESSING
- COMMUNICATIONS
- REAL TIME

	MODULES	LINES
MONITOR	227	198,000
OTHER PROCESSORS	168	256,000
	395	454,000

- 25% OF LINES ARE COMMENTS
- LANGUAGE PROCESSORS ARE NOT INCLUDED

CP-V DOO Size

Honeywell

	MODULES	SOURCE LINES (K)
• CENTRAL SYSTEM	43	36
• USER SERVICES	64	67
• JOB MANAGEMENT	36	52
• INITIALIZATION, SYSGEN, RECOVERY	54	55
• SERVICE PROCESSORS	48	57
• INSTALLATION MANAGEMENT PROCESSORS	93	107
• TEST AND DIAGNOSTIC INTERFACE	5	11
• TRANSACTION PROCESSING	31	48
• COMMUNICATIONS	17	15
• REAL TIME	4	6
	395	454

CP-6 Disposition of CP-V Code

Honeywell

	SOURCE LINES (K)
• TO BE REPLACED	52
• TO BE ELIMINATED	56
• TO BE RECODED	245
• TO BE REDESIGNED	101

CP-6 Physical Overview

Honeywell

- 10 TO 12 CODE CATEGORIES
- 42 DESIGN AREAS – USUALLY A DESIGN SPEC
- 77 FUNCTIONAL CODE GROUPS (FCG)

CP-V/CP-6 Scheduler

Honeywell

- SCHEDULES SWAPS AND DISPATCHES FOR EXECUTION
- SCHEDULES ALL JOBS – BATCH, ON-LINE, GHOST
- FAST – TYPICALLY DISPATCHES EACH 25 MS
- TWO ENTRY TYPES: REPORT EVENT, SCHEDULE
- INTERRUPT DRIVEN, PRIORITY CONTROLLED
- "DISABLED" DURING MONITOR OPERATION, CAL EXIT ENTRY

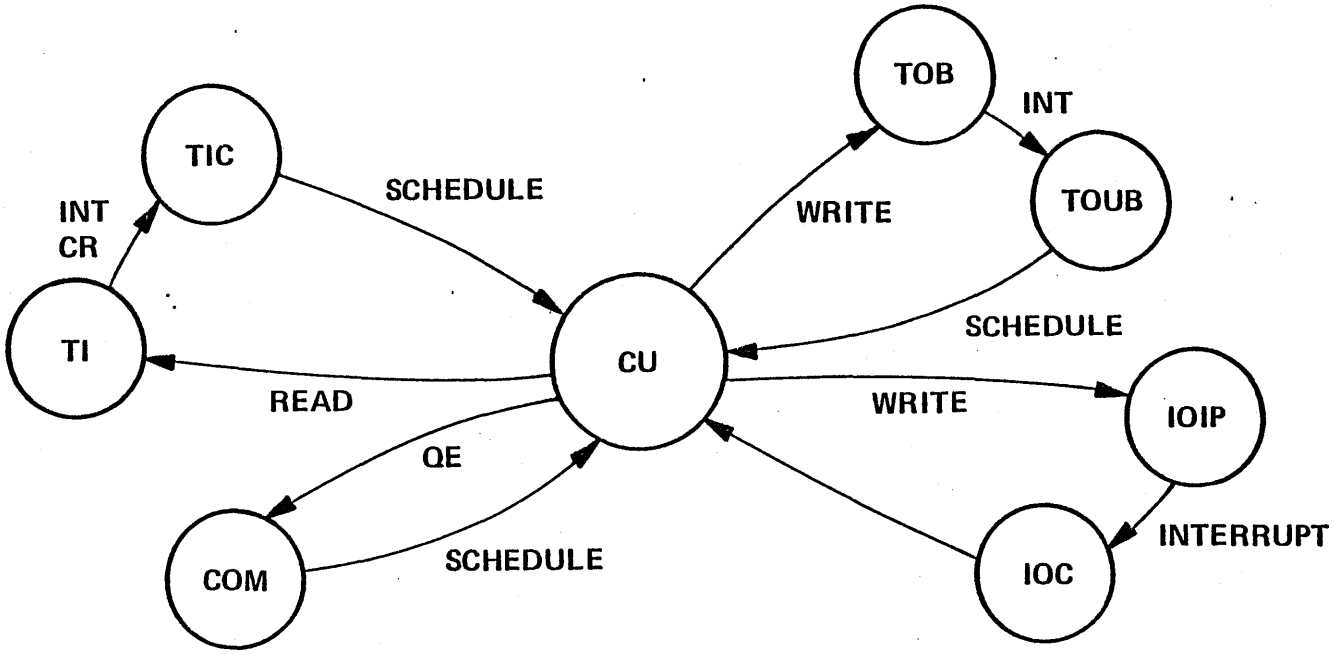
Scheduler States

Honeywell

- EVERY JOB IS IN ONE STATE (28)
- EVENTS CAUSE STATE CHANGE IN PRESCRIBED WAY
- EACH STATE HAS QUEUE OF JOB ARRIVAL ORDERED
- STATE QUEUES ARE ORDERED
  - FOR EXECUTION DISPATCH
  - FOR IN-SWAP SELECTION
  - FOR OUT-SWAP SELECTION

A Scheduling Example

Honeywell



EXECUTION AND SWAP-IN

TIC
TOUB
IOC
COM

SWAP-OUT

TI
TOB
COM
IOC
TOUB
TIC

CP-V/CP-6 Scheduler Controls

Honeywell

- ALL MAY BE SET DYNAMICALLY
- QUANTUMS: QMIN, SQUAN, QUAN
- I/O BLOCK AND UNBLOCK LIMITS: FILE, TERMINAL
- BASE EXECUTION PRIORITIES: ON-LINE, BATCH, GHOST
- I/O TIME ALLOWANCE

CP-V Multiprocessing

Honeywell

- ADDED CPU'S ARE "COMPUTE PERIPHERALS"
- ONE CPU IS MASTER
- MASTER CPU ESTABLISHED AT BOOT TIME
- MASTER CPU
  - HANDLES INTERRUPTS
  - SCHEDULES FOR ALL CPU'S
  - DOES ALL CRITICAL CP-V SERVICES
- ONE COPY OF CP-V IN MEMORY
- WAS RAPIDLY ADDED TO CP-V

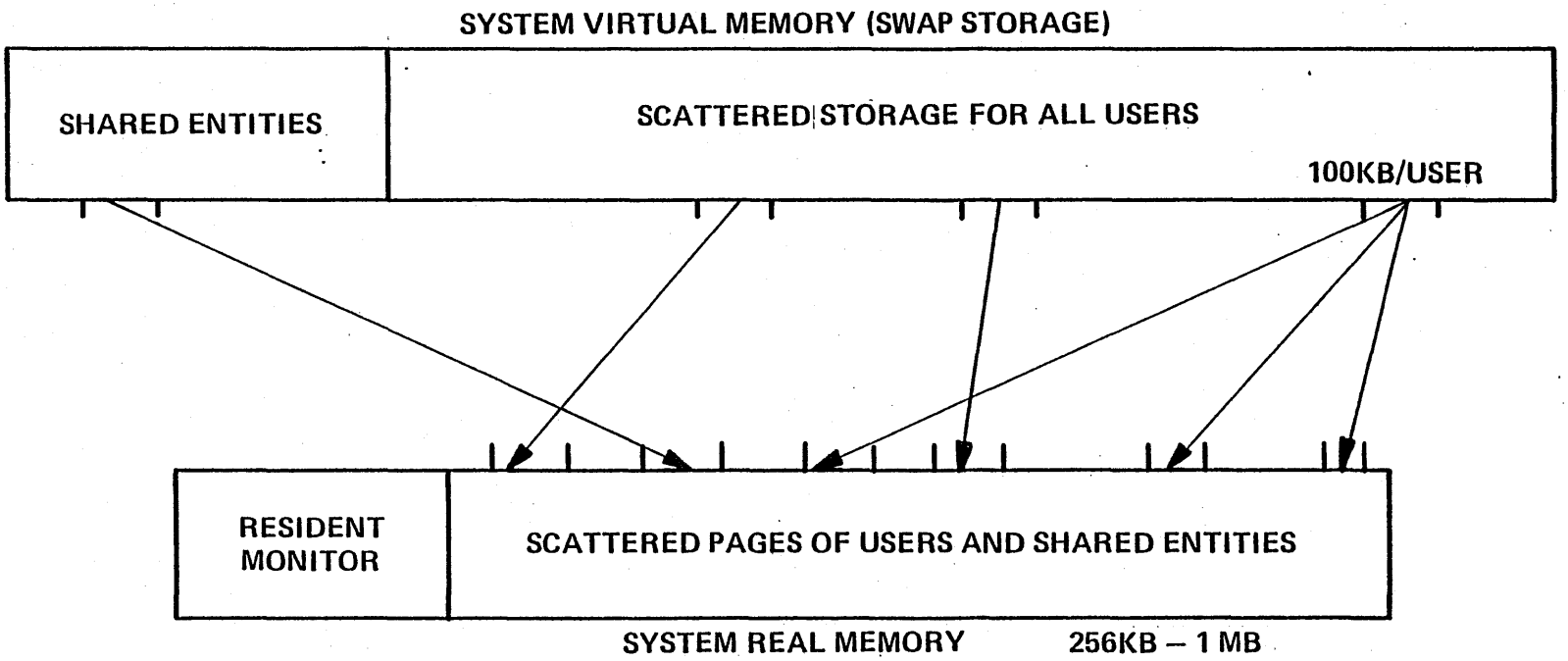
Swapping

Honeywell

- SYSTEM DESIGNED AROUND HIGH PERFORMANCE SWAPPER
- FOR FAST RESPONSE – INTERACTIONS <<1 SEC
  - DEVICE IS 17 MS LATENCY, 2.5 MEGABYTE TRANSFER 20K WDS/REV
- HIGH CPU EFFICIENCY
- NO WORKING SET PROBLEM (NO DEMAND PAGING)
- INTEGRATED WITH MEMORY MANAGEMENT
- FULL CONTEXT USER AND SHARED PROCESSOR
- TAKES ADVANTAGE OF PURE PROCEDURE

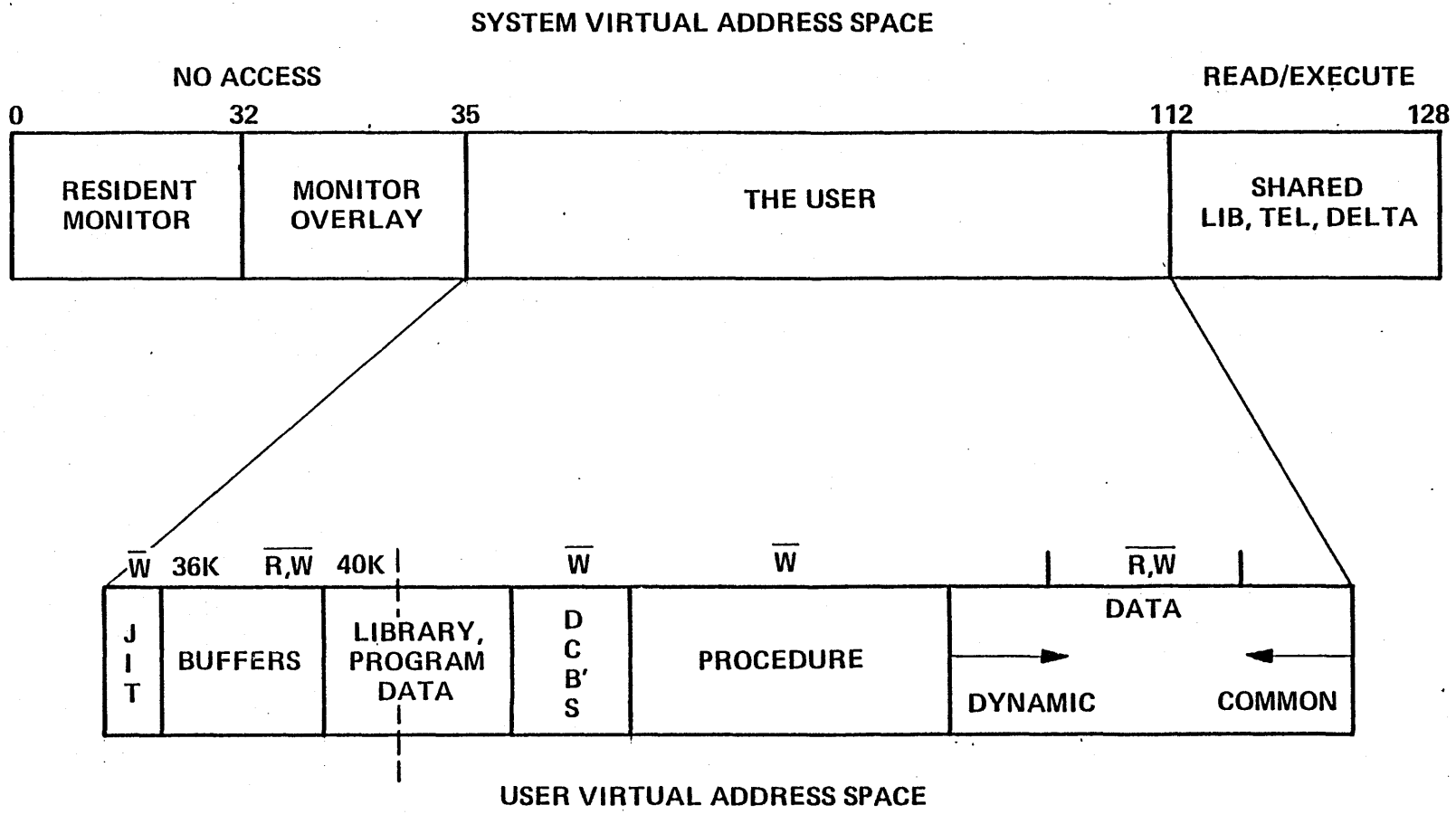
Swapper and Main Memory (CP-V & CP-6)

Honeywell



CP-V User Virtual Memory

Honeywell



Logical I/O

Honeywell

- OPERATIONS ARE: OPEN, CLOSE, READ, WRITE
- CONTROLS: FILES, DEVICES, SYMBIONTS, TERMINALS
- WORKS IN ANY MODE: ON-LINE, BATCH, REMOTE BATCH
- SYSTEM ALWAYS ESTABLISHES PHYSICAL ADDRESSES

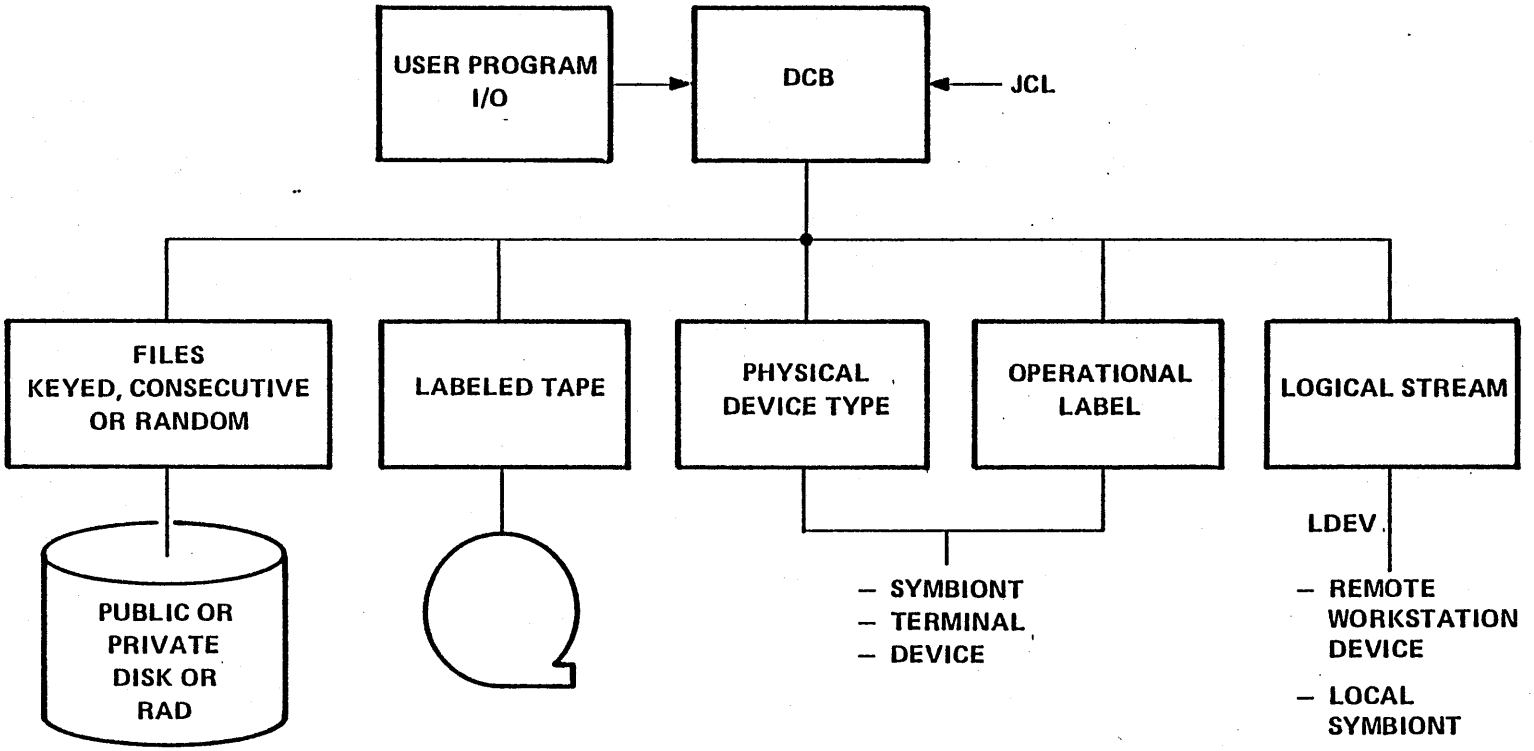
Logical I/O Assignment

Honeywell

- DIRECTED ONE OF FIVE WAYS BY DCB POINTER
  - MANAGED DISK – FILE
  - MANAGED TAPE
  - PHYSICAL DEVICE TYPE – INCLUDES SYMBIONTS AND TERMINALS
  - OPERATIONAL LABEL – INCLUDES SYMBIONTS AND TERMINALS
  - LOGICAL STREAM – TO A WORKSTATION
- POINTER IS SET BY
  - 1 INITIAL COMPILED DCB CONTENTS
  - 2 JCL – ON LINE SET OR BATCH ASSIGN
  - 3 EXECUTION OF THE OPEN OPERATION
- DEFAULT ASSIGNMENTS MAY BE SET BY INSTALLATION MANAGER
  - ON-LINE – USUALLY TERMINAL
  - BATCH – USUALLY SYMBIONT PRINTER AND READER
  - GHOST – USUALLY THE OPERATORS CONSOLE

Logical I/O Flow

Honeywell



File Management

Honeywell

- TWO LEVEL CATALOG
  - ACCOUNTS CONTAINING FILES
  - MANAGED BY KEYED LOGIC
  - OPTIMIZED FOR A LARGE NUMBER OF SMALL FILES
- DYNAMIC ALLOCATION (RUN BY A GHOST)
- FILE ORGANIZATIONS
  - KEYED – EACH RECORD IS NAMED, LIKE ISAM
  - CONSECUTIVE – NEXT, PREVIOUS, POSITION
  - RANDOM
- INTEGRATED INTO CP-V (NOT A LIBRARY)

Keyed Files

Honeywell

- EACH RECORD HAS A KEY NAME (AN INDEX)
- REFERENCE BY KEY OR SEQUENTIALLY
- VARIABLE LENGTH RECORDS AND KEYS
- NO RESTRICTIONS ON UPDATE, APPEND
- USED THROUGHOUT SYSTEM AND PROCESSORS
- KEY SEPARATED FROM DATA
  - FACILITATES SEQUENTIAL ACCESS
  - ACCESS CODE SAME AS DIRECTORIES

CP-V I/O Accelerators

Honeywell

- READ AHEAD
- DISASSOCIATED WRITE
- CACHE OF FILE DIRECTORIES
- CACHE OF DIRECTORY POINTERS
- POINTERS TO RECENTLY OPENED FILES
- STAR FILES – CATALOGED IN JIT

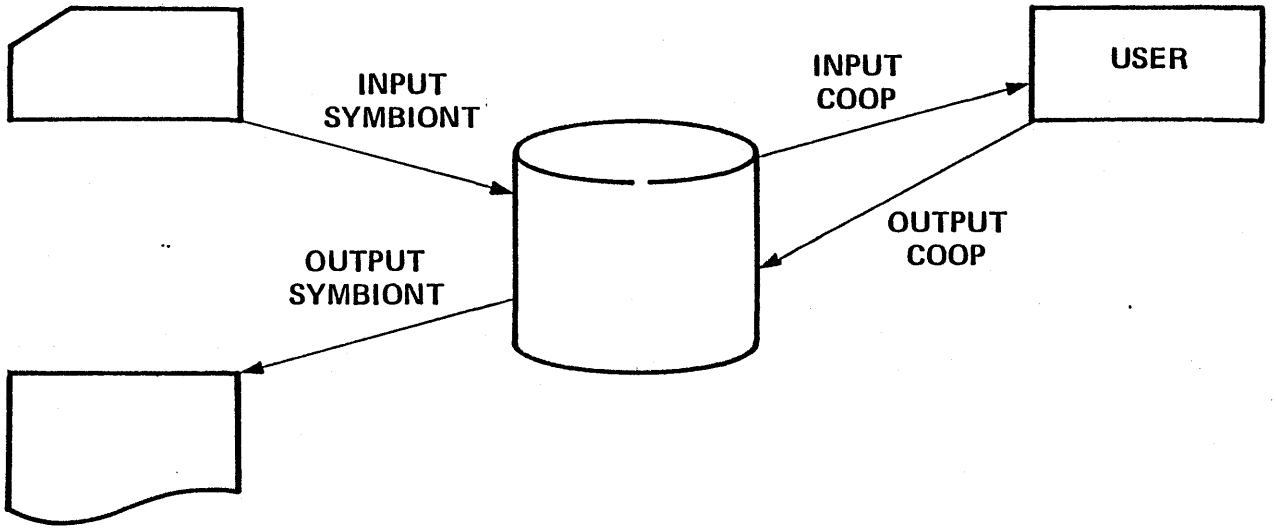
CP-V File Security

Honeywell

- SYSTEM ACCESS
- FILE PASSWORD
- FILE ACCESS LISTS FOR READ, WRITE, EXECUTE
- STORAGE CLEANING OPTION
- DATA ENCRYPTION OPTION
- TAPE LABEL PROTECTION

Symbionts and Cooperatives

Honeywell



- SYMBIONTS ARE INTERRUPT DRIVEN TASKS
- COOPS ARE PART OF LOGICAL I/O
- CP-6 IS THE SAME EXCEPT
  - WILL USE STANDARD FILES
  - BLOCK SIZE WILL DOUBLE TO 512 WORDS

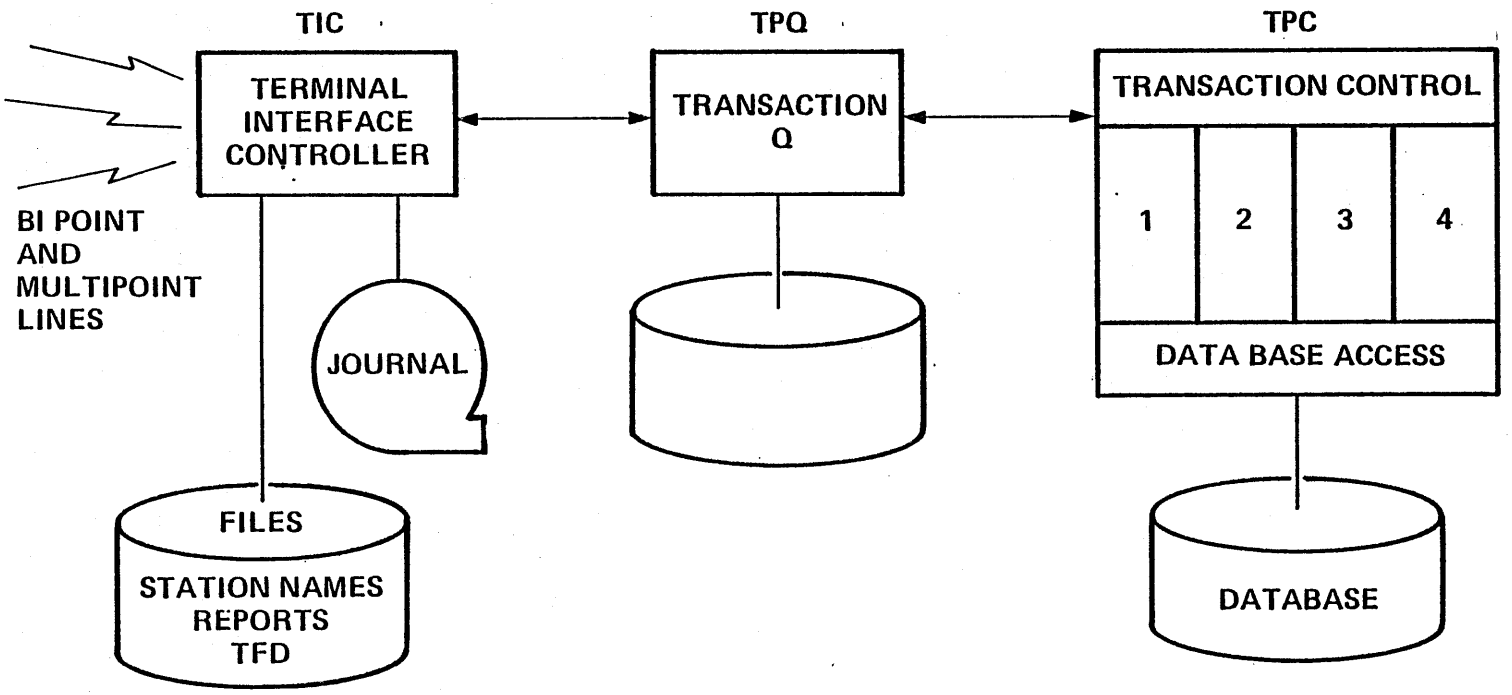
Batch Job Scheduling

Honeywell

- JOBS FROM REMOTE OR LOCAL WORKSTATIONS
- 16 "PARTITIONS" FOR EXECUTION
- RESOURCES ARE CONTROLLED BY PRE-ALLOCATION
- LIMITS AND THEIR DEFAULTS
- AFTER SELECTION AND START THEY ARE JUST ANOTHER JOB

CP-V Transaction Processing

Honeywell



Transaction Processing Recovery

Honeywell

- DEPENDS ON USE OF A JOURNAL
- JOURNAL RECORDS STEPS IN TRANSACTION
- CAN ROLL BACK DATA BASE
- CAN RE-ENTER REQUESTS
- CAN RE-TRANSMIT REPORTS
- NOT AUTOMATIC WITH CP-V RECOVERY

Command Processors

Honeywell

- CCI — HISTORICAL BATCH JCL
- TEL — ON-LINE CL AND BASIS FOR CCL
- LOGON — INITIAL CP
- EASY — MARK II
- USER SUPPLIED
  - — JIT ACCESS, CAN "CALL" A PROGRAM OR PROCESSOR, EXIT CONTROL, Y^c CONTROL

Debuggers

Honeywell

- USER (INTERACTIVE OR BATCH)
  - DELTA – ON-LINE MACHINE LANGUAGE
  - COBRA – COBOL PROGRAMS
  - FDP – FORTRAN PROGRAMS
  - SNAPS & DUMPS – BATCH
- SYSTEM
  - XDELTA
  - ANALZ DELTA
  - GENMD PATCHES
  - BOOT TIME PATCHES

Debug Schema

Honeywell

- EASILY GENERATED, AVAILABLE IF NEEDED
- DEFER EFFORT TO DEBUG TIME
- PROGRAM IDENTICAL, DEBUG OR NO
- ADAPTS TO ALL LANGUAGES
- USES HARDWARE FOR DATA BREAKPOINTS
- COMES IN PARTS (VARIABLES, STATEMENT, BLOCKS)

CP-V Recovery

Honeywell

- AUTOMATIC – OPERATOR NOT NEEDED – INITIATED VIA TRAP OR LOGICAL INCONSISTENCY
- FAST – 20 SEC TO 2 MINUTES
- CLOSES AND SAVES FILES
- DUMP WITH FORMATTED OUTPUT
- TWO TYPES
  - FULL SYSTEM
  - SINGLE USER ABORT – 1 SEC
- POWER FAIL SAFE
  - NON-VOLATILE MEMORY
  - NON-VOLATILE SWAPPER

Service Processors

Honeywell

- THE "UTILITY" PROGRAMS OF CP-V
- USER INTERFACE WILL BE RETAINED
- THESE PROGRAMS
  - ARE ALL UNPRIVILEGED
  - RUN ON-LINE, BATCH OR GHOST
  - USE LOGICAL I/O
  - USE STANDARD FILE MANAGEMENT (LARGELY KEYED)
- EDIT – LINE AND CONTEXT TEXT EDITOR
- PCL – FILE AND MEDIA CONVERSION AND TRANSFER
- I/R – INTERSYSTEM FILE TRANSFER VIA HASP
- LYNX – OBJECT MODULE TO RUN UNIT LOADER
- LEMUR – LIBRARY MAINTENANCE PROGRAM

Installation Management Processors

Honeywell

- USER AUTHORIZATION AND ACCOUNTING
  - LOGON — AUTHORIZING ACCESS FOR A USER
  - SUPER — MAINTENANCE OF THE AUTHORIZATION LIST
  - ACCTSUM — PRODUCTION OF THE USAGE RECORDS
  - RATES — MAINTENANCE OF THE CHARGE RATE FILE
- OPERATOR COMMUNICATIONS
  - KEYIN — RECEIPT OF MESSAGES FROM THE OPERATOR
  - DISPLAY — FORMATTING OF OUTPUT TO THE OPERATOR
  - ONLIST — DISPLAY OF CURRENT USERS
- PERFORMANCE MONITORING AND CONTROL
  - PM — THE RESIDENT DATA GATHERING ROUTINES
  - STATS — ROUTINES WHICH RECORD AND DISPLAY DATA
  - CONTROL — CONTROL OF SYSTEM PARAMETERS

CP-V System Control

- ACCOMPLISHED BY AN ON-LINE PROGRAM
- CONTROL VALUES MAY BE CHANGED ANY TIME
- CONTROL CATEGORIES
  - NUMBER OF USERS
  - CORE USAGE
  - MULTIPROCESSING CONTROL
  - SCHEDULER CONTROL
  - BATCH PARTITION CONTROL
  - I/O ACCELERATOR CONTROL
  - JOB SERVICE LIMITS
  - JOB RESOURCE LIMITS
  - JOB DEFAULTS

Honeywell

THE HEART OF CP-6

CPU AND SWAP SCHEDULER:

IT'S

THE

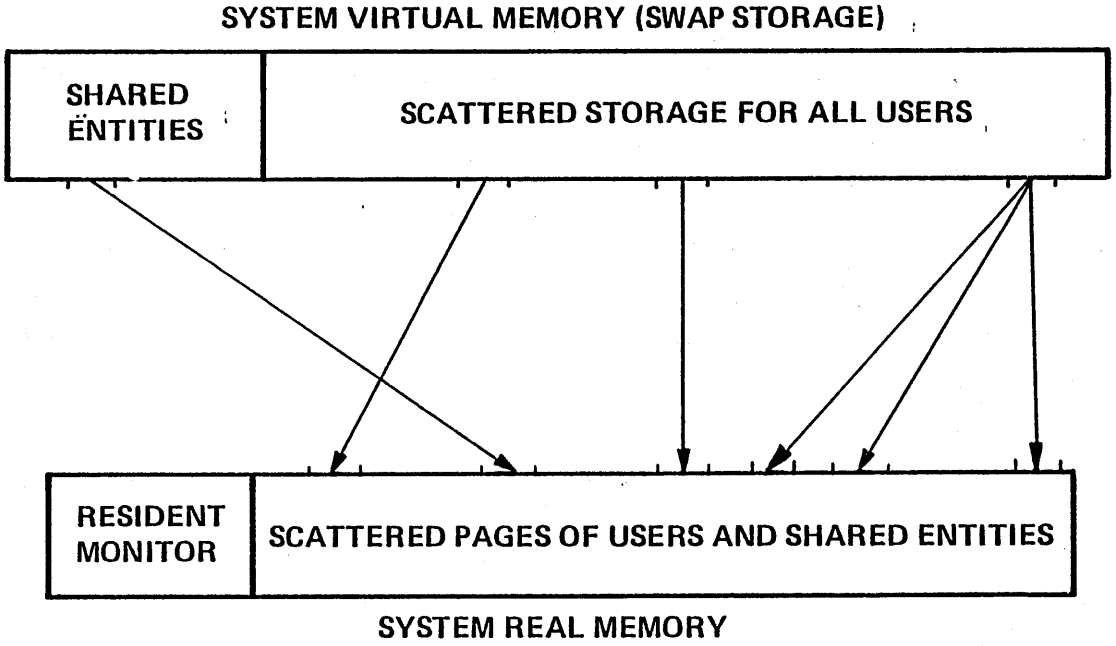
SAME!

Memory and Swap Storage

Honeywell

- SYSTEM VIRTUAL MEMORY
- SYSTEM REAL MEMORY
- SYSTEM VIRTUAL ADDRESS SPACE
- USER VIRTUAL ADDRESS SPACE
- MAKEUP OF SWAP PACKAGE
- ADVANTAGES OF NSA/CP-6

Swapper and Main Memory (CP-V & CP-6) Honeywell



Swapping Requirements

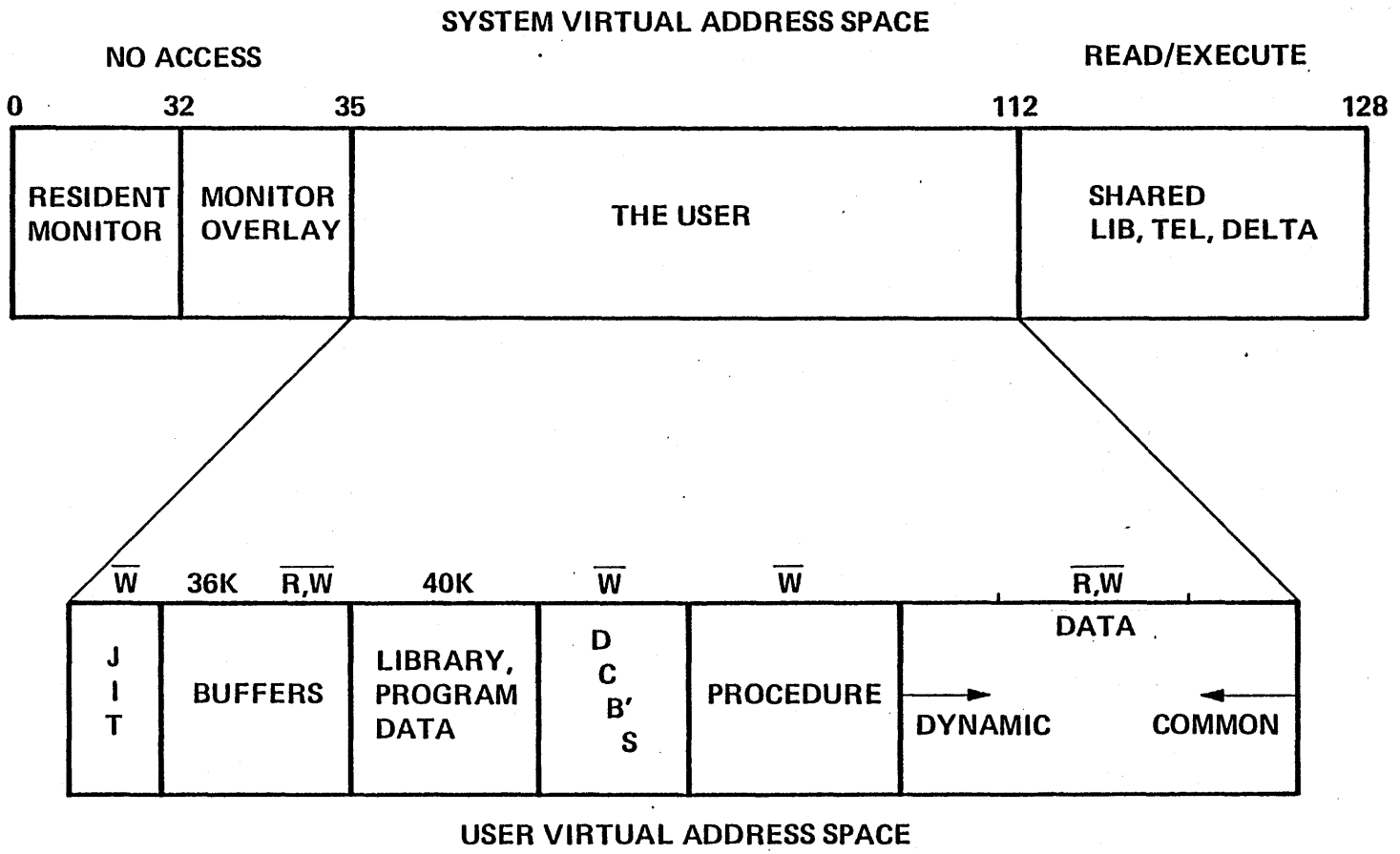
Honeywell

- CP-V EXPERIENCE
  - TWO REPLACEMENT SWAPS PER INTERACTION
  - AVERAGE SWAP SIZE 15-20 KW, TWO PARTS
  - 7212 WILL SUPPORT 120 USERS
- CP-6 PROJECTIONS

NO. USERS	TRANSFER RATE	LATENCY	CAPACITY
120	2.5 MB/SEC	16 MS	13.7 MB
160	2.5 MB/SEC	8 MS	18.1 MB
240	5 MB/SEC	8 MS	26.9 MB

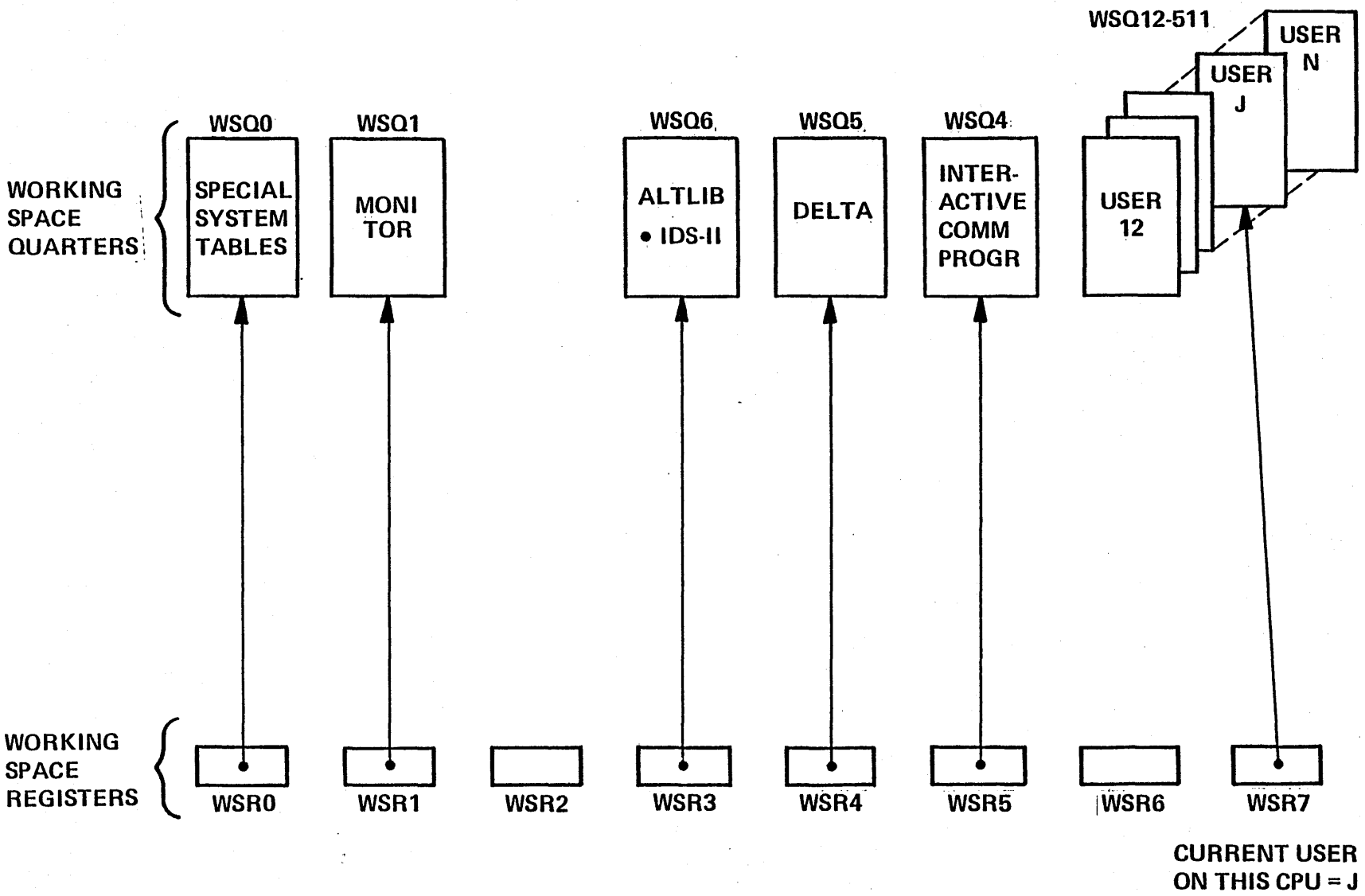
CP-V User Virtual Memory

Honeywell



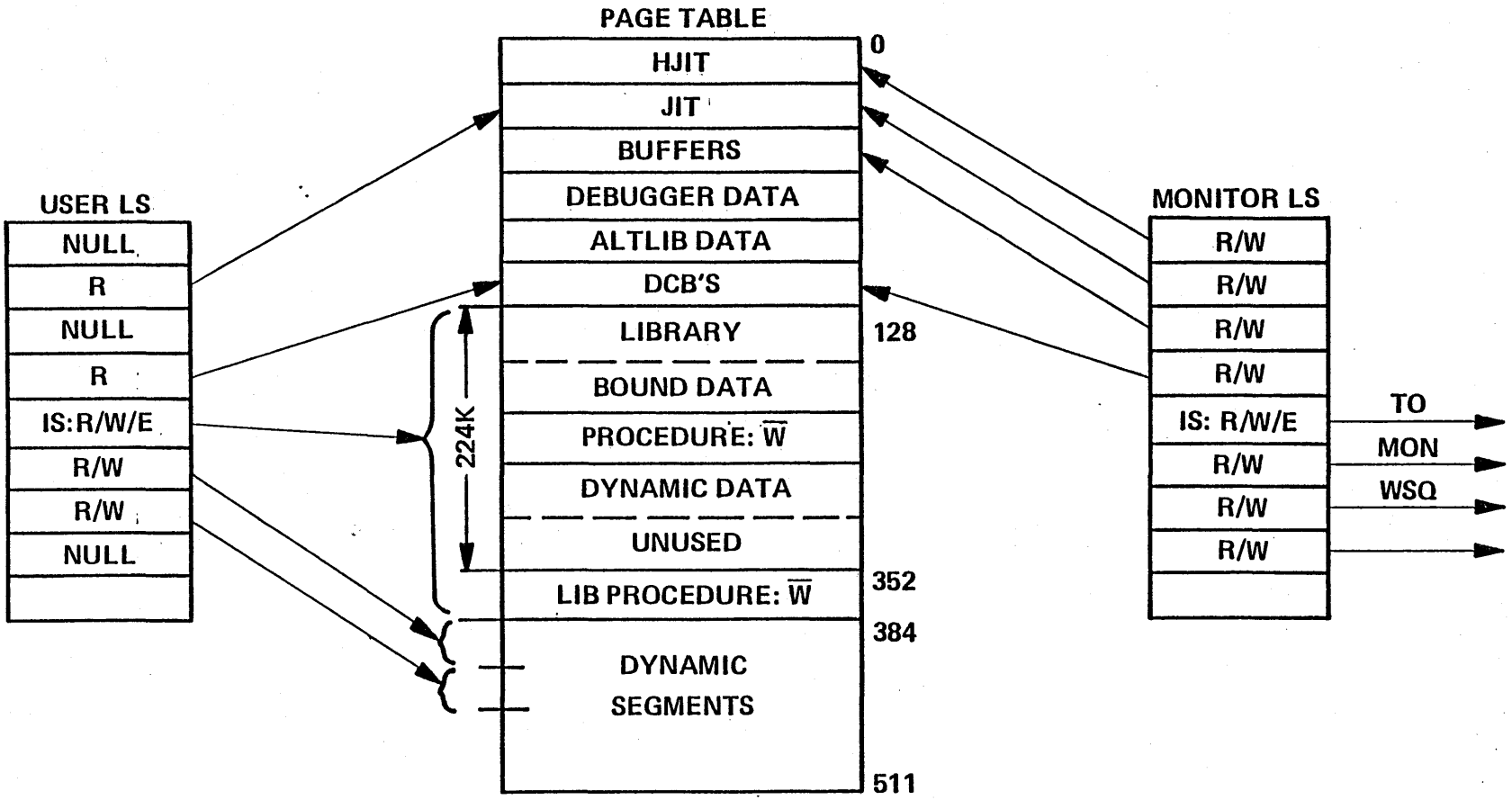
System Virtual Address Space

Honeywell



User Virtual Address Space

Honeywell



User Swap Package:

Honeywell

CP-V	CP-6
USER CONTEXT, PROC, DATA	SAME
MONITOR OVERLAY (OPT)	SAME
SHARED PROCESSOR (OPT)	SAME
SHARED PROCESSOR OVERLAY (OPT)	SAME
SHARED LIBRARY (OPT)*	SAME*
———	ALTERNATE LIBRARY (OPT)*
COMMAND PROG/DEBUGGER (OPT)	SAME

*NOT INCLUDED IF COMMAND PROG OR DEBUGGER INCLUDED.

Advantages of CP-6 Enabled by NSA

Honeywell

- EXPANDED VIRTUAL FOR USER
- EXPANDED VIRTUAL FOR SHARED ENTITIES
- IDS SECURITY PROVIDED
- MONITOR ACCESSES USER ONLY AS SPECIFIED
- MUCH LESS PAGE TABLE MANIPULATION
- INTRA MODULE ISOLATION IN MONITOR
- BUT – CONTROL OVER REAL MEMORY RETAINED

Monitor Services to User Programs

Honeywell

- INTERFACE – CALLING SEQUENCE
- LOGICAL I/O SERVICES
- FILE MANAGEMENT/TAPE MANAGEMENT
- OTHER MONITOR SERVICES
- SYMBIONTS/COOPS (INDIRECT)
- IOQ/IOS (INDIRECT)

CP-V Monitor Service Call

Honeywell

M:READ M:SI, (BUF,bb), (SIZE,ss), (KEY,kk), (ABN,aa)

CAL α ⟶ α

CODE	dcb
Presence	Bits
ABNormal	address
BUFfer	address
SIZE	value
KEY	address
⋮	

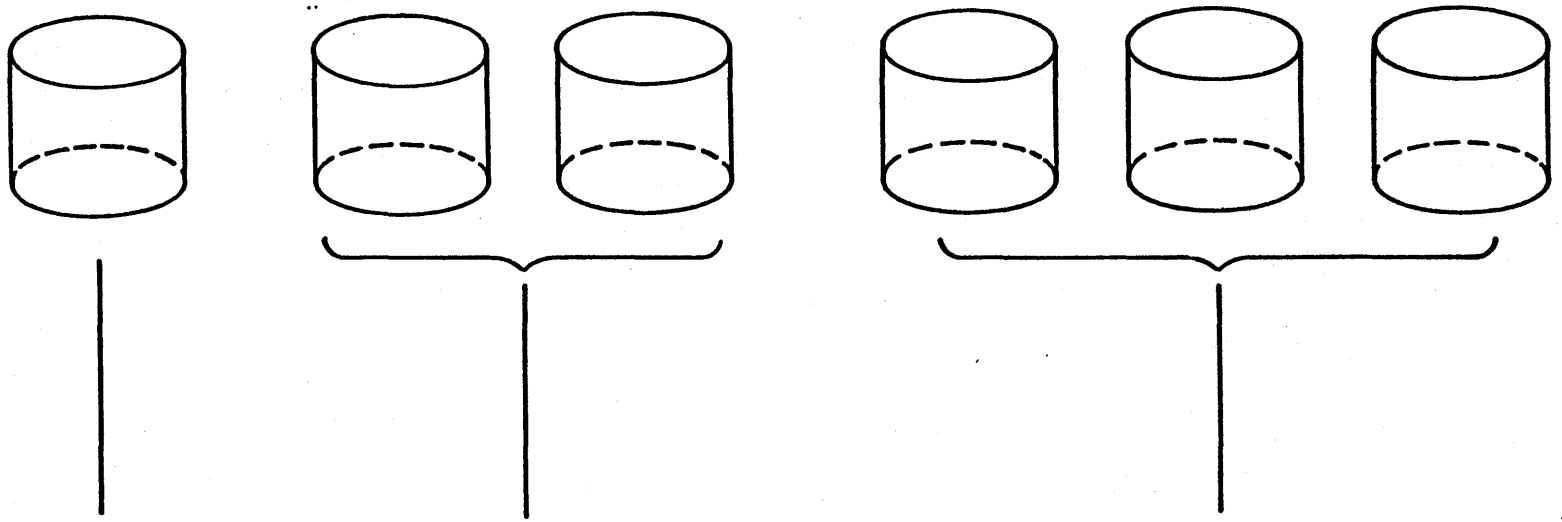
CHARACTERISTICS:

- VERY COMPACT
- HIGH OVERHEAD TO VERIFY
- EASY TO USE
- MONITOR HAS ALL ACCESS
- REQUIRES SOPHISTICATED META ASSEMBLER

CP-6 File Management

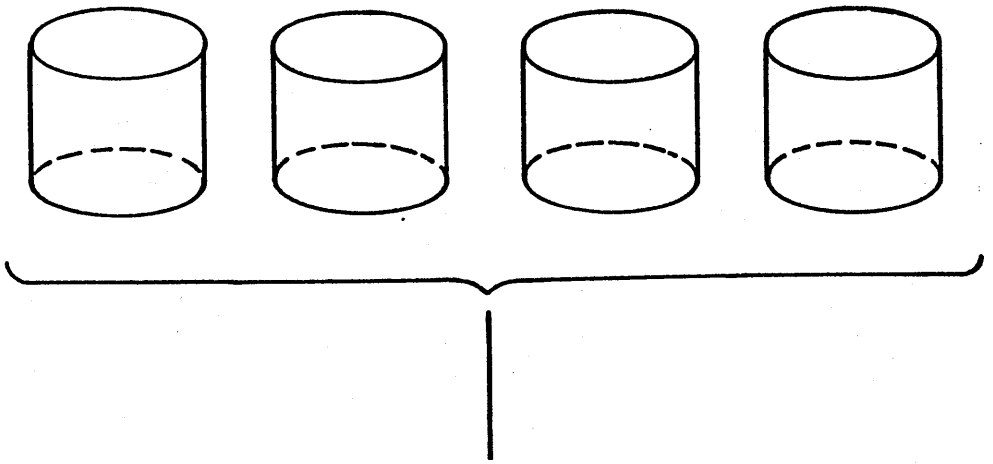
Honeywell

- DESIGN WAS IN PLACE FOR CP-V
- ARCHIVAL STORAGE PROVIDED
- PUBLIC STORAGE PARTITIONED



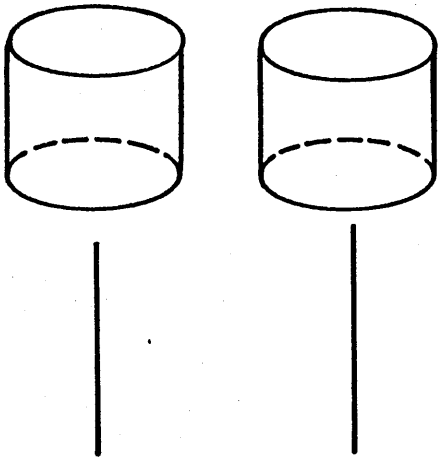
CP-V File Management

Honeywell



PUBLIC STORAGE

- ALL ACCOUNTS
- ONE COMMON POOL



PRIVATE DRIVES

- EXCLUSIVE USE
- ONE ACCOUNT

Honeywell

THE MOTOR CONTROL CENTER OF CP-6

LOGICAL I/O:

IT'S

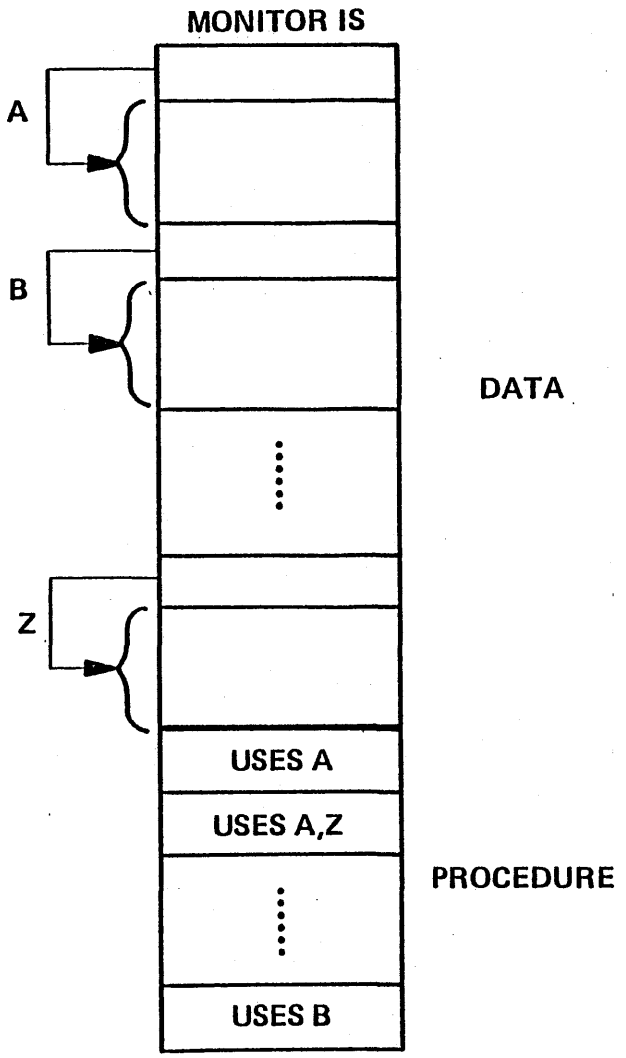
THE

SAME

Monitor Data Isolation

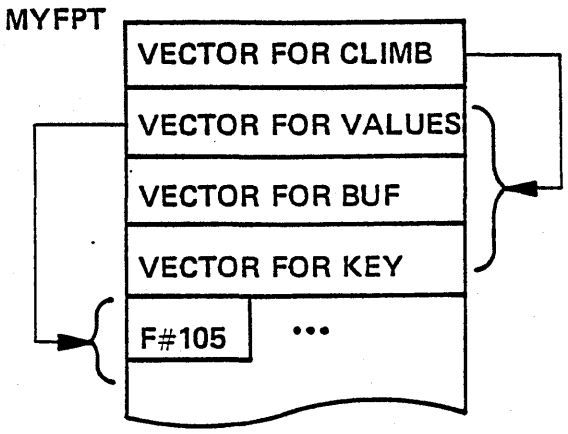
Honeywell

- USES NSA TO LOCALIZE REFERENCE
- CATCHES TROUBLESOME PROBLEMS WITH VIRTUALLY NO OVERHEAD
- SOFT PROTECTION – CATCHES ERRONEOUS REFERENCES, NOT MALICIOUS ONES
- REFERENCES TO PASSED PARAMETERS RESTRICTED
- MUST BE SPECIFIABLE IN LANGUAGE



```
%FPT$READ(MYFPT,F#105,BUF=ptr,KEY=ptr);
        ⋮
CALL M$READ(MYFPT) ALTRET(label);
```

```
LDDO    MYFPT
CLIMB   READCODE
TRA     label
```



CHARACTERISTICS:

- MODERATELY COMPACT
- EFFICIENT TO PROCESS (HARDWARE VERIFY)
- EASY TO USE
- MONITOR ADDRESSES USER ONLY AS SPECIFIED
- REQUIRES MACRO FACILITY IN COMPILER

NOTE: ALL SERVICES HAVE SAME OPTIONS, PARAMETERS, ETC. AS CP-V.

Functional Code Groups (FCG)

Honeywell

- COMPOSED OF MODULES FOR SAME MAJOR FUNCTION
- FREQUENT CALLS AND REFERENCES INSIDE
- CALLS TO OTHER FCG'S RARE
- DATA PASSED AS PARAMETERS TO OTHER FCG'S
- NSA HARDWARE ISOLATES REFERENCES

CP-6 File Organizations

Honeywell

- CURRENT:
  - KEYED
  - CONSECUTIVE
  - RANDOM
- ADDED:
  - INDEXED; KEYED WITH KEY IN RECORD
  - RELATIVE; CONSECUTIVE WITH FIXED RECORD SIZE
  - INTEGRATED; RANDOM WITH IDS CONTENT MANAGEMENT

CP-6 File Saving and Archiving

Honeywell

- WORKS FOR ALL KINDS OF FILES
- TARGET IS DISK OR TAPE
- DISK DUALS
- ARCHIVE FILES ON TAPE ARE CATALOGED
- INCREMENTAL, SELECTIVE, SAVE ALL OPTIONS
- USER PRIVATE BACKUP

CP-V/CP-6 Tape Management

Honeywell

- CP-V; THREE BASIC TYPES
  - XEROX LABELLED; SUPPORT STANDARD FILE ORGANIZATIONS
  - ANS LABELLED; SUPPORT ANS FILE FORMATS
  - FOREIGN
- CP-6; TWO BASIC TYPES
  - ANS LABELLED; SUPPORT STANDARD FILE ORGANIZATIONS AND ANS FORMATS
  - FOREIGN

CP-6 Monitor Service Calls

Honeywell

- I/O PROCEDURES
  - 20 TYPES, FULL SET, ALL MEDIA
- EXECUTION CONTROL
  - 29 PROCEDURES, JOB FLOW CONTROL, ETC.
- MEMORY MANAGEMENT
  - 11 PROCEDURES, DYNAMIC MEMORY ALLOCATION
- TERMINAL CONTROL
  - 10 PROCEDURES
- MISCELLANEOUS
  - 5 PROCEDURES

```
/*    CP-6  SERVICE CALLS
/*    I/O PROCEDURES       */
/*     DATA CONTROL BLOCK PROCEDURE */
/*     OPEN DCB PROCEDURE  */
/*     CLOSE DCB PROCEDURE */
/*     OPEN STREAM PROCEDURE */
/*     CLOSE STREAM PROCEDURE */
/*     CHANGE FILE MANAGE ACCOUNT PROCEDURE */
/*     READ PROCEDURE  */
/*     WRITE PROCEDURE */
/*     TRUNCATE BUFFERS PROCEDURE */
/*     CHECK IO COMPLETION PROCEDURE */
/*     DELETE RECORD PROCEDURE */
/*     POSITION FILE PROCEDURE */
/*     CLOSE VOLUME PROCEDURE */
/*     REWIND PROCEDURE */
/*     WRITE END OF FILE PROCEDURE */
/*     POSITION RECORD PROCEDURE */
/*     OPERATOR MESSAGE PROCEDURE */
/*     PRINT ON LL PROCEDURE */
/*     PRINT ON UC PROCEDURE */
/*     REQUEST OPERATOR RESPONSE PROCEDURE */
```

```
/*      MEMORY MANAGEMENT SERVICES     */


/*      GET DYNAMIC SEGMENT SPACE PROCEDURE      */
/*      FREE DYNAMIC SEGMENT SPACE PROCEDURE     */
/*      GET DYNAMIC PAGE PROCEDURE      */
/*      FREE DYNAMIC PAGE PROCEDURE      */
/*      GET VIRTUAL PAGE PROCEDURE */
/*      FREE VIRTUAL PAGE PROCEDURE */
/*      GET PHYSICAL PAGE PROCEDURE */
/*      FREE PHYSICAL PAGE PROCEDURE */
/*      CHANGE VIRTUAL MAP PROCEDURE */
/*      MAP PHYS TO VIRT OR VICE-VERSA PROCEDURE */
/*      SET MEMORY PROTECT PROCEDURE */


/*    INTERACTIVE TERMINAL CONTROL PROCEDURES    */


/*      SET PROMPT OR TFD PROCEDURE */
/*      CHANGE TERMINAL TYPE PROCEDURE */
/*      GET TERMINAL STATUS PROCEDURE */
/*      PURGE COC BUFFERS PROCEDURE */
/*      CHANGE ACTIVATION SET PROCEDURE */
/*      ACCEPT COUPLE PROCEDURE */
/*      REJECT COUPLE PROCEDURE */
/*      COUPLE PROCEDURE */
/*      DECOUPLE PROCEDURE */
/*      RESET BREAK COUNT PROCEDURE */
```

```
/*  EXECUTION CONTROL PROCEDURES  */

/*      INTERPRETIVE EXIT PROCEDURE */
/*      RESET ERROR FLAGS PROCEDURE */
/*      EXIT PROCEDURE  */
/*      ERROR PROCEDURE */
/*      ABORT PROCEDURE */
/*      TRAP OR INTERRUPT RETURN PROCEDURE */
/*      STANDARD ERROR HANDLER PROCEDURE */
/*      EXIT CONTROL PROCEDURE */
/*      TRAP CONTROL PROCEDURE */
/*      SIMULATE TRAP PROCEDURE */
/*      SET TIMER PROCEDURE */
/*      TEST TIMER PROCEDURE */
/*      CONSOLE INTERRUPT, BREAK CONTROL PROCEDURE */
/*      SAVE PROGRAM IMAGE PROCEDURE */
/*      GET PROGRAM IMAGE PROCEDURE */
/*      LINK TO LOAD MODULE PROCEDURE */
/*      TRANSFER OR RETURN TO LM PROCEDURE */
/*      LOAD OVERLAY SEGMENT PROCEDURE */
/*      ASSOCIATE LIBRARY PROCEDURE */
/*      DISASSOCIATE LIBRARY PROCEDURE */
/*      ACCESS TO SYSTEM ROUTINES PROCEDURE */
/*      SET MASTER MODE PROCEDURE */
/*      SET SLAVE MODE PROCEDURE */
/*      EXECUTE PRIVILEGED INSTRUCTION PROCEDURE */
/*      WAIT PROCEDURE  */
/*      CHECK ECB PROCEDURE */
/*      START GHOST JOB PROCEDURE */
/*      FIND SUSPENDED USER PROCEDURE     */
/*      ASSOCIATE SUSPENDED USER PROCEDURE     */
```

```
/* RESOURCE RELATED  PROCEDURES */

/*      RELEASE RESOURCE PROCEDURE */
/*      ENQUEUE PROCEDURE */
/*      DEQUEUE PROCEDURE */



/*  SYSTEM INFORMATION PROCEDURES  */

/*      RETURN DISPLAY INFORMATION PROCEDURE */
/*      RETURN DATE AND TIME PROCEDURE */
```

- CP-V IOQ PROVIDED
  - QUEUEING
  - DISPATCHING
  - DEVICE HANDLING
  - DEVICE ERROR RECOVERY
  - DUAL CHANNEL MANAGEMENT
  - ERROR LOG
- GCOS IOS PROVIDES
  - GENIOS SERVICE
  - QUEUEING
  - DISPATCHING
  - DEVICE HANDLING
  - GENERAL ERROR HANDLING
  - CROSS BAR MANAGEMENT
  - INTERFACE TO HEALS

Initialization, Sysgen, & Recovery

Honeywell

- SAME GENERAL PHILOSOPHY
  - CUSTOMIZE TABLES
  - LOAD MONITOR
  - WRITE BOOTABLE LABELLED TAPE
  - INITIALIZE AS APPROPRIATE AT BOOT TIME
- USE IMPLEMENTATION LANGUAGE TO CUSTOMIZE TABLES
- MPC INITIALIZATION
- VARIOUS LEVELS OF RECOVERY
  - POWER FAILURE
  - SINGLE USER
  - FULL SYSTEM
  - EXTENDED
- BOOT TIME RECONFIGURATION AND DYNAMIC PARTITIONING

Test & Diagnostic

Honeywell

- CP-V ERROR LOG
- HEALS
- CP-V ON-LINE DIAGNOSTICS
- TOLTS
- REMOTE ASSIST

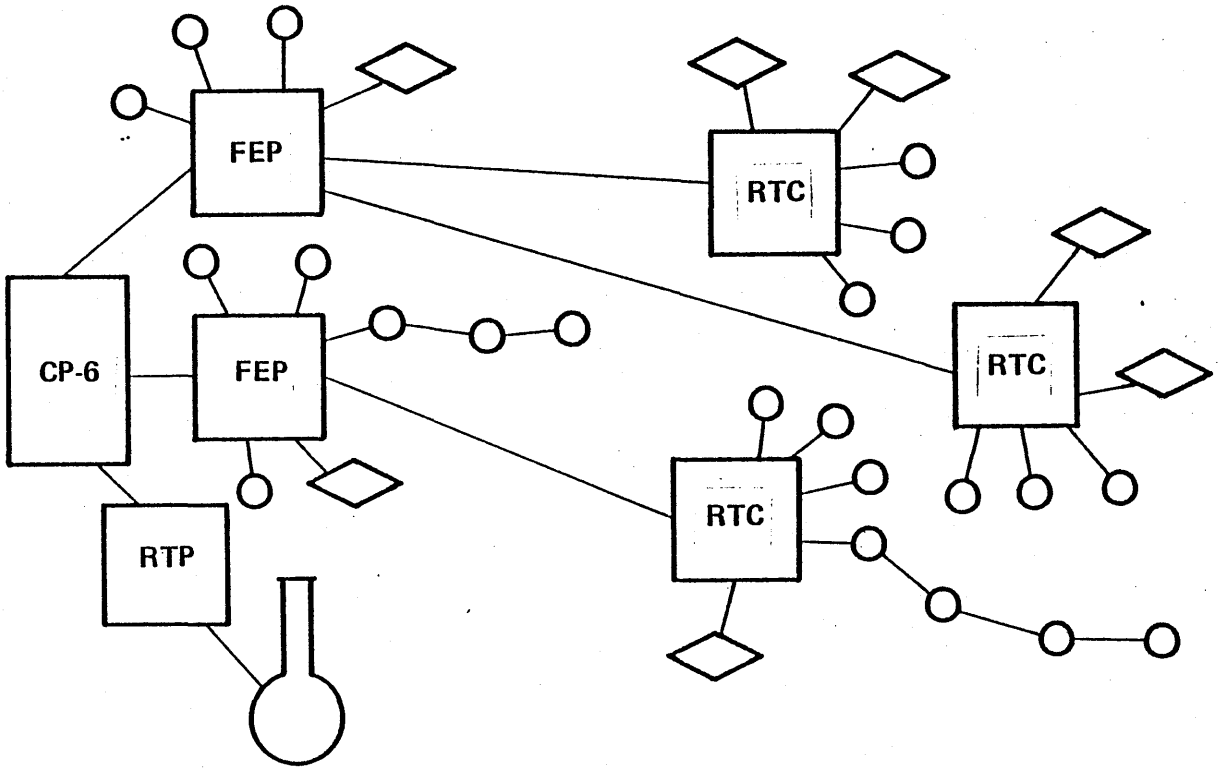
CP-6 Communications Overview

Honeywell

- ALL COMMUNICATIONS VIA L6 FEP
- PROVIDE ALL CP-V TERMINAL SUPPORT
- PROVIDE REMOTE TERMINAL CONCENTRATORS
- PROVIDE CP-V IBM WORKSTATION SUPPORT
- INTEGRATE WITH REAL TIME FRONT ENDS
- PROVIDE FOR INCLUSION OF HONEYWELL TERMINALS
- USE BILLERICA TOOLS AND SYSTEMS AS A BASIS

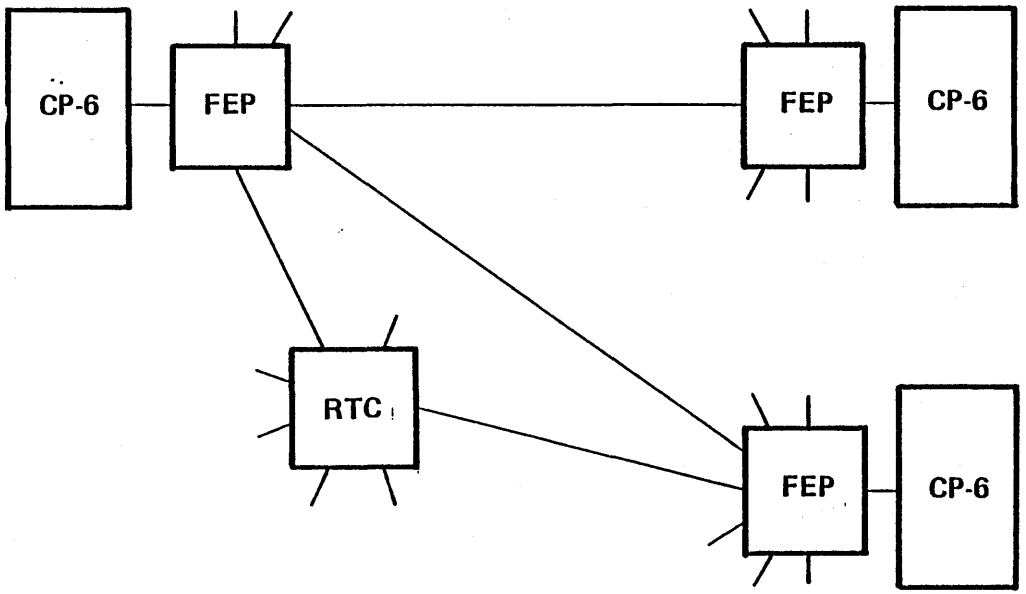
CP-6 Front End Processing

Honeywell



CP-6 to CP-6 Communications

Honeywell



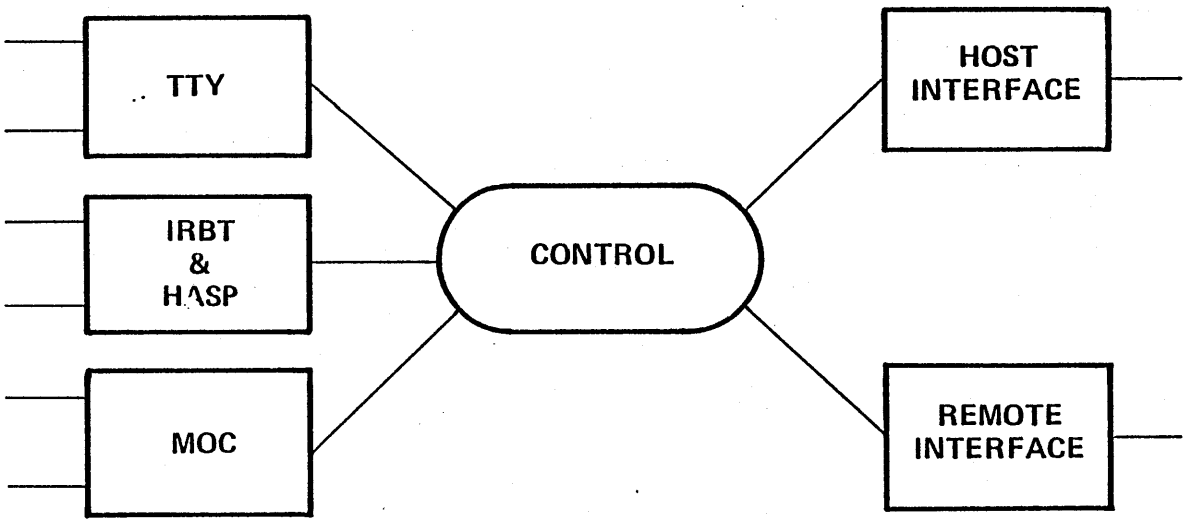
Terminals Supported

Honeywell

- TTY AND COMPATIBLE, CRT AND HARD COPY
  - ECHOPLEX, TYPE AHEAD
- 2741
- HASP COMPATIBLE IRBTS
- 2780/3780 COMPATIBLE RBTS
- 3270
- TRANSPARENT MODE
- SLAVE/MASTER TERMINALS

Front End Software Structure

Honeywell



Real Time

Honeywell

- RTP FOR HIGH RESPONSE
- HOST FOR DATA PROCESSING
- "READ/WRITE" INTERFACE BETWEEN RTP AND HOST
- ALL PROGRAM DEVELOPMENT IN HOST
- "DOWN LINE LOAD"
- SAME L6-L66 INTERFACE AS FEP
  - NEED HIGH BAND WIDTH FOR RESPONSE

CP-6 L6-L66 Interface Requirements

Honeywell

- FULL DUPLEX, 1 MEGABYTE CHANNEL
- MUST USE MEMORY MAP ON BOTH ENDS
- MUST PROVIDE SCATTER-GATHER I/O
- SHOULD ADDRESS AND COUNT IN BYTES
- ASCII AND BINARY MODES
- BOOT LOAD FORCING OPERATION

CP-6 GOALS

Honeywell

PERFORMANCE GOALS:

- AVERAGE RESPONSE <1 SEC; 90% <2 SEC
- CPU UTILIZATION >90%; MONITOR SERVICE <15%
- THRUPUT RATIO SAME AS CPU KIPS RATIO

SUPPORT GOALS:

- OPTIMIZE FOR 250 TS USERS; 500 MAXIMUM
- MAXIMUM 16 BATCH PARTITIONS
- 2000 TP TERMINALS

RMA GOALS:

- MEAN TIME BETWEEN SYSTEM INTERRUPT >100 HR.
- MEAN TIME OF SYSTEM INTERRUPT <5 MIN.
- AVAILABILITY >99%

CP-6 Performance

Honeywell

HOW DO WE KNOW WE'LL BE FAST ENOUGH

- ALGORITHMS PROVEN IN CP-V
- USAGE PATTERNS KNOWN
- INTEGRAL PERFORMANCE MONITOR
- HIGH LEVEL LANGUAGE PERMITS SYSTEM WIDE OPTIMIZATION
- USE OF STANDARD BENCHMARKS
- NSA HARDWARE USED FOR CONTEXT SWITCH
- OFFLOADING OF COMMUNICATIONS TO L6 FRONT ENDS

256K Dual Sigma 9

```
 STATISTICS ON-LINE
 INTERVAL FROM 14:01 TO 14:21 FEB 10, 76
 PARAM
HOUR:MINUTES              1421  INTERVAL IN MINUTES          20
MAX # BATCH USERS           16  MAX # ONLINE USERS           90
AVERAGE BATCH SIZE K        28  AVERAGE ONLINE SIZE K        10
# CHAR TERM BLOCK            5  # CHAR TERM UNBLOCK           1
MSEC W/O INTERRUPT           4  MSEC SWAP QUANTUM          400
AVE BATCH QUANTUM         2500  MSEC ONLINE COMPUTE         500
# CPU ACTIVE                 2  AVE SCPU QUANTUM MSEC     2500
RAHD TIMEOUT SEC             5  AIR TIMEOUT SEC              32
# OF INTERACTIONS = 58213
MINS SINCE STARTUP=  1610
NUMBER OF USERS   =    71
NUMBER OF ONLINE  =    63
NUMBER OF BATCH   =     3
NUMBER OF GHOSTS  =     5
90% RESPONSE TIME =  1000

 CPU %          ALL   SNAP   I/O PER MIN   ALL   SNAP
BATCH EXEC     32.8  83.3  SERVICE REQ   4672 10037
BATCH SERV      5.8  19.5  INTERACTIONS    36   119
ONLINE EXEC    28.0  14.7  CHAR IN        750  1853
ONLINE SERV     7.7  17.0  CHAR OUT      3816  9757
GHOST EXEC       .4    .9  TERM WRITES    154   453
GHOST SERV      2.3    .1  I/O ACCESSES  1241  2071
MONITOR SERV    9.7  22.7  # TRUNCS         9     8
IDLE           31.5    .0  AIR ATTEMPTS   124   304
SWAP WAIT        .2    .4  AIR HITS        96   230
I/O WAIT       14.4    .2  SYMBIONT       138   174
I/O&SWP WAIT     .9   3.3  IN SWAPS        57   318
TOTAL         133.8 162.0  OUT SWAPS       69   219

 TASK/INTERVAL    ALL    SNAP   RAHD-AIR/MIN     ALL  SNAP
INTERACT SEC      61      64  #AIR  ATTEMPTS    124   304
THINK-TY SEC      57      60  #AIR  HITS        96   230
TURNAROND SEC     32      23  #AIR  TIMEOUTS     2     0
COMPLETE SEC       5       4  #RAHD ATTEMPTS    69   166
RESPONSE MSEC   5972    1509  #RAHD STARTS      69   165
CPU   MSEC       263     122  #RAHD USED        66   161
                               #RAHD I/O WAIT    22    33
                               #RAHD NOT USED     0     0
                               #RAHD TIMEOUTS     2     3

 SCPU USE %     ALL   SNAP   EVENT RATE/MIN  ALL  SNAP
SCPU #1 EXEC  39.2  65.0  MASTER  CALS     4042  7935
SCPU #1 IDLE  60.2  33.4  SCPU #1 CALS     631  2102
SCPU #1 TOT   99.4  98.4  MASTER  SCHEDS   2587  4968
                          SCPU #1 SCHEDS    766  2267

 BATCH %   ALL   SNAP   ONLINE % ALL   SNAP
CCI         .7    1.4  CCI         .0    .0
LOGON       .0    .3   LOGON       .1    .3
LINK        .0    .0   LINK        .3    .0
DELTA       .0    .0   DELTA       .2   1.0
:P00        .0    .0   :P00        .1    .0
:P11      15.4  47.2   :P11       1.6    .8
DRSP        .0    .0   DRSP        .0    .0
RUNNER      .0    .1   RUNNER      .0    .0
EDIT        .0    .0   EDIT       1.4   2.8
PCL        1.1  12.6   PCL        2.7   8.4
USER       6.5   2.3   USER      19.7  13.4
SHARED    14.8  39.0   SHARED     9.5   4.9

 USERS    #   QUEUE    #
BASIC     3  LOGGED   60
DELTA     3  LOGGING   3
EDIT     12  BATCH     3
:P00      0  GHOST     5
FORTRAN   0  TERM IN  43
:P11      3  TERM OUT  2
LINK      0  COMPUTE   7
LOADER    0  COMP BND  1
METASYM   1  I/O       0
PCL       5  SLEEP    17
TEXT      0
IN CORE   9

 RESOURCES IN USE    #
NPOOLS               0
CDCBUFS             56
IOO ENTRIES          5
CPUS                61
GRAN PACK        35255
GRAN SYMB         5311
GRAN RAD          1234

     <--------SYSTEM--------->      <-SYSTEM->
      RESP  INTR TYPE TURN  CPU        IILN OTLN
        MS   SEC  SEC  SEC   MS         CHAR CHAR
  <1    .0 10.4 17.8 81.1   .1   <5   55.5 23.0
  <2    .0 12.3 13.5  9.7   .0  <10   16.1  6.5
  <5   2.3 22.6 20.8  5.2  9.9  <15    9.3  4.6
 <10    .8 22.5 21.6  1.6 20.0  <20    3.6  2.8
 <20    .7 15.9 13.0   .6 23.4  <25    2.9  2.4
 <50   4.7  9.6  7.5   .7 22.8  <30    1.1  3.5
<100  15.9  2.5  2.2   .1  8.8  <35    .7   5.2
<200  30.2  1.6  1.0   .2  7.8  <40    .7   2.6
<500  33.3   .9   .7   .1  3.7  <45    .7   2.8
 <1K   8.4   .3   .3   .0  1.8  <50    .6   2.1
 <2K   1.6   .3   .3   .0   .7  <55   1.1   2.0
 <5K    .7  1.3  1.2   .5   .6  <60   1.0   2.1
<10K    .1   .0   .0   .0   .3  <65    .4   1.9
 &UP   1.4   .0   .0   .0   .2  &UP    7.3  38.5
TOT# 2365 2365 2365 2365 2365  TOT#  2735  8997

     <--OUT SWAP--->      <---IN SWAP--->
                  TOT          JIT REST  TOT
    #USERS        MS          MS   MS   MS
  =0 63.9   <1    .0   <1     .0   .0   .0
  =1 25.8   <2    .0   <2     .0   .0   .0
  =2  7.4   <5    .0   <5    2.6   .0   .0
  =3  2.0  <10    .0  <10    8.3   .3   .0
  =4   .6  <20    .6  <20   23.3 39.9 34.1
  =5   .3  <50  37.4  <50   55.5 43.7 48.3
  =6   .0 <100  47.2 <100   10.3 14.7 15.9
  =7   .0 <200  14.3 <200     .0  1.3  1.7
  =8   .0 <500    .4 <500     .0   .0   .1
  =9   .0  <1K    .0  <1K     .0   .0   .0
 =10   .0  <2K    .0  <2K     .0   .0   .0
 =11   .0  <5K    .0  <5K     .0   .0   .0
 =12   .0 <10K    .0 <10K     .0   .0   .0
 &UP   .0  &UP    .0  &UP     .0   .0   .0
TOT# 4340 TOT#10535 TOT# 6319 TOT# 6319
..SLEEPING
```

CP-V Weaknesses

Honeywell

- NO COMMUNICATIONS PROCESSOR
  - NOT REMOTE
  - NO AUTOBAUD
- PUBLIC FILE PACKS "NOT REMOVEABLE"
- 128K VIRTUAL SPACE
  - 70–90K PROGRAM SPACE
- BATCH & ON-LINE COMMAND LANGUAGES DIFFERENT
- RUNS ON "DEAD" HARDWARE

CP-6 Extensions Over CP-V

Honeywell

- ADDRESSABILITY AND PROTECTION
  - LARGER USER PROGRAMS – TO 224K
  - SEPARATE SEGMENTS FOR SYSTEM USE
  - HARDWARE CHECKING ON CLIMBS

- FRONT END PROCESSORS
  - ALL COMMUNICATIONS
  - LOCAL FEP AND REMOTE CONCENTRATOR, RTC
  - CRITICAL REAL TIME – RTP
  - TRANSACTION PROCESSING COMMUNICATIONS
  - AUTOMATIC SPEED AND FORMAT DETECTION

- FILE SYSTEM IMPROVEMENTS
  - REMOVEABLE PUBLIC DISC STORAGE
  - FILE ALLOCATION BY EXTENTS
  - EXTENDABLE RANDOM FILES
  - IMPROVED FILE BACKING WITH ARCHIVING
  - ADDED ACCESS METHODS FOR ISAM AND GCOS66

- COMMON COMMAND LANGUAGE
  - OPERATES ON-LINE OR BATCH
  - CCI CONVERTED BY UTILITY

- CP-6 IS CP-V
  - EXTERNAL CHARACTERISTICS INTACT
  - DESIGN LARGELY INTACT
  - WORKING MODEL AT HAND
- CP-6 TAKES ADVANTAGE OF L66 NSA
  - USER ADVANTAGES
  - SPEED
  - IOS AND T&D
- COMPLETENESS OF DESIGN ASSURED
  - CP-V MODULES FOR CHECK LIST
  - IMPLEMENTERS HAVE DONE IT BEFORE

CP-V Languages

Honeywell

BASIC (NEW DESIGN)

ANS FORTRAN

APL

IDP

RPG II

TEXT

FORTRAN AND COBOL DEBUGGERS

Basic

Honeywell

- SHARED PROCESSOR UNDER CP-6
- COMPATIBLE WITH PROPOSED ANS MINIMAL BASIC STANDARD
- FUNCTIONALITY EQUIVALENT TO DARTMOUTH BASIC
- ON-LINE AND BATCH OPERATION

ANS FORTRAN

Honeywell

- SHARED PROCESSOR AND LIBRARY UNDER CP-6
- COMPATIBILITY WITH PROPOSED ANS FORTRAN STANDARD
- INTERACTIVE LINE-BY-LINE SYNTAX CHECKING
- COMPRESSED INPUT/OUTPUT CAPABILITY
- LOAD-AND-GO OPTION

APL

Honeywell

- SHARED PROCESSOR UNDER CP-6
- ON-LINE AND BATCH OPERATION
- SUPPORT FOR KEYED FILES
- EXECUTE-ONLY OPTION
- INTERFACE TO DATABASE MANAGEMENT SYSTEM
- SHARED VARIABLES

- INTERACTIVE RETRIEVAL AND DISPLAY OF INFORMATION FROM DATABASE
- MUST BE SIMPLE!
- RETRIEVAL THROUGH LOGICAL CRITERIA
- REPORT FORMATTING CAPABILITIES
- FLEXIBILITY TO MEET USER NEEDS

RPG II

Honeywell

- BATCH ORIENTED REPORT PROGRAM GENERATOR
- COMPATIBLE TO IBM
- MEETS HONEYWELL RPG STANDARD

Text

Honeywell

- SHARED PROCESSOR UNDER CP-6
- FAST DOCUMENT CREATION
- AUTOMATIC FORMATTING CAPABILITIES
- NAME-AND-ADDRESS FILES
- ON-LINE AND BATCH OPERATION

FORTRAN and COBOL Debuggers

Honeywell

- INTERACTIVE DEBUGGING CAPABILITY
- WHILE IN EXECUTION, PROGRAMS CAN BE EXAMINED AND MODIFIED
- BREAKPOINTS CAN BE SET AT SPECIFIED STATEMENTS OR WHEN DATA VALUES CHANGE
- VALUES OF VARIABLES CAN BE EXAMINED AND MODIFIED
- PROGRAM CONTROL CAN BE ALTERED
- PROGRAM TRACE CAPABILITY

- XEROX COBOL IN USE AT 150 INSTALLATIONS
- 1976 EXCHANGE USER SURVEY RATES:
  - ANS COMPLIANCE – "VERY IMPORTANT" (3.9)
  - COBOL DEBUGGER – "IMPORTANT" (3.2)
  - INTERACTIVE COMPILE/EXECUTE – "IMPORTANT" (2.9)
- CONVERSION MUST BE RELATIVELY EASY

- XEROX COBOL (X-68) VS. HIS COBOL 74 (H-74)
  - HIS COBOL MEETS NEW STANDARD
  - ALMOST A FUNCTIONAL SUPERSET OF X-68

- FUNCTIONAL DIFFERENCES CAUSED BY CHANGE IN STANDARD
  - APPROXIMATELY 35 ITEMS
    - REDEFINES CLAUSE
    - EXPRESSION EVALUATION
    - EVALUATION OF NOT OPERATOR
    - PERFORM RANGE
    - USER HEADERS
  - PRESENTS CONVERSION RISK

CP-6 COBOL TECHNICAL NOTES

XEROX COBOL F00 vs ANS COBOL 74 STANDARDS

The following list describes the differences found between the Xerox COBOL F00 compiler and the ANS 74 COBOL Standards. The significance of the severity assigned to each difference is as follows:

1. Major change - User may be required to make logic changes to affected programs.
2. Minor change - Syntax changes may be required to affected user programs.

XEROX COBOL F00 vs ANS COBOL 74 STANDARDS

	SUBSTANTIVE CHANGE	MODULE LEVEL AFFECTED	SEVERITY	REMARKS
1.	Mnemonic-name must have at least one alphabetic character.	1 NUC	2	X3.23-1968 had no such restriction.
2.	Number of qualifiers permitted is implementor-defined, but must be at least five.	2 NUC	2	X3.23-1968 specified no such lower limit.
3.	Complete set of qualifiers for a name may not be same as partial list of qualifiers for another name.	2 NUC	2	
4.	REMARKS paragraph is deleted.	1 NUC	2	Function was replaced by the comment line.
5.	Continuation of Identification Division comment-entries must not have a hyphen in the continuation indicator area.	1 NUC	2	
6.	SPECIAL-NAMES paragraph: 'L', '/', and '=' may not be specified in the CURRENCY SIGN clause.	2 NUC	2	This restriction did not exist in X3.23-1968.
7.	All items which are immediately subordinate to a group item must have the same level-number.	1 NUC	2	
8.	REDEFINES: No entry with lower level-number can appear between the redefined and redefining items.	1 NUC	1	X3 23-1968 had no such restriction.
9.	Multiple redefinition of same storage area permitted.	1 NUC	2	
10.	An asterisk used as a zero suppression symbol in a PICTURE clause and the BLANK WHEN ZERO clause may not appear in the same entry.	1 NUC	2	
11.	The number of digit positions that can be described by a numeric PICTURE character-string cannot exceed 18.	1 NUC	2	X3.23-1968 had no such rule.
12.	PICTURE character-string is limited to 30 characters.	1 NUC	2	X3.23-1968 defines limi as 30 symbols where one symbol could have been two characters.

	SUBSTANTIVE CHANGE	MODULE LEVEL AFFECTED	SEVERITY	REMARKS
13.	A signed numeric literal cannot be used in a VALUE clause unless it is associated with a signed PICTURE character-string.	1 NUC	2	
14.	If the item is numeric edited, the literal in the VALUE clause must be nonnumeric.	1 NUC	2	
15.	In relation and sign conditions, arithmetic expressions must contain at least one reference to a variable.	1 NUC	2	
16.	Comparison of nonnumeric operands; If one of the operands is described as numeric, it is treated as though it were moved to an alphanumeric item of the same size and the contents of this alphanumeric item were then compared to the nonnumeric operand.	1 NUC	2	
17.	Abbreviated combined relation condition: When any portion is enclosed in parentheses, all subjects and operators required for the expansion of that portion must be included within the same set of parentheses.	2 NUC	1	No such restriction appeared in X3.23-1968.
18.	Abbreviated combined relation condition: If NOT is immediately followed by a relational operator, it is interpreted as part of the relational operator.	2 NUC	1	In X3.23-1968, NOT was a logical operator in such cases.
19.	Class condition: The numeric test cannot be used with a group item composed of elementary items described as signed.	1 NUC	1	
20.	In an arithmetic operation, the composite of operands must not contain more than 18 decimal digits.	1 NUC	1	X3.23-1968 specified limits only for ADD and SUBTRACT.
21.	DISPLAY statement: If the operand is a numeric literal, it must be an unsigned integer.	1 NUC	2	

	SUBSTANTIVE CHANGE	MODULE LEVEL AFFECTED	SEVERITY	REMARKS
22.	A PERFORM statement in a non-independent segment can have in its range only one of the following: a. Non-independent segment (fixed/ fixed overlayable) b. Sections and/or paragraphs wholly contained in a single independent segment.	1 NUC 1 SEG	1	
23.	A PERFORM statement in an independent segment can have in its range only one of the following: a. Non-independent segments (fixed/ fixed overlayable). b. Sections and/or paragraphs wholly contained in the same independent segment as that PERFORM.	1 NUC 1 SEG	1	
24.	PERFORM statement: Control is passed only once for such execution of a Format 2 PERFORM statement. (i.e.,an independent segment referred to by such a PERFORM is made available in its initial state only once for each execution of that PERFORM statement).	1 NUC 1 SEG	1	
25.	STOP statement: If the operand is numeric literal, it must be an unsigned integer.	1 NUC	2	
26.	The DEPENDING phrase is now required in the Format 2 of the OCCURS clause.	2 TBL	1	X3.23-1968 has no restriction.
27.	Integer-1 cannot be zero in the Format 2 of the OCCURS clause.	2 TBL	1	
28.	The results of a SEARCH ALL operation are predictable only when the data in the table is ordered as described by the ASCENDING/ DESCENDING KEY clause associated with identifier-1.	2 TBL	2	Default is ASCENDING

	SUBSTANTIVE CHANGE	MODULE LEVEL AFFECTED	SEVERITY	REMARKS
29.	The subject of the condition in the WHEN phrase of the SEARCH ALL statement must be a data item named in the KEY phrase of the table; the object of this condition may not be a data item named in the KEY phrase.	2 TBL	1	X3.23-1968 specified that either the subject or object could be a data item named in the KEY phrase.
30.	SEARCH...VARYING identifier-2: If identifier-2 is an index data item, it is incremented as the associated index is incremented.	2 TBL	3	In X3.23-1968 the data item is incremented by same amount as occurrence number, i.e.,by one
31.	File control entry: The ASSIGN TO implementor-name-1 OR implementor-name-n clause for the GIVING file of a SORT statement was deleted.	1 SRT	2	
32.	SORT statement: semicolon deleted from format.	1 SRT	2	
33.	No more than one file-name from a multiple file reel can appear in a SORT statement.	2 SRT		
34.	Where a SORT or MERGE statement appears in a segmented program, then any associated input/output procedures are subject to the same constraints that apply to the range of a PERFORM	1 SRT 1 SEG	1	No such restriction in X3.23-1968.
35.	ORGANIZATION IS RELATIVE clause	1 REL		New feature. *
36.	ORGANIZATION IS SEQUENTIAL clause	1 SEQ		New feature. *
37.	ORGANIZATION IS INDEXED clause	1 INX		New feature. *
38.	MULTIPLE REEL/UNIT clause deleted			
39.	The data-name option of the LABEL RECORDS clause was deleted.	1 SEQ 1 REL 1 INX	1	X3.23-1968 provided for user-defined label records.

* See Appendix A

	SUBSTANTIVE CHANGE	MODULE LEVEL AFFECTED	SEVERITY	REMARKS
40.	SEER statement was deleted		2	
41.	PAGE-COUNTER and LINE-COUNTER are described as unsigned integers that must handle values from 0 through 999999.	RPW	1	
42.	The value in LINE-COUNTER must not be changed by the user.	RPW	1	
43.	LINE-COUNTER, PAGE-COUNTER and sum counters must not be used as subscripts in the Report Section.	RPW	1	
44.	PAGE-COUNTER is always generated.	RPW	1	
45.	PAGE-COUNTER does not need to be qualified in the Report Section.	RPW	1	
46.	LINE-COUNTER is always generated.	RPW	1	
47.	LINE-COUNTER does not need to be qualified in the Report Section.	RPW	1	
48.	The words LINE and LINES are optional in the PAGE clause.	RPW	1	
49.	The DATA RECORDS clause and the REPORT clause are mutually exclusive.	RPW	1	
50.	A report may not be sent to more than one file.	RPW	1	
51.	RESET is no longer a clause; it is a phrase under the SUM clause.	RPW	1	
52.	Multiple SUM clauses may be specified in an item; multiple UPON phrases may be specified.	RPW	1	
53.	Up to three hierarchical levels are permitted in a report group description.	RPW	1	
54.	A report group level 01 entry cannot be elementary.	RPW	1	

	SUBSTANTIVE CHANGE	MODULE LEVEL AFFECTED	SEVERITY	REMARKS
55.	An entry that contains a LINE NUMBER clause must not have a subordinate entry that also contains a LINE NUMBER clause.	RPW	1	
56.	An entry that contains a COLUMN NUMBER clause but no LINE NUMBER clause must be subordinate to an entry that contains a LINE NUMBER clause.	RPW	1	
57.	An entry that contains a VALUE clause must also have a COLUMN NUMBER clause.	RPW	1	
58.	In the CODE clause, mnemonic-name has been replaced by literal. (A two-character nonnumeric literal placed in the first two character positions of the logical record.)	RPW	1	
59.	If the CODE clause is specified for any report in a file, it must be specified for all reports in the same file.	RPW	1	
60.	Control data items may not be subscripted or indexed.	RPW	1	
61.	Each data-name in the CONTROL clause must identify a different data item.	RPW	1	
62.	The GROUP INDICATE clause may only appear in a DETAIL report group entry that defines a printable item (contains a COLUMN and PICTURE clause).	RPW	1	
63.	LINE clause integers must not exceed three significant digits in length.	RPW	1	
64.	The NEXT PAGE phrase of the LINE clause is no longer legal in RH, PH, and PF groups.	RPW	1	
65.	A relative LINE NUMBER clause can no longer be the first LINE NUMBER clause in a PAGE FOOTING group.	RPW	1	

	SUBSTANTIVE CHANGE	MODULE LEVEL AFFECTED	SEVERITY	REMARKS
66.	A NEXT GROUP clause without a LINE clause is no longer legal.	RPW	1	
67.	Integer-2 in the NEXT GROUP clause must not exceed three significant digits in length.	RPW	1	
68.	If the PAGE clause is omitted, only a relative NEXT GROUP clause may be specified.	RPW	1	
69.	The NEXT PAGE phrase of the NEXT GROUP clause must not be specified in a PAGE FOOTING report group.	RPW	1	
70.	The NEXT GROUP clause must not be specified in a REPORT FOOTING report group.	RPW	1	
71.	The phrases of the PAGE clause may be written in any order.	RPW	1	
72.	In the PAGE clause, the maximum size of the integer is three significant digits.	RPW	1	
73.	It is no longer possible to sum upon an item in another report.	RPW	1	
74.	Source-sum correlation is not required. (Operands of a SUM clause need not be operands of a SOURCE clause in DETAIL groups.)	RPW	1	
75.	TYPE clause data-names may not be subscripted or indexed.	RPW	1	
76.	PAGE HEADING and PAGE FOOTING report groups may be specified only if a PAGE clause is specified in the corresponding report description entry.	RPW	1	

	SUBSTANTIVE CHANGE	MODULE LEVEL AFFECTED	SEVERITY	REMARKS
77.	In CONTROL FOOTING, PAGE HEADING, PAGE FOOTING, and REPORT FOOTING report groups, SOURCE clauses and USE statements may not reference: a. Group data items containing control data item. b. Data items subordinate to a control data item. c. A redefinition or renaming of any part of a control data item. In PAGE HEADING and PAGE FOOTING report groups, SOURCE clauses and USE statements must not reference control data-name.	RPW	1	
78.	In summary reporting, only one detail group is allowed.	RPW	1	
	The description of a report must include at least one body group.	RPW	1	
80.	Report files must be opened with either the OPEN OUTPUT or OPEN EXTEND statement.	RPW	1	
81.	A file described with a REPORT clause cannot be referenced by any input-output statement except the OPEN or CLOSE statement.	RPW	1	
82.	The SUPPRESS statement	RPW	1	
83.	If no GENERATE statements have been executed for a report during the interval between the execution of an INITIATE statement and a TERMINATE statement for that report, the TERMINATE statement does not cause the Report Writer Control System to perform any of the related processing.	RPW	1	
84.	A USE procedure may refer to a DETAIL group.	RPW	1	

APPENDIX A

The ACTUAL KEY clause in X-68 must be changed. H-74 states that if the key is an unsigned numeric value, the RELATIVE KEY clause must be used. When this clause is present, the file being accessed is a random file in which the key is a relative record number of the logical record ordinal position in the file; and it is not described within the record description entry. If the key is alphanumeric, the RECORD KEY clause, in conjunction with INDEXED organization, must be used. In this case, the Key must be described within the record description entry associated with that file. Furthermore, if the access mode is sequential, the records must be presented in sequential order.

The CP-V/CP-6 file management system will permit any type of data to be used as a Key. These keys may or may not be imbedded in the record description entry of the associated files. In either case the file management system will use the key that is always external to the record. This is essentially an INDEXED file without the limitation of the keys being alphanumeric and contained within the record description entry. With this same file managementt system, records may be retrieved by the logical position within the file.

Although the CP-6 will continue to provide the same capabilities as CP-V, the CP-6 COBOL user will be required to change his programs to conform to the COBOL 74 standards.

COBOL Technical Notes (Continued)

Honeywell

FUNCTIONAL DIFFERENCES CAUSED BY PERSONALITY OF GCOS COBOL

- IDENTIFIED BY COBOL BENCHMARK
  - IMPLEMENTOR DEFINED NAMES
  - KEY FIELDS CONTAINED IN DATA RECORD
  - REPORT WRITER
  - NO SINGLE OR DOUBLE PRECISION FLOATING POINT
  - FILE OPENED IN ROOT SEGMENT CANNOT BE ACCESSED BY A SUB-PROGRAM
  - NO ENTER STATEMENT
  - NO NUMERIC LITERALS IN INSPECT STATEMENT
  - •
  - •
  - •
- SOFTWARE CHANGES SHOULD BE MADE

CP-6 COBOL TECHNICAL NOTES

Some number of differences between Xerox COBOL 68 and GCOS COBOL 74 have been identified. It is imperative that we provide a means by which the CP-V COBOL user can make a transition to CP-6 COBOL 74 as painlessly as possible. It is also necessary that the compiler that is targeted for CP-6 remain as close to GCOS COBOL 74 as possible, allowing for easy compiler conversion for future releases. To this end, a series of HIS software modifications and customer program changes are defined in the following pages:

DIFFERENCES

GCOS COBOL PERSONALITY

1.0 IDENTIFICATION DIVISION

1.1 The paragraph names within the IDENTIFICATION DIVISION are identical with the exception of two specific items.

1.1.1 The PROGRAM-ID name must not exceed six (6) characters (one BCD word) in H-74; while X-68 allows up to eight characters (one EBCDC double word). Also, H-74 places some minor restrictions as to what the program name may be and how it may be constructed, (i.e., no reserved words, no special characters are used). The name should be expanded to 12 characters (two BCD words) with no restrictions.

1.1.2 The REMARKS paragraph is not defined in ANSI 74 standards nor is it implemented in H-74. Users program should be changed.

2.0 ENVIRONMENT DIVISION

2.1 Although the paragraph and section names within the ENVIRONMENT DIVISION are identical there are some differences in paragraph entries.

2.1.1 The implementor-name clause of the SPECIAL-NAMES paragraph would naturally present differences. X-68 allows a one-character, non-numeric literal used for carriage control information, while H-74 does not. X-68 also uses the mnemonic-name PRINTER, while H-74 uses SYSIN and SYSOUT (assigned to the system input and output files I* and P* respectively). The mnemonic-name CONSOLE is used in both compilers with the same implementation. In addition to SYSIN/SYSOUT, we should provide the implementor name PRINTER, as well as a single non-numeric literal for carriage-control information.

2.1.2 The FILE-CONTROL paragraph is somewhat different for each of the compilers.

2.1.2.1 The RESERVE AREAS clause in COBOL 74 has only a slight syntax change, but has no functional differences. The user program should be changed.

2.1.2.2 The ASSIGN clause in X-68 uses peripheral device names such as CARD-READER, PRINTER, etc., while H-74 uses a concatenation of file code and device type. The way the file codes are named can affect multiple report files going to the same device (i.e., the reports may be segregated or interspersed). H-74 should be expanded to recognize all X-68 implementor names associated with the assign clause, as well as doing away with the two character file codes.

It should also be noted that INDEXED file structures under GCOS3 are such that two separate files are required--the data occupies one while the index occupies the other. This means that two file codes are generated by the compiler. CP-6 COBOL will not require this since the index for the file is physically part of the record.

2.1.2.3 It should also be noted that H-74 2H does not permit a file that is opened in the root to be accessed in a subprogram. This restriction can be circumvented by the use of a special option (.BLOCK) of the SPECIAL-NAMES statement. This new option is available in the 31 release of H-74; however, the RESERVE clause in the Select statement needs to be added. This is probably a 31 bug.

2.1.2.4 Because of certain conventions provided under CP-V, which allowed a file to be assigned to a null device, X-68 users do not need to use the OPTIONAL clause of the SELECT statement. This capability will be offered to CP-6 COBOL users but may not require change to H-74.

2.1.3 The syntax of the I-O-CONTROL paragraph differs only in the RERUN clause. This was rarely used in CP-V programs and can be changed by the user when converting.

3.0 DATA DIVISION

3.1 Differences in the DATA DIVISION are at a minimum.

3.1.1 The COMMON-STORAGE SECTION found in X-68 will have to be changed to LINKAGE SECTION. The functionality of the two sections will be equal. X-68 already supports the LINKAGE SECTION. This change is something our users will have to live with.

3.1.1.1 The test indicates that H-74 presently does not permit REDEFINES in the Linkage Section. This restriction should be removed.

3.1.2 X-68 permitted FILLER to occur on 01 levels. Although this seems to be meaningless, it was commonly used to define areas for debugging purposes. H-74 should permit this.

3.1.3 The data description statements are identical except for the SIGN and USAGE clause entries.

3.1.3.1 The USAGE clause contains many differences. First, while X-68 supports both single and double precision floating point computational variables, H-74 does not. Secondly, packed decimal computational items in X-68 carry the sign as the right most half byte. H-74 does not follow this convention unless "s" is used in the Picture Clause. If "s" is omitted from the Picture Clause the item is treated as unsigned numeric. Thirdly, two's complement binary integers (COMP) are defined as one-word (32 bits) in X-68. H-74 represents the data either; externally by two four eight bit bytes, internally by two/four nine bit bytes with bit zero of each byte unused, or by a 36-bit two's complement binary integer. We must define replacements f single and double precision floating point computational variables. The other formats will suffice in their present form; some user conversion will be required.

4.0 PROCEDURE DIVISION

4.1 There are many changes that are reflected in H-74 PROCEDURE DIVISION. Of these, the following are the most notable at this time:

4.1.1 The PROCEDURE DIVISION paragraph name must contain the using option if the program is to function under the CALL statement. Although X-68 has this feature, it also had the capability of calling a subprogram via a PERFORM statement. Due to the limitation of the PERFORM statement, this should be a required user change.

4.1.2 The ADD statement in H-74 has three formats while X-68 has four. This fourth format is a variation of the three other formats. The compiler should be expanded to allow this fourth format.

4.1.3 The DISPLAY statement has a slight variation in that X-68 uses the PRINTER option while H74 uses the SYSOUT option. Both are functionally the same (see 2.1.2.2.).

4.1.4 The ANSI 74 Standards specify that the language-name referenced by the ENTER statement may refer to any programming language which the implementor specifies may be entered through COBOL. H74 chose to specify no language; therefore, the ENTER statement was not implemented. It should be added to provide the same function now available in X-68.

4.1.5 The EXHIBIT statement is no longer in the standards and, therefore, was not implemented in H74. This should be implemented for CP-6.

4.1.6 The INSPECT statement in X-68 allows for literals to be alphanumeric or numeric. In H74, literals must be non-numeric. If TALLY is used as identifier-2 in the TALLYING option, X-68 resets it to zero while H74 does not. Both of these discrepancies should be the user's responsibility to change.

4.1.7 There are many changes to the Report Writer in H74. In both the INITIATE and TERMINATE statements, the ALL option, which is supported in X-68, was dropped. The user will have to be responsible here.

4.1.8 The OPEN INPUT clause provides a REVERSE option which may be used for input devices on which reverse reading is allowed (mag. tape). Honeywell hardware does not support this feature and, therefore, it was not implemented in H74. User programs can be changed to reflect this.

4.1.9 The PERFORM statement has had further clarification in the ANSI 74 standards (i.e. changing the FROM variable during execution can affect the number of times the procedures are executed in a Format 4 PERFORM if more than one AFTER phrase is specified). These changes may cause X-68 users some problems, but they will have to be responsible for changes.

4.1.10 The READ INTO statement of H74 may not be used when the input file contains logical records of various sizes as indicated by their record descriptions. X-68 supports this capability. H-74 should be expanded to allow this.

4.1.11 The STOP literal statement of H74 functions the same as X-68 except that the program is temporarily suspended for an interval of time, then execution continues automatically. X-68 requires the operator to restart execution. The CP-6 version of COBOL should follow the X-68 practice.

4.1.12 An extensive revision to label processing is currently underway, by the ANSI Committee, to remove ambiguities and provide for the processing of ANSI standard labels. Since these revisions were not completed, the Committee decided to define only a minimum label processing capability. For this reason, H74 does not support all the label processing capabilities of X-68. If the ANS Committee's definitions are not eminently forthcoming, we need to consider extensions to H-74 to allow present X-68 capabilities.

4.1.13 H74 does not support the INVALID KEY option of the WRITE statement since there is no user-defined keys for sequential files. However, X-68 does support this option. This allows the X-68 user to recover when no more space exists in the mass storage files. This should be included in the list of extensions to H-74.

5.0 ALL DIVISIONS

5.1 There are several items which affect all division and even the logic flow of programs.

5.1.1 The Library module (COPY) has been modified in H74. Those changes which may affect the X-68 user most are the matching and replacement process. Specifically, a period is not carried over from the called Library when the preceding word is replaced.

Example:

```
01  WSTR-2    COPY WSTOR2 REPLACING WA by WB.

01  WSTR-3.
```

Expands to:

```
01  WSTR-2
    02 WB  PIC XX.
01  WSTR-3.
```

Notice that the period is dropped after WSTR-2. This discrepancy should be removed.

5.1.2 An area of great concern is the problem of collating sequences. H74 provides options in several phrases (in OBJECT-COMPUTER, SORT, etc.) to specify the collating sequence. This will be a great help. However, there are areas where even this will not do. For instance, in an indexed file the keys will be sorted in ASC II sequence. If one wishes to access the records sequentially and in a collating sequence other than ASC II, watch out ... . This problem will have to be solved by user program logic changes.

6.0 COMPILER

6.1 There are a few items relating to the compiler that need further analysis.

6.1.1 Since CP-6 will not support restart capabilities, how will this affect the compiler? How much embedded restart code is there in the compiler? How dependent is the compiler design on the restart capability?

6.1.2 What about shared code? What has to be done to provide this? How does it affect the compiler's design?

6.1.3 Can the compiler size be reduced? If so, how much? How?

6.1.4 We need to be able to compile on-line as well as in a batch mode. How does this affect the compiler design?

6.1.5 Users will need to be able to execute in both on-line and batch modes. What has to be done to allow this? How are ISD II users affected?

Risks and Exposures

Honeywell

- PERFORMANCE
  - SIZE
  - SPEED
- MAINTAINABILITY
  - PHOENIX RESPONSIBILITY

Risks and Exposures (Continued)

Honeywell

- SCHEDULE
  - PRIOR COMMITMENTS IN PHOENIX
    - EIS, NSA CODE GENERATION, PL/1 CODE GENERATOR
    - GCOS66
  - SERIAL DEVELOPMENT
- FUNCTION
  - GCOS COMPATIBILITY OR CP-V COMPATIBILITY?
  - PERSONALITY
  - SHAREABILITY
- KEY COMPONENT
  - THERE IS NO CONTINGENCY PLAN

Data Management System

Honeywell

- COMPARED EDMS AND IDS-II
  - OFFER EDMS BRIDGE TO CP-6
- SIMILARITIES
- FUNCTIONAL DIFFERENCES
  - DUE TO IDS-II DESIGN DECISIONS
  - DUE TO OPERATING SYSTEM DIFFERENCES
- PERFORMANCE
- MAINTAINABILITY

EDMS Family

Honeywell

- FILE DEFINITION PROCESSOR
- DATABASE MANAGER
- DATABASE INITIALIZER
- DATABASE DUMPER
- DATABASE LOADER
- STATISTICAL SUMMARIZER
- EDMS RESTRUCTURING
- INTERACTIVE DATABASE PROCESSOR
- INTERACTIVE DATABASE DEBUGGER
- INTERACTIVE APL INTERFACE

EDMS and IDS-II

Honeywell

- FUNCTIONAL DIFFERENCES DUE TO DESIGN DECISIONS
  - NO SET RELATIONSHIPS IN IDS-II INDEXED FILES
  - IDS-II INTERFACE TO COBOL 74 ONLY
  - DIFFERENT USAGE STATISTICS IN IDS-II
  - NO RUN TIME TRACE IN IDS-II
  - NO DUPLICATE CALCULATED KEYS IN IDS-II
  - NO RESTRUCTURING PROCESSOR FOR IDS-II

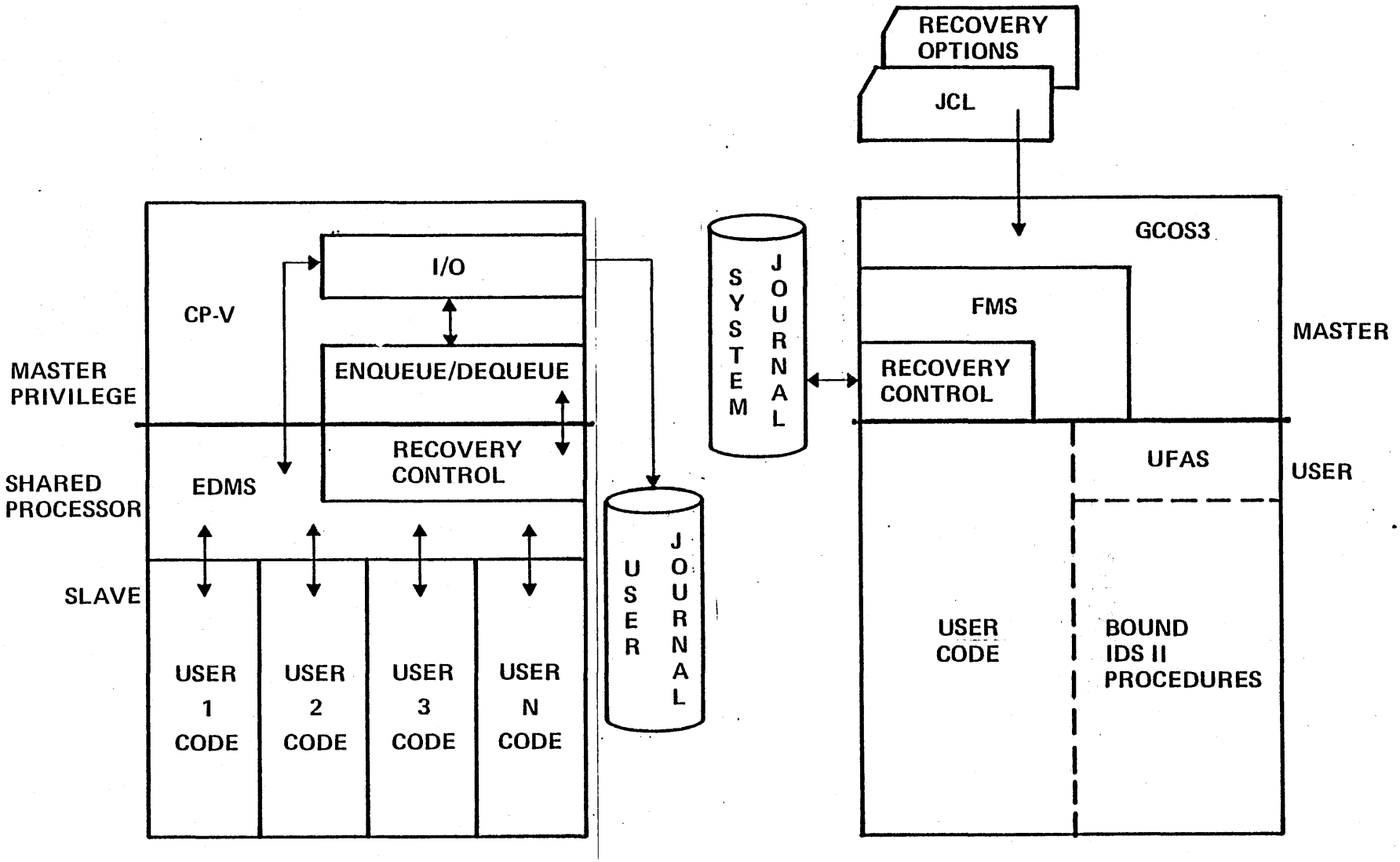
EDMS and IDS-II (Continued)

Honeywell

- FUNCTIONAL DIFFERENCES DUE TO OPERATING SYSTEM
  - RECOVERY AND ROLLBACK
  - INDEXED FILES
  - SHARED DATABASES

Recovery Journal Control

Honeywell



Risks and Exposures

Honeywell

- SCHEDULE
  - PROGRAM DEVELOPMENT AND CHECKOUT AT LADC
- FUNCTION
  - BOTH EDMS AND IDS-II WERE GOING IN THE SAME DIRECTION
- PERFORMANCE
  - NO DATA
- QUALITY ASSURANCE
- MAINTAINABILITY
  - CP-6 INTERFACE IS LADC RESPONSIBILITY

- ENHANCEMENTS TO BE COMMITTED
  - EIS
  - NSA
  - CP-6 OBJECT UNIT FORMAT
  - CP-6 OPERATING SYSTEM INTERFACE
    - CALLS/CLIMBS
    - SHAREABLE CODE
- REQUIRED FOR COBOL, IDS-II, ASM-66

ASM-66

Honeywell

- DESIGN, IMPLEMENT, TEST, AND DOCUMENT FOR GCOS 66
- ENHANCE FOR CP-6 OBJECT UNIT AND CP-6 INTERFACE
- GMAP TO ASM-66 CONVERTER

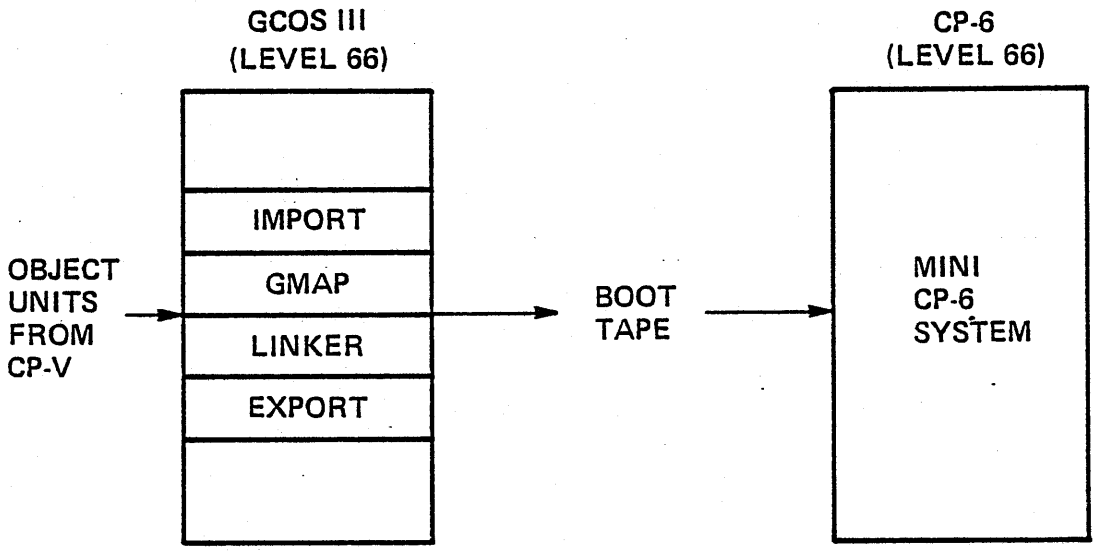
Development Environment

Honeywell

1. CP-V & PLUTO
2. CP-V & PL-6
3. GCOS III & ASSEMBLER
4. CP-6 & PL-6

First Boot of CP-6

Honeywell



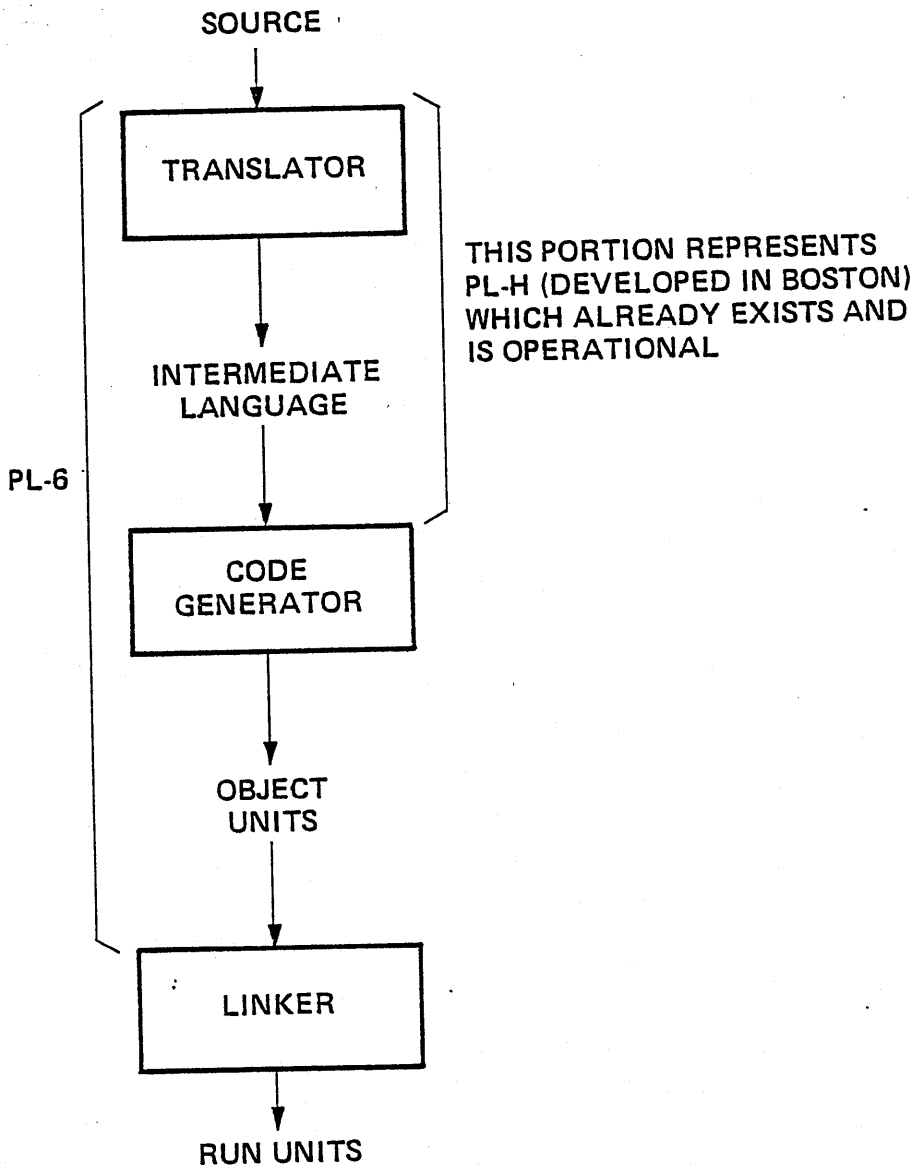
PL-6

Honeywell

- PROGRAMMING LANGUAGE FOR CP-6
- DIALECT OF PL/I
- DERIVED FROM PL-H

PL-6 Overview

Honeywell



REQUIREMENTS OF AN IMPLEMENTATION LANGUAGE

- High Compiler Performance
  - Fast compilation and execution
  - Low core requirement
- High Object Code Performance
  - Efficient object code
  - Shared object code
  - EIS code
  - NSA code
- Time-Sharing Capability
- Symbolic Debugging Capability
- Easily Maintainable and Extensible
- Desirable Features
  - Shared compiler (faster turnaround)
  - Runs on Xerox CP-V computer (provides an additional development environment)

DIFFERENCES BETWEEN PL-6 AND PL/1

FEATURE	PL-6	PL/1	REASON
POINTER DEFINITION	Pointers in PL-6 are NSA vectors. There are a complement of built-in functions to support the new definition.	PL/1 defines pointer as merely addresses, and does not provide for their modification.	This redefinition allows addressability of data in any segment using the same language syntax. It also provides the additional bounds checking associated with vectors.
EXTERNAL DATA REFERENCING	SYMDEF/SYMREF added as Data Attributes.	SYMDEF/SYMREF not allowed.	In conjunction with rules to the code generator, allows the separation of data into functional code groups and thus provides protection through vector references.
BINARY INTEGER DEFINITION	Unsigned binary allowed.	Unsigned binary not allowed.	Many values have only positive logical values and must be treated as such.
CASE STATEMENT	DO CASE allowed.	DO CASE not allowed.	This language element supports structured programming and was defined in PL-H. It provides more readable and maintainable code.
CALL With ALTERNATE RETURN	Alternate Return on call allowed.	Alternate Return on call not allowed.	This language element was added for efficiency to eliminate argument passing and type of return checking.

PL-6 EXTENSIONS TO PL/1

FEATURE	PL-6	PL/1	
PREPROCESSOR	% INCLUDE % SUB % MACDEF % LIST % NLIST	% INCLUDE	The preprocessor capability is to be used to: 1. Control Data Referencing 2. Increase productivity by allowing shorthand 3. Conversion to PL/1
WHO AM I?	PL-6 will be able to generate different code for the monitor versus the user.	PL/1 has only one mode of code generation.	The monitor has different requirements for such things as allocation of automatic space. PL-6 will be able to recognize this and generate code appropriately.
WHAT KIND OF CALL AM I?	PL-6 will recognize certain calls and generate PMME for them.	PL/1 has only one type of call.	One of the rules to the code generator is a set of call definitions. This restricts the need for GMAP subroutines to generate PMME's.

PL-6 RESTRICTIONS TO PL/1

FEATURE	PL-6	PL/1	REASON
END STATEMENT	Multiple closures not allowed.	Multiple closures allowed.	The restriction provides for more readable and maintainable code.
GO TO	Non-local GO TO not allowed.	Non-local GO TO allowed.	This restriction requires the code to be structured better, which provides for more maintainable code.
AUTOMATIC DATA ALLOCATION	Occurs at entry to external procedure for all nested procedures. Calls to internal procedures limited.	Occurs at entry to procedure block. No limitation on calls.	This restriction allows compile time addressing as opposed to run-time addressing. In addition, there is less overhead required for allocation/deallocation.
LABEL VARIABLES	Label variables not supported.	Label variables supported.	This restriction eliminates the need for extensive runtime checking of GO TO statements. It provides for more readable and maintainable code.

Advantages of PL-6

Honeywell

- HIGH PERFORMANCE
- GENERATES SHARED OBJECT CODE
- GENERATES EIS AND NSA CODE
- SMALL RUN-TIME LIBRARY
- SMALL AUTOMATIC STORAGE (NO RECURSION)
- EASILY MAINTAINABLE AND EXTENSIBLE
- HIGHER PRODUCTIVITY

Conventions & Standards

Honeywell

- NAMES - FILES/MODULES, SYSTEM TABLES & ENTRY POINTS
  - SHORTHAND FOR CONCEPTUAL STRUCTURE OF SYSTEM
  - FACILITATE EASY & PRECISE COMMUNICATION ABOUT THE SYSTEM
  - FIX SYSTEM TABLE RESPONSIBILITY TO SYSTEM FUNCTIONS
  - ADMINISTRATION AND DEVELOPMENT CONTROL
  - RELATE CP-V DESIGN TO CP-6 DEVELOPMENT
  - FACILITATE DEVELOPMENT, DEBUGGING, MAINTENANCE & EXTENSIBILITY

- ERROR MESSAGES
  - GENERIC ERROR CODES
  - ALLOW VARIABLE INFORMATION
  - FACILITATE EASY RECOGNITION OF ORIGIN OF ERROR

- DOCUMENTATION
  - CENTRAL REPOSITORY
  - IDENTIFICATION CONTROL SCHEME
  - PARALLEL SYSTEM ORGANIZATION

- PROGRAMMING LANGUAGE
  - LANGUAGE HELP ENFORCE STRUCTURING DISCIPLINES
  - READABILITY, EXTENSIBILITY, MAINTAINABILITY
  - CONVENIENCE AND CONTROL

Conventions & Standards (Continued)

Honeywell

- FUNCTIONAL CODE GROUPS (FCG)
  - UNIQUE TWO LETTER DESIGNATION
  - FIRST LETTER = FUNCTIONAL AREA
  - SECOND LETTER = SUB-FUNCTION

- NAMES
  - FTI$RDL

- SYSTEM TABLES
  - BFT$DCB — DCB TABLE — FILE MANAGEMENT RESPONSIBILITY
  - B$JIT — JIT TABLE — MORE THAN ONE FCG RESPONSIBLE

- ERROR CODES
  - ERROR CODE 14 = NON EXISTENT FILE
  - FTI 14 FILE ### CANNOT BE READ, AS IT DOES NOT EXIST

- DOCUMENTATION
  - ARCHITECTURE FILE

- PL-6
  - INHERENT DISCIPLINES
  - % INCLUDE, % SUB, % MAC
  - POINTERS AS VECTORS

Date: 761019

To: Architecture File

From: Ed Bryan/Pat Crisman

Location: AFC

Subject: CP-6 Architecture File Table of Contents

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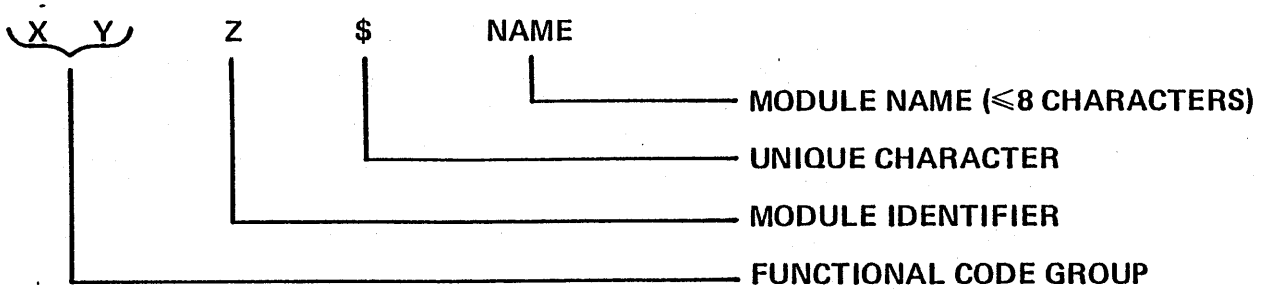
Naming Conventions

Honeywell

- FILE NAMES, MODULE NAMES, ENTRY POINTS



- DATA BASE

  B X Y $ NAME

  B $ NAME

Error Messages

Honeywell

- ERROR MESSAGE BASE
  - FUNCTIONAL CODE GROUP (FCG)
  - MODULE ID (MID)
  - SEVERITY
  - ERROR CODE
- DECLARABLE AS A PL-6 STRUCTURE
- BECOMES PART OF DATA BASE VIA % INCLUDE
- ERROR CODE HAS SAME GENERIC MEANING INDEPENDENT OF FCG OR MID

Architecture File

Honeywell

- CENTRAL REPOSITORY FOR PROJECT TECHNICAL DOCUMENTATION
- SELECTIVE USE OF TEXT
- DOCUMENT CONTROL – AF SECTION, DOC. NUMBER, VERSION, RELEASE
- FILE STRUCTURE PARALLELS FCG
- TECH. DOC. BASE FOR DESIGN SPECIFICATIONS

Use of PL-6

Honeywell

- DISCIPLINE INHERENT IN LANGUAGE
  - NO LABEL VARIABLES
  - NO RECURSIVE PROCEDURES
  - CASE STATEMENT
  - ALTRETURN
- SYSTEM CONTROL VIA % INCLUDE
  - DATA BASE
  - TEMPLATES
  - MACROS
- POINTERS AS VECTORS - RUN TIME BOUNDS CHECKING

CAN WE DO IT?

Productivity Assumptions

Honeywell

- PRODUCTIVITY INVARIANT WITH THE LANGUAGE (in source lines / man year)

* • IND. STNDRD. – MONITOR – 1.0K/MY TO 1.4K/MY

* • IND. STNDRD. – SERVICE PROCESSORS – 2.0K/MY TO 3.0K/MY

- 75% OF MONITOR IN HLL, 25% IN AL
- 90% OF SERVICE PROCESSORS IN HLL, 10% IN AL

* • 2:1 COMPRESSION RATIO – CP-V TO CP-6 – MONITOR

* • 3:1 COMPRESSION RATIO – CP-V TO CP-6 – SERVICE PROCESSORS

- LINE COUNTS INCLUDE COMMENTS

* • 40% PRODUCTIVITY INCREASE DUE TO EXTANT DESIGN & EXTANT CP-V STAFF

- CP-6 STNDRD. – MONITOR – 1.4K/MY TO 2.0K/MY
- CP-6 STNDRD. – SERVICE PROCESSORS – 2.8K/MY TO 4.2K/MY
- CP-6 BUDGET = 86 MY

* ASSUMPTION CONSIDERED TO BE CONSERVATIVE

Nov 1976

Productivity Assumptions

Honeywell

	MONITOR	SERVICE PROCESSORS
CP-V AL LINE COUNT	175K	200K
CP-6 HLL LINE COUNT	75K	64K
CP-6 AL LINE COUNT	25K	8K
CP-6 TOTAL	100K	72K

- REQUIRED PRODUCTIVITY RATE FOR CP-6

  MONITOR – 1.6K/MY

  SERVICE PROCESSORS – 3.1K/MY

Productivity Assumptions (Continued)

Honeywell

PRODUCTIVITY RATES

	Required CP-6	Estimated CP-6 STANDARD
MONITOR	1.6K/MY	1.4K/MY – 2.0K/MY
SERVICE PROCESSORS	3.1K/MY	2.8K/MY – 4.2K/MY

achieved rate 4.8 → 7.5K
6/28/82

CP-6 Release Documentation

Honeywell

- CP-6 CONCEPTS AND FACILITIES
- CP-6 PROGRAMMER'S REFERENCE MANUAL
- CP-6 MONITOR SERVICES REFERENCE MANUAL
- CP-6 OPERATIONS REFERENCE MANUAL
- CP-6 SYSTEM MANAGEMENT REFERENCE MANUAL
- CP-6 SYSTEM PROGRAMMER'S REFERENCE MANUAL
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- CP-6 ANS FORTRAN LANGUAGE REFERENCE MANUAL
- CP-6 ANS FORTRAN OPERATIONS REFERENCE MANUAL
- CP-6 FDP REFERENCE MANUAL
- CP-6 APL LANGUAGE REFERENCE MANUAL
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- CP-6 COBOL-74 LANGUAGE, OPERATIONS REFERENCE MANUAL
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- CP-6 PL/1 USERS REFERENCE MANUAL
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- CP-6 POCKET GUIDE
- CONVERSION MANUAL

Organization and Team Concepts

Honeywell

- ARCHITECTURE TEAM
  - C. MARTIN – MANAGER
  - E. BRYAN – COMMUNICATIONS AND REAL TIME TEAM LEADER
  - D. HEYING – OPERATING SYSTEM TEAM LEADER
  - F. FARRAND – DOCUMENTATION TEAM LEADER
  - R. LITSCHGI – OPERATING SYSTEMS MANAGER
  - W. WONG – LANGUAGE PROCESSORS MANAGER
  - A. KOPITO – COMMERCIAL SYSTEMS MANAGER
  - G. KINNEY – OPERATIONS MANAGER
  - TBA – COMMUNICATIONS MANAGER
- TASK TEAMS – TEAM LEADERS + MGR + CP-6 STAFF
- DESIGN REVIEW TEAM – A.T. + APPROPRIATE STAFF
  - INTERNAL TO PROJECT
  - USERS GROUP EXCHANGE TECHNICAL COMMITTEES

Organization and Status — Architecture

Honeywell

- ORGANIZATION AND TEAM CONCEPTS
- GOALS AND STATUS

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14. 0	0014 A	760802	BRYAN/HEYING	CP6 MEMORY CHART
14. 0	0038 A	760819	I. GREENWALD	SLAVE/MASTER/PRIVILEDGED INTERFACES
14. 0	0042 A	760913	I. GREENWALD	CHANGING OPERANDS TO DESCRIPTORS
14. 0	0083 A	761026	AVERY/COLLINS	CP-6 BASIC STRUCTURE AND CONTROL
15. 0	0015 A	760621	E. BRYAN	PROTECTED GROUPS OF CP6 CODE
18. 0	00 76 A	761013	S. LAMOREE	IRBT (HASP) COMMUNICATIONS SUPPORT
18. 0	0060 A	760930	S. LAMOREE	IBM 2780-COMPATABLE TERMINAL SUPPORT
18. 0	0064 A	760929	P. STENDAL	PROGRAM CONTROL OF COMMUNICATIONS MODES
18. 0	0066 A	761001	S. LAMOREE	IBM 3780-COMPATABLE TERMINAL SUPPORT
19. 0	0052 A	760922	L. FELDMAN	CP-6 COMMAND PROGRAM

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23. 0	0082 A	761025	D. HEYING	MONITOR DATA ORGANIZATION, PROTECTION, ETC,
27. 0	0016 A	760422	C. MARTIN	GP5 MODULE ORGANIZATION
27. 0	0017 A	760312	W. WONG	LANGUAGE PROCESSORS MODULE ORGANIZATION
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1. 3	0003 A	760723	S. KLEE	GUIDELINES FOR 1976-1977
1. 4	0004 A	760805	C. MARTIN	CHARTER FOR CP6 ARCHITECTURE TEAM
1. 5	0005 A	760831	C. MARTIN	CP6 AF DISTRIBUTION LIST BY PERSON
3. 2	0006 A	760810	C. MARTIN	MINUTES OF TOLTS MTG.
3. 2	0007 A	760813	D. HEYING	MINUTES OF SOFTWARE FACTORY STUDY GROUP MTG
8. 5	0008 A	760226	E. BRYAN	A PRELIMINARY LOOK AT GCOS MME'S
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10. 1	0030 A	760727	I. GREENWALD	CP-6/GCOS-66 INTERACTIONS
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10. 2	0046 A	760909	J. QUELLE	GMAP 77
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13. 0	0056 A	760923	T. MARTIN	CP-6 FILE DCB
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8. 1	0088 A	761101	G. ULSCHMID	GCOSIII/66 DOCUMENTATION

Goals and Status

Honeywell

GOAL	STATUS	AF DOCUMENTS
• ARCHITECTURE FILE	COMPLETE	2B-0, 1.1/2B-0, 1.2
• HIS FILE	COMPLETE	—
• PFS REVIEW	COMPLETE	—
• SYSTEM STRATEGY	COMPLETE (1QT77)	77A-0, 1.5
• DS FORMAT & CONTENT GUIDE	COMPLETE	74A-0, 7.2
• CP-6 C&F	DEC 76	(9A-0, 7.3)
• TECHNICAL OVERVIEW	COMPLETE	59A-0, 27.0
• RELEASE DOCUMENTS LIST	COMPLETE	51B-0, 7.0
• PL-6 REFERENCE MANUAL	COMPLETE	84A-0, 10.2
• USE INTERFACE DESCRIPTION	JAN 77	(79A-0, 6.3)
• SYSTEM TABLES	JAN 77	—
• MARKETING ANNOUNCEMENT	JAN 77	—
• PRODUCTION PHASE WORK PLAN	JAN 77	—

Release Staging

Honeywell

FIRST RELEASE

- BASIC CP-6 SYSTEM
  - TIME SHARING
  - BATCH PROCESSING
- REAL TIME

SECOND RELEASE

- REMOTE PROCESSING
- REMOTE TERMINAL CONCENTRATOR
- MEDIUM 6 HARDWARE SUPPORT

THIRD RELEASE

- TRANSACTION PROCESSING

Mileposts to First Release

Honeywell

HARDWARE AVAILABILITY

- LEVEL 66
  - FIRST SYSTEM 10-76
  - NSA OPTION 1-77
  - SECOND SYSTEM 6-77
  - HIGH PERFORMANCE SWAPPER 12-77
  - ADDITIONAL CPU (M.P. CHECKOUT) 3-78
- LEVEL 6
  - FIRST SYSTEM 10-76
  - SECOND SYSTEM 7-77
  - L6/I66 INTERFACE 7-77

Mileposts to First Release (Continued)

Honeywell

SOFTWARE DEVELOPMENT TOOLS

• HIGH LEVEL COMPILER	
– INITIAL VERSION	4-77
– PRODUCTION VERSION	7-77
– OPTIMIZED VERSION	7-78
• ASSEMBLER (GCOS-III, NSA)	2-77
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• DEVELOPMENT VEHICLES	
– CP-V (LOCAL)	8-76
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Mileposts to First Release (Continued)

Honeywell

- STAFF
  - FULL DEVELOPMENT STAFF 6-77
- HONEYWELL CP-6
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  - BENCHMARK 12-78
  - FIRST CUSTOMER SHIP (CONTROLLED) 3-79

Hardware Configuration

Honeywell

THREE MODELS	(PERFORMANCE EQUIVALENT)
– 66/A	XEROX 560
– 66/B	SIGMA 9
– 66/C	2X SIGMA 9

REQUIRED CENTRAL PROCESSOR HARDWARE

- BASIC 6000 INSTRUCTION PROCESSOR
- EIS
- CACHE MEMORY
- NSA

Minimum Hardware Configuration

Honeywell

- 66/A CENTRAL PROCESSOR
- 128K WORDS
- 1 IOM
- 4MB SWAP SUBSYSTEM
- 1 X 2 MASS STORAGE
- 1 X 1 9T MAGNETIC TAPE
- 1 X 8 FEP
- 1 CARD READER
- 1 LINE PRINTER
- 1 SYSTEM CONSOLE

Hardware Configuration (Detail)

Honeywell

	66/A	66/B	66/C
MAIN FRAME			
PERFORMANCE	XEROX 560	SIGMA 9	2X SIGMA 9
NUMBER OF CP'S	1-1	1-2	1-4
MAIN MEMORY (K)	128-256	256-512	256-1024
IOM'S	1-1	1-2	2-4
SWAP CAPACITY (MAXIMUM)	16 MB	32 MB	64 MB
SYSTEM CONSOLE	1	1	1
MASS STORAGE			
REQUIRED	1 X 2	1 X 2	1 X 4
MAXIMUM	1 X 8	1 X 16 (2 X 8)	1 X 32 (2 X 16)
DEVICE CAPACITY (MB)	100/200	100/200	100/200/600
UNIT RECORD			
CARD READER	1-1	1-2	1-2
CARD PUNCH	0-1	0-1	0-1
LINE PRINTER	1-4	1-4	1-4
MAGNETIC TAPE			
REQUIRED	1 X 1	1 X 1	1 X 1
MAXIMUM	1 X 8	1 X 8	2 X 16
SPEED (IPS)	75	75/125	125/200
COMMUNICATIONS			
REQUIRED (FEP X LINES)	1 X 8	1 X 8	1 X 8
MAXIMUM	1 X 64	2 X 64	4 X 64
REMOTE CONCENTRATOR	NO	YES	YES

Device Configuration by Model Number

Honeywell

MASS STORAGE

MSP 0601	CONTROLLER	
– MSU 0400		100 MB
– MSU 0451		200 MB
MSS 0601	CONTROLLER	
– MSU 6512		600 MB

MAGNETIC TAPE

MTP 0601	CONTROLLER	
– MTU 0400		75 OPS
– MTU 0500		125 OPS
– MTU 0600		200 OPS

UNIT RECORD

URP 0600	CONTROLLER	
– CRU 1050		1050 CPM
– PCU 0120		100-400 CPM
– PRU 1200		1200 LPM
– PRU 1600		1600 LPM

SYSTEM CONTROL CONSOLE

CSU 6001	SYSTEM CONSOLE	
– CSF 6001		REMOTE DISPLAY
– CSF 6003		INTERACTIVE DISPLAY
CSU 6002	SYSTEM CONSOLE	
– CSF 6002		REMOTE DISPLAY

REAL TIME AND COMMUNICATION PROCESSOR

LEVEL 6/36

SWAP SUBSYSTEM

CURRENTLY UNDEFINED

Software Packaging

Honeywell

- BASIC CP-6 SYSTEM
  - TIME SHARING
  - BATCH PROCESSING
  - SERVICE PROCESSORS
    - LINK
    - EDIT
    - ETC.
- CP-6 SOFTWARE
  - HIGHER LEVEL COMPILER
  - ASM 66
  - SOURCE FOR BASIC CP-6 SYSTEM
- TRANSACTION PROCESSING
- REAL TIME
- REMOTE PROCESSING
  - IBM SUPPORT PACKAGE
- REMOTE TERMINAL CONCENTRATOR
- MULTI PROCESSING
- LANGUAGE PROCESSORS

Conversion CP-V to CP-6

Honeywell

OBJECTIVE

MINIMIZE CONVERSION EFFORT

APPROACH

RECOMPILE SOURCE PROGRAMS

PROVIDE CONVERSION AIDS

PROVIDE DOCUMENTATION FOR CONVERSION ASSISTANCE

Conversion Aids

Honeywell

- HONEYWELL COBOL-68 TO COBOL-74 CONVERTER
- APL WORKSPACE CONVERTER
- DATA AND FILE CONVERSION
  - FILE TRANSFER PROGRAM FROM CP-V TO CP-6
  - CONVERSION SUBROUTINES TO READ/WRITE FOREIGN FILES
  - CONVERSION SUBROUTINES TO CONVERT DATA
- INVESTIGATE AUTOMATIC DATA BASE CONVERTER FROM EDMS TO IDS
- CONVERSION MANUAL
  - LIST AND DESCRIPTION OF CONVERSION TOOLS
  - HELPFUL HINTS AND POTENTIAL PROBLEMS
  - METHODOLOGY FOR CONVERTING ASSEMBLY LANGUAGE PROGRAMS

Risks and Issues — Part I

Honeywell

- SCHEDULE
- FUNCTIONALITY: 1ST RELEASE
- IMPLEMENTATION LANGUAGES
- TEST ENVIRONMENT
- PERFORMANCE
- STABILITY: 1ST RELEASE
- T&D FIT
- DOCUMENTATION
- STAFFING
- CONVERSION EASE (CP-V TO CP-6)

Risks and Issues — Part II

Honeywell

- SWAPPER
- FRONT-END PROCESSOR
- HARDWARE AVAILABILITY, STABILITY AND SUPPORT
- GCOS COMPATIBILITY
- COMMON CP-6/GCOS DEVELOPMENTS
  - IMPLEMENTATION LANGUAGE
  - PL/1 – ASM-66
  - DIVISION OF RESPONSIBILITIES
  - OPTIMIZATION FOR DIFFERENT SYSTEMS
- MEMORY VOLATILITY – NO POWER FAIL SAFE
- COMPETITION FOR RESOURCES FROM CURRENT PROGRAMS

CP-6 Summary

Honeywell

- PFS IN PREPARATION
- ARCHITECTURE PHASE COMPLETE — JANUARY-FEBRUARY 1977
- PRODUCTION PHASE WORK PLAN — JANUARY 1977
- PRINCIPAL DESIGN SPECIFICATIONS — APRIL 1977
- FIRST CUSTOMER SHIP — 1Q79

CP-6 Summary

Honeywell

- CP-6 WILL BE MORE THAN CP-V
  - XEROX HARDWARE OBSTACLES REMOVED
  - IMPROVED RELIABILITY AND SECURITY
  - MORE PERFORMANCE
  - DISTRIBUTED FUNCTION
  - COBOL-74, PL/1, IDS-II
- BUT IN MANY WAYS CP-6 IS CP-V
  - SUBSTANTIALLY SAME DESIGN
  - MAJOR PORTION OF CP-V TEAM RECONSTITUTED
- GROWTH TO GCOS 66 WILL NOT BE VERY DIFFICULT
- EXTERNAL INFLUENCES CAN ADVERSELY IMPACT PROJECT
- WE WILL MEET CP-6 OBJECTIVES BUT:
  - SCHEDULE IS TIGHT
  - CONVERSION, BIGGER EFFORT
  - NSA HARDWARE STABILITY, SWAPPER, IMPLEMENTATION LANGUAGE ARE BIGGEST RISKS