

IBM CONFIDENTIAL

CONVERSATIONAL PROGRAMMING SYSTEM

PROGRESS REPORT

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ABSTRACT

CPS

(CONVERSATIONAL PROGRAMMING SYSTEM)

PROGRESS REPORT

INTRODUCTION

CPS is a time-sharing system being developed by Allen-Babcock Computing, Inc. for IBM. The purpose of the development contract is to make advances in the adaptation of PL/I to conversational work and to extend our knowledge of how to exploit read only store. Allen-Babcock plans to use the system to support a remote time-sharing service, and IBM may do likewise.

This progress report presents the state of the project as of May 17, 1966. People who know little about the project should read the November 5, 1965 progress report first. Further documentation is available and more will be provided, as indicated in the section on documentation.

STATUS AND SCHEDULE

The system is presently installed at the San Jose Programming Center where the program is being debugged. The microprograms are complete and have no known bugs. The program is largely complete, but many important component programs are not debugged and the system test has not begun. It is expected that the basic parts of the system will be running with more than one terminal by June 1.

The objective is to have the system running by July 1, and it probably will be capable of being demonstrated at that time. However, a substantial amount of debugging, shakedown, and refinement will be needed before the system will be suitable for users. The Allen-Babcock people have not stated a target for this later than July 1, but my prediction continues to be September 1. There are large problems and uncertainties, but the people doing the work are highly competent, have good esprit de corps, and are working hard and productively. The date could be earlier or later.

The system will be at the San Jose Programming Center through June, and then will be shipped to a customer facility in the San Jose area where it will be run as that customer's computation center by Allen-Babcock and where shakedown of CPS will continue. As soon as the system operates well enough, CPS subscription service will begin, with 42 Type 2741 terminals in the San Jose area and 20 in the Los Angeles area. The Boston Programming Center will order one subscription and use a few hours a month of service until January when its Model 50 is delivered.

Allen-Babcock has ordered a second Model 50 and has been promised May 1967 delivery.

MICROPROGRAMS

The microprograms are:

<u>Code Name</u>	<u>Name or Function</u>	
EVAL	Evaluate an arithmetic expression	
CHB	One byte	List search
CHBE	= item	operations
CHH	Two byte	
CHHE	= item	
LDM	Load Multiple Floating Point	
STDM	Store Multiple Floating Point	
LUM	Load Under Mask	
STUM	Store Under Mask	
TAC	Table ANDED Characters	Extensions of
TOC	Table ORed Characters	Translate & Test
BS	Binary Search	
ADD	Floating decimal instructions	
SUB		
COMP		
MULT		
DIV		

Each of these microprograms acts as new machine instruction. They are located in five of the eight extra planes of ROS that can be installed in a Model 50.

The microprograms have been tested by setting in memory, manually, the necessary information and then executing the microprogram. The most complicated tests run so far have been executions of EVAL to evaluate assignment statements. All known bugs have been removed and the microprograms are substantially complete. However, when the system starts running, the microprograms will get their first heavy use and a few new bugs are expected to show up.

Detailed descriptions of the microprograms are available in Boston, and the CAS programs that generated them are also available. These have not been given wide distribution, because they are too

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detailed, but they can be made available to those who are qualified and have the time and interest to read them.

A final appraisal of the performance of the microprograms will not be available until the complete system is in operation and tests have been run. The preliminary tests that have been run so far indicate that the microprograms other than EVAL and the floating point instructions run about five times faster than the corresponding programs of machine instructions. EVAL is substantially more than a factor of five faster than a program to interpret an assignment statement. The decimal floating point instructions are about 20% or 25% slower than the corresponding hex instructions of the Model 50. However, for intimate man-machine interaction, the calculations must either be done in decimal or frequently translated. The floating point decimal microprograms are, of course, enormously faster than either of these alternatives.

### CPS AND OS/360

It has been found possible and appropriate for CPS to run under OS/360, initially under SSS. CPS will be a single task. Eventually, under SPS, it will be possible to run conventional OS/360 stacked jobs as a background with the CPS time-sharing users in the foreground.

The 62 Type 2741 remote terminals of CPS are controlled by EXCP, execute channel program, with CPS appendages attached in accordance with OS/360 specifications.

CPS does its own scheduling and allocation of 2 usec and 8 usec memory. The 62 users will be served cyclically and, when his turn comes, each user will get a few milliseconds of machine time. The entire cycle will take less than 3 seconds between the successive turns of a single user. The time spent in overhead between turns of successive users will probably be less than 0.5 milliseconds.

The system includes the break feature to allow the user to interrupt the CPU but does not yet include the RPQ to allow the CPU to interrupt the user.

### MACHINE CONFIGURATION

The machine configuration of the Allen-Babcock system is given in the diagram and list of features that follow. An interesting detail in their planned installation is a new arrangement that Pacific Telephone is going to provide. Instead of requiring a handset and a dial with each

of the 62 data sets that must be installed at the computer, there will be a panel with one handset, one dial, and 62 buttons. This new facility will not only be better looking, more compact, and cheaper, but it will also be easier to use.

The machine configuration at the Boston Programming Center will include twice as much 2 microsecond memory and twice as much 8 microsecond memory. This will allow the simultaneous operation of CPS with other systems running under the SPS version of OS/360.

The following configuration is for the development period:

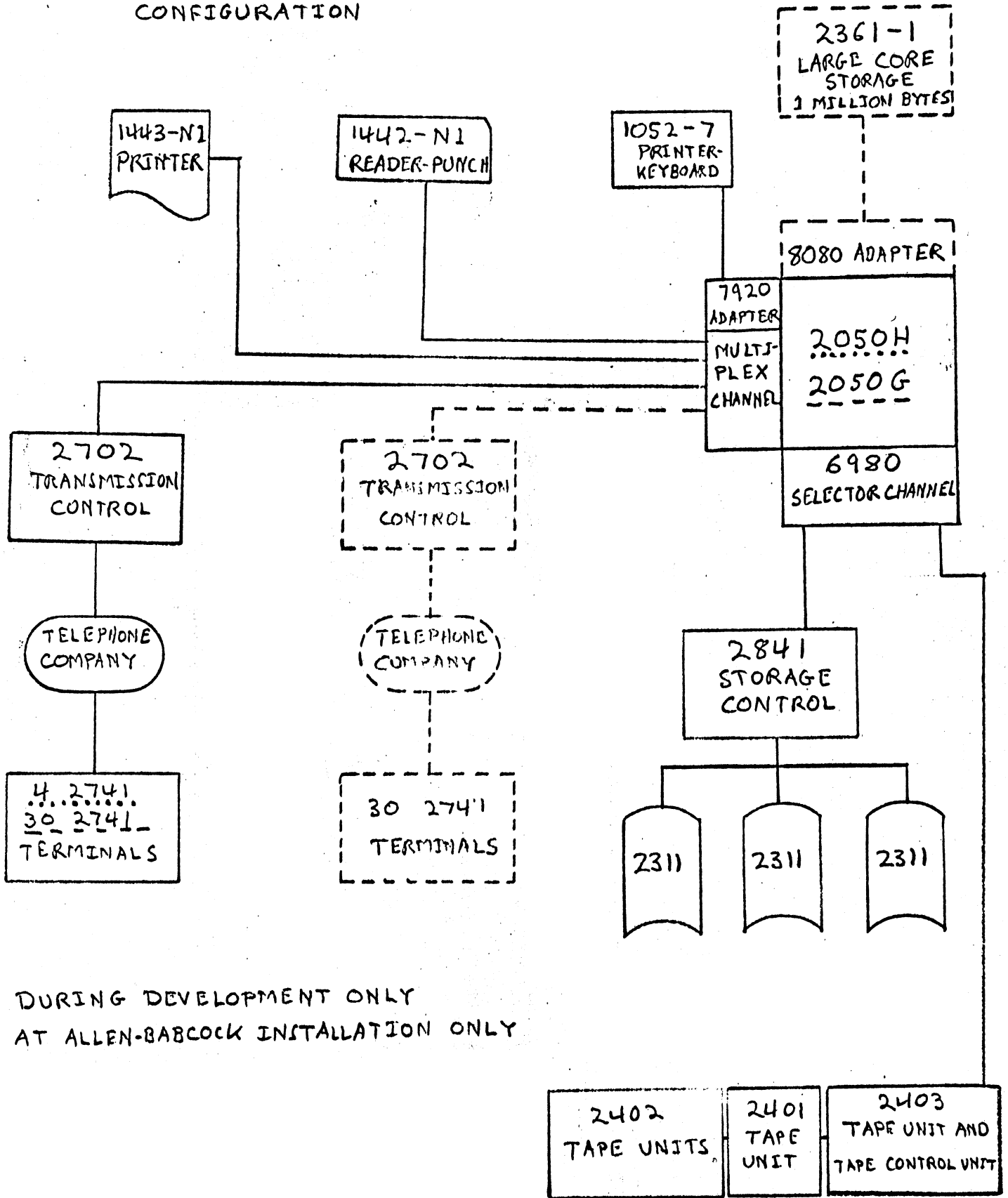
2050H	<del>During development - CPS eventually will run on 2050G</del> <i>256K Bytes</i>
6980	1 Selector channel
7920	1052 Adapter
8080	2361 Attachment
RPQ	W15538 Extended ROS (for ABC special op-codes)
1442-N1	Card reader-punch
<del>1403</del> N1	Printer
<del>7821</del>	<i>Printer control</i>
1052-7	Console typewriter
2401-II	9 Track tape drives
2402-II	9 Track tape drives
2403-II	9 Track tape drives and adapter
2841	Storage control
3x2311	Disk storages
2702-1	Transmission control
4615	Terminal control Type I
7955	31 Line expansion
9684	Selector speed 134.49
3233	Line adapters
9696	Space
8055	2741 Break feature
<del>60</del> x2741	Terminals
4708	Break feature
2x 2712	<i>Remote Multiplexors</i>

The above configuration has two of the terminals hooked up to the computer via telephone company 103As. The other two terminals are hooked up via telephone company 103Fs.

The following additions will be made to the system on installation at Allen-Babcock:

2361	Large Core Storage (1 million bytes)
2702-1	<del>Same as above</del> , except with the 8045-1 adapter for use with <del>2712</del> <i>2712</i>
<del>56x2741</del>	<del>More terminals like the above. Some for attachment with 103As, and others for attachment with 103Fs.</del>

# CONVERSATIONAL PROGRAMMING SYSTEM CONFIGURATION



DOCUMENTATION

Since the purpose of the CPS contract is to develop certain technology, the reports are distributed to a substantial list of persons within IBM. In addition to the documents distributed, there is more detailed documentation that will be stored in the Boston Programming Center and which can be made available to interested persons who would have use for it. Of this material, only the language and external specifications are for distribution outside of IBM and Allen-Babcock. The reports that have been distributed are:

"CPS, Conversational Programming System" N. Rochester,  
D. A. Schroeder, P. Y. Woon, February 11, 1965

"Conversational Programming System, Report No. 1,  
Introduction" D. A. Schroeder, May 20, 1965

"Conversational Programming System, Progress Report"  
N. Rochester, November 5, 1965

"A PL/I Based Terminal Language for the Allen-Babcock  
Conversational Programming System" N. Rochester,  
P. Y. Woon, TR 00.1446 April 29, 1966

"Conversational Programming System, Progress Report"  
N. Rochester, May 23, 1966

After July 1, work will begin on Technical Reports to describe the whole system in a comprehensive way, and these will be distributed. When the Allen-Babcock users manual is available, it will be distributed. In January, a Model 50 will be delivered to the Boston Programming Center, and a substantial series of tests will be conducted to appraise CPS. The reports of these tests will be distributed.

Other material that is available but will not be distributed includes:

- . The contract between IBM and Allen-Babcock Computing, Inc.
- . The microprograms in the form of the source documents for CAS and on tape
- . The source decks for the programs
- . The development workbook. This consists of flow charts and terse detailed write-ups and is suitable for use by people who have worked on the design or maintenance of the system.
- . Monthly reports submitted to the contract administrator by Allen-Babcock Computing, Inc.