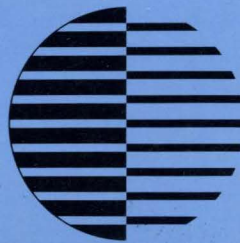


SOFTWARE

PRODUCT SPECIFICATION LIBRARY

E012
Chippewa Operating System
64/6600
Version 1.1



CONTROL DATA
CORPORATION

DEVELOPMENT DIVISION - APPLICATIONS
3145 PORTER DRIVE, PALO ALTO, CALIFORNIA

E012
Chippewa Operating System
64/6600
Version 1.1

CONTROL DATA CORPORATION • APPLICATIONS • SOFTWARE DOCUMENT PAGE NO. 1
DOCUMENT CLASS SIR WRITTEN C. Murray 236 DATE March 4, 1966
SYSTEM NAME Chippewa Operating System APPROVED WDB DATE 3/17/66
ACCEPTED RA Zentler DATE 3-22
SYSTEM NO. E012 VERSION 1.1 MACH. 64/6600 CHANGE NO. _____ DATE _____

I. Product Identification

- A. Proposed product name; Chippewa Operating System Version 1.1
- B. Project Number:
- C. Product Number: E012

II. Products to be Developed:

A. Software:

An update of the Chippewa Operating System containing a number of individual improvements which can be implemented in a relatively short time without disturbing the overall system.

B. Customer Documentation:

System Bulletin.

C. Design Documents:

External Reference Specifications, Update to Internal Maintenance Specifications.

III. Design Requirements:

A. Justification:

These are features not provided in Version 1.0 of the Chippewa Operating System which are generally desired by the customers. Many of these may be provided at small cost, thus avoiding many different field modifications.

B. External Design Objectives:

At least the following features will be provided:

1. An operator request to save a job by dumping it onto disk, release all (or nearly all) of memory assigned to that job (but not release the control point or peripheral equipment assigned) and later on operator request, request memory, reload, and continue the job.
2. A comment control card.

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III. (continued)

3. A Density control card or provision for specifying density on the Program card which allows for density control of 3000 tape controllers.
4. Cause central processor error exits to give a DMP of the control point area.
5. Ability to change INPUT and OUTPUT file priority from the console.
6. Ability to increment INPUT file priority at a specified time interval (time interval is installation parameter).
7. A deadstart restart package which allows recovering output and input files which are in the system and restarting from the beginning jobs which were at the control points.
8. A procedure for periodically (on operator request) purging the dayfile (onto tape or printer) of all messages which do not belong to current jobs.
9. Add more file types. When 1DJ searches the FNT and finds an unassigned file of one of these types, it will call a PPU package (standard for PUNCH, user supplied for PLOT) to another PPU.

Other features that may be added as time and manpower permit include:

1. Provision for peripheral controllers connected to more than one channel.
2. Tape drivers which allow full use of 3000 features.
3. The ability to restart printing of a file (e.g. paper jams).
4. Numerous other one and two day jobs which are known to be needed.

C. Internal Design Objectives:

The improvements and extensions should not disturb the overall system.

D. Time Phasing:

None.

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CONTROL DATA CORPORATION • APPLICATIONS • SOFTWARE DOCUMENT PAGE NO. 3
DOCUMENT CLASS SIR WRITTEN C. Murray 236 DATE March 4, 1966
PROJ. MGR. DEPT. NO.
SYSTEM NAME Chippewa Operating System APPROVED _____ DATE _____
DEPT. MGR.
ACCEPTED _____ DATE _____
R & D PROJ. NO. APP. MGMT.
SYSTEM NO. E012 VERSION 1.1 MACH. 64/6600 CHANGE NO. _____ DATE _____

IV. Hardware Configuration

The same as Chippewa Operating System Version 1.0

V. Software Relationships and Interdependencies

All software dependent on Version 1.0 should not be disturbed
by Version 1.1.

VI. Standards

None

VII. Other Actions Required

None.

VIII. Recommended Responsibilities

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DOCUMENT CLASS ERS PAGE NO 1.1
PRODUCT NAME Chippewa Operating System
PRODUCT NO. E012 VERSION 1.1 MACHINE SERIES 64/6600

1. General Description

Version 1.1 of the Chippewa Operating System contains new features and improvements to old features in the areas of

3000 Series Drivers

Output Control Point

Roll-out, Roll-in

Priority Assignment

Dayfile Dump

Deadstart Restart

Dump

General Improvements

2. 3000 Series Drivers

The 3000 Series Drivers allow the use of features of standard 3000 series controllers which are not available with the 6000 series controllers.

These drivers also include improved error handling procedures and more easily handled operator intervention.

2.1 New features - all operations

2.1.1 Removal of system hang-ups due to equipment malfunctions.

See Section 2.4.

2.1.2 Provision for peripheral controllers to access from one to four channels.

DOCUMENT CLASS ERS PAGE NO 2
 PRODUCT NAME Chippewa Operating System
 PRODUCT NO. VERSION 1.1 MACHINE SERIES 64/6600

2.1.3 Improved message handling. All equipment messages are displayed at the fourth line of the control point. Third line of the control point display contains control cards and job messages and diagnostics as before.

2.1.4 The EST format for 3000 series peripheral equipment is:

CP	BB AA	DD CC	Ø HH	SEUU
----	-------	-------	------	------

where CP is the control point assignment (12 bits)
 AA, BB, CC, DD are channels connected (6 bits each)
 Ø is the on/off bit (1 bit)
 HH is the hardware type (11 bits)
 S is the 6681 number (3 bits)
 E is the 3000 equipment number (3 bits)
 UU is the unit number (6bits)

2.2 New Features - Card Operations

- 2.2.1 Console message to indicate that a card which has caused a compare error should be re-read. See 2.4.
- 2.2.2 Offsetting of a card (blank) at the beginning of the punching of a logical record.
- 2.2.3 Offsetting and repunching of a card on which a compare error has been detected.
- 2.2.4 Ability to punch (on one or more cards) any length line of packed display code. A buffer with more than 80 characters of output is punched on successive cards.
- 2.2.5 Ability to punch full 80 column binary cards by using the file name PAB for the card punch.
- 2.2.6 Trailing blank bytes are deleted when a Hollerith card is read instead of trailing blank characters.
- 2.2.7 In order to check card punch compare errors, the OUT pointer lags one card behind the punch.

DOCUMENT CLASS ERS PAGE NO 3
PRODUCT NAME Chippewa Operating System
PRODUCT NO. VERSION 1.1 MACHINE SERIES 64/6600

2.3 New Features - Tape Operations

- 2.3.1 Ability to search file mark forward and reverse. The tape is positioned to the other side of the closest end of file mark in the direction specified by the CIO call code.

CIO code - Forward 030₈
Reverse 130₈

- 2.3.2 Better control over write parity errors. Bad area of tape erased. See 2.4.

- 2.3.3 Termination with a file mark of all tapes written in BCD. Any operation requesting backward motion after a write operation causes a file mark to be written prior to the backward operation.

- 2.3.4 Provision for unloading at end of tape and continuing the operation on another tape.

When an end of tape signal is detected after writing a physical record the tape is rewound and unloaded.

The message MT XX END OF TAPE - FILE NAME is displayed for the operator. If another record is to be written, it will be written on unit xx when that unit again becomes ready.

Read and write operations are compatible so that the programmer need not be concerned with end of tape.

- 2.3.5 Optional density selection by means of the Request or Assign Cards.

REQUEST filename, XX.

ASSIGN unit number, filename, XX.

where XX = LO, HI, HY indicating the density of 200, 556 or 800 bpi. If no density is specified when units are assigned or requested (old control cards are valid) the density set by the operator is used.

DOCUMENT CLASS ERS PAGE NO. 4
PRODUCT NAME Chippewa Operating System
PRODUCT NO. _____ VERSION 1.1 MACHINE SERIES 64/6600

2.3.6 BCD read - Physical records are read until buffer is full or end of file sensed. End of file responds with end of record status. The next BCD read responds with end of file status and tape is not moved. This allows BCD tapes to be read at tape speed.

2.4 Error Procedures

2.4.1 Certain errors are processed by the drivers and require no operator intervention. These are:

2.4.1.1 Compare error during punch operation. When a compare error occurs the bad card and the card following it are offset. These two cards should be removed from the deck. The proper cards are punched following the offset cards. The message CP XX COMPARE ERROR is entered in the DAYFILE.

2.4.1.2 Recoverable write parity error on tape. The message MT XX WPE RECOVERED is entered in the DAYFILE.

2.4.1.3 If, during a backspace operation, load point is encountered unexpectedly, the block count in FST is reset to zero. This condition occurs when a tape has been manually repositioned.

2.4.2 Data transmission errors cause a message to be entered in the DAYFILE and a message for the operator which requires action on his part.

2.4.2.1 Compare error during card read. Message to the DAY-FILE: CR XX COMPARE ERROR. Message to the operator - CR XX RE-READ LAST 2 CARDS. The operator should reload the last two cards in the output tray of the reader and type X.GO. where X is the control point.

DOCUMENT CLASS ERS PAGE NO 5
PRODUCT NAME Chippewa Operating System
PRODUCT NO. VERSION 1.1 MACHINE SERIES 64/6600

2.4.2.2 Binary Card Error

Message to the DAYFILE - CR XX BINARY CARD ERROR.

Message to the Operator - CR XX RE-READ LAST 2 CARDS.

The operator should reload the last two cards in the output tray and type X.GO. where X is the control point.

2.4.2.3 Card jam during card read. Message to the operator:

CR XX REREAD LAST CARD.

The operator should reload the last card in the output tray and ready the reader. The reading will resume without further action.

2.4.2.4 Tape Read Parity Errors

Message to the DAYFILE and Operator - MT XX PARITY ERROR. Typing X.GO. (Where X is the control point) will cause the read data to be accepted as is and the read operation will proceed. (The block on tape was re-read 10 times before the message was displayed.)

2.4.2.5 Unrecoverable write parity errors. Message to DAYFILE and Operator - MT XX WPE UNRECOVERED. Typing X.GO. will allow the operation to proceed ignoring the error on the tape. (It is possible to change the tape at this point.) The following operations are performed to detect unrecoverable write parity errors.

- a. Backspace record
- b. Rewrite record
- c. If no parity error, exit
- d. Backspace record

DOCUMENT CLASS ERS PAGE NO. 6
PRODUCT NAME Chippewa Operating System
PRODUCT NO. _____ VERSION 1.1 MACHINE SERIES 64/6600

2.4.2.5 (continued)

- e. Rewrite record
- f. If no parity error, exit
- g. Backspace record
- h. Erase bad spot
- i. Write record
- j. Backspace 2 records
- k. Read 1 record
- l. If parity error on read, an unrecoverable write parity error is declared.
- m. Read 1 record
- n. If no parity error, exit
- o. If parity error, repeat steps a. through n.
once more. Second time through this step
causes an unrecoverable parity error to be declared.

2.4.3 Equipment malfunction errors may be responded to by dropping the job, changing the equipment code on the controller and/or unit or correcting the condition.

2.4.3.1 Equipment not ready

The message EQ XX NOT READY is displayed.

DOCUMENT CLASS ERS PAGE NO 7
PRODUCT NAME Chippewa Operating System
PRODUCT NO. _____ VERSION 1.1 MACHINE SERIES 64/6600

2.4.3.2 Equipment Cannot be Connected

The message EQ XX REJECT is displayed. This error may be caused by (a) Controller and/or unit numbers which do not agree with the EST entry (b) Equipment malfunction or (c) Transmission parity error. If a transmission parity error is indicated at the appropriate controller, the channel should be master cleared to clear the parity error indication by typing MCH XX (where XX is channel number). See section 9. After the channel is cleared the operation continues with a reissue of the rejected function.

2.4.3.3 No write enable on tape unit.

The message MT XX NO WRITE ENABLE is displayed.

The appropriate tape with the write ring in may be mounted and the operation will continue.

3. Output Control Point

The OUTPUT control point provides "offline" processing for print, punch and other (defined by user) output. Up to six files can be processed simultaneously at the one control point. Storage is assigned based on output devices defined in the Equipment Status Table and equipments are assigned as needed.

3.1 New Features

3.1.1 Operator control over print and punch.

- a) Reprint file.
- b) Stop print or punch operation.
- c) Suppression of program page control during printing.

3.1.2 Each punch job is identified by a readable punched card at the beginning of the job.

DOCUMENT CLASS ERS PAGE NO 8PRODUCT NAME Chippewa Operating SystemPRODUCT NO. _____ VERSION 1.1 MACHINE SERIES 64/6600

3.1.3 Additional File types are defined in FNT.

The format of the low order byte of FNT is:

I		E	F	C
G		X	T	P
1	4	1	3	3

CP control point

FT file type - new types 4=PUNCH, 5= FILM, 7=PLOT.

EX express control point indicator

IG output ignore bit. This bit is not currently being used in this system. It has been specified in anticipation of software to handle remotes.

3.2 Operator Notes

3.2.1 The control point display for OUTPUT is as follows:

2. OUTPUT , , , -2---67-

15100, 6100, 20. 21. 22. 23. 24.

1.PRINT 2.IDLE 3.PUNCH 4.PRINT 5.PRINT 6.PRINT

JOBNAME JOB0001 JOB0002 JOB0003 JOB0004

Each of the numbers on the third line refer to BUFFER POINTS.

These buffer points are assigned as they are needed. The number of output devices in the equipment status table determines the number of buffer points set up.

Because the assignment is dynamic, each is labeled with the operation in process.

3.2.2 Control Entries

The following entries are used for controlling the operations:

X = CONTROL POINT NUMBER

Y = BUFFER POINT NUMBER

DOCUMENT CLASS ERS PAGE NO 9
PRODUCT NAME Chippewa Operating System
PRODUCT NO. _____ VERSION 1.1 MACHINE SERIES 64/6600

3.2.2 (continued)

- a) X.ENDY. Terminate operation at Y.
 - b) X.REPEATY. Repeat current operation at Y when complete.
 - c) X.SUPPRESSY. Suppress page control of printer at Y.
- If y = 7 for a and b above, all buffer points will be affected. If Y = 7 for c above all buffer points concerned with printers will be affected.
- An operation is restarted after an equipment malfunction by typing:

X.REPEATY.

X.ENDY.

3.2.3 Punch card Operations

At the beginning of the punch out of each job a card is punched with a visual image of the job name for ease of identification.

3.2.4 Printer Operation

The print file may cause the printer to stop and a message to appear at the fourth line of the control point. The message appears in the form X. LPnn message, where X is the buffer point number and nn is the printer number. After the action specified by the message is taken, the print operation may be resumed by typing X.GO.

3.3 Programmer Notes

For repeat listings or changing of printer forms, the special pseudo format characters PM will cause the printer to stop

DOCUMENT CLASS ERS PAGE NO 10
PRODUCT NAME Chippewa Operating System
PRODUCT NO. VERSION 1.1 MACHINE SERIES 64/6600

3.3 (continued)

and the transmission of up to 30 characters following the format characters to the console message area for operator action.

FORTRAN statements to do this would be as follows:

PRINT 10

10 FORMAT (21HPMREPEAT THIS LISTING)

PRINT 11

11 FORMAT (29HPMCHANGE FORMS TO CORP. 345-A)

4. Roll-Out, Roll-In

This feature permits the operator to request that a job at a specified control point be "rolled out" such that all of the memory assigned to the job except its control point area is released. Neither the control point nor the equipment assigned to the job is released. Later, the operator can request that the rolled-out job be restored and its execution resumed.

This action is caused by operator messages

X.ROLLOUT.

X.ROLLIN.

where X is the control point number.

5. Priority Assignment

The operator can change the priority of any file or control point from the console.

5.1 To change the priority of INPUT/OUTPUT files listed in the H-display the operator types the following:

ENPR,xx,f,y.

DOCUMENT CLASS ERS PAGE NO 11
 PRODUCT NAME Chippewa Operating System
 PRODUCT NO. VERSION 1.1 MACHINE SERIES 64/6600

5.1 (continued)

where xx is the new priority, and f is the name of the file to be changed. y is I, O, P, indicating input, output, punch file priority is to be changed. If y is not specified only input file priorities may be changed.

The file name may be any file in the system (FNT).

5.2 The priority of a job at a control point may be changed without using DIS. In this case, the operator types the following:

x.ENPR,yy.

where x is the control point number, and

yy is the new priority.

5.3 The time limit of a job at a control point may be changed without using DIS. In this case, the operator types the following:

x.ENTL,yyyy.

where x is the control point number, and yyyy is the new time limit in octal number of seconds. The time limit in the control point area is reset.

6. DAYFILE DUMP

This feature permits the operator to request that the DAYFILE be dumped and the disk space released thus shortening search time through the DAYFILE. The operator initiates this action by freeing a control point and typing X.DAYFILE.

where X is the control point number. The operator will then be requested to assign an equipment on which to dump the DAYFILE. Acceptable equipments are tape, printer, punch. The DAYFILE will be copied to the equipment in coded format, the disk space will be released and the pointers reset to the beginning of the new DAYFILE. If the dump is to tape, an end of file mark is written on the tape after the dump and the tape is left positioned after the file mark. Jobs currently in the system will not receive a printout of any messages put in the DAYFILE prior to the dumping action.

DOCUMENT CLASS ERS PAGE NO. 12
PRODUCT NAME Chippewa Operating System
PRODUCT NO. _____ VERSION 1.1 MACHINE SERIES 64/6600

6. (continued)

This loss of messages may be avoided by allowing the system to idle down before initiating the dump.

7. Deadstart Restart

The Deadstart Restart package provides for restarting the system after the occurrence of non-catastrophic hang-ups.

All files except those of type local are rewound and preserved and all jobs at control points are restarted from their beginnings. The operator procedure is:

- a) A normal deadstart which loads the system in from tape.
- b) When the scope comes up the message RECOVER. is keyed in instead of AUTO.

8. Dump

The DMP. option is changed to dump the control point area in addition to the exchange area.

9. General Improvements

9.1 The system uses all available disks. The number of disks available to the system is specified in EST by disks being turned on. Disks which are turned OFF are not used by the system. Thus, if a user requires the use of an entire disk it should remain OFF. Note that this usage of the ON/OFF flag is different between disk and other equipments. OFF for disk restricts the system from using it. In a multiple disk configuration, the system assigns disks in a cyclic fashion to successive files. This scheme greatly reduces the amount of CPU idle time waiting for disk positioning since all disks may be used simultaneously.

DOCUMENT CLASS ERS PAGE NO 13
 PRODUCT NAME Chippewa Operating System
 PRODUCT NO. _____ VERSION 1.1 MACHINE SERIES 64/6600

9.1 (continued)

Although the system will use all disks, which are turned ON, control cards assigning extra disks such as ASSIGN DB, FILE. may still be used. However, the capacity of DB is no longer the full disk because the system may have used parts of it.

9.2 The storage move program in CPRES located in CMR, locations 2000₈ - 2077₈, is improved to reduce the number of hardware conflicts. The new program averages .92 micro-seconds/word versus 1.4 micro-seconds/word used by the old version. This change provides faster CPU throughput since at least two storage moves are required for every job.

9.3 All PP routines are loaded with PLL. PLL (Peripheral Library Loader) is the general overlay call subroutine in PP resident (PPR) which loads a routine from either RPL or PLD. However, 7DP must stay in RPL in order to handle disk parity errors if they occur without referencing the disk. Therefore, the length of RPL may be reduced to include only 7DP. It should be noted that the pointers at CM locations 000001-000002 must be adjusted when decreasing the size of RPL.

9.4 If a job contains a JOB card error or too many control cards, a diagnostic is entered in the DAYFILE and reading proceeds to the next job. These errors are diagnosed during the reading of cards; therefore, the only programmer output will be the DAYFILE.

9.5 The operator may perform a master clear on a channel.

MCHxx.

where xx is the channel.

DOCUMENT CLASS ERS PAGE NO 14
PRODUCT NAME Chippewa Operating System
PRODUCT NO. VERSION 1.1 MACHINE SERIES 64/6600

- 9.6 The operator statement TIME only resets the current time.

TIME.hh.mm.ss.

where hh.mm.ss are the hours, minutes, seconds for 24 hour clock.

Only eight characters may be entered.

The operator may set the date by typing up to 10 characters;

DATE.cccccccccc.

where mm/dd/yy is the usual format for giving month, day, and year.

The date is displayed immediately following the time at the top of the left screen.

The operator cannot change the remaining characters of the date line; these are installation parameters for identifying the system.

The complete line is printed as the last line after the DAYFILE on all print output.

- 9.7 Three messages or diagnostics can appear above the line of keyboard input.

FORMAT ERROR - the keyboard type-in contains a formatting error.

ILLEGAL ENTRY - the keyboard input is totally unrecognizable to the system.

WAIT MTR FCN XX - the system is in step mode (or MTR is busy) and DSD is waiting for MTR when processing the keyboard input. XX is the number of the monitor function.

- 9.8 Punch and common files, in addition to input and output files are displayed by the H-display in DSD.