

RELOAD DATA BLOCK CONSTANT
INSTALLATION GUIDELINES

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1.0 INTRODUCTION AND OVERVIEW

1.1 Introduction

The Reload Data Block (RDB) is a group of constants [

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A preliminary list of RDB constants is presented in Appendix A to illustrate the types and number of constants expected in the RDB.

A specialized System Loader will be used to load both the CPC/CEAC System Load disk and the Reload Data Block Constants disks.

This document provides guidelines for generating the RDB disk for a given change in RDB constants. It is expected that RDB constants will be changed infrequently, [

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1.2 References

- 1.2.1 Software Change Procedure for CPC/CEAC Protection Algorithms,
CEN-39(A)-P, Rev. 3.
- 1.2.2 Quality Assurance of Design Manual for C-E Nuclear Power Systems.
- 1.2.3 CPC Functional Design Requirements CEN-305-P.
- 1.2.4 CEAC Functional Design Requirements CEN-304-P.
- 1.2.5 Software Modifications Document, to be issued August, 1986.

1.3 Software Overview

- 1.3.1 The RDB constants disk will be generated by the Reload Data Block Interactive Utility Program. This program contains an RDB Disk Generation Routine and a Disk Comparison Routine. The latter will be used for verification of changes in RDB constants.

The Disk Generation Routine is designed to generate an RDB disk via a series of questions and answers at the TTY console. The program includes range checking to reduce the chances of mis-entry.

Upon user request, the program can print a list of changes and/or a complete list of the RDB constant values cross-referenced with the old values. The complete list will include identification of all constants that have changed, facilitating quality assurance of the final disk.

- 1.3.2 The RDB Interactive Utility Program will be quality assured to the requirements of Reference 1.2.2.

2.0 RELOAD DATA BLOCK DISK GENERATION

2.1 Purpose: To create a floppy disk containing Reload Data Block constants.

2.2 Prerequisites:

System Configuration: CPC SINGLE CHANNEL
TELETYPE TERMINAL
FLOPPY DISK DRIVE

Software: RDB Interactive Utility Program Disk

Other Items: Previous RDB constants disk with
associated checksum and sequence numbers.

Blank Disk

List of New Constant Values

2.3 Procedure:

- 1) Load the RDB Interactive Utility Program. Refer to Figure 1 for a Pre System 80 plant or to Figure 2 for a System 80 plant.
- 2)
 - a) Program will print 'ENTER OPERATOR NAME AND DATE'
 - b) Respond with operators name followed by a RETURN and then the date in MM/DD/YY format followed by RETURN.
 - c) Program will then print 'LOAD THE RDB GENERATION OR COMPARISON PROGRAM? G/C'
 - d) Respond with 'G', the program will print 'RELOAD DATA BLOCK GENERATION ROUTINE'

- 3) Program will then print 'INSERT CURRENT RELOAD DATA BLOCK DISK, HIT RETURN WHEN READY'. Insert the current RDB disk in drive 0 and hit RETURN. The program will then load the RDB constants into memory.
- 4) Respond to the 'ENTER CHECKSUM' prompt with the checksum printed on the TTY output when the current RDB disk was generated.
 - a) The checksum entered will be compared to the checksum of the constants in memory, ensuring the correct sequencing of the RDB disk updates. If a mismatch does not occur, continue with step 5.
 - b) If a mismatch occurs, 'CHECKSUM ERROR -- RELOAD OR RE-ENTER L/E' will be printed. Enter 'L' to load again or 'E' to re-enter the checksum. Return to step 3 if 'L' was chosen or repeat step 4 if 'E' was chosen.
- 5) Respond to the 'ENTER DISK SEQUENCE NUMBER' with the sequence number printed on the TTY output when the current RDB disk was generated.
 - a) The sequence number entered will be compared to the sequence number on disk. If a mismatch does not occur, continue with step 6.
 - b) If a mismatch occurs, 'DISK SEQUENCE NUMBER ERROR -- RELOAD OR RE-ENTER L/E' will be printed. Enter 'L' to load again or 'E' to re-enter disk sequence number. Return to step 3 if 'L' is chosen or repeat step 5 if 'E' is chosen.
- 6) 'ENTER CONST/DONE' will be printed. If 'DONE' is selected, go to step 11. Otherwise, continue to step 7.

- 7) Enter the label of the constant to be changed as it appears in reference 1.2.5. (See notes #1 and #3 at end of this section.) If the entered label is not found, 'CONSTANT LABEL ERROR' will be displayed and the program returns to step 6.
- 8) When a match occurs the label and its current value will be printed after which 'CHANGE? Y/N' will be printed.
- 9) Respond 'N' if the value is not to be changed, respond 'Y' if the value is to be changed. If 'N' is selected, return to step 6. If 'Y' is selected, go to step 10a.
- 10)
 - a) Program prints 'ENTER NEW VALUE'. Enter the new value. (See note #2 at the end of this section.)
 - b) If an error is made in typing the new value, enter '#' to abort the current value. Then, reenter the value.
 - c) If the value is not within the pre-defined range for the constant being changed, 'RANGE ERROR' will be printed, and the program returns to step 8. If the value does not meet the requirements of note #2, 'INPUT FORMAT ERROR' will be printed and the program returns to step 8.
 - d) If the value is within the pre-defined ranges and of the correct format, the value will be updated and the program returns to step 8.
- 11) If 'DONE' is selected in step 6, 'PRINT CHANGES? Y/N' will be printed. If 'Y' is chosen, the label, old value and new value of the constants which have changed will be printed. If 'N' is chosen they will not be printed.

- 12) 'MORE CHANGES? Y/N' will be printed. If 'Y' is selected, execution returns to step 6. Otherwise execution continues with step 13.
- 13) 'INSERT NEW RELOAD DATA BLOCK CONSTANTS DISK' will be printed. Place the new RDB disk in the floppy disk drive and hit RETURN. The RDB constants, plant identification number, CPC/CEAC software revision number, new disk sequence number, and checksum will be written to the floppy disk.
- 14) After the new RDB disk has been generated, 'WRITE PROTECT NEW RDB DISK' will be printed. Remove the new RDB disk from drive 0 and write protect it, then replace it in the drive and hit RETURN.
- 15) After the new RDB disk has been write protected, 'DISK SEQUENCE NUMBER = XXXX' and 'CHECKSUM = NNNN' will be printed on the TTY. Record both values as they will be used to uniquely identify this disk and will be used in future RDB changes (steps 4 and 5 above).
- 16) Next, 'COMPARE?Y/N' will be printed. If 'N' is selected, the calculator will halt. If 'Y' is selected the Reload Data Block Comparison Routine will be executed starting at step 2 of Section 3.3.

Note #1: Array values are entered in standard FORTRAN notation. Example: The tenth constant of a fifty item array would be entered as 'CONST(10)'.

Note #2: All values are input at the TTY as real numbers either in decimal format or in FORTRAN format. Examples: The floating point number 100.25 can be entered as '100.25', '100.25E+0', '0.10025E+3', etc.

The integer number 56 can be entered as '56', '56.', '56.0', '560E-1', '0.56E+2' etc. If an integer is incorrectly entered with a fractional value, 'INPUT FORMAT ERROR' will be printed.

Note #3: Appendix A contains a preliminary list of RDB constants. The list is provided for reference purposes only. Reference 1.2.5 will contain the final list of constants. After approval of Reference 1.2.5, the list will be incorporated in revised versions of References 1.2.3 and 1.2.4.

3.0 RELOAD DATA BLOCK COMPARISON PROCEDURE

3.1 Purpose: To compare new Reload Data Block constants with previous values as an aid in verifying those constants that have changed.

3.2 Prerequisites:

System Configuration: CPC SINGLE CHANNEL
TELETYPE TERMINAL
FLOPPY DISK DRIVE

Software: RDB Interactive Utility Program Disk

Other Items: Current RDB constants disk with associated checksum and sequence numbers.

Previous RDB constants disk with associated checksum and sequence numbers.

3.3 Procedure:

- 1) (This step is not needed if the response was 'Y' in step 2.3.16). Load the Reload Data Block Interactive Utility Program. Refer to figure 1 for a pre System 80 plant and to figure 2 for a System 80 plant.
 - a) Program will print 'ENTER OPERATOR NAME AND DATE'
 - b) Respond with operators name followed by a RETURN and then the date in MM/DD/YY format followed by RETURN.
 - c) Program will then print 'LOAD THE RDB GENERATOR OR COMPARISON PROGRAM? G/C'.
 - d) Respond with 'C'.

- 2) The program will respond with: 'RELOAD DATA BLOCK COMPARISON ROUTINE'
- 3) 'INSERT NEW RDB CONSTANTS DISK. HIT RETURN WHEN READY.' will be printed. Insert the new RDB constants disk in drive 0 and hit RETURN. The program will then load the new RDB constants.
- 4) Respond to the 'ENTER CHECKSUM' prompt with the checksum printed on the TTY output when the new RDB disk was generated.
 - a) The checksum entered will be compared to the checksum of the constants read from the disk, ensuring that the correct RDB disk was selected. If a mismatch does not occur, continue with step 5.
 - b) If a mismatch occurs, 'CHECKSUM ERROR -- RELOAD OR RE-ENTER L/E' will be printed. Enter 'L' to load again or 'E' to re-enter the checksum. Return to step 3 if 'L' was chosen or repeat step 4 if 'E' was chosen.
- 5) Respond to the 'ENTER DISK SEQUENCE NUMBER' with the sequence number printed on the TTY output when the new RDB disk was generated.
 - a) The sequence number entered will be compared to the sequence number on the disk. If a mismatch does not occur, continue with step 6.
 - b) If a mismatch occurs, DISK SEQUENCE NUMBER ERROR -- RELOAD OR RE-ENTER L/E' will be printed. Enter 'L' to load again or 'E' to re-enter disk sequence number. Return to step 3 if 'L' is chosen or repeat step 5 if 'E' is chosen.

- 6) When the checksum and disk sequence number of the new generation RDB constants have been verified the program will print 'INSERT PREVIOUS RDB CONSTANTS DISK. HIT RETURN WHEN READY.'
- 7) Insert previous RDB constants disk in drive 0 and hit RETURN. The program will then load the previous RDB Constants.
- 8) Respond to the 'ENTER CHECKSUM' prompt with the checksum printed on the TTY output when the previous RDB disk was generated.
 - a) The checksum entered will be compared to the checksum of the constants read from the disk, ensuring that the correct RDB disk was selected. If a mismatch does not occur, continue with step 9.
 - b) If a mismatch occurs, 'CHECKSUM ERROR -- RELOAD OR RE-ENTER L/E' will be printed. Enter 'L' to load again or 'E' to re-enter the checksum. Return to step 7 if 'L' was chosen or repeat step 8 if 'E' was chosen.
- 9) Respond to the 'ENTER DISK SEQUENCE NUMBER' with the sequence number printed on the TTY output when the previous RDB disk was generated.
 - a) The sequence number entered will be compared to the sequence number on the disk. If a mismatch does not occur, continue with step 10.
 - b) If a mismatch occurs, DISK SEQUENCE NUMBER ERROR -- RELOAD OR RE-ENTER L/E' will be printed. Enter 'L' to load again or 'E' to re-enter disk sequence number. Return to step 7 if 'L' is chosen or repeat step 9 if 'E' is chosen.

- 10) Next, the program will print out a comparison list of all constants in the following format:

```
      USERS NAME
      DATE

OLD CHECKSUM                NEW CHECKSUM
OLD DISK SEQUENCE #        NEW DISK SEQUENCE #
SOFTWARE REVISION #        SOFTWARE REVISION #

CONSTANT 1      OLD VALUE    NEW VALUE
CONSTANT 2      OLD VALUE    NEW VALUE **
```

etc.

Where '**' means a value has been changed between the two revisions.

- 11) The program will then halt.

FIGURE 1

Reload Data Block
Interactive Utility Program
Load Procedure For Pre-System 80 Plants

- 1) Set the drive select switches on the AED 2500 so drive A is drive 0, drive B is drive 1, and drive C is drive 2 (drives B&C are not used. The select switches are set to avoid hardware confusion).

- 2) Place the Reload Data Block Interactive Utility Program Disk in drive 0, with a write protect tab on.
 - a) Set the INIT and WP on the disk drive switches up
 - b) Lift the IPL switch
 - c) Put the CPC Coldstart Loader tape in the teletype reader. Ensure the teletype is connected to the proper CPU (CPC or CEAC) and turn on (switch to 'on-line').
 - d) Unprotect memory with the key switch on the Operator's Module.
 - e) Set up the following memory locations, using the hex panel on the calculator:

<u>Location</u>	<u>Content</u>
30	0000
32	0000
34	0000
36	0050
50	D500
52	00CF
54	4300
56	0080
78	0294

FIGURE 1
(continued)

- f) Check the entries in step e.
- g) Set the address at 30, Press INI button.
- h) Start the processor at location 30 by pressing RUN button.
- i) Start the punched tape reader.
- j) Respond to the 'TEST TRACK' prompt wit 55.

FIGURE 2

Reload Data Block Interactive
Utility Program Load Procedure
For System 80 Plants

- 1) Place the Reload Data Block Interactive Utility Program Disk in the disk drive, write protected.
 - a) Set the auto-load unit switch in the middle position.
 - b) On the hex panel press the INI button.

APPENDIX A

PRELIMINARY RDB CONSTANTS

This appendix provides a preliminary list of the CPC/CEAC data base constants that are expected to be included in the Reload Data Block (RDB). As noted in the list, some of the constants are single values while others are arrays of values. The list includes 240 data base constants which, counting individual array members, totals 556 individual values. The final list of RDB constants may differ in small ways from this list. However, the number of constants and/or the number of values are not expected to change substantially.

The final list of constants will be defined in the Software Modification document for the Reload Data Block (Reference 1.2.5) and will be incorporated in revisions to the CPC and/or CEAC Functional Design Requirements documents (References 1.2.3 and 1.2.4) as appropriate.

APPENDIX A PRELIMINARY RDB CONSTANTS

MODULE: TRIPSEQ

<u>VARIABLE NAME</u>	<u>VARIABLE DESCRIPTION</u>
[]

TOTAL RDB CONSTANTS IN TRIPSEQ

2 VARIABLES
2 VALUES

MODULE: FLOW

<u>VARIABLE NAME</u>	<u>VARIABLE DESCRIPTION</u>
[]

TOTAL RDB CONSTANTS IN FLOW

6 VARIABLES OR ARRAYS
14 VALUES

APPENDIX A PRELIMINARY RDB CONSTANTS

MODULE: UPDATE

VARIABLE NAME

VARIABLE DESCRIPTION

<u>VARIABLE NAME</u>	<u>VARIABLE DESCRIPTION</u>
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APPENDIX A PRELIMINARY RDB CONSTANTS

MODULE: UPDATE

VARIABLE NAME

VARIABLE DESCRIPTION

<u>VARIABLE NAME</u>	<u>VARIABLE DESCRIPTION</u>
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TOTAL RDB CONSTANTS IN UPDATE

100 VARIABLES AND ARRAYS
108 VALUES

APPENDIX A PRELIMINARY RDB CONSTANTS

MODULE: POWER

VARIABLE NAME

VARIABLE DESCRIPTION

<u>VARIABLE NAME</u>	<u>VARIABLE DESCRIPTION</u>
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APPENDIX A PRELIMINARY RDB CONSTANTS

MODULE: POWER

VARIABLE NAME

VARIABLE DESCRIPTION

<u>VARIABLE NAME</u>	<u>VARIABLE DESCRIPTION</u>
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TOTAL RDB CONSTANTS IN POWER

51 VARIABLES OR ARRAYS
152 VALUES

APPENDIX A PRELIMINARY RDB CONSTANTS

MODULE: STATIC

VARIABLE NAME

VARIABLE DESCRIPTION

<u>VARIABLE NAME</u>	<u>VARIABLE DESCRIPTION</u>
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APPENDIX A PRELIMINARY RDB CONSTANTS

MODULE: STATIC

VARIABLE NAME

VARIABLE DESCRIPTION

<u>VARIABLE NAME</u>	<u>VARIABLE DESCRIPTION</u>
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TOTAL RDB CONSTANTS IN STATIC

67 VARIABLES OR ARRAYS
86 VALUES

APPENDIX A PRELIMINARY RDB CONSTANTS

MODULE: CEAC

VARIABLE NAME

VARIABLE DESCRIPTION

<u>VARIABLE NAME</u>	<u>VARIABLE DESCRIPTION</u>
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TOTAL RDB CONSTANTS IN CEAC

22 VARIABLES OR ARRAYS
202 VALUES

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